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:

Yicheng Biomass Cogeneration Project in Hubei Province, China

Version number of the document: 01

Date: 05/09/2008

Version number of the document: 02

Date: 09/09/2009(revised after on site visit according to the DOE's validation protocol and other requirements)

Version number of the document: 03

Date: 22/10/2009(revised according to the CB's comments from TUV SUD)

Version number of the document: 04

Date: 28/04/2010(revised according to the incomplete comments by UNFCCC CDM Project Registration Team)

Version number of the document: 05

Date: 20/11/2010(revised according to the request for review by EB)

A.2. Description of the project activity:

Yicheng Biomass Cogeneration Project in Hubei Province, China (hereafter referred to as "the proposed project") is sited in Yicheng Hubei Province, and will be constructed and operated by Anneng (Yicheng) Biomass Thermo-Electricity Co. Ltd. The EIA of the proposed project was approved by Hubei province Environment Protection Bureau on 17th, July, 2007, and the project was approved by Hubei Development and Reform Commission on 16th, November, 2007, and purchased the equipments in April 2008.

The proposed project will consume nearly 231,303 tons of surplus biomass per year (mainly being rice straw, rape stalk and cotton stalk, hereafter referred to as "biomass") which will be collected from local towns around Yicheng City. The construction and operation of the proposed project will realize biomass comprehensive utilization and provide clean energy. It is conservatively estimated that in the 21 kilometers radius range of the project site[1] the total available quantities for biomass is 300,000-400,000 tons[2] (these surplus biomass mainly decayed or uncontrolled burning in field in baseline scenario[3]), which is much more than the usage quantities of the proposed project of 231,303 tons. Therefore, biomass resources are abundant around Yicheng city.

[1] According to Page 30 in the FSR, the biomass collection radius between the dispersed farmers to the collection stations is 5km, and the biomass collection radius between the collection stations and the proposed biomass cogeneration plant is 15km. In order to be more conservative, 21km was chosen as the total biomass collection radius from the dispersed biomass supply sites to the proposed project site.

[2] Page 27 in the FSR.

[3] Page 25 in the FSR.

The existing scenario prior to the implementation of the proposed project is equal to the baseline scenario.The existing scenario prior to the implementation of the proposed project is that the Central China Power Grid supplies the same annual power generation, and the same amount of heat is supplied by coal-fired boilers, and the same amount of biomass is dumped or left to decay under mainly aerobic conditions or burnt in an uncontrolled manner, as identified in the section B.4.

Before the implementation of the proposed project, there are no equipments and systems of biomass cogeneration plants or fossil fuel fired cogeneration plants or the fossil fuel fired power and heat plants in the nearby of the project site. The proposed project is a new biomass project in Yicheng city, and it includes system of biomass collection, transportation and storage, combustion system, thermoelectricity system and other auxiliary system, and the main equipments involved include biomass burning boiler, steam turbines and generators.

The baseline emission sources are CO_2 emission by Central China Power Grid, CO_2 emission by coal-fired boilers, CH_4 emission by decay under mainly aerobic conditions or burnt in an uncontrolled manner. The project emission resources are CO_2 emissions by on-site fossil fuel[4], CO_2 emission by power consumption, CO_2 emission by biomass transportation and CH_4 emission by biomass burning.

The proposed project will install two 75 t/h biomass direct burning boilers and two 12 MW steam turbines and two generators, so the total installed capacity is 24 MW. The annual operation hours are estimated to be 6,500h with load factor of 74.2 %(6,500h/8,760h), and the annual electricity generation is 156,000MWh, and the annual grid-connected electricity is 141,960MWh, and the annual steam generation is 529,740GJ.[5] The generated electricity will be delivered to the Central China Power Grid (hereafter referred to as CCPG); heat supply will be supplied to surrounding industrial and commercial heat/steam demanders. The proposed project didn't involve anaerobic treatment of wastewater.

Therefore, when the proposed project is put into operation, it will help reduce GHG emissions from CCPG, which is dominated by fossil fuel fired power plants, and will reduce CO_2 emissions from coal fired boilers through clean heat/steam generation. Moreover, the proposed project will use biomass in high efficiency for energy purpose, which will reduce CH_4 emissions due to the biomass is dumped or left to decay or burned in an uncontrolled manner in the absence of the proposed project. The estimated annual GHG emission reductions are 143,033tCO_2e[6].

The proposed project mainly adopts renewable biomass as fuels, and will contribute to sustainable development in the region in following aspects:

- Use biomass resources effectively, develop recycle economy; control the burning of biomass safely, protect the environment;
- Increase the local power supply, accelerate the local economic development; displace part of the electricity generated by CCPG, which is dominated by coal-fired power plants, and reduce air pollutant emission as CO_2, SO_2, NO_X.

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[4] According to the Explanation and Clarification for the Start-up way of the boiler provided by China City Environment Protection Engineering Limited Company and by the boiler manufacturer, the proposed project will use the dry biomass to start up the boiler and the fossil fuels such as the diesel or natural gas won't be used; But in order to be more conservative, 0.5tons of diesel was considered to be consumed ex-ante and the amount of diesel will be monitored ex-post.

[5] Page 149 in the FSR

[6] The heat generation component of the proposed project is still under the planning and implementation and the project owner hasn't yet signed the formal heat supply contract with the heat end user so far. Considering the conservativeness of the emission reductions, the project owner finally decided not to claim the emission reductions due to displacement of heat. So the emission reductions due to displacement of heat ($ER_{Heat,y}$) is zero in all the crediting periods

- Meet the increasing requirement of heat, guarantee the operation of industry construction; displace small coal-fired boilers, to reduce the GHG emission and improve the air quality.
- Facilitate the local employment, and supply a lot of opportunities in construction period and long-term employment opportunities in operation period.

A.3. Project participants:

Name of Party involved (*)((host) indicates a host Party)	Private and/or public entity(ies) project participants (*) (as applicable)	Kindly indicate if the Party involved wishes to be considered as project participant (Yes/No)
People's Republic of China (host)	Anneng (Yicheng) Biomass Thermo-Electricity Co. Ltd	No
Germany	Emissionshandels Gesellschaft Bavaria GmbH	No

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):

People's Republic of China

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

Hubei Province

A.4.1.3. City/Town/Community etc:

Yicheng City

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

The proposed project is located in Yicheng City Hubei Province, 37 km away from Xiangfan City and 332 km away from Wuhan City, the capital of Hubei Province. It has north latitude of 31.6481° and east longitude of 112.7978°.[7] Figure 1 indicates the location of the proposed project.

[7] According to page 40 in the FSR, Yicheng City has north latitude of 31.4333°-31.9000°and east longitude of 111.9500°-112.7500°. The proposed project was in the above location range in Yicheng City and its concrete coordinate was directly measured by the project owner at the gate of the power plant.

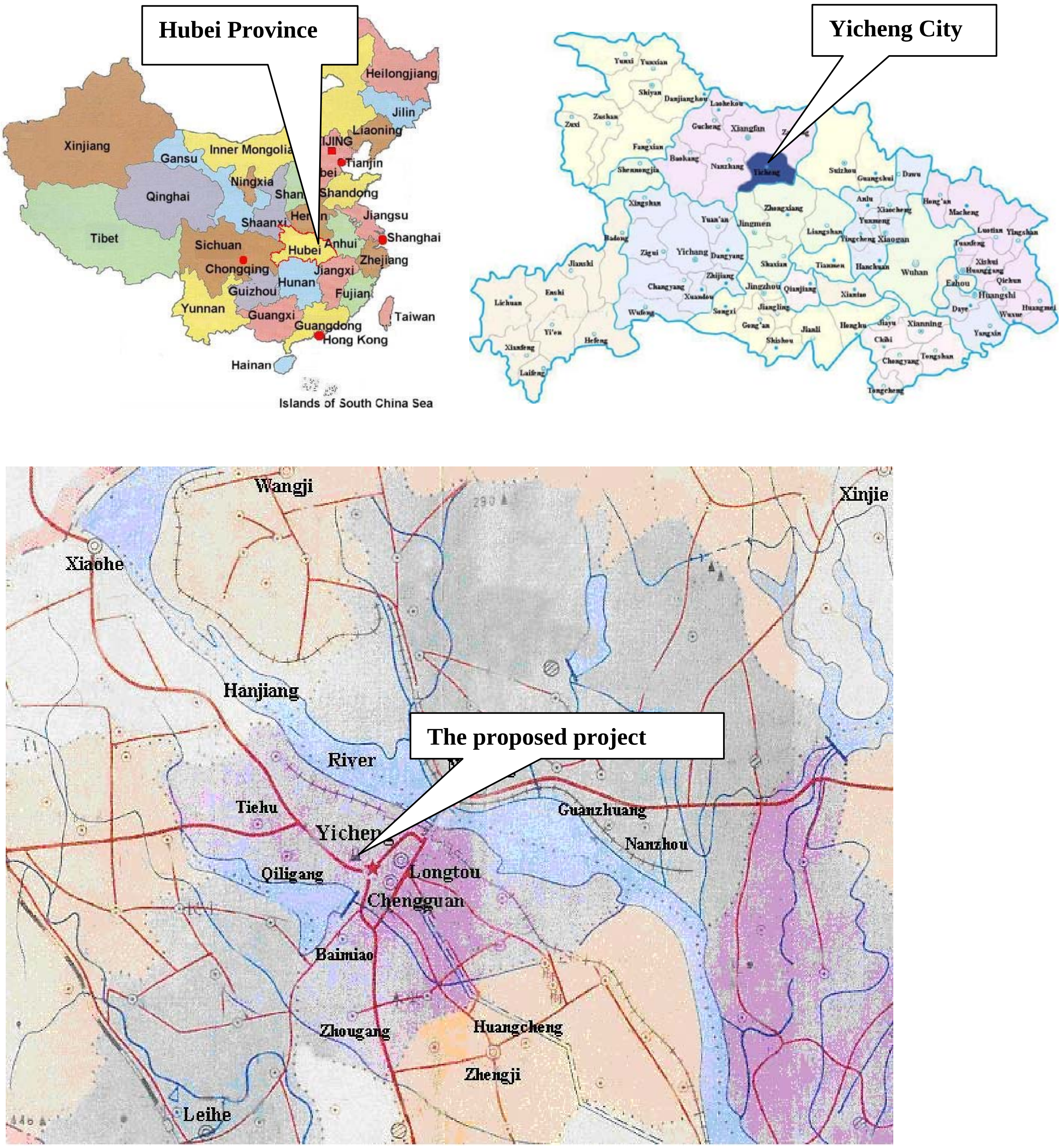

Figure 1 Location of the proposed project

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

Sectoral scope 1: energy industries (renewable sources)

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

Before the implementation of the proposed project, there are no equipments and system of biomass thermo-electricity in the nearby of the project site.

The proposed project is a new biomass cogeneration project in Yicheng city. According to the following analysis in section B.4, in absence of the proposed project, the most feasible baseline scenario is "The Central China Power Grid providing the same annual power generation", the same amount of heat supplied by coal-fired boilers, the same amount of biomass dumped or left to decay under mainly aerobic conditions or burnt in an uncontrolled manner.

Central China Power Grid is dominated by fossil fuel-fired power plants, and it is developed fast recently. In three years between 2004 and 2006, the annual average increasing rate of the total installed capacity is 15.6% and the annual average increasing rate of the coal-fired install capacity is 15.3%. In five years between 2002 and 2006, the annual average increasing rate of total generated electricity is 7.8% and the annual average increasing rate of coal-fired generated electricity is 22.0%; in annual generated electricity composition, coal-fired generation accounts for 64.1%, 65.6%, 61.5%, 61.8% and 63.4% respectively in year 2002-2006.

The baseline emission sources are CO_2 emission by Central China Power Grid, CO_2 emission by coal-fired boilers, CH_4 emission by decay under mainly aerobic conditions or burnt in an uncontrolled manner. The project emission resources are CO_2 emissions by on-site fossil fuel, CO_2 emission by power consumption, CO_2 emission by biomass transportation and CH_4 emission by biomass burning.

The proposed project will adopt the biomass direct burning technology. The proposed project activity includes biomass collection, transportation and storage system, biomass combustion system, heat and power generation system and other auxiliary systems. Before the biomass combustion system, there is the pre-treatment process for the biomass such as biomass collection and transportation outside of the proposed project site (including biomass packing and storage system, biomass purchase stations, transportation to the proposed project site) and biomass collection and transportation inside of the proposed project site (storage inside of the project site, breaking and feeding system).[8]

As for the mass flow for the proposed project, the biomass will be collected, transported to the proposed project site and finally burnt in the boilers to convert to the energy.

As for the energy flow for the proposed project, the boilers will generate the steam and then be input to the steam turbines and then part of the steam will supply the heat suppliers and the remaining part of the steam will be input to the generators to generate the electricity finally connected to CCPG. The whole process for the systems is balanced.

The proposed project will install two 75 t/h biomass direct burning boilers and two 12 MW steam turbines and two 12MW generators, which are manufactured by domestic companies. Key technical specifications of boilers, steam turbines and generators are listed as Table 1 below.

Table 1 key technical parameters of boilers, steam turbines and generators

Boilers[9]	
Items	**Parameters**
Model	DGJ-75/9.8
Quantity	2
Manufacturer	Zigong Huaxi Energy Industrial Sharing Co. Ltd
Boiler rated evaporating capacity (t/h)	75
Rated pressure at the exit of Super heater (MPa)	9.8
Rated Temperature at the exit of Super heater (℃)	540
Boiler feed-water temperature (℃)	215
Lifetime of the boilers	30years

[8] Chapter 7.2 in the FSR.

[9] The Purchase Agreement for Boilers between the project owner and Zigong Huaxi Energy Industrial Sharing Co. Ltd;

Steam turbines[10]	
Model	C12-8.83/0.98
Quantity	2
Manufacturer	Qingdao Jieneng Steam Turbines Group Sharing Co. Ltd
Rated capacity (MW)	12
Rated put-in steam pressure (MPa)(a)	8.83±0.49
Rated put-in steam temperature (℃)	535（+5, -10）
Rated rotating speed (r/min)	3000
Rated Extraction steam pressure (MPa)(a)	0.98
Rated/Maximum Extraction steam amount(t/h)	30/50
Lifetime of the steam turbines	No less than 30years
Generators[11]	
Model	QF-12-2
Quantity	2
Manufacturer	Qingdao Jieneng Steam Turbines Group Sharing Co. Ltd
Rated capacity (MW)	12
Rated voltage (kV)	6.3
Capacity factor	0.8
Rated frequency (HZ)	50
Rated rotating speed (r/min)	3000
The efficiency	≥97%
Lifetime of the generators	No less than 30years

The voltage of the electricity at the outlets of the two generators is 6.3 kV, and will be increased to 35 kV by the main transformers and then sent to Baimiao Substation through two 35 kV circuits, finally to CCPG, the transmission distance from the power station to Baimiao Substation is about 4.5 kilometers. The steam will be supplied to the nearby industrial and commercial heat demanders.

The proposed project makes good use of the renewable biomass to generate electricity instead of combusting the fossil fuels and heat instead of combusting the fossil fuels, and it can reduce the air pollutant emission such as CO_2, SO_2, NO_X. It can also avoid the CH_4 emission from biomass by decayed under mainly aerobic conditions or burnt in an uncontrolled manner. The Environmental Impact Assessment (EIA) Report for the proposed project was approved by the Environmental Protection Bureau of Hubei Province on 17th July, 2007, with approval No. "Ehuanhan [2007] No.280". The proposed project can meet the target of environmental protection through implementing the measures set in section E in the PDD. So it was environmentally safe.

The proposed project adopts domestic technologies and facilities, not referring to international technical transfer.

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[10] The Purchase Agreement for Turbines and Generators between the project owner and Qingdao Jieneng Steam Turbines Group Sharing Co. Ltd;

[11] The Purchase Agreement for Turbines and Generators between the project owner and Qingdao Jieneng Steam Turbines Group Sharing Co. Ltd;

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

The renewable crediting period of the proposed project is chosen as 7*3 years. It is estimated that the proposed project will have a total GHG emission reductions of about 1,001,231 tCO_2e in the first renewable crediting period (from 01/07/2010 to 30/06/2017) with an annual emission reduction of 143,033 tCO_2e.

Year	Annual estimation of emission reductions in tonnes of CO_{2e}
01/07/2010- 30/06/2011	143,033
01/07/2011- 30/06/2012	143,033
01/07/2012- 30/06/2013	143,033
01/07/2013- 30/06/2014	143,033
01/07/2014- 30/06/2015	143,033
01/07/2015- 30/06/2016	143,033
01/07/2016- 30/06/2017	143,033
Total estimated reductions (tonnes of CO_{2e})	1,001,231
Total number of crediting years	7
Annual average over the crediting period of estimated reductions （tonnes of CO_{2e}）	143,033

A.4.5. Public funding of the project activity:

No official development assistant (ODA) from Annex I Parties is involved in the proposed project.

SECTION B. Application of a baseline and monitoring methodology

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

The approved baseline and monitoring methodology applied in the proposed project activity is ACM0006 "Consolidated methodology for electricity generation from biomass residues in power and heat plants" (Version 10, EB52).

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

- ACM0002: "Consolidated baseline and monitoring methodology for grid-connected electricity generation from renewable sources" (Version 11, EB52);
- "Tool to calculate the emission factor for an electricity system" (version 02, EB50);
- "Combined tool to identify the baseline scenario and demonstrate additionality" (Version 02.2, EB28);
- Tool to calculate project or leakage CO2 emissions from fossil fuel combustion (version 02, EB41);
- "Tool to calculate baseline, project and/or leakage emissions from electricity consumption" (version 01, EB39).

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

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:

The proposed project will construct a new cogeneration power station with fuel of surplus biomass residues, the baseline scenario is combination of power supplied by CCPG, heat supplied by dispersive coal-fired boilers, biomass dumped or left to decay under mainly aerobic conditions or burnt in an uncontrolled manner. It belongs to baseline and project combination scenario2 which is regulated by methodology ACM0006, and accord with the application premise of methodology ACM0006.

Meanwhile, methodology ACM0006 regulates the application conditions, and the proposed project meets all these conditions:

The applicable conditions set in ACM0006	The specific conditions for the proposed project
1. The main fuels of the proposed project are biomass residues.	According to the FSR and the approval letter for the FSR, biomass from local agricultural residues will be the predominant fuel in the proposed project, and there are no co-fired fossil fuels. According to the Explanation and Clarification for the Start-up way of the boiler provided by China City Environment Protection Engineering Limited Company and by the boiler manufacturer, the proposed project will use the dry biomass to start up the boiler and the fossil fuels such as the diesel or natural gas won't be used. But in order to be more conservative, 0.5tons of diesel was considered to be consumed ex-ante and the amount of diesel will be monitored ex-post.
2. For projects that use biomass residues from a	According to the FSR and the approval letter for the

production process (e.g. production of sugar or wood panel boards), the implementation of the project shall not result in an increase of the processing capacity of raw input (e.g. sugar, rice, logs, etc.) or in other substantial changes (e.g. product change) in this process;	FSR, the biomass used by the proposed project is by products of agriculture crops, not from a production process.
3. The biomass residues used by the project facility should not be stored for more than one year;	According to the biomass collection and disposal conditions of the proposed project[12], the storage time of the biomass won't be no more than half year, and be average three months.
4. No significant energy quantities, except from transportation or mechanical treatment of the biomass residues, are required to prepare the biomass residues for fuel combustion, i.e. projects that process the biomass residues prior to combustion (e.g. esterification of waste oils) are not eligible under this methodology.	According to the FSR, the proposed project will consume some energy because of transportation of the biomass, which will be monitored after operation. Except this, no significant energy quantities are required.

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

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

The space boundary of the proposed project includes the proposed cogeneration power station, the transportation process of biomass residues from the dispersed biomass supply sites to the proposed project site, sites where biomass residues will be dumped or burned in the absence of the proposed project activity, and all power plants connected to CCPG. According to the guidance on grid boundaries provided by the China's DNA NDRC on 18th July, 2008, CCPG covers Jiangxi Power Grid, Henan Power Grid, Hunan Power Grid, Hubei Power Grid, Sichuan Power Grid and Chongqing Power Grid.

According to ACM0006 (version 10), emission sources include or excluded in baseline emission and project emission for the proposed project are shown as below:

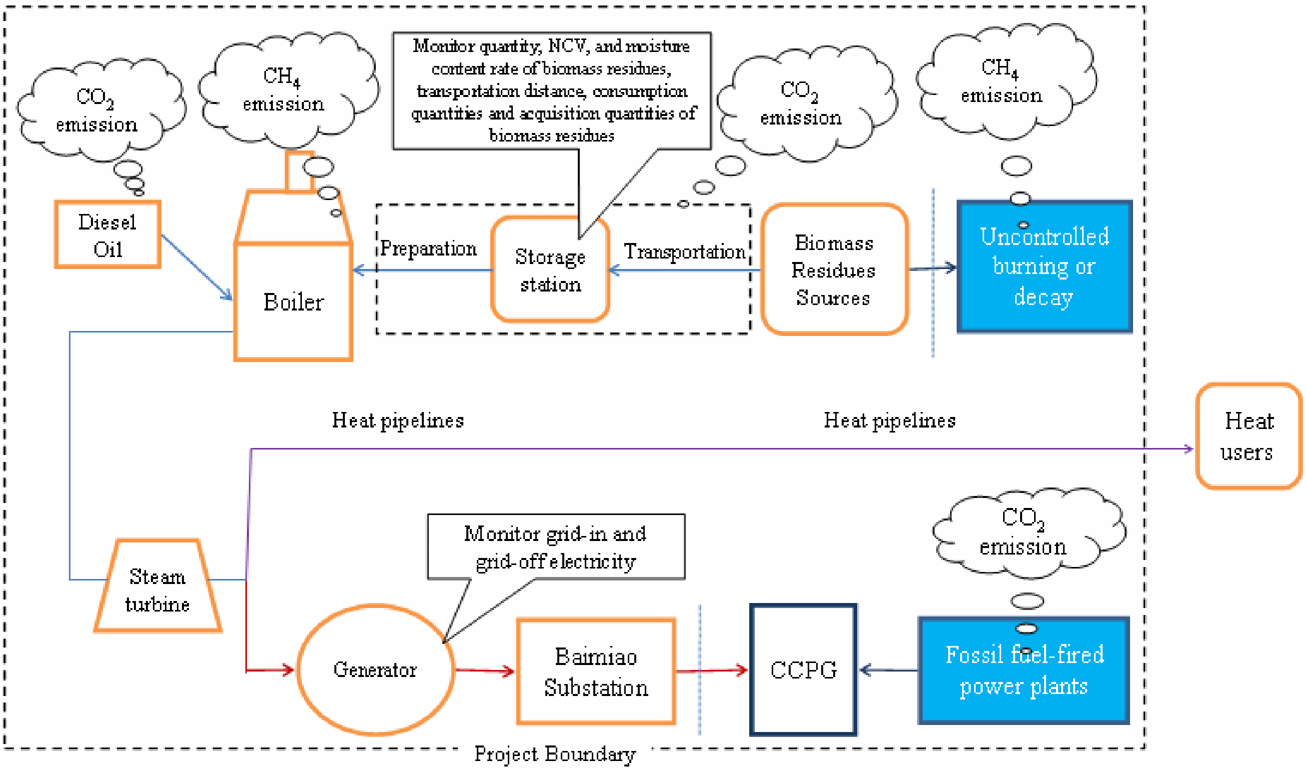
	Source	**Gas**	**Included or excluded**	**Justification / Explanation**
Baseline	Electricity Generation by CCPG	CO_2	Included	Main emission source
		CH_4	Excluded	Excluded for simplification. This is conservative.
		N_2O	Excluded	Excluded for simplification. This is conservative.
	Heat generation by small coal-fired boilers	CO_2	Included	Main emission source.
		CH_4	Excluded	Excluded for simplification. This is conservative.
		N_2O	Excluded	Excluded for simplification. This is conservative.
	Uncontrolled burning or decay of surplus biomass residues	CO_2	Excluded	It is assumed that CO_2 emissions from surplus biomass residues do not lead to changes of carbon pools in the LULUCF sector.
		CH_4	Included	The project participants of the

[12] Chapter 7.2 in the FSR

				proposed project finally decided to include this emission source, since B1 and B3 have been identified as the most likely baseline scenario for the proposed project.
		N_2O	Excluded	Excluded for simplification. This is conservative.
Project Activity	On-site fossil fuel and electricity consumption due to the project activity (stationary or mobile)	CO_2	Included	An important emission source
		CH_4	Excluded	Excluded for simplification. This emission source is assumed to be very small
		N_2O	Excluded	Excluded for simplification. This emission source is assumed to be very small
	Off-site transportation of biomass residues	CO_2	Included	An important emission source
		CH_4	Excluded	Excluded for simplification. This emission source is assumed to be very small
		N_2O	Excluded	Excluded for simplification. This emission source is assumed to be very small
	Combustion of biomass residues for electricity and/or heat generation	CO_2	Excluded	It is assumed that CO_2 emissions from surplus biomass do not lead to changes of carbon pools in the LULUCF sector.
		CH_4	Included	Because the CH_4 emissions from uncontrolled burning or decay of biomass residues in the baseline scenario have been included, this emission source must be included.
		N_2O	Excluded	Excluded for simplification. This emission source is assumed to be small
	Storage of biomass residues	CO_2	Excluded	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	Excluded	Excluded for simplification. Since biomass residues are stored for not longer than one year, this emission source is assumed to be small.
		N_2O	Excluded	Excluded for simplification. This emissions source is assumed to be very small.
	Waste water from the treatment of biomass residues	CO_2	Excluded	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	Excluded	There is none of waste water which is treated (partly) under anaerobic

				conditions for the proposed project, so this source is excluded.
		N_2O	Excluded	Excluded for simplification. This emission source is assumed to be small.

The flow diagram of the proposed project is as follows:



B.4. Description of how the <u>baseline scenario</u> is identified and description of the identified baseline scenario:

According to the requirement of ACM0006, identification of the baseline scenario will adopt "Combined tool to identify the baseline scenario and demonstrate additionality" (version 02.2), the steps are as below:
Step 1: Identification of alternative scenarios
Step 1a: Define alternative scenarios to the proposed CDM project activity

For the proposed project is biomass cogeneration project, the analysis of alternative scenario includes three parts: such as electricity supply, heat supply and biomass residues disposal.

Methodology ACM0006 sets P1-P11 baseline alternatives scenarios for power generation, and according to the actual condition of the proposed project the analysis for them is as below:

Series	Alternatives	Included?	Justification/Explanation
P1	The proposed project activity not undertaken as a CDM project activity.	**Yes**	It seems to be a plausible alternative without considering the analysis described in the latter step 3.
P2	The continuation of power generation in	No	The proposed project is a new power and

	an existing biomass residue fired power and heat plant at the project site, in the same configuration, without retrofitting and fired with the same type of biomass residues as (co-) fired in the project activity.		heat plant and there are none of existing biomass residue fired power and heat plants on-site or nearby the project site, so P2 is excluded.
P3	The generation of power in an existing captive power and heat plant, using only fossil fuels.	No	There are none of fossil fuel fired captive power and heat plants on-site or nearby the project site, so P3 is excluded.
P4	The generation of power in the grid (CCPG).	**Yes**	The generation of power from CCPG will meet the requirement of national laws and regulations, also financially viable. Hence, the Alternative P4 is a feasible alternative.
P5	The installation of a **new** biomass residue fired power and heat plant, fired with the same type and with the same annual amount of biomass residues as the project activity, but with a lower efficiency of electricity generation than the project plant and therefore with a lower power output than in the project case.	No	According to national guidelines of saving energy and reducing emission such as Law of the People's Republic of China on Conserving Energy [13] , power industry generally adopt advanced technology; technology with low-efficient is hard to receive. Furthermore, according to the "Economic evaluation and influence factors analysis on biomass combustion for power generation"[14] which was written by Doctor Huangjintao and published on Renewable Energy Resources in April 2008, it can shown that the lower efficiency technology will bring higher electricity cost., so a lower efficiency technology results in a less financially attractive project. At the same time, the biomass fired power generation is a very new technology in China, and the biomass residue fired power and heat plant fired with the same type and with the same annual amount of biomass residues as the project activity with a lower efficiency of electricity generation is not common practice in the local area. Therefore, alternatives P5 is prevented by law barriers and less financial attractive, and thus cannot become the most realistic alternative for power generation. So P5 is excluded.
P6	The installation of a **new** biomass residue fired power and heat plant that is fired with the same type but with a higher annual amount of biomass residues as the project activity and that has a lower efficiency of electricity	No	P6 is excluded by the same reason as the above P5.

[13] http://www.chinatax.gov.cn/n480462/n480513/n480902/8083826.html
[14] http://d.wanfangdata.com.cn/Periodical_ncny200802027.aspx

	generation (e.g. an efficiency that is common practice in the relevant industry sector) than the project activity. Therefore, the power output is the same as in the project case.		
P7	The **retrofitting** of an existing biomass residue fired power and heat plant, fired with the same type and with the same annual amount of biomass residues as the project activity, but with a lower efficiency of electricity generation (e.g. an efficiency that is common practice in the relevant industry sector) than the project plant and therefore with a lower power output than in the project case.	No	The proposed project is a new power and heat plant and there are none of existing biomass residue fired power and heat plants on-site or nearby the project site, so P7 is excluded.
P8	The **retrofitting** of an existing biomass residue fired power and heat that is fired with the same type but with a higher annual amount of biomass residues as the project activity and that has a lower efficiency of electricity generation (e.g. an efficiency that is common practice in the relevant industry sector) than the project activity.	No	The proposed project is a new power and heat plant and there are none of existing biomass residue fired power and heat plants on-site or nearby the project site, so P8 is excluded.
P9	The installation of a **new** fossil fuel fired captive power and heat plant at the project site.	**Yes**	It will be analyzed in Sub-step 1b below.
P10	The installation of a new single- (using only biomass residues) or co-fired (using a mix of biomass residues and fossil fuels) cogeneration plant with the same rated power capacity as the project activity power and heat plant, but that is fired with a different type and/or quantity of fuels (biomass residues and/or fossil fuels). The annual amount of biomass residue used in the baseline scenario is lower than that used in the project activity;	No	Firstly, as per the FSR there are no other different biomass residues abundant for a new single cogeneration plant with the same rated power capacity as the project activity power and heat plant. Secondly, it is not allowed in China that the new-built biomass project using other fossil fuels[15], so the new co-fired cogeneration plant with a different type and quantity of fuels (biomass residues and fossil fuels) is not feasible.
P11	The generation of power in an existing fossil fuel fired cogeneration plant co-fired with biomass residues, at the project site.	No	According to the FSR, there are no existing fossil fuel fired cogeneration plants co-fired with biomass residues at the project site, so P11 is excluded.

Methodology ACM0006 sets H1-H10 baseline alternatives scenarios for heat generation, and according to the actual condition of the proposed project the analysis for them is as belows:

[15] "Notification of Further Strengthening Environmental Impact Assessment Management of Biomass Power Generation Projects" approved and issued by Ministry of Environmental Protection of PRC, NDRC and National Energy Bureau on 4th September 2008,http://www.gov.cn/gzdt/2008-09/08/content_1090271.htm

Series	Alternatives	Included?	Justification/Explanation
H1	The proposed project activity not undertaken as a CDM project activity	**Yes**	It seems to be a plausible alternative without considering the analysis described in the latter step 3.
H2	The proposed project activity (installation of a power and heat plant), fired with the same type of biomass residues but with a different efficiency of heat generation	No	At present, biomass cogeneration technology is at the initial stage, and the biomass cogeneration plants (including those with lower efficiency of heat generation) are not common practice in China. The adoption of lower efficiency of heat generation is not conformity with the national guideline of saving energy and reducing emission, which encourages the energy-saving and higher efficiency projects[16]. Therefore, **H2** is excluded.
H3	The generation of heat in an existing captive power and heat plant, using only fossil fuels	No	There are none of existing captive fossil fuel fired power and heat plant on-site or nearby the project site, so H3 is excluded.
H4	The generation of heat in boilers using the same type of biomass residues	No	The biomass residues are dumped or burnt in an uncontrolled manner, and there is no heat boiler using biomass residues in the local area, while all the heat demand is satisfied by local fossil-fuel boilers[17]. Therefore, heat generation by biomass boiler is not a common practice, and **H4** is excluded.
H5	The continuation of heat generation in an existing biomass residue fired power and heat plants at the project site, in the same configuration, without retrofitting and fired with the same type of biomass residues as in the project activity	No	The proposed project is a new power and heat plant and there are none of existing biomass residue fired power and heat plants on-site or nearby the project site, so H5 is excluded.
H6	The generation of heat in boilers using fossil fuels	**Yes**	H6 will meet the requirement of national laws and regulations, also financially viable. Hence, the Alternative H6 is possibly a feasible alternative. Its detailed analysis was shown as follows.
H7	The use of heat from external sources, such as district heat	No	There is none of external sources and district heat in the nearby areas around the proposed project [18], so H7 is excluded.

[16] http://www.chinatax.gov.cn/n480462/n480513/n480902/8083826.html

[17] Chapter 2 in the FSR.

[18] Chapter 2 in the FSR

H8	Other heat generation technologies (e.g. heat pumps or solar energy)	No	Other heat generation technologies (e.g. heat pumps or solar energy) are still at demonstrate stage [19], the technologies are infeasible, so H8 is excluded.
H9	The installation of a **new** single- (using only biomass residues) or co-fired (using a mix of biomass residues and fossil fuels) power and heat plant with the same rated power capacity as the project activity power and heat plant, but that is fired with a different type and/or quantity of fuels (biomass residues and/or fossil fuels). The annual amount of biomass residue used in the baseline scenario is lower than that used in the project activity;	No	Firstly, as per the FSR there are no other different biomass residues abundant for a new single cogeneration plant with the same rated power capacity as the project activity power and heat plant. Secondly, it is not allowed in China that the new-built biomass project using other fossil fuels[15], so the new co-fired cogeneration plant with a different type and quantity of fuels (biomass residues and fossil fuels) is not feasible. Thus alternative H9 is excluded.
H10	The generation of power in an existing fossil fuel fired cogeneration plant co-fired with biomass residues, at the project site.	No	According to the FSR, there is no existing fossil fuel fired cogeneration plants co-fired with biomass residues at the project site, so H10 is excluded.

The detailed analysis for H6 was shown as follows:

As for the requirements set in page 6 in ACM0006 (version 10), the detailed information on the requirement is as follows:

Because the proposed project site is near to the end-users of the steam (8.6km) and both sites are under the same city and the same environment, so the two sites are analyzed together:

(1)According to p16 in section 2.1 in the FSR, there is none of power and heat plant that was operating at the project site during the most recent three years prior to the start of the project activity.

(2)According to p18 in table 2-1 in the FSR, there are existing 20 coal fired boilers that were operating at the project site during the most recent three years prior to the start of the project activity.

The detailed information for them is as follows:

Num.	Steam users	Location geographical coordinates	boilers owned by the steam users(unit)	Type of boilers	Types of fuels
1	Yanjing Beer (Xiangfan) Co.Ltd.	north latitude of 31.7097° and east longitude of 112.2794°	5 1	SZL6-1.25 SZW10-1.25	Coal
2	Yicheng Guangfa Paper Co.Ltd.	north latitude of 31.6750° and east longitude of 112.2531°	1	DZL6-1.25	Coal
3	Yicheng Yingfeng Cereals Co.Ltd.	north latitude of 31.7203° and east longitude of 112.2347°	1	DZL2-1.25	Coal
4	Yicheng Yaxin Textiles Co.Ltd.	north latitude of 31.7203° and east longitude of 112.2225°	1	SZW4-1.25	Coal
5	Yicheng Yunjin Textiles Co.Ltd	north latitude of 31.6878° and east longitude of 112.2594°	1	DZL2-0.69	Coal
6	Yicheng People's	north latitude of 31.7006°	1	DZG4-1.25	Coal

[19] http://nyj.ndrc.gov.cn/zywx/t20060206_58771.htm

	Hospital	and east longitude of 112.2556°	1	DZL2-1.25	
7	Yicheng Honghai Textiles Co.Ltd	north latitude of 31.7042° and east longitude of 112.2619°	1	KZL2-0.78	Coal
8	Yicheng Chinese Medicine Hospital	north latitude of 31.7158° and east longitude of 112.2619°	1	DZL1-0.8	Coal
9	Xiangfan Fodder Co.Ltd.	north latitude of 31.7203° and east longitude of 112.2183°	1	DZL2-1.25	Coal
10	East Fine Chemicals Co.Ltd.	north latitude of 31.6939° and east longitude of 112.2519°	1	DZL6-1.25	Coal
11	Yaxin Textiles New Plant Co.Ltd	north latitude of 31.7203° and east longitude of 112.2225°	1	DZL4-1.6	Coal
12	Yicheng Hotel	north latitude of 31.7089° and east longitude of 112.2594°	1	DZL1.4-0.7	Coal
13	Xinyuan Vegetable Oil Co.Ltd	north latitude of 31.7181° and east longitude of 112.2364°	1 1	KZL4-1.25 KZL1-8	Coal

So, in the absence of the project activity, there were 20 existing coal fired boilers constructed and operated by the heat demanders themselves. After the start of the proposed project activity, the boilers will be replaced and stop operation.

(3) According to the chapter 2 in the FSR, there was none of boiler or power and heat plant installed under the project activity.

(4) In the absence of the proposed project, according to p19 in section 2.2.2 in the FSR, there will be none of new boiler or new power and heat plant, and the heat would be generated by the existing coal-fired boilers. After the start of the proposed project activity, the above boilers will be replaced and stop operation.

So, the heat in absence of the project activity would have come from coal and not from any other less carbon intensive fossil or biomass fuel or from other renewable source.

The proposed project uses three types of biomass residues such as rice straw, rape stalk and cotton stalk. The total quantity of biomass consumed by the project activity per year is 231,303 tons, and the detailed information for the three types was as follows:

Types of biomass	**Content(tons)**
rice straw	138,782(60%)
Rape stalk	34,695(15%)
Cotton stalk	57,826(25%)
Total	231,303(100%)

Because their baseline alternatives for the three types are the same as dumped or left to decay under mainly aerobic conditions or burnt in an uncontrolled manner, they are analyzed together when doing the baseline scenario analysis.

Methodology ACM0006 sets B1-B8 baseline alternatives scenarios for biomass residues disposal, and according to the actual condition of the proposed project the analysis for them is as below:

Series	**Alternatives**	**Included?**	**Justification/Explanation**
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.	**Yes**	The Alternative B1 is possibly a feasible alternative.
B2	The biomass residues are dumped or left	No	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.		to decay under anaerobic conditions, which only happen under manually controlled condition with proper temperature and moisture, which will give rise to the certain investment for deep landfills to purchase the certain equipments and the certain engineering systems (there were none of existing landfill sites near the proposed project site which can be adopted). Therefore, alternative B2 is economically less attractive, and should be excluded from the baseline scenario.
B3	The biomass residues are burnt in an uncontrolled manner without utilizing it for energy purposes.	**Yes**	The Alternative B3 is possibly a feasible alternative.
B4	The biomass residues are used for heat and/or electricity generation at the project site	**Yes**	It seems to be a plausible alternative without considering the analysis described in the latter step 3.
B5	The biomass residues are used for power generation, including cogeneration, in other existing or new grid-connected power and heat plants	No	There is no power generation project using biomass residues as fuel close to proposed project. Considering the cost of biomass transportation, other existing or new grid-connected power and heat plants will not use these surplus biomass residues. Therefore, B5 is excluded.
B6	The biomass residues are used for heat generation in other existing or new boilers at other sites	No	The biomass residues used in the proposed project wasn't adopted for heat supply, because there are none of existing biomass residue fired power and heat plants on-site or nearby the project site, so B6 is excluded.
B7	The biomass residues are used for other energy purposes, such as the generation of biofuels	No	The biomass residues used in the proposed project are not the raw material for biofuel production. So B7 is excluded.
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)	No	Currently, there is no company using biomass residues for non-energy purpose around the project site such as fertilizer or as feedstock in processes. Furthermore, it is difficult for the biomass to be used as fertilizer. So alternative B8 is excluded.

Outcome of Step 1a:
After the analysis of the above three aspects, leave the baseline alternative scenarios as below:

Power generation: P1, P4, P9

Heat generation: H1, H6

Use of biomass residues: B1, B3, B4

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

<u>As for P9</u>

The installed capacity of the proposed project is 24MW, with the annual generation hours of 6,500 hours, so the annual electricity generation is 156,000MWh. If constructed a new coal-fired power station with same electricity supply, the generation hours for the new coal-fired power station is estimated to be about 5,712 hours[20] (coal-fired generation facility usage hours in Hubei province in 2006), so the installed capacity will be 27.31MW, much lower than 135MW. According to China's regulations on the power industry, any coal-fired power plant with installed capacity less than 135 MW[21] is forbidden and any thermal power generator unit with installed capacity per set less than 100 MW[22] is strictly controlled in places which are within a big power grid. As for P9, if a **new** fossil fuel fired captive power and heat plant at the project site with the same annual power generation as the proposed project, it is not in compliance with legal and regulatory requirements. Therefore, **P9** is not a realistic alternative, which is excluded.

<u>As for B3</u>

Hubei Province People's Congress Standing Committee approved and promulgated "Hubei province Agriculture Environment Protection Regulation". The regulation point out that: agriculture administration department should strengthen the instruction of comprehensive usage of biomass, popularize the comprehensive usage technology of biomass; prohibit burn biomass in open air in the areas of airdrome, main road, around high voltage line and the area which is regulated by local peoples' government.[23]

As the proposed project is located in Yicheng city, Hubei province, the local country is not in the area of airdrome, main road, around high voltage line and the area which is regulated by local peoples' government. Therefore, local adopt burning the surplus biomass in the open air to disposal, B3 is reserved.

Outcome of Step 1b:
<u>After the analysis, the surplus baseline alternative scenarios as below:</u>

Power generation: P1, P4

Heat generation: H1, H6

Use of biomass residues: B1, B3, B4

The baseline scenarios above are all accord with the current law and regulation, and these scenarios should not be enforced according to the mandatory laws and regulations.

Step 2: Barrier analysis

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.

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[20] Page 626 in the 2007 China Electric Power Yearbook

[21] *Notice on Banning the Development of thermal generators with capacity under 135 MW from the General Office of the State Council*

[22] *Interim Measures on Construction and Management of Small Thermal Power Generators (August 1997)*

[23] http://www.hbxgagri.gov.cn/govern/Print.asp?ArticleID=1469

Outcome of Step 2a:

The barriers that would prevent the implementation of alternative scenarios are not identified yet.

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

None of the remaining alternative scenarios after step 1 is eliminated by step 2.

Outcome of Step 2b:

None of the remaining alternative scenarios after step 1 is eliminated by step 2. These scenarios are needed to be further discussed in Step 3.

In fact, baseline scenario B1, B3 exist at the same time, which should be considered as baseline scenario (B1+B3), namely, part of biomass residues is naturally decay in aerobic conditions, other part of biomass residues is uncontrolled burning. But their composing is hard to decide, so in calculating baseline emission, conservative consider that they all are emission by uncontrolled burning. Further, B4 scenario "biomass residues is used to power supply and/or heat supply in project site" should be considered as scenario "the proposed project is not as a CDM project".

From the analysis above, the feasible combination baseline scenario of power generation, heat generation, use of biomass residues is conclude as below:

- Combination 1: P1+H1+B4
- Combination 2: P4+H6+ (B1+B3)

We can see that, the project is not the only scenario which is both feasible in technology and accords with current regulation. After analysis in the step3 investment analysis below, combination scenario of P1, H1, B4 is not economically attractive, it belongs to baseline regulated by methodology ACM0006 and project combination scenario2.

Step 3: Investment analysis

According to the ACM0006 (Version 10), 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, "Combined tool to identify the baseline scenario and demonstrate additionality" (Version 02.2) establishes in its footnote No.1 (on the first page of the methodology tool) that for project activities in which one or more alternatives are not available options to project participants (such as grid-connected power projects or other projects that increase the delivery of a given product to a local, regional or global market), a different procedure to demonstrate additionality and identify the baseline scenario must be required. 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 which such projects might compete), and provide their own methods to develop and/or assess baseline scenario. Besides, "Guidance on the Assessment of Investment Analysis" issued in EB39 has clearly pointed that if the alternative to the project activity is the supply of electricity from a grid this is not to be considered an investment and a benchmark approach is considered appropriate.

According to the above, this PDD will use the Benchmark to analyze whether the proposed project activity is less economically or financially attractive than the alternatives without the revenue from CER.

To conduct the investment analysis, use the following sub-steps:

Since P4 (generation of power in the grid) is not a comparable specific new project, therefore an investment comparison analysis can not be conducted between the remaining scenarios of power generation P1 and P4, and the investment analysis for P1 (the proposed project activity not undertaken as a CDM project activity) has to be conducted, compared with the appropriate investment benchmark.

The choice of the IRR benchmark:

Feasibility Study Provision of Project Combined Heat and Power Generation issued by State Development

Planning Commission, State Economic and Trade Commission and Ministry of Construction on 11th January 2001 is applicable for the cogeneration projects with capacity equal or less than 300MW, and according to page 129 in the item 1.7 of this Guideline, *in order to adapt the market economy condition, in the financial analysis the IRR target adopts the "the acceptable target recovery rate of the investors". As for the specific evaluation of some project, its target recovery rate is determined by the investors.* It can be shown that there is none of clearly consolidated IRR benchmark for the cogeneration industry. As for the proposed project, the revenues from the electricity are about 3.2 times of the revenues from the heat, so the revenue from the electricity is the main part and the benchmark of the electricity can be referred as the benchmark.

In accordance with ***Interim Rules on Economic Assessment of Electrical Engineering Retrofit Projects*** issued by former State Power Corporation of China, there is not yet such a financial internal rate of return (IRR) as benchmark in China's power generation industry to date. However, the project IRR shall not be lower than 8 percent considering economic assessments of hydropower projects, fossil fuel fired projects, transmission and substation projects[24]. Nowadays many of China's existing power projects have applied it as the benchmark IRR.

So, during the FSR period, the project owner decided to adopt the 8% as its acceptable target recovery rate. The FSR was approved by the local government.

Therefore, 8% is selected as the benchmark of this project.

According to the feasibility study report of proposed project, parameters needed for calculation of key financial indicators are listed in following table 2:

Table 2 Parameters for calculation of key financial indicators

Parameters	Values	Data source
Installed capacity (MW)	24	FSR
Annual generated electricity (MWh)	156,000	FSR
Annual grid-connected electricity (MWh)	141,960[25]	FSR
Annual steam generation (GJ or ton)	529,740GJ or 195,000ton[26]	FSR
Annual biomass consumption (t)	231,303	FSR
Total static investment (million yuan)	225.17[27]	FSR

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

[25] It was calculated as: annual generated electricity *(1-self consumption rate) =156,000*(1-9%)*=141,960MWh. As for the "self consumption rate", the design institute issued the detailed Explanation Letter on how this rate was estimated and calculated, and based on the formulas in Technical Rule for Designing Auxiliary Power System of fossil fuel power plants (DL/T 5153-2002), according to capacities of the subscribed equipments and DL/T5153-2002, the station service power consumption rate would be much higher than 9%. However, there are also some equipments aren't counted in, so for the actual situation, station service power consumption rate will far exceed 9%. Therefore, the station service power consumption rate of 9% is conservative.

[26] According to the FSR, 529,740GJ is stated as annual steam generation. According to the Explanation of Converting the Unit of Annual Steam Generation from GJ to ton, based on the Enthalpy and Entropy Chart, the enthalpy value of the steam and water can be obtained respectively as 2,821kJ/kg and 105kJ/kg and the difference between them is 2,716kJ/kg(=2,821-105). So, 529,740GJ/2,716kJ/kg=195,000ton.

[27] The total static investment does not include the costs of local heat pipeline network.

Tariff (yuan/kWh, excluding VAT, from the 1st operation year to the 15th operation year)	0.5265[28]	FSR
Tariff (yuan/kWh, excluding VAT, from the 16th operation year to 20th operation year)	0.3128[29]	FSR
Steam price (yuan/ton or yuan/GJ, excluding VAT)	119yuan/ton or 43.8yuan/GJ[30]	FSR
Biomass price (yuan/ton)	232.8	FSR
Annual O&M cost (million yuan) （include biomass purchase cost）	70.73	FSR
Construction period (year)	2	FSR
Operation life (year)	20	FSR
VAT (%)	17 (electricity), 13 (heat)	FSR
City maintenance& Construction tax (%)	7	FSR
Education addition fee (%)	3	FSR
Income tax (%)	25	FSR
Depreciation rate (%)	6.47	FSR
The remaining value of the fixed capital (million yuan)	5.444	FSR
Expected CERs price (EUR/tCO_2e)	10	LOI
Crediting period(years)	21	Chosen
Currency exchange rate (RMB/EUR)	10	Expected

Note: The FSR was completed by China City Environment Protection Engineering Limited Company[31] in August 2007, which was approved by Hubei Province Development and Reform Commission in 16th November 2007.

The IRRs without and with the income from CERs sale are listed in below table 3.

Table 3 Comparison of financial indicators without and with income from CERs

Financial indicator	Unit	Without income from CERs	Benchmark	With income from CERs
IRR of total investment	%	6.10	8	13.99

[28] It was consistent with the approval letter for the electricity tariff of the proposed project issued by Hubei Province Price Bureau on 22/04/2008(Ejianengjiaohan[2008]26). And it did follow the spirit in Tentative Management Measures for Pricing and Expense-sharing for Electricity Generated from Renewable Energy issued by Chinese NDRC in 2006.

[29] It was consistent with the approval letter for the electricity tariff of the proposed project issued by Hubei Province Price Bureau on 22/04/2008(Ejianengjiaohan[2008]26). And it did follow the spirit in Tentative Management Measures for Pricing and Expense-sharing for Electricity Generated from Renewable Energy issued by Chinese NDRC in 2006.

[30] According to the FSR, the heat price was estimated to be 119yuan/ton. So the annual heat revenues is 119yuan/ton*195,000ton=23.205 million yuan. So 23.205million yuan/529,740GJ=43.8yuan/GJ.

[31] The qualification certificate for China City Environment Protection Engineering Limited Company issued by National Development and Reform Commission has been submitted to DOE.

(after tax)				

Without the income from CERs, the IRR of the proposed project is 6.10%, lower than the benchmark IRR, so the proposed project is financially unacceptable. With the income from CERs, the IRR is increased to 13.99%. Therefore, with the revenue of CDM, the proposed project becomes financially feasible to investors.

Sensitivity analysis

As per *Guidelines on the Assessment of Investment Analysis* (version 03, EB51 Annex 58), only variables that constitute more than 20% of either total project costs or total project revenues should be subjected to reasonable variation. For the proposed project, the justification of parameters is as follow:

1) Total static investment
2) Annual O&M cost
3) Biomass price
4) Grid-in tariff
5) Annual grid-in electricity
6) Heat Price
7) Annual steam

Assuming the following seven factors to vary in the range of -10% ~ +10%, the IRR of the project (without the income from CERs sales) varies to different extents, as shown in the following table 4 and Figure 2.

Table 4 Sensitivity analysis of the proposed project

	-10%	-5%	0	5%	10%
Total static investment	7.76%	6.91%	6.10%	5.31%	4.57%
Annual O&M cost	9.61%	8.04%	6.10%	3.70%	0.51%
Biomass price	8.88%	7.61%	6.10%	4.33%	2.18%
Grid-in tariff	1.01%	3.83%	6.10%	7.99%	9.58%
Annual grid-in electricity	1.27%	3.93%	6.10%	7.92%	9.47%
Annual steam	4.61%	5.38%	6.10%	6.77%	7.40%
Heat Price	4.61%	5.38%	6.10%	6.77%	7.40%

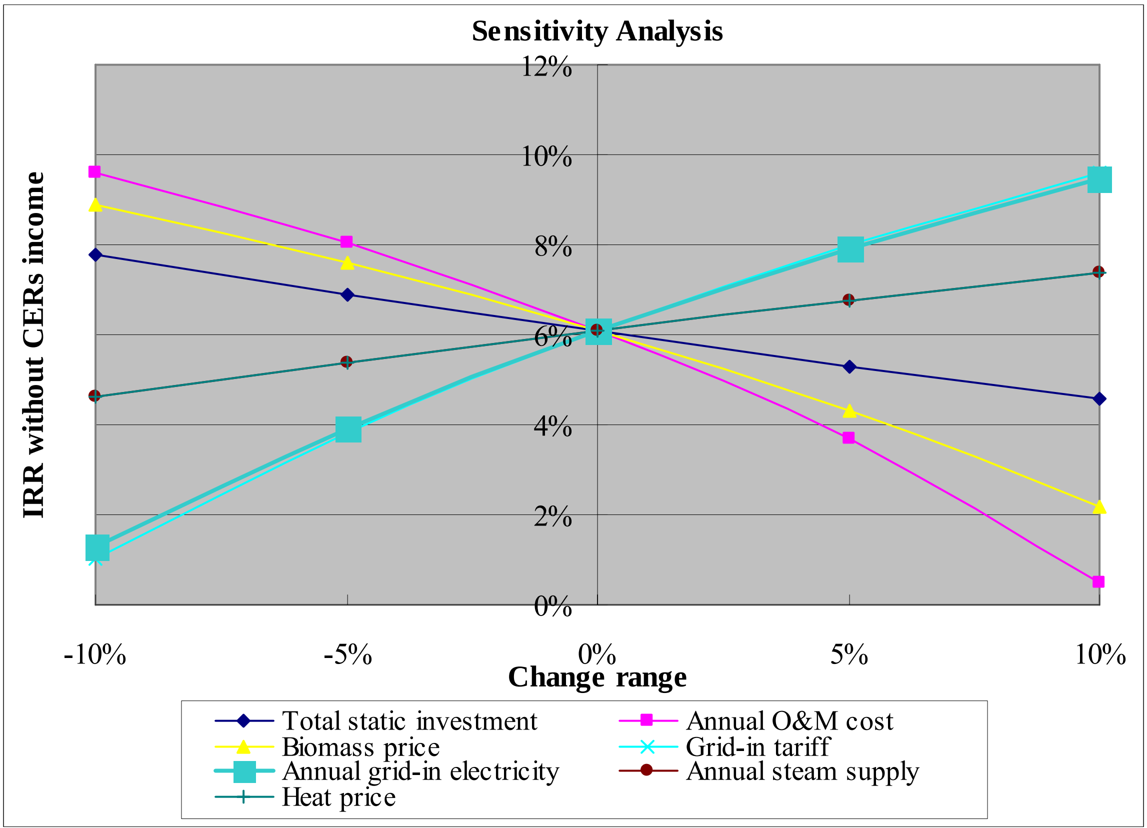

Figure 2 Sensitivity analysis of the proposed project

Calculation under what variations of the above parameters will result in the IRR can reach the benchmark

It is calculated that under the following variations of the above parameters, the IRR will reach the benchmark of 8%.

Variations of the parameters to reach the benchmark (without CERs revenues**)**

The parameters	Variation to reach the benchmark of 8%
Total static investment	-11.40%
Annual O&M cost	-4.90%
Biomass price	-6.43%
Grid-in tariff	+5.02%
Annual grid-in electricity	+5.23%
Annual steam	+15.10%
Heat Price	+15.10%

Justification why the above variations of each parameter is unlikely in the real world

<u>As for the total static investment</u>

When the total static investment decreases more than 11.40%, the IRR can reach the benchmark. The Engineering/Procurement/Construction (EPC) Contract has been signed between the project owner and *China City Environment Protection Engineering Limited Compan*y on 8th May 2008[32]. According to the

[32] Data source: the Engineering/Procurement/Construction (EPC) Contract has been submitted to DOE.

Engineering/Procurement/Construction (EPC) Contract, the actual total static investment is 230 million yuan, which is a little higher than the estimation in the FSR. Therefore, the total static investment will be impossible to decrease, and the proposed project is always lack of financial attractiveness within the reasonable change range of total static investment.

As for the annual O&M cost

When the annual O&M cost decreases more than 4.90% the IRR can reach the benchmark.

According to the FSR, the annual O&M cost was composed of the following parts:

	Estimated Cost in the FSR(million yuan)	Percentage
Power cost	2.0340	2.88%
Water cost	0.3588	0.51%
30%NaOH, 30%HCL and compressed air cost	0.9274	1.31%
Biomass cost	53.8473	76.13%
Other material cost	0.78	1.10%
Salary & welfare cost	6.2771	8.87%
Repair cost	4.5367	6.41%
Other cost	1.9725	2.79%
Total	**70.73**	**100%**

From the above, it can be resulted that the sum of the biomass cost, Salary & welfare cost is 85%, and they have bigger impact. So the two parts in O&M cost was analyzed.

a) As for the biomass cost

According to the actual measurement record by the electronic belt(the calibration report of the electronic belt and the original record by the operators have been submitted to DOE), the biomass consumption by the boilers and the generated electricity from 9th March 2010 to 31st October 2010 is shown as follows:

Period	2:00 9th March-2:00 12th March	2:00 12th March-24:00 31st march	April	May	June	July	August	September	October	Total
biomass consumption(ton)	3,266.37	6,139.11	10,614.89	10,774.8	8,846.8	9,599.03	17,128.32	13,958.76	14,063.22	94,391.3
Generated electricity (10000kWh)	83.004	255.864	730.857	669.771	573.408	650.832	988.764	813.486	762.489	5528.475
Generated heat(GJ)	0	0	0	0	0	0	0	0	0	0

As the analysis in the following for biomass price, the actual price was 265-280 yuan/ton, much higher than that estimated one in the FSR. Even if the minimum biomass price (265yuan/ton) was adopted to calculate the biomass cost from 9th March 2010 to 31st October 2010, the biomass cost during this period is 25.01369 million yuan(=265yuan/ton*94,391.3ton).

It means the biomass consumption cost per kWh is 0.452 yuan/kWh(=25.01369 million yuan/55284.75MWh), i.e. if annual electricity generation of 156,000MWh in the FSR is assumed to be generated, the biomass consumption cost would be about 70.512 million yuan. It is conservative to adopt 70.512 million yuan to calculate the assumed biomass cost in the following.

b) As for Salary & welfare cost

As for Salary & welfare cost, it was calculated as: staff×salary×(1+Rate of employee welfare) ×(1+ Labor insurance overall planning fee rate) . The Rate of employee welfare and Labor insurance overall planning fee rate are consistent with the national regulations and they are relatively stable. So the staff and the salary are the key parameters in the real world.

		The estimated value in the FSR	**The actual value in the real world**	**Evidences and justification**
Salary & welfare cost	staff	138	145	The actual evidence from the project owner
	salary	RMB 30000	RMB 30000	The actual evidence from the project owner; Furthermore, according to http://www.stats.gov.cn/tjsj/ndsj/2007/indexch.htm, the salary is ever-growing year by year over the recent years.
	Rate of employee welfare	14%	Consistent with the national regulations and relatively stable.	According to the *Technical Requirements for Cogeneration Feasibility Study* issued by State Development Planning Commission, State Economic and Trade Commission and Ministry of Construction on 11/01/2001, the rate of employee welfare should be 14%.
	Labor insurance overall planning fee rate	33%(Medical insurance of 6%+ Housing fund of 5%+ Endowment insurance of 20%+ Unemployment insurance of 2%)	Consistent with the national regulations and relatively stable.	**Medical insurance of 6%:** http://www.hbaudit.gov.cn/html/2007/0430/2417.htm **Housing fund of 5%:** http://www.chinacourt.org/flwk/show1.php?file_id=99058 **Endowment insurance of 20%:** http://www.hubei.gov.cn/zwgk/zfxxgk/zfwj/ezfwj/ezf2009/201001/t20100113_111368.shtml **Unemployment insurance of 2%:** http://www.hbxfjob.com/employment/deploy/zcfg/news/200901/20090109153854219.html

Based on the above analysis, the cost for each part in annual O&M cost can be compared between the FSR and the assumed parameters as follows

	Estimated O&M Cost in the FSR(million yuan)	**The assumed O&M cost (million yuan)**
Power cost	2.0340	0(very conservative)
Water cost	0.3588	0(very conservative)
30%NaOH, 30%HCL and compressed air cost	0.9274	0(very conservative)
Biomass cost	53.8473	70.512
Other material cost	0.78	0(very conservative)
Salary & welfare cost	6.2771	6.595(=145person*30,000yuan/person*(1+14%)*(1+33%))
Repair cost	4.5367	0(very conservative)

Other cost	1.9725	0(very conservative)
Total	**70.73**	77.10

Therefore, the annual O&M cost in the real world will be impossible to decrease more than 4.90%, and the proposed project is always lack of financial attractiveness within the reasonable change range of annual O&M cost.

As for the biomass price

When the biomass price decreases more than 6.43%, the IRR can reach the benchmark.

According to the real purchase agreements for biomass signed between the project owner and the biomass supplier, the real price of the biomass was much higher than the price estimated in the FSR:

	The expected value in the FSR(yuan/ton)	**The actual value in the real world**	**Evidences and justification**	**Result**
Biomass price	232.8	265-280	the real purchase agreements for biomass signed between the project owner and the biomass supplier	The value in the real world is higher than the expected one in the FSR

The biomass price was further analyzed as follows:

According to the FSR of the proposed project, the biomass cost incurred in two stages. Firstly, the cost incurred from the fields to the collection sites and then secondly, the cost incurred from the collection sites to the power plant. The cost incurred from the fields to the collection sites includes the biomass collection cost from the individual farmers to the collection site, then transport to the collection sites and storage at the collection site and then pre-treatment cost of biomass incurred at the collection sites. The costs incurred to get the biomass from the collection sites to the power plant again include vehicles and labor. There will also be an overhead cost and margin associated with the third party agent that supplies the biomass from the local farmers. The business model applied in the project is common practice according to the research report from the Chinese Journal, Renewable Energy Resources which also illustrates the same work flow for collection, transportation, handling and storage, agent's overhead and margin as the project activity.[35]

[35] The operating model, existing problems and development strategies for China's straw storage and transportation system, Renewable Energy Resources,Vol.27 No.1,Feb. 2009

So, the biomass purchase price is determined based on actual costs for collection, transportation, and pretreatment of the biomass. According to the China Statistical Yearbook 2005, 2006,2007,2008,2009, from Year 2004 to Year 2008, the average wages index of the Hubei Province and the fuel and power purchasing index are listed as follows:

Year	2004	2005	2006	2007	2008
Average wages index (Preceding year = 100)	110.9[36]	121.6[37]	111.3[38]	123.5[39]	114.7[40]
Fuel and power purchasing index (Preceding year = 100)[41]	109.7	115.0	111.9	104.3	120.6

This table clearly shows an upward trend over last five years. Therefore the biomass price is not likely to decrease.

Besides, the experience from the other early biomass projects in China shows that when the farmers realize the biomass residues could be a product, they would start to bargain fiercely and even when there is a surplus in supply it has been shown that the price will increase dramatically. For example, the first biomass co-firing project in China, Shiliquan Biomass co-firing power plant, which was put into commission on December 2005 in Shandong Province, a biomass cost of 100RMB per tonne was assumed in the FSR. After commissioning, the price rose to 400RMB[42]. The same situation happens for the registered project - Zhongjieneng Suqian Biomass Power Plant Project, which is located in Jiangsu Province. For this project, the average purchasing price in early 2008 is more than 300RMB/ton, nearly twice as the price in the survey done in year 2006[43]. It is also reported that the typical biomass cost in the CCPG area where the project located was 300RMB/ton in 2006.[44]

So the biomass price can't be decreased more than 6.43%., and the proposed project is always lack of financial attractiveness within the reasonable change range of biomass price.

As for the tariff

When the tariff increases more than 5.02%, the IRR can reach 8%.

However, according to the approval letter for the tariff of the proposed project issued by Hubei Province Price Bureau on 22/04/2008 (E'jianengjiaohan [2008]26), the tariff of the proposed project during the first 15 operation years is 0.616 yuan/kWh (including VAT) and 0.366 yuan/kWh (including VAT) after 15 years of operation which is the same as the tariff in the FSR. The electricity tariff of the proposed project during the first 15 operation years comprises two parts: a 0.366 yuan/kWh for the benchmarking tariff for desulphurized power units in Hubei Province and a 0.25 Yuan/kWh of subsidy for biomass-fired power units.

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36 http://www.stats.gov.cn/tjsj/ndsj/2005/html/E0521C.HTM
37 http://www.stats.gov.cn/tjsj/ndsj/2006/html/E0518C.HTM
38 http://www.stats.gov.cn/tjsj/ndsj/2007/html/E0522C.HTM
39 http://www.stats.gov.cn/tjsj/ndsj/2008/html/E0423C.HTM
40 http://www.stats.gov.cn/tjsj/ndsj/2009/html/E0422c.htm
41 http://www.stats.gov.cn/tjsj/ndsj/2009/html/I0815C.HTM

42 http://www.sdpc.gov.cn/zdxm/t20051229_55135.htm

43 http://www.sxcoal.com/2008/08/01/120814/Article.html
44 Related Questions Research on Biomass Generation Using Agriculture and Forest Residue in China, HUANG Jintao, Journal of Shenyang Institute of Engineering (Natural Science), Vol14 No11,Jan. 2008

46 http://www.gov.cn/ztzl/2006-01/20/content_165910.htm

For the first part, it is strictly controlled by the government, and thus cannot be changed easily and frequently. For the second part, according to the *Tentative Management Measures for Pricing and Expense-sharing for Electricity Generated from Renewable Energy issued by Chinese NDRC in 2006* [46], starting in year 2010, the subsidy for the newly approved biomass power projects in any given year will be reduced by 2% compared to that in the previous year. So it is very likely to see a decreasing trend on subsidy in the following years.

Furthermore, according to the actual invoices of the electricity sales since trial operation, the actual tariff is 0.616yuan/kWh (including VAT).

So the Grid-in tariff can't be increased more than 5.02%, and the proposed project is always lack of financial attractiveness within the reasonable change range of Grid-in tariff.

As for the annual grid-in electricity

When the annual grid-in electricity increased by 5.23% more, the IRR can reach 8%.

The annual grid-in electricity is determined by annual operation hours and station service power consumption rate. The installed capacity of the proposed project was fixed as 24MW and the annual operation hours are optimistically estimated as maximum as 6,500h, the station service power consumption rate was estimated maximally as 9%, so the annual grid-in electricity is very optimistically high in the FSR. According to the *Explanation about Station Serv*ice Power Consumption Rate of Yicheng Biomass Cogeneration Project in Hubei Province issued by China City Environment Protection Engineering Limited Company on 20th April, 2009[47], it is shown that according to capacities of the subscribed equipments, the station service power consumption rate would be 10.7%. However, there are also equipments aren't counted in, so for the actual situation, station service power consumption rate will far exceed 10.7%. Furthermore, during the real operation the annual grid-in electricity will be influenced by the overhaul and the load arrangement in the power grid.

Furthermore, the proposed project was in trial operation since 9th March 2010. According to the actual measurement and statistics for the generated electricity and self-consumption electricity and the grid-in electricity from 9th March 2010 to 31st October 2010(237 days), the generated electricity from actual electricity transaction notes is 55,284.75MWh (much lower than 101,293MWh=156,000*237/365) and the grid-in electricity from actual electricity transaction notes and the electricity sale invoices is 46,284.462MWh(much lower than 92,176 MWh =141,960*237/365). And the actual self-consumption electricity is 9,000.288MWh, so the actual self-consumption rate is 16.28% (=9,000.288/55,284.75), higher than 9%.

Therefore, the annual grid-in electricity can't be increased by more than 5.23%, and the proposed project is always lack of financial attractiveness within the reasonable change range of annual grid-in electricity.

As for the annual steam generation

When the annual steam generation increased by 15.10% more, the IRR can reach 8%.

In the FSR stage, it was expected that the heat supply will be supplied to surrounding industrial and commercial heat/steam demanders. In the real word, the heat generation component of the proposed project is still pending and hasn't been started and implemented and the reasons are:

1) **Investment barrier:** The investment for the heat generation component such as heat pipeline network is not included in the FSR, and this part of investment must be bear by the project owner, but the financial condition of the project owner is not so good that the project owner hasn't enough capital at present to put into the heat part.
2) **Institutional barrier:** The existing heat demand in the local area is met by individual small coal-fired

[47] The document has been submitted to DOE.

boilers, which are invested and owned by the different industries and factories. If the heat generated by the project will substitute the existing coal-fired boilers in order to reduce the GHG emission and improve the air quality, the existing coal-fired boilers must be stopped and abandoned and the heat user must buy the heat from the proposed project, which will have negative impact on the interest of the heat user. In order to balance and solve the above situation, it needs the coordination and guidance of the local government. But there is none of government departments responsible to coordinate and regulate it now, and the coordination capacity of the project owner is weak and it can't organize all the stakeholders and adjust their interests. So there is none of heat end users in the local area who has signed the formal heat purchase contract with the project owner so far. There is none of actual demand for the steam generated by the proposed project in the real world, i.e. the steam generated by the proposed project can't sell in the market in the present institutional situation.

3) **Technical barrier:** Because the biomass direct combustion for heat generation in China is in the demonstration stage, this steam generation is not so mature as that of the coal fired boilers. On one hand, the heat end user needs the steady heat, but the heat supply under the technology of the proposed project is fluctuant. Furthermore, the heat demand from the different industries in the local area is somewhat different due to the different engineering process, so the heat generated by the proposed project need meet all kinds of heat demand, which request the high requirement for the proposed project. In the current technical condition, it can't meet all the kinds of heat demand. In all, it is difficult for the proposed project to meet the heat demand in the technical aspect.

The proposed project was in trial operation since March 2010. There is none of sold steam so far. The heat generation component won't be started and implemented until all the above faced barriers can be conquered in the coming future.

Even if the heat generation component of the proposed project will be implemented in the future, according to the *Explanation about Annual Steam generation o*f Yicheng Biomass Cogeneration Project in Hubei Province issued by China City Environment Protection Eng*ineering Limited Company* on 21st , October 2009, the annual steam in the FSR calculated as:

Annual heat supply= the enthalpy of the steam for heat supply*the average steam for

heat supply per hour*annual operation hours*the adjusted rate for heat supply

＝2963.58 kJ/kg*25 t/h*6500 h*1.1＝529,740GJ

So, Annual heat supply was calculated to be 529,740GJ conservatively.

Furthermore, it can be seen that the Annual heat supply is only the designed and the most theoretical value that the proposed project can generate and with the most conservative assumption that 100% of the generated heat can be sold and 100% of the heat user with heat load in the local area would like to buy its heat regardless of the demand of the heat market, and the annual steam in the FSR also didn't consider the line loss of the heat pipelines.

Therefore, the annual steam generation can't be increased by more than 15.10%, and the proposed project is always lack of financial attractiveness within the reasonable change range of annual steam generation.

As for heat price

The heat generation component in the real world has been analyzed above. Based on the above, when there is none of sold steam, the heat price is meaningless. Even if the heat generation component of the proposed project will be implemented in the future, the heat price is analyzed as follows:

In order to provide additional substantiation as to the heat price applied in the investment analysis, a levelized cost analysis for the independent small coal fired boiler heat generation has been done to illustrate whether or not it is feasible to purchase heat from the proposed project from the heat users' point of view. If the purchase price of heat is higher than the levelized cost of generation heat, the existing heat users will

continue to run their own small coal-fired boilers to meet their heat demand.

The levelized cost was calculated based on 6 t/h coal-fired boilers as these are common practice boilers for heat generation in China[48] . The key assumptions are described below.

i Capital cost

The capital cost of 665,000 RMB used in the levelised cost is an average capital cost of a 6t/h coal-fired boiler which is from publicly available reference[49] and is therefore deemed reliable and credible.

ii Coal cost (Fuel cost)

- Coal consumption: 7,387 tonne/year.

The coal consumption is calculated by considering the boiler efficiency, and heat value of purchased coal, heat generation, heat enthalpy of the rated steam from the boiler. This is taken from publicly available data which are listed in the table below. Therefore the input value is appropriate for the levelised cost calculation.

- Coal price: 550RMB/tonne was based on the published market price in 2009 and the reference can be seen in the table below.

iii. O&M cost (excluding fuel cost)

For a typical 6 t/h coal-fired boiler, annual O&M cost is 422,625RMB (excluding fuel cost) which includes desulfurization expenditure, electricity consumption cost, labor cost, overhaul, ash and sediments treatment fees etc. Each component of O&M cost was rated in terms of the relevant sector standard and published market rate. Each component of O&M was justified as below:

- Labor cost: 140,000 RMB: Employee number: 7 people and Salary: 20,000RMB/employee/year
- Overhaul cost: 2.5% of capital cost[50].
- Desulfurization expenditure:50,000 RMB/year[51]
- Ash and sediments treatment fees: 72,000 RMB/year[52]
- Electricity cost:140,000RMB/year[53]

The input parameters and reference were listed in the table below.

Parameter	Value	Unit	Reference

[48] FANLing, CAO Qin, GUTao, YUQian, Comparison of Environmental Impact and Operation Cost of Mini Type Gas-fired Boiler(Oil-fired Boiler) with Coal-fired boilers,[J] Arid Environmental Monitoring, 2004(03)

[49] FANLing, CAO Qin, GUTao, YUQian, Comparison of Environmental Impact and Operation Cost of Mini Type Gas-fired Boiler(Oil-fired Boiler) with Coal-fired boilers,[J] Arid Environmental Monitoring, 2004(03)

[50] Technical Guidelines for the Feasibility Study of Cogeneration Projects, issued by NDRC and State Economy Commission and Ministry of Construction on 11/01/2001.

[51] WU Xihuan. Inner Mongolia Oil and Chemistry, Investigation on retrofitting the coal-fired boiler to gas-fired boiler, 2008 (10)

[52] WU Xihuan. Inner Mongolia Oil and Chemistry, Investigation on retrofitting the coal-fired boiler to gas-fired boiler, 2008 (10)

[53] WU Xihuan. Inner Mongolia Oil and Chemistry, Investigation on retrofitting the coal-fired boiler to gas-fired boiler, 2008 (10)

Construction period	1	year	Experienced data
Lifetime	25	years	Experienced data
Boiler efficiency	85%		AM0058, Page26
Capacity	6	t/h	Taking it as example for the calculation
Capital Cost	665,000	RMB	FANLing, CAO Qin, GUTao, YUQian, Comparison of Environmental Impact and Operation Cost of Mini Type Gas-fired Boiler(Oil-fired Boiler) with Coal-fired boilers,[J] Arid Environmental Monitoring, 2004(03);
Coal Price	550	RMB/ tonne	http://news.stockstar.com/info/darticle.aspx?id=JL,20090707,00001411&columnid=2921
Heat Value of the Coal	5,500	Kcal/tonne	http://news.stockstar.com/info/darticle.aspx?id=JL,20090707,00001411&columnid=2921
Unit conversion from Kcal to KJ	4.182		
Operational Hour	8,000	hours	Information obtained from the owners of the existing mini type coal-fired boilers
Assumed enthalpy of the rated Steam from the boiler	2963.58	KJ/kg	Same data from the biomass fired boiler in the proposed project
Discount Rate -(r)	0.08		Benchmark used in power industry
Labor Number	7		WU Xihuan. Inner Mongolia Oil and Chemistry, Investigation on retrofitting the coal-fired boiler to gas-fired boiler, 2008(10)
Salary of the labor	20,000	RMB/year	Information obtained from the owners of the existing mini type coal-fired boilers
Electricity Cost	144,000	RMB	WU Xihuan. Inner Mongolia Oil and Chemistry, Investigation on retrofitting the coal-fired boiler to gas-fired boiler, 2008(10)
Desulferisation Cost	50,000	RMB	WU Xihuan. Inner Mongolia Oil and Chemistry, Investigation on retrofitting the coal-fired boiler to gas-fired boiler, 2008(10)
Ash and sediments treatment fees	72,000	RMB	WU Xihuan. Inner Mongolia Oil and Chemistry, Investigation on retrofitting the coal-fired boiler to gas-fired boiler, 2008(10)
Employee Cost	140,000	RMB	Calculated
Overhaul	16,625	RMB	Calculated using the experienced overhaul rate as 2.5% and cross checked with Technical Guidelines for the Feasibility Study of Cogeneration Projects, issued by NDRC and State Economy Commission and Ministry of Construction on 11/01/2001.
Coal	7,276	tonne	Calculated

consumption			
Fuel Cost	4,001,796	RMB	Calculated
Total heat generation	142,252	GJ	Calculated
O&M Cost excluding the fuel cost	422,625	RMB	Calculated

Based on the above, the levelized cost of a coal fired boiler for the heat user to supply heat to themselves independently is 31.5RMB/GJ.

So, the expected heat price of 43.8 RMB/GJ in the FSR is much higher than 31.5RMB/GJ, which exceeds the bearing capability of the heat end user in the local area. Considering the interests of the heat end user, if the heat generated by the project will substitute the existing coal-fired boilers and the existing coal-fired boilers must be stopped and abandoned and the heat user must buy the heat from the proposed project, the heat price of the proposed project should be lower than the levelized cost of a coal fired boiler for the heat user to supply heat to themselves independently. If the purchase price of heat is higher than the levelised cost of generation heat, the existing heat users will continue to run their own small coal-fired boilers to meet their heat demand. So, there is big possibility that the heat price will be lower than 43.8RMB/GJ in the real world.

It is a fact that for most of the cogeneration plants in China, the heat selling price is regulated by the local government. Generally, the profit rate for selling heat cannot be greater than 5% of the cost of producing the heat. [54] This is because heat is a basic service to people and Industry and therefore the government of China regulates the price very closely to avoid inflation of the heat price which would be damaging to Chinese society.

So the heat price can't be increased more than 15.10%.

In all, when the key parameters fluctuate within a reasonable range, the proposed project will never be economically attractive.

Therefore, the Alternatives of "**P1+H1+B4**" is not the baseline, and the Alternatives of "**P4+H6+(B1+B3)**" is the baseline.

So, the proposed project is **Scenario 2** of the combinations of project activities and baseline scenarios identified in ACM0006 (version 10).

Step 4: Common practice analysis

Sub-step 4a. Analyze other activities similar to the proposed project activity:

According to step 4 in "Combined tool to identify the baseline scenario and demonstrate additionality" (Version 02.2), the similar project activities were chosen as follows:

<u>Choose the similar scale</u>

The installed capacity of the proposed project activity is 24 MW, so the projects with capacity in the range 12 - 36 MW have been selected as the similar scale.

<u>Choose the similar area</u>

[54]The Assessment Report for the Cogeneration Market in China, issued by China Energy-Saving Investment Co.Ltd.

In China, the regulatory framework and investment climate for biomass projects are only similar and comparable in the same Province/Autonomous Region. Generally, the project proposals are approved by the Provincial DRC, and the projects' EIAs are approved by the provincial Environmental Protection Bureau. The tariffs in different Province/Autonomous Region are also different. Therefore, according to the "Combined tool to identify the baseline scenario and demonstrate additionality", Hubei Province was chosen as the similar area.

Choose the similar technology

The similar technology is the biomass power generation or biomass cogeneration.

Based on the analysis above, the projects similar to the proposed project are biomass power generation or biomass cogeneration projects with capacity of 12-36MW which have been operated in Hubei Province.

Based on investigation, the similar five projects are listed as follows:

Table 5 Projects similar to the proposed project

Ref.No	Project Name	Status	Installed capacity (MW)
-	Hubei Dangyang 25MW Biomass Power Project	At validation[55]	25
3044	Jianli Kaidi Biomass Power Project	Registered [56]	24
3055	Jingshan Kaidi Biomass Power Project	Under going completeness[57]	24
-	Hubei Shayang 15MW Biomass Power Generation Project	At validation[58]	15
3057	Qichun Kaidi Biomass Power Project	Under going completeness	24

Sub-step 4b. Discuss any similar options that are occurring:

As a new technology in china, biomass power generation or biomass cogeneration projects need CDM application to be financially feasible, there are biomass generation projects under development with the support from CDM[59], including the similar project activities listed above.

Based on the sub-step 4a and sub-step 4b, the proposed project is not common practice in Hubei Province.

The analysis has shown that the proposed project meets with the requirements of "Combined tool to identify the baseline scenario and demonstrate additionality". In a word, the proposed project has additionality.

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[55] http://cdm.unfccc.int/UserManagement/FileStorage/Q394AS7M7O3O6ARVPKUREPZVJ58FBQ

[56] http://cdm.unfccc.int/Projects/DB/TUEV-RHEIN1256015812.95/view

[57] http://cdm.unfccc.int/Projects/completeness_check.html

[58] http://cdm.unfccc.int/Projects/Validation/DB/OBPMXEHFN4PBXZJRXH107C5GITOCN6/view.html

[59] http://cdm.ccchina.gov.cn/web/index.asp

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):

As per *Combined tool to identify the baseline scenario and demonstrate additionality*, based on the analysis in section B.4, the baseline scenario is identified, so the additionality of the proposed project is demonstrated simultaneously.

Consideration of CDM before implementation of the proposed project

According to the FSR, the IRR of the proposed project was lower than the benchmark without CDM benefit, and CDM consideration was suggested in the FSR. After that, the project owner did their best to seek for the suitable CERs buyers and made the internal decision for CDM consideration. Based on the consideration of CDM and the belief of the proposed project, the project owner started to do the equipment purchase and construction.

The time schedule of CDM consideration of the proposed project is as follows:

Date	Milestones	Evidence
June 2007	EIA was completed by Hubei Province Environment Science Institute	EIA
17/07/2007	The EIA report was approved by Hubei Province Environmental Protection Bureau	The approval document of "E'Huanhan [2007]280"
August 2007	FSR was completed by China City Environment Protection Engineering Limited Company and CDM consideration was suggested in this FSR.	The FSR, the IRR of total investment after tax is lower than 8% and CDM consideration is suggested.
10/09/2007	The approval letter (Ediansifazhan[2007]No.255) for Power Connection System issued by Hubei Province Electric Power Co.ltd	This approval letter (Ediansifazhan[2007]No.255)
08/10/2007	The CDM stakeholders' meeting for the proposed project was held.	The minutes of this meeting
16/11/2007	The FSR was approved by Hubei Province Development and Reform Commission	The approval document of "E'Fagainengyuan [2007]1211"
20/12/2007	The meeting for CDM consideration was held by the project owner	The minute of the meeting
06/03/2008	The LOI between the Anneng (Yicheng) Biomass Thermo-Electricity Co. Ltd and Emissionshandels Gesellschaft Bavaria GmbH was signed	The LOI
09/04/2008	The Purchase Agreement for Turbines and Generators was signed	The purchase contract
20/04/2008	The Purchase Agreement for Boilers was signed	The purchase contract

08/05/2008	The Engineering/Procurement/Construction (EPC) Contract was signed between the project owner and China City Environment Protection Engineering Limited Company[60].	Engineering/Procurement/Construction (EPC) Contract
30/05/2008	The validation contract was signed between the CERs buyer and the DOE.	The validation contract
30/05/2008	The ERPA was signed between the Anneng (Yicheng) Biomass Thermo-Electricity Co. Ltd and Emissionshandels Gesellschaft Bavaria GmbH	The ERPA
23/07/2008	The Permission Letter for the Construction was approved and issued by Construction Bureau of Yicheng City.	The Permission Letter for the Construction
25/09/2008	Starting GSP on the UNFCCC website	http://cdm.unfccc.int/Projects/Validation/DB/8J8WAZ0YD76CKQWT0XB7XXJP2RMTIS/view.html
05/12/2008	The LOA from China was acquired	The LOA from China DNA
03/2010	The generators started to generate electricity.	

As per Combined tool to identify the baseline scenario and demonstrate additionality, the proposed project is additional.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

According to methodology ACM0006, scenario 2 of the methodology is applied to the proposed project activity.

Calculation formula of baseline emissions, project emissions, leakage emissions and emission reductions are as below:

1. **Emission reductions** （ER_y）

the emission reduction of the proposed project is decided by the following formula:

$$ER_y = ER_{Heat,y} + ER_{Electricity,y} + BE_{Biomass,y} - PE_y - L_y \qquad (1)$$

Where:

ER_y = Emissions reductions of the project activity during the year y (tCO_2/yr);

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

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

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

[60] The qualification certificate in electric power industry for China City Environment Protection Engineering Limited Company issued by Ministry of Construction of the People's Republic of China has been submitted to DOE.

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

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

2. Project Emissions（PE_y）

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 activity ($PEFF_y$), CO_2 emissions from consumption of electricity ($PE_{EC,y}$), CH_4 emissions from the combustion of biomass residues ($PE_{Biomass,CH4,y}$),

Calculate as below:

$$PE_y = PET_y + PEFF_y + PE_{EC,y} + GWP_{CH4} \times (PE_{Biomass,CH4,y} + PE_{WW,CH4,y}) \qquad (2)$$

Where:

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

$PEFF_{,y}$ = CO_2 emissions during the year *y* due to fossil fuels co-fired by the generation facility or other fossil fuel consumption at the project site that is attributable to the project activity (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 activity (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)

$PE_{WW,CH4,y}$ = CH_4 emissions from waste water generated from the treatment of biomass residues in 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)

In cases where the biomass residues are not generated directly at the project site, project participants shall determine CO_2 emissions resulting from transportation of biomass residues to the project plant. In many cases transportation is undertaken by vehicles.
Project participants may choose between two different approaches to determine emissions: an approach based on distance and vehicle type (option 1) or on fuel consumption (option 2).

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

$$PET_y = N_y \times AVD_y \times EF_{km,CO2,y} \qquad (3)$$

Or:

$$PET_y = \frac{\sum_k BF_{T,k,y}}{TL_y} \times AVD_y \times EF_{km,CO2,y} \qquad (4)$$

Where:
PET_y = CO_2 emissions during the year *y* due to transport of the biomass residues to the project plant (tCO_2/yr)
N_y = Number of truck trips during the year *y*
AVD_y = Average round trip distance (from and to) between the biomass residue fuel supply sites and the site of the project plant during the year *y* (km)
$EF_{km,CO2,y}$ = Average CO_2 emission factor for the trucks measured during the year *y* (tCO_2/km)

$BF_{T,k,y}$ = Quantity of biomass residue type *k* that has been transported to the project site during the year *y* (tons of dry matter or liter)[9]
TL_y = Average truck load of the trucks used (tons or liter) during the year *y*.

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

$$PET_y = \sum_i FC_{TR,i,y} \cdot NCV_i \cdot EF_{CO2,FF,i} \quad (5)$$

Where:
PET_y = CO_2 emissions during the year *y* due to transport of the biomass residues to the project plant (tCO_2/yr)
$FC_{TR,i,y}$ = Fuel consumption of fuel type *i* in trucks for transportation of biomass residues during the year *y* (mass or volume unit per year)[10]
NCV_i = Net calorific value of fossil fuel type *i* (GJ / mass or volume unit)
$EF_{CO2,FF,i}$ = CO_2 emission factor for fossil fuel type *i* (tCO_2/GJ)
i = Fossil fuel types used for transportation of the biomass residues to the project plant in the year *y*

When doing the ex-ante calculation, formula (4) (option 1) was adopted; according to monitor part regulated by methodology, doing the ex-post measurement, formula (3) was adopted and Ny will be monitored.

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

According to ACM0006, CO_2 emissions from on-site combustion of fossil fuels (*$PEFF_y$*) should be calculated using the latest approved version of the "Tool to calculate project or leakage CO2 emissions from fossil fuel combustion". According to the Explanation and Clarification for the Start-up way of the boiler provided by China City Environment Protection Engineering Limited Company and by the boiler manufacturer, the proposed project will use the dry biomass to start up the boiler and the fossil fuels such as the diesel or natural gas won't be used. But in order to be more conservative, 0.5tons of diesel was considered to be consumed ex-ante and the amount of diesel will be monitored ex-post:

$$PEFF_y = (FF_{projectplant\ diesel,y} + FF_{projectsite\ diesel,y}) \times COEF_{diesel,y} \quad (6)$$

Where:
$FF_{project\ plant,diesel,y}$ Quantity of diesel combusted in the biomass residue fired power and heat plant during the year *y*
(mass or volume unit per year)
$FF_{project\ site,diesel,y}$ Quantity of diesel 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)
$COEF_{diesel,y}$ the CO_2 emission factor for diesel in year y (tCO_2/mass or volume unit)

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

Option A: The CO_2 emission coefficient *$COEF_{i,y}$* is calculated based on the chemical composition of the fossil fuel type *i*, using the following approach:

1). $COEF_{diesel,y} = w_{c,diesel,y} \times \rho_{diesel,y} \times 44/12$ (7)

Where:
$w_{C,diesel,y}$ the mass fraction of carbon in diesel in year y (tC/mass unit)
$\rho_{diesel,y}$ the density of diesel in year y (mass unit/mass or volume unit)

Option B: The CO_2 emission coefficient $COEF_{i,y}$ is calculated based on net calorific value and CO_2 emission factor of the fuel type *i*, as follows:

2). $COEF_{diesel,y} = NCV_{diesel,y} \times EF_{diesel,y}$ (8)

Where:

$NCV_{diesel,y}$ the net calorific value of diesel in year y (GJ/mass or volume unit)

$EF_{diesel,y}$ the CO_2 emission factor of diesel in year y (tCO_2/GJ)

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

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

According to regulation by methodology ACM0006, the calculation of the project emission due to electricity consumption should adopt the latest version of "Tool to calculate baseline, project and/or leakage emissions from electricity consumption" (Version 01, EB39). The power used in the proposed project is from CCPG, and it belongs to Situation A which is regulated in "Tool to calculate baseline, project and/or leakage emissions from electricity consumption". Meanwhile, "Tool to calculate emission factor of power industry" is adopted to calculate the CM in CCPG. Therefore, it belongs to option A1 in scenario A and the calculation formula is as below:

$$PE_{EC,y}=EC_{PJ,y}\times EF_{grid,CM,y}\times(1+TDL_y) \quad (9)$$

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/yr)

$EF_{grid,CM,y}$=adopt "Tool to calculate emission factor of power industry" to calculate the CM in CCPG CM(tCO2e/MWh)

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

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

$$PE_{biomass,CH4,y} = EF_{CH4,BF} \cdot \sum_k BF_{k,y} \cdot NCV_k \quad (10)$$

Where:

$BF_{k,y}$ = Quantity of biomass residue type *k* combusted in the project plant during the year *y* (tons of dry matter or liter)[9]

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

$EF_{CH4,BF}$ = CH_4 emission factor for the combustion of biomass residues in the project plant (tCH_4/GJ)

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

No waste water treatment is involved in the proposed project activity. As a result, the emissions are zero.

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

$$ER_{Electricity,y} = EG_y \times EF_{Electricity,y} \quad (11)$$

Where:

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

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

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

The proposed project belongs to baseline scenario 2 which is regulated in methodology ACM0006, so EG_y is

equal to net power supply by power station, namely:
$EG_y = EG_{project\ plant,y}$

Meanwhile, as the baseline scenario of the proposed project is gird-connected electricity, and the install capacity of the project plant is more than 15MW, so $EF_{grid,CM,y}$ is calculated as a combined margin (CM) of the CCPG, namely, EFElectricity,y =EFgrid,CM,y. According to regulation by ACM0006, CM of CCPG should be calculated using the latest methodology ACM0002 (Version 11), and according to the requirement of ACM0002 (version 11), the emission factor $EF_{grid,CM,y}$ is calculated according to "*Tool to calculate the emission factor for an electricity system*".

According to "Tool to calculate the emission factor for an electricity system" (version 02), there are seven steps to calculate the baseline emission factor of the grid. The detailed processes are as follows:

Step 1 Identify the relevant electricity systems

Because China DNA has published a delineation of the project electricity system and connected electricity systems on 18th July, 2008, the electricity generated by the proposed project will be transmitted to Hunan Power Grid which is part of CCPG. According to the latest guidelines issued on 18th July, 2008 by China's DNA, the geographical boundary of CCPG covers Jiangxi Power Grid, Henan Power Grid, Hunan Power Grid, Hubei Power Grid, Sichuan Power Grid and Chongqing Power Grid.

Step 2. Choose whether to include off-grid power plants in the project electricity system (optional).

The proposed project chooses the "Option I: only grid power plants are included in the calculation".

Step 3. Select a method to determine the operating margin (OM)

According to the "Tool to calculate the emission factor for an electricity system", four methods could be used to calculate the OM and any of the four methods can be used:

(a) Simple OM,

(b) Simple adjusted OM, or

(c) Dispatch Data Analysis OM, or

(d) Average OM.

The simple OM method is applicable if low-cost/must run resources[61] constitute less than 50% of total grid generation in average of the five most recent years. From 2002 to 2006, the proportion of low-cost/must-run resources in total grid electricity of CCPG was35.9% in 2002, 34.4% in 2003, 38.5% in 2004, 38.2% in 2005 and 36.6% in 2006[62], far lower than 50%. So the simple OM method is applicable to the proposed project. According to this tool, the emissions factor can be calculated using either of the two following data vintages:

- *Ex ante* option: If the *ex ante* option is chosen, the emission factor is determined once at the validation stage, thus no monitoring and recalculation of the emissions factor during the crediting period is required. For grid power plants, use 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.
- *Ex post* option: If the *ex post* option is chosen, the emission factor is determined for the year in which the project activity displaces grid electricity, requiring the emissions factor to be updated annually during monitoring.

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

[62] China Electric Power Yearbooks (2003, 2004, 2005, 2006, and 2007)

The proposed project chooses the "Ex ante option". 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, without requirement to monitor and recalculate the emissions factor during the first crediting period.

Step 4. Calculate the operating margin emission factor according to the selected method

As for the chosen simple OM, there are two methods to calculate simple emission factor in this tool:

- Option A: Based on the net electricity generation and a CO_2 emission factor of each power unit;[63] or
- Option B: Based on the total net electricity generation of all power plants serving the system and the fuel types and total fuel consumption of the project electricity system.

For data of each power station and power unit is not public available in China, it can't adopt option A. Meanwhile, only nuclear and renewable power generation are considered as low-cost / must-run power sources and the quantity of electricity supplied to the grid by these sources is known from "China Electric Power Yearbook" and "China Energy Statistical Yearbook" and off-gird power plants are not included in the calculation. Therefore, option B could be used to calculate OM emission factor.

According to the selected method above, the calculation formula of OM emission factor is as below:

$$EF_{grid,OMsimple,y} = \frac{\sum_i \left(FC_{i,y} \times NCV_{i,y} \times EF_{CO2,i,y}\right)}{EG_y} \quad (12)$$

Where:

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

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

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

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

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

i= All fossil fuel types combusted in power sources in the project electricity system in year y;

y= the three most recent years (2004, 2005and 2006) for which data is available at the time of submission of the CDM-PDD to the DOE for validation (ex ante option);

Otherwise, electricity dispatched from other grid should be considered from one station. Adopt one option from following four options, decide the emission factor of this dispatched electricity:

(1) 0 tCO_2/MWh, or

(2) Average OM emission factor according to electricity generation weighted average in grid from which electricity is imported, or

(3) Simple OM emission factor in the power grid from which electricity is imported

(4) The adjusted simple OM emission factor in the power grid from which electricity is imported.

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

To CCPG, there is no power delivering in from other power grid.

The proposed project adopts the latest data of OM emission factor in CCPG which is issued by China DNA on 18th July 2008. Please refer to "Report on 2008 Baseline Emission Factor or Regional Power Grids in China" issued by NDRC and Annex 3 for the concrete calculation process.

For this approach (simple OM) to calculate the operating margin, the subscript m refers to the power plants / units delivering electricity to the grid, not including low-cost/must-run power plants / units, and including electricity imports to the grid. Electricity imports should be treated as one power plant m.

Based on the formula (12), the calculation process for OM of CCPG is shown in annex 3.

Step 5. Identify the group of power units to be included in the build margin

The sample group of power unit m used to calculate the build margin consists of either:

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

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

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

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

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

This PDD chooses **Option 1.**

Step 6. Calculate the build margin emission factor

The build margin emissions 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:

$$EF_{grid,BM,y} = \frac{\sum_m EG_{m,y} \times EF_{EL,m,y}}{\sum_m EG_{m,y}} \qquad (13)$$

Where:

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

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

$EF_{EL,m,y}$ = CO_2 emission factor of power unit m in year y (tCO_2/MWh)

m = Power units included in the build margin;

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

In China, because some data can't be available, the BM calculation in this PDD adopts the modifications methods agreed by the CDM EB[64]. First, calculate the newly added installed capacity and the various component technologies, then calculation of the weight of newly added installed capacity of each power generation technology. Finally the commercial and efficient level of each power generation technology is adopted to calculate BM emission factor.

Because the generating capacity of the coal-fired, oil-fired and gas-fired technology can not be separated from the existing statistical data, the BM calculation in this PDD adopts the following method: First, use the available data in the energy balance tables on the most recent year, then calculate the proportion of CO2 emissions from solid, liquid and gaseous fuels corresponding to the total emissions of CO2 emissions; Second, the proportion used as the weight, based on the emission factors of the optimal efficient and commercial technologies, calculate the emission factor of the thermal power in each grid. Finally, this thermal emission factor is multiplied by the proportion of thermal power added capacity in the additional 20% capacity. The result is BM emission factor.

Concrete steps and the formula for BM are as follows:

Sub-step1: Calculation of the proportion of CO2 emissions from solid, liquid and gaseous fuels corresponding to the total emissions of CO2 emissions.

$$\lambda_{Coal,y} = \frac{\sum_{i \in COAL,j} F_{i,j,y} \times NCV_{i,y} \times EF_{CO_2,i,j,y}}{\sum_{i,j} F_{i,j,y} \times NCV_{i,y} \times EF_{CO_2,i,j,y}} \quad (14)$$

$$\lambda_{Oil,y} = \frac{\sum_{i \in OIL,j} F_{i,j,y} \times NCV_{i,y} \times EF_{CO_2,i,j,y}}{\sum_{i,j} F_{i,j,y} \times NCV_{i,y} \times EF_{CO_2,i,j,y}} \quad (15)$$

$$\lambda_{Gas,y} = \frac{\sum_{i \in GAS,j} F_{i,j,y} \times NCV_{i,y} \times EF_{CO_2,i,j,y}}{\sum_{i,j} F_{i,j,y} \times NCV_{i,y} \times EF_{CO_2,i,j,y}} \quad (16)$$

Where:

$F_{i,j,y}$ is the amount of fuel *i* (in a mass or volume unit) consumed by plant *j* in year *y*;
$NCV_{i,y}$ is Net calorific value (energy content) of fossil fuel type i in year y (GJ / mass or volume unit);

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

Coal, Oil and Gas are the feet for solid fuels, liquid fuels and gas fuels, respectively.

Sub-step2: Calculation the emission factor of thermal power.

$$EF_{Thermal,y} = \lambda_{Coal,y} \times EF_{Coal,Adv,y} + \lambda_{Oil,y} \times EF_{Oil,Adv,y} + \lambda_{Gas,y} \times EF_{Gas,Adv,y} \quad (17)$$

$EF_{Coal,Adv,,y}$, $EF_{Oil,Adv,,y}$ and $EF_{Gas,Adv,,y}$ represent the emission factors of the optimal efficient and commercial coal-fired, oil-fueled and gas-fueled technologies.

Sub-step 3: Calculation of BM in the grid.

[64] the clarifications for some proposed projects in China adopting the approved methodology AM0005 and AMS-I.D to calculate the build margin emission factor.

$$EF_{grid,BM,y} = \frac{CAP_{Thermal,y}}{CAP_{Total,y}} \times EF_{Thermal,y} \quad (18)$$

Where:

$CAP_{Total,y}$ is the total added installed capacity;

$CAP_{Thermal,y}$ is the total added installed capacity for thermal power.

The proposed project adopts the latest data of OM emission factor in CCPG which is issued by China DNA on 18th July. 2008. Please refer to "Report on 2008 Baseline Emission Factor or Regional Power Grids in China" issued by NDRC and Annex 3 for the concrete calculation process.

Step 7. Calculate the combined margin emissions factor

The combined margin emissions factor is calculated as follows:

$$EF_{grid,CM,y} = w_{OM} \times EF_{grid,OM,y} + w_{BM} \times EF_{grid,BM,y} \quad (19)$$

Where:

$EF_{grid,CM,y}$ = Combination margin CO_2 emission factor in year y (tCO_2e/MWh);

$EF_{grid,BM,y}$ = Build margin CO_2 emission factor in year y (tCO_2e/MWh);

$EF_{grid,OM,y}$ = Operating margin CO_2 emission factor in year y (tCO_2e/MWh);

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

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

In this PDD the weight w_{OM} and w_{BM} are 50% for the first crediting period: $w_{OM} = w_{BM} = 0.5$

4. Emission reductions or increases due to displacement of heat ($ER_{Heat,y}$)

As for the status of the proposed project, the power generation component was constructed and implemented firstly and the heat generation component such as the heat pipelines is still under the planning and implementation and the project owner hasn't yet signed any formal heat supply contract with the heat end user so far. Considering the conservativeness of the emission reductions, the project owner finally decided not to claim the emission reductions due to displacement of heat. So the emission reductions due to displacement of heat are zero in all the crediting periods. So the latest PDD didn't calculate the emission reductions of heat generation.

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

This project activity belongs to baseline scenario 2 in methodology ACM0006. According to methodology ACM006, $BF_{PJ,k,y}$ (incremental use of biomass residues as a result of the project activity) is equal to $BF_{k,y}$ (total quantity of biomass residues used in the project plant), namely, $BF_{PJ,k,y} = BF_{k,y}$.
Meanwhile, according to ACM0006, if baseline scenario of use of biomass residues is combination of B1 and B3, according to conservative principle, use emission by uncontrolled burning to calculate the baseline emission.
Therefore, the calculation formula of baseline emission produced by biomass residues uncontrolled burning or aerobic decay is as below:

$$BE_{biomass,y} = GWP_{CH4} \cdot \sum_k BF_{PJ,k,y} \cdot NCV_k \cdot EF_{burning,CH4,k,y} \quad (21)$$

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)[9]
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)
k = Types of biomass residues for which the identified baseline scenario is B1 or B3 and for which leakage effects could be ruled out with one of the approaches L_1, L_2 or L_3

6. Leakage(L_y)

As per methodology ACM0006, if the most likely baseline scenario is that the biomass residues are dumped or left to decay or are burnt in an uncontrolled manner without utilizing them for energy purposes (e.g., scenarios 2), it shall be demonstrated that the use of the biomass residues does not result in increased fossil fuel consumption elsewhere. The following options may be used to demonstrate this:

L1 Demonstrate that at the sites where the project activity is supplied from with biomass residues, the biomass residues have not been collected or utilized (e.g. as fuel, fertilizer or feedstock) but have been dumped and left to decay, land-filled or burnt without energy generation (e.g. field burning) prior to the implementation of the project activity. Demonstrate that this practice would continue in the absence of the CDM project activity, e.g. by showing that in the monitored period no market has emerged for the biomass residues considered or by showing that it would still not be feasible to utilize the biomass residues for any purposes (e.g. due to the remote location where the biomass residue is generated).
This approach is applicable to situations where project participants use only biomass residues from specific sites and do not purchase biomass residues from or sell biomass residues to a market.

L2 Demonstrate that there is an abundant surplus of the biomass residue in the region of the project activity which is not utilized. For this purpose, demonstrate that the quantity of available biomass residue of type k in the region is at least 25% larger than the quantity of biomass residues of type k that are utilized (e.g. for energy generation or as feedstock), including the project plant.

L3 Demonstrate that suppliers of the type of biomass residue in the region of the project activity are not able to sell all of their biomass residues. For this purpose, project participants shall demonstrate that the ultimate supplier of the biomass residue (who supplies the project) and a representative sample of suppliers of the same type of biomass residue in the region had a surplus of biomass residues (e.g. at the end of the period during which biomass residues are sold), which they could not sell and which is not utilized.

The proposed project adopts approach L2 to demonstrate.

According to FSR of the proposed project, in radius range 21 kilometers of biomass collection, the acquisition quantity and consumption quantity of biomass used in the proposed project are shown as below:

Type of biomass residues	rice straw	rape stalk	Cotton stalk	Total
1. Available quantity (1000 t)	360	90	160	610
2.Quantity utilized (1000 t)	216	54	96	366
2.1 Quantity to be utilized at the project plant (1000 t)	139	35	58	232
2.2 Quantity utilized for other purposes (1000 t)	77	19	38	134

3. Ratio of available quantity vs. quantity utilized	1.67	1.67	1.67	1.67

As shown above, it meets the requirement of L2.

Furthermore, the supply situation for the types of biomass residues used in the proposed project plant will be monitored.

Conclusively, there is an abundant surplus of the biomass residues in the region of the project activity, the leakage of the project activity is zero.

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

Data / Parameter:	$NCV_{i,y}$
Data unit:	GJ/mass or volume unit
Description:	Net calorific value (energy content) of fossil fuel type i in year y
Source of data used:	China Energy Statistical Yearbook（2007）;
Value applied:	See Annex 3 for details
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”, the national average default value can be applied. Once for each crediting period using the most recent three historical years for which data is available at the time of submission of the CDM-PDD to the DOE for validation (ex-ante option)
Any comment:	

Data / Parameter:	$EF_{CO2,i,y}$
Data unit:	tCO_2e/GJ
Description:	CO2 emission factor of fossil fuel type i in year y
Source of data used:	Defaults in table 1.4 of Chapter 1 of Vol.2(Energy) of the 2006 IPCC Guidelines for National Greenhouse Gas Inventories
Value applied:	Please refer 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”, 2006 IPCC defaults can be used; Once for each crediting period using the most recent three historical years for which data is available at the time of submission of the CDM-PDD to the DOE for validation (ex-ante option)
Any comment:	

Data / Parameter:	$FC_{i,y}$
Data unit:	Mass or volume unit of fuel i
Description:	the amount of fossil fuel type *i* (in a mass or volume unit) consumed by power plant/unit in year(s) *y*
Source of data used:	China Energy Statistical Yearbooks (2005,2006,2007)

Value applied:	See Annex 3 for details
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”, values from government records or official publications can be used; Once for each crediting period using the most recent three historical years for which data is available at the time of submission of the CDM-PDD to the DOE for validation (ex-ante option)
Any comment:	

Data / Parameter:	EG_y
Data unit:	MWh
Description:	Net electricity generated and delivered to the grid by power plant/unit in year y
Source of data used:	China Electric Power Yearbook (2005,2006,2007)
Value applied:	See Annex 3 for details
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”, values from government records or official publications can be used; Once for each crediting period using the most recent three historical years for which data is available at the time of submission of the CDM-PDD to the DOE for validation (ex-ante option)
Any comment:	

Data / Parameter:	$CAP_{y,j}$
Data unit:	MW
Description:	The installed capacity of every kind of electricity generation (such as thermal power, hydro power, nuclear power, wind power and other energy sources etc.) of CCPG in the recent years. And to find the change of capacity additions in the CCPG in the past few years.
Source of data used:	China Electric Power Yearbook
Value applied:	See annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	This kind of data accords with the latest version of ACM0002 and the clarifications for some proposed projects in China adopting the approved methodology AM0005 and AMS-I.D to calculate the build margin emission factor.
Any comment:	Reasonable

Data / Parameter:	$GENE_{best,coal}$
Data unit:	%
Description:	The maximized efficiency of coal-fired power supply
Source of data used:	China’s DNA : Report on Determination of Baseline Grid Emission Factor
Value applied:	37.28
Justification of the choice of data or description of	Specific national value

measurement methods and procedures actually applied :	
Any comment:	

Data / Parameter:	$GENE_{best,oil/gas}$
Data unit:	%
Description:	The maximized efficiency of oil and gas-fired power supply
Source of data used:	China's DNA : Report on Determination of Baseline Grid Emission Factor
Value applied:	48.81
Justification of the choice of data or description of measurement methods and procedures actually applied :	Specific national value
Any comment:	

Data / Parameter:	**$EF_{CH4,BF}$**
Data unit:	kgCH4/GJ
Description:	CH_4 emission factor for the combustion of biomass residues in the project plant
Source of data used:	default values, as provided in Table 4 in the ACM0006 (version 10);
Value applied:	30
Justification of the choice of data or description of measurement methods and procedures actually applied :	default values, as provided in Table 4 in the ACM0006 (version 10); The uncertainty level is 300%;
Any comment:	

Data / Parameter:	**TL_y**
Data unit:	Tons or liter
Description:	Average truck load of the trucks used for transportation of biomass.
Source of data used:	Project owner
Value applied:	5tons
Justification of the choice of data or description of measurement methods and procedures actually applied :	
Any comment:	

Data / Parameter:	GWP_{CH4}

Data unit:	tCO_2e/tCH_4
Description:	Global warming potential for CH_4
Source of data used:	IPCC
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 :	
Any comment:	

Data / Parameter:	electricity imports from other power grid to CCPG
Data unit:	MWh
Description:	electricity imports from other power grid to CCPG
Source of data used:	China Electric Power Yearbook
Value applied:	See Annex 3.
Justification of the choice of data or description of measurement methods and procedures actually applied :	
Any comment:	

B.6.3 Ex-ante calculation of emission reductions:

Project emissions

1. CO_2 emissions from transportation of biomass residues (PET_y)

According to FSR of the proposed project, the average round trip (from and to) between the biomass residue supply sites and the project plant is 42 km, the average truck load of the trucks used is 5 tons, the quantity of biomass residue transported per year is approximately 231,303 tons, therefore, the round trip (from and to) of truck is 46,261. The carbon emission factors for large heavy load transportation truck of IPCC default value is 1.011×0.001 tCO_2/km. Therefore, the emissions from biomass transportation are calculated as follows:

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

$$= 231{,}303/5 \times 42 \times 1.011 \times 0.001 = 1{,}964 \text{ tCO2e/yr}$$

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

According to the Explanation and Clarification for the Start-up way of the boiler provided by China City Environment Protection Engineering Limited Company and by the boiler manufacturer, the proposed project will use the dry biomass to start up the boiler and the fossil fuels such as the diesel or natural gas won't be used. But in order to be more conservative, 0.5tons of diesel was considered to be consumed ex-ante and the amount of diesel will be monitored ex-post:

The NCV and the emission factor of diesel are 42.652 GJ/t and 20.2 tC/TJ, respectively. The corresponding emissions will be:

$$PEFF_y = FF_{\text{projectplant,diesel,y}} \times NCV_{diesel,y} \times EF_{diesel,y}$$

$$= 0.5 \times 20.2 \times 42.652 \times 10^{-3} \times 44/12 = 1.6 \text{ tCO2e/yr}$$

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

According to conservative estimate of the project situation, power consumption of 1 ton biomass collection, storage, disposal is 10kWh, therefore, the power consumption is:
231,303 ton biomass×10kWh/ton biomass=2,313.03MWh.
The power consumed by the proposed project are delivered from CCPG, according to *"Tool to calculate the emission factor for an electricity system"*, $EF_{grid,CM,y}$ of CCPG is 0.99695 tCO_2e/MWh.
According to *"Tool to calculate baseline, project and/or leakage emissions from electricity consumption"*, TDL_y adopts the default value 20%.
Therefore, according to the calculation formula in B.6.1:

$$PE_{EC,y} = EC_{PJ,y} \times EF_{grid,CM,y} \times (1+TDL_y)$$

$$= 2{,}313.03 \text{ MWh} \times 0.99695 \text{ tCO}_2\text{e/MWh} \times (1+20\%) = 2{,}767 \text{ tCO}_2\text{e}$$

4. Methane emissions from combustion of biomass residues

As per methodology ACM0006, the default CH_4 emission factor for all biomass utilized in the proposed project activity is 30 kg CH_4/TJ, the uncertainty is then estimated to be 300%, resulting in a conservativeness factor of 1.37.

The total quantity of biomass consumed by the project activity per year is 231,303 tons, with[65]:

Rice straw: content of 60%, moisture content of 11.5%, NCV of 11346 MJ/t;
Rape stalk: content of 15%, moisture content of 11.19%, NCV of 13339 MJ/t;
Cotton stalk: content of 25%, moisture content of 20.7%, NCV of 11629 MJ/t;

The corresponding project emission is as below:

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

$$= 30 \times 1.37 \times [231{,}303 \times 60\% \times (1-11.5\%) \times 11{,}346$$
$$+ 231{,}303 \times 15\% \times (1-11.19\%) \times 13{,}339$$
$$+ 231{,}303 \times 25\% \times (1-20.7\%) \times 11{,}629] / 1{,}000{,}000 / 1{,}000$$
$$= 96.08 \text{ tCH4/yr}$$

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

According to the analysis in B6.1, no waste water treatment is involved in the proposed project activity. As a result, the emissions are zero.

Conclusively, according to equation (2), the total project emissions are:

$$PE_y = PET_y + PEFF_y + PE_{EC,y} + GWP_{CH4} \cdot PE_{Biomass,Ch4,y}$$

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[65] Page 28 in the FSR.

=1,964 + 1.6 + 2,767 + 21× 96.08 = 6,750.83 tCO2e/yr

Emission reductions due to displacement of electricity

Based on the formula in section B.6.1 and data from section B.6.2, the figures of emission factors of CCPG are as follows:

- $EF_{gird,OM,y}$: 1.2783tCO_2e/MWh;
- $EF_{grid,BM,y}$: 0.7156 tCO_2e/MWh;
- $EF_{grid,CM,y}$: 0.99695 tCO_2e/MWh.

According to the project's feasibility study report, its net power generation delivered to the CCPG is 141,960 MWh/yr. Thus, the emission reductions due to displacement of electricity are calculated as the product of the baseline emission factor (EF_y in tCO_2/MWh) and the net electricity supplied by the project activity to the CCPG (EG_y in MWh):

$$ER_{\mathrm{Electricity,y}} = EG_y \times EF_y$$

$$= (EG_{\mathrm{project\ plant,y}} - EC_{PJ,y}) \times EF_y$$

$$= (141{,}960 - 0) \times 0.99695 = 141{,}527\ \mathrm{tCO2e/yr}$$

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

Because the project owner finally decided not to claim the emission reductions due to displacement of heat, this step is not applicable.

Baseline emissions due to natural decay or uncontrolled burning of anthropogenic sources of biomass residues

It is recommended in methodology ACM0006 to use 0.0027 tCH_4/t of biomass as default value for the product of NCV_k and $EF_{burning,CH4,k,y}$, and the uncertainty can be deemed to be greater than 100%, resulting in a conservativeness factor of 0.73.

The total quantity of biomass consumed by the project activity per year is 231,303 tons, with:

Rice straw: content of 60%, moisture content of 11.5%;
Rape stalk: content of 15%, moisture content of 11.19%;
Cotton stalk: content of 25%, moisture content of 20.7%;
So:

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

$$= 21\times[231{,}303\times60\%\times(1-11.5\%) + 231{,}303\times15\%\times(1-11.19\%) + 231{,}303\times25\%\times(1-20.7\%)]\times0.0027\times0.73$$

$$= 8{,}257\ \mathrm{tCO2e/yr}$$

Leakage

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

Emission Reductions

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

$ER_y = ER_{Electricity,y} + ER_{Heat,y} + BE_{Biomass,y} - PE_y - L_y$

=141,527+0+8,257–6,751 – 0 =143,033tCO2e/yr

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

Year	**Estimation of project activity emissions** (tCO_2e)	**Estimation of baseline emissions** (tCO_2e)	**Estimation of leakage** (tCO_2e)	**Estimation of emission reductions** (tCO_2e)
01/07/2010-30/06/2011	6,751	149,784	0	143,033
01/07/2011-30/06/2012	6,751	149,785	0	143,033
01/07/2012-30/06/2013	6,751	149,784	0	143,033
01/07/2013-30/06/2014	6,751	149,784	0	143,033
01/07/2014-30/06/2015	6,751	149,784	0	143,033
01/07/2015-30/06/2016	6,751	149,784	0	143,033
01/07/2016-30/06/2017	6,751	149,784	0	143,033
Total (tCO_2e)	47,257	1,048,488	0	1,001,231

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

B.7.1 Data and parameters monitored:

According to ACM0006 (version 10), the data and parameters monitored are as follows:

Data / Parameter:	$BF_{k,y}$
Data unit:	tons of dry matter
Description:	Quantity of biomass residue type *k* combusted in the project plant during the year *y*
Source of data to be used:	On-site measurements
Value of data applied for the purpose of calculating expected emission reductions in section B.6	231,303; Rice straw: content of 60%, moisture content of 11.5%; Rape stalk: content of 15%, moisture content of 11.19%; Cotton stalk: content of 25%, moisture content of 20.7%;
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 should be crosschecked with the quantity of electricity (and heat) generated and any fuel purchase receipts (if available). Continuously, prepare annually an energy balance.
QA/QC procedures to be applied:	Crosscheck the measurements with an annual energy balance that is based on purchased quantities and stock changes
Any comment:	

Data / Parameter:	$BF_{T,k,y}$

Data unit:	tons of dry matter
Description:	Quantity of biomass residue type *k* that has been transported to the project site during the year *y* where *k* are the types of biomass residues used in the project plant in year *y*
Source of data to be used:	On-site measurements
Value of data applied for the purpose of calculating expected emission reductions in section B.6	231,303; Rice straw: content of 60%, moisture content of 11.5%; Rape stalk: content of 15%, moisture content of 11.19%; Cotton stalk: content of 25%, moisture content of 20.7%;
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 should be crosschecked with the quantity of electricity (and heat) generated and any fuel purchase receipts (if available). Continuously, prepare annually an energy balance.
QA/QC procedures to be applied:	Crosscheck the measurements with an annual energy balance that is based on purchased quantities and stock changes
Any comment:	

Data / Parameter:	**Moisture content of the biomass residues**
Data unit:	% Water content
Description:	Moisture content of each biomass residue type *k*
Source of data to be used:	On-site measurements; For the proposed project, the measurement equipment is handheld hygrometer.
Value of data applied for the purpose of calculating expected emission reductions in section B.6	Rice straw: moisture content of 11.5%(Data source: from page 28 in the FSR); Rape stalk: moisture content of 11.19%(Data source: from page 28 in the FSR); Cotton stalk: moisture content of 20.7%(Data source: from page 28 in the FSR);
Description of measurement methods and procedures to be applied:	Continuously, mean values calculated at least annually. This parameter will be monitored by the project owner with the moisture analyzer when the biomass enters the power plant.
QA/QC procedures to be applied:	
Any comment:	In case of dry biomass, monitoring of this parameter is not necessary.

Data / Parameter:	**AVD_y**
Data unit:	km
Description:	Average round trip distance (from and to) between biomass fuel supply sites and the project site
Source of data to be used:	Records by project participants on the origin of the biomass
Value of data applied for the purpose of calculating expected emission reductions in section B.6	42
Description of measurement methods and procedures to be applied:	Continuously;
QA/QC procedures to be	Check consistency of distance records provided by the truckers by comparing

applied:	recorded distances with other information from other sources (e.g. maps).
Any comment:	Option 1 is chosen to estimate CO_2 emissions from transportation by the proposed project, so this parameter should be monitored like this. If biomass is supplied from different sites, this parameter should correspond to the mean value of km traveled by trucks that supply the biomass plant

Data / Parameter:	**N_y**
Data unit:	-
Description:	Number of truck trips for the transportation of biomass.
Source of data to be used:	On-site measurements
Value of data applied for the purpose of calculating expected emission reductions in section B.6	46,261
Description of measurement methods and procedures to be applied:	Continuously;
QA/QC procedures to be applied:	Check consistency of the number of truck trips with the quantity of biomass combusted, e.g. by the relation with previous years
Any comment:	Option 1 is chosen to estimate CO_2 emissions from transportation by the proposed project, so this parameter should be monitored like this. The project participants of the proposed project adopted to monitor this parameter not the average truck load TL_y.

Data / Parameter:	**$EF_{km,CO2,y}$**
Data unit:	tCO_2/km
Description:	Average CO_2 emission factor for the trucks during the year *y*
Source of data to be used:	default value for the Moderate Control in Table 1-32 of “Estimated Emission Factors for US Heavy Duty Diesel Vehicles” on Page 1.75 in the Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories: Reference Manual
Value of data applied for the purpose of calculating expected emission reductions in section B.6	1.011×10^{-3}
Description of measurement methods and procedures to be applied:	According to the several measurement choices in the methodology, the proposed project adopts choosing emission factors applicable for the truck types used from the literature in a conservative manner (i.e. the higher end within a plausible range). The monitoring frequency is at least annually.
QA/QC procedures to be applied:	Cross check with the values from literature at least annually
Any comment:	Option 1 is chosen to estimate CO_2 emissions from transportation by the proposed project, so this parameter should be monitored like this.

Data / Parameter:	$EF_{CO2,diesel,y}$
Data unit:	tCO_2/GJ
Description:	CO_2 emission factor for diesel
Source of data to be used:	the table1.3 "default values of carbon content" Chapter 1 of 2006 IPCC Guidelines for national greenhouse gas inventories :default carbon content for diesel oil: 20.2kg/GJ

Value of data applied for the purpose of calculating expected emission reductions in section B.6	0.07406667=20.2*44/12000
Description of measurement methods and procedures to be applied:	The proposed project is in case of other data sources: Review the appropriateness of the data annually.
QA/QC procedures to be applied:	Check consistency of local / national data with default values by the IPCC. If the values differ significantly from IPCC default values, possibly collect additional information.
Any comment:	

Data / Parameter:	$FF_{project\ plant,i,y}$
Data unit:	ton/year
Description:	Quantity of fossil fuel type *i* combusted in the project plant during the year y; As for the proposed project, according to the Explanation and Clarification for the Start-up way of the boiler provided by China City Environment Protection Engineering Limited Company and by the boiler manufacturer, the proposed project will use the dry biomass to start up the boiler and the fossil fuels such as the diesel or natural gas won't be used. But in order to be more conservative, 0.5tons of diesel was considered to be consumed ex-ante and the amount of diesel will be monitored ex-post:
Source of data to be used:	On-site measurements
Value of data applied for the purpose of calculating expected emission reductions in section B.6	0.5
Description of measurement methods and procedures to be applied:	Use weight meters. Continuously
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 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)

Data / Parameter:	$EG_{project\ plant,y}$
Data unit:	MWh/yr
Description:	Net quantity of electricity generated in the project plant during the year y
Source of data to be used:	On-site measurements
Value of data applied for the purpose of calculating expected emission reductions in section B.6	141,960
Description of measurement methods and procedures to be applied:	Continuously
QA/QC procedures to be applied:	The consistency of metered net electricity generation should be cross-checked with receipts from electricity sales (if available) and the quantity of

	fuels fired (e.g. check whether the electricity generation divided by the quantity of fuels fired results in a reasonable efficiency that is comparable to previous years).
Any comment:	

Data / Parameter:	**$EC_{PJ,y}$**
Data unit:	MWh
Description:	On-site electricity consumption attributable to the project activity imported from CCPG during the year *y*
Source of data to be used:	On-site measurements
Value of data applied for the purpose of calculating expected emission reductions in section B.6	2313.03
Description of measurement methods and procedures to be applied:	Use electricity meters. The quantity shall be cross-checked with electricity purchase receipts. Continuously, aggregated at least annually
QA/QC procedures to be applied:	Cross-check measurement results with invoices for purchased electricity if available.
Any comment:	

Data / Parameter:	**TDL_y**
Data unit:	%
Description:	The average technical distribution losses rate from power transmission site to power consumption site
Source of data to be used:	According to *"Tool to calculate baseline, project and/or leakage emissions from electricity consumption"*, adopt the default value
Value of data applied for the purpose of calculating expected emission reductions in section B.6	20
Description of measurement methods and procedures to be applied:	The technical distribution losses should not contain other types of grid losses (e.g. commercial losses/theft). The distribution losses can be based on references from utilities, network operators or other official documentation.
QA/QC procedures to be applied:	
Any comment:	

Data / Parameter:	**NCV_i**
Data unit:	GJ/t
Description:	Net calorific value of the fossil fuel type *i* (*i*: diesel)
Source of data to be used:	Use accurate and reliable local or national data where available. As for the proposed project, it comes from "China Energy Statistical Yearbook (2007)"
Value of data applied for the purpose of calculating expected emission reductions in section B.6	42.652

Description of measurement methods and procedures to be applied:	Review the appropriateness of the data annually
QA/QC procedures to be applied:	Check consistency of local / national data with default values by the IPCC. If the values differ significantly from IPCC default values, possibly collect additional information.
Any comment:	

Data / Parameter:	NCV_k
Data unit:	GJ/t
Description:	Net calorific value of biomass residue type *k*
Source of data to be used:	Measurements
Value of data applied for the purpose of calculating expected emission reductions in section B.6	1. As for calculation of baseline emissions due to natural decay or uncontrolled burning of anthropogenic sources of biomass residues, to use 0.0027 tCH4 per ton of biomass as default value for the product of *NCVk* and *EFburning,CH4,k,y*. 2. As for calculation of methane emissions from combustion of biomass residues, the following was adopted ex-ante: Rice straw: content of 60%, moisture content of 11.5%, NCV of 11346 MJ/t; Rape stalk: content of 15%, moisture content of 11.19%, NCV of 13339 MJ/t; Cotton stalk: content of 25%, moisture content of 20.7%, NCV of 11629 MJ/t; and the NCV must be monitored ex-ante.
Description of measurement methods and procedures to be applied:	1. As for calculation of baseline emissions due to natural decay or uncontrolled burning of anthropogenic sources of biomass residues, to determine the CH4 emission factor, project participants will use referenced default values. In the absence of more accurate information, it is recommended to use 0.0027 t CH4 per ton of biomass as default value for the product of *NCVk* and *EFburning,CH4,k,y*. 2. As for calculation of methane emissions from combustion of biomass residues, measurements shall be carried out at reputed laboratories and according to relevant international standards. Measure the NCV based on dry biomass. 3.Monitoring frequency: at least every six months, taking at least three samples for each measurement.
QA/QC procedures to be applied:	Check the consistency of the measurements by comparing the measurement results with measurements from previous years, relevant data sources (e.g. values in the literature, values used in the national GHG inventory) and default values by the IPCC. If the measurement results differ significantly from previous measurements or other relevant data sources, conduct additional measurements. Ensure that the NCV is determined on the basis of dry biomass.
Any comment:	

Data / Parameter:	$\mathbf{EF_{burning,CH4,k,y}}$
Data unit:	tCH_4/GJ
Description:	CH_4 emission factor for uncontrolled burning of the biomass residue type *k* during the year *y*
Source of data to be used:	Use referenced and reliable default values (e.g.IPCC)
Value of data applied for the	To use 0.0027 tCH_4 per ton of biomass as default value for the product of

purpose of calculating expected emission reductions in section B.6	NCV_k and $EF_{burning,CH4,k,y}$.
Description of measurement methods and procedures to be applied:	To determine the CH_4 emission factor, project participants will use referenced default values. In the absence of more accurate information, it is recommended to use 0.0027 t CH_4 per ton of biomass as default value for the product of NCV_k and $EF_{burning,CH4,k,y}$. Monitoring frequency: Review of default values: annually
QA/QC procedures to be applied:	Review of default values:；
Any comment:	The CH_4 emissions from biomass combustion are included in the project boundary for the proposed project, so this parameter must be monitored like this.

Data / Parameter:	$BF_{utilized,k,y}$
Data unit:	Tones
Description:	Quantity of biomass residues of type *k* that are utilized for energy generation and as feedstock etc in the defined geographical region
Source of data to be used:	Directly from the statistics issued by the local agriculture government.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Rice straw: 216,000tons; Rape stalk: 54,000tons; Cotton stalk: 96,000tons;
Description of measurement methods and procedures to be applied:	Monitoring frequency: Annually
QA/QC procedures to be applied:	
Any comment:	The proposed project adopted L2 to think about leakage.

Data / Parameter:	$BF_{available,k,y}$
Data unit:	Tones
Description:	Quantity of biomass residues of type *k* in the region
Source of data to be used:	Directly from the statistics issued by the local agriculture government.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Rice straw: 360,000tons; Rape stalk: 90,000tons; Cotton stalk: 160,000tons;
Description of measurement methods and procedures to be applied:	Monitoring frequency: Annually
QA/QC procedures to be applied:	
Any comment:	The proposed project adopted L2 to think about leakage.

B.7.2 Description of the monitoring plan:

This Monitoring plan will set out a number of monitoring tasks in order to ensure that all aspects of greenhouse gas (GHG) emission reductions for the proposed project are controlled and reported. This

requires an on going monitoring of the project to ensure performance according to its design and that claimed Certified Emission Reductions (CERs) are actually achieved.

The following monitoring plan is set out according to the monitoring requirement in ACM0006.

1. The requirement of the monitoring plan

The monitoring plan of the proposed project is a guidance document that provides the set of procedures for preparing key project indicators, tracking and monitoring the impacts of the proposed project. The monitoring plan will be used throughout the defined crediting period for the project to determine and provide documentation of GHG emission impacts from the proposed project. This monitoring plan fulfils the requirement set out by the Kyoto Protocol that emission reductions projects under the CDM have real, measurable and long-term benefits and that the reductions in emissions are additional to any that would occur in the absence of the certified project activity.

2. The monitoring organization

The user of this monitoring plan is the project owner "Anneng (Yicheng) Biomass Thermo-Electricity Co. Ltd". The organization for CDM monitoring of Anneng (Yicheng) Biomass Thermo-Electricity Co. Ltd is as follows:

The vice president is in charge of CDM

The vice president of Anneng (Yicheng) Biomass Thermo-Electricity Co. Ltd will be the person in charge of CDM, who is in charge of issues related to CDM projects, in particular: track the development of CDM, keep in touch with EB, DOE and relevant agencies; supervise the project operation related to data monitoring and the monitoring process as well and ensure a smooth and orderly monitoring process;

The CDM manager

One of the engineers will be the CDM manager, who is in charge of the everyday CDM management, including the statistics of the monitored data, calculation of the emission reduction and work with DOE to do the validation and verification work.

The CDM monitoring team

Several workers will form the CDM monitoring team to do the concrete monitoring work including monitoring, record and calibration and maintenance of the equipment etc.

The above can be figured as follows:

The vice president is in charge of CDM

In charge of issues related to CDM projects, in particular: track the development of CDM, keep in touch with EB, DOE and relevant agencies; supervise the project operation related to data monitoring and the monitoring process as well and ensure a smooth and orderly monitoring process;

The CDM manager

In charge of the everyday CDM management, including the statistics of the monitored data, calculation of the emission reduction and work with DOE to do the validation and verification work.

The CDM monitoring team
Do the concrete monitoring work including monitoring, record and calibration and maintenance of the equipments etc.

3. The parameters needed to be monitored

According to ACM0006 "Consolidated methodology for electricity generation from biomass residues in power and heat plants" (Version 10), parameters need to be monitored in the proposed project includes:

- 1)The electricity connected to CCPG($EG_{project\ plant,y}$) and delivered from CCPG($EC_{PJ,y}$);
- 2)The biomass quantities combusted in the project plant($BF_{k,y}$) and transported to the project site($BF_{T,k,y}$) ;moisture content rate, and NCV of biomass residues(NCV_k); Except the parameters regulated by ACM0006, the pressure of the steam, the temperature of the steam and the flow of the main steam and the main water supply will be monitored by the project owner voluntarily.
- 3)The round trip (from and to) of biomass residues transportation(AVD_y) and the number of truck trips for the transportation of bimass(N_y);
- 4)The diesel consumption by project activity($FF_{project\ plant,i,y}$);
- 5) Quantity of biomass residues of type *k* that are utilized for energy generation and as feedstock etc in the defined geographical region ($BF_{utilized,k,y}$) and quantity of available biomass residues of type *k* in the region ($BF_{available,k,y}$)
- 6)Furthermore, except the direct measurement for the above parameters, the following parameters are from the IPCC or other default values and they also need to be cross checked ex-post through the renew of the IPCC or other default values according to the requirement of the methodology:

✓ CH_4 emission factor for the combustion of biomass residues in the project plant($EF_{CH4,BF}$);

✓ Average CO_2 emission factor for the trucks during the year *y*($EF_{km,CO2,y}$);

✓ CO_2 emission factor for diesel($EF_{CO2,diesel,y}$);

✓ The average technical distribution losses rate from power transmission site to power consumption site(TDL_y)

✓ Net calorific value of the fossil fuel type *i* (*i*: diesel)(NCV_i)

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

To monitor these parameters, project owner will build up a system to measure and collect reliable data, ensure to receive all the emission reduction information.

4. the detailed monitoring work such as monitoring facilities, accuracy and calibration etc

The parameters' monitoring facilities, accuracy and calibration for the above parameters can be typed as the following:

1) The first part of monitoring work is in the charge of the power station operators and power grid staffs. All the data will be recorded once an hour and will be checked and reserved by CDM manager once a day. All the data should be copied; copy work is in the charge of CDM manager. Besides, CDM manager should in charge of collect sales invoices, to check with the monitor results.

The installation of meters is the charge of project owner, the calibration and monitor of meters is in the charge of local power grid company, and the calibration record will be delivered to project owner. If measure meters were breakdown, project owner should notice the local power grid company, the electricity generated in the period of breakdown should be negotiated by two parties.

Grid-connected electricity generated by the proposed project will be monitored continuously through metering equipment at the substation (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.

The electric energy metering should be equipped according the requirements of the *Technical Administrative Code of Electric Energy Metering* (DL/T448-2000). Before its operation, the project owner and the power grid corporation should examine the electric energy metering according to the *Technical Administrative Code of Electric Energy Metering* (DL/T448-2000). The measure meter of main meters and backup meters should be calibration once a year.

Grid-connected electricity will be recorded in the positive way and the electricity provided by the grid to the plant will be recorded in the negative way by main meters of the proposed project. Furthermore, backup meters will be installed at the output ends of the generators and at the output of the high pressure side of the main transformer. The backup meters are the back-ups of the main meters. All of the accuracy for the main meters and the backup meters are 0.2S.

2) The second part of monitoring work is in the charge of biomass residues storehouse securities. The securities are in charge of check the track transportation times, and measure the quantities of biomass residues arrived at factory, measured the moisture content and NCV of the biomass residues etc and the screen in the central control room can show the monitored values. The detailed measurement information for these parameters is as follows:

Parameters	Types of measuring instruments	Accuracy	Calibration frequency
The quantities of biomass residues arrived at factory	the electronic truck scale or the electronic belt	0.3S	once a year
The moisture content of the biomass residues	the moisture analyzer	0.1S	once half a year
The NCV of the biomass residues	The instrument to measure the NCV of biomass residues	0.1S	once a year

The measure results should be recorded by securities, and collected the data once a day, reported to CDM manager for check and reserve. All the records should have one copy at least, and CDM manager is in charge of copy them.

3) The third part of monitoring work is in the charge of CDM manager, to measure round trip (from and to) of biomass residues transportation ($\mathbf{AVD_y}$) and the number of truck trips for the transportation of bimass($\mathbf{N_y}$);

4) The fourth part of monitoring work is in the charge of CDM manager, and record the diesel consumption and reservation quantities. Besides, CDM manager should in charge of collect sales invoices, to check with the monitor results.

5) The fifth part of monitoring work is the statistical report from the local agriculture government.

6) The sixth part of monitoring work should be cross checked ex-post through the renewal of the IPCC or other default values according to the requirement of the methodology and CDM manager should organize the related persons to do the work of cross check.

At last, all the monitoring data should be collected by CDM manager, the calculation of emission reduction should be completed by CDM manager.

5. Contingency plan

As for electricity, if the reading of the main meter in a certain month is so inaccurate as to be out of the error range or the meter doesn't work normally, the grid-connected power generation shall be worked out by using the following measures:

a) Read the data of the backup meter and work out the grid-connected power of the proposed project according to the line loss rate in the past;

b) If the backup meter's data is not so accurate as to be accepted, or the practice is not standardized, the project owner and the grid corporation should joint make a reasonable and conservative estimation method which can be supported by sufficient evidence and proved to be reasonable and conservative when verified by DOE;

c) If the project owner and the grid corporation don't agree on an estimation method, arbitration will be conducted according the procedures set by the agreement to work out an estimation method.

6. Data Management

At the end of each month, the monitoring data of that month should be archived electronically. E-documents should have disc backups and be printed out. The project owner should also keep the copy of electricity sales/purchase receipts. Written documents such as paper-based maps, diagrams and environmental assessments will be used in addition to the monitoring plan to check the information. In order to facilitate auditors' reference of relevant literature relating to verification of the emission reductions of the proposed project, the index of the project materials and monitoring results should be provided. All paper-based information and data shall be stored by the technical department of the project owner and all the materials shall have copies for backup. And all data will be kept until 2 years after the end of the total credit period of the proposed project.

7. Monitoring Report

CDM manager is responsible to compile monitoring report of the proposed CDM project. The monitoring report includes all the monitoring parameter, monitoring data result, maintain and calibration report of the measuring instruments, the emission reduction result of the certain period, as the main evidence for DOE's verification.

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

The applied study on the baseline and monitoring methodology of the proposed project was completed on 05/09/2008. The individuals/entities involved in the study are as follows:

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Mr. Cheng Xiaodong

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The above entities are the project participants listed in Annex 1.

SECTION C. Duration of the project activity / crediting period

C.1 Duration of the project activity:

C.1.1. Starting date of the project activity:

09/04/2008 (the date of signing the purchase agreement of steam turbines and generators)[66]

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

20 years[67]

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

C.2.1. Renewable crediting period

7*3 years

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

01/07/2010 (or the registration date whichever is later.)

C.2.1.2. Length of the first crediting period:

7 years

C.2.2. Fixed crediting period:

Not applicable

C.2.2.1. Starting date:

Not applicable

C.2.2.2. Length:

Not applicable

[66] As analyzed in section B.5 in the PDD, this date was the earliest one among all the key implementation events.

[67] According to the above section A.4.3, the lifetime for the boilers is 30 years, the lifetime for the steam turbines is no less than 30 years and the lifetime for the generators is no less than 30 years. In order to make sure the operation of the proposed project, the lifetime of the equipments should be equal to or larger than the lifetime of the proposed project. According to the FSR, the lifetime of the proposed project was 20 years. So the expected operational lifetime of the project activity is 20 years.

SECTION D. Environmental impacts

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

The Environmental Impact Assessment (EIA) Report for the proposed project was compiled by Environmental Sciences Research Institute in Hubei Province. The EIA Report for the proposed project has been approved by the Environmental Protection Bureau of Hubei Province on 17th July, 2007, with approval No. "Ehuanhan [2007] No.280". According to the approval comments of the EIA Report by the Environmental Protection Bureau of Hubei Province, the environmental impacts likely to be caused by the proposed project are analyzed as follows:

1. Construction Phase

Wastewater

The wastewater produced by the proposed project will be industrial, workers' and power station's wastewater. Production wastewater treatment facilities will be built to gather the wastewater, after the treatments of sand setting, precipitation, adding neutralizer etc., then the production wastewater will be discharged. Domestic wastewater will also be dealt before being discharged.
Both production wastewater and domestic wastewater will meet the Level-two standard of Integrated Wastewater Discharge Standard (GB8978-1996).

Waste Air

Waste air during the construction period will be mainly from blasts, crushed sand processing, dust and the pollutant discharged by construction equipment etc.
Wet techniques and protect measures will be adopted; dust collecting equipment will be installed. These measures will ensure that the discharge of air pollutants will meet the standard of the Integrated Emission Standard of Air Pollutants (GB16297-1996).

Noise

Noise during the construction period will be mainly from blasts, drilling, crushed sand processing, mixing of concrete and traffic. Low-noise processing equipments will be used, meanwhile the construction time will be strictly controlled. If the condition allows, greenbelt will be built to decrease the effect of noise. These measures will ensure that the construction site will meet the Standard of Noise at Boundary of Industrial Enterprises (GB 12523-90).

Waste Residue

Waste residue consists of engineering refuse and domestic waste produced by constructers. The construction waste and domestic waste will be piled up in corresponding abandoned dreg site respectively. All the abandoned dreg sites will be reinforced, and slag dam will be built along rivers and roads. Domestic waste will be put together, and delivered to landfill sites to be dealt at set intervals.

2. Operation Phase

Waste gas

The air pollution sources of the proposed project are mainly resulted from Biomass combustion by boiler. The primary air pollutants are smoke and dust. The approach to prevent and reduce the waste gas is: install a

bag filter for each of the two 75t/h boilers of the proposed project, and the waste gas from biomass combustion will be emitted after entering and treating by the bag filter. The dust removal efficiency is higher than 99.7%.

The dusts produced from the crushing workshop, ash repository, and biomass heaping shed can be removed by bag filter with efficiency higher than 90%, and can subsequently be discharged through the 20-meter-high discharge pipe. Close the ash storing and transportation system and install bag filter for the ash repository. Based on the above measures, the discharged dusts can meet the requirement of 2^{nd} level standard of "Integrated Air Pollutant Emission Standards" (GB16297-1996).

Waste water

The wastewater of the proposed project mainly include industrial cooling water, wastewater from cooling towers, acid and alkali wastewater and domestic wastewater.

According to the theory of "Water-Sewage Separation, Rain-Sewage Separation, Multiple Use of Water", design and construct discharge and recycle system, and collect and treat initial rainwater in plant district and biomass heaping area. The circulating cooling water can be recycled and reused. The acid and alkali wastewater in the chemical water workshop can be neutralized and then treated together with wastewater from cooling towers by physicochemical system for reuse; the domestic wastewater can be treated by 2^{nd} level biochemical wastewater treatment system for road washing and greening.

After the above measures, all the discharged wastewater can meet the 1^{st} level standard of "Integrated Wastewater Discharge Standards" (GB8978-1996).

Noises

The noises of the proposed project mainly derive from Boiler room, generators and other facilities.

Optimize the plant layout, reasonably arrange the high-noise equipment, give priority to low-noise equipment; adopt sound insulation and absorption measures to high-noise equipment; implement closed sound insulation, sound damping and inner sound absorption measures for the centralized controlling room in the main power house; properly set absorption wall and noise barrier in sound source workshops with frequent staff-involved productive activities; strengthen greening in the plant area to reduce the impacts of noises on the environment.

After the above measures, the noise in the plant will meet the "Noise Standards in the Boundary of Industrial Enterprises" (GB12348-90).

Solid waste

The solid waste mainly includes dust pollutant and ash pollutant.

For removing dust pollutant, a closed biomass crushing system is utilized and the bag filter is installed. In addition, the fly ash will be transported through the conveyer to the ash repository, and the bag filter is installed to prevent dusts. For removing ash pollutant, the comprehensive utilization approaches of plant ash are implemented. Temporary and closed plant ash heaping area with sufficient volume is constructed in the plant to fulfill the plant ash heaping if it is not comprehensively used in time.

After the above measures, the harmless disposal rate will be 100%.

Transportation pollutant

The biomass transportation will bring about transportation pollutants. The main measures are:

Reasonably dispatch vehicle transportation to reduce working in the night; Try to avoid whistling, regularly sweeping vehicle passing roads and spraying water to prevent dust generation; Transportation vehicles should follow the rated load, and the overloading is prohibited; Canvas or plastic sheeting should be used in the top of the vehicle during the transportation to prevent material scattering.

After the above measures, the gas pollution and noise pollution will meet the requirement of regulation.

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

The EIA report of the proposed project has been approved by the Hubei Province Environmental Protection Bureau. The project owner will work hard to protect and management the environment during the construction and operational periods according to the suggestions in the approval document made by the Hunan Province Environmental Protection Bureau.

SECTION E. Stakeholders' comments

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

There are three phases for the stakeholders' investigation: the first phase was carried out during the EIA design in May ～ June 2007, the second phase was carried out after the completion of FSR through holding the CDM stakeholders' meeting on 08/10/2007, and the third phase was carried out for CDM activity requirements in January ～February 2008 when applying for CDM through questionnaires.

1. The first phase [68](Stakeholders comments collection required by China EIA)

To let the public realize the significance of biomass thermoelectricity project, the proposed project to be realized, support and cooperate the construction of the proposed project, and enhance the environment benefit and society benefit of the proposed project, a survey of stakeholders was carried out to collect stakeholder's awareness and requirement of the proposed project.

The proposed project adopted collecting stakeholder's views and opinions through medium bulleting and questionnaires surveying.

Medium bulletin: the proposed project adopted the media such as the official website of Yicheng government[69] to invite the stakeholders' comments since 06/06/2007, and the bulletin contents include general situation of the proposed project, public participation load table and contact method.

Questionnaires survey: During the survey of stakeholders, 100 questionnaires were released and 100 questionnaires were got back during May to June 2007. Collect the opinions of Xuancheng government and related department, Xuancheng Environment Protection Bureau, and Yaowan villager. Questionnaires contents include introduce general situation of the proposed project, the environmental influence in project construction period and function period and the environment protect measures the project owner will take, and survey the attitude, requirements and suggestions of the stakeholders.

The information of the 100 stakeholders was as follows:

Items	Choices	Shares
Gender	male	65%
	female	35%
Age	under 30 years	5%
	30-50 years	79%
	>50 years	16%
Education level	university education level	30%
	middle-level education level	6%
	middle school education level	57%
	primary education level	7%
Profession	farmers	70%
	normal workers	6%
	leading cadres	24%

[68] Page 131-134 of the EIA of the proposed project which was approved by Environmental Protection Bureau of Hubei Province.

[69] http://www2.yichengnews.com/gongshi.htm

The questions of this questionnaire survey were as follows：

- Do you know about the proposed project?
- What the influences the project will bring to your work?
- What the influences the project will bring to your life?
- What is your attitude to the proposed project?
- What environment influences of this project will bring to the natural environment?
- What influences of this project will bring to the circumstance?
- Do you satisfy the environment around the project?
- If not satisfied, what do you think is the main environmental problem?

2. The second phase (the CDM stakeholders' meeting on 08/10/2007)

On 08/10/2007, the project owner organized the CDM stakeholders' meeting and the related stakeholders such as 8 people from Yaowan Village near to the proposed project site participated this meeting.

3. The third phase [70](stakeholders' comments collection through questionnaires during CDM application phase)

In January to February 2008, to facilitate the local stakeholders know about CDM activity, an additional questionnaire activity was also carried out after the project owner made an introduction of CDM activity and how the GHG emission reduction obtained from the proposed project activity.

Totally 35 questionnaires were distributed and all of them had been returned. 21 people were male and 14 people were female and most of them had the education level of junior high school and high school and all of them were from the nearby villages around the location of the proposed project.

E.2. Summary of the comments received:

1. The opinions result from the first phase

Feedback result of medium bulletin

Up to now, survey from medium bulletin didn't have any feedback.

Feedback results of Questionnaires survey

The Statistic results of the 100 questionnaires are as follows:

- Realization extent of the proposed project: totally and partly know the proposed project are 100, accounting for 100%.
- Influences the proposed project will bring to work and life: 98% think that the proposed project will bring positive influences, 2% think that the proposed project will bring negative influences.
- Attitude to the proposed project: 100% agree, nobody opposes.
- Environment influence the project construction will bring: 85% think positive influence, 15% think no influence.
- Outstanding environment problem the project will bring to: 82% think satisfied, 18% think relatively satisfied, nobody unsatisfied.

Public considerations and opinions: the public hopes that the project will take measures to reach the emission standard according to the policy, and complete the project as soon as possible, boost the local

[70] From the thirty-five questionnaires during the CDM application.

economic development, including: do the environment protect well, reach the standard of pollution emission; expedite the construction, boost the local economic development, solve the employment of surplus labour force.

2. The second phase (the CDM stakeholders' meeting on 08/10/2007)

According to the minutes of this meeting, all the participate thought that the proposed project uses the biomass resources effectively which can develop recycle economy; control the burning of biomass safely and protect the environment. Furthermore, all of them supported the proposed project to apply for CDM.

3. The opinions result from the third phase

The result of thirty-five questionnaires is as follows:

Items	Choices	Persons	Percentage (%)
Do you know about the proposed project?	know	24	68.6
	Know very well	7	20.0
	Don't know	4	11.4
What do you think the necessity of the proposed project?	To increase the power supply	8	22.9
	To promote the local employment	23	65.7%
	To increase the local tax	18	51.4%
What the positive influences the proposed project will bring to your life?	To increase the power supply	6	17.1%
	To reduce the tariff	12	34.3%
	To increase earnings	12	34.3%
	To increase employment opportunities	19	54.3%
	To improve the standard of living	19	54.3%
What the negative influences the proposed project will bring to your life?	noise pollution	15	42.9%
	Waste water pollution	24	68.6%
	Waste air pollution	17	48.6%
Compared to the fossil fuel fired power generation projects, which advantages the biomass power generation project have?	to reduce amount of the pollutants	19	54.3%
	to reduce GHG emissions	9	25.7%
	to utilize renewable energy and reduce consumption of fossil fuels	26	74.3%
Compared to the fossil fuel fired power generation projects, which disadvantages the biomass power generation project have?	with higher investment per kW	16	45.7%
	with higher O&M cost and weaker economical capacity	20	57.1%

	with more technical risk	7	20%
Do you support the proposed project applying for CDM?	Agreed	31	88.6%
	Don’t care	1	2.9%
Do you support the start of construction of the proposed project?	Agreed	31	88.6%
	Don’t care	0	0

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

According to the result of the survey, local resident totally supported the proposed project and there were some matters they cared about. The solutions to the concerned matters during the survey were as follows:

- Toward atmosphere pollution and waste water pollution that some resident concerned about, according to the protection measure of atmosphere and waste water pollution which were authorized, strictly implement, reach emission standard.

Consequently, whereas no big counterview is showed in the survey, there will be no change in the project design, construction and function.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

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Annex 2

INFORMATION REGARDING PUBLIC FUNDING

No official development assistant (ODA) from Annex I Parties is involved in the proposed project.

Annex 3
BASELINE INFORMATION

The proportion of the hydro power plus nuclear power plus the power produced by other low-cost/must run resources in the total electricity output of Central China Power Grid in the last five years in order to choose the Simple OM method:

Table 3-1 Power generation of Central China Power Grid in 2002

Power generation(MWh)	Henan	Hubei	Hunan	Jiangxi	Sichuan	Chongqing	Total
Hydro power	4,859,000	27,854,000	25,329,000	6,151,000	44,499,000	3,748,000	112,440,000
Fossil fuelled	84,734,000	34,301,000	20,058,000	18,648,000	27,879,000	14,727,000	200,347,000
Others	0	0	0	0	0	0	0
Total	89,593,000	62,155,000	45,387,000	24,799,000	72,378,000	18,475,000	312,788,000

The proportion of low operating cost/must-run power plants of Central China Power Grid in 2002: (312,788,000-200,347,000)/312,788,000=35.9%.
Data Source: *China Electric Power Yearbook 2003*

Table 3-2 Power generation of Central China Power Grid in 2003

Power generation(MWh)	Henan	Hubei	Hunan	Jiangxi	Sichuan	Chongqing	Total
Hydro power	5,457,000	38,775,000	24,401,000	3,864,000	50,000,000	3,951,000	126,448,000
Fossil fuelled	95,518,000	39,532,000	29,501,000	27,165,000	32,782,000	16,341,000	240,839,000
Others	0	0	0	0	0	0	0
Total	100,975,000	78,307,000	53,903,000	31,029,000	82,782,000	20,292,000	367,287,000

The proportion of low operating cost/must-run power plants of Central China Power Grid in 2003: (367,287,000-240,839,000)/ 367,287,000=34.4%.
Data Source: *China Electric Power Yearbook 2004*

Table 3-3 Power generation of Central China Power Grid in 2004

Power generation(MWh)	Henan	Hubei	Hunan	Jiangxi	Sichuan	Chongqing	Total

Hydro power	6,884,000	69,512,000	24,236,000	3,890,000	58,902,000	5,670,000	169,094,000
Fossil fuelled	109,352,000	43,034,000	37,186,000	30,127,000	34,627,000	16,520,000	270,846,000
Others	0	0	0	0	0	725,000	725,000
Total	116,236,000	112,546,000	61,423,000	34,017,000	93,529,000	22,914,000	440,665,000

The proportion of low operating cost/must-run power plants of Central China Power Grid in 2004: (440,665,000-270,846,000)/ 440,665,000=38.5%.
Data Source: *China Electric Power Yearbook 2005*

Table 3-4 Power generation of Central China Power Grid in 2005

Power generation(MWh)	Henan	Hubei	Hunan	Jiangxi	Sichuan	Chongqing	Total
Hydro power	6,700,000	81,400,000	24,100,000	5,000,000	64,498,000	6,036,000	187,734,000
Fossil fuelled	131,590,000	47,700,000	39,900,000	30,000,000	37,202,000	17,584,000	303,976,000
Others	10,000	0	0	0	0	0	10,000
Total	138,300,000	129,100,000	64,000,000	35,000,000	101,700,000	23,620,000	491,720,000

The proportion of low operating cost/must-run power plants of Central China Power Grid in 2005: (491,720,000-303,976,000)/ 491,720,000=38.2%.
Data Source: *China Electric Power Yearbook 2006*

Table 3-5 Power generation of Central China Power Grid in 2006

Power generation(MWh)	Henan	Hubei	Hunan	Jiangxi	Sichuan	Chongqing	Total
Hydro power	--	--	--	--	--	--	--
Fossil fuelled	151,235,000	54,841,000	46,408,000	34,449,000	44,193,000	23,487,000	354,613,000
Others	--	--	--	--	--	--	--
Total	158,300,000	130,800,000	74,800,000	43,600,000	122,700,000	28,900,000	559,100,000

The proportion of low operating cost/must-run power plants of Central China Power Grid in 2006: (559,100,000-354,613,000)/ 559,100,000=36.6%.
Data Source: *China Electric Power Yearbook 2007*

The calculation of the emission factors of Central China Power Grid adopts the data from "Report on 2008 Baseline Emission Factor for Regional Power Grids in China" issued by China DNA on 18th July. 2008, which are Operating Margin ($EF_{grid,OM,y}$) 1.2783 tCO2e/MWh , and Build Margin ($EF_{grid,BM,y}$) 0.7156tCO2e/MWh.

The concrete calculation process is shown in the following tables:

Table 3-6 Thermal electricity generation of Central China Power Grid in 2004

Province	Thermal power generation（MWh）	Self-consumption rate of electricity（%）	Supply of thermal power generation（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

Data source: *China Electric Power Yearbook 2005*

Table 3-7 Calculation of simple OM emission factor of Central China Power Grid in 2004

Fuels	Unit	Jiangxi	Henan	Hubei	Hunan	Chong qing	Sichuan	Total	Emission factor（tC/TJ）	OXID（%）	NCV（MJ/t or MJ/km^3）	CO_2 emission（tCO_2e）
		A	B	C	D	E	F	G=A+B+C+D+E+F	H	I	J	K=G*H*I*J*44/12/10000（mass unit） or =G*H*I*J*44/12/1000 (volume unit
Raw coal	10^4ton	1863.8	6948.5	2510.5	2197.9	875.5	2747.9	17144.1	25.8	100	20908	339,092,605
Washed coal	10^4ton		2.34					2.34	25.8	100	26344	58,316

Other washed coal	10^4ton	48.93	104.22			89.72		242.87	25.8	100	8363	1,921,441
Coke	10^4ton		109.61					109.61	29.2	100	28435	3,337,011
Coke oven gas	10^8 M^3			1.68		0.34		2.02	12.1	100	16726	149,900
Other gas	10^8 M^3					2.61		2.61	12.1	100	5227	60,527
Crude oil	10^4ton		0.86	0.22				1.08	20	100	41816	33,118
Gasoline	10^4ton		0.06			0.01		0.07	18.9	100	43070	2,089
Diesel	10^4ton	0.02	3.86	1.7	1.72	1.14		8.44	20.2	100	42652	266,627
Fuel oil	10^4ton	1.09	0.19	9.55	1.38	0.48	1.68	14.37	21.1	100	41816	464,893
LPG	10^4ton							0	17.2	100	50179	0
Refinery gas	10^4ton	3.52	2.27					5.79	15.7	100	46055	153,506
Natural gas	10^8 M^3						2.27	2.27	15.3	100	38931	495,775
Other petroleum products	10^4ton							0	20	100	38369	0
Other coking products	10^4ton							0	25.8	100	28435	0
Other energy	10^4tce		16.92		15.2	20.95		53.07	0	100	0	0
Total												346,035,810
Total mission (tCO_2e)	346,035,810											
Total electricity supply(MWh)	249,074,186											

$EF_{simple,OM,2004}$(tCO_2e/MWh)	1.38929

Data source: *China Energy Statistical Yearbook 2005*

Table 3-8 Thermal electricity generation of Central China Power Grid in 2005

Province	Thermal power generation （MWh）	Self-consumption rate of electricity （%）	Supply of thermal power generation（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

Data source: *China Electric Power Yearbook 2006*

Table 3-9 Calculation of simple OM emission factor of Central China Power Grid in 2005

Fuels	Unit	Jiangxi	Henan	Hubei	Hunan	Chongqing	Sichuan	Total	Emission factor （tC/TJ）	OXID （%）	NCV （MJ/t or MJ/km^3）	CO_2 emission （tCO_2e）
		A	B	C	D	E	F	G=A+B+C+D+E+F	H	I	J	K=G*H*I*J*44/12/10000（mass unit）or =G*H*I*J*44/12/1000 (volume unit
Raw coal	10^4ton	1869.29	7638.87	2732.15	1712.27	875.4	2999.77	17827.75	25.8	100	20908	352,614,497
Washed coal	10^4ton	0.02						0.02	25.8	100	26344	498

Other washed coal	10^4ton		138.12			89.99		228.11	25.8	100	8363	1,804,669
Coke	10^4ton		25.95		105			130.95	29.2	100	28435	3,986,695
Coke oven gas	10^8 M^3			1.15		0.36		1.51	12.1	100	16726	112,054
Other gas	10^8 M^3		10.2			3.12		13.32	12.1	100	5227	308,897
Crude oil	10^4ton		0.82	0.36				1.18	20	100	41816	36,185
Gasoline	10^4ton		0.02			0.02		0.04	18.9	100	43070	1,194
Diesel	10^4ton	1.3	3.03	2.39	1.39	1.38		9.49	20.2	100	42652	299,798
Fuel oil	10^4ton	0.64	0.29	3.15	1.68	0.89	2.22	8.87	21.1	100	41816	286,959
LPG	10^4ton							0	17.2	100	50179	0
Refinery gas	10^4ton	0.71	3.41	1.76	0.78			6.66	15.7	100	46055	176,572
Natural gas	10^8 M^3						3	3	15.3	100	38931	655,209
Other petroleum products	10^4ton							0	20	100	38369	0
Other coking products	10^4ton				1.5			1.5	25.8	100	28435	40,349
Other energy	10^4tce		2.88		1.74	32.8		37.42	0	100	0	0
Total												360,323,575
Total mission (tCO_2e)	360,323,575											
Total electricity supply(MWh)	286,203,305											
$EF_{simple,OM,2005}$ (tCO_2e/MWh)	1.25898											

Data source: *China Energy Statistical Yearbook 2006*

Table 3-10 Thermal electricity generation of Central China Power Grid in 2006

Province	Thermal power generation （MWh）	Self-consumption rate of electricity （%）	Supply of thermal power generation（MWh）
Jiangxi	34449000	6.17	32,333,497
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

Note: The electricity importing from Northwest China Power Grid is3,028,950MWh, so the total fuel fired electricity generation of Central China Power Grid is 334,027,226+3,028,950=**337,056,176** MWh.
Data source: *China Electric Power Yearbook 2007*

Table 3-11 Calculation of simple OM emission factor of Central China Power Grid in 2006

Fuels	Unit	Jiangxi	Henan	Hubei	Hunan	Chong qing	Sichuan	Total	Emission factor （tC/TJ）	OXID （%）	NCV （MJ/t or MJ/km^3）	CO_2 emission （tCO_2e）
		A	B	C	D	E	F	G=A+B+C +D+E+F	H	I	J	K=G*H*I*J*44 /12/10000 （mass unit） or =G*H*I*J*44/ 12/1000 (volume unit
Raw coal	10^4ton	1926.02	8098.01	3179.79	2454.48	1184.3	3285.22	20127.82	25.8	100	20908	398,107,508
Washed coal	10^4ton					5.79		5.79	25.8	100	26344	144,295

Other washed coal	10^4ton	4.51	104.12		8.59	79.21		196.43	25.8	100	8363	1,554,036
Briquette	10^4ton						0.01	0.01	26.6	100	20908	204
Coke	10^4ton		17.23		0.32			17.55	29.2	100	28435	534,299
Coke oven gas	10^8 M^3		0.52	1.07	4.24	0.38	0.01	6.22	12.1	100	16726	461,572
Other gas	10^8 M^3	12.69	3.95		1.7	4.36	0.01	22.71	12.1	100	5227	526,655
Crude oil	10^4ton		0.49					0.49	20	100	41816	15,026
Gasoline	10^4ton		0.01					0.01	18.9	100	43070	298
Diesel	10^4ton	0.91	2.23	1.41	1.78	0.96		7.29	20.2	100	42652	230,298
Fuel oil	10^4ton	0.51	1.26	1.31	0.8	0.57	3.49	7.94	21.1	100	41816	256,872
LPG	10^4ton							0	17.2	100	50179	0
Refinery gas	10^4ton	0.86	8.1	1	0.97			10.93	15.7	100	46055	289,780
Natural gas	10^8 M^3			0.28		0.16	18.63	19.07	15.3	100	38931	4,164,943
Other petroleum products	10^4ton							0	20	100	38369	0
Other coking products	10^4ton						0.01	0.01	25.8	100	28435	269
Other energy	10^4tce	17.45	37.36	31.55	18.29	29.35		134	0	100	0	0
Total												406,286,055
Total mission (tCO_2e)	406,286,055+3,028,950*0.82214=408,776,270											
Total electricity supply(MWh)	334,027,226+3,028,950=337,056,176											
$EF_{simple,OM,2006}$(tCO_2e/MWh)	408,776,270/337,056,176=1.212784											

Note: The electricity importing from Northwest China Power Grid in 2006 is 3,028,950MWh, and the simple OM emission factor of Northwest China Power Grid is 0.82214 tCO_2e/MWh, so the total CO_2 emission of Central China Power Grid in 2006 is 406,286,055+3,028,950*0.82214=**408,776,270**tCO_2e.

Data source: *China Energy Statistical Yearbook 2007*

Table 3-12 the three years average emission factor of Central China Power Grid

Years	Total CO_2 emission(tCO_2e)	The total fuel fired electricity connected to the grid(MWh)	Three years average emission factor(tCO_2e /MWh)
2004	346,035,810	249,074,186	1.2783
2005	360,323,575	286,203,305	
2006	408,776,270	337,056,176	

Table 3-13 the weight of CO_2 emissions from solid fuels, liquid fuels and gas fuels among total emissions in Central hina Power Grid

		Jiangxi	Henan	Hubei	Hunan	Chong qing	Sichuan	Total	NCV （MJ/t, or MJ/km^3 ）	Emission factor （tC/TJ ）	OXID （% ）	CO_2 emissions （tCO2e ）
Fuels	Units	A	B	C	D	E	F	G=A+…+F	H	I	J	K=G*H*I*J*44/12/100
Raw coal	10^4ton	1926.02	8098.01	3179.79	2454.48	1184.3	3285.22	20127.82	20908	25.8	1	398,107,508
Washed coal	10^4ton	0	0	0	0	5.79	0	5.79	26344	25.8	1	144,295
Other washed coal	10^4ton	4.51	104.12	0	8.59	79.21	0	196.43	8363	25.8	1	1,554,036
Briquette	10^4ton	0	0	0	0	0	0.01	0.01	20908	26.6	1	204
Coke	10^4ton	0	17.23	0	0.32	0	0	17.55	28435	29.2	1	534,299
Sum												**400,340,342**
Crude oil	10^4ton	0	0.49	0	0	0	0	0.49	41816	20	1	15,026
Gasoline	10^4ton	0	0.01	0	0	0	0	0.01	43070	18.9	1	298
Kerosene	10^4ton	0	0	0	0	0	0	0	43070	19.6	1	0
Diesel	10^4ton	0.91	2.23	1.41	1.78	0.96	0	7.29	42652	20.2	1	230,298

Fuel oil	10^4ton	0.51	1.26	1.31	0.8	0.57	3.49	7.94	41816	21.1	1	256,872
Other petrolem products	10^4ton	0	0	0	0	0	0	0	38369	20	1	0
Other coking products	10^4ton	0	0	0	0	0	0.01	0.01	28435	25.8	1	269
Sum												**502,763**
Natural gas	10^7m^3	0	0	2.8	0	1.6	186.3	190.7	38931	15.3	1	4,164,943
Coke-oven gas	10^7m^3	0	5.2	10.7	42.4	3.8	0.1	62.2	16726	12.1	1	461,572
Other coal gas	10^7m^3	126.9	39.5	0	17	43.6	0.1	227.1	5227	12.1	1	526,655
LPG	10^4ton	0	0	0	0	0	0	0	50179	17.2	1	0
Refinery dry gas	10^4ton	0.86	8.1	1	0.97	0	0	10.93	46055	15.7	1	289,780
Sum												**5,442,950**
Total												**406,286,055**

Data source: *China Energy Statistical Yearbook 2007*

$\lambda_{Coal,y}$ =98.54%, $\lambda_{Oil,y}$ =0.12%, $\lambda_{Gas,y}$ =1.34%.

Table 3-14 emission factors of the most efficient commercial thermal power plants

	Variable	Efficiency of electricity supply (%)	Emission factor of the fuel (tC/TJ)	OXID	Emission factor (tCO_2e/MWh)
		A	B	C	D=3.6/A/1000*B*C*44/12
Coal-fired power plant	$EF_{Coal,Adv,y}$	37.28%	25.8	1	0.9135
Gas-fired power plant	$EF_{Oil,Adv,y}$	48.81%	15.3	1	0.4138

Oil-fired power plant	$EF_{Gas,Adv,y}$	48.81%	21.1	1	0.5706

$$EF_{Thermal,y} = \lambda_{Coal,y} \times EF_{Coal,Adv,y} + \lambda_{Oil,y} \times EF_{Oil,Adv,y} + \lambda_{Gas,y} \times EF_{Gas,Adv,y} = 0.9064\ tCO_2e/MWh.$$

Table 3-15 Calculation of BM emission factor of Central China Power Grid

	Installed capacity in 2004	**Installed capacity in 2005**	**Installed capacity in 2006**	**Newly added installed capacity between2005 and 2006**	**Percentage to the newly added installed capacity**
	A	B	C	D=C-B	
Thermal power（MW）	53825.7	60167.2	76658	16490.8	78.95%
Hydropower（MW）	34642	38405.2	42719	4313.8	20.65%
Nuclear power（MW）	0	0	0	0	0.00%
Wind power（MW）	0	24	106	82	0.39%
Total（MW）	88467.7	98596.4	119483	20886.6	**100.00%**
Percentage to 2006 total installed capacity	74.04%	82.52%	100%		

$EF_{Grid,BM,y}$=0.9064×78.95%=0.7156 tCO_2/MWh.

Data source: *China Electric Power Yearbook 2005, China Electric Power Yearbook 2006, China Electric Power Yearbook 2007*

Annex 4

MONITORING INFORMATION

No other information.