CLEAN DEVELOPMENT MECHANISM

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

CONTENTS

Annexes

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SECTION A. General description of project activity

A.1 Title of the project activity:

Liucheng Biomass Power Generation Project in Guangxi Zhuang Autonomous Region, China

Version number of the document: 01

Date: 03/08/2009

Version number of the document: 05

Date: 29/03/2010

A.2. Description of the project activity:

Liucheng Biomass Power Generation Project in Guangxi Zhuang Autonomous Region, China (hereafter referred to "the proposed project") is sited in Liucheng County Guangxi Zhuang Autonomous Region, and it will be constructed and operated by Liuzhou City Xin'neng Biomass Power Generation Co., Ltd. (hereafter referred to "the project owner").

The proposed project will construct a biomass residues power generation plant with the biomass residues from mulberry leaf and sugarcane leaf discarded by local farmers in Liucheng County. The main systems of the proposed project involve heat system, fuel supply system, ash removal system, water disposal system, water supply system, electrical system, thermal control system, auxiliary production system etc. There are abundant biomass resources in Liucheng County as follows: within the 50 kilometers radius range of the project site, the annual available quantities of sugarcane leaf is 375,000 tons and the annual available quantities of mulberry leaf is 315,000 tons, therefore, the total annual available quantities will be 690,000 tons. The total quantity of biomass residues used by the proposed project will be 178,198 tons. Before the implementation of the proposed project, there are no equipments and systems of biomass residues power generation in the nearby of the project site.

According to the following analysis in section B.4, in absence of the proposed project, the most viable baseline scenario is "The SCPG providing the same annual power generation" and the same amount of biomass residues "dumped or left to decay under mainly aerobic conditions or burnt in an uncontrolled manner". The project emission sources are CO_2 emissions by on site fossil fuels[1], CO_2 emissions by on site electricity consume and CO_2 emissions by mulberry leaf and sugarcane leaf transportation and CH_4 emissions by mulberry leaf and sugarcane leaf burning. The proposed project will install two 75 t/h biomass residues direct-burning boilers and two 15 MW steam turbines and generators. The total installed capacity is 30 MW, with annual operation hours of 6,000, thus the annual generated electricity is 180,000 MWh and the annual grid-connected electricity is 157,860 MWh. The electricity will be delivered to Guangxi grid, and finally delivered to South China Power Grid (SCPG).The estimated annual GHG emission reductions are 123,324 tCO_2.

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

- Use biomass residues resources effectively, promote recycle economy; control the burning of mulberry leaf and sugarcane leaf safely, protect the environment;

[1] The proposed project only uses the biomass as fuels and won't use any other fossil fuels and 0 ton of diesel was considered to be consumed ex-ante. But in order to be more conservative, the amount of diesel will be monitored ex-post.

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- To increase local power supply, accelerate local economic development; displace part of the electricity generated by SCPG, which is dominated by fossil fuel fired power plants, and reduce air pollutant emissions such as CO_2, SO_2 and NO_X.
- The proposed project will facilitate the local employment, and create a lot of opportunities in construction period and 111 employees 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)	Liuzhou City Xin'neng Biomass Power Generation Co., Ltd.	No
Japan	Mitsubishi Corporation	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.:

Guangxi Zhuang Autonomous Region

A.4.1.3. City/Town/Community etc:

Liuzhou City / Liucheng County

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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 Liucheng County, Guangxi Zhuang Autonomous Region, 3.5 km west away from Liucheng county, 58 km north away from Liuzhou city. The site's coordinates are east longitude of 109°11′35″ and north latitude of 24°39′27″[2]. Figure 1 indicates the location of the proposed project.

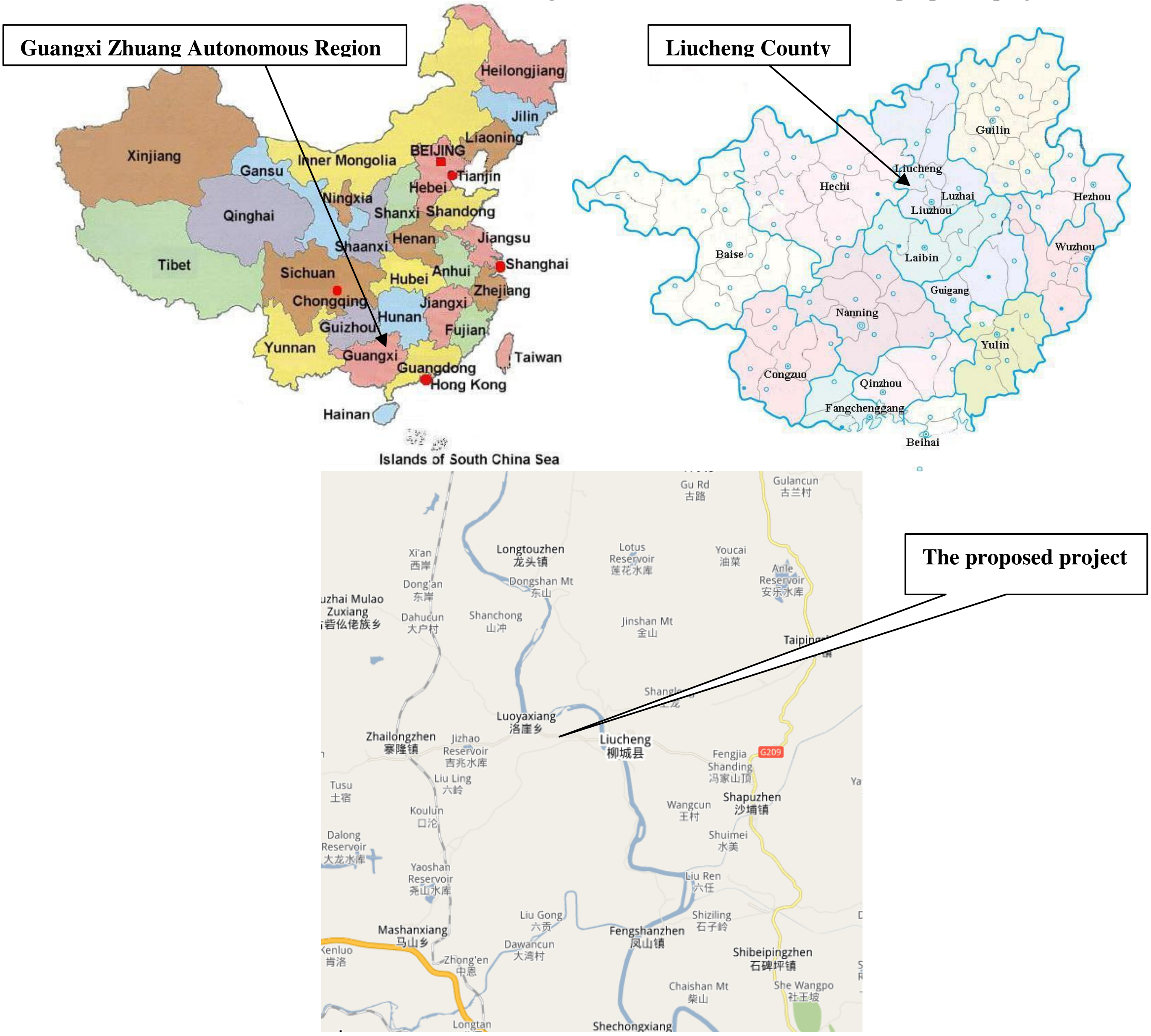

Figure 1 Location of the proposed project

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

Sectoral scope 1: energy industries (renewable sources)

[2] This concrete coordinate was directly measured by the project owner on the project site.

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

There is no equipment and systems of biomass residues power generation in the nearby of the project site before the implementation of the proposed project.

According to the following analysis in section B.4, in absence of the proposed project, the most feasible baseline scenario is "The SCPG providing the same annual power generation" and the same amount of biomass residues "dumped or left to decay under mainly aerobic conditions or burnt in an uncontrolled manner". SCPG is dominated by fossil fuel-fired power plants, and is developed fast recently. During the five years between 2003 and 2007, the fossil-fired generation accounted for 68.94%, 70.05%, 71.39%, 70.25% and 70.72% in total power generation, respectively.

The baseline emission sources are CO_2 emissions by SCPG and CH_4 emissions by decay under mainly aerobic conditions or burnt in an uncontrolled manner. The project emission sources are CO_2 emissions by on site fossil fuels, CO_2 emissions by on site electricity consume and CO_2 emissions by mulberry leaf and sugarcane leaf transportation and CH_4 emissions by mulberry leaf and sugarcane leaf burning.

The proposed project will adopt the biomass residues direct-burning technology. The proposed project will install two 75 t/h biomass residues direct-burning boilers and two 15 MW steam turbines and generators, which are manufactured by domestic companies. The main systems of the proposed project involve fuel supply system, ash removal system, water disposal system, water supply system, electrical system, thermal control system, auxiliary production system etc.

Before the biomass residues combustion system, there is the pre-treatment process for the biomass residues such as biomass residues collection and transportation outside the proposed project site (including biomass residues packing and storage system, biomass residues purchase stations, transportation to the proposed project site) and biomass residues collection and transportation inside the proposed project site (storage inside the project site, breaking and feeding system).

As for the mass flow for the proposed project, the biomass residues 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 the steam will be input to the generators to generate the electricity which finally connected to SCPG. The whole process for the systems is balanced.

According to the purchase agreement of the equipment, 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

Item	Quantity	Manufacturer	Model	Main technical parameter
Boilers[3]	2	Nantong Wanda Boiler Manufacture Co., Ltd.	medium temperature medium pressure biomass cycle fluidized bed boiler	Boiler rated evaporating capacity : 75t/h Steam pressure: 3.82MPa(g) Steam Temperature: 450℃ Boiler feed-water temperature: 150℃ Boiler efficiency: not lower than 89%
Steam turbines[4]	2	China Changjiang Power Corporation	medium pressure, single cylinder, actuation,	Rated put-in steam pressure: 3.43MPa(a)

[3] Data source: Purchase agreement of Biomass Boilers signed with Nantong Wanda Boiler Manufacture Co., Ltd.
[4] Data source: turbines purchase agreement signed with China Changjiang Power Corporation (Group)

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		(Group)	impulse, condensed gas, N15-3.43/435	Rated put-in steam temperature: 435℃ Rated put-in steam capacity: 65t/h Total efficiency: 81.5%
Generators[5]	2	China Changjiang Power Corporation (Group)	QF-15-2	Rated capacity: 15MW Most run capacity: 18MW Rated frequency: 50Hz Rated voltage: 10.5KV Capacity factor: 0.80 Rated efficiency: 97.6%

The voltage of the electricity at the outlets of the two generators is 10.5 kV, and the electricity generated by the proposed project will be delivered to Dapu substation through one 110 kV circuit, and the distance between the power station and Dapu substation is about 12 km. The electricity generated by the power station will be further delivered to Guangxi grid, and finally to SCPG.

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

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

A renewable crediting period as 7×3 years is chosen for the proposed project. It is estimated that the proposed project will have a total GHG emission reduction of about 863,268 tCO_2 in the first renewable crediting period （01/07/2010-30/06/2017）with an average annual emission reduction of 123,324 tCO_2.

Year	Annual estimation of emission reductions in tonnes of CO_2
01/07/2010～31/12/2010	61,662
2011	123,324
2012	123,324
2013	123,324
2014	123,324
2015	123,324
2016	123,324
01/01/2017～30/06/2017	61,662
Total estimated reductions (tonnes of CO_2)	863,268
Total number of crediting years	7
Annual average over the crediting period of estimated reductions (tonnes of CO_2)	123,324

A.4.5. Public funding of the project activity:

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

[5] Data source: Generators purchase agreement signed with China Changjiang Power Corporation (Group)

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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” (Version 09, EB48).

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

- ACM0002: “Consolidated baseline and monitoring methodology for grid-connected electricity generation from renewable sources” (Version 10, EB47);
- “Tool to calculate the emission factor for an electricity system” (version 02);
- “Combined tool to identify the baseline scenario and demonstrate additionality” (Version 02.2);
- “Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion” (version 02);
- “Tool to calculate baseline, project and/or leakage emissions from electricity consumption” (version 01, EB39).

For more information regarding the methodologies and tools, 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 power station with fuel of surplus biomass residues, and the baseline scenario is combination of “The SCPG providing the same annual power generation” and biomass residues dumped or left to decay under mainly aerobic conditions or burnt in an uncontrolled manner. It belongs to **scenario 2** which is regulated by methodology ACM0006, and accords 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.	Biomass residues from local agricultural residues will be the predominant fuel in the proposed project. Furthermore, the proposed project only uses the biomass residues as fuels and won’t use any other fossil fuels. But in order to be more conservative, the amount of fossil fuels will be monitored ex-post.
2. For projects that use biomass residues from a production process (e.g. production of sugar or wood panel boards), the implementation of the project shall not result in an increase of the processing capacity of raw input (e.g. sugar, rice, logs, etc.) or in other substantial changes (e.g. product change) in this process;	The biomass residues (mulberry leaf and sugarcane leaf) used by the proposed project is byproducts 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 residues collection and disposal conditions of the proposed project, the

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	storage period of the biomass residues would 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.	The proposed project will consume some energy because of transportation of the biomass residues, which will be monitored during 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 gases included in the project boundary

The spatial boundary of the proposed project includes the power station, the transportation process of biomass residues from the dispersed biomass residues supply sites to the proposed project site, the sites where biomass residues will be dumped or burned in the absence of the proposed project activity, and all power plants which connected to SCPG. According to the guidance on grid boundaries renewed by the China's DNA (NDRC) on 2nd July, 2009, SCPG covers Guangdong Power Grid, Guangxi Power Grid, Guizhou Power Grid and Yunnan Power Grid. Furthermore, because SCPG import some electricity from Central China Power Grid (CCPG), so CCPG was seen as a part of Grid boundaries.

According to ACM0006, 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 SCPG	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 fossil-fired boilers	CO_2	Excluded	The proposed project is only for power generation, not for heat supply
		CH_4	Excluded	The proposed project is only for power generation, not for heat supply
		N_2O	Excluded	The proposed project is only for power generation, not for heat supply
	Uncontrolled burning or decay of surplus biomass residues	CO_2	Excluded	It is assumed that CO2 emissions from surplus biomass residues do not lead to changes of carbon pools in the LULUCF sector.
		CH_4	Included	The project participants of the proposed project finally decided to include this emission source, since B1 and B3 have been identified as the most likely baseline scenarios for the proposed project.
		N_2O	Excluded	Excluded for simplification. This is conservative.
Project	On-site fossil	CO_2	Included	Main emission source

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Activity	fuel and electricity consumption due to the project activity (stationary or mobile)	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 CO2 emissions from surplus biomass residues do not lead to changes of carbon pools in the LULUCF sector.
		CH_4	Included	Because the CH4 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 CO2 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	The treatment of biomass residues of the proposed project is not referred to the waste water.
		CH_4	Excluded	The treatment of biomass residues of the proposed project is not referred to the waste water.
		N_2O	Excluded	The treatment of biomass residues of the proposed project is not referred to the waste water.

The flow diagram of the proposed project is as follows:

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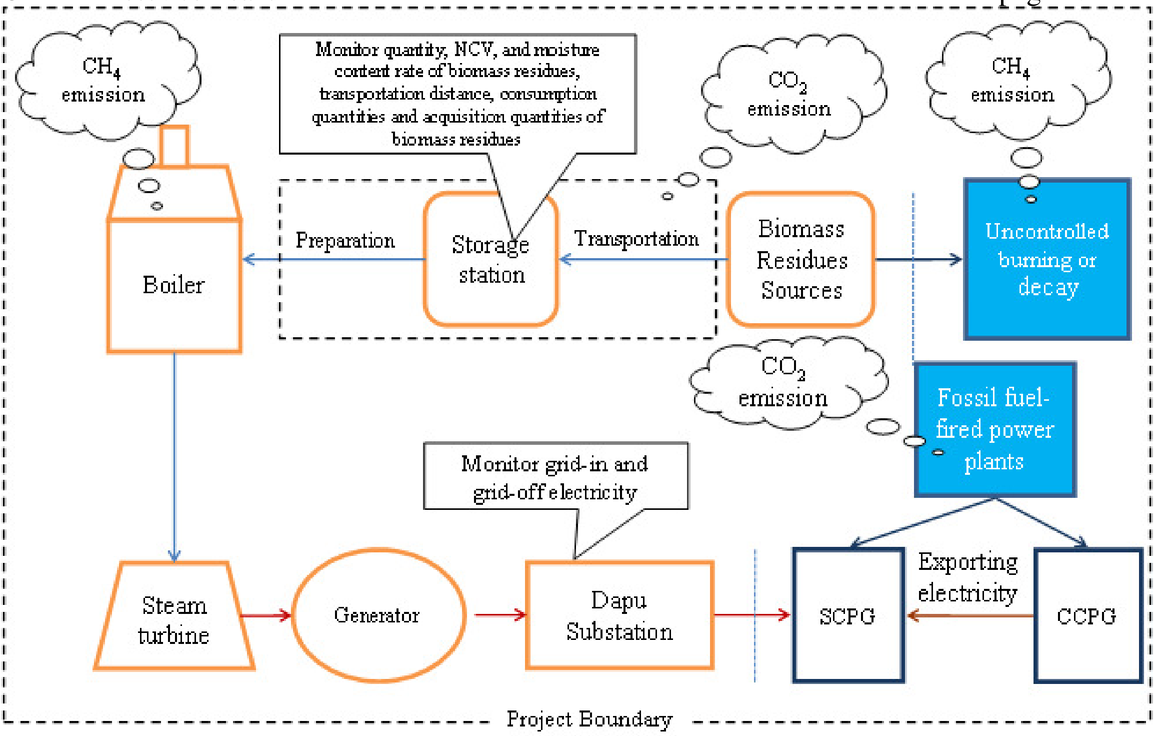

B.4. Description of how the baseline scenario is identified and description of the identified baseline scenario:

According to the requirement of ACM0006, to identify the baseline scenario will adopted "Combined tool to identify the baseline scenario and demonstrate additionality" (version 02.2), the steps are as bellows:

Step 1: Identification of alternative scenarios
Sub-step 1a: Define alternative scenarios to the proposed CDM project activity

As the proposed project is a biomass residues power generation project, analysis of alternative scenarios includes two parts of electricity supply and biomass residues disposal.

Methodology ACM0006 sets P1-P11 baseline alternative scenarios for power generation, and according to the actual condition of the proposed project the alternative scenarios for power generation is analyzed as follows:

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 barriers described in the latter step.
P2	The continuation of power generation in an existing biomass residue fired power plant at the project site, in the same configuration, without retrofitting and fired with the same type of biomass residues as (co-) fired in the project activity.	No	The proposed project is a new power plant and there is none of existing biomass residue fired power plants on-site or nearby the project site, so P2 is excluded.
P3	The generation of power in an existing captive power plant, using only fossil	No	There is none of fossil fuel fired power plants on-site or nearby the project site, so

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	fuels.		P3 is excluded.
P4	The generation of power in the grid (SCPG).	**Yes**	The generation of power from SCPG 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 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 strategy of saving energy and reducing emission, power industry generally adopts advanced technologies; technology with low-efficiency is hard to be used.[6] So P5 is excluded.
P6	The installation of a **new** biomass residue fired power plant that is fired with the same type but with a higher annual amount of biomass residues as the project activity and that has a lower efficiency of electricity generation than the project activity. Therefore, the power output is the same as in the project case.	No	According to national strategy of saving energy and reducing emission, power industry generally adopts advanced technologies; technology with low-efficiency is hard to be used.[7] So P6 is excluded.
P7	The **retrofitting** of an existing biomass residue fired power, fired with the same type and with the same annual amount of biomass residues as the project 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 plant and there is none of existing biomass residue fired power plants on-site or nearby the project site, so P7 is excluded.
P8	The **retrofitting** of an existing biomass residue fired power that is fired with the same type but with a higher annual amount of biomass residues as the project 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 plant and there is none of existing biomass residue fired power plants on-site or nearby the project site, so P8 is excluded.
P9	The installation of a **new** fossil fuel fired captive power plant at the project	**Yes**	It will be analyzed in Sub-step 1b below.

6 http://www.chinatax.gov.cn/n480462/n480513/n480902/8083826.html

7 http://www.chinatax.gov.cn/n480462/n480513/n480902/8083826.html

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	site.		
P10	The installation of a new single- (using only biomass residues) or co-fired (using a mix of biomass residues and fossil fuels) cogeneration plant with the same rated power capacity as the project activity power plant, but that is fired with a different type and/or quantity of fuels (biomass residues and/or fossil fuels). The annual amount of biomass residue used in the baseline scenario is lower than that used in the project activity;	**No**	First, the proposed project is only a power generation plant, so its service provided is different from cogeneration. Second, as per the FSR there are no other different biomass residues abundant for power generation at the project site. Third, co-fired cogeneration plant with a different type and quantity of fuels (biomass residues and fossil fuels) is technologically unavailable at present. Thus alternative P10 is excluded.
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.

The proposed project uses two types of biomass residues such as Sugarcane leaf and Mulberry leaf. The total quantity of biomass residues consumed by the project activity per year is 178,198 tons, and the preliminary estimation for the two types is as follows:

Types of biomass residues	Content[8]
Sugarcane leaf	80%
Mulberry leaf	20%
Total	100%

Because the baseline alternatives for the two 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 alternative scenarios for biomass residues disposal, and according to the actual condition of the proposed project the alternative scenarios for biomass residues disposal is analyzed as follows:

[8] The utilization ratio of the residues has been changed to the ratio set in the actual statistics on residues.

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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**	It seems to be a plausible alternative without considering the barriers described in the latter step. Hence, the Alternative B1 is possibly a feasible alternative.
B2	The biomass residues are dumped or left to decay under clearly 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.	No	The biomass residues are dumped or left to decay under clearly anaerobic conditions, it should be in a suitable temperature and moisture condition, it needs to be invested, and costs high. So B2 is excluded.
B3	The biomass residues are burnt in an uncontrolled manner without utilizing it for energy purposes.	**Yes**	It seems to be a plausible alternative without considering the barriers described in the latter step. Hence, 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 barriers described in the latter step.
B5	The biomass residues are used for power generation, including cogeneration, in other existing or new grid-connected power plants	No	There is no power generation project using biomass residues as fuel close to proposed project. Considering the cost of biomass residues transportation, other existing or new grid-connected power 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 don't sale for heat supply, because there is none of existing biomass residue fired power 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 residues to be used as fertilizer. So alternative B8 is excluded.

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Outcome of Sub-step 1a:
After the analysis of the above two aspects, the remaining baseline alternative scenarios as below:

Power generation: P1, P4, P9

Use of biomass residues: B1, B3, B4

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

As for P9

The installed capacity of the proposed project is 30 MW, with annual operation hours of 6,000, so annual electricity generation is 180,000 MWh. If a new fossil-fired power station with same electricity supply is constructed, its annual operation hours are estimated to be 5,643 hours[9] (fossil-fired generation facility usage hours in Guangxi Zhuang Autonomous Region in 2006), so the installed capacity will be 31.9 MW, much lower than 135 MW. According to China's regulations on the power industry, any fossil-fired power plant with installed capacity less than 135 MW[10] is forbidden and any thermal power generator unit with installed capacity per set less than 100 MW[11] is strictly controlled in places which are within a big power grid. As for P9, if a **new** fossil fuel fired captive power plant at the project site with the same annual power generation as the proposed project is built, it is not in compliance with legal and regulatory requirements. Therefore, **P9** is not a realistic alternative, which is excluded.

Outcome of Sub-step 1b:
After the analysis, the remaining baseline alternative scenarios as below:

Power generation: P1, P4

Use of biomass residues: B1, B3, B4

The baseline scenarios above all accord with the current laws and regulations, and these scenarios are not 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

When the project not registered CDM project, confirm that there are barriers to prevent the implementation of this type of project. Such barriers may include as follows:

Investment Barrier

As mentioned in Step 3 below, the financial indicators of this kind of project have not fundamentally been changed and the IRR is still lower than the benchmark. However, with the CDM revenues, the IRR will be improved and exceed the benchmark

Barriers due to Lack of Prevailing Practice

Technology of large-scale biomass residues power generation is still at starting stage of demonstration, both in China and in Guangxi Zhuang Autonomous Region. Until the end of 2008, there was still no biomass residues power generation plant put into operation in Guangxi Zhuang Autonomous Region. The proposed

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[9] Page 626, 2007 China Power Electric Yearbook

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

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

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project is the first of this kind being carried out in Guangxi Zhuang Autonomous Region. Moreover, the proposed project is also the first biomass residues power plant to the project owner. Therefore, it is lack of prevailing practice that increases the investment risk to the project owner.

<u>Outcome of Sub-step 2a:</u>

The barriers that may prevent the proposed project have been described in Sub-step 2a.

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

For power generation alternative scenario P1, the above barriers can't make the scenarios completely unfeasible, and the most unfeasible reason is lack of economic attractive which will be analyzed in step3. For P4, there is no barrier.

For biomass residues usage alternative scenarios B1 and B3, they are a normal manner of biomass residues disposal currently, and there is no barrier. For B4, the most unfeasible reason is lack of economic attraction, and this will be analyzed in step 3.

<u>Outcome of Sub-step 2b:</u>

After the analysis above, alternative scenarios without barriers include:

Power generation: P1, P4

Use of biomass residues: B1, B3, B4

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

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

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

The above shows that the project is not the only scenario which is both feasible in technology and accords with current regulations. By the step3 investment analysis below, it is known that combination scenario of P1+ B4 is not economic attractive, so P4+(B1+B3) is the baseline scenario of the proposed project, it belongs to one of baselines outlined by methodology ACM0006: **scenario 2**.

Step 3: Investment analysis

The baseline scenario P4 is power supply by SCPG, and it is hard to do investment analysis, and B1+B3 don't need to be invested. Therefore, it is hard to do "investment comparison analysis" and the benchmark analysis method (derive from "Tools for the demonstration and assessment of additionality" is adopted to do analysis for "P1+B4".

In accordance with ***Interim Rules on Economic Assessment of Electrical Engineering Retrofit Projects*** issued by former State Power Corporation of China, the project IRR shall not be lower than 8 percent considering economic assessments of hydropower projects, fossil fuel fired projects, transmission and substation projects[13]. Nowadays many of China's existing power projects have applied it as the benchmark

[13] State Power Corporation of China. *Interim Rules on Economic Assessment of Electrical Engineering Retrofit*

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IRR. Furthermore, 8% was adopted as the benchmark in the Feasibility Study Report (FSR) of the proposed project. Therefore, 8% is selected as the benchmark of this project.

According to the FSR of the 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 sources
Installed capacity (MW)	30	FSR
Total static investment (RMB million yuan)	249.29	FSR
Annual grid-connected electricity (MWh)	157,860	FSR
Annual consumption of the biomass residues (ton)	178,198	FSR
Tariff (yuan/kWh, excluding VAT, from the 1st operation year to the 15th operation year)	0.53691	FSR
Tariff (yuan/kWh, excluding VAT, from the 16th operation year to 20th operation year)	0.32276	FSR
The price of biomass residues (yuan/t)	224.47	FSR
Annual O&M cost (million yuan)	53.81	FSR
Construction period (year)	1	FSR
Operation life (year)	20	FSR
VAT (%)	17	FSR
City maintenance & construction tax (%)	5	FSR
Education addition fee (%)	4	FSR
Income tax (%)	25	FSR
Depreciation rate (%)	6.33%	FSR
The remaining value of the fixed capital (million yuan)	12.37	FSR
Expected CERs price (EUR/tCO_2)	9.75	Expected
Crediting period (years)	21	Selected
Currency exchange rate (RMB/EUR)	10.80	Expected

Note: The FSR was completed by Guangxi Power Industry Survey Design and Research Institute in September 2007, and the FSR was approved by Guangxi Zhuang Autonomous Region Development and Reform Commission on 04th Feb, 2008 (Guifagainengyuan[2008]No.67).

The IRRs without and with the income from CERs sale (the crediting period to be 7×3 years and the price of CERs to be EUR 9.75/tCO_2) are listed in below table 3.

Projects. Beijing: China Electric Power Press, 2003

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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 (after tax)	%	5.42	8	12.84

Without the income from CERs, the IRR of the proposed project is 5.42% lower than the benchmark IRR, so the proposed project is financially unacceptable. With the income from CERs, the IRR is increased to 12.84%, therefore, the proposed project becomes financial feasible to investors.

Sensitivity analysis

Assuming the four factors of total static investment, tariff, grid-connected electricity, the price of biomass residues 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

Parameter	-10%	-5%	0	5%	10%
Total static investment	7.08%	6.22%	5.42%	4.67%	3.97%
Tariff	0.34%	3.13%	5.42%	7.42%	9.22%
Grid-connected electricity	3.50%	4.48%	5.42%	6.32%	7.19%
The price of biomass residues	7.47%	6.48%	5.42%	4.26%	2.97%

Parameter	Variation when project IRR reaches the 8% benchmark
Total static investment	-14.93%
Tariff	+6.57%
Grid-connected electricity	+14.80%
The price of biomass residues	-12.86%

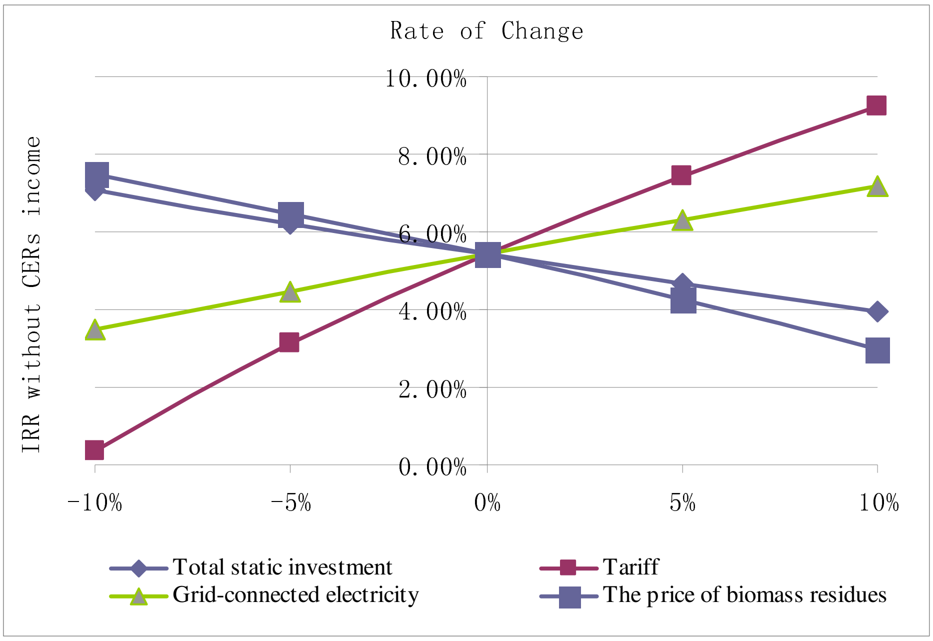

Figure 2 Sensitivity analysis of the proposed project

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It is analyzed as follows:

As for total static investment

When the total static investment decreases by more than 14.93%, the IRR will reach 8%. However, the annual wages and the purchase price of raw material and fuel and power (key determinants for total static investment) are gradually increasing in China. The details are in the following table.

Table 5 Index of wages and material price in recent years

Index	Year 2005	Year 2006	Year 2007	Year 2008
Index of Average annual Wages (Preceding year = 100*)[14]	112.8	112.7	113.6	111.0
Purchase Price index for Raw Material and Fuel and Power (Preceding year = 100*)[15]	108.3	106.0	104.4	110.5

Note: * the data of the wages index and material price index is directly from the China Statistical Yearbook, and it is set that the preceding year =100. If the index is less than 100, the price is decreased compared to the previous year. The index of average wage in 2005 is 112.8, and it means that the average wage rose 1.128 times (112.8/100, the previous year is 2004, and the preceding year=100) from Year 2004 to 2005. The index of average wage in 2006 is 112.7, and it means that the average wage rose 1.127 times (112.7/100, the previous year is 2005, and the preceding year=100) from Year 2005 to 2006.

Therefore, it is impossible that the total static investment could decrease by 14.93%, so the proposed project is always lack of financial attractiveness within the reasonable range of total static investment.

As for tariff

When the tariff of the proposed project increases by 6.57%, the IRR will reach 8%. The tariff value adopted in the PDD is directly from the approved FSR. The tariff adopted is also in accordance with the Interim Regulation for Tariff of Renewable Energy Power Generation and Allocation of Expenses, which is the incentive tariff that introduced in 2006 for the renewable energy power generation projects in China.

In China, the policy of electricity tariff was strictly controlled by the State[16]. According to "The reply letter of grid-connected tariff of Liucheng Biomass Power Generation Project" (guijiage[2007]No.426) issued by Guangxi Zhuang Autonomous Region Price Bureau on 18/09/2007, the tariff adopted in the above investment analysis is the same with the one in the Reply Letter of "guijiage[2007]No.426", so the tariff is relatively fixed and can't increase by 6.57%. Therefore, the IRR of the proposed project can't reach the benchmark of 8%.

As for grid-connected electricity

When the grid-connected electricity of the proposed project increases by 14.80%, the IRR will reach 8%. According to the approved FSR, The grid-connected electricity = Installed capacity * Annual operation hours * (1- Internal Consumption rate) * (1- Transmission Loss rate).

As for the installed capacity and annual operation hours, they are the designed value in the FSR which was applied by relying on the design of the plant load factor by the Design Institute, and they are appropriate.

14 Source: Table 4-22, Chapter 4, China Statistical Yearbook 2009.

15 Source: Table 8-1, Chapter 8, China Statistical Yearbook 2009

16 Notice of the State Council General Office on print and distribute tariff reform programme, Guobanfa[2003]No.62

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As for the Internal Consumption rate of 12.3%, it was calculated by all electrical equipment lists of the plants according to the "Technical rule for designing auxiliary power system of fossil fuel power plants DL/T5153-2002", so it is reasonable and credible.

As for the Transmission Loss rate of zero, the transmission line from the plant to the Dapu Substation was about 12km, so the transmission loss rate is conservative.

Therefore, it is impossible that the grid-connected electricity could increase by 14.80%, so the proposed project is always lack of financial attractiveness within the reasonable range of grid-connected electricity.

As for the price of biomass residues

When the price of biomass residues of the proposed project decreases by 12.86% (from 225yuan/t to 196yuan/t), the IRR will reach 8%. There is no reference price in any public information for the purchasing price of Biomass Residues (Sugarcane leaves and Mulberry leaves) from farmers in the specific district of the project in Guangxi Zhuang Autonumous Region, because the proposed project is the first greenfield business in the Guangxi Zhuang Autonumous Region.

According to the survey report on the farmers' expecting price of the biomass residues, the expecting price was 201yuan/t. However, the annual wages and the purchase price of raw material (key determinants for O&M cost) are gradually increasing in China, so the price of biomass residues would not decrease. The details are in the following table.

Table 6 Index of wages and material price in recent years

Index	Year 2006	Year 2007	Year 2008
Index of Average annual Wages (Preceding year = 100*)[17]	112.7	113.6	111.0
Purchase Price index for Raw Material (Preceding year = 100*)[18]	106.0	104.4	110.5

Note: * the data of the wages index and material price index is directly from the China Statistical Yearbook, and it is set that the preceding year =100. If the index is less than 100, the price is decreased compared to the previous year. The index of average wage in 2006 is 112.7, and it means that the average wage rose 1.127 times (112.7/100, the previous year is 2005, and the preceding year=100) from Year 2005 to 2006. The index of average wage in 2007 is 113.6, and it means that the average wage rose 1.13.6 times (113.6/100, the previous year is 2006, and the preceding year=100) from Year 2006 to 2007.

Therefore, it is impossible that the price of biomass residues could decreases by 12.86%, so the proposed project is always lack of financial attractiveness within the reasonable range of the price of biomass residues.

Therefore, the sensitivity analysis above shows that: without the CERs revenues, the proposed project is always lack of financial attractiveness.

The analysis above shows that, the combined scenario P1+B4 (the proposed project is not as a CDM project) is not the baseline; but the combined scenario P4+(B1+B3) is the baseline of the proposed project, i.e. power supply by SCPG and biomass residues decay under mainly aerobic conditions or burnt in an uncontrolled manner. This combined baseline belongs to scenario 2 in ACM0006.

In the project site of the proposed project in recently three years, power supply is mainly from SCPG which mainly depends on thermal power.

Step 4: Common practice analysis

17 Source: Table 4-22, Chapter 4, China Statistical Yearbook 2009.
18 Source: Table 8-1, Chapter 8, China Statistical Yearbook 2009

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According to step 4 in "Combined tool to identify the baseline scenario and demonstrate additionality", the similar project activities are chosen as follows:

<u>Choose the similar size</u>

The installed capacity of the proposed project activity is 30 MW, so the range 15 - 45 MW is selected as the similar size.

<u>Choose the similar region</u>

As for the region selection when doing common practice, China is so large and the development policy and investment environment for each province is so different, for example, the tariff in each province has some difference and the investment environment differs from region to region, as for the proposed project, Guangxi Zhuang Autonomous Region is chosen as the similar region.

Choose the similar technology

The similar technology is the biomass residues power generation.

Based on the above, the similar project activities of the proposed project refer to the biomass residues power generation or biomass residues cogeneration projects with installed capacity between 15-45MW (50%-150% of installed capacity of the proposed project) in Guangxi Zhuang Autonomous Region.

According to the publicly available data source, the proposed project is the first of its kind being carried out in Guangxi Zhuang Autonomous Region. Moreover, the proposed project is also the first biomass residues power plant to the project owner. Therefore, it is not a common practice in Guangxi Zhuang Autonomous Region.

In a word, the proposed project is of additionality.

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" and the analysis in section B.4, the baseline scenario is identified, so the additionality of the proposed project is demonstrated simultaneously.

<u>Consideration of CDM before implementation of the proposed project</u>

According to the FSR, the IRR of the proposed project was lower than the benchmark without CDM benefit, and CDM consideration was suggested by the FSR. After that, the project owner made an internal decision for CDM consideration on 10/09/2007 and then they did their best to seek for the suitable CERs buyers in the following months. Based on CDM consideration and the confidence in the proposed project, the project owner signed the generators and turbines purchase agreement on 28/08/2008. After the contact and negotiation with the CERs buyers in the past one year from September 2007 to September 2008, the project owner finally signed the ERPA with Mitsubishi Corporation on 09/09/2008. Then the PDD and other application documents started to be prepared and they had been completed and submitted to China DNA in January 2009 and the LOA from China DNA had been acquired on 30/04/2009.

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

Date	Milestones	Evidence
September, 2007	FSR was completed by Guangxi Power Industry Survey Design and Research Institute	FSR shows that, without CERs revenue, the IRR of the proposed project lower than 8%, with the CERs revenue, the IRR

		higher than 8%, therefore, FSR suggested project owner to apply for CDM.
10/09/2007	Base on the suggestion of FSR, project owner held a board meeting on CDM consideration	Minutes of the meeting
18/09/2007	"The reply letter of grid-connected tariff of Liucheng Biomass Power Generation Project"(guijiage[2007]No.426) by Price Bureau of Guangxi Zhuang Autonomous Region	The reply letter of grid-connected tariff of the proposed Project
24/09/2007	The review approval of "Water Resource Demonstration Report of Liucheng Biomass Power Generation Project" by Water Resource Bureau of Guangxi Zhuang Autonomous Region	The review approval
27/09/2007	Approval letter of "Water and soil conservation scheme for Liucheng Biomass Power Generation Project" by Water Resource Bureau of Guangxi Zhuang Autonomous Region	The approval letter of "Water and soil conservation scheme for Liucheng Biomass Power Generation Project"
November, 2007	EIA was completed by Environmental Protection Science Institute of Guangxi Zhuang Autonomous Region	EIA
26/11/2007	The approval letter of "Grid Connection System of Liucheng Biomass Power Generation Project" by Guangxi Power Grid Corporation, guidianji[2007]No.274	The approval letter of "Grid Connection System of Liucheng Biomass Power Generation Project"
29/12/2007	EIA was approved by Environmental Protection Bureau of Guangxi Zhuang Autonomous Region	Approval letter of EIA (Guihuanguanzi[2007]No.536)
03/01/2008	The land use was approved by Land Resource Office of Guangxi Zhuang Autonomous Region	The Approval letter
04/02/2008	The Feasibility Study Report was approved by Development and Reform Commission of Guangxi Zhuang Autonomous Region	The approval letter of "guifagainengyuan[2008]No.67 "
28/08/2008	Generators and turbines purchase agreement was signed.	The generators and turbines purchase agreement
09/09/2008	Based on the contact and negotiation with the CERs buyers in the past one year from September 2007 to September 2008, the project owner finally signed the ERPA with Mitsubishi Corporation.	ERPA
October 2008	Purchase agreement of biomass boilers signed	The purchase agreement
January 2009	The PDD and other application documents had been completed and submitted to China DNA for approval.	The Application letter to China DNA
10/01/2009	PP informed China DNA in writing of the	The notification letter

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	commencement of the project activity and of its intention to seek CDM status as per Annex 46 of EB41.	
20/01/2009	The notification letter of the commencement of the project activity and of the intention to seek CDM status was issued by China DNA.	The notification letter
February 2009	The construction contract was signed.	The construction contract
April 2009	The proposed project was reviewed by China DNA at the 61st meeting of CDM projects in China by NDRC	The meeting notice
30/04/2009	The LOA from China DNA had been acquired.	The LOA from China DNA
28/05/2009	The Contract of Validation /Registration Service was signed between the Mitsubishi Corporation and DoE (JCI).	The Contract of Validation /Registration Service
18/08/2009-16/09/2009	The PDD of the proposed project was published on UNFCCC website for GSP.	http://cdm.unfccc.int/Projects/Validation/DB/1DFZB4RO5X28VLOXA4LS6N6COH1YQ7/view.html
09/12/2009	The LoA by Japan DNA was issued.	The LoA from Japan DNA

According to the analysis steps in "Combined tool to identify the baseline scenario and demonstrate additionality", the baseline identification and additionality demonstration are an united process, in order to keep the integrality and not to be separated in two sections, the additionality of the proposed project has been analyzed in section B.4. The main conclusion is: the proposed project is not the baseline, and it has the additionality.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

According to methodology ACM0006, there are 22 baseline scenarios, Scenario 2 is applied to the proposed project activity.

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

1. **Emission reductions (ER_y)**

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

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

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_2/yr)
PE_y	Project emissions during the year y (tCO_2/yr)

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

2. Project Emissions (PE_y)

Project emissions include CO2 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:

$$PE_y = PET_y + PEFF_y + PE_{EC,\,y} + GWP_{CH4} \times (PE_{Biomass,CH4,\,y} + PE_{WW,CH\,4,\,y}) \qquad (2)$$

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:

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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)
TLy	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.

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

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)

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 the monitor part in the methodology; doing the ex-post measurement, formula (3) was adopted and N_y 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 “Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion”. The proposed project only uses the biomass residues as fuels and won’t use any other fossil fuels. But in order to be more conservative, 0 tons of diesel was considered to be consumed ex-ante and the amount of diesel will be monitored ex-post.

CO_2 emissions from on-site consumption of diesels are calculated as follows:

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

Where:

$FF_{project\ plant,diesel,y}$ Quantity of diesel combusted in the biomass residue fired power 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 (tCO_2/mass or volume unit)

The CO_2 emission coefficient $COEF_{diesel,y}$ can be calculated by following two procedures, depending on the

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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 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 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) CO2 emissions from electricity consumption (*$PE_{EC,y}$*)

According to methodology ACM0006, project emission from electricity consumption should adopt the latest version of "Tool to calculate baseline, project and/or leakage emissions from electricity consumption" (Version 01, EB39), since the power used in the proposed project is all from SCPG, it belongs to Scenario A regulated in this Tool. Meanwhile, adopt "Tool to calculate the emission factor for an electricity system" to calculate the CM in SCPG, therefore, it belongs to option A1 in Scenario A. 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)
$EF_{grid,CM,y}$	The CM in SCPG CM (tCO_2/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)
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

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(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 heat ($ER_{Heat,y}$)

Because the proposed project does not concern heat production, so $ER_{Heat,y}$ is zero.

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

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

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:

$$EG_y = EG_{project\ plant,y} \qquad (12)$$

Where:

$EG_{project\ plant,y}$	Net electricity supplied to the grid generated by the project plant in year y (MWh)

Meanwhile, as the baseline scenario of the proposed project is gird-connected electricity, and the installed capacity of the project plant is more than 15 MW, so $EF_{grid,CM,y}$ is calculated as a combined margin (CM) of the SCPG, namely, $EF_{Electricity,y} = EF_{grid,CM,y}$. According to ACM0006, CM of SCPG should be calculated using the latest methodology ACM0002, and according to the requirement of ACM0002, 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 electric power system

As the demonstration in section B.3, according to the delineation of grid boundaries published by China’s DNA on 2nd July, 2009, the project electricity system of the proposed project is SCPG, so the boundary of the proposed project includes the proposed project and all power plants connected physically to SCPG which is composed of Guangdong Power Grid, Guangxi Power Grid, Guizhou Power Grid and Yunnan Power Grid. The power from Central China Power Grid (CCPG) has been also considered as the net gird-in electricity.

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)

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

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(a) Simple OM; or
(b) Simple adjusted OM; or
(c) Dispatch data analysis OM; or

(d) Average OM.

Because the data required to apply "dispatch data analysis OM" can't be publicly available in China, "dispatch data analysis OM" can't be used.

The simple OM method is applicable if low-cost/must run resources[19] constitute less than 50% of total grid generation in average of the five most recent years. From 2003 to 2007, the proportion of low-cost/must-run resources in the total grid electricity of SCPG was 31.06% in 2003, 29.95% in 2004, 28.61% in 2005 and 29.75% in 2006 and 29.28% in 2007[20], respectively, 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.

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 is 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;[21] 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:

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[19] 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.

[20] China Electric Power Yearbooks (2004, 2005, 2006, 2007, and 2008)

[21] 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.

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$$EF_{grid,OMsimple,y} = \frac{\sum_i FC_{i,y} \times NCV_{i,y} \times EF_{CO2,i,y}}{EG_y} \quad (13)$$

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 (2005, 2006 and 2007) for which data is available at the time of submission of the CDM-PDD to the DOE for validation (ex ante option);

SCPG also imports electricity from Central China Power Grid (CCPG), the imported electricity from CCPG should be treated as generation form one power plant. Because it's impossible to identify the specific power plants which exporting electricity to SCPG, the simple operating margin emission factor of CCPG which exporting electricity was chosen as the CO_2 emission factor for net electricity imports ($EF_{grid, import, y}$) from CCPG.

The proposed project adopts the latest data of OM emission factor in SCPG which is issued by China DNA on 2nd July 2009. Please refer to "2009 Baseline Emission Factors for Regional Power Grids in China" by NDRC and Annex 3 for the concrete calculation process.

Step 5 Identify the cohort 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;

Due to the data availability in China, it is impossible to adopt either one of the two options mentioned above for BM calculation. The deviation method to calculate BM for the situation of China which can be approved by CDM EB is elaborated in Step 6.

"Tool to calculate the emission factor for an electricity system" provided two methods to calculate BM:

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,

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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.

Option 1 was adopted by the proposed project.

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:

$$EF_{grid,BM,y} = \frac{\sum_m EG_{m,y} \times EF_{EL,m,y}}{\sum_m EG_{m,y}} \quad (14)$$

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 of the data is not available, a deviation methods agreed by the CDM EB[22] was adopted.

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 CO_2 emissions from solid, liquid and gaseous fuels corresponding to the total emissions of CO_2 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 CO_2 emissions from solid, liquid and gaseous fuels corresponding to the total emissions of CO_2 emissions.

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

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

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

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$$\lambda_{Gas,y} = \frac{\sum_{i \in GAS,j} F_{i,j,y} \times NCV_{i,y} \times EF_{CO_2,i,j,y}}{\sum_{i,j} F_{i,j,y} \times NCV_{i,y} \times EF_{CO_2,i,j,y}} \quad (17)$$

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 is the feet for solid fuels, liquid fuels and gas fuels.

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

$$EF_{Thermal,y} = \lambda_{Coal,y} \times EF_{Coal,Adv,y} + \lambda_{Oil,y} \times EF_{Oil,Adv,y} + \lambda_{Gas,y} \times EF_{Gas,Adv,y} \quad (18)$$

$EF_{Coal,Adv}$, $EF_{Oil,Adv}$, $EF_{Gas,Adv}$ 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.

$$EF_{grid,BM,y} = \frac{CAP_{Thermal,y}}{CAP_{Total,y}} \times EF_{Thermal,y} \quad (19)$$

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 SCPG which is issued by China DNA 2nd July 2009. Please refer to "2009 Baseline Emission Factors for Regional Power Grids in China" by China DNA (NDRC) and Annex 3 for the concrete calculation process.

Step 7 Calculate the combine margin emission factor

CM emission factor is weighted average OM margin emission factor and BM margin emission factor:

$$EF_{grid,CM,y} = w_{OM} \times EF_{grid,OM,y} + w_{BM} \times EF_{grid,BM,y} \quad (20)$$

Where:

$EF_{grid,CM,y}$ = Combined margin CO_2 emission factor for grid connected power generation in year y (tCO_2e/MWh)

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

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

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

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

In this PDD for the first crediting period, the weights w_{OM} and w_{BM} are 50%.

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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 ACM0006, $BF_{PJ,k,y}$ (biomass residues consumption produced by this project activity) is equal to $BF_{k,y}$ (biomass residues consumption produced by the proposed project), namely, $BF_{PJ,k,y} = BF_{k,y}$.
In this PDD, the baseline scenario for use of biomass residues is a combination of B1 and B3, emissions from uncontrolled burning (scenario B3) are taken as the baseline emission by following the conservative principle.
Therefore, the calculation formula of baseline emission produced by biomass residues uncontrolled burning or aerobic decay is as below:

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

where:

$BE_{biomass,y}$	Baseline emissions due to natural decay or burning of anthropogenic sources of biomass residues during the year *y* (tCO_2/yr)
GWP_{CH4}	Global Warming Potential of methane valid for the commitment period (tCO_2/tCH_4)
$BF_{PJ,k,y}$	Incremental quantity of biomass residue type *k* used as a result of the project activity in the project plant during the year *y* (tons of dry matter or liter)
NCV_k	Net calorific value of the biomass residue type *k* (GJ/ton of dry matter or GJ/liter)
$EF_{burning,CH4,k,y}$	CH4 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 L1, L2 or L3

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., scenario 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

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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 analyze leakage.

According to FSR of the proposed project, in radius range 50 kilometers of mulberry leaf and sugarcane leaf collection, the acquisition quantity and consumption quantity of mulberry leaf and sugarcane leaf used in the proposed project are shown as below:

Type of biomass residues	Sugarcane leaf	Mulberry leaf
1. Available quantity (1,000 t)	375	315
2. Quantity to be utilized at the project plant (1,000 t)	142.558	35.640
Comments	Meet L2 requirement	Meet L2 requirement

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 ex-post.

Conclusively, there is an abundant surplus of the biomass residues in the region of the project activity, so 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（2008）
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_2/GJ
Description:	CO_2 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

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	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 (2006, 2007, 2008)
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 (2006, 2007, 2008)
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 SCPG in the recent years. And to find the change of capacity additions in the SCPG in the past few years.
Source of data used:	China Electric Power Yearbook
Value applied:	See annex 3

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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.
Any comment:	Reasonable

Data / Parameter:	$GENE_{best,coal}$
Data unit:	%
Description:	The maximized efficiency of fossil-fired power supply
Source of data used:	China's DNA : Report on Determination of Baseline Grid Emission Factor
Value applied:	38.10
Justification of the choice of data or description of measurement methods and procedures actually applied :	Specific national value
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:	49.99
Justification of the choice of data or description of measurement methods and procedures actually applied :	Specific national value
Any comment:	-

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

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Data / Parameter:	GWP_{CH4}
Data unit:	
Description:	The warm current of CH_4
Source of data used:	IPCC default value
Value applied:	21
Justification of the choice of data or description of measurement methods and procedures actually applied :	According to the regulation of ACM0006, IPCC defaults can be used;
Any comment:	–

Data / Parameter:	Electricity imports from other power grid to SCPG
Data unit:	MWh
Description:	electricity imports from other power grid to SCPG
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 100 km, the average truck load of the trucks used is 5 tons, the quantity of biomass residue transported per year is approximately 178,198 tons. 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 residues transportation are calculated as follows:

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

$$= 178{,}198/5 \times 100 \times 1.011 \times 0.001 = 3{,}603 \ tCO_2/yr$$

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

According to FSR of the proposed project and the actual situation of the project, there is no any fossil fuel as combustion improver and ignition fuels, and the proposed project only uses the biomass residues as fuels. But in order to be more conservative, 0 tons of diesel is considered to be consumed ex-ante and the amount of diesel will be monitored ex-post:

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$PEFF_y = FF_{\text{projectplant,diesel,y}} \times NCV_{diesel,y} \times EF_{diesel,y} = 0.$

3. CO2 emissions from electricity consumption (*$PE_{EC,y}$*)

According to conservative estimate of the project situation, power consumption of 1 ton (mulberry leaf and sugarcane leaf) collection, storage and disposal is 10 kWh, therefore, the power consumption is:
178,198 ton (mulberry leaf and sugarcane leaf) ×10 kWh/ton (mulberry leaf and sugarcane leaf) = 1,781.98 MWh

The power consumed by the proposed project are delivered from SCPG, according to "Tool to calculate the emission factor for an electricity system", $EF_{grid,CM,y}$ of SCPG is 0.78795 tCO_2/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:

$$PE_{EC,y}=EC_{PJ,y}\times EF_{grid,CM,y}\times(1+TDL_y)$$
$$= 1{,}781.98\ \text{MWh}\times 0.78795\ tCO_2/\text{MWh}\times(1+20\%)=1{,}685\ tCO_2$$

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

As per methodology ACM0006, the default CH_4 emission factor for all biomass residues 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 mulberry leaf and sugarcane leaf consumed by the project activity per year is 178,198 tons, with:

Sugarcane leaf: moisture content of 13.60%, NCV of 15,560MJ/t;
Mulberry leaf: moisture content of 26.70%, NCV of 13,480 MJ/t.

According to formula (10), the corresponding project emission is as below:

$$PE_{biomass,CH4,y} = EF_{CH4,BF} \cdot \sum_k BF_{k,y} \cdot NCV_k$$
$$= 30 \times 1.37\times[178{,}198\times 80\%\times(1-13.60\%)\times 15{,}560 + 178{,}198\times 20\%\times(1-26.70\%)\times 13{,}480\ ]/1{,}000{,}000/1{,}000$$
$$= 93\ tCH_4/yr$$

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:

$$PE_y = PET_y + PEFF_y + PE_{EC,y} + GWP_{CH4} \cdot PE_{Biomass,Ch4,y}$$
$$= 3{,}603 + 0 + 1{,}685 + 21\times 93 = 7{,}241\ tCO_2/yr$$

<u>Emission reductions due to displacement of electricity</u>

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

- $EF_{gird,OM,y}$: 0.9987 CO_2/MWh;
- $EF_{grid,BM,y}$: 0.5772 tCO_2/MWh;

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- $EF_{grid,CM,y}$: 0.78795 tCO_2/MWh.

According to FSR of the project, the net power supply EGy is 157,860 MWh/yr. Thus, the emission reductions due to displacement of electricity are calculated as:

$$ER_{\text{Electricity,y}} = EG_y \times EF_y$$
$$= EG_{\text{Project plant, y}} \times EF_y$$
$$= 157{,}860 \times 0.78795 = 124{,}386 \ tCO_2/yr$$

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 residues 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 mulberry leaf and sugarcane leaf consumed by the project activity per year is 178,198 tons, with:

Sugarcane leaf: moisture content of 13.60%;

Mulberry leaf:, moisture content of 26.70%.

According to formula (21) in B.6.1, the baseline emission by biomass residues uncontrolled burning or natural decay cause by the proposed project is as follows:

$$BE_{biomass,y} = GWP_{CH4} \cdot \sum_k BF_{PJ,k,y} \cdot NCV_k \cdot EF_{burning,CH4,k,y}$$
$$= 21 \times [178{,}198 \times 80\% \times (1-13.60\%)$$
$$+178{,}198 \times 20\% \times (1-26.70\%)] \times 0.0027 \times 0.73$$
$$= 6{,}179 \ tCO_2/yr$$

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:

$$ER_y = ER_{Electricity,\ y} + BE_{Biomass,\ y} - PE_y - L_y$$
$$=124{,}386 + 6{,}179 - 7{,}241 - 0 = 123{,}324 \ tCO2/yr$$

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

Year	**Estimation of project activity emissions** (tCO_2)	**Estimation of baseline emissions** (tCO_2)	**Estimation of leakage** (tCO_2)	**Estimation of emission reductions** (tCO_2)
01/07/2010～31/12/2010	3,621	65,283	0	61,662
2011	7,241	130,565	0	123,324
2012	7,241	130,565	0	123,324
2013	7,241	130,565	0	123,324
2014	7,241	130,565	0	123,324
2015	7,241	130,565	0	123,324
2016	7,241	130,565	0	123,324

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01/01/2017～30/06/2017	3,620	65,282	0	61,662
Total (tCO_2)	50,687	913,955	0	863,268

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

B.7.1 Data and parameters monitored:

According to ACM0006, 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	178,198; Sugarcane leaf: moisture content of 13.60%; Mulberry leaf: moisture content of 26.70%.
Description of measurement methods and procedures to be applied:	Use weight or volume meters. Adjust for the moisture content in order to determine the quantity of dry biomass residues. The quantity should be crosschecked with the quantity of electricity generated. 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	178,198; Sugarcane leaf: moisture content of 13.60%; Mulberry leaf: moisture content of 26.70%.
Description of measurement methods and procedures to be applied:	Use weight or volume meters. Adjust for the moisture content in order to determine the quantity of dry biomass residues. The quantity should be crosschecked with the quantity of electricity generated. 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;

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Value of data applied for the purpose of calculating expected emission reductions in section B.6	Sugarcane leaf: moisture content of 13.60%; Mulberry leaf: moisture content of 26.70%.
Description of measurement methods and procedures to be applied:	Continuously, mean values calculated at least annually
QA/QC procedures to be applied:	-
Any comment:	In case of dry biomass residues, monitoring of this parameter is not necessary.

Data / Parameter:	$EF_{CH4,BF}$
Data unit:	$kgCH_4/GJ$
Description:	CH_4 emission factor for the combustion of biomass residues in the project plant
Source of data to be used:	default values, as provided in Table 4 in the ACM0006
Value of data applied for the purpose of calculating expected emission reductions in section B.6	30
Description of measurement methods and procedures to be applied:	Default values, as provided in Table 4 in the ACM0006; The uncertainty level is 300%.
QA/QC procedures to be applied:	Default values, as provided in Table 4 in the ACM0006; The uncertainty level is 300%.
Any comment:	CH_4 emissions from biomass residues combustion have been included in the project boundary, so monitoring this parameter is required.

Data / Parameter:	AVD_y
Data unit:	km
Description:	Average round trip distance (from and to) between biomass residues supply sites and the project site
Source of data to be used:	Records by project participants on the origin of the biomass residues
Value of data applied for the purpose of calculating expected emission reductions in section B.6	100
Description of measurement methods and procedures to be applied:	Continuously
QA/QC procedures to be applied:	Check consistency of distance records provided by the truckers by comparing recorded distances with information from other sources (e.g. maps).
Any comment:	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 residues are supplied from different sites, this parameter should correspond to the mean value of km traveled by trucks that supply the biomass residues to the plant.

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Data / Parameter:	***N_y***
Data unit:	-
Description:	Number of truck trips for the transportation of biomass residues
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	35,640
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 residues combusted, e.g. by comparison 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:	Choose emission factors applicable for the truck types used from the literature in a conservative manner (i.e. the higher end within a plausible range)
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:	Cross check with the values from literature 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:	Use IPCC default emission factors
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:	Review the appropriateness of the data annually

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QA/QC procedures to be applied:	Check the default values of IPCC
Any comment:	–

Data / Parameter:	***FF**$_{project\ plant,diesel,y}$*
Data unit:	ton/year
Description:	Quantity of diesel combusted in the project plant during the year y; The proposed project only uses the biomass residues as fuels and won't use any other fossil fuels. But in order to be more conservative, 0 tons of diesel is 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
Description of measurement methods and procedures to be applied:	Use weight. 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

Data / Parameter:	***EG**$_{project\ plant,y}$*
Data unit:	MWh/yr
Description:	Net quantity of electricity supplied to the grid by 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	157,860
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 and the quantity of biomass residues fired.
Any comment:	–

Data / Parameter:	$EC_{PJ,y}$
Data unit:	MWh
Description:	On-site electricity consumption attributable to the project activity imported from SCPG during the year *y*
Source of data to be used:	On-site measurements
Value of data applied for the	1,781.98

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purpose of calculating expected emission reductions in section B.6	
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
Any comment:	-

Data / Parameter:	$\boldsymbol{TDL_y}$
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 distribution losses can be based on references from utilities, network operators or other official documentation. Here the default value is used.
QA/QC procedures to be applied:	-
Any comment:	-

Data / Parameter:	$\boldsymbol{NCV_i}$
Data unit:	GJ/t
Description:	Net calorific value of the fossil fuel type *i* (*i*: diesel)
Source of data to be used:	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	Please refer to Annex 3
Description of measurement methods and procedures to be applied:	Review the appropriateness of the data annually
QA/QC procedures to be applied:	Check the local / national data.
Any comment:	-

Data / Parameter:	$\boldsymbol{NCV_k}$
Data unit:	GJ/t
Description:	Net calorific value of biomass residue type *k*
Source of data to be used:	Measurements

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Value of data applied for the purpose of calculating expected emission reductions in section B.6	As for calculation of baseline emissions due to natural decay or uncontrolled burning of anthropogenic sources of biomass residues, to use 0.0027 tCH_4 per ton of biomass residues as default value for the product of NCV_k and $EF_{burning,CH4,k,y}$. As for calculation of methane emissions from combustion of biomass residues, the following is adopted ex-ante: Sugarcane leaf: moisture content of 13.60%; NCV of 15,560MJ/t; Mulberry leaf: moisture content of 26.70%; NCV of 13, 480MJ/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 CH_4 emission factor, referenced default values are used. In the absence of more accurate information, it is recommended to use 0.0027 t CH_4 per ton of biomass residues as default value for the product of NCV_k and $EF_{burning,CH4,k,y}$. 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 residues. 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 in 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 residues.
Any comment:	-

Data / Parameter:	$EF_{burning,CH4,k,y}$
Data unit:	tCH_4/GJ
Description:	CH_4 emission factor for uncontrolled burning of the biomass residue type *k* during the year *y*
Source of data to be used:	Use IPCC default values
Value of data applied for the purpose of calculating expected emission reductions in section B.6	To use 0.0027 tCH_4 per ton of biomass residues as default value for the product of NCV_k and $EF_{burning,CH4,k,y}$.
Description of measurement methods and procedures to be applied:	To determine the CH_4 emission factor, the referenced default values are used. In the absence of more accurate information, it is recommended to use 0.0027 t CH_4 per ton of biomass residues as default value for the product of $NCVk$ and $EF_{burning,CH4,k,y}$. Monitoring frequency: annually
QA/QC procedures to be applied:	Review of default values
Any comment:	The CH_4 emissions from biomass residues combustion are included in the project boundary for the proposed project, so this parameter must be

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	monitored like this.

Data / Parameter:	$BF_{utilized,k,y}$
Data unit:	Tones
Description:	Quantity of biomass residues of type *k* that are utilized (e.g. for energy generation or as feedstock) in the defined geographical region
Source of data to be used:	Directly from the statistics
Value of data applied for the purpose of calculating expected emission reductions in section B.6	Sugarcane leaf: 142,558 tons; Mulberry leaf: 35,640 tons.
Description of measurement methods and procedures to be applied:	Monitoring frequency: Annually
QA/QC procedures to be applied:	–
Any comment:	The proposed project adopts L2 for considering leakage.

Data / Parameter:	$BF_{available,k,y}$
Data unit:	Tones
Description:	Quantity of biomass residues of type *k* available in the region
Source of data to be used:	Directly from the statistics
Value of data applied for the purpose of calculating expected emission reductions in section B.6	Sugarcane leaf: 375,000 tons; Mulberry leaf: 315,000 tons.
Description of measurement methods and procedures to be applied:	Monitoring frequency: Annually
QA/QC procedures to be applied:	–
Any comment:	The proposed project adopts L2 for considering 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 the 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.

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2. The monitoring organization

The monitoring management structure will be established for implementation of the monitoring plan, and the roles and responsibilities of monitoring management structure are shown in Figure 3:

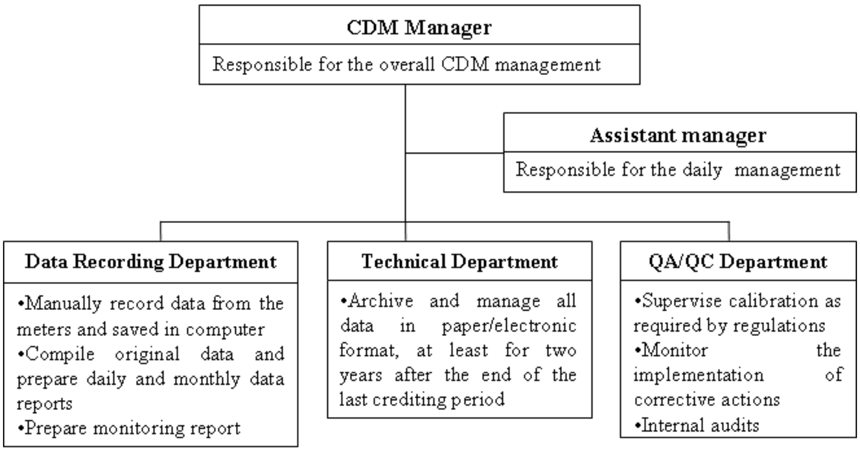

Figure 3. Monitoring management structure

According to the arrangement of the project owner, the general manager of Liuzhou City Xin'neng Biomass Power Generation Co., Ltd will be the CDM manager.

3. Parameters to be monitored

According to ACM0006 "Consolidated methodology for electricity generation from biomass residues", parameters need to be monitored in the proposed project include:

1) The electricity connected to SCPG ($EG_{project\ plant,y}$) and delivered from SCPG ($EC_{PJ,y}$);
2) The 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);
3) The round trip (from and to) of biomass residues transportation (AVD_y) and the number of truck trips for the transportation of biomass residues (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 (e.g. for energy generation or as feedstock) in the defined geographical region ($BF_{utilized,k,y}$) and quantity of biomass residues of type *k* available in the region($BF_{available,k,y}$);

The measurement points of the above parameters can be simply shown as follows:

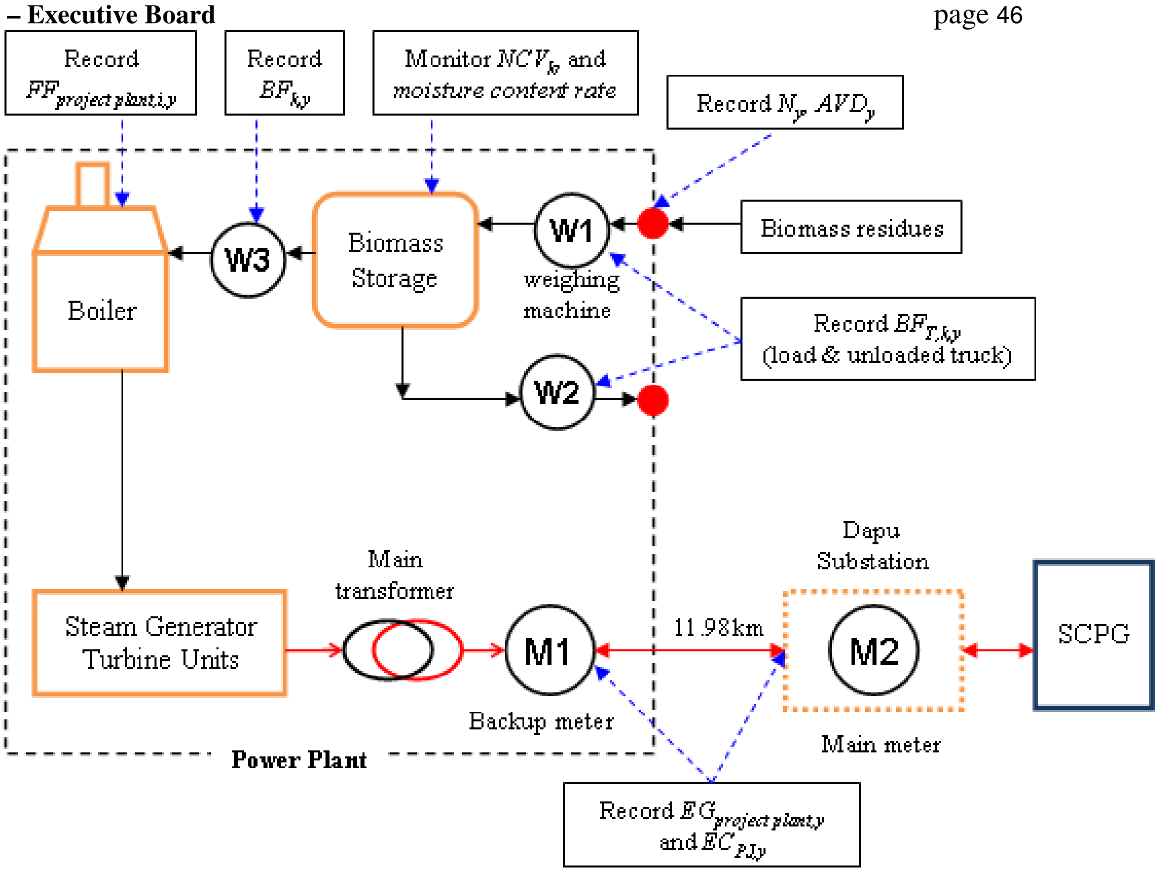

Figure 4. Measurement points of parameters

6) Furthermore, besides 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. Monitoring facilities, installation and data collection for the monitored parameters

The above parameters needed to be monitored can be typed as the following according to the different monitoring facilities, installation and data collection:

1) $EG_{project\,plant,y}$ and $EC_{PJ,y}$:

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The electric energy metering should be equipped according the requirements of the *Technical Administrative Code of Electric Energy Metering* (DL/T448-2000, China). Before putting into 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).

According to the approval letter of "Grid Connection System of Liucheng Biomass Residues Power Generation Project" by Guangxi Power Grid Corporation, both the main meter (0.2s, bidirectional) and back-up meter (0.2s, bidirectional) will be installed in Dapu substation. Grid-connected electricity will be recorded in the positive direction and the electricity provided by the grid to the plant will be recorded in the opposite direction by both main meter and back-up meter. The backup meter is the back-ups of the main meters. According to the national technology regulation, the measure meters should be calibrated once a year.

The detailed process is as follows:

a. The project owner and the grid company will read and record the data from the main meter and backup meter in the last day of every month.

b. The grid company and the project owner provide the electricity purchase/sales invoices, respectively.

c. The project owner provides the records of the meters and copies of invoices to the verifying DOE.

If the imprecision of readings from the main meter falls outside the range of acceptable error in specific months, or the main meter's function is abnormal, the amount of the electricity should be confirmed according to the following measures.

a. Conduct calibration on the main meter and backup meter by a qualified party to evaluate where there exists a fault.

b. If the project owner and the grid company cannot reach an agreement on the conservative method to estimate a reading, arbitration should be conducted according to the power purchase agreement to confirm the consistency of the estimating method applied.

2) $BF_{k,y}$, $BF_{T,k,y}$ and NCV_k:

The quantities combusted in the project plant and transported to the project site will be recorded, and the moisture content and NCV of the biomass residues will be measured by project owner every day.

3) AVD_y and N_y:

The round trip (from and to) of biomass residues transportation and the number of truck trips for the transportation of biomass residues will be recorded by project owner every day.

4) $FF_{project\ plant,i,y}$:

The diesel consumption and reservation quantities will be recorded by project owner, which can be cross checked by the sales invoices.

5) The consumption quantities of biomass residues *k* in year *y* in project site, the acquisition quantities of biomass residues *k* in year *y* in project site:

The relevant statistical reports will be collected from the local agriculture department.

6) $EF_{CH4,BF}$, $EF_{km,CO2,y}$, $EF_{CO2,diesel,y}$, TDL_y, NCV_i and $EF_{burning,CH4,k,y}$:

The above parameters will be cross checked ex-post through the latest IPCC or other default values according to the requirement of the methodology, and the relevant work will be done by the project owner.

All the data mentioned above will be collected by the data recording department.

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5. **Quality Assurance and Quality Control (QA/QC)**

QA/QC is to ensure the accuracy of data collected through measures including periodic calibration of monitoring meters, corrective actions, and internal audits.

5.1 Calibration

According to the *Technical Administrative Code of Electric Energy Metering* (DL/T448-2000), the electric meters will be calibrated periodically. The electric meters will be calibrated by an accredited calibration agency. Calibration certificates of the accredited calibration agency and the relevant calibration documents will be collected by the QA/QC department and transferred to technical department for archiving.

5.2 Corrective actions

If problems which can affect the quality of data occur, the QA/QC department will initiate and supervise the implementation of corrective actions.

5.3. Internal audit

Internal audit is independent.

Internal audit procedure will be initiated under any of the following circumstances:

- modification of the monitoring system
- prior to verification

Firstly, the monitoring system will be checked on whether the monitoring system runs properly and whether the monitored results are correct. Secondly, spot check of daily/monthly data report will be undertaken. Internal audit report will be submitted upon completion of the procedure.

5.4 Management review

The CDM manager will organize the management review periodically in order to let the monitoring process running smoothly. Through the management review, the related problems can be found out and the corrections can be done.

6. Data management

The monitoring record of the meters will be transferred from data recording department to technical department, and the calibration reports of the meters should be also archived by technical department.

7. Training

Monitoring training is critical to ensure that all members of the CDM Monitoring Team have a thorough understanding of the monitoring procedure and are able to carry out the monitoring tasks strictly in line with the CDM requirements. Only qualified staff can work on duty. The training will include:

- Training on operation and monitoring system of the biomass residues power generation station

This is the type of training which are routinely carried out by the biomass residues power generation station itself for new staff.

- Training on CDM basics with focus on CDM monitoring

It will be carried out by the CDM consultancy company before the project is implemented. The

CDM monitoring manual which including the content of the function of organization and data management system will be used as the primary training materials. The training includes the following contents:

- ✧ CDM project cycle and the significance of monitoring
- ✧ Management structure and work scope of each team member
- ✧ Components of the monitoring plan
- ✧ QA/QC procedure
- ✧ Monitoring report template
- ✧ Preparation for verification
- ✧ Questions and answers

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8. Monitoring Report

After the proposed project is registered and begins its operation, the monitoring reports should be prepared by the data recording department and reviewed by the CDM Manager prior to the verification of DOE. The report should cover the monitoring of grid-in power generation, grid-off power to the plant, check report, report on calculation of the emission reductions and records of monitoring instrument repair and calibration, etc.

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 29/03/2010. The individuals/entities involved in the study are as follows:

Tsuyoshi Nakamura

Mitsubishi Corporation

3-1, Marunouchi 2-Chome, Chiyoda-ku, Tokyo, Japan

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Telephone：+81-3-3210-4134

Fax：+81-3-3210-7708

Sun Yuping

Liuzhou City Xin’neng Biomass Power Generation Co., Ltd.

Hexi Industrial Zone, Dapu Town, Liucheng County, Liuzhou City, Guangxi Zhuang Autonomous Region, China

E-mail：LZXN0772@163.com or hxsyp727@163.com

Telephone：+86-772-761 8211

Fax：+86-772-761 6211

Mobile phone：+86-133 7722 2505 or 133 7722 2505

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

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SECTION C. Duration of the project activity / crediting period

C.1 Duration of the project activity:

C.1.1. Starting date of the project activity:

28/08/2008 (the date of signing the purchase agreement of steam turbines and generators)

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

20 years

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

C.2.1. Renewable crediting period

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

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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 Guangxi Zhuang Autonomous Region. The EIA Report for the proposed project has been approved by the Environmental Protection Bureau of Guangxi Zhuang Autonomous Region on 29th Dec, 2007, with approval No. "Guihuanguanzi[2007]No.586". According to the approval comments of the EIA Report by the Environmental Protection Bureau of Guangxi Zhuang Autonomous Region, the environmental impacts likely to be caused by the proposed project are analyzed as follows:

Waste gas

The air pollution sources of the proposed project are mainly resulted from mulberry leaf and sugarcane leaf combustion by boiler. The primary air pollutants are smoke and dusts. 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 mulberry leaf and sugarcane leaf combustion is 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 mulberry leaf and sugarcane leaf heaping shed can be removed by the bag filter with efficiency higher than 90%, and subsequently be discharged through the 20-meter-high discharge pipe. In addition, close the ash storing and transportation system and install bag filter for the ash repository.

Based on the above measures, the amount of discharged dusts could meet the requirement of 2nd level standard of "Integrated Air Pollutant Emission Standards" (GB13223-2003, China).

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 principal 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 mulberry leaf and sugarcane leaf 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 2nd level biochemical wastewater treatment system for road washing and greening.

By above measures, all the discharged wastewater could meet the 1st level standard of "Integrated Wastewater Discharge Standards" (GB8978-1996, China).

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.

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

Solid waste

The solid waste mainly includes dust pollutant and ash pollutant.

For removing dust pollutant, a closed mulberry leaf and sugarcane leaf 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 pollutants, the comprehensive approaches of utilizing 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%.

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

According to the analysis above, there will be no big environmental impacts as the EIA report of the proposed project has been approved by the Environmental Protection Bureau of Guangxi Zhuang Autonomous Region. Nevertheless, the project owner will work hard to protect the environment during the construction and operational periods according to the suggestions in the approval document issued by the Environmental Protection Bureau of Guangxi Zhuang Autonomous Region.

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SECTION E. Stakeholders' comments

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

To let the public realize the objective of the proposed project, support and cooperate with construction of the project, and heighten the environmental benefits and social benefits of the proposed project, the project proponent developed a stakeholders' survey of the proposed project in July and September 2007, to collect comments and requirement of public in the related region.

The first stage

The public participation was organized in July 2007 for collecting stakeholder's views and opinions mainly focued on the environmental impacts through releasing questionnaire and public announcement, partly by interview one by one:

Medium bulletin: make medium bulletin in the local residential area near the location site and release bulletin survey of stakeholders in the residential area near the project construction site. The bulletin contents include general description of the proposed project, public participation load table and contact method.

Questionnaire survey: The survey objects include local government and related departments of Liucheng county, the local villagers living nearby Liucheng biomass power project. During the survey of stakeholders, 150 questionnaires were released and 145 questionnaires were got back, the return ratio is 96.7%. In addition, 40 people is interviewed and consulted.

Items	Choices	Shares (%)
Gender	male	75.2
	female	24.8
Age	Older than 30 years	81.4
	Younger than 30 years	18.6
Education level	Below high school education	46.9
	Beyond high school education	53.1
Profession	Teachers, farmers	70.3
	Cadres	29.7

The questions in the questionnaire survey were as follows：

- Do you know about the proposed project?
- What do you worry about the water environment influences the project will bring?
- What do you worry about the waste gas influences the project will bring?
- What do you worry about the solid waste the project will bring to peoples' health?
- Do you think the project will boost the local economic development?
- Do you worry about the project will influence the local farmland?
- What do you think the project will bring influence to your work and employment?
- Do you think the site location of the project is reasonable?

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The second stage

To know the public's suggestions and advices mainly on the issues of CDM application of the proposed project, the project owner did the stakeholders' survey in September 2007. The survey range was in Liucheng County, 66 questionnaires were released and all were got back.

Items	Choices	Number	Shares (%)
Gender	Male	44	66.7
	Female	21	31.8
	No choice	1	1.5
Age	Younger than 30 years	16	24.2
	30-50	44	66.7
	Older than 50 years	2	3
	No choice	4	6.1
Education level	Elementary school	2	3
	High school and technical secondary school	16	24.2
	Junior college and undergraduate course	41	62.1
	No choice	7	10.7
Nationality	Han	33	50
	Zhuang	27	40.9
	Others	3	4.5
	No choice	3	4.6

The content of survey were as follows：

- Do you know this biomass residues project?
- How do you think the need of construction of the project?
- What are the positive influences of construction of the project?
- What are the negative influences of construction of the project?
- What are the advantages of biomass residues project compared to fossil fuels?
- What are the disadvantages of biomass residues project compared to fossil fuels?
- Do you support the proposed project to be a CDM project?

E.2. Summary of the comments received:

The first stage

Feedback result of medium bulletin

Up to now, there is no any feedback.

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Feedback results of Questionnaires survey

The Statistic results of the 145 questionnaires are as follows:

- 57.2% know about the project, 42.8% don't.
- Water environment influences to work and life the proposed project may bring: 51.7% of the people worry about it, 40.7% don't worry, 7.6% no idea.
- Waste gas environment influences to work and life the proposed project may bring: 53.8% worry about it, 37.9% don't worry, 8.3% no idea.
- Solid waste environment influences to work and life the proposed project may bring: 38.6% worry about it, 42.1% don't worry, 19.3% no idea.
- Can the project boost the local economic development: 91.7% think it can, 0% think it can't, 8.3% no idea.
- Do you worry about the influence to farmland: 32.4% worry about it, 44.1% don't worry, 23.5% no idea.
- Whether bad influences to work and employment the project will bring or not: 2.8% think yes, 92.4% think no, 4.8% no idea.
- Whether or not the location is reasonable: 88.2% think it is reasonable, 1.4% think it isn't, 10.4% no idea.

The second stage

- 7.6% has detailed understand of the proposed project, 72.7% know about it, 19.7% don't know it.
- 50% think the project can increase the power supply, 45.5% think it can promote local employment, 50% think it can increase the local tax.
- For the positive influence of construction of the project: 28.8% think it can increase the power supply, 42.4% think it can decrease the tariff, 19.7% think it can increase income, 51.5% think it can increase employment, 33.3% think it can improve living standard, 3% think it is for other aspects.
- For the negative influence of construction of the project: 12.1% think it is noises, 33.3% think it is waste water, 48.5% think it is waste gas, 25.8% think it is for other aspects.
- For the advantage of this project compared to fossil fuels project: 37.9% think it can reduce emissions of waste gas, waste water and waste solid, 25.8% think it can reduce GHG emission, 80.3% think it can efficiently use renewable resource.
- For the disadvantage of this project compared to fossil fuels project: 26.8% think the unit investment cost is higher, 31.8% think the operation cost is higher, 39.4% think the technology is not mature.
- For applying CDM, 75.8% support, 16.7% think no idea.

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

According to the results of the survey, local residents fully support the proposed project and satisfy the social and economic benefits. In the survey of stakeholders', there are some requirement, opinions and suggestions. Aiming at solving these opinions, the proposed project will bring forward and implement relevant measures as the following:

- As for the waste water, waste gas, waste solid and noises pollution that some residents concerned about, the protection measure which were authorized mentioned in D.1 will be strictly implemented, so that they can meet the relevant environmental standard.

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- The project will achieve the economic benefits and social benefits, should raise more environmental investment and advanced environmental technologies to solve the problems of waste water, waste gas, waste solid, noises pollution, to make the environmental pollution to be the lowest.

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

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Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

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Annex 2

INFORMATION REGARDING PUBLIC FUNDING

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

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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 SCPG in the last five years:

Table 3-1 Power generation of SCPG in 2003

Power generation (GWh)	Guangdong	Guangxi	Guizhou	Yunnan	Total
Fossil fuelled	143,351	17,079	43,295	19,055	222,780
Hydro power	17,136	19,288	8,019	26,837	71,280
Others	29,089	0	0	0	29,089
Total	189,576	36,367	51,314	45,892	323,149

The proportion of low operating cost/must-run power plants of SCPG in 2003: (323,149-222,780)/323,149=31.06%.
Data Source: China Electric Power Yearbook 2004.

Table 3-2 Power generation of SCPG in 2004

Power generation (GWh)	Guangdong	Guangxi	Guizhou	Yunnan	Total
Fossil fuelled	169,389	20,143	49,720	24,322	263,574
Hydro power	14,114	17,229	23,379	29,350	84,072
Others	28,630	0	0	0	28,630
Total	212,133	37,372	73,099	53,672	376,276

The proportion of low operating cost/must-run power plants of SCPG in 2004: (376,276-263,574)/376,276=29.95%.
Data Source: China Electric Power Yearbook 2005.

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Table 3-3 Power generation of SCPG in 2005

Power generation (GWh)	Guangdong	Guangxi	Guizhou	Yunnan	Total
Fossil fuelled	176,453	25,023	58,430	27,281	287,187
Hydro power	17,482	19,582	10,848	33,228	81,140
Others	33,924	0	0	0	33,924
Total	227,859	44,604	69,278	60,509	402,251

The proportion of low operating cost/must-run power plants of SCPG in 2005: (402,251-287,187)/402,251=28.61%.
Data Source: China Electric Power Yearbook 2006.

Table 3-4 Power generation of SCPG in 2006

Power generation (GWh)	Guangdong	Guangxi	Guizhou	Yunnan	Total
Fossil fuelled	188,429	27,967	76,039	39,791	332,226
Hydro power	26,799	24,369	22,596	35,572	109,336
Others	31,354	0	0	0	31,354
Total	246,582	52,334	98,636	75,363	472,916

The proportion of low operating cost/must-run power plants of SCPG in 2006: = (472,916-332,226)/472,916=29.75%.
Data Source: China Energy Statistical Yearbook 2007.

Table 3-5 Power generation of SCPG in 2007

Power generation (GWh)	Guangdong	Guangxi	Guizhou	Yunnan	Total
Fossil fuelled	215,700	36,100	84,300	47,400	383,500
Hydro power	23,200	32,400	29,500	43,100	128,200
Others	30,590	0	0	0	30,590
Total	269,490	68,500	113,800	90,500	542,290

The proportion of low operating cost/must-run power plants of SCPG in 2007: (542,290-383,500)/542,290=29.28%.
Data Source: China Electric Power Yearbook 2008.

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The calculation of the emission factors of SCPG adopts the data from "Report on 2009 Baseline Emission Factor for Regional Power Grids in China" issued by China DNA-National Development & Reform Commission on 2nd July 2009, which are Operating Margin ($EF_{grid,OM,y}$) 0.9987 tCO_2/MWh , and Build Margin ($EF_{grid,BM,y}$) 0.5772 tCO_2/MWh.

The concrete calculation process is shown in the following tables:

Operating Margin (OM) Calculation

Table 3-6 Thermal power generation of SCPG in 2005

Province	The fuel fired electricity generation（MWh）	The rate of electricity self-consumption（%）	The fuel fired electricity connected to the grid（MWh）
Guangdong	176,453,000	5.58	166,606,923
Guangxi	25,023,000	7.95	23,033,672
Guizhou	58,430,000	7.34	54,141,238
Yunnan	27,281,000	6.94	25,387,699
Total	--	--	269,169,531

Note: When calculating simple OM emission factor of SCPG in 2005, the electricity imports from Central China Power Grid is 20,264,000 MWh, so the total thermal power generation of SCPG in 2005 is 20,264,000+269,169,531=**289,433,531** MWh.
Data source: China Electric Power Yearbook 2006.

Table 3-7 Calculation of simple OM emission factor of SCPG in 2005

Fuels	Units	Guang dong	Guangxi	Guizhou	Yunnan	Total	Carbon content (tC/TJ)	OXID (%)	Emission factors ($kgCO_2$/TJ)	NCV (MJ/t, km^3)	CO_2 emissions (tCO_2)
		A	B	C	D	E=A+…+D	F	G	H	I	J=E×H×I/100000 (quality unit) or J=E×H×I/10000 (volume unit)
Raw coal	10^4 ton	6696.47	1435	3212.31	1975.55	**13319.33**	25.8	100	87,300	20,908	243,113,522
Washed coal	10^4 ton				0.15	**0.15**	25.8	100	87,300	26,344	3,450

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Other washed coal	10^4 ton			10.39	33.88	**44.27**	25.8	100	87,300	8,363	323,211
Coke	10^4 ton	4.79			8.05	**12.84**	29.2	100	95,700	28,435	349,406
Coke oven gas	10^8 M^3				0.79	**0.79**	12.1	100	37,300	16,726	49,287
Other gas	10^8 M^3	1.87			15.96	**17.83**	12.1	100	37,300	5,227	347,626
Crude oil	10^4 ton	10.91				**10.91**	20	100	71,100	41,816	324,367
Gasoline	10^4 ton	0.68				**0.68**	18.9	100	67,500	43,070	19,769
Diesel	10^4 ton	31.96	2.02		1.81	**35.79**	20.2	100	72,600	42,652	1,108,250
Fuel oil	10^4 ton	887.21				**887.21**	21.1	100	75,500	41,816	28,010,178
LPG	10^4 ton					**0**	17.2	100	61,600	50,179	0
Refinery gas	10^4 ton	4.92				**4.92**	15.7	100	48,200	46,055	109,217
Natural gas	10^8 M^3	0.93				**0.93**	15.3	100	54,300	38,931	196,598
Other petroleum products	10^4 ton	1.7				**1.7**	20	100	75,500	38,369	53,671
Other coking products	10^4 ton					**0**	25.8	100	95,700	28,435	0
Other energy	10^4 tce	104.66	133.15		59.72	**297.53**	0	0	0	0	0
Total		-	-	-	-	-	-	-		-	274,008,550
Total CO_2 emission （tCO_2）						274,008,550+1.16148*20264000=**297,544,857**					
Total thermal power generation connected to the grid（MWh）						20,264,000+269,169,531=**289,433,531**					
$EF_{simple,OM,2005}$（tCO_2/MWh）						**1.02802**					

Note: The electricity import from Central China Power Grid in 2005 is 20,264,000 MWh, and the average emission factor of Central China Power Grid in 2005 is 1.16148 tCO_2/MWh, so the total CO_2 emission of SCPG in 2005 is 274,008,550+1.16148*20,264,000=**297,544,857** tCO_2.

Data source:

- China Energy Statistical Yearbook 2006.

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- "2009 Baseline Emission Factors for Regional Power Grids in China" by China DNA (NDRC) at http://cdm.ccchina.gov.cn issued on 2nd July 2009.

Table 3-8 Thermal power generation of SCPG in 2006

Province	The fuel fired electricity generation (MWh)	The rate of electricity self-consumption (%)	The fuel fired electricity connected to the grid (MWh)
Guangdong	188,429,000	5.27	178,498,792
Guangxi	27,967,000	4.45	26,722,469
Guizhou	76,039,000	6.06	71,431,037
Yunnan	39,791,000	4.12	38,151,611
The total			314,803,908

Note: When calculating simple OM emission factor of SCPG in 2006, the electricity imports from Central China Power Grid is 21,730,840 MWh, so the total thermal power generation of SCPG in 2006 is 21,730,840+314,803,908=**336,534,748** MWh.
Data source: China Electric Power Yearbook 2007.

Table 3-9 Calculation of simple OM emission factor of SCPG in 2006

Fuels	Units	Guang dong	Guangxi	Guizhou	Yunnan	Total	Carbon content (tC/TJ)	OXID (%)	Emission factors ($kgCO_2/TJ$)	NCV (MJ/t, km^3)	CO_2 emission (tCO_2)
		A	B	C	D	E=A+⋯+D	F	G	H	I	J=E×H×I/100000 (quality unit) or J=E×H×I/10000 (volume unit)
Raw coal	10^4 ton	7303.19	1490.01	4001.54	2735.88	**15530.62**	25.8	100	87,300	20,908	283,475,499
Washed coal	10^4 ton					**0**	25.8	100	87,300	26,344	0
Other washed coal	10^4 ton			19.53	45.8	**65.33**	25.8	100	87,300	8,363	476,968
Coal Briquette	10^4 ton	133.75				**133.75**	26.6	100	87,300	20,908	2,441,296
Coke	10^4 ton				1.31	**1.31**	29.2	100	95,700	28,435	35,648

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Coke oven gas	10^8 M^3		0.84		2.06	**2.9**	12.1	100	37,300	16,726	180,925
Other gas	10^8 M^3	0.89			19.15	**20.04**	12.1	100	37,300	5,227	390,714
Crude oil	10^4 ton	0.87				**0.87**	20	100	71,100	41,816	25,866
Gasoline	10^4 ton	0				**0**	18.9	100	67,500	43,070	0
Diesel	10^4 ton	29.92	1.26		3	**34.18**	20.2	100	72,600	42,652	1,058,396
Fuel oil	10^4 ton	685.85	0.09			**685.94**	21.1	100	75,500	41,816	21,655,867
LPG	10^4 ton					**0**	17.2	100	61,600	50,179	0
Refinery gas	10^4 ton	0				**0**	15.7	100	48,200	46,055	0
Natural gas	10^8 M^3	7.92				**7.92**	15.3	100	54,300	38,931	1,674,251
Other petroleum products	10^4 ton	0.67				**0.67**	20	100	75,500	38,369	21,153
Other coking products	10^4 ton					**0**	25.8	100	95,700	28,435	0
Other energy	10^4 tce	93.54	189.68		20.29	**303.51**	0	0	0	0	0
Total		-	-	-	-	**-**	-	-		-	311,436,583
Total CO_2 emission （tCO_2）						311,436,583 +1.12157*21,730,840=**335,809,186**					
Total thermal power generation connected to the grid（MWh）						21,730,840+314,803,908=**336,534,748**					
$EF_{simple,OM,2006}$ （tCO_2/MWh）						**0.99784**					

Note: The electricity imports from Central China Power Grid in 2006 is 21,730,840 MWh, and the average emission factor of Central China Power Grid in 2007 is 1.12157 tCO_2/MWh, so the total CO_2 emission of SCPG in 2006 is 311,436,583 +1.12157*21,730,840=**335,809,186** tCO_2.

Data source:

- China Energy Statistical Yearbook 2007;
- "2009 Baseline Emission Factors for Regional Power Grids in China" by China DNA (NDRC) at http://cdm.ccchina.gov.cn issued on 2nd July 2009.

Table 3-10 Thermal power generation of SCPG in 2007

Province	The fuel fired electricity generation（MWh）	The rate of electricity self-consumption（%）	The fuel fired electricity connected to the grid（MWh）
Guangdong	215,700,000	6.01	202,736,430
Guangxi	36,100,000	7.42	33,421,380
Guizhou	84,300,000	6.62	78,719,340
Yunnan	47,400,000	7.23	43,972,980
Total	--	-	358,850,130

Note: When calculating simple OM emission factor of SCPG in 2007, the electricity imports from Central China Power Grid is 24,237,240 MWh, so the total thermal power generation of SCPG in 2007 is 24,237,240+358,850,130=**383,087,370** MWh.
Data source: China Electric Power Yearbook 2008.

Table 3-11 Calculation of simple OM emission factor of SCPG in 2007

Fuels	Units	Guang dong	Guangxi	Guizhou	Yunnan	Total	Carbon content (tC/TJ)	OXID (%)	Emission factors ($kgCO_2/TJ$)	NCV (MJ/t, km^3)	CO_2 emission (tCO_2)
		A	B	C	D	E=A+⋯+D	F	G	H	I	J=E×H×I/100000 (quality unit) or J=E×H×I/10000 (volume unit)
Raw coal	10^4 ton	8214.78	1750.63	4298.8	3170.79	17435	25.8	100	87,300	20,908	318,235,546
Washed coal	10^4 ton	3.46				3.46	25.8	100	87,300	26,344	79,574
Other washed coal	10^4 ton		0.65	21.58	14.64	36.87	25.8	100	87,300	8,363	269,184
Coal Briquette	10^4 ton	271.25				271.25	26.6	100	87,300	20,908	4,951,041
Coke	10^4 ton	0.04	1.69		2.15	3.88	29.2	100	95,700	28,435	105,584
Coke oven	10^8 M^3		0.96	3.19	1.8	5.95	12.1	100	37,300	16,726	371,208

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gas											
Other gas	10^8 M^3		30.77		21.63	52.4	12.1	100	37,300	5,227	1,021,628
Crude oil	10^4 ton					0	20	100	71,100	41,816	0
Gasoline	10^4 ton					0	18.9	100	67,500	43,070	0
Diesel	10^4 ton	21.37	2.13		2.29	25.79	20.2	100	72,600	42,652	798,596
Fuel oil	10^4 ton	467.97	0.41			468.38	21.1	100	75,500	41,816	14,787,262
LPG	10^4 ton					0	17.2	100	61,600	50,179	0
Refinery gas	10^4 ton	0.37				0.37	15.7	100	48,200	46,055	8,213
Natural gas	10^8 M^3	32.17				32.17	15.3	100	54,300	38,931	6,800,588
Other petroleum products	10^4 ton	8.47				8.47	20	100	75,500	41,816	267,407
Other coking products	10^4 ton					0	25.8	100	95,700	28,435	0
Other energy	10^4 tce	118.04	81.89	44.1	50.3	294.33	0	0	0	0	0
Total		-	-	-	-	**-**	-	-		-	347,695,831
Total CO_2 emission （tCO_2）						347,695,831+1.10197*24,237,240=**374,404,628**					
Total thermal power generation connected to the grid（MWh）						24,237,240+358,850,130=**383,087,370**					
$EF_{simple,OM,2007}$ （tCO_2/MWh）						**0.97733**					

Note: The electricity imports from Central China Power Grid in 2007 are 24,237,240 MWh, and the average emission factor of Central China Power Grid in 2007 is 1.10197 tCO_2/MWh, so the total CO_2 emission of SCPG in 2007 is 347,695,831+1.10197*24,237,240=**374,404,628** tCO_2.

Data source:

- China Energy Statistical Yearbook 2008.
- “2009 Baseline Emission Factors for Regional Power Grids in China” by China DNA (NDRC) at http://cdm.ccchina.gov.cn issued on 2nd July 2009.

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Table3-12 The three years average OM emission factor of SCPG

Years	Total CO_2 emission (tCO_2)	Total thermal power generation connected to the grid（MWh）	Three years average emission factor (tCO_2/MWh)
2005	297,544,857	289,433,531	0.9987
2006	355,809,186	336,534,748	
2007	374,404,628	383,087,370	

Data Source: from the above table 3-6～3-11.

Build Margin (BM) Calculation

Table 3-13 Calculation of the weight of CO_2 emissions from solid fuels, liquid fuels and gas fuels among total emissions in SCPG

Fuels	Units	Guang dong	Guangxi	Guizhou	Yunnan	Total	NCV (KJ/kg, km^3)	Emission factor (tc/TJ)	OXID	CO_2 emissions (tCO_2)
		A	B	C	D	E=A+…+D	F	G	H	I=E×F×G×H/100,000
Raw coal	10^4 ton	8,214.78	1,750.63	4,298.8	3,170.79	17,435	20,908	87,300	1	318,235,546
Washed coal	10^4 ton	3.46	0	0	0	3.46	26,344	87,300	1	79,574
Other washed coal	10^4 ton	0	0.65	21.58	14.64	36.87	8,363	87,300	1	269,184
Coal Briquette	10^4 ton	271.25	0	0	0	271.25	20,908	87,300	1	4,951,041
Coke	10^4 ton	0.04	1.69	0	2.15	3.88	28,435	95,700	1	105,584
Other coke chemicals	10^4 ton	0	0	0	0	0	28,435	95,700	1	0
Total of										**323,640,928**

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solid fuels										
Crude oil	10^4 ton	0	0	0	0	0	41,816	71,100	1	0
Gasoline	10^4 ton	0	0	0	0	0	43,070	67,500	1	0
Diesel	10^4 ton	21.37	2.13	0	2.29	25.79	42,652	72,600	1	798,596
Fuel oil	10^4 ton	467.97	0.41	0	0	468.38	41,816	75,500	1	14,787,262
Other petroleum products	10^4 ton	8.47	0	0	0	8.47	41,816	75,500	1	267,407
Total of liquid fuels										**15,853,266**
Natural gas	10^7 M^3	321.7	0	0	0	321.7	38,931	54,300	1	6,800,588
Coke oven gas	10^7 M^3	0	9.6	31.9	18	59.5	16,726	37,300	1	371,208
Other gas	10^7 M^3	0	307.7	0	216.3	524	5,227	37,300	1	1,021,628
LPG	10^4 ton	0	0	0	0	0	50,179	61,600	1	0
Refinery gas	10^4 ton	0.37	0	0	0	0.37	46,055	48,200	1	8,213
Total of gas fuels										**8,201,637**
Total of solid, liquid and gas fuels										**347,695,831**

Data source: China Energy Statistical Yearbook 2008.

From the above table, $\lambda_{Coal,y}$ =93.08%, $\lambda_{Oil,y}$ =4.56%, $\lambda_{Gas,y}$ =2.36%.

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Table 3-14 Emission factor of the most efficient commercial thermal power plants

Thermal power	Variable	Efficiency of electricity supply (%)	Emission factor of the fuels ($kgCO_2/TJ$)	OXID	Emission factor (tCO_2/MWh)
		A	B	C	D=3.6/A/100000*B*C
Coal-fired power plant	$EF_{Coal,Adv,y}$	38.10%	87,300	1	0.8429
Gas- fired power plant	$EF_{Gas,Adv,y}$	49.99%	75,500	1	0.5437
Oil- fired power plant	$EF_{Oil,Adv,y}$	49.99%	54,300	1	0.3910

$EF_{Thermal,y} = \lambda_{Coal,y} \times EF_{Coal,Adv,y} + \lambda_{Oil,y} \times EF_{Oil,Adv,y} + \lambda_{Gas,y} \times EF_{Gas,Adv,y}$ =0.8018 tCO_2/MWh.

Table 3-15 Calculation of BM emission factor of SCPG

	Installed capacity in 2005	Installed capacity in 2006	Installed capacity in 2007	Newly added installed capacity between 2005 and 2007	Weight in newly added installed capacity
	A	B	C	D=C-A	
Thermal power（MW）	54,507	68,963	80,610	26,103	71.98%
Hydropower（MW）	30,347.1	34,176	40,340	9,992.9	27.56%
Nuclear power（MW）	3,780	3,780	3,780	0	0.00%
Wind power（MW）	83.4	183	250	166.6	0.46%
Total（MW）	88,717.5	107,102	124,980	36,262.5	100.00%
Share in 2007 installed capacity	70.99%	85.70%	100%		

$EF_{Grid,BM,y}$=0.8018×71.98%=0.5772 tCO_2/MWh.

Data source: China Electric Power Yearbook 2006, China Electric Power Yearbook 2007, China Electric Power Yearbook 2008.

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Table 3-16 Basic parameters

Serial No.	Items	Value	Unit/Remark
	General description		
1	Installed capacity	30	MW
2	Annual electricity generation （the 2nd year）	135000	MWh
3	Annual electricity generation （from 3rd year to 21st year）	180000	MWh
4	Construction period	1	Year
5	Operation period	20	Year
6	Tariff (excl.VAT, from 1st operation year to 15th operation year)	536.91	RMB/MWh
7	Tariff (excl.VAT, from 16th operation year to 20th operation year)	322.76	RMB/MWh
	Investment plan		
1	Value of total static value	26046.00	10000RMB
1.1	Total static value	24929.00	10000RMB
	Year 1	22436.00	10000RMB
	Year 2	2493.00	10000RMB
1.2	Interest incurred during construction	1117.00	10000RMB
	Year 1	673.00	10000RMB
	Year 2	444.00	10000RMB
2	initial working capital	136.00	10000RMB
3	Ratio of initial working capital to circulating capital	30%	
4	Ratio of Intangible assets & other assets to value of total static value	5.00%	
4.1	Intangible assets	651.00	10000RMB
	Year 1	97.65	
	After Year1	130.20	
4.2	Other assets	651.00	10000RMB
	Year 1	97.65	
	After Year1	130.20	
5	Amortization period	5.00	Year
6	Original value of total static value		
	Year 1	21953.55	10000RMB
	Year 1 to Year 21	24744.00	10000RMB
	Investment allocation		
1	Total proportion of construction investment	100%	
1.1	Year 1	90%	
	Unit 1#	51%	
	Unit 2#	39%	
1.2	Year 2	10%	
	Unit 1#	5%	
	Unit 2#	5%	
2	Commissioning date of unit 1#	1	Month（in 2nd year）
3	Commissioning date of unit 2#	7	Month（in 2nd year）

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	Fund resource		
1	Equity for total static investment	5210.00	10000RMB
	Year 1	4689.00	10000RMB
	Year 2	521	10000RMB
2	Loan for total static investment	19719	10000RMB
	Year 1	17747	10000RMB
	Year 2	1972	10000RMB
3	Annual interest rate of long-term loan	7.38%	
4	Quarterly interest rate of long-term loan	7.587%	
5	Equity for circulating capital	137.00	10000RMB
	Year 1	108.00	
	Year 2	29.00	
6	Loan for circulating capital	319	10000RMB
	Year 1	252	10000RMB
	Year 2	67	10000RMB
7	Interest rate of loan for circulating capital	6.84%	
8	Interest rate of short-term loan	6.84%	
9	Payment period of long-term loan（including construction period）	12	Year
	Tax		
1	City maintenance & construction tax	5%	
2	Additional tax for education fee	4%	
3	Income tax	25%	
4	VAT	17%	
	Cost		
1	Fuel consumption for electricity generation	990	kg/MWh
2	Fuel price	224.47	RMB/t
3	Pollutant discharge fee	49.94	10000RMB/year
4	Water fee	1	RMB/MWh
5	Materials fee	8	RMB/MWh
6	Other cost	10	RMB/MWh
7	Electricity consumption rate of plant	12.30%	
8	Rate of repair cost	2.50%	
9	Premium rate	0.25%	
10	Employee	111	Person
11	Salary	2.5	10000RMB/ Person/year
12	Rate of employee welfare	57%	
13	The remaining value rate	5%	
14	Depreciation rate	15	Year
	CERs		
1	Annual GHG emission reductions	123324	tCO_2e/year
2	CERs price	9.75	Euro/Ton
3	Euro exchange rate	10.80	Euro:RMB

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Table 3-17 Investment schedule（unit：10000RMB）

Serial No.	Items	Total	Year 1	Year 2
1	Total static investment using plan			
1.1	Proportion of total static investment	100%	90%	10%
1.2	Amount of total static investment	24929.00	22436.10	2492.90
2	Resource of total static investment			
2.1	Equity	5210.00	4689.00	521.00
2.1.1	Unit 1#		2657.10	521.00
2.1.2	Unit 2#		2031.90	260.50
2.2	Loan	19719.00	17747.10	1971.90
2.2.1	Unit 1#			
	Loan	11042.64	10056.69	985.95
	Interest incurred during construction period	450.60	381.49	69.11
2.2.2	Unit 2#			
	Loan	8676.36	7690.41	985.95
	Interest incurred during construction period	666.80	291.73	375.08
3	Total interest incurred during construction period	1117.40	673.22	444.19
4	Interest of unit 1# included in financial cost			760.21
5	Interest of unit 2# included in financial cost			267.91

Table 3-18 Loan and Payment (unit: 10000RMB yuan)

Serial No.	Items	Construction period	Operation period										
		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12
1	Accumulative principal and interest of loan at the beginning of		18420.32	19161.83	17245.64	15329.46	13413.28	11497.10	9580.91	7664.73	5748.55	3832.37	1916.18

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	the year												
2	Principal and interest payment of the year		2702.70	3369.95	3224.57	3079.19	2933.82	2788.44	2643.06	2497.69	2352.31	2206.94	2061.56
2.1	Principal payment		1674.57	1916.18	1916.18	1916.18	1916.18	1916.18	1916.18	1916.18	1916.18	1916.18	1916.18
2.2	Interest payment		1028.12	1453.76	1308.39	1163.01	1017.63	872.26	726.88	581.51	436.13	290.75	145.38

Table 3-19 Total cost expenses（Unit: 10000RMB）

Serial No.	Items	Construction period	Operation period								
		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
	Annual electricity generation (MWh)		135000	180000	180000	180000	180000	180000	180000	180000	180000
	Plant electricity consumption (MWh)		16605	22140	22140	22140	22140	22140	22140	22140	22140
	Annual grid-connected electricity (MWh)		118395	157860	157860	157860	157860	157860	157860	157860	157860
1	Fuel cost		3000.04	4000.06	4000.06	4000.06	4000.06	4000.06	4000.06	4000.06	4000.06
2	Water cost		13.50	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00
3	Material cost		108.00	144.00	144.00	144.00	144.00	144.00	144.00	144.00	144.00
4	Pollutant discharge cost		37.46	49.94	49.94	49.94	49.94	49.94	49.94	49.94	49.94
5	Salary and employee welfare		435.68	435.68	435.68	435.68	435.68	435.68	435.68	435.68	435.68
6	Repair cost		444.05	592.06	592.06	592.06	592.06	592.06	592.06	592.06	592.06
7	Other cost		135.00	180.00	180.00	180.00	180.00	180.00	180.00	180.00	180.00
8	Premium cost		51.95	55.00	51.09	47.17	43.25	39.33	35.41	31.50	27.58
9	Depreciation cost		1175.34	1567.12	1567.12	1567.12	1567.12	1567.12	1567.12	1567.12	1567.12
10	Amortization charge		195.30	260.40	260.40	260.40	260.40	65.10	0.00	0.00	0.00
11	Financial cost		1045.36	1522.58	1415.21	1301.83	1179.45	1048.08	907.70	761.32	607.95

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11.1	Interest of long-term loan		1028.12	1453.76	1308.39	1163.01	1017.63	872.26	726.88	581.51	436.13
11.2	Interest of loan for circulating capital		17.24	21.82	21.82	21.82	21.82	21.82	21.82	21.82	21.82
11.3	Interest of short-term loan		0.00	47.00	85.00	117.00	140.00	154.00	159.00	158.00	150.00
	Annual O&M cost		4225.66	5474.74	5470.82	5466.90	5462.98	5459.07	5455.15	5451.23	5447.31
	Annual total cost expenses		6641.66	8824.84	8713.55	8596.25	8469.96	8139.36	7929.97	7779.68	7622.38

Serial No.	**Items**	**Operation period**										
		Year 11	**Year 12**	**Year 13**	**Year 14**	**Year 15**	**Year 16**	**Year 17**	**Year 18**	**Year 19**	**Year 20**	**Year 21**
	Annual electricity generation (MWh)	180000	180000	180000	180000	180000	180000	180000	180000	180000	180000	180000
	Plant electricity consumption (MWh)	22140	22140	22140	22140	22140	22140	22140	22140	22140	22140	22140
	Annual grid-connected electricity (MWh)	157860	157860	157860	157860	157860	157860	157860	157860	157860	157860	157860
1	Fuel cost	4000.06	4000.06	4000.06	4000.06	4000.06	4000.06	4000.06	4000.06	4000.06	4000.06	4000.06
2	Water cost	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00
3	Material cost	144.00	144.00	144.00	144.00	144.00	144.00	144.00	144.00	144.00	144.00	144.00
4	Pollutant discharge cost	49.94	49.94	49.94	49.94	49.94	49.94	49.94	49.94	49.94	49.94	49.94
5	Salary and employee welfare	435.68	435.68	435.68	435.68	435.68	435.68	435.68	435.68	435.68	435.68	435.68
6	Repair cost	592.06	592.06	592.06	592.06	592.06	592.06	592.06	592.06	592.06	592.06	592.06
7	Other cost	180.00	180.00	180.00	180.00	180.00	180.00	180.00	180.00	180.00	180.00	180.00
8	Premium cost	23.66	19.74	15.83	11.91	7.99	4.07	3.09	3.09	3.09	3.09	3.09
9	Depreciation cost	1567.12	1567.12	1567.12	1567.12	1567.12	1567.12	391.78	0.00	0.00	0.00	0.00
10	Amortization charge	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	Financial cost	443.57	281.20	110.82	53.82	21.82	21.82	21.82	77.82	110.82	145.82	183.82
11.1	Interest of long-term loan	290.75	145.38	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11.2	Interest of loan for circulating capital	21.82	21.82	21.82	21.82	21.82	21.82	21.82	21.82	21.82	21.82	21.82
11.3	Interest of short-term loan	131.00	114.00	89.00	32.00	0.00	0.00	0.00	56.00	89.00	124.00	162.00
	Annual O&M cost	5443.40	5439.48	5435.56	5431.64	5427.72	5423.81	5422.83	5422.83	5422.83	5422.83	5422.83
	Annual total cost expenses	7454.09	7287.79	7113.50	7052.58	7016.66	7012.75	5836.43	5500.65	5533.65	5568.65	5606.65

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Table 3-20 Profit and tax (Unit: 10000RMB)

Serial No.	Items	Construction period	Operation period								
		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
1	Electricity sales revenues		6356.75	8475.66	8475.66	8475.66	8475.66	8475.66	8475.66	8475.66	8475.66
2	Sales tax and additional tax		1160.15	1546.87	1546.87	1546.87	1546.87	1546.87	1546.87	1546.87	1546.87
2.1	VAT		1064.36	1419.15	1419.15	1419.15	1419.15	1419.15	1419.15	1419.15	1419.15
2.2	City maintenance & construction tax and additional tax for education fee		95.79	127.72	127.72	127.72	127.72	127.72	127.72	127.72	127.72
3	Annual total cost expenses		6641.66	8824.84	8713.55	8596.25	8469.96	8139.36	7929.97	7779.68	7622.38
4	Total profits		-380.71	-476.90	-365.61	-248.31	-122.02	208.57	417.97	568.26	725.56
5	Redeeming amount of adjusted income tax		664.65	1045.68	1049.60	1053.52	1057.43	1256.65	1325.67	1329.59	1333.50
6	Adjusted income tax		166.16	261.42	262.40	263.38	264.36	314.16	331.42	332.40	333.38

Serial No.	Items	Operation period										
		Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20	Year 21
1	Electricity sales revenues	8475.66	8475.66	8475.66	8475.66	8475.66	8475.66	5095.09	5095.09	5095.09	5095.09	5095.09
2	Sales tax and additional tax	1546.87	1546.87	1546.87	1546.87	1546.87	1546.87	929.89	929.89	929.89	929.89	929.89
2.1	VAT	1419.15	1419.15	1419.15	1419.15	1419.15	1419.15	853.11	853.11	853.11	853.11	853.11
2.2	City maintenance & construction tax and additional tax for education fee	127.72	127.72	127.72	127.72	127.72	127.72	76.78	76.78	76.78	76.78	76.78
3	Annual total cost expenses	7454.09	7287.79	7113.50	7052.58	7016.66	7012.75	5836.43	5500.65	5533.65	5568.65	5606.65
4	Total profits	893.85	1060.14	1234.44	1295.36	1331.27	1335.19	-818.12	-482.34	-515.34	-550.34	-588.34
5	Redeeming amount of adjusted income tax	1337.42	1341.34	1345.26	1349.18	1353.09	1357.01	-796.30	-404.52	-404.52	-404.52	-404.52
6	Adjusted income tax	334.36	335.34	336.31	337.29	338.27	339.25	0.00	0.00	0.00	0.00	0.00

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Table 3-21 Cash Flow and FIRR (Unit: 10000RMB yuan)

Serial No.	Items	Construction period	Operation period								
		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
1	**Cash inflow**		6356.75	8475.66	8475.66	8475.66	8475.66	8475.66	8475.66	8475.66	8475.66
1.1	Electricity sales revenues		6356.75	8475.66	8475.66	8475.66	8475.66	8475.66	8475.66	8475.66	8475.66
1.2	Recovery of circulating capital										
1.3	Recovery of remain value of total static investment										
2	**Cash outflow**	22796.00	7076.62	5862.88	5859.94	5857.00	5854.07	5899.95	5913.29	5910.35	5907.41
2.1	Total static investment	22436.00	2493.00								
2.2	Circulating capital	360.00	96.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00
2.3	Annual O&M cost		4225.66	5474.74	5470.82	5466.90	5462.98	5459.07	5455.15	5451.23	5447.31
2.4	City maintenance & construction tax and additional tax for education fee		95.79	127.72	127.72	127.72	127.72	127.72	127.72	127.72	127.72
2.5	Adjusted income tax		166.16	261.42	262.40	263.38	264.36	314.16	331.42	332.40	333.38
3	**Net cash flow without CERs income**	-22796.00	-719.87	2612.78	2615.72	2618.66	2621.59	2575.71	2562.37	2565.31	2568.25
4	**Net cash flow with CERs income**	-22796.00	254.08	3911.38	3914.32	3917.26	3920.20	3874.31	3860.97	3863.91	3866.85

Serial No.	Items	Operation period										
		Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20	Year 21
1	**Cash inflow**	8475.66	8475.66	8475.66	8475.66	8475.66	8475.66	5095.09	5095.09	5095.09	5095.09	6780.29
1.1	Electricity sales revenues	8475.66	8475.66	8475.66	8475.66	8475.66	8475.66	5095.09	5095.09	5095.09	5095.09	5095.09
1.2	Recovery of circulating capital											448.00
1.3	Recovery of remain value of total static investment											1237.20
2	**Cash outflow**	5904.47	5901.54	5898.60	5895.66	5892.72	5890.78	5499.61	5499.61	5499.61	5499.61	5499.61

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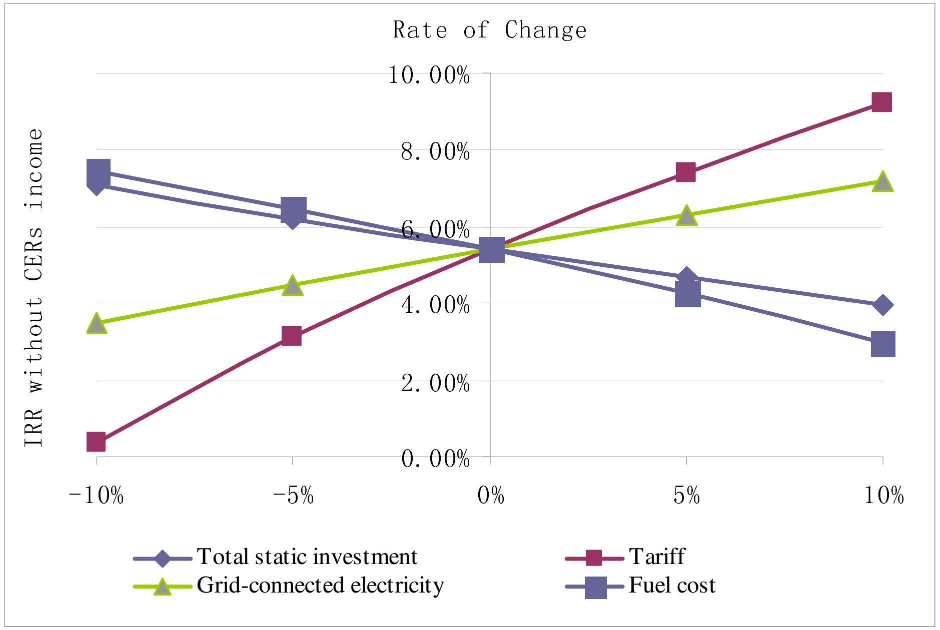
2.1	Total static investment											
2.2	Circulating capital	-1.00	-1.00	-1.00	-1.00	-1.00	0.00	0.00	0.00	0.00	0.00	0.00
2.3	Annual O&M cost	5443.40	5439.48	5435.56	5431.64	5427.72	5423.81	5422.83	5422.83	5422.83	5422.83	5422.83
2.4	City maintenance & construction tax and additional tax for education fee	127.72	127.72	127.72	127.72	127.72	127.72	76.78	76.78	76.78	76.78	76.78
2.5	Adjusted income tax	334.36	335.34	336.31	337.29	338.27	339.25	0.00	0.00	0.00	0.00	0.00
3	**Net cash flow without CERs income**	2571.19	2574.13	2577.06	2580.00	2582.94	2584.88	-404.52	-404.52	-404.52	-404.52	1280.68
4	**Net cash flow with CERs income**	3869.79	3872.73	3875.67	3878.60	3881.54	3883.48	894.08	894.08	894.08	894.08	2579.28
5	**IRR without CERs income**	**5.42%**										
6	**IRR with CERs income**	**12.84%**										

Table 3-22 Sensitivity analysis results

Fluctuation range	-10%	-5%	0%	5%	10%
Total static investment	7.08%	6.22%	5.42%	4.67%	3.97%
Tariff	0.34%	3.13%	5.42%	7.42%	9.22%
Grid-connected electricity	3.50%	4.48%	5.42%	6.32%	7.19%
Fuel cost	7.47%	6.48%	5.42%	4.26%	2.97%


Rate of Change
IRR without CERs income
10.00%
8.00%
6.00%
4.00%
2.00%
0.00%
-10%
-5%
0%
5%
10%
Total static investment
Tariff
Grid-connected electricity
Fuel cost

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Annex 4

MONITORING INFORMATION

No other information.

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