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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Project name: Jianli Kaidi Biomass Power Project
Version: 01
Date: 27/08/2008

A.2. Description of the project activity:

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Jianli Kaidi Biomass Power Project (hereafter referred to as the proposed project) is a biomass utilization project developed by Jianli Kaidi Green Energy Development Co., Ltd.(hereafter referred to as the Project Owner) is located in Chengdong Industry Area, Jianli County, Hubei Province, P.R. China.

The proposed project will process about 181,700tonnes of biomass residue annually, of which rice husk is the main biomass fuel. 2 sets of 65t/h Circulating Fluidized Bed (CFB) boiler and 2 sets of 12MW steam turbines generator units will be installed. Therefore, the total installed capacity of the Project is 24MW. The annual operation time is estimated to be 6000 hours with a net electricity of 126,720MWh and a net heat generation of 541,602GJ per year. It is estimated that the proposed project will generate GHG emission reductions 173,936 tCO_2e per year.

The electricity generated will be transmitted through a 110kV transformer at the site to Yusha 110kV substation and then supplied to Hubei power grid, which is a sub-grid of the Central China Power Grid (CCPG). The proposed project will therefore replace the capacity of power plants on the CCPG, which is predominantly made up of coal fired power plants. The heat generated will be supplied to the plants in Chengdong Industrial Area to meet the process heat demand and replace the small coal-fired boilers.

Additionally, the proposed project will accomplish an extra benefit of greenhouse gas (GHG) mitigation derived from a reduction of methane emissions by utilizing rice husk from the local area which would be dumped or left decay under mainly aerobic conditions and burned uncontrolled outside in the fields.

The baseline scenario of the proposed project is the generation of power in the grid, generation of heat in coal-fired boilers and the biomass residues are dumped or left to decay under mainly aerobic conditions. The latter applies to, for example, dumping and decay of biomass residues on fields or burnt in an uncontrolled manner without utilizing it for energy purposes.

The proposed project will not only supply renewable electricity to grid generating emission reductions, but it will also contribute to sustainable development of the local community and the host country by means of:

- Supply of clean renewable energy to CCPG with improvements to the local energy structure;
- Promoting the comprehensive utilization of resources and mitigating emissions caused by decay or uncontrolled fire of the biomass residues;
- Increasing local incomes and providing 93 job opportunities;
- Decreasing the GHG emission from the fossil-fuel fired power plants as well as the emission of SO_x, NO_x and dust.

A.3. Project participants:

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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)**
Peoples' Republic of China (host)	Jianli Kaidi Green Energy Development Co., Ltd	No
Netherlands	Camco International	No

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See Annex 1 for details

A.4. Technical description of the project activity:

A.4.1. Location of the project activity:

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A.4.1.1. Host Party(ies):

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People's Republic of China

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

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Hubei Province

A.4.1.3. City/Town/Community etc:

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Jianli County

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 proposed project activity is located in the Chengdong Industrial Area, Jianli County, Hubei Province.

The center of plant has geographical coordinates of 112°54´18″ east longitude 29°49´30″north latitude. The figureA-1 shows the location of the proposed project.

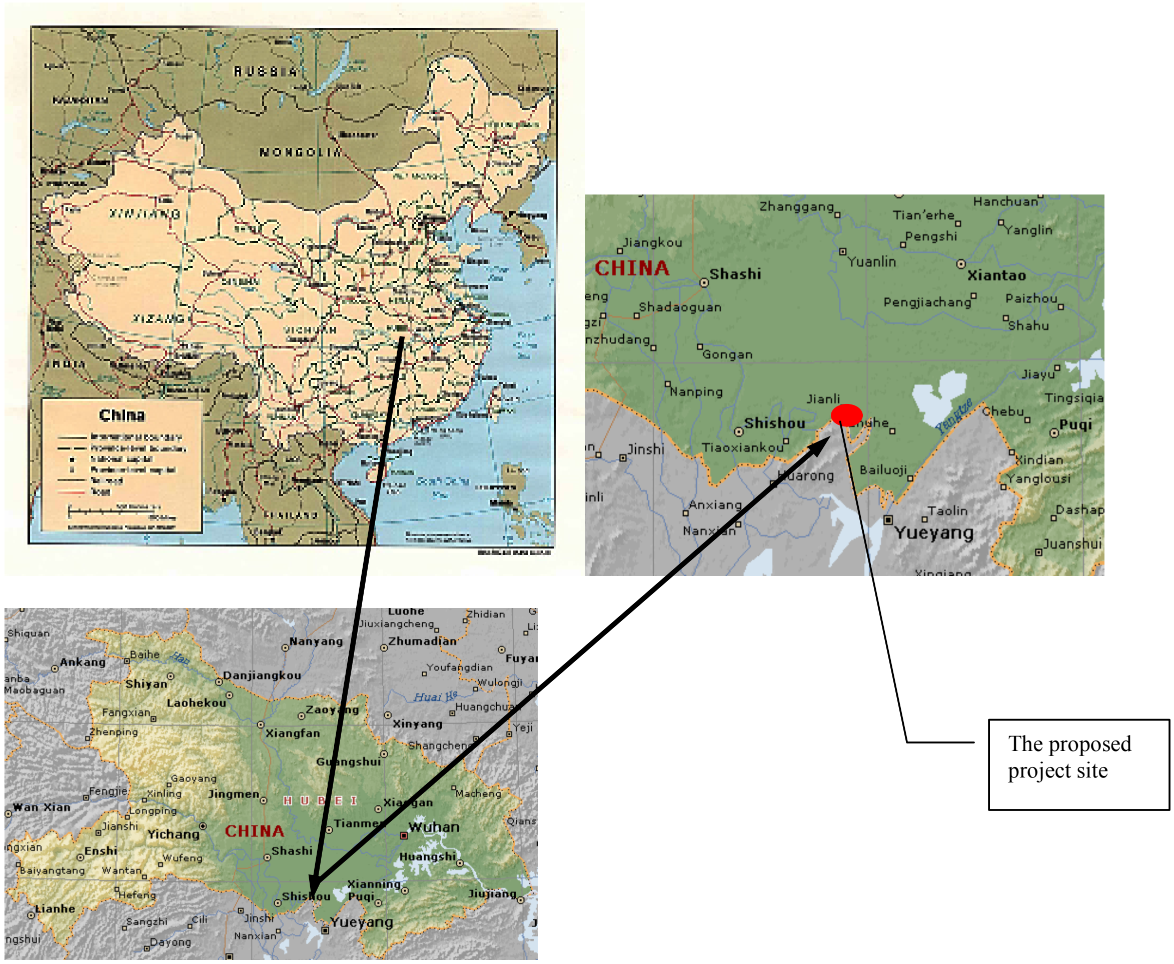

Figure A-1. The location of Jianli Kaidi Biomass Power Project

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

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The proposed project falls into:
Sectoral Scope 1: energy industries (renewable - / non-renewable sources)
Project Activity: Grid-connected renewable power generation;

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

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Scenario prior to the start of the implementation of the project activity:

The equivalent electricity is supplied from the CCPG, which is dominated by coal-fired power plants. The process heat demand in the Chengdong Industry Area is or would be met by small coal-fired boilers.. The small coal-fired boilers would be used in the local area is traditional boilers, with low efficiency and high pollution to the surroundings. The lifetime is about 20 years and if they are operating well, the lifetime may last for about 25years.

The biomass residues which are to be utilized in the proposed power plant are currently dumped or left decay under mainly aerobic conditions and burned uncontrolled outside in the fields.

Baseline Scenario:
The baseline scenario is the scenario prior to the start of the implementation of the project activity as above. In the absence of the proposed project, the scenario will continue.

Project Activity Scenario:
The technology employed by the proposed project is advanced domestic technology. The proposed project will install two sets of 65t/h circulating fluid bed (CFB) boilers with medium temperature and medium pressure. At the same time, two 12MW steam turbines and two suited generators (C12-4.90/0.981-12/435℃) will be applied in the proposed project .The steam turbine employed is medium temperature and medium pressure condensing steam turbine. The total installed capacity of the proposed project is 24MW.

The key technical specifications of boiler, turbine and generator are listed in the table below.

TableA-1 Key Equipments Parameters:

STEAM TURBINE and GENERATOR	
Manufacturer	NanJing Steam Turbine(Group) Co., Ltd
Model	C12-4.90/0.981-12/435℃
Type	Medium temperature and medium pressure condensing steam turbine
Rated power	12MW
Rated voltage	6.3KV
Efficiency factor	0.85
Rated rotating speed	3000r/min
Rated frequency	50Hz
Lifetime	30years
Quantity	2
BOILER	
Manufacturer	Jiangxi Jianglian Energy and Environmental Protection Co., Ltd
Model	KG65-450/5.29-FSWZ-Ⅰ
Type	Medium temperature and High pressure Circulating Fluidized Bed
Rated steam pressure	5.29MPa
Rated steam temporary	450℃
Efficiency	≥86 %
Lifetime	30years
Quantity	2

The biomass residues utilized in this proposed project will be mainly rice husk, but some straws will also be used. The straws include rice straw, cotton straw and oil seed rape straw. The rice husk will be packed

and stored temporarily at the rice mills. Some collection stations will be set up near to the resources for the straw to be processed and stored temporarily. From here the straws will be transported to the plant according to the dispatch schedule. The proposed radius for biomass collection is 50km2 around the site of the power plant.

After the biomass residues are transported to the storehouse in the plant, they will be weighed by the weighbridge and then fed into fuel entering system to the boiler, and then sent to the boiler for combustion. All the steam entered into the turbine is used for power generation and some is extracted for heat supply. The heat generated by the proposed project will be supply to the local industry users in the industrial park.

The boiler smoke will be treated by a high efficiency hop-pocket dust catcher and then carried to the ash storeroom. It is estimated that the annual ash generated from the power plant will be very limited. The ash is expected to be picked up by the local farmers and used as fertilizer.

All of the turbine and generator system will be supplied by Chinese domestic suppliers as well as the other auxiliary equipments installed in the power plant.

A flow diagram showing the power plant operation is provided as below. The monitoring equipments and their location are presented in section B.7.2. Figure B-4

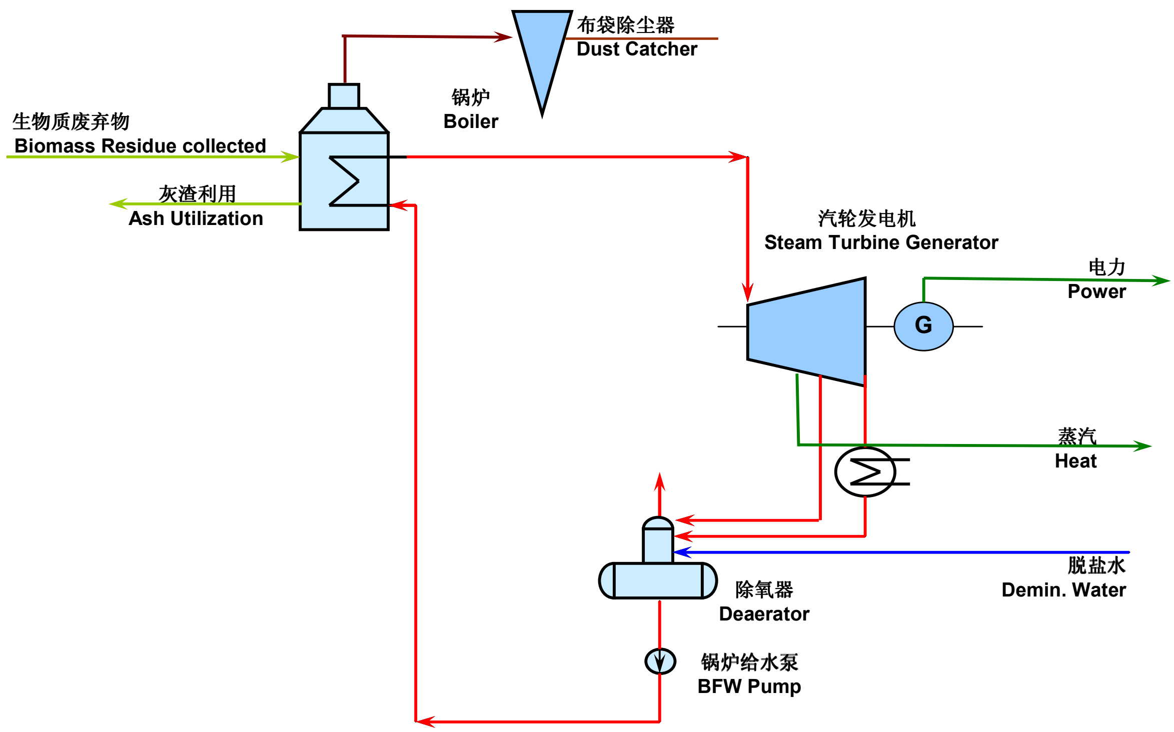

Figure A-2 Diagram of the plant

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

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A crediting period of 7 (seven) years (renewable twice) is selected for the project activity. During the first crediting period, 1st July 2009 to 30th June 2016, the proposed project is expected to lead to emission reductions of 173,936 tCO_2e per year. The estimated amount of emission reductions over the chosen crediting period is indicated below. .[1].

Years	Annual estimation of emission reductions in tones of CO_2 e
01/07/2009-30/06/2010	148,318
01/07/2010-30/06/2011	173,936
01/07/2011-30/06/2012	173,936
01/07/2012-30/06/2013	173,936
01/07/2013-30/06/2014	173,936
01/07/2014-30/06/2015	173,936
01/07/2015-30/06/2016	173,936
Total estimated reductions (tones of CO_2 e)	1,191,933
Total number of crediting years in 1st crediting period	7
Annual average over the crediting period of estimated reductions (tones of CO_2e)	170,276

A.4.5. Public funding of the project activity:

>>
There is no public funding for this project.

[1] The proposed project will not supply heat in2009.

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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1. ACM0006 (Version 06.2) – "*Consolidated methodology electricity generation from biomass residues*"
2. *"Combined tool to identify the baseline scenario and demonstrate additionality"*. (Version 02.1)
3. "*Tool for the demonstration and assessment of additionality"*(Version 05)
4. ACM0002 (Version 07) – "*Consolidated baseline methodology for grid-connected electricity generation from renewable sources*"
5. "*Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion*" (Version 01)
6. *"Tool to calculate baseline, project and/or leakage emissions from electricity consumption"* (Version 01)

For more information regarding the methodology, please refer to the link:

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

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

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The approved methodology ACM0006 is applied here to determine the baseline of the proposed project. The project activity is a newly installed biomass power plant in the Central China Power Grid (CCPG). The proposed project activity includes the installation of a new power generation plant at a site where currently no power generation occurs. Therefore, it is a "Greenfield" power project.

The proposed project meets all applicability conditions of methodology ACM0006 which are listed as follows:

- *No other biomass types than biomass residues, as defined in the methodology, are used in the project plant and these biomass residues are the predominant fuel used in the project plant (some fossil fuels may be co-fired);*
  Rice husk in Jianli County will be the predominant fuel in the proposed project. Cotton straw, rice straw and oil seed rape straw will also be used. Currently these biomass sources are dumped or left to decay under mainly aerobic conditions or burned in an uncontrolled way outside in the fields. A small amount of diesel will be used to help start-up of the boilers.

- *For projects that use biomass residues from a production process, the implementation of the project shall not result in an increase of the processing capacity of raw input or in other substantial changes in this process;*
  The biomass residues used by the proposed project are byproducts of agriculture crops, not from a production process.

- *The biomass residues used by the project facility should not be stored for more than one year;*
  The straws are directly bought from the farmers at the temporary storage stations at which the straws should not be stored for more than one year. The rice husks are directly bought from the rice mills and transported to the plant to use.

- *No significant energy quantities, except from transportation or mechanical treatment of the biomass residues, are required to prepare the biomass residues for fuel combustion, i.e. projects that process the biomass residues prior to combustion (e.g. esterification of waste oils).*
  There will be a small amount of energy consumption during the preparation of the biomass residues. This preparation includes mechanical treatment only, such as cutting and sheaving. There will also be fossil fuel consumption during transportation of the biomass residues. Except for these, the proposed project will not have significant consumption of fossil fuels.

Therefore, ACM0006 is applicable to the proposed project.

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

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Emission sources:

For the proposed project, the following emission sources shall be included:

- CO_2 emissions from on-site fossil fuel and electricity consumption that is attributable to the project activity. This includes fossil fuel co-fired in the project plant, fossil fuel used for on-site transportation of shredders or other equipment, as well as many other sources that are attributable to the project activity;
- CO_2 emissions from the electricity consumption in the biomass residues pretreatment
- CO_2 emissions from off-site transportation of biomass residues that are combusted in the project activity
- CH_4 emissions due to Combustion of biomass residues for electricity and heat generation in the project activity

According to the approved methodology ACM0006, the emission sources and GHGs in the project boundary are listed in the following table.

Table B-1 GHGs source included or excluded from the project boundary

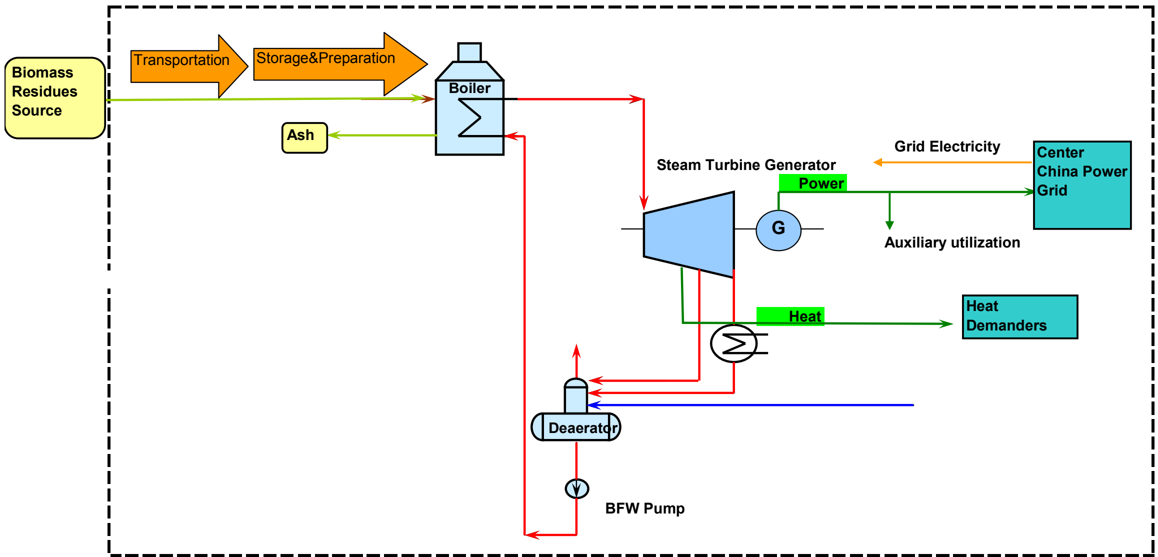
	Source	**Gas**	**Included or not**	**Justification / Explanation**
Baseline	Electricity generation	CO_2	Yes	Main emission source
		CH_4	No	Excluded for simplification. This is conservative.
		N_2O	No	Excluded for simplification. This is conservative.
	Heat generation	CO_2	Yes	Main emission source
		CH_4	No	Excluded for simplification. This is conservative.
		N_2O	No	Excluded for simplification. This is conservative.
	Uncontrolled burning or decay of surplus biomass	CO_2	No	It is assumed that CO_2 emissions from surplus biomass residues do not lead to changes of carbon pools in the LULUCF sector.
		CH_4	Yes	Main emission source
		N_2O	No	Excluded for simplification. This is conservative.
Project Activity	On-site fossil fuel and electricity consumption	CO_2	Yes	May be an important emission source by the project activity
		CH_4	No	Excluded for simplification. This emission source is assumed to be very small.

	due to the project activity	N_2O	No	Excluded for simplification. This emission source is assumed to be very small.
	Off-site transportation of biomass residues	CO_2	Yes	May be an important emission source by the project activity
		CH_4	No	Excluded for simplification. This emission source is assumed to be very small.
		N_2O	No	Excluded for simplification. This emission source is assumed to be very small.
	Combustion of biomass residues for electricity and / or heat generation	CO_2	No	It is assumed that CO2 emission from surplus biomass residues do not lead to changes of carbon pools in the LULUCF sector.
		CH_4	Yes	Since the CH_4 emissions of biomass residue are included in baseline, according to the methodology, this emission is included in project scenario.
		N_2O	No	Excluded for simplification. This emission source is assumed to be very small.
	Storage of biomass residues	CO_2	No	It is assumed that CO_2 emissions from surplus biomass residues do not lead to changes of carbon pools in the LULUCF sector.
		CH_4	No	Excluded for simplification. Since biomass is stored for not longer than one year, this emission source is assumed to be small.
		N_2O	No	For simplification. This emission source is assumed to be very small.
	Waste water from the treatment of biomass residues	CO_2	No	It is assumed that CO2 emission from surplus biomass residues do not lead to changes of carbon pools in the LULUCF sector.
		CH_4	No	No anaerobic treatment is involved in the proposed project.
		N_2O	No	Excluded for simplification. This emission source is assumed to be very small.

Spatial Extent of the Project Boundary:

The spatial extent of the project boundary encompasses

- The power plant at the project site;
- Heat users whose heat demand will be supplied by the proposed project
- Transportation of biomass residues to the project site;
- All power plants connected physically to the Central China Power Grid (CCPG). The CCPG includes Henan Province, Hubei Province, Hunan Province, Jiangxi Province, Sichuan Province and Chongqing.
- The sites where the biomass residues would have been left for decay or dumped.



FigureB-1 Project Boundary

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

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According to the latest methodology ACM0006, "Combined Tool to identify the baseline scenario and demonstrate additionality"(Version02.1) should be used to identify the most plausible baseline scenario and demonstrate additionality.

This tool applies the following four steps:
STEP 1 Identification of alternative scenarios
STEP 2 Barrier analysis
STEP 3 Investment analysis (If applicable)
STEP 4 Common practice analysis

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:

Sub-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;
- How the heat would be generated in the absence of the project activity.

For **power generation**, the realistic and credible alternatives may include, inter alia:
P1 The Project not undertaken as a CDM project activity.

P2 The continuation of power generation in an existing biomass residue fired power plant at the project site, in the same configuration, without retrofitting and fired with the same type of biomass residues as (co-)fired in the Project.
P3 The generation of power in an existing captive power plant, using only fossil fuels.
P4 The generation of power in the grid.
P5 The installation of a **new** biomass residue fired power plant, fired with the same type and with the same annual amount of biomass residues as the Project, but with a lower efficiency of electricity generation (e.g. an efficiency that is common practice in the relevant industry sector) than the Project plant and therefore with a lower power output than in the Project case.
P6 The installation of a **new** biomass residue fired power plant that is fired with the same type but with a higher annual amount of biomass residues as the Project and that has a lower efficiency of electricity generation (e.g. an efficiency that is common practice in the relevant industry sector) than the Project. Therefore, the power output is the same as in the Project.
P7 The **retrofitting** of an existing biomass residue fired power, fired with the same type and with the same annual amount of biomass residues as the Project, but with a lower efficiency of electricity generation (e.g. an efficiency that is common practice in the relevant industry sector) than the Project plant and therefore with a lower power output than in the Project case.
P8 The **retrofitting** of an existing biomass residue fired power that is fired with the same type but with a higher annual amount of biomass residues as the Project and that has a lower efficiency of electricity generation (e.g. an efficiency that is common practice in the relevant industry sector) than the Project.
P9 The installation of a **new** fossil fuel fired captive power plant at the project site.

P2, P7 and P8 are excluded because the proposed project is a Greenfield project; therefore no continuation or retrofitting is plausible. P3 can also be excluded since there is no existing captive power plant, using fossil fuels near the project site.

P5 and P6 are excluded for a number of reasons. Firstly, biomass power plants are not common practice in the local area. Secondly, the installation of a new biomass residue fired power plant that is fired with the same type but with a lower efficiency of electricity generation is not feasible. A lower efficiency technology results in a less financially attractive project than the proposed project not undertaken as a CDM project activity. Also a low efficiency power plant is not encouraged by Chinese government[2].

Scenarios P2, P5, P6, P7 and P8 are therefore eliminated and scenarios **P1, P4 and P9** need further discussion.

For **heat generation**, the realistic and credible alternatives may include, inter alia:
H1 The Project not undertaken as a CDM project activity.
H2 The Project (installation of a cogeneration power plant), fired with the same type of biomass residues but with a different efficiency of heat generation (e.g. an efficiency that is common practice in the relevant industry sector).
H3 The generation of heat in an existing captive cogeneration plant, using only fossil fuels.
H4 The generation of heat in boilers using the same type of biomass residues.
H5 The continuation of heat generation in an existing biomass residue fired cogeneration plant at the project site, in the same configuration, without retrofitting and fired with the same type of biomass residues as in the Project.
H6 The generation of heat in boilers using fossil fuels.

[2]Energy development 11th five year plan, Page 17, NDRC, April, 2007

H7 The use of heat from external sources, such as district heat.
H8 Other heat generation technologies (e.g. heat pumps or solar energy).

H2 is excluded for a number of reasons. Firstly, because at present the technology of biomass cogeneration in China is just started, even if the biomass power plants with lower heat supply efficiency are not common practice in China. Secondly, the installation of a new biomass residue fired power plant that is fired with the same type but with a lower efficiency of heat generation is not feasible. A lower efficiency technology results in a less financially attractive project than the proposed project not undertaken as a CDM project activity. Also a low efficiency power plant is not encouraged by Chinese government.

H3 and H5 are excluded because there is no fossil fuel fired cogeneration plant or any other cogeneration plant at or around the project site,

H4 is excluded as there is no heat boiler using biomass residues in the local area and using small coal-fired boiler is common practice in the local area for heating.

H7 is excluded since there is no district heat supply in the local area, heat sources from external sources such as district heating do not exist.

H8 is excluded due to lack of other heat generation resources such as heat pumps or solar energy in and around the project site, The Hubei province where the proposed project located has no identified commercial geothermal resource that could be utilized for heat pump to supply heat. The local region lacks sufficient solar resources, hence, solar energy to heat is not feasible heat supply alternative in the region.

Therefore, scenarios **H1 and H6** need further discussion.

For **the use of biomass residues**, the realistic and credible alternatives may include, inter alia:
B1 The biomass residues are dumped or left to decay under mainly aerobic conditions. This applies, for example, to dumping and decay of biomass residues on fields.
B2 The biomass residues are dumped or left to decay under clearly anaerobic conditions. This applies, for example, to deep landfills with more 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 heat and/or electricity generation at the Project site
B5 The biomass residues are used for power generation, including cogeneration, in other existing or new grid-connected power plants
B6 The biomass residues are used for heat generation in other existing or new boilers at other sites.
B7 The biomass residues are used for other energy purposes, such as the generation of biofuels
B8 The biomass residues are used for non-energy purposes, e.g. as fertilizer or as feedstock in processes (e.g. in the pulp and paper industry)

The biomass residues which are to be utilized in the proposed power plant are currently dumped or left to decay under mainly aerobic conditions and burned in an uncontrolled way outside in the fields. For straws, local farmers have to get rid of a huge amount of straw in order to keep the land free for the next season's planting. For the rice husks the rice mills have limited room for the rice husk and they have to burn it or dumped it to leave room for the rice.

B2 is excluded, since there is no deep landfill with more than 5 meters around the site of the proposed project, Moreover, a landfill would result in a large investment and ongoing operation costs and this is therefore unlikely to occur given the current situation of decay and burning.

B5 and B6 can be excluded because using biomass to generate electricity or heat is not common practice in this region. Moreover, near the project site, there are no existing (grid connected) power plants or boilers which can use biomass residues to generate energy.

B7 is excluded, because the biomass residues used in the proposed project cannot be used to produce biofuels.

According to the FSR and biomass availability report, the rice husks consumed by the proposed project are about 87,900tons, accounting for 33% of practical and economical available rice husk (270,000 tons within 50 kilometers) of the biomass dumped or left to decay or burned in an uncontrolled manner; The straws consumed by the proposed project are about 93,800 tons, accounting for 37% of the practical and economical available straws (250,000 tons within 50 kilometers) that would be dumped or left to decay or burned in an uncontrolled manner in the absence of the proposed project activity.

Alternative B8 is excluded because the proposed project will not change the use of biomass as fertilizer. Currently, there is no company using biomass residues for non-energy purpose such as fertilizer or as feedstock in processes around the project site.

Therefore, scenarios **B1, B3 and B4** need further discussion.

Outcome of Step 1a:
As described above, the plausible alternative scenarios for the proposed project are **P1, P4** and **P9** for power generation, **H1 and H6** for heat generation and **B1**, **B3 and B4** for the biomass residues.

Sub-step 1b. Consistency with mandatory applicable laws and regulations:
In this sub step, alternative which is not compliance with laws and regulations will be eliminated:

Scenario P9 is not consistent with mandatory applicable laws and regulations. In 2006, the average annual utilization hours of Chinese fuel-fired power equipments are 5612 hours[3]. Considering the same annual electricity generation, the alternative baseline scenario for the proposed project should be a fuel-fired power plant with installed capacity of 26 MW. Furthermore, given that the proposed project is a grid-connected project, the alternative baseline scenario must be a grid-connected fuel-fired power project.

According to Chinese power regulations, fuel-fired power plants of less than 135MW[4] are prohibited to construct in the areas covered by large grids. The alternative of building a fossil fuel-fired power plant with installed capacity of 26MW conflicts with Chinese regulations. Therefore, P9 is excluded.

Outcome of Step 1b:

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[3] China Electric Power Yearbook 2007

[4] Notice on Strictly Prohibiting the Illegal Installation of coal-fired Generators with the Capacity of 135MW or below issued by the General Office of the State Council, Guo Ban Fa Ming Dian decree No. 2002-6.

The plausible alternative scenarios are compliance with laws and regulations: P1, P4, H1, H6, and B1, B3. In conclusion, the credible baseline scenarios are as follows:

Combined Scenarios	Baseline alternatives			Descriptions
	Electricty generation	Heat generation	Uses of biomass residues	
a	P1	H1	B4	The Project not undertaken as a CDM project activity
b	P4	H6	B1, B3	Exporting electricity from the grid; generating heat from fossil fuel fired boilers; and dumping biomass residues to naturally decay. This is Scenario 2 in ACM0006

STEP 2. Barrier analysis

This step serves to identify barriers and to assess which alternatives are prevented by these barriers. Apply the following sub-steps:

Sub-step 2a. Identify barriers that would prevent the implementation of alternative scenarios:
The barriers that would prevent the implementation of alternative scenarios are not identified yet.

Outcome of Step 2a:
The barriers that would prevent the implementation of alternative scenarios are not identified yet.

Sub-step 2b. Eliminate alternative scenario which are prevented by the identified barriers:
Neither of the two combined scenarios is eliminated by the alternative scenario

Outcome of Step 2b:
Neither of the two combined scenarios is eliminated by the alternative scenario. The two combined scenarios need to be further discussed in Step 3.

STEP 3. Investment analysis

According to the ACM0006 (Version 06.2), project participants shall identify the most plausible baseline scenario and demonstrate additionality using the latest approved version of the “Combined tool to identify the baseline scenario and demonstrate additionality”.
However, Version 02.1 of the aforementioned tool establishes in footnote Nº2 (on the first page) that for project activities in which one or more alternatives are not available options to project participants (such as grid-connected power projects), a different procedure to demonstrate additionality and identify the baseline scenario must be followed. For example, methodologies that involve alternatives that is not under the control of project participants can continue to use, if desired, the additionality tool (provides benchmark and other tools that utilize information about the markets in wich such projects might compete), and provide their own methods to develop and/or assess baseline scenario.

According to the above and considering that the ACM0006 (Version 06.2) in this case applies to a project activity in which not all the alternatives are available options to the project participants, this PDD will use the "step 2 Investment analysis" in the last version of the additionality tool to determine whether the proposed project activity is less economically or financially attractive than the alternatives without the revenue from CER. The investment analysis is conducted in the following steps:

Sub-step 3a. Determine appropriate analysis method

Three options can be applied for the investment analysis: the simple cost analysis, the investment comparison analysis and the benchmark analysis.

The simple cost analysis is not applicable for the proposed project because the project activity will produce economic benefit (from electricity sale) other than the CDM related income. The investment comparison analysis is also not applicable for the proposed project because one of the baseline alternatives, as identified in step 1, providing the same electricity output by the Center China Power Grid, is not a new investment project. To conclude, the benchmark analysis will be used to identify whether the financial indicators of the proposed project is better than relevant benchmark value.

Sub-step 3b. Apply benchmark analysis.
The financial benchmark rate of return (after tax) of Chinese Power Industries is 8% for the IRR of total investment.[3]

Sub-step 3c. Calculation and comparison of financial indicators.
1) Parameters needed for calculation of IRR
According to the Feasibility Study Report of the proposed project, parameters needed for calculation of IRR are as follows:

Table B-2 Parameters for calculation of IRR

Parameter	Value	Unit	Source
Installed capacity	24	MW	FSR
Project Lifetime	20	years	FSR
Net Power Generation output	126,720	MWh	FSR
Net Heat Generation output	541, 600	GJ	FSR
Static total investment	264,770,000	RMB	FSR
Tariff(excl. VAT) in first 15 years	540.17	Yuan/WMh	FSR
Tariff(excl. VAT) after the 15 years	326.50	Yuan/WMh	FSR
Annual O&M cost(including the fuel cost)	58,910,000	RMB	FSR
Heat price	29.85	Yuan/GJ	FSR
Biomass Purchase Price	241	Yuan/t	FSR
Income tax	25%		FSR
VAT	17%		FSR
Other Tax	10%		FSR
Depreciation period	15	years	FSR
Residual Rate	4%		FSR
Expected CERs price	8	EUR	FSR

[3] State Power Corporation of China. Interim Rules on Economic Assessment of Electrical Engineering Retrofit Projects. Beijing: China Electric Power Press, 2003

2) Comparison of the project IRR and the financial benchmark

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

Table 3 shows the project IRR with and without the income from CERs sale. Without the sales of CERs, the project IRR is 2.81% which is lower than the financial benchmark. Thus the proposed project is not financially acceptable. Taking into account the CDM revenues, the project IRR is 8.73% and higher than the financial benchmark. Therefore, the CDM revenues enable the project to overcome the investment barrier.

Table B-3 Comparison of IRR with and without the income from CERs sale

Item	Without CDM	Benchmark	With CDM
IRR	2.81%	8%	8.73%

Sub-step 2d. Sensitivity analysis

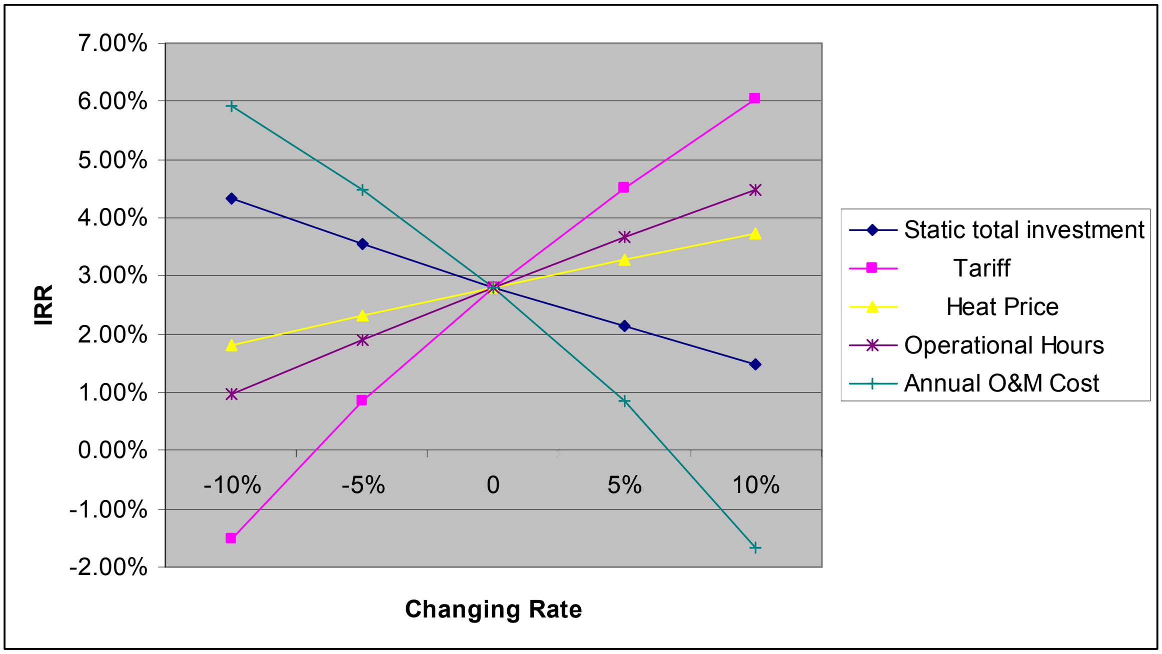
For the proposed project, three parameters were selected as sensitive factors to check out the financial attractiveness:

1) Static total investment
2) Tariff
3) Heat Price
4) Operational Hours
5) Annual O&M Cost

Assuming the above three factors vary in the range of -10% to 10%, the project IRR (without the income from CERs sales) varies to different extents as shown in Table B-3 and Figure B-1 below.

TableB-4 Sensitivity analysis of the proposed project

	-10%	-5%	0	5%	10%
Static total investment	4. 33%	3. 55%	2. 81%	2. 13%	1. 48%
Tariff	−1. 52%	0. 86%	2. 81%	4. 52%	6. 03%
Heat Price	1.80%	2.32%	2.81%	3.29%	3.74%
Operational Hours	0.96%	1.91%	2.81%	3.67%	4.49%
Annual O&M Cost	5. 91%	4. 47%	2. 81%	0. 84%	−1. 66%



FigureB-2 Sensitivity analysis of the proposed project

When the Total Investment, the Static total investment, Expected Tariff, Heat Price, Operational Hours and Annual O&M cost are changing within the range of -10% to 10%, , the IRR of the proposed project is always lower than the investment benchmark, and lacking of financial attractiveness.

Outcome of Step 3:
Based on the Investment Analysis above, the proposed project is not financially attractive without consideration of CERs sales revenues. Combined Scenario a "the proposed project not undertaken without being registered as a CDM project activity "is not feasible thus is eliminated.

So, the baseline scenario combination of the proposed project is Combine Scenario b (which belongs to Scenario 2 in the methodology.

Scenario	Power generation	Heat generation	Use of biomass residues
2	P4	H6	B1 or B3

STEP 4. Common practice analysis

According to the "Combined tool to identify the baseline scenario and demonstrate additionality", Hubei Province is selected as the relevant geographical boundary of the project activity.

The proposed project is the first biomass residue power project in the Hubei Province and there are no similar project in the area.

It can be concluded that the proposed project is not common practice in the Hubei Province..

In conclusion, the proposed project activity passed all criteria of the "combined tool to identify the baseline scenario and demonstrate additionality". The baseline scenario 2 in the methodology is the realistic and credible baseline scenario and the proposed project is additional.

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):

>>

ACM0006 requires that the "Combined tool to identify the baseline scenario and demonstrate additionality" is used. Therefore, please refer to the section above where the additionality has been determined.

The CDM consideration and decision making process is presented as follows:

The project owner wanted to invest and develop some biomass projects for a long time but due to the high cost, low profit of biomass power plants in China, the project owner found it is not feasible to invest in biomass project at that time. Then the project owner learned that some biomass projects were applying for CDM. The project owner began to learn about CDM and consider seeking help from CDM financing. The project owner asked the institute to write FSR for the project. The financial result in the FSR shows that with CER revenue, the IRR of the project is above benchmark, while the IRR is below benchmark without CER revenue. Therefore, the project owner determined to develop the biomass project as CDM project.

TableB-5 Milestones and Schedule in Project Implementation

July 2007	EIA was finished
July 2007	EIA was approved by EPC
September 2007	FSR was finished, which showed that with CER revenue, the project is not feasible and pointed out clearly to implement the project as CDM project can make the project financially attractive.
September 2007	The management board's decision was made and issued to undertake the proposed project as CDM project.
November 2007	Project was approved by DRC
November 2007	CADA signed with CAMCO
March 2008	Construction started
August 2008	Contract signed with DOE
March 2009	Estimated Commission date of the project

Based on the analysis in B.4 and the above description, the Project is additional.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

EMISSION REDUCTION

The Project reduces CO_2 emissions through substitution of power and heat 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 ($ER_{electricity,y}$), the emission reductions through substitution of heat generation with fossil fuels ($ER_{heat,y}$), project emissions (PE_y), emissions due to leakage (L_y) and, where this emission source is included in the project boundary and relevant, baseline emissions due to the natural decay or burning of anthropogenic sources of biomass residues($BE_{biomass,y}$), as equation (1):

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

Where,

ER_y = Emissions reductions of the Project during the year y (tCO_2/yr)

$ER_{heat,y}$ = Emission reductions due to displacement of heat during the year y (tCO_2/yr)

$ER_{electricity,y}$ = Emission reductions due to displacement of electricity during the year y (tCO_2/yr)

$BE_{biomass,y}$ =Baseline emissions due to natural decay or burning of anthropogenic source of biomass residues during the year y(tCO_2/yr)

PE_y = Project emissions during the year y (tCO_2/yr)

L_y = Leakage emissions during the year y (tCO_2/yr)

Lifetime aspects

According to ACM0006, for the scenario 2, only heat generation facilities in baseline should be considered the lifetime aspects. Based on the information from the survey of the boiler from the Industry plant area management bureau, the normal lifetime of the small coal-fired boilers utilized in the local area is around 20 years.

The baseline, project, and leakage emissions are calculated respectively as following:

A. PROJECT EMISION

According the Table in B.3, the project emissions include:

- CO_2 emissions from transportation of biomass residues to the project site (PET_y),
- CO_2 emissions from on-site consumption of fossil fuels due to the project ($PEFF_y$),
- CO_2 emissions from consumption of electricity ($PE_{EC,y}$)
- Where this emission source is included in the project boundary and relevant: CH_4 emissions from the combustion of biomass residues($PE_{biomass,CH4,y}$)

Project emissions are calculated as follows:

$$\mathbf{PE}_y = \mathbf{PET}_y + \mathbf{PEFF}_y + PE_{\mathbf{EC},y} + GWP_{CH4} \times PE_{Biomass,CH4,y} \quad (2)$$

Where,

PET_y = CO_2 emissions during the year y due to transport of the biomass residues to the project (tCO_2/yr)

$PEFF_y$ = CO_2 emissions during the year y due to fossil fuel consumption at the project site that is attributable to the project (tCO_2/yr)

$PE_{EC,y}$ = CO_2 emissions during the year y due to electricity consumption at the project site that is attributable to the project (tCO_2/yr)

GWP_{CH4}=Global Warming Potential for methane valid for the relevant commitment period

$PE_{biomass,CH4,y}$= CH_4 emissions from the combustion of biomass residues during the year y(tCH_4/yr)

a) Carbon dioxide emissions from combustion of fossil fuels for transportation of biomass residues to the project plant (PET_y)

Because the biomass residues will be transported to the power plant around the project site by trucks, CO_2 emissions from vehicles should be determined. According to the methodology ACM0006, it could be calculated by the following formula based on the distance and vehicle type (option 1):

$$PET_y = \frac{\sum_k BF_{T,k,y}}{TL_y} \cdot AVD_y \cdot EF_{km,CO2,y} \quad (3)$$

Where,

PET_y = CO_2 emissions during year y due to transport of the biomass residues to the project plant (tCO_2/yr)

$BF_{T,k,y}$ = Quantity of biomass residue type k that has been transported to the Project site during the year y (tons of dry matter or liter)

TL_y = Average truck load of the trucks used (tons or liter) during the year y.

AVD_y = Average round trip distance (from and to) between the biomass residue fuel supply sites and the site of the Project plant during the year y (km)

$EF_{km,CO2,y}$ = Average CO_2 emission factor for the trucks measured during the year y (tCO_2/km)

k = Types of biomass residues used in the project plant and that have been transported to the project plant in year y

b) Carbon dioxide emissions from on-site consumption of fossil fuels ($PEFF_y$)

According to the Feasibility Study, the fossil fuels (diesel oil) are only used for boiler start-up, the emissions from combusting fossil fuels are calculated as "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion" as following:

$$PEFF_y = PE_{FC,j,y} = \sum_i (FF_{projectplant,i,y} + FF_{projectsite,i,y}) \cdot COEF_{i,y} \quad (4)$$

Where,

$PE_{FC,j,y}$ = CO_2 emissions from fossil fuel combustion in process j during the year y (tCO_2 / yr);

$FF_{projectplant,i,y}$= Quantity of fossil fuel type *i* combusted in the biomass residue fired power plant during the year *y* (mass or volume unit per year)

$FF_{projectsite,i,y}$=Quantity of fossil fuel type *i* combusted at the project site for other purposes that are attributable to the project activity during the year *y* (mass or volume unit per year)

$COEF_{i,y}$ = CO_2 emission coefficient of fuel type i in year y (tCO_2 / mass or volume unit);

i = fuel types combusted in process j during the year y.

The "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion" provides two procedures to determine $COEF_{i,y}$. The Option A requires carbon content and density of the diesel oil used in the project, however the data is not available. Therefore the Option B is adopted as follows:

$$\mathrm{COEF}_{i,y} = NCV_{i,y} \times EF_{CO2,i,y} \quad (5)$$

Where,

$NCV_{i,y}$ = weighted average net calorific value of the fuel type i in year y (GJ/mass or volume unit);

$EF_{CO2,i,y}$ = weighted average CO_2 emission factor of fuel type i in year y (tCO_2/GJ);

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

CO_2 emissions from on-site electricity consumption ($PE_{EC,y}$) should be calculated using the latest approved version of the "Tool to calculate baseline, project and/or leakage emissions from electricity consumption". Little electricity will be consumed during the biomass residues pretreatment. The emissions due to auxiliary electricity consumption are calculated as Scenario A in Generic approach of the "Tool to calculate baseline, project and/or leakage emissions from electricity consumption" as follows:

$$PE_{EC,y} = \sum_j EC_{PJ,j,y} \cdot EF_{EL,j,y} \cdot (1 + TDL_{j,y}) \quad (6)$$

Where,

$PE_{EC,y}$ = project emissions from electricity consumption in year y (tCO_2 / yr);

$EC_{PJ,j,y}$ = quantity of electricity consumed by the Project electricity consumption source j in year y (MWh);

$EF_{EL,j,y}$ = emission factor for electricity generation for source j in year y. (tCO_2/MWh)

$TDL_{j,y}$ = average technical transmission and distribution losses for providing electricity to source j in year y.

j = source of electricity consumption in the Project.

In this case, refer to the description of project boundary, the only source of j is the East China Power Grid.

According to the "Tool to calculate baseline, project and/or leakage emissions from electricity consumption"(Version 01), the proposed project belongs to Scenario A: Electricity consumption from the grid, so, we choose Option A1: Calculate the combined margin emission factor of the applicable electricity system, using the procedures in the latest approved version of the "Tool to calculate the emission factor for an electricity system" ($EF_{EL,j/k/l,y} = EF_{grid,CM,y}$).

d) Methane emission from Biomass residues combustion

Consistent with IPCC Guidelines, CO_2 emissions from biomass combustion at the project site is equal to the release of the CO_2 absorbed on a sustainable basis by plants that is replanted every year. The same treatment is not extended to methane emissions. When biomass is combusted in a well-controlled manner at the project, methane emissions are small in quantity but still not zero.

$$PE_{Biomass,CH4,y} = EF_{CH4,BF} \cdot \sum_k BF_{k,y} \cdot NCV_k$$

where:
$PE_{biomass,CH4,y}$: Project emissions from biomass controlled burning (tCH_4/yr)
$BF_{k,y}$: Quantity of biomass residue type k combusted in the project plant during the year y (ton)
NCV_k : Net calorific value of the biomass residue type k (GJ/ton)
$EF_{CH4,BF}$; CH_4 emission factor for the combustion of biomass residues in the project plant (tCH_4/GJ)

According to the chosen baseline methodology, the project proponent will monitor the consumption and Net Calorific Values of each type of biomass consumed in the power plant. However, given that the amounts of each type of biomass remain constant in time (homogeneous biomass mix); this PDD will consider to apply the biomass mix and the corresponding weighted average Net Calorific Value for emission reduction calculations.

B. EMISSION REDUCTIONS DUE TO DISPLACEMENT OF ELECTRICITY

According to the methodology ACM0006, emission reductions due to the displacement of electricity are calculated by multiplying the net quantity of increased electricity generated with biomass residues as a result of the project activity (EG_y) with the CO_2 baseline emission factor for the electricity displaced due to the project ($EF_{electricity,y}$), as follows:

$$ER_{electricity,y} = EG_y \cdot EF_{electricity,y} \qquad (7)$$

Where,

$ER_{electricity,y}$ = Emission reductions due to displacement of electricity during the year y (tCO_2/yr)

EG_y = Net quantity of increased electricity generation as a result of the Project (incremental to baseline generation) during the year y (MWh)

$EF_{electricity,y}$ = CO_2 emission factor for the electricity displaced due to the Project during the year y (tCO_2/MWh)

In this case, all the electricity displaced is from the East China Power Grid.

STEP 1: Determination of $EF_{electricity,y}$

The Project has been identified as the scenario 2 of ACM0006, i.e. the baseline of the power generation is P4 – "The generation of power in the grid", the emission factor for the displacement of electricity should correspond to the grid emission factor ($EF_{electricity,y} = EF_{grid,y}$). On the other hand, the installed capacity of the Project is more than 15MW, the $EF_{grid,y}$ shall be determined as a combined margin (CM), following the guidance in the section Baselines" in the "Consolidated baseline methodology for grid-connected electricity generation from renewable sources" (ACM0002). Refer to the relevant chapter of ACM0002, the combined margin (CM) should be calculated as the "Tool to calculate the emission factor for an electricity system" (hereafter referred to as the Emission Factor Tool).

Sub-step 1: Identify the relevant electric power system

This is identified in B.3. as the Central China Power Grid. For the purpose of determining the operating margin emission factor, the methodology provides following four options to determine the CO2 emission factor for net electricity import from the Central China power Grid:

(a) 0 tCO2/MWh, or

(b) The weighted average operating margin (OM) emission rate of the exporting grid; or

(c) The simple operating margin emission rate of the exporting grid; or

(d) The simple adjusted operating margin emission rate of the exporting grid.

For this project activity, we choose option (b) to calculate the OM emission rate of the East China Power Grid.

Sub-step 2: Select an operating margin (OM) method

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

a) Simple OM

b) Simple adjusted OM

c) Dispatch data analysis OM

d) Average OM

Option b needs the annual load duration curve of the gird. The data required by this method is not publicly available in China. This option is not applicable.

Option c requires the detailed operating and dispatch data of power plants within the grid, but the dispatch data for the East China Power Network is not publicly available. This option is not applicable.

Option d can be only used when low-cost/ must run resources account for more than 50% of the total amount of grid power generation. As shown in table A1 of annex 3, the CCPG is a coal-fired dominated power grid, where the installed capacity of low cost and must run plants account for 35.95%, 43.81%, 37.89%, 38.60% and 35.12% in 2002, 2003, 2004, 2005 and 2006 respectively. The fractions are all below 50%, so this option is not applicable.

Option a is used when low-cost/ must run resources account for less than 50% of the total amount of grid power generation. ACM0002 defines low cost/must run resources as "Low operating cost and must run resources typically include hydro, geothermal, wind, low-cost biomass, nuclear and solar generation. If coal is obviously used as must-run, it should also be included in this list, i.e. excluded from the set of plants." Compared with other generation sources (Hydro, Wind) connected with the CCPG, there is no indication that coal fired plants should be included as "must run." This was confirmed through the guidelines issued by Chinese DNA on determining baseline emission factor of Chinese grids (available at http://cdm.ccchina.gov.cn/web/NewsInfo.asp?NewsId=1235). In these guidelines the emission factor of Chinese regional grids, including the CCPG, was calculated by Chinese experts. In their calculation, the experts did not consider coal as a must run source.

Therefore the Simple OM is selected for the project and the operating margin $EF_{grid,OM,y}$ is approximated by the generation mix of CCPG, excluing its low cost / must run resources (in this case hydro and wind). Emissions of CO_2 for the generation mix of the CCPG can be directly calculated from the data provided in the China Energy Statistical Yearbook (published annually). This yearbook provides annual data on power generation by fuel source and by province, as well as calorific values of fuels.

The simple OM is calculated ex-ante using 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.

Sub-step 3: Calculate the operating margin emission factor according to selected method

According to the "Tool to calculate the emission factor for an electricity system", the Simple OM emission factor is calculated as the generation-weighted average CO_2 emissions per unit net electricity generation (tCO_2/MWh) of all generating power plants serving the system, not including low-operating cost and must-run power plants/units. It may be calculated:

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

According to the Tool, option A should be preferred and must be used if fuel consumption data is available for each power plant/unit. In other cases, option B or option C can be used. For the purpose of calculating the simple OM, Option C should only be used if the necessary data for option A and option B is not available and can only be used if only nuclear and renewable power generation are considered as low-cost/ must-run power sources and if the quantity of electricity supplied to the grid by these sources is known.

Data on fuel consumption, power generation and average efficiency of individual power stations is not publicly available in China. Therefore, in the proposed project activity, Option C is used and the following formula is used:

$$EF_{Grid,OM,simple,y} = \frac{\sum_i FC_{i,y} \cdot NCV_{i,y} \cdot EF_{CO2,i,y}}{\sum_j EG_y} \qquad (8)$$

Where:

$FC_{i,y}$ = amount of fossil fuel type i consumed in the project electricity system in year y (mass or volume unit),

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

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

EG_y = net electricity generated and delivered to the grid by all power sources serving the system, not including low-cost/must-run power plants/units, in year y (MWh)

i = all fossil fuel types combusted in power sources in the project electricity system in year y,

y = three most recent years for which data is available at the time of submission of the CDM-PDD to the DOE for validation (ex-ante option)

Based on calculation from the China DNA (see Annex 3), the OM Emission Factor of the Central China Power Grid is 1.2783 tCO_2e/MWh.

Sub-step 4: Identify the cohort of power units to be included in the build margin (BM)

According to the tool to calculate the emission factor for an electricity system, the sample group of power units m used to calculate the build margin could consist of either:

(a) the set of five power plants that have been built most recently, or

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

The tool also states that project participants should use the set of power units that comprises the larger annual generation. In this case option (b) is used.

In terms of the vintage of the data, two options are given in the tool. In this case Option 1 is chosen: For the first crediting period, the build margin emission factor is calculated ex-ante based on the most recent information available on units already built for sample group m at the time of CDM-PDD submission to the DOE for validation. For the second crediting period, the build margin emission factor should be updated based on the most recent information available on units already built at the time of submission of the request for renewal of the crediting period to the DOE. For the third crediting period, the build margin emission factor calculated for the second crediting period should be used. This option does not require monitoring the emission factor during the crediting period.

Sub-step 5: Calculate the build margin emission factor

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

$$EF_{Grid,BM,y} = \frac{\sum_m EG_{m,y} \cdot EF_{EL,m,y}}{\sum_m EG_{m,y}} \quad (9)$$

Where:

$EF_{grid,BM,y}$ = Build margin CO_2 emission factor in year y (tCO_2/MWh)

$EG_{m,y}$ = Net quantity of electricity generated and delivered to the grid by power unit m in year y (MWh)

$EF_{EL,m,y}$ = CO_2 emission factor of power unit m in year y

m = Power units included in the build margin

y = Most recent historical years for which power generation data is available

Following guidance issued by the CDM Executive Board in response to a request for guidance from an accredited DOE on the determination of the Build Margin in methodology AM0005 in China, $EF_{BM,y}$ is calculated as the capacity weighted average emissions factor of new installed capacity rather than the

generation weighted factor. Furthermore, it is suggested in the same guidance note that the efficiency level of the best technology commercially available in the provincial/regional or national grid of China is used as a conservative proxy for each fuel type in estimating the fuel consumption when calculating the Build Margin. The suggested approach is followed in the determination of the Build Margin for the purposes of this project.

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

The steps and equations are as follows:

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

$$\lambda_{Coal,y} = \frac{\sum_{i \in COAL,j} F_{i,j,y} \times NCV_{i,y} \times EF_{CO_2,i,j,y}}{\sum_{i,j} F_{i,j,y} \times NCV_{i,y} \times EF_{CO_2,i,j,y}} \qquad (10)$$

$$\lambda_{Oil,y} = \frac{\sum_{i \in OIL,j} F_{i,j,y} \times NCV_{i,y} \times EF_{CO_2,i,j,y}}{\sum_{i,j} F_{i,j,y} \times NCV_{i,y} \times EF_{CO_2,i,j,y}} \qquad (11)$$

$$\lambda_{Gas,y} = \frac{\sum_{i \in GAS,j} F_{i,j,y} \times NCV_{i,y} \times EF_{CO_2,i,j,y}}{\sum_{i,j} F_{i,j,y} \times NCV_{i,y} \times EF_{CO_2,i,j,y}} \qquad (12)$$

Where,

$F_{i,j,y}$ = amount of fuel i (tce) consumed by power plants m in year y,

COAL, OIL and GAS refer to coal fuel, oil fuel and gas fuel in the subscript set.

2. Calculate thermal emission factor

$$EF_{Thermal} = \lambda_{Coal} \times EF_{Coal,Adv} + \lambda_{Oil} \times EF_{Oil,Adv} + \lambda_{Gas} \times EF_{Gas,Adv} \qquad (13)$$

Where,

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

3. Calculate the BM of the Grid

$$EF_{\text{Grid},BM,y} = \frac{CAP_{Thermal}}{CAP_{Total}} \times EF_{Thermal} \qquad (14)$$

Where,

CAP_{Total} = new added total capacity,

$CAP_{Thermal}$ = new added thermal power capacity.

The data used to calculate OM and BM emission factors are all publicly available. The generation data and average self consumption rate data are from publicly available China Electric Power Yearbooks. The data of fuel consumption per electricity generated and net calorific values of fuels are from the China Energy Statistical Yearbooks. The $OXID_i$ and $EF_{CO2,i}$ data by fuels are from the "2006 IPCC Guidelines for National Greenhouse Gas Inventories," Volume 2 Energy.

According to the announcement "China's Regional Grid Baseline Emission Factors Renewed", the weighted average of coal consumption per kWh supplied of 30 new built 600 MW sub critical units in 2006 is adopted to determine the emission factor of the best advanced coal fired generation technology, which is 329.94gce/kWh. In other words, the efficiency of best advanced coal fired generation technology is 37.28%.

The maximum electricity supplied efficiency of oil and gas fired generation plants are regarded as approximate estimation of commercially optimal efficiency technology. Similarly, the fuel consumption per kWh supplied of best advanced oil and gas fired generation technology is determined to be 252 gce/kWh, which means a generation efficiency of 48.81%.

According to the Chinese DNA[5], the $EF_{Grid,BM,y}$ for the Central China Power Grid is 0.7156 tCO_2e/MWh. For the data source and the calculations, please see Annex 3.

Sub-step 6: Calculate the combined margin emissions factor

The combined margin emissions factor is calculated as follows:

$$EF_y = w_{OM} \cdot EF_{\text{Grid},OM,y} + w_{BM} \cdot EF_{Grid,BM,y} \qquad (15)$$

Where,

$EF_{grid,OM,y}$ = Operating margin CO_2 emission factor in year y (tCO_2/MWh)

$EF_{grid,BM,}y$ = Build margin CO_2 emission factor in year y (tCO_2/MWh)

W_{OM} = Weighting of operating margin emissions factor (%)

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

The defaults weights are used, i.e. each of the Operating Margin and Build Margin is weighted equally.

$w_{OM} = w_{BM} = 0.5$

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[5] http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File1875.pdf

In this case, for the first crediting period:

$EF_{grid,CM,y}$=0.5×$EF_{grid,OM,y}$ + 0.5×$EF_{grid,BM,y}$ = 0.9970tCO_2/MWh

STEP 2: Determination of EG_y

Where scenarios 2 apply, EG_y corresponds to the net quantity of electricity generation in the Project plant (EG_y = $EG_{project\ plant,y}$).

C. EMISSION REDUCTIONS OR INCREASES DUE TO DISPLACEMENT OF HEAT

According to ACM0006, scenario 2 is applicable for the proposed project. As the identified baseline scenario is the generation of heat in boilers using fossil fuels, and then baseline emission can be calculated through the following formula:

$$ER_{heat,y} = \frac{Q_y \cdot EF_{CO2,BL,heat,i}}{\varepsilon_{boiler}}$$

Where:

$ER_{heat,y}$: Emission reductions due to displacement of heat during the year y in tons of CO_2e.

Q_y : Net quantity of heat generated in the proposed plant during the year y in GJ.

ε_{boiler} : Energy efficiency of the boiler that would be used in the absence of the project activity. The efficiency of boilers to be displaced is conservatively estimated as 100%.

$EF_{CO2,BL,heat,I}$: CO_2 emission factor of the fossil fuel type i used for heat generation in the absence the project activity (tCO_2/GJ)

According to the ACM0006, in case of scenario 2, the baseline scenario is that all heat generated by the cogeneration project plant would in the absence of the project activity be generated in fossil fuel fired boilers. Thus: $\boldsymbol{Q_y = Q_{project\ plant,y}}$

D. BASELINE EMISSIONS DUE TO NATURAL DECAY OR UNCONTROLLED BURNING OF BIOMASS RESIDUES

The emissions from avoided disposal of the biomass to be used by the project activity in year *y* can be calculated as:

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

where:

$BE_{biomass,y}$: Baseline emissions due to natural decay or burning of anthropogenic sources of biomass residues during the year *y* (tCO_2e/yr)

GWP_{CH4} : Global Warming Potential of methane valid for the commitment period (tCO_2e/tCH_4)

$BF_{PJ,k,y}$: Incremental quantity of biomass residue type *k* used as a result of the project activity in the project plant during the year *y* (tons of dry matter or liter)

NCV_k : Net calorific value of the biomass residue type *k* (GJ/ton of dry matter or GJ/liter)

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

E. LEAKAGE

Option L2 (ACM0006, Section Leakage) is used to demonstrate that there is an abundant surplus of the straws in the region of the project activity, and then the leakage can be neglected.

According to the feasibility study report and the biomass availability report for this project in Jianli: within the region covering a radius of 50km around the proposed project, the total quantity of annual rice husk is 305,000t, the practical and economical available quantity is 270,000t and the project demand for rice husk is approximately 87,900t. Therefore, the available biomass residue is 207% larger than the quantity of rice husk utilized, including the project plant; within the region covering a radius of 50km around the proposed project, the total quantity of annual straws is 926,000t, the practical and economical available quantity is 250,000t and the project demand for rice husk is approximately 93,800 t. Therefore, the available biomass residue is 166% larger than the quantity of rice husk utilized, including the project plant.

The utilization of the biomass residues by the project plant is considered to have no influence on the current biomass usage, and therefore the leakage of proposed project is considered 0.

In conclusion, the Project does not result increase of fossil fuel consumptions, i.e. the leakage is zero (L_y = 0 tCO_2e).

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

Data / Parameter:	*GWP_{CH4}*
Data unit:	tCO_2e/tCH_4
Description:	Global warming potential for CH_4
Source of data used:	IPCC 2006 Revised Guidelines
Value applied:	21 for the first commitment period. Shall be updated according to any future COP/MOP decisions.
Justification of the choice of data or description of measurement methods and procedures actually applied :	IPCC 2006 default value
Any comment:	

Data / Parameter:	**EG_y**
Data unit:	MWh

Description:	net electricity generated and delivered to the grid by power plant / unit m in year y
Source of data used:	China Electric Statistical Yearbook, 2005-2007
Value applied:	Values depend on specifically fuel, referring to Annex 3.
Justification of the choice of data or description of measurement methods and procedures actually applied :	According to the Tool to calculate the emission factor for an electricity system requirement, use accurate and reliable local or national data where available
Any comment:	

Data / Parameter:	**$FC_{i,y}$**
Data unit:	mass or volume unit
Description:	Amount of fossil fuel type i consumed in the project electricity system in year y
Source of data used:	China Electric Statistical Yearbook, 2005-2007
Value applied:	Values depend on specifically fuel, referring to Annex 3.
Justification of the choice of data or description of measurement methods and procedures actually applied :	According to the Tool to calculate the emission factor for an electricity system requirement, use accurate and reliable local or national data where available
Any comment:	

Data / Parameter:	**$F_{i,j,y}$**
Data unit:	mass or volume unit
Description:	The fuel consumption of fuel i in power plant j during year y
Source of data used:	China Electric Statistical Yearbook, 2005-2007
Value applied:	Values depend on specifically fuel, referring to Annex 3.
Justification of the choice of data or description of measurement methods and procedures actually applied :	According to the Tool to calculate the emission factor for an electricity system requirement, use accurate and reliable local or national data where available
Any comment:	

Data / Parameter:	**$NCV_{i,y}$**
Data unit:	TJ/t, TJ/km^3
Description:	Net calorific value (energy content) per mass or volume unit of a fuel i in year y
Source of data used:	China Energy Statistical Yearbook, 2007
Value applied:	Values depend on specifically fuel, referring to Annex 3.
Justification of the choice of data or description of	According to the Tool to calculate the emission factor for an electricity system requirement, use accurate and reliable local or national data where available.

measurement methods and procedures actually applied :	
Any comment:	

Data / Parameter:	**$EF_{CO2,i,y}$**
Data unit:	tC/TJ (tCO_2e/TJ)
Description:	CO_2 emission factor of fossil fuel type i in year y (tCO_2/GJ)
Source of data used:	IPCC 2006 Revised Guidelines
Value applied:	Values depend on specifically fuel, referring to Annex 3.
Justification of the choice of data or description of measurement methods and procedures actually applied :	According to the Tool to calculate the emission factor for an electricity system requirement, use IPCC default value.
Any comment:	

Data / Parameter:	**$CAP_{i,j,y}$**
Data unit:	MW
Description:	Installed capacities of power plant category i of province j in years y.
Source of data used:	China Electric Power Yearbook 2005-2007
Value applied:	See Annex 3 for details.
Justification of the choice of data or description of measurement methods and procedures actually applied :	Data used are from Chinese authorities.
Any comment:	

Data / Parameter:	**$EG_{grid,\ imported}$**
Data unit:	MWh
Description:	Electricity imported from other grid to Central China Grid.
Source of data used:	China's Regional Grid Baseline Emission Factors Renewed
Value applied:	See Annex 3 for details.
Justification of the choice of data or description of measurement methods and procedures actually applied :	Data used are from Chinese authorities.
Any comment:	

Data / Parameter:	**$TDL_{j,y}$**
Data unit:	%
Description:	average technical transmission and distribution losses for providing

	electricity to source j in year y.
Source of data used:	Tool to calculate baseline, project and/or leakage emissions from electricity consumption
Value applied:	20
Justification of the choice of data or description of measurement methods and procedures actually applied :	Because the data is not available within host country, the default value (20%) can be adopted for project emission calculation according to the Tool to calculate baseline, project and/or leakage emissions from electricity consumption. This is conservative.
Any comment:	

Data / Parameter:	$EF_{CO2,BL,heat}$
Data unit:	tCO_2/GJ
Description:	CO_2 emission factor of the fossil fuel type used for heat generation in the absence the project activity
Source of data used:	Default value from IPCC 2006. In the Project, the identified fossil fuel for heat generation is coal.
Value applied:	0.0946
Justification of the choice of data or description of measurement methods and procedures actually applied :	The data is adopted from IPCC, this is conservative.
Any comment:	

Data / Parameter:	ε_{boiler}
Data unit:	
Description:	Average net energy efficiency of heat generation in the boiler that would generate heat in the absence of the project activity
Source of data to be used:	ACM0006
Value of data applied for the purpose of calculating expected emission reductions in section B.5	100%
Description of measurement methods and procedures to be applied:	Because the data is not available, the default value (100%) can be adopted according to the ACM0006. This is conservative
QA/QC procedures to be applied:	-
Any comment:	The data will be fixed during the crediting period which is conservative.

Data / Parameter:	$EF_{CH4,BF}$
Data unit:	tCH_4 /GJ
Description:	CH_4 emission factor for controlled burning of the biomass residue in the project plant
Source of data used:	IPCC 2006 Default Value ; ACM0006
Value applied:	30 for the first commitment period. Considering the conservativeness factor as 1.37, this should be adjusted as: $EF_{CH4,BF}$=30*1.37=41.1
Justification of the choice of data or description of measurement methods and procedures actually applied :	IPCC 2006 default value. The conservative factor is applied, as specified in the baseline methodology.
Any comment:	

Data / Parameter:	$NCV_k*EF_{burning,CH4,k,y}$
Data unit:	tCH_4/tonne
Description:	CH_4 emission factor for uncontrolled burning of the biomass residue
Source of data used:	IPCC 2006 Default Value ; ACM0006
Value applied:	0.001971
Justification of the choice of data or description of measurement methods and procedures actually applied :	The conservative factor is applied, as specified in the baseline methodology
Any comment:	

Data / Parameter:	$EF_{km,CO2}$
Data unit:	$kgCO_2e$/km
Description:	Average CO_2 Emission Factor for transportation of biomass with trucks
Source of data used:	IPCC 2006 default value from the Moderate Control index for the US heavy Duty Diesel Vehicle
Value applied:	1.011for the first commitment period
Justification of the choice of data or description of measurement methods and procedures actually applied :	IPCC 2006 default value from the Moderate Control index for the US heavy Duty Diesel Vehicle
Any comment:	

Data / Parameter:	$EF_{CO2,diesel}$
Data unit:	$kgCO_2e$/TJ
Description:	Emission Factor of Diesel

Source of data used:	IPCC 2006 default value (Volume2.Chapter2.P16)
Value applied:	74,100 for the first commitment period
Justification of the choice of data or description of measurement methods and procedures actually applied :	IPCC 2006 default value (Volume2.Chapter2.P16) for diesel
Any comment:	

Data / Parameter:	NCV_i of fossil fuel combusted in Plant
Data unit:	TJ/tonne
Description:	Net Calorific Value(NCVi) of fossil fuel combusted in plant
Source of data used:	China Energy Statistical Yearbook
Value applied:	0.042652
Justification of the choice of data or description of measurement methods and procedures actually applied :	The value for Diesel is used for estimation. If other fuels are to be used, the valued will be changed accordingly.
Any comment:	

B.6.3 Ex-ante calculation of emission reductions:

Project emissions

a) Carbon dioxide emissions from combustion of fossil fuels for transportation of biomass residues to the project plant (PETy)

According to the Feasibility Study Report, the Project is designed to consume 87,900tons rice husk and 93,800 tons of straws which includes cotton straw, rice straw and oil seed straw annually and these biomass residues are transported by 3t, 5t, 8t, 10t -loading diesel trucks. The moisture content of rice husk is 6% and the moisture content of the cotton straw, rice straw and oil seed straw is 20.7%, 11.5% and 11.19% respectively.

The farthest distance that the trucks will travel is 50km. In order to keep conservativeness, the longest distance and the smallest loading capacity is chosen, namely: AVD_y is adopted as 100km (2*50) and the loading per truck is adopted as 3t.

The CO_2 emission factor for the trucks is 1.011 $kgCO_2e/km$, which is IPCC 2006 default value from the Moderate Control index for the US heavy Duty Diesel Vehicle (assuming the 3t-loading truck is diesel heavy truck). Refer to the equation (3), the emissions from biomass residues transportation are calculated as follow: PET_y = 181,700 t / 3t * 100km * 0.001011tCO_2e/km = 6,123 tCO_2e. The actual emissions from the transportation will be calculated according to monitored data.

b) Carbon dioxide emissions from on-site consumption of fossil fuels (PEFFy)

According to the project owner, the fossil fuel (diesel) is only used for boiler start-up, and the quantity of fossil fuel consumed in the project plant is estimated as 25t per year, and fossil fuel consumed for other purposes is assumed to be 0.

The $NCV_{i,y}$ and $EF_{CO2,I,y}$ are adopted IPCC default value. Therefore the $PEFF_y$ is calculated as follow: $PEFF_y$ = 25t* 0.042652TJ/t * 74.1tCO_2e/TJ = 79tCO_2e. The actual emissions will be calculated according to monitored diesel consumptions.

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

There will be some electricity consumption in the bimass residues pretreatment, and it is estimated as 1,830MWh， So, the CO2 emissions from electricity consumption (PEEC,y) can be calculated as:

$EF_{EL,j,y}$(=$EF_{grid,CM,y}$) is calculated in Annex 3 as 0.9970 tCO_2e/MWh, where: $PE_{EC,y}$ = 1,817MWh * 0.90470tCO_2e/MWh * (1+20%) = 2,174 tCO_2e

d) Methane emission from Biomass residues combustion($PE_{biomass,CH4,y}$)

According to the Feasibility Study Report, the quantity of rice husk consumed annually is 87,900t, and the moisture content is 6%, Net Calorific Value is 3100kal/kg(0.013TJ/tone). , the quantity of straws consumed annually is 93,800t, and the moisture content of the cotton straw, rice straw and oil seed straw is 20.7%, 11.5% and 11.19% respectively. The average Net Calorific Value of the straw is 3000kal/kg(0.0125TJ/tone). The biggest moisture content of the straws (20.7%) is used when calculating the total dry biomass residues, which is conservative. Besides, the biggest NCV (0.013TJ/tone) is used when caculating the methane emission which is conservative.
CH_4 emission factor for controlled burning of the biomass residue in the project plant, $EF_{CH4,BF}$=41.1kgCH_4/TJ, which is adopted IPCC default value.
So, $PE_{biomass,CH4,y}$== (87,900*(1-6%)+93800*(1-20.7)) *0.013TJ/tone*41.1kgCH_4/TJ=84tCH_4

Therefore the project emissions are calculated as: PEy = PETy + PEFFy + PEEC,y +GWP_{CH4}* $PE_{biomass,CH4,y}$ = 6, 123tCO2e + 79tCO2e + 2, 174tCO2e +21*84= 10, 132tCO2e

Emission reductions due to displacement of electricity

Step 1: Determination of $EF_{electricity,y}$
Based on the description in B.6.1 and detailed calculation in Annex 3, the $EF_{electricity,y}$ = $EF_{grid,y}$ = 0.9970 tCO_2e/MWh.

Step 2: Determination of EG_y
According to the Feasibility Study Report, the delivered electricity is 126,720MWh per year, i.e. EG_y = 126,720MWh. Therefore: $ER_{electricity,y}$ = 126,720MWh * 0.9970tCO_2/MWh =126,334tCO_2e

Emission reductions or increases due to displacement of heat

According to the Feasibility Study Report, the proposed project is designed to supply 541,600GJ heat per year. The CO_2 emission factor of the fossil fuel type (coal) used for heat generation in the absence the Project is adopted from IPCC 2006, i.e. $EF_{CO2,BL,heat}$ = 0.0946tCO_2e/GJ. The efficiency of the boiler is assumed to be 100% for conservativeness. Therefore: $ER_{heat,y}$ = 541,600GJ * 0.0946tCO_2e/GJ / 100% = 51, 235tCO_2e

Uncontrolled burning or decay of biomass baseline emission
According to the Feasibility Study Report, the quantity of rice husk consumed annually is 87,900t, and the moisture content is 6%, Net Calorific Value is 3100kal/kg(0.013TJ/tone). , the quantity of straws consumed annually is 93,800t, and the moisture content of the cotton straw, rice straw and oil seed straw is 20.7%, 11.5% and 11.19% respectively. The average Net Calorific Value of the straw is 3000kal/kg(0.0125TJ/tone). The biggest moisture content of the straws (20.7%) is used when calculating the total dry biomass residues, which is conservative.

CH_4 emission factor for uncontrolled burning of the biomass residue, i.e. $NCV_k * EF_{burning,CH4,k,y}$=0.001971 t$CH_4$/tonne biomass, which is from IPCC default value.

So, Baseline emissions due to natural decay or burning of anthropogenic sources of biomass residues during the year *y,*

$BE_{biomass,y} = GWP_{CH4} \cdot \sum_k BF_{PJ,k,y} \cdot NCV_k \cdot EF_{burning,CHA,k,y}$ =21tCH_4/tCO_2*(87,900*(1-6%)+93800*(1-20.7)) *0.001971 tCH_4/tonne=6,499 tCO_2e

Leakage
Based on the description in B.6.1, the leakage of the Project is not taken into account, i.e. L_y = 0tCO_2e

Emission Reductions
Refer to the equation (1), the emission reductions are calculated as:
$ER_y = ER_{heat,y} + ER_{electricity,y} + BE_{biomass,y} - PE_y - L_y$ = 173, 936tCO_2e

The $ER_{heat,y}$ is not claimed in the year 2009.

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

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)
01/07/2009-30/06/2010	10,132	158,450	0	148,318
01/07/2010-30/06/2011	10,132	184,068	0	173,936
01/07/2011-30/06/2012	10,132	184,068	0	173,936
01/07/2012-30/06/2013	10,132	184,068	0	173,936
01/07/2013-30/06/2014	10,132	184,068	0	173,936
01/07/2014-30/06/2015	10,132	184,068	0	173,936

01/07/2015-30/06/2016	10,132	184,068	0	173,936
Total (tonnes of CO_2e)				1,191,933

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

B.7.1 Data and parameters monitored:

Data / Parameter:	**$BF_{k,y}$**
Data unit:	Tons *of dry matter*
Description:	Quantity of biomass residue type *k* combusted in the project plant in 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	*K=Rice husk: 85,897t* *K=Straws:74,383t*
Description of measurement methods and procedures to be applied:	Use weight meters. Adjust for the moisture content in order to determine the quantity of dry biomass. The quantity shall be crosschecked with the quantity of electricity generated and any fuel purchase receipts. Continuously, prepare annually an energy balance
QA/QC procedures to be applied:	The meter will undergo calibration/maintenance subject to appropriate industrial standards. Direct measurements at the plant site will be cross-checked with an annual energy balance that is based on purchased quantities and stock changes
Any comment:	The data on quantity of biomass residues combusted in the boiler will be collected separately for all types of biomass residues. The data will be kept for minimum two years after the last crediting period

Data / Parameter:	**$BF_{T,k,y}$**
Data unit:	Tones of dry matter
Description:	Quantity of biomass residue type k that has been transported to the Project site during the year *y* where *k* are the types of biomass residues used in the project plant in year *y*.
Source of data to be used:	Measured data by weighbridge
Value of data applied for the purpose of calculating expected emission reductions in section B.5	*K=Rice husk: 85,897t* *K=Straws:74,383t*
Description of measurement methods and procedures to be applied:	Each truck will be measured twice, loading weight and empty weight. The transferred biomass residues will be aggregated daily, monthly and yearly.
QA/QC procedures to	The measuring range of the weighbridge is from 0 to 30 tones, the minimum

be applied:	scale is 0.01 tones. The weighbridge will be calibrated and maintained according to relevant standards and regulars. The biomass residues purchase invoice will be kept for double check.
Any comment:	Dry weight

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	6% for the rice husk 20.7% for the straws, which including cotton straw, rice straw and oil seed straw
Description of measurement methods and procedures to be applied:	Continuously monitored by moisture analyzer. Moisture content of the biomass residues will be both measured in collection points and in power plant.
QA/QC procedures to be applied:	The analyzers will be calibrated and undergo maintenance subject to appropriate industry standard annually
Any comment:	The moisture content of the biomass residues are taken into consideration in all the calculations of emission reductions. In case of dry biomass, monitoring of this parameter is not necessary.

Data / Parameter:	NCV_K
Data unit:	KJ/Kg
Description:	Net calorific value of the biomass residue of type k utilized in the project
Source of data to be used:	Feasibility Study Report
Value of data applied for the purpose of calculating expected emission reductions in section B.5	k=rice husk: 12958 k=straws: 12540
Description of measurement methods and procedures to be applied:	Measure the NCV based on the dry biomass. This parameter will be measured taking at least three samples(dry matter) for each measurement
QA/QC procedures to be applied:	Measurements will be carried out at reputed laboratories and according to relevant international standards.
Any comment:	-

Data / Parameter:	**AVD_y**
Data unit:	km

Description:	Average round trip distance (from and to) between the biomass residue fuel supply sites and the site of the Project plant during the year y
Source of data to be used:	On site records maintained at project site (log books)
Value of data applied for the purpose of calculating expected emission reductions in section B.5	*100*
Description of measurement methods and procedures to be applied:	The data is recorded at the central collecting station for it is close to the project plant, based on the information given by the truck driver about the biomass supply site and the distance form the project.
QA/QC procedures to be applied:	The data on distance of fuel supply site from the plant can be verified by cross checking data records on the distances available with information from other sources (e.g. maps)
Any comment:	If the biomass residues are supplied from different sites, this parameter will be taken from the longest distance.

Data / Parameter:	TL_y
Data unit:	Tonne
Description:	Average truck load of the trucks used during the year y
Source of data to be used:	Measured data by weightbridge
Value of data applied for the purpose of calculating expected emission reductions in section B.5	3
Description of measurement methods and procedures to be applied:	Each truck will be measured twice, loading weight and empty weight. The loading data will be averaged monthly and yearly.
QA/QC procedures to be applied:	The weighbridge will be calibrated and maintained according to relevant standards and regulars. Check consistency of load records will be done frequently.
Any comment:	-

Data / Parameter:	$FF_{project\ plant,i,y}$
Data unit:	*tons*
Description:	Quantity of fossil fuel type *i* combusted in the project plant during year *y*
Source of data to be used:	On-site measurements
Value of data applied for the purpose of calculating expected	*25*

emission reductions in section B.5	
Description of measurement methods and procedures to be applied:	Use weight meters.
QA/QC procedures to be applied:	The meter will under go calibration/maintenance subject to appropriate industrial standards. The consistency of metered fossil fuel consumption quantities can be cross checked with fuel purchased quantities and the stock change records
Any comment:	This should include fossil fuels co-fired in the project plant but not any other fuel consumption at the project site that is attributable to the project activity (e.g. for mechanical preparation of the biomass residues). The data on quantity of fossil fuel combusted in the boiler will be collected separately for all types of fossil fuels

Data / Parameter:	$FF_{project\ site,,i,\ y}$
Data unit:	*tons*
Description:	Quantity of fossil fuel type *i* combusted in the project site for other purposes that are attributable to the project activity during 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	*0*
Description of measurement methods and procedures to be applied:	Use weight meters.
QA/QC procedures to be applied:	Cross-check the measurements with an annual energy balance that is based on purchased quantities and stock changes
Any comment:	This should not include fossil fuels co-fired in the project plant but any other fuel consumption at the project site that is attributable to the project activity (e.g. for mechanical preparation of the biomass residues)

Data / Parameter:	$EC_{PJ,j,y}$
Data unit:	MWh/yr
Description:	The quantity of electricity consumed by the Project electricity consumption source j in year y
Source of data to be used:	Measured by meters
Value of data applied for the purpose of calculating expected emission reductions in	It is estimated as 1,830 MWh .

section B.5	
Description of measurement methods and procedures to be applied:	Hourly measurement and monthly recording; 100% of data will be monitored and electronic archived.
QA/QC procedures to be applied:	The accuracy of the meter is 0.5s and it will be calibrated and maintained according to relevant national regulations and/or standards. The electricity purchased invoice will be kept for double-checking.
Any comment:	

Data / Parameter:	**EGy**
Data unit:	MWh
Description:	Net quantity of increased electricity generation as a result of the Project (incremental to baseline generation) during the year y
Source of data to be used:	Measured by meters
Value of data applied for the purpose of calculating expected emission reductions in section B.5	126,720
Description of measurement methods and procedures to be applied:	Hourly measurement and monthly recording; 100% of data will be monitored and electronic archived.
QA/QC procedures to be applied:	The accuracy of the meter is 0.5s and it will be calibrated and maintained according to relevant national regulations and/or standards. The electricity sales invoice will be kept for double-checking.
Any comment:	Double checked by receipt of sales.

Data / Parameter:	**Q_y**
Data unit:	GJ/yr
Description:	Quantity of increased heat generation in the Project (incremental to heat generation in any existing cogeneration plants) that displaces heat generation in fossil fuel fired boilers during the year y
Source of data to be used:	Thermal meter
Value of data applied for the purpose of calculating expected emission reductions in section B.5	541, 600
Description of measurement methods and procedures to be applied:	The meter is installed on main heat supplying pipe. The meter will measure the flow, temperature and pressure individually and then calculate the supplied heat. The meter will measure the supplied heat continuously.
QA/QC procedures to	The heat sales invoice will be kept for double-checking.

be applied:	
Any comment:	

Data / Parameter:	-
Data unit:	Tons
Description:	Quantity of biomass residues of type k that are available
Source of data to be used:	Feasibility Study Report of the proposed project
Value of data applied for the purpose of calculating expected emission reductions in section B.5	k=rice husk: 270,000 t k=straws: 250,000t
Description of measurement methods and procedures to be applied:	Surveys or statistics from local agricultural bureau if national statistics is not available.
QA/QC procedures to be applied:	This parameter will be reviewed annually according to the project data and official data.
Any comment:	This parameter is applicable since approach L_2 is utilized to rule out leakage.

B.7.2 Description of the monitoring plan:

This monitoring plan is to serve as a guideline for the project owner to monitor the emission reduction of the proposed project. The contents of the Monitoring Plan are highlighted as follows:

1. The Operational and Management Structure for Monitoring

To monitor the project emission reductions and any leakage effects, the project owner will set up a CDM Monitoring Office and designate a qualified staff responsible for all relevant matters, including monitoring of emission reductions, data collection and archiving, QC/QA, and verification. The structure of the CDM Monitoring Office is outlined in Figure B–3.

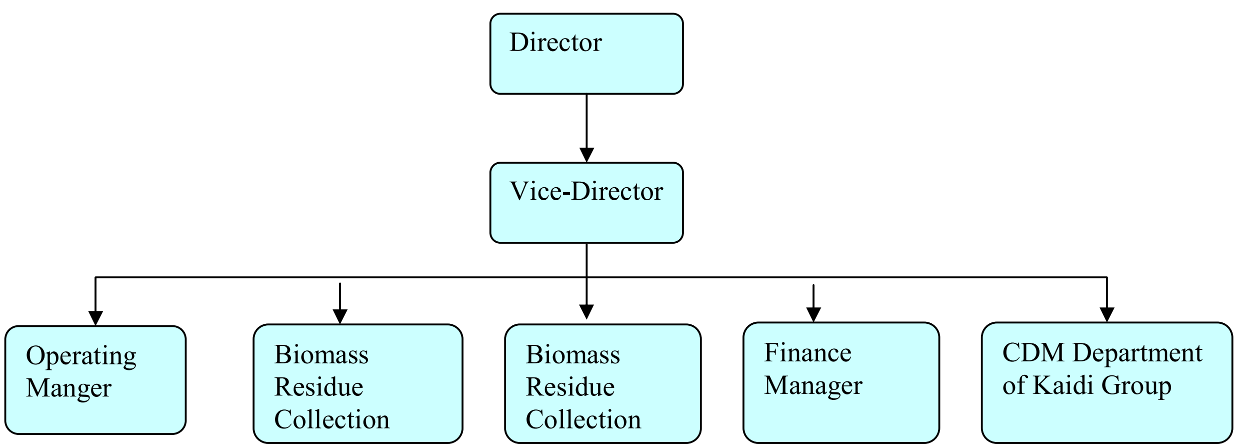

Figure B–3 Organization Chart of the CDM Project Management Office

Wuhan Kaidi Holding Investment Co., Ltd is the investor of Jianli Kaidi Biomass Power Project. Jianli Kaidi Green Energy Development Co., Ltd. is as the shareholding company under Kaidi. The staffs of Jianli Kaidi Green Energy Development Co., Ltd.at the biomass residues collection sites will record the data to be monitored concerning with information of biomass residues purchased from local area.

The manager of the collection sites will be responsible for quality control and summary of this information. When the biomass is transported to the site of the power plant, the data of the biomass residues collection and transportation will be recorded by the staff of Jianli Kaidi Green Energy Development Co., Ltd. and stored in the power plant. The summary of biomass consumption by the power plant will be calculated by the CDM Project Manager of the proposed project monthly. Another data to be recorded is the fossil fuel consumption by the power plant and on-site electricity consumption. The relatedresponsible operators will record this data, and the CDM manager will collect the data monthly. When the plant starts heat supply to local district, the net heat supply to the users will be collected and recorded by staffs of Jianli Kaidi Green Energy Development Co., Ltd. Other related data need to be monitored are described in Section 5 below.

The CDM manager will in charge of the implementation of this Monitoring Plan and summarizing the results. The results will be checked by the General Manger of Jianli Kaidi Green Energy Development Co., Ltd. ensuring the quality and accuracy of the data monitored. The monthly summary will be reported to the headquarter of Wuhan Kaidi Holding Investment Co., Ltd in Beijing. The CDM Manager of the Wuhan Kaidi Holding Investment Co., Ltd will calculate the emission reductions of the proposed project and develop reports with the support from Camco Limited

The responsibilities for carrying out these tasks are broadly elaborated in below.
Responsibilities of the proposed project in Jianli: Operating Manager of the plant: Overall management of the implementation of the monitoring plan and quality control of data and records.
Head of Staw Collection Stations: straw collection and summarizing the data collected at the collection stations in terms of types, amount, and transportation record, etc of straws. Ensuring the biomass at the sites will not be stored over half year.

Engineering Department of the plant: in charge of the monitoring of ammeters and calibration, biomass consumption of NCV of each kind of biomass, fossil fuel consumption within the power plant including boilers, crashing machines,etc, as well as maintenance of equipments
Procurement Dept. of the plant: cross checking the monitoring records with receipt and procurement records.

2. Calibration of Meters & Metering

2.1 Electricity output ammeter

An agreement should be signed between the project owner and the Grid that defines the metering arrangements and the required quality control procedures to ensure accuracy. The accuracy of the ammeter will be 0.5s. The metering equipment will be properly calibrated and checked annually for accuracy according to Technical Administrative Code of Electric Energy Metering（dl/t448-2000）. The project owner will prepare backup procedures to deal with any errors occurred to the meters. In case of any errors happens, the grid-connected electricity generated by the proposed project shall be determined by the project owner and the Grid jointly according to the error handling procedures.
Calibration is carried out by the Grid with the records being provided to the project owner, and these records will be maintained by the project owner and the third party designated.

All the monitoring equipment installed is indicated in the following figure.

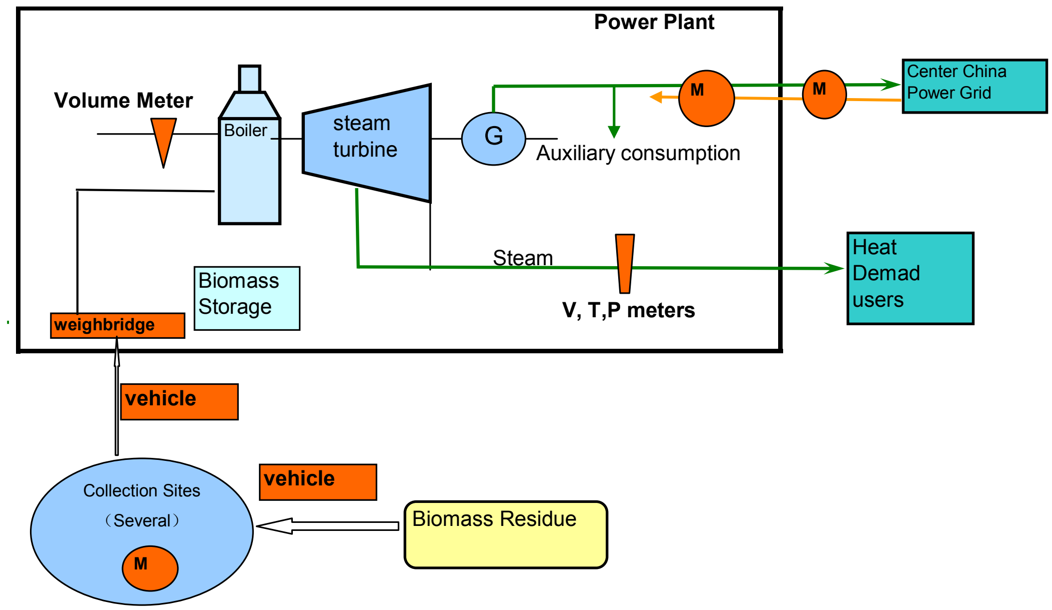

Figure B-4 Project boundary and monitoring map

2.2 Heat supply meter

When the proposed project starts heat supply, the heat supply meter including flow meter, pressure meter and temperature meter will be installed at the output of the power plant. The metering equipment will be properly calibrated and checked annually for accuracy. The project owner will prepare backup procedures to deal with any errors occurred to the meters. In case of any errors happens, the heat supplied to the users by the proposed project shall be determined by the project owner and the users jointly according to the error handling procedures.

Calibration is carried out by the project owner, and these records will be maintained by the project owner and the third party designated.

2.3 Electricity input ammeter

Following the same process as listed in 2.1.

2.4 Biomass residues consumption

The project owner will conduct an energy balance analysis to verify the amounts of biomass residues collected at the collection sites, purchased at biomass procurement department of the power plant and combusted by the boilers. If significant difference among the three sources identified, the project developer will conduct further check the original records to find out reasons and correct. If the significant difference can't be resolved, the most conservative value of biomass utilized by the proposed project will be applied as monitoring results.

3. Monitoring

Meters of electricity and heat employed by the proposed project will follow the national measurement standard.

3.1 Net Electricity Generated
Grid-connected electricity generated by the proposed project will be monitored through metering equipment at the substation continuously (interconnection facility connecting the facility to the Grid). The data can also be monitored and recorded at the on-site control center using a computer system. The meter reading will be readily accessible for DOE. Calibration tests records will be maintained for verification.

3.2 Availability of Biomass Residues
The project developer will provide evidence to DOE concerning with the availability of Biomass residues resource in the nearby counties. This will be obtained from official information yearly. If it is not available, the data will be calculated or estimated based on a survey conducted by project developer yearly.

3.3 Biomass Residues Consumption of the Power Plant
The quality and type of biomass residues burned by the power plant will be monitored during the operation of the power plant, including all the necessary parameters of the biomass residues to be monitored according to Section B.7 of this PDD. All relevant records will be maintained for verification.

3.4 Fossil Fuel Consumption by the boiler
Fossil Fuel Consumption by the boiler during the operation will be recorded and monitored during the operation period of the proposed project. All relevant records will be maintained for verification. Flow meter will be equipped in the sucker and return pipe to monitor the quantity of diesel consumption.

3.5 Transportation of Biomass residues
The project developer of the proposed project will structure a recording and monitoring system within the biomass residues supply and management system covering all the biomass collection sites established by the proposed project. The quantity and type of biomass, transportation vehicle and transportation distance to the collection sites will be recorded by company staffs at the sites. The receipts and records regarding with biomass purchase by the proposed project will be documented and summarized for verification. The transportation of the biomass from the collection sites to the power plant will be monitored and documented by the project developer to determine the fossil fuel consumption by the biomass transportation activity. The transportation records will be documented and maintained for verification.

3.6 Heat supplied
The heat supply monitoring will only start after the proposed project starts heat supply to local users. Heat supplied by the proposed project will be monitored through metering equipments at the end of users continuously. The meter reading will be readily accessible for DOE. Calibration tests records will be maintained for verification.

3.7 Electricity purchased from the grid
When the biomass residues is pretreated, the proposed project needs a certain amount of electricity from grid. This amount will be metered, and the record be kept for examination.
The meter reading will be readily accessible for DOE. Calibration tests records will be maintained for verification.

3.8 Leakage
Amount of biomass types consumed and Quantity of biomass types that is available in surplus in the counties that defined in Project Boundary will be monitored to check the leakage effect brought by the operation of the proposed project. This will be obtained from official information, such as agriculture

statistics and survey of Counties defined within Project Boundary that supply biomass residues to the proposed project. If it is not available, the data will be calculated or estimated based on a survey conducted by project developer with the support from governmental entity. If any leakage occurs during the crediting period, the project developer will determine the parameters in terms of leakage effects according the definition in the PDD with the support from local government entity.

4. Quality Assurance and Quality Control
The quality assurance and quality control procedures for recording, maintaining and archiving data shall be improved as part of this CDM project activity. This is an on-going process that will be ensured through the CDM in terms of the need for verification of the emissions on an annual basis according to this PDD and the CDM manual.

5. Data Management System
This provides information on record keeping of the data collected during monitoring. Record keeping is the most important exercise in relation to the monitoring process. Without accurate and efficient record keeping, project emission reductions cannot be verified. Below follows an outline of how project related records would be managed.
Overall responsibility for monitoring of GHG emissions reduction will rest with the CDM responsible person of the proposed project. The CDM manual sets out the procedures for tracking information from the primary source to the end-data calculations in paper document format. It is the responsibility of the proposed project owner to provide additional necessary data and information for validation and verification requirements of respective DOE. Physical documentation such as paper-based maps, diagrams and environmental assessment will be collated in a central place, together with this monitoring plan. All paper-based information will be stored by the project owner and kept at least one copy.

6. Verification and Monitoring Results
The verification of the monitoring results of the project is a mandatory process required for all CDM projects. The main objective of the verification is to independently verify that the project has achieved the emission reductions as reported and projected in the PDD. It is expected that the verification will be done annually.

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)

>>
Date of completion: 27/08/ 2008
Name of persons determining the baseline study and monitoring methodology:

Contact Information of the responsible person	**Is organisation a Project Participant *Yes/No***
Sun Li, Gong Jing, Liu Yanan Camco International Limited Floor 14, Lucky Tower A, No. 3 North Road, East 3rd Ring Road, Chaoyang District, Beijing, China 100027 Tel: (86 10) 8448 1623 Fax: (86 10) 8448 2432 email: lilian.sun@camcoglobal.com.cn kerry.gong@camcoglobal.com.cn melody.liu@camcoglobal.com.cn	Yes

Website: www.camcoglobal.com.cn	

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:

>>
25/01/2008 (Key Equipment Purchase Contract Signed Date, the construction begin date is 07/03/2008)

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

>>
20 years

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

C.2.1. Renewable crediting period

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

>>
01/07/2009

C.2.1.2. Length of the first crediting period:

>>
7 years

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 EIA of the proposed project was completed by Hubei Environmental Science Institute and approved by Hubei Environmental Protection bureau. The summary of this evaluation is as follows.

1. Air

In the construction period, the air pollutants are mainly from transportation and machinery. This includes road dust during the transporting process , automobile emissions, emissions from excavator and bulldozer, and so on. Compared to the relevant estimation result of automobile emissions in the construction period, the maximum NO_2 concentration is 0.013mg/ m^3, which is lower than the 2^{nd} standard concentration value of the GB3095-96 <Environmental Air Quality Standard>. So it has no significant negative effect on the environment. Furthermore, according to the on-site research, the air quality around the proposed project site is good and the environment capacity is large. So the discharge of waste gas will not cause any negative impacts.

After the project is implemented, there will be waste gases from the boiler. These will be treated by the bag filter. The dust removal efficiency is higher than 99.8%. Therefore, the main pollutants contained in the waste gas, will be S02 and NO2. These can meet the pollutants emission standard requirements of the thermal power generation boiler for resource comprehensive utilization, which is regulated in the <Pollutant emission standard for fossil-fuel power plant >.

2. Waste Water

During construction, the waste water is mainly from: rainwater, wash water from all kinds of machinery and automobiles, and domestic wastewater. The wash water mainly contains the suspended sediment, and it will be collected by a simple drain, filter by grid, and then recovery and utilization after sedimentation. This can prevent the construction waste and sediment from inflowing into the outlet water. The domestic wastewater will be transmitted by engineer sewage pipe network to the domestic sewage integration treatment equipment for treating. The domestic sewage treated can be used for washing ground in the plant region and for afforestation. So the effluent water is zero. Some sewage sludge produced after the treatment will be sent for comprehensive resource utilization together with the boiler ash.

In the project operation process, there will be industrial cooling water, which is mainly the cooling water of all kinds of equipments. The cooling water does not contain any harmful substances or pollutants but the returned water temperature is higher.

The water will be collected for recovery and the recovery water mainly be used for boiler cooling water, oil region washing water, afforestration and so on.

3. Noise

During construction, the project noise is mainly from: fixed and successive drilling, construction machinery noise, and fluid traffic noise. It is estimated that the site out of 150m away from sound source in the construction site can reach 3^{rd} control standard during the day time, in the scope of 300m area

around the construction site can reach the control standard in the night, 50m away from the two sides of the traffic line can reach the standard.

When the project is operated, the noise source is mainly from machinery noise and gas dynamic noise from the exhaust pipe. The noise control measures include: choosing the equipments with high efficiency and little noise, taking vibration reduction measures when fixing equipments, taking sound proof measures to the noisy equipments, to control the noise in the standard range.

4. Solid Waste

The solid waste produced in the construction period is mainly the construction residues and the domestic waste from workers. During project operation, the solid waste is mainly boiler ash residues, domestic waste and sludge from the water treatment station.

The ash residues will be used for producing agricultural fertilizer and the project owner has signed an agreement of ash residues comprehensive utilization with Jianli Agricultural Bureau.

The waste and sludge from the water treatment station will be collected by local environmental protection department for municipal treatment.

The solid waste produced in the proposed project is the common waste, and all of them can be treated and reused. So the solid waste has little negative effect on the environment.

5. Conclusion

After the above measurements performed, the negative impacts on environments will be minimized below the requirements of laws and regulations during the construction and implementation. Furthermore, as renewable power project, the proposed project can reduce the consumption of fossil fuel sources and GHG emission.

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:

>>

According to EIA, no significant environmental impacts are discovered by the project participants or the host party. Hubei Environmental Protection Bureau has approved the EIA in Jul., 17th, 2007 .

SECTION E. Stakeholders' comments

>>

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

In Jul., 2007, The project owner carried out the investigation stakeholders in Questionnaire. Questionnaire was implemented by filling the stakeholder comments investigation form. The comments, from the Jianli government, Jianli Environmental protection Bureau, Feijia Villiage, Bandilu Villiage, Shenliu villiage and other relevant stakeholders , were collected. 50 copies questionnaires were distributed and all of them were collected. The basic information about the interviewee is described as following table:

Table E-1 Interviewee Statistics

	Number of interviewee	Gender		Age			Education		
		M	F	below 30	30-50	Above 50	Junior middle school and below	Middle school	High school and above
Number of People	50	43	7	9	37	4	24	12	14
Percentage (%)	100	86	14	18	74	8	48	24	28

The investigator introduced the project information to the interviewee firstly including the environmental impacts during the construction and operation , environmental protection measures that will be taken. Then, the stakeholders' comments were investigated by questionnaires. The questions in the questionnaire included the following questions:

- Are you familiar with the proposed project and what's you attitude towards this project?
- What is the effect of the project on local ecologic environment?
- What do you think the influence on the local economic development?
- Are you satisfied with the methods proposed to alleviate the environment impacts?
- Do you support the construction of the proposed project?

E.2. Summary of the comments received:

>>

Among the 50 interviewees, 82% persons are familiar with the proposed project, and only 18% don't know about this project.

40% think the proposed project can improve the local ecological environment and 60% think it has no impacts on the ecological environment.

96% of the interviewees are satisfied with the methods proposed to alleviate the environment impacts and 4% have no idea about it.

82% think the proposed project can promote local economic development, and 18% think it have no significant impact.

All of them support the construction of the proposed project, and no negative comments have been received. The outcome of the survey indicated that it is generally believed that the construction of the project will contribute to the local environment and to the development of local enterprises and improve the local employment situation. The participants said that they wish the project could be put into operation as soon as possible.

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

>>

The residents and local government are all very supportive to the proposed project. No negative comments have been received on the project. However, there are few persons who express some concerns. Through detailed investigation and discussion, the reason is found and it is mainly as follows: The proposed project is a new project and power is generated by biomass combustion. They are concerned that some unknown pollutant will have negative impacts on their living environment.

In fact, the proposed project is a renewable energy utilization project. For the environmental pollution problems that the public make more concerns, the Feasibility Study Report has supplied many specific measures and they are feasible through the technical and economical analysis. So, they do not need to be concerned with the environmental problems. Furthermore, the project owner also make a decision to further the project publication together with local government to eliminates there public concerns. And, the project owner will make best use of the CDM and facilitate the project construction. In the future project operation period, the project owner will keep good contact with the local stakeholders, and invite them to supervise their actions for environmental protection.

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 in the project activity.

Annex 3

BASELINE INFORMATION

According to the approved methodology ACM0002 and the document "China's Regional Grid Baseline Emission Factors Renewed", released at http://cdm.ccchina.gov.cn/ on 18 July 2008, the $EF_{grid,CM,y}$, $EF_{grid,OM,y}$, and $EF_{grid,BM,y}$ of Central China Power Grid could be calculated as following:

A. Electricity Generation of Central China Power Grid (2002-2006)

Table A1. Electricity Generation of Central China Power Grid (2002-2006)

Year	Electricity Generation (Unit：10^8 KWh)					Split of low-cost/must-run resources
	Total	Hydro	Thermal	nuclear	Others	
2002	3127.88	1124.40	2003.47	0	0	35.95%
2003	8345.05	3655.70	4689.35	0	0	43.81%
2004	4396.36	1665.89	2730.47	0	0	37.89%
2005	4964.30	1915.48	3048.25	0	0.57	38.60%
2006	5478.59	1922.96	3554.53	0	1.02	35.12%

Sources: China Electric Power Yearbook 2003-2007

B. Calculation of Operating Margin Emission Factor ($EF_{grid,OM,y}$)

Table B1. Electricity Generation of East China PowerGrid in 2004

	Electricity generation of fuel-fired power plants (MWh)	Auxiliary power ratio (%)	Total Electricity Supplied to the Grid (MWh)
Jiangxi	30127000	7.04	28,006,059
Henan	109352000	8.19	100,396,071
Hubei	43034000	6.58	40,202,363
Hunan	37186000	7.47	34,408,206
Chongqing	16520000	11.06	14,692,888
Sichuan	34627000	9.41	31,368,599
Total			249,074,186

Sources: China Electric Power Yearbook 2005

Table B2. Electricity Generation of Central China Power Gridin 2005

	Electricity generation of fuel-fired power plants (MWh)	Auxiliary power ratio (%)	Total Electricity Supplied to the Grid (MWh)
Jiangxi	30000000	6.48	28,056,000
Henan	131590000	7.32	121,957,612

Hubei	47700000	2.51	46,502,730
Hunan	39900000	5	37,905,000
Chongqing	17584000	8.05	16,168,488
Sichuan	37202000	4.27	35,613,475
Total			286,203,305

Sources: China Electric Power Yearbook 2006

Table B3. Electricity Generation of Central China Power Grid in 2006

	Electricity generation of fuel-fired power plants (MWh)	**Auxiliary power ratio (%)**	**Total Electricity Supplied to the Grid (MWh)**
Jiangxi	34449000	6.17	32,323,497
Henan	151235000	7.06	140,557,809
Hubei	54841000	2.75	53,332,873
Hunan	46408000	4.95	44,110,804
Chongqing	23487000	8.45	21,502,349
Sichuan	44193000	4.51	42,199,896
Total			334,027,226

Sources: China Electric Power Yearbook 2007; China Energy Statistical Yearbook 2007

Table B4. Calculation of Operating Margin Emission Factor of Central China Power Grid in 2004

Fuel	Unit	Jiangxi A	Henan B	Hubei C	Hunan D	Chongqing E	Sichuan F	Total G=A+ … +F	Emission Factor[1] (tC/TJ) H	Oxidation[2] (%) I	Average Low Caloric Value[3] (MJ/t or km^3) J	CO_2 Emission (tCO_2e) K=G*H*I*F*44/12/1000 (mass) K=G*H*I*F*44/12/1000 (Volume)
Raw Coal	10^4t	1863.8	6948.5	2510.5	2197.9	875.5	2747.9	**17144.1**	25.8	100	20908	339,092,605
Cleaned coal	10^4t		2.34					**2.34**	25.8	100	26344	58,316
Other Washed Coal	10^4t	48.93	104.22			89.72		**242.87**	25.8	100	8363	1,921,441
Coke	10^4t		109.61					**109.61**	29.2	100	28435	3,337,011
Coke Oven Gas	10^8m^3			1.68		0.34		**2.02**	12.1	100	16726	149,900
Other Gas	10^8m^3					2.61		**2.61**	12.1	100	5227	60,527
Crude Oil	10^4t		0.86	0.22				**1.08**	20	100	41816	33,118
Gasoline	10^4t		0.06			0.01		**0.07**	18.9	100	43070	2,089
Diesel Oil	10^4t	0.02	3.86	1.7	1.72	1.14		**8.44**	20.2	100	42652	266,627
Fuel Oil	10^4t	1.09	0.19	9.55	1.38	0.48	1.68	**14.37**	21.1	100	41816	464,893
PLG	10^4t							**0**	17.2	100	50179	0
Refinery Gas	10^4t	3.52	2.27					**5.79**	15.7	100	46055	153,506
Natural Gas	10^8m^3						2.27	**2.27**	15.3	100	38931	495,775
Other Petroleum Products	10^4t							**0**	20	100	38369	0
Other Coking Products	10^4t							**0**	25.8	100	28435	0
Other Energy	10^4t tce		16.92		15.2	20.95		**53.07**	0	100	0	0
									Total CO_2 Emission: 346,035,810			
Net electricity imported from Central China Grid (MWh)									**346,035,810**			
Total emission of the Central China Power Grid(tCO_2e)									**249,074,186**			
OM emission factor of the CCPG (tCO_2e/MWh)									**1.38929**			

Sources: China Electric Power Yearbook 2005

1,2 2006 IPCC Guidelines for National Greenhouse Gas Inventories， Volume 2 Energy, chapter 1, page 1.21-1.24, table 1.3 and 1.4.

3 China Energy Statistical Yearbook 2007,Page 287

Table B5. Calculation of Operating Margin Emission Factor of Central China Power Grid in 2005

Fuel	Unit	Jiangxi A	Henan B	Hubei C	Hunan D	Chongqing E	Sichuan F	Total G=A+ … +F	Emission Factor[1] (tC/TJ) H	Oxidation[2] (%) I	Average Low Caloric Value[3] (MJ/t or km^3) J	CO_2 Emission (tCO_2e) K=G*H*I*F*44/12/1000 (mass) K=G*H*I*F*44/12/1000 (Volume)
Raw Coal	10^4t	1869.29	7638.87	2732.15	1712.27	875.4	2999.77	**17827.75**	25.8	100	20908	352,614,497
Cleaned coal	10^4t	0.02						**0.02**	25.8	100	26344	498
Other Washed Coal	10^4t		138.12			89.99		**228.11**	25.8	100	8363	1,804,669
Coke	10^4t		25.95		105			**130.95**	29.2	100	28435	3,986,695
Coke Oven Gas	10^8m^3			1.15		0.36		**1.51**	12.1	100	16726	112,054
Other Gas	10^8m^3		10.2			3.12		**13.32**	12.1	100	5227	308,897
Crude Oil	10^4t		0.82	0.36				**1.18**	20	100	41816	36,185
Gasoline	10^4t		0.02			0.02		**0.04**	18.9	100	43070	1,194
Diesel Oil	10^4t	1.3	3.03	2.39	1.39	1.38		**9.49**	20.2	100	42652	299,798
Fuel Oil	10^4t	0.64	0.29	3.15	1.68	0.89	2.22	**8.87**	21.1	100	41816	286,959
PLG	10^4t							**0**	17.2	100	50179	0
Refinery Gas	10^4t	0.71	3.41	1.76	0.78			**6.66**	15.7	100	46055	176,572
Natural Gas	10^8m^3						3	**3**	15.3	100	38931	655,209
Other Petroleum Products	10^4t							**0**	20	100	38369	0
Other Coking Products	10^4t				1.5			**1.5**	25.8	100	28435	40,349
Other Energy	10^4t tce		2.88		1.74	32.8		**37.42**	0	100	0	0
									Total CO_2 Emission: 360,323,575			
Net electricity imported from Central China Grid (MWh)									**360,323,575**			
Total emission of the Central China Power Grid(tCO_2e)									**286,203,305**			
OM emission factor of the CCPG (tCO_2e/MWh)									**1.25898**			

Sources: China Electric Power Yearbook 2006

Table B6. Calculation of Operating Margin Emission Factor of Central China Power Grid in 2006

Fuel	Unit	Jiangxi A	Henan B	Hubei C	Hunan D	Chongqing E	Sichuan F	Total G=A+ … +F	Emission Factor[1] (tC/TJ) H	Oxidation[2] (%) I	Average Low Caloric Value[3] (MJ/t or km³) J	CO_2 Emission (tCO_2e) K=G*H*I*F*44/12/1000 (mass) K=G*H*I*F*44/12/1000 (Volume)
Raw Coal	10^4t	1926.02	8098.01	3179.79	2454.48	1184.3	3285.22	**20127.82**	25.8	100	20908	398,107,508
Cleaned coal	10^4t					5.79		**5.79**	25.8	100	26344	144,295
Other Washed Coal	10^4t	4.51	104.12		8.59	79.21		**196.43**	25.8	100	8363	1,554,036
Briquette							0.01	**0.01**	26.6	100	20908	204
Coke	10^4t		17.23		0.32			**17.55**	29.2	100	28435	534,299
Coke Oven Gas	10^8m^3		0.52	1.07	4.24	0.38	0.01	**6.22**	12.1	100	16726	461,572
Other Gas	10^8m^3	12.69	3.95		1.7	4.36	0.01	**22.71**	12.1	100	5227	526,655
Crude Oil	10^4t		0.49					**0.49**	20	100	41816	15,026
Gasoline	10^4t		0.01					**0.01**	18.9	100	43070	298
Diesel Oil	10^4t	0.91	2.23	1.41	1.78	0.96		**7.29**	20.2	100	42652	230,298
Fuel Oil	10^4t	0.51	1.26	1.31	0.8	0.57	3.49	**7.94**	21.1	100	41816	256,872
PLG	10^4t							**0**	17.2	100	50179	0
Refinery Gas	10^4t	0.86	8.1	1	0.97			**10.93**	15.7	100	46055	289,780
Natural Gas	10^8m^3			0.28		0.16	18.63	**19.07**	15.3	100	38931	4,164,943
Other Petroleum Products	10^4t							**0**	20	100	38369	0
Other Coking Products	10^4t						0.01	**0.01**	25.8	100	28435	269
Other Energy	10^4t tce	17.45	37.36	31.55	18.29	29.35		**134**	0	100	0	0
									Total CO_2 Emission: 406,286,055			
Net electricity imported from Central China Grid (MWh)									**408,776,270**			
Total emission of the Central China Power Grid(tCO_2e)									**337,056,176**			
OM emission factor of the CCPG (tCO_2e/MWh)									**1.212784**			

Sources: China Electric Power Yearbook 2007; China Energy Statistic Yearbook 2007

Table B7. Weighted-average OM emission factor of Central China Power Grid (2004-2006)

	2004	2005	2006	Weighted-average OM emission factor
Total Emission, tCO2	346,035,810	360,323,575	408,776,270	
Total power supply, MWh	249,074,186	286,203,305	337,056,176	
OM emission factor, tCO2/MWh	1.38929	1.25898	1.212784	**1.2783**

Therefore, the $EF_{grid,OM,simple}$ could be calculated as:

$EF_{grid,OM,simple}$ =（346,035,810+ 360,323,575+408,776,270）/ (249,074,186+ 286,203,305+ 337,056,176) = **1.2783** tCO_2e/MWh

C. Calculation of the Build Margin Emission Factor ($EF_{grid,BM,y}$)

Table C1 Emission Factor of Best Technology

	Variable	Electricity supply efficiency	Emission factor of fuel (tC/TJ)	Oxidation rate	Emission factor (tCO_2/MWh)
		A	B	C	D=3.6/A/1000*B*C*44/12
Coal-based power plants	$EF_{Coal,Adv}$	37.28%	25.8	1	0.9135
Gas-based power plants	$EF_{Gas,Adv}$	48.81%	15.3	1	0.4138
Oil-based power plants	$EF_{Oil,Adv}$	48.81%	21.1	1	0.5706

Sources: China's grid baseline BM calculation progress, NRDC

Table C2 The Proportion Of CO_2 Emission From Solid、Liquid、Gas Fuel For Generating Electricity

Fuel	Unit	Jiangxi	Henan	Hubei	Hunan	Chongqing	Sichuan	Total	Caloric	Emission	Oxidatio	E
		A	B	C	D	E	F	G=A+…+F	H (KJ/kg)	I	J	K=F*G*H*I* 44/12/100
Raw Coal	10^4 t	1926.02	8098.01	3179.79	2454.48	1184.3	3285.22	20127.82	20908	25.8	1	398,107,508
Cleaned Coal	10^4 t	0	0	0	0	5.79	0	5.79	26344	25.8	1	144,295
Other Washed Coal	10^4 t	4.51	104.12	0	8.59	79.21	0	196.43	8363	25.8	1	1,554,036
Briquette	10^4 t	0	0	0	0	0	0.01	0.01	20908	26.6	1	204
Coke	10^4 t	0	17.23	0	0.32	0	0	17.55	28435	29.2	1	534,299
Subtotal												**400,340,342**
Crude Oil	10^4 t	0	0.49	0	0	0	0	0.49	41816	20	1	15,026
Gasoline	10^4 t	0	0.01	0	0	0	0	0.01	43070	18.9	1	298
Kerosene	10^4 t	0	0	0	0	0	0	0	43070	19.6	1	0
Diesel Oil	10^4 t	0.91	2.23	1.41	1.78	0.96	0	7.29	42652	20.2	1	230,298
Fuel Oil	10^4 t	0.51	1.26	1.31	0.8	0.57	3.49	7.94	41816	21.1	1	256,872
Other Petroleum	10^4 t	0	0	0	0	0	0	0	38369	20	1	0
Other Coking	10^4 t	0	0	0	0	0	0.01	0.01	28435	25.8	1	269
Subtotal												**502,763**
Natural Gas	10^7 m^3	0	0	2.8	0	1.6	190.7	190.7	38931	15.3	1	4,164,943
Coke Oven Gas	10^7 m^3	0	5.2	10.7	42.4	3.8	62.2	62.2	16726	12.1	1	461,572
Other Gas	10^7 m^3	126.9	39.5	0	17	43.6	227.1	227.1	5227	12.1	1	526,655
PLG	10^4 t	0	0	0	0	0	0	0	50179	17.2	1	0
Refinery Gas	10^4 t	0.86	8.1	1	0.97	0	10.93	10.93	46055	15.7	1	289,780
Subtotal												**5,442,950**
Total												**406,286,055**

Sources: China Energy Statistical Yearbook 2007

Calculate with relevant data and formulae, the value for λ_{Coal} is 98.54%the value for λ_{Oil} is 0.12% and the value for λ_{Gas} is 1.34%.

Therefore,

$EF_{Thermal} = \lambda_{Coal} \times EF_{Coal,Adv} + \lambda_{Oil} \times EF_{Oil,Adv} + \lambda_{Gas} \times EF_{Gas,Adv}$ =0. 9064 tCO_2e/MWh.

Table C3 Installed capacity of the Central China Power Grid in 2006

Installed Capacity	Unit	Jiangxi	Henan	Hubei	Hunan	Chongqing	Sichuan	Total
Fuel-fired	M	6568	32603	11623	10715	5594	9555	76658
Hydro	M	3288	2553	8521	8648	1979	17730	42719
Nuclear	M	0	0	0	0	0	0	0
Wind & Others	MW	0	106	0	0	0	0	106
Total	M	9856	35262	20144	19363	7573	27285	119483

Sources：China Electric Power Yearbook 2007

Table C4 Installed capacity of the Central China Power Grid in 2005

Installed Capacity	Unit	Jiangxi	Henan	Hubei	Hunan	Chongqing	Sichuan	Total
Fuel-fired	M	5906	26267.8	9526.3	7211.6	3759.5	7496	60167.2
Hydro	M	3019	2539.9	8088.9	7905.1	1892.7	14959.6	38405.2
Nuclear	M	0	0	0	15116.7	0	0	0
Wind & Others	MW	0	0	0	7211.6	24	0	24
Total	M	8925	28807.7	17615.2	7905.1	5676.2	22455.6	98596.4

Sources：China Electric Power Yearbook 2006

Table C5 Installed capacity of the Central China Power Grid in 2004

Installed Capacity	Unit	Jiangxi	Henan	Hubei	Hunan	Chongqing	Sichuan	Total
Fuel-fired	M	5496	21788.5	9590.3	6779.5	3271.1	6900.3	53825.7
Hydro	M	2549.9	2438	7415.1	7448.2	1407.9	13382.9	34642
Nuclear	M	0	0	0	0	0	0	0
Wind & Others	MW	0	0	0	0	0	0	0
Total	M	8045.9	24226.5	17005.4	14227.7	4679	20283.2	88467.7

Sources：China Electric Power Yearbook 2005

Table C6. Calculation of BM Emission Factor of Central China Power Grid (2004-2006), MW

	New Capacity 2004	New Capacity 2005	New Capacity 2006	New Capacity 2005-2006	Percentage of New Capacity Additions
	A	**B**	**C**	**D=C-B**	
Fuel-fired (MW)	53825.7	60167.2	76658	16490.8	78.95%
Hydro (MW)	34642	38405.2	42719	4313.8	20.65%
Nuclear (MW)	0	0	0	0	0.00%
Wind(MW)	0	24	106	82	0.39%
Total	88467.7	98596.4	119483	20886.6	**100.00%**
Percentage of Year 2006	74.04%	82.52%	100%		

$$EF_{grid,BM,y} = \frac{CAP_{Thermal}}{CAP_{Total}} \times EF_{Thermal} = 0.9064 \times 78.95\% = 0.7156\ tCO_2/MWh$$。

D．Calculation of the Baseline Emission Factor （$EF_{grid,CM,y}$）

$EF_{grid,CM,y} = 0.5 \times EF_{grid,OM,y} + 0.5 \times EF_{grid,BM,y} = 0.5 \times 1.2783 + 0.5 \times 0.7156 = 0.9970\ tCO_2/MWh$

Annex 4

MONITORING INFORMATION

No Supplement Information.