PROJECT DESIGN DOCUMENT FORM
FOR CDM PROJECT ACTIVITIES (F-CDM-PDD)
Version 04.1

PROJECT DESIGN DOCUMENT (PDD)

Title of the project activity	Biomass Power Generation Project by Everbright Alternative Energy (Dangshan) Limited
Version number of the PDD	02
Completion date of the PDD	23/09/2013
Project participant(s)	Everbright Alternative Energy (Dangshan) Limited Macquarie Bank Limited
Host Party(ies)	P.R.China
Sectoral scope and selected methodology(ies)	Scope 1: Energy industries (renewable - / non-renewable sources) ACM0018.ver 02.0.0 – "Consolidated methodology for electricity generation from biomass residues in power-only plants"
Estimated amount of annual average GHG emission reductions	162,647 tCO_2e

SECTION A. Description of project activity

A.1. Purpose and general description of project activity

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Biomass Power Generation Project by Everbright Alternative Energy (Dangshan) Limited (hereafter referred to as "the proposed project") developed by Everbright Alternative Energy (Dangshan) Limited (hereafter referred to "the project owner") is a biomass utilization project located in Dangshan County, Anhui Province, China. The project is to utilize branches and wood scrap to generate electricity and supply to East China Power Grid.

The implementation of the proposed project will utilize 356,850 tonnes of biomass residues (with dry basis of 210,185 tons) totally. The branches are from fruit trees, dominated by pear and the rest are apple and peach trees. The proportion of each category is: 30% of pear branches, 10% of apple branches,10% of peach branches and 50% of wood scrap respectively. Before the proposed project is implemented, branches and wood scrap were dumped and left to be decay or burnt in an uncontrolled manner; while the equivalent electricity was generated from the East China Power Grid . This is also the baseline scenario of the proposed project.

The proposed project involves installation of one 130t/h high pressure and high temperature biomass combustion boiler and one set of 30MW steam turbine and power generator. The total installed capacity of the proposed project is 30MW. It is estimated that the project can generate 234,000 MWh by consuming 356,850 tons of biomass residues. The estimated emission reductions are 162,647 tCO_2e per year by avoiding CO_2 emission from fossil fuel-fired power plants in the East China Power Grid and the CH_4 emission from natural decay or burning biomass residues in an uncontrolled manner.

The proposed project will produce social and environmental benefits and contribute to the sustainable development of the local area through the following aspects:

- Reduce GHG emissions compared to a business-as-usual scenario;
- Save coal and other fossil fuels used in the power sector, and correspondingly reduce SO_2 and NOx emissions;
- Reduce the wastage of biomass resources which are currently being dumped and burnt;
- Stimulate the biomass industry in China, including domestic manufacturing;
- Create local employments during the assembly and installation, and during the operation of the plant;

A.2. Location of project activity

A.2.1. Host Party(ies)

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People's Republic of China

A.2.2. Region/State/Province etc.

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Anhui Province

A.2.3. City/Town/Community etc.

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Dangshan County

A.2.4. Physical/Geographical location

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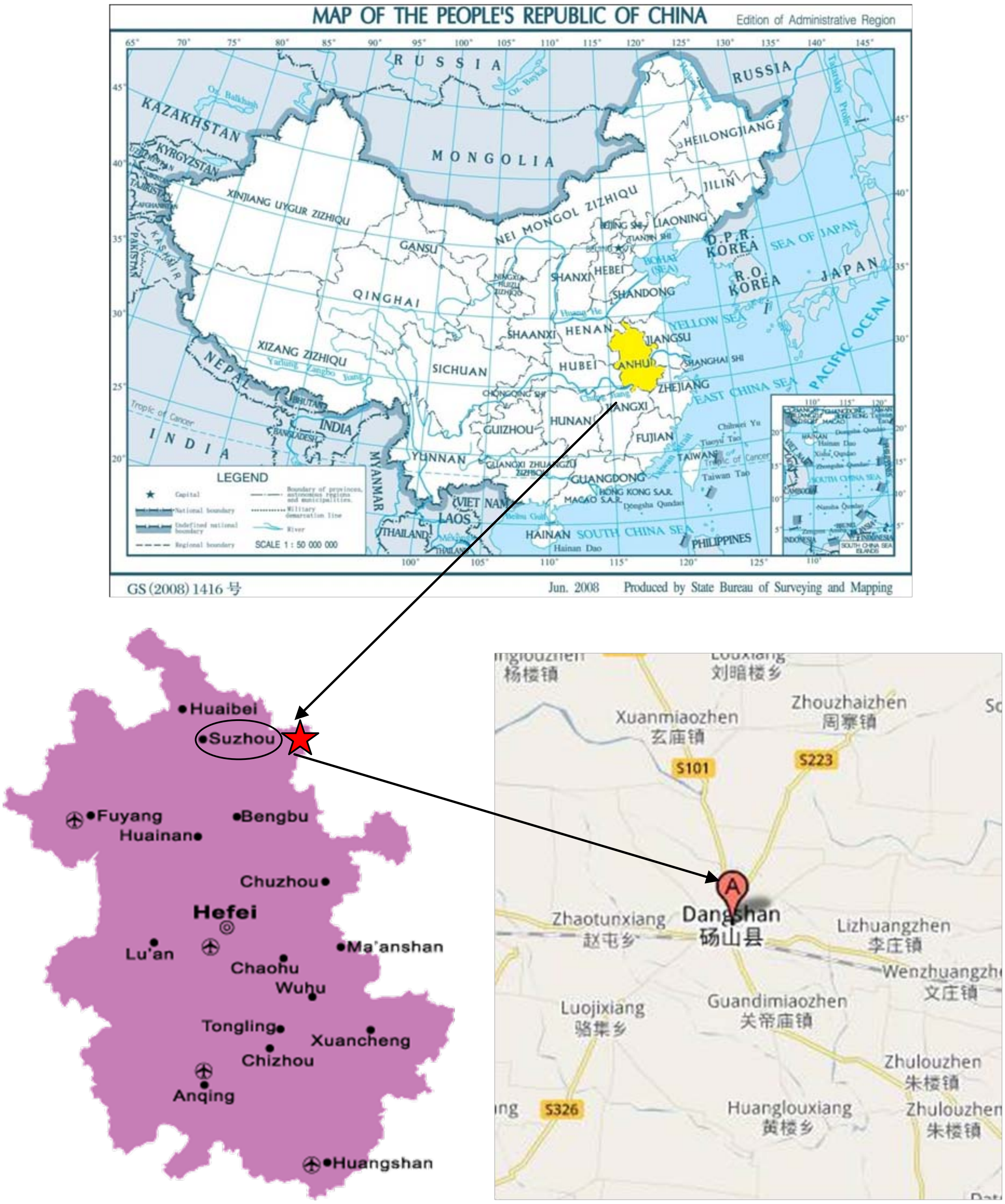
The proposed project is located in the north of the Anhui province. The geographical location of the project site is shown in Figure A.1. The geographical coordinates of the biomass power plant is latitude 34°24′56″N and longitude 116°24′56″E, which is got by mobile GPS apparatus.



FigA.1 The location of the Proposed Project

A.3. Technologies and/or measures

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The proposed project is to utilize 356,850 tons of branches and wood scrap for electricity generation. It would reduce emissions by replacing equivalent mainly fossil-fuel dominated grid connected electricity generation in the East China Power Grid (ECPG). Moreover, the project would reduce CH_4 emission as the biomass residues are currently dumped or left to decay under aerobic conditions or burned in an uncontrolled manner in the absence of the proposed project.

The technology employed by the proposed project is an advanced domestic technology. One biomass combustion boiler (capacity of 130t/h) with high temperature and high pressure, one 30MW steam turbine and generator will be applied in the proposed project. The total installed capacity of the proposed project is 30MW and the power generation is 234,000 MWh per year. The electricity supply is about 217,620 MWh and will be transmitted to Longhai 110kV substation, and then connected to Anhui Provincial Power Grid which is an integral part of ECPG. In addition, the emission of methane will be avoided since the proposed project will utilize branches and wood scrap which are currently dumped or left decay under mainly aerobic conditions and burned uncontrolled outside in the fields.

Key technical specifications of boiler, turbine and generator are listed as follows:

Table A.1 Key Characteristics of Major Technology Employed by project activity

Biomass Boiler		
Model	High temperature and high pressure vibrating stoker	
Manufacturer	Dragon Power CleanTech Company Limited [1]	
Steam flow rate	t/h	130
Steam pressure outlet	MPa	9.2
Steam temperature outlet	℃	540
Water temperature	℃	210
Designed boiler efficiency	%	89
Lifetime	years	20

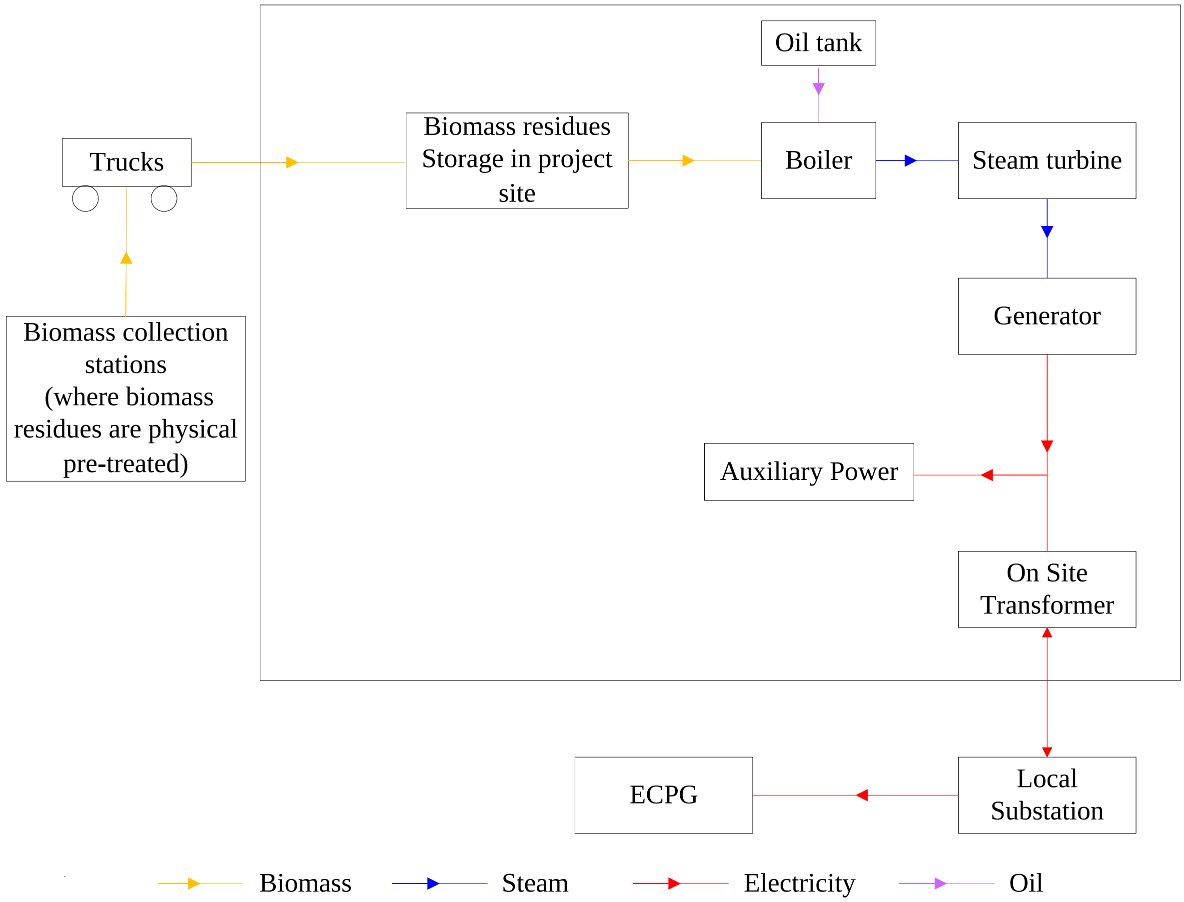
Condensing Steam Turbine			
Model		N30-8.83	
Manufacturer		Qingdao Jieneng Steam Turbine Group Co., Ltd	
Power		MW	30
Steam flow	Temperature	℃	535
	Pressure	MPa	8.83
	Quantity	t/h	114
RPM		r/min	3,000
Lifetime		years	20

Generator		
Model	QFW-30-2	
Manufacturer	Jinan Power Generation Equipment Plant	
Power	MW	30
Voltage	kV	10.5
Frequency	Hz	50
Lifetime	years	20

[1] The Dragon Power CleanTech Company Limited is the parent company of the Jinan Boiler Group Co., Ltd..

The biomass residues utilized in the proposed project will be branches and wood scrap. The radius for biomass residues collection is 50km around the site of the power plant. Firstly, the residues will be collected and put together in processing stations nearby. In the stations, the residues will be physically treated, such as shredded. After temporary storage, the treated residues will be transported to project site according to dispatch scheme. After transported to the plant, the biomass residues will be weighted by platform balance and stored in the biomass stockyard afterwards. The biomass residues will be fed into fuel entering system of the boiler according to the dispatch and all of the steam generated will be used for power generation. At the same time, the soot and smog will be captured by the hop-pocket dust catcher, and then carried into ash storeroom.

The detailed process flow diagram of the proposed project is shown below:



FigA.2 The Flow-Process Diagram of the Project

Please refer to B.7.3 for details about the monitoring equipments and their location in the system.

All the equipments adopted by the proposed project are manufactured domestically in China, and no technology transfer is involved.

A.4. Parties and project participants

Party involved (host) indicates a host Party	**Private and/or public entity(ies) project participants (as applicable)**	**Indicate if the Party involved wishes to be considered as project participant (Yes/No)**
P.R.China (host)	Everbright Alternative Energy (Dangshan) Limited (Project owner)	No
United Kingdom of Great Britain and Northern Ireland	Macquarie Bank Limited	No

A.5. Public funding of project activity

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No public funding from Annex I countries is involved in the project activity.

SECTION B. Application of selected approved baseline and monitoring methodology

B.1. Reference of methodology

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ACM0018.ver 02.0.0 – “Consolidated methodology for electricity generation from biomass residues in power-only plants”.

According to ACM0018, the following methodology tools are also referred to by the Project:

“Tool to calculate the emission factor for an electricity system”(version03.0.0);

“Emissions from solid waste disposal sites”(version06.0.1);

“Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion” (version02);

“Tool to calculate baseline, project and/or leakage emissions from electricity consumption” (version01);

“Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period” (version03.0.1);

“Project and leakage emissions from transportation of freight” (version 01.1.0).

For more information about the methodology and tools, please refer to:

http://cdm.unfccc.int/methodologies/DB/3X5L4HPLWP1Y18LYZZM57A1IQ01VCC

B.2. Applicability of methodology

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According to the *Feasibility Study Report* of the project, the project meets all applicability conditions of the consolidated methodology ACM0018 as follows:

No.	Applicability	Explanation
1	This methodology is applicable to project activities that generate electricity in biomass residue (co-)fired power-only plants.	The project generates electricity in power-only plant fired with branches and wood scrap.
2	The project activity may include the following activities or, where applicable, combinations of these activities: • The installation of new biomass residues (co-)fired power-only plants at a site where currently no power generation occurs (**greenfield power projects**); • The installation of new biomass residues (co-)fired	The project involves the installation of a new power-only plant by firing branches and wood scrap, where currently no power generation occurs (greenfield power project)

	power-only plants, which replace or are operated next to existing power-only plants fired with fossil fuels and/or biomass residues (**power capacity expansion projects**); • The improvement of energy efficiency of existing biomass residues (co-)fired power-only plants (energy **efficiency improvement projects**), which can also lead to a capacity expansion, e.g. by retrofitting the existing plant; • The total or partial replacement of fossil fuels by biomass residues in an existing power-only plant or in a new power-only plant that would have been built in the absence of the project (**fuel switch projects**), e.g. by increasing the share of biomass residues use as compared to the baseline, by retrofitting an existing plant to use biomass residues, etc.	
3	The biomass residues used in the project activity may be produced on-site (e.g. if the project activity is based on the operation of a power plant located in an (agro-) industrial plant generating the biomass residues), or they can be obtained off-site from the nearby area, specific suppliers or purchased from a market.	The branches and wood scrap used in the project activity is obtained off-site from nearby area, which are left for decay or dumped or burned in an uncontrolled manner in the absence of the proposed project. Under the project activity, the biomass residues will be collected and pre-treated in the processing stations nearby and then sell to the project owner.
4	No other biomass types than biomass residues, as defined above, are used in the project plant.	The project uses branches and wood scrap as the fuels, no other biomass types than biomass residues are used in the project plant.
5	Fossil fuels may be co-fired in the project plant. However, the amount of fossil fuels co-fired shall not exceed 50% of the total fuel fired on an energy basis.	Co-firing is not applied by the boiler (vibrating stoker). Only a small amount of diesel oil will be used in the start-up combustion of boilers which would not exceed 50% of the total fuel fired.
6	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.	For the proposed project, only the wood scrap is generated by the production of wood panel boards. The other biomass residues are not from production process. The current capacity of wood panel production process can generate abundant wood scrap that can fully satisfy the need of the proposed project. Besides, the price for the logs is much higher than the that wood scrap,[2] so the processing capacity of raw input will not be influenced by the need of wood scrap. Therefore, the implementation of the

[2] [2] http://www.wood168.net/b2b/gcym.asp

		project will not result in an increase of the processing capacity of raw input (e.g. sugar, rice, logs, etc.). In addition, the whole process and products of the wood panel producing line is sole and mature, no other substantial changes (e.g. product change) would happen in this process.
7	The biomass residues used by the project facility should not be stored for more than one year.	The storage time of the biomass residues will be supervised by the project owner, in order to ensure that the biomass residues will not be stored for more than one year.
8	Projects that chemically process the biomass residues prior to combustion (e.g. by means of esterification, fermentation and gasification) are not eligible under this methodology. The biomass residues can however be processed physically such as by means of drying, pelletization, shredding and briquetting.	The project will simple process the biomass residues physically (mainly processed with shredding), and no chemical process involved.
9	No power and heat plant operates at the project site during the crediting period.	The project will be the only one power-only plant operated at the project site during the crediting period.
10	If any heat which is used for purposes other than power generation (e.g. heat which is produced in boilers or extracted from the header to feed thermal loads in the process) is generated during the crediting period or was generated prior to the implementation of the project activity, by any on-site or off-site heat generation equipment connected to the project site, the following conditions should apply: (a) The implementation of the project activity does not influence directly or indirectly the operation of the heat generation equipment, i.e. the heat generation equipment would operate in the same manner in the absence of the project activity; (b) The heat generation equipment does not influence directly or indirectly the operation of the project plant (e.g. no fuels are diverted from the heat generation equipment to the project plant); and (c) The amount of fuel used in the heat generation equipment can be monitored and clearly differentiated from any fuel used in the project activity.	There is no heat used for any purpose other than power generation during the crediting period or was generated prior to the implementation of the project activity, by any on-site or off-site heat generation equipment connected to the project site.
11	In the case of fuel switch project activities, the use of biomass residues or the increase in the use of biomass residues as compared to the baseline scenario is technically not possible at the project site without a capital investment in: • The retrofit or replacement of existing heat generators/boilers; or • The installation of new heat generators/boilers; or • A new dedicated biomass residues supply chain	The project is not a fuel switch project.

	established for the purpose of the project (e.g. collecting and cleaning contaminated new sources of biomass residues that could otherwise not be used for energy purposes); • Equipment for preparation and feeding of biomass residues.	
12	Finally, the methodology is only applicable if the most plausible baseline scenario, as identified per the "Procedure for the selection of the baseline scenario and demonstration of additionality" section hereunder, is: • For power generation: Scenarios P2 to P7, or a combination of any of those scenarios; • For biomass use: Scenarios B1 to B8, or a combination of any of those scenarios. However, note that for scenarios B5 to B8, leakage emissions should be accounted for as per the procedures of the methodology.	The most plausible baseline scenario is: •For power generation: Scenario P5; •For biomass use: Scenario B1&B3.

In conclusion, the project satisfies the applicability conditions of the consolidated methodology ACM0018.

B.3. Project boundary

The project is a biomass residues fired power-only plant project, and the biomass residues used would be dumped or left to decay under aerobic conditions or burnt in uncontrolled manner in the baseline scenario (cases B1& B3) (please refer to B.4 for detailed analysis). According to the consolidated methodology ACM0018, the following emission sources should be considered:

The spatial extent of the project boundary encompasses:

- The project activity power-only plant(s);
- All other on-site power-only plants, whether fired with biomass residues, fossil fuels or a combination of both;
- All power plants connected physically to the electricity system (grid) that the project plant is connected to;
- If applicable, the means of transportation of biomass residues to the project site;
- If applicable, the site where the biomass residue would have been left for decay or dumped;
- If the biomass residues involve any type of processing prior to combustion such as drying, pelletization, shredding, briquetting, etc., two options can be considered. The biomass residues processing plant can be included in the project boundary and the primary source of the biomass residues is assessed according to the procedures described in the following section. Or else, the biomass residues processing plant is not included in the project boundary and then the processed biomass obtained from that plant should be considered as alternative B8 in the following section;
- If applicable, the wastewater treatment facilities used to treat the wastewater produced from the treatment of biomass residues.

For the proposed project, the project boundary encompasses:

- The project site of Everbright Alternative Energy (Dangshan) Limited;
- All power plants connected physically to the ECPG that the project plant is connected to, which covers Shanghai, Jiangsu Province, Zhejiang Province, Anhui Province and Fujian province according to published information by the China DNA;
- The means of transportation of biomass residues to the project site, referring to the vehicles including trucks or other vehicles transporting the biomass residues to the processing stations and project site;

- The nearby 50 km area where the branches and wood scrap would have been left for decay or dumped or burnt in an uncontrolled manner;
- The biomass residues processing stations. For the proposed project, it mainly refers to the processing stations where shredding the biomass residues mainly.

For the purpose of determining baseline emissions, project participants include the following emission sources:
• For each power plant that has been operated at the project site during the most recent three years prior to the start of the project activity: the type and capacity of the power plant, the types and quantities of fuels which have been used in the power plant during the most recent three years prior to the start of the project activity, and whether the plant continues operation after the start of the project activity;
• For each boiler or other heat generation equipment that has been operated at the project site during the most recent three years prior to the start of the project activity: the type and capacity of the equipment, the types and quantities of fuels which have been used in the equipment during the most recent three years prior to the start of the project activity, and whether the equipment continues operation after the start of the project activity;
• For each power plant installed under the project activity: the type and capacity of the power plant, and the types and quantities of fuels which are planned to be used;
• For each power plant that would be installed in the absence of the project activity: the type and capacity of the power plant and the types and quantities of fuels which would be used.

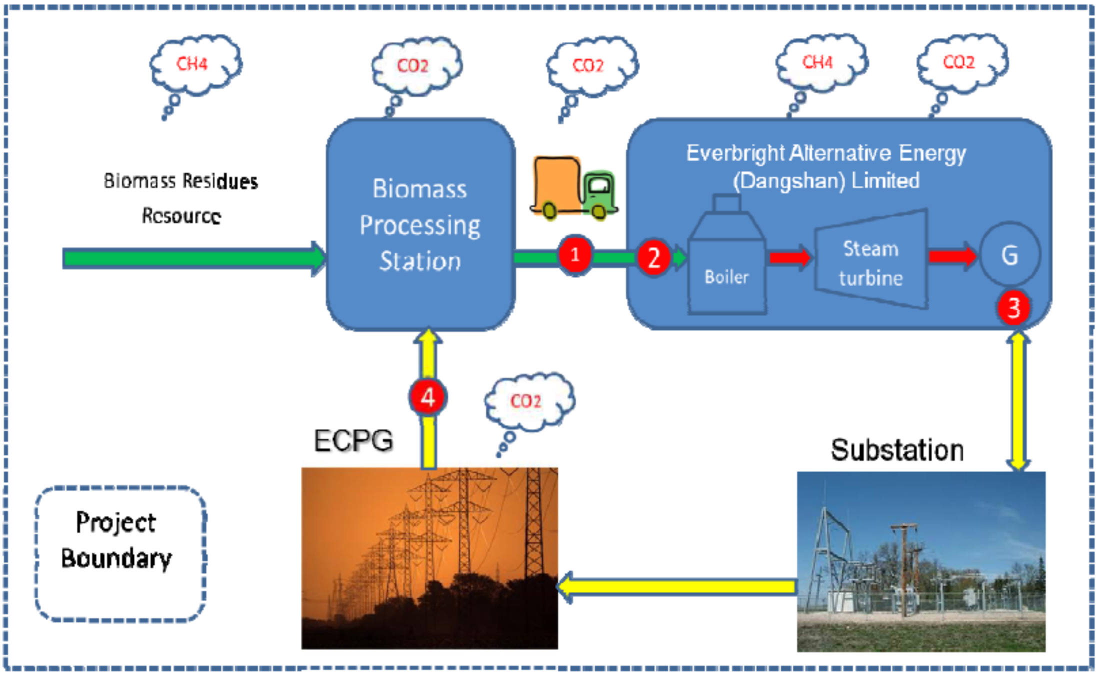
As the project is a greenfield power project, the following emission sources include the 30MW power plant and branches and wood scrap used for the project.
Table B.1 illustrates which emissions sources are included and which are excluded from the project boundary for determination of both baseline and project emissions.

Table B.1. Overview on emissions sources included in or excluded from the project boundary

	Source	GHGs	Included?	Justification/Explanation
Baseline scenario	Electricity generation	CO_2	Yes	Main emission source
		CH_4	No	Excluded for simplification. This is conservative.
		N_2O	No	Excluded for simplification. This is conservative.
	Uncontrolled burning or decay of surplus biomass residues	CO_2	No	It is assumed that CO_2 emissions from surplus biomass residues do not lead to changes of carbon pools in the LULUCF sector.
		CH_4	Yes	Project participants decide to include this emission source, as B1&B3 has been identified as the most likely baseline scenario.
		N_2O	No	Excluded for simplification. This is conservative. Note also that emissions from natural decay of biomass are not included in GHG inventories as anthropogenic sources.
Project scenario	On-site fossil fuel consumption	CO_2	Yes	May be an important emission source
		CH_4	No	Excluded for simplification. This emission source is assumed to be very small
		N_2O	No	Excluded for simplification. This emission source is assumed to be very small
	On-site and off-site	CO_2	Yes	May be an important emission source
		CH_4	No	Excluded for simplification. This emission

	transportation and processing of biomass residues			source is assumed to be very small
		N_2O	No	Excluded for simplification. This emission source is assumed to be very small
	Combustion of biomass residues for electricity	CO_2	No	It is assumed that CO_2 emissions from surplus biomass do not lead to changes of carbon pools in the LULUCF sector
		CH_4	Yes	This emission source included as the CH_4 emissions from uncontrolled burning or decay of biomass residues in the baseline scenario are included
		N_2O	No	Excluded for simplification. This emission source is assumed to be small
	Storage of biomass residues	CO_2	No	It is assumed that CO_2 emissions from surplus biomass residues do not lead to changes of carbon pools in the LULUCF sector
		CH_4	No	Excluded for simplification. Since biomass residues are stored for not longer than one year, this emission source is assumed to be small
		N_2O	No	Excluded for simplification. This emissions source is assumed to be very small
	Wastewater from the treatment of biomass residues	CO_2	No	It is assumed that CO_2 emissions from surplus biomass residues do not lead to changes of carbon pools in the LULUCF sector
		CH_4	No	There is no waste water is treated under anaerobic conditions of the proposed project
		N_2O	No	Excluded for simplification. This emission source is assumed to be small

The project boundary picture is shown in Figure B.1 below:



Biomass residues		1	Monitoring transportation distance, biomass transportation amount
Steam		2	Monitoring the NCV and moisture of biomass residues, on-site electricity and fossil fuel use
Electricity		3	Monitoring electricity generation and off-grid electricity
		4	Monitoring off-site electricity use for processing the biomass residues

Fig B.1 Project boundary

B.4. Establishment and description of baseline scenario
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The consolidated methodology ACM0018 is employed to identify the baseline scenario.

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

For the purpose of identifying relevant alternative scenarios, an overview of other technologies or practices that provide outputs or services with comparable quality, properties and application areas as the proposed CDM project activity and that have been implemented previously or are currently underway in the relevant geographical area should be provided. According to the methodology ACM0018, the relevant geographical area is defined as the Anhui Province.

In doing so, alternative scenarios are separately determined regarding:
• How electric power would be generated in the absence of the CDM project activity; and
• What would happen to the biomass residues in the absence of the project activity.

Results of the analysis and corresponding justification are shown in Table B.2 and Table B.5.

Table B.2. Analysis and result on realistic and credible alternatives for power generation of the project

Alternatives provided by consolidated methodology ACM0018			Realistic and credible?	Justification/explanation
Power generation	P1	The proposed project activity not undertaken as a CDM project activity.	Yes	The project activity
	P2	If applicable, the continuation of power generation in existing power-only plants fired with biomass residues, or fossil fuels, or a combination of both, at the project site. The existing power-only plants would operate at the same conditions (e.g. installed capacities, average load factors, or average energy efficiencies, fuel mixes, and equipment configuration) as those observed in the most recent three years prior to the project activity;	No	No existing power-only plants fired with biomass residues, or fossil fuels, or a combination of both exists at the project site.
	P3	If applicable, the continuation of power generation in existing power-only plants fired with biomass residues, or fossil fuels, or a combination of both, at the project site. The existing power-only plants would operate with different conditions from those observed in the most recent three years prior to the project activity;	No	No existing power-only plants fired with biomass residues, or fossil fuels, or a combination of both exists at the project site.
	P4	If applicable, the retrofitting of existing power-only plants fired with biomass residues, or fossil fuels, or a combination of both, at the project site. The retrofitting may or may not include a change in fuel mix;	No	The proposed project is a green field biomass residue power-only plant. No retrofit of the existing power plant fired with biomass residues at the project site.
	P5	The generation of power in the grid;	Yes	In the absence of the project, equivalent electricity would be supplied by power plants from East China Power Grid. Thus P5 is a possible alternative.
	P6	The installation of new power-only plants fired with biomass residues, or fossil fuels, or a combination of both, at the project site, using the same amount or less biomass residues than under scenario P1;	No	To “using same or less biomass residues”, three scenarios may happen: (1)Power-only plants fired with fossil fuels. However, according to China’s regulations, construction of fuel-fired power

				plants with the installed capacity equal to or lower than 135 MW is prohibited[3]. As the project is a grid-connected power generation project, where fossil fuels fired power plants of 30 MW or below is not possible. (2)Power-only plants co-fired with combination of fossil fuels and biomass residues, using the same or less amount of biomass residues. Co-firing is not applied by the boiler (vibrating stoker), therefore the project developer will not co-fire with fossil fuel. ⑶Power-only plants operated fired with biomass, using less biomass residues. In order to make same output of the proposed project, power-only plants using less biomass residue means operating a biomass power-only plants with higher efficiency technology. The efficiency of boiler that applied in the project is 89%, which is at advanced level already. The other biomass projects will not cause significant biomass use reduction.
	P7	The installation of new power-only plants fired with biomass residues, or fossil fuels, or a combination of both, at the project site, using more biomass residues than under scenario P1.	No	At present, the technology of biomass power plant is just starting to be applied in China, even if the biomass power plants with lower efficiency of electricity generation are not common practice in China. Furthermore, the installation of a new biomass residue fired power plant with a lower efficiency of electricity generation will face worse financial situation and need to seek for CDM support as well.

Outcome of Table B.2: for **power generation**, the realistic and credible alternatives include Alternative P1 and Alternative P5;

The project will use the branches and wood scrap as the fuel. According to methodology ACM0018, the analysis of the quantities of which biomass residues categories are used in the project activity is taken, which has been shown in Table B.3:

Table B.3: Biomass residues categories

[3] Notice on strictly prohibiting the installation of fuel-fired generators with the capacity of 135MW or below, issued by State Council, 2002

Biomass residues category (k)	Biomass residues type	Biomass residues source	Biomass residues fate in the absence of the project activity	Biomass residues use in project scenario	Biomass residues quantity (tonnes)
1	Branches	Off-site from the nearby area	Dumped or burnt in an uncontrolled manner(B1&B3)	Electricity generation on-site (biomass-only boiler)	178,425 Where: Peach: 35,685 Apple: 35,685 Pear: 107,055 Dry basis: 106,698 Where: Peach: 21,054 Apple: 21,411 Pear: 64,233
2	Wood scrap	Off-site from the nearby area	Dumped or burnt in an uncontrolled manner(B1&B3)	Electricity generation on-site (biomass-only boiler)	178,425 Dry basis: 103,487

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

The scenarios B1, B2, B3 can only be regarded as a plausible baseline scenario for a certain category of biomass residues, if the project participants can demonstrate that at least one of the two approaches are fulfilled.The approach (a) will be applied and demonstrated as below.

According to the Feasibility Study Report of the project, the project biomass consumption and annual available amount is illustrated as Table B.4. Calculated with this data, the quantity of available biomass residues in the region is larger than the quantity of biomass residues that are utilized, which satisfy the 25% floor level required by the consolidated methodology ACM0018[4]. Then the scenarios B1:, B2: or B3: could be a plausible baseline alternative for biomass residues categories.

Table B.4 The quantity of available biomass residues and usage amount

	Pear Branches	Peach Branches	Apple Branches	Wood scrap residues

[4] According to consolidated methodology ACM0018, project participants should demonstrate that there is an abundant surplus of the biomass residue in the region of the project activity which is not utilized. For this purpose, demonstrate that the quantity of available biomass residue of type *k* in the region is at least 25% larger than the quantity of biomass residues of type *k* that are utilized (e.g. for energy generation or as feedstock), including the project plant.

Available Biomass residues (tonnes)	482,366	225,135	162,267	333,000
Other Use (family cooking) (tonnes)	24,118	11,257	8,113	16,650
Project Use (tonnes)	107,055	35,685	35,685	178,425
Total biomass utilized (tonnes)	131,173	46,942	43,798	195,075
Available Biomass/Total biomass utilized-100%	268%	380%	270%	71%

According to the analysis of Table B.4, the realistic and credible alternatives for biomass residues use of the project will be shown in Table B.5

Table B.5. Analysis and result on realistic and credible alternatives for biomass residues use of the Project

Alternatives provided by consolidated methodology ACM0018			**Realistic and credible?**	**Justification/explanation**
Use of Biomass residue	B1	The biomass residues are dumped or left to decay mainly under aerobic conditions. This applies, for example, to dumping and decay of biomass residues on fields;	Yes	A common practice for disposing of biomass residues within the project area. Please refer to the Feasibility Study Report of the project.
	B2	The biomass residues are dumped or left to decay under clearly anaerobic conditions. This applies, for example, to landfills which are deeper than 5 meters. This does not apply to biomass residues that are stock-piled4 or left to decay on fields;	No	Before the project activity, the biomass residues are primarily dumped or left to decay or burnt in an uncontrolled manner at the project site[5,],thus the disposal of biomass residues under anaerobic conditions does not apply.
	B3	The biomass residues are burnt in an uncontrolled manner without utilizing it for energy purposes;	Yes	A common practice for disposing of biomass residues within the project area. Please refer to the Feasibility Study Report of the project.
	B4	The biomass residues are used for electricity generation in power-only plant configuration at the project site in new and/or existing power plants;	Yes	The proposed project activity not undertaken as a CDM project activity.
	B5	The biomass residues are used for power and/or heat generation in other existing or new power plants at other sites;	No	There is no existing power and/or heat generation plant fired with biomass residues in the biomass collection area defined by the proposed project. For the existing projects located out of the collection area, the biomass residues would not be used neither due to the expensive transportation fee. Besides, the

[5] Feasibility Study Report

				project site is the most reasonable site compared with other site in local area which was programmed by the local government, so no other new plants fired with biomass residues will be set up within this area[6]. So alternative B5 can't be considered as a feasible scenario.
	B6	The biomass residues are used for other energy purposes, such as the generation of biofuels;	No	These two types of biomass residues are not energy or oil crop, and no mature technology is practical in China to generate biodiesel or any other energy purpose from biomass residues. This alternative is technical unrealistic. Thus, B6 is excluded.
	B7	The biomass residues are used for non-energy purposes, e.g. as fertilizer or as feedstock in processes (e.g. in the pulp and paper industry);	No	Before the project implemented, no biomass residues are used for non-energy purpose.
	B8	The primary source of the biomass residues and/or their fate in the absence of the project activity cannot be clearly identified.	No	The biomass residues are primarily dumped or left to decay or burnt in an uncontrolled manner at the project site in the absence of the project, which could be clearly identified. Thus B8 has been excluded.

Outcome of Step 1a: based on Table B.2 and Table B.5, it is identified that for **power generation**, the realistic and credible alternatives include Alternative P1 and Alternative P5; for the use of **biomass residues**, the realistic and credible alternatives include Alternative B1, Alternative B3 and Alternative B4.

Sub-Step 1b. Consistency with mandatory applicable laws and regulations:
The objective of this step is to determine whether the alternatives listed in outcome of step 1a are in compliance with all mandatory applicable legal and regulatory requirements.

Table B.6 Determine whether the alternatives comply with mandatory laws and regulations

	Alternatives		**Whether plausible**	**Explanation**
Power generation	P1	The proposed project activity not undertaken as a CDM project activity	Yes	In compliance with all Chinese mandatory applicable laws and regulations.
	P5	The generation of power in the grid;	Yes	In compliance with all Chinese mandatory applicable laws and

[6] The commitment letter issued by Dangshan government.

				regulations.
The use of biomass residues	B1	The biomass residues are dumped or left to decay mainly under aerobic conditions. This applies, for example, to dumping and decay of biomass residues on fields;	Yes	In compliance with all Chinese mandatory applicable laws and regulations.
	B3	The biomass residues are burnt in an uncontrolled manner without utilizing it for energy purposes;	Yes	In compliance with all Chinese mandatory applicable laws and regulations.
	B4	The biomass residues are used for electricity generation in power-only plant configuration at the project site in new and/or existing power plants;	Yes	In compliance with all Chinese mandatory applicable laws and regulations.

Outcome of step 1b: based on Table B.2-B.6, it is identified that for **power generation**, the realistic and credible alternatives include Alternative P1 and Alternative P5; for the use of **biomass residues**, the realistic and credible alternative includes Alternative B1&Alternative B3 and Alternative B4.

Step 2. Barrier Analysis

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

Sub-step 2a: Identify barriers that would prevent the implementation of alternative scenarios
Establish a complete list of realistic and credible barriers that may prevent alternative scenarios to occur. Such realistic and credible barriers may include:

· Investment barriers, other than insufficient financial returns as analyzed in Step 3, *inter alia*:
o For alternatives undertaken and operated by private entities: Similar activities have only been implemented with grants or other non-commercial finance terms. Similar activities are defined as activities that rely on a broadly similar technology or practices, are of a similar scale, take place in a comparable environment with respect to regulatory framework and are undertaken in the relevant geographical area, as defined in Sub-step 1a above;
o No private capital is available from domestic or international capital markets due to real or perceived risks associated with investments in the country where the project activity is to be implemented, as demonstrated by the credit rating of the country or other country investment reports of reputed origin.
· Technological barriers, *inter alia*:

o Skilled and/or properly trained labor to operate and maintain the technology is not available in the relevant geographical area, which leads to an unacceptably high risk of equipment disrepair, malfunctioning or other underperformance;
o Lack of infrastructure for implementation and logistics for maintenance of the technology (e.g. natural gas cannot be used because of the lack of a gas transmission and distribution network);
o Risk of technological failure: the process/technology failure risk in the local circumstances is significantly greater than for other technologies that provide services or outputs comparable to those of the proposed CDM project activity, as demonstrated by relevant scientific literature or technology manufacturer information;
o The particular technology used in the proposed project activity is not available in the relevant geographical area.
· Lack of prevailing practice:
o The alternative is the .first of its kind..
· Other barriers, preferably specified in the underlying methodology as examples.

There are no barriers identified that would prevent the implementation of either of alternatives scenarios above.

Outcome of Step 2a: There is no barrier that may prevent one or more alternative scenarios to occur.

Sub-step 2b: Eliminate alternative scenarios which are prevented by the identified barriers
Based on the outcome of Step 2a, neither of the two combined scenarios is eliminated.

Outcome of Step 2b: List of alternative scenarios to the project activity that are not prevented by any barrier.

Table B.7 List of Outcome of Step 2b

	Power generation	**Use of biomass residues**
The project activity	The proposed project activity not undertaken as a CDM project activity (P1)	The biomass residues are used for electricity generation in power-only plant configuration at the project site in new and/or existing power plants (B4)
Alternative scenario	The generation of power in the grid; (P5)	The biomass residues are dumped or left to decay (B1) & The biomass residues are burnt in an uncontrolled manner(B3)

Therefore, there are still several alternative scenarios remaining, including the proposed project activity undertaken without being registered as a CDM project activity. Therefore, according to ACM0018, it proceeds to Step 3 (investment analysis).

Step 3. Investment Analysis

After Step 2, there are two combinations of alternative scenarios remaining. As per the methodology ACM0018, "If one of the alternative scenarios remaining after Step 2 corresponds to the situation where the project participants do not undertake any investment, then use either the NPV or the IRR as financial indicator in the analysis.If the financial indicator is the NPV: assume a value of NPV equal to zero." Therefore, as the alternative scenario identified in Table B.7 does not cause any investment by the project participants, the NPV is chosen as the financial indicator in this analysis and the alternative scenario is assumed a value of NPV equal to zero.

For the project activity identified in Table B.7, as per the FSR, the NPV is calculated to be -213.15 million RMB. The basic parameters and assumptions for the calculation of NPV are summarized in Table B.8. In accordance with the NPV analysis, if the NPV of a case is lower than zero, the case is considered not financially attractive. Therefore, only baseline scenario is feasible and remaining in this step.

Table B.8. Basic parameters for calculation of financial indicators of the project

Name of parameter	Unit	value	Source of data
Installed capacity	MW	30	FSR
Quantity of electricity supply	MWh	217,620	Project Supplementary Feasibility Study Report/ Actual Operational Data in 2011/2012/2013
Annual consumption of biomass residuess	ton	356,850	Project Supplementary Feasibility Study Report/ Actual Operational Data in 2011/2012/2013
Construction period	Year	2	FSR
Operation period	Year	20	FSR
Construction investment	Million Yuan	264.703	FSR
Tariff (including VAT)	Yuan/kWh	0.619	FSR
Price of biomass	Yuan/ton	250	FSR
O&M cost	Million Yuan	104.94	FSR/NPV sheet
Where:			
Raw material cost	Million Yuan	2.35	FSR/NPV sheet
Fuel Cost (Biomass Residues)	Million Yuan	89.21	FSR/NPV sheet
Pay & Welfare	Million Yuan	4.0817	FSR/NPV sheet
Repare Fee	Million Yuan	6.2957	FSR/NPV sheet
Other	Million Yuan	3	FSR/NPV sheet
Depreciation year	Year	20	FSR
Residue Rate	%	5	FSR
VAT rate for electricity	%	17	FSR
Income tax rate	%	25	FSR
City maintenance and construction tax rate(of VAT)	%	5	FSR
Education surplus tax rate (of VAT)	%	3	FSR
Discount rate	%	8	FSR

Adding revenues from CERs sales with 21 years crediting period, the NPV can increase to -99.51 million RMB. This shows CERs revenues can significantly improve the financial indicators, making the project financially more attractive, comparing to the other alternative.

Table B.9. Financial indicators of the Proposed Project

	NPV (million RMB)
Without CDM revenue	-213.15

With CDM revenue	-99.51

The objective of sensitivity analysis is to show whether the conclusion regarding the financial attractiveness is robust given reasonable variations in the critical assumptions. The investment analysis provides a valid argument in favour of additionality only if it consistently supports (for a realistic range of assumptions) the conclusion that the project activity is unlikely to be the most financially attractive or is unlikely to be financially attractive.

In accordance with the Feasibility Study Report, the following five financial parameters were taken as uncertain factors for sensitive analysis of financial attractiveness:

- Construction investment
- Annual O&M cost
- Operational hours
- Tariff
- Price of biomass residues

The impacts of the above parameters on the project NPV were analyzed. The results of sensitivity analysis of the five indicators are shown in Table B.10 and Figure B.2.

Table B.10 Sensitivity of Project NPV to different financial parameters

Unit: Million RMB

range / Parameter	-10.00%	-5.00%	0	5.00%	10.00%
Construction investment	-189.38	-201.26	-213.15	-225.03	-236.92
Annual O&M cost	-127.22	-169.22	-213.15	-257.31	-301.48
Tariff	-303.79	-258.47	-213.15	-168.18	-125.46
Operational Hours	-303.79	-258.47	-213.15	-168.18	-125.46
Price of biomass residues	-140.46	-176.08	-213.15	-250.30	-287.46

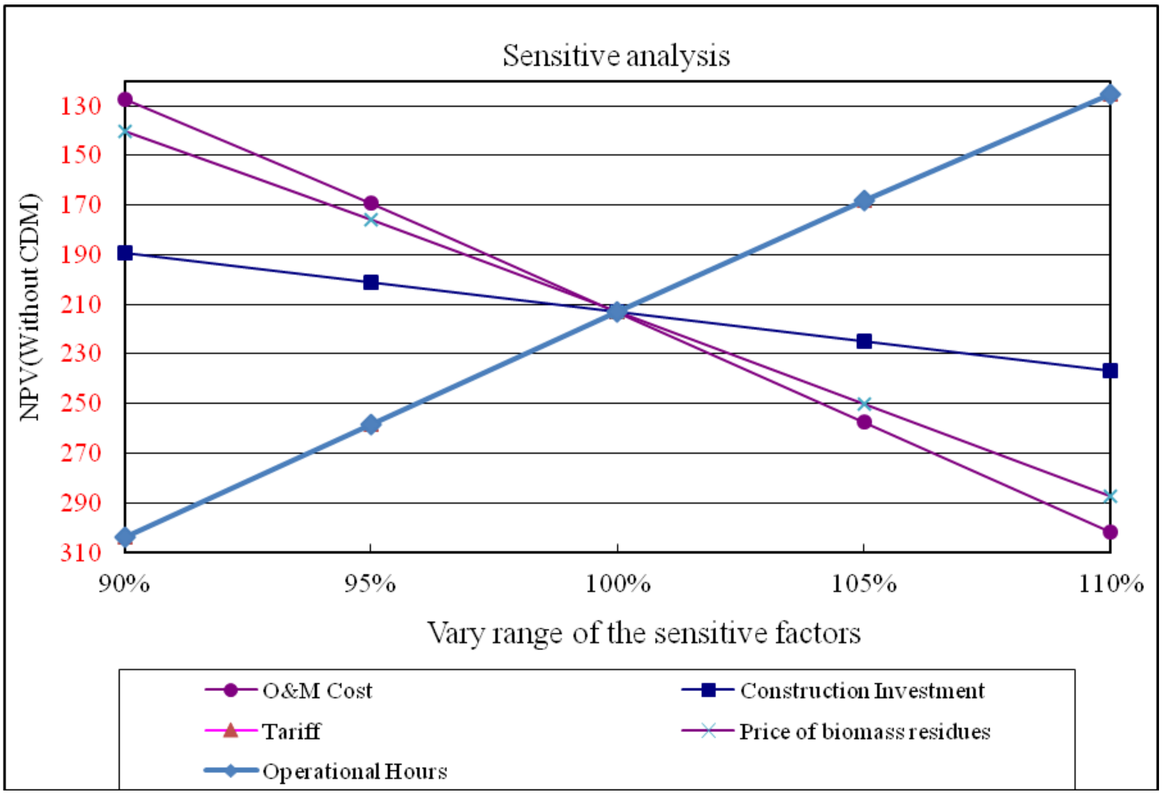

Fig B.2. Sensitivity analysis of financial indicators of the project

As is shown in Table B.10 and Figure B.2, even if the variation range of the uncertain factors reaches ±10%, the NPV could not reach zero and the additionality of the project would not be influenced.

a) Construction Investment

The NPV would not exceed zero even when the construction investment decreases by 90%. According to the statistics released by 2009 National Bureau of Statistics of China, in recent three years (2006～2008), the national total price index of investment in fixed assets are 101.5, 103.9, 108.9 respectively[7]. This indicator can inflect the trend of price fluctuation on investment items accurately. Therefore, it is obvious that the price for investment is going up and would be impossible to decrease.

b) Annual O&M cost

The NPV would exceed zero when the O&M cost decreases by 28%. Considering about the composition of the O&M cost, the analysis focuses mainly on following items:

- Raw material and fuel expenses. Based on statistics released by 2009 National Bureau of Statistics of China, the index of expenses for raw material and fuel expenses is increasing in recent three years (106.0, 104.4 and 110.5) and therefore will not cause significant decrease. Especially for the fuel, which refers to biomass residues for the project, is analyzed in details in following text (biomass price).
- Wages and welfare. Based on statistics released by 2009 National Bureau of Statistics of China, the wages keep increasing in recent three years (28765, 33809 and 39204). Therefore, there will not be decrease by 28% happened on wages and welfare.

Therefore, as what are stated above, the annual O&M cost is not likely to decrease.

[7] China Statistic Year Book, http://www.stats.gov.cn/tjsj/ndsj/2008/indexch.htm; http://www.stats.gov.cn/tjsj/ndsj/2009/indexch.htm

c) Tariff
The NPV would exceed zero when the tariff increases by 28% to 0.792 RMB/KWh. The tariff used in NPV calculation is derived from FSR, which is based on *Tentative Measures for the Administration of Renewable Energy Power Price and Cost-sharing (fagaijiage [2006] 7)*. It states that the guide tariff constituted by the tariff of coal fired power plants in the province and the tariff subsidy of 0.25 Yuan/kWh. The tariff subsidy will be implemented by the power generation project in the first 15 operational years and then will be abolished. From year 2010, the subsidy for the newly approved biomass power projects in any given year will be reduced by 2% compared to the subsidy for the projects approved in the previous year. Therefore, there is very likely a decreasing trend on subsidy in the coming years for the biomass power projects in China and the tariff is impossible to reach 0.792 RMB/KWh.

d) Operational hours
The NPV would exceed zero when the operational hours increases by 28% to 9,980 hours, which is more than total hours per year (8760 hours). Therefore, no matter how the operational hours changes, the NPV will not exceed zero.

e) Price of biomass residues
The NPV would exceed zero when the price of biomass residues decreases by 34%. According to the *Biomass residues Purchase Agreements* signed with suppliers, the average price of biomass residues is about 260-280 RMB/ton (without VAT). It is a bit higher than the assumed price in the FSR (250RMB/ton without VAT). Meanwhile, considering the factor of increasing tread of CPI in the long term, the price is expected to increase rather than decrease. Hence, it is impossible to assume that the price of biomass residues will decrease by 34%.

Based on the Investment Analysis, the alternative that the proposed project activity not undertaken as a CDM project activity is not financially attractive to the project owner and is thus not baseline scenario. Only one alternative scenario is left.

Outcome of Step 3 is illustrated in Table B.11.

Table B.11 Combination of baseline scenarios of the project

	Power generation	**Use of biomass residues**
Baseline scenario	The generation of power in the grid; (P5)	The biomass residues are dumped or left to decay (B1) & The biomass residues are burnt in an uncontrolled manner(B3)

Step 4: Common practice analysis
According to the ACM0018, the common practice provides an analysis of any other activities that are operational and that are similar to proposed project activity. Projects are considered similar if they are in the same country/region and/or rely on a broadly similar technology, are of a similar scale, and take place in a comparable environment with respect to regulatory framework, investment climate, access to technology, access to financing, etc. Other CDM project activities (registered project activities and project activities which have been published on the UNFCCC website for global stakeholder consultation as part of the validation process) are not included in this common practice analysis.
Therefore, the similar projects are defined as below:

- Region: In China, the general environment for projects of biomass generation, such as the biomass resources, is only similar and comparable in the same province (Autonomous Region). Therefore, the similar projects will be chosen from Anhui Province.
- Scale: Project activities with installed capacity within 15MW~45MW, which is -50%~+50% of 30 MW are chosen as the similar projects, because different project scales may vary the investment risks raised from technology issues, total investment cost and operation cost etc.

Comparable environment: projects that had been operated between 2006 and Jun of 2010 are chosen. Because since Jan of 2006, the subsidy for the biomass projects implemented[8], while Jun of 2010 is the time when the investment decision were made for the project activity. Therefore, the projects under this period have similar investment policy and financial environment. After searching from public & available sources, no similar project is found. Therefore, the project activity is not common.

Outcome of Step 4: No similar option without applying CDM is occurs.

Based on the analysis above, the baseline scenario is:
Combination of P5 and B1 & B3: The generation of power in the grid, and the biomass residues are dumped or left to decay mainly under aerobic conditions or burnt in an uncontrolled manner without utilizing it for energy purposes.

B.5. Demonstration of additionality
>>
Evidence of the Project's being considered for CDM development and major events

CDM revenues have played an important role in the investment decision of the project. The Board meeting gave serious consideration to the CDM revenues to make the investment decision.

Table B.12 Review of major events related to CDM development

Date	**Major events**
6th May.,2010	Everbright Alternative Energy (Dangshan) Limited (Project owner) established
Jun.,2010	FSR completed
Jun.,2010	EIA completed
16th Jun.,2010	Meeting minute of CDM consideration
22th Jul.,2010	EIA approval
28th Jul.,2010	FSR approval
12ed Aug.,2010	Main equipment (Boier) purchased agreement signed, this date is defined as the start date of the project
26th Sep.,2010	Construction started
1st Dec., 2010	Notification to EB
1st Dec., 2010	ERPA signed
17th Dec., 2010	Global Stakeholder Consultation started
23rd Dec., 2010	Notification to NDRC

Step 1: Identification of alternatives to the project activity consistent with current laws and regulations
The alternatives to the project activity which are consistent with current laws and regulation have been identified in Table B.5 in section B.4.

Step 2: Investment analysis
Please refer to Step 3 of section B.4.

Step 3: Barrier analysis
It is skipped.

Step 4: Common practice analysis

[8]http://www.ndrc.gov.cn/zcfb/zcfbtz/tz2006/t20060120_57583.htm

Please refer to Step 4 of section B.4.
Therefore, based on the above 4 steps analysis, the proposed project is additional.

B.6. Emission reductions
B.6.1. Explanation of methodological choices
>>
According to the consolidated methodology ACM0018, emission reductions are calculated as follows:

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

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

Baseline Emissions
Baseline emissions may, where applicable, include the following emission sources:
· CO_2 emissions from fossil fuel power plants at the project site;
· CO_2 emissions from grid-connected fossil fuel power plants in the electricity system;
· CH_4 emissions from anaerobic decay of biomass residues and/or CH_4 emissions from uncontrolled burning of biomass residues without utilizing them for energy purposes.

Baseline emissions are calculated as follows:

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

Where:
BE_y = Baseline emissions in year y (tCO_2e)
$BE_{EL,y}$ = Baseline emissions due to generation of electricity in year y (tCO_2)
$BE_{BR,y}$ = Baseline emissions due to uncontrolled burning or decay of biomass residues in year y (tCO_2)

Baseline emissions are determined through the following steps:

Step 1: Determination of $BE_{EL,y}$
Baseline emissions from electricity generation are calculated based on the net quantity of electricity generated at the project site under the project scenario ($EG_{PJ,y}$) and a baseline emission factor ($EF_{BL,EL,y}$) which expresses the weighted average CO_2 intensity of electricity generation in the baseline, as follows:

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

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

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

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

$$EG_{PJ,y} = EG_{PJ,gross,y} - EG_{PJ,aux,y} \tag{4}$$

Where:

$EG_{PJ,y}$ = Net quantity of electricity generated in all power plants which are located at the project site and included in the project boundary in year *y* (MWh)
$EG_{PJ,gross,y}$ = Gross quantity of electricity generated in all power plants which are located at the project site and included in the project boundary in year *y* (MWh)
$EG_{PJ,aux,y}$ = All electricity required on-site for the operation of equipment related to the preparation, processing, storage and transport of biomass residues (e.g. for mechanical treatment of the biomass, conveyor belts, driers, pelletization, shredding, briquetting processes, etc.) and electricity required for the operation of all power plants which are located at the project site and included in the project boundary (e.g. for pumps, fans, cooling towers, instrumentation and control, etc.)(MWh)

Step 1.2: Determination of $EF_{BL,EL,y}$

As the baseline scenario of the project is P5 (The generation of power in the grid), the calculation of $EF_{BL,EL,y}$ belongs to the option (a) of the particular situation of **Power generation in the electricity grid:** The project activity exports all electricity to the grid and no electricity would be produced at the project site in the baseline.

Therefore, the determination of $EF_{BL,EL,y}$ applies the formula as follows:

$$EF_{BL,EL,y} = \frac{EG_{BL,FF,y} \bullet EF_{BL,FF,y} + EG_{BL,grid,y} \bullet EF_{grid,CM,y} + EG_{BL,FF/grid,y} \bullet MIN(EF_{BL,FF,y}; EF_{grid,CM,y})}{EG_{BL,BR,y} + EG_{BL,FF,y} + EG_{BL,grid,y} + EG_{BL,FF/grid,y}} \tag{5}$$

Where:

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

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

Step 1.3: Determination of $EG_{BL,BR,y}$

According to the analysis of baseline scenario in section B.4, the project is a newly built power-only project, then the calculation of $EG_{BL,BR,y}$ belongs to **case 1, No power generation with biomass residues in the baseline.** Then $EG_{BL,BR,y}=0$.

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

According to the analysis of baseline scenario in section B.4, the project is a newly built power-only project, then the calculation of $EG_{BL,BR,y}$ belongs to **case 1, No use of fossil fuels in the baseline.** Then $EG_{BL,FF,y} = 0$.

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

According to the analysis of baseline scenario in section B.4, the project is a newly built power-only project, then the calculation of $EG_{BL,BR,y}$ belongs to **case 2, No electricity generation at the project site in the baseline.** Then $EG_{BL,grid,y} = EG_{PJ,y}$.

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

$EG_{BL,FF/grid,y}$ is calculated as follows:

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

Where:

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

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

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

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

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

According to step 1.3, 1.4 and 1.5, $EG_{BL,BR,y}=0$, $EG_{BL,FF,y}=0$ and $EG_{BL,grid,y}= EG_{PJ,y}$. Then according to formula (6), $EG_{BL,FF/grid,y}=0$.

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

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

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

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

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

Project participants shall apply the following six steps:

STEP 1. Identify the relevant electricity systems.

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

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

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

STEP 5. Calculate the build margin (BM) emission factor.

STEP 6. Calculate the combined margin (CM) emissions factor.

The detailed calculated processes are as follows:

STEP 1: Identify the relevant electricity system

The electricity generated by the Project will be connected to the East China Power Grid (ECPG), in the absence of the project activity, the installed capacity of the ECPG for both the existing power plants and the power plants to be built in a foreseeable future would supply electricity comparable to that supplied by the Project. As per *2012 Baseline Emission Factors for Regional Power Grids in China* published by China DNA on Oct. 15, 2012, the ECPG includes provincial grid spatial extent of Shanghai, Jiangsu Province, Zhejiang Province, Anhui Province and Fujian province.

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

According to the *"Tool to calculate the emission factor for an electricity system" (Version 03.0.0)*, project participants may choose between the following two options to calculate the operating margin and build margin emission factor:

Option I: Only grid power plants are included in the calculation.
Option II: Both grid power plants and off-grid power plants are included in the calculation.

Option I is chosen to calculate the operating margin and build margin emission factor.

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:

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

Detailed information to carry out a dispatch data analysis is not publicly available; therefore, method (b) and method (c) is not suitable for the proposed project.

According to *"Tool to calculate the emission factor for an electricity system" (Version 03.0.0)*, the Simple OM method is applicable to the project if low-cost resources constitute less than 50% of total grid generation (excluding electricity generated by off-grid power plants) in: 1) average of the five most recent years, or 2) based on long-term averages for hydroelectricity production.

Low-cost/must run resources constitute less than 50%[9] of total amount of grid generating output from 2006 to 2010 in the ECPG, referred to China Electric Power Yearbook 2007-2011. Therefore, Method (a) Simple OM was selected.

The Simple OM can be calculated using either of the two following data vintages:
(a) *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.
(b) *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.

[9] 11.44%, 10.92%, 11.97%, 10.64% and 12.05% from 2006 to 2010 respectively.

Here ex-ante vintage is chosen, and the $EF_{grid,OM,y}$ is fixed during the first crediting period.

STEP 4: Calculate the operating margin emission factor according to the selected method

The simple OM emission factor is calculated as the generation-weighted average CO_2 emissions per unit net electricity generation (t CO_2/MWh) of all generating power plants serving the system, not including low-cost/must-run power plants/units.

The simple OM may be calculated by one of the following two options：

(a) **Option A**: Based on the net electricity generation and a CO_2 emission factor of each power unit[10]; or
(b) **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.

Option A should be preferred and must be used if fuel consumption data is available for each power plant/unit. As the fuel consumption data for each power plant/unit is not available in China, Option A cannot be selected. While total net electricity generation of all power plants serving the ECPG and the fuel types and total fuel consumption of the ECPG are available from *China Electric Power Yearbook* and *China Energy Statistical Yearbook*. So, the project uses Option B for calculating the simple OM emission factor as follows:

$$EF_{grid,OMsimple,y} = \frac{\sum_i FC_{i,y} \times NCV_{i,y} \times EF_{CO_2,i,y}}{EG_y} \qquad (7)$$

Where

$EF_{grid,OMsimple,y}$	=	Simple operating margin CO_2 emission factor in year *y* (t CO_2/MWh);
$FC_{i,y}$	=	Amount of 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 fuel type i in year y (GJ/mass or volume unit);
$EF_{CO2,i,y}$	=	CO_2 emission factor of 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 fuel types combusted in power sources in the project electricity system in year *y*;
y	=	The relevant year as per the data vintage chosen in Step 3.

Based on *2012 Baseline Emission Factors for Regional Power Grids in China* published by China DNA, the Operating Margin Emission Factor ($EF_{grid,OM,y}$) of the ECPG could be obtained determined to be: 0.82436 t CO_2/MWh.

STEP 5: Calculate the build margin (BM) emission factor

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

[10] 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.

(a) **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.

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

For the proposed project, option 1 is chosen to calculate Build Margin emission factor ($EF_{grid, BM, y}$).

The sample group of power units *m* used to calculate the build margin should be determined as per the following procedure, consistent with the data vintage selected above:

(a) Identify the set of five power units, excluding power units registered as CDM project activities, that started to supply electricity to the grid most recently ($SET_{5\text{-units}}$) and determine their annual electricity generation ($AEG_{SET\text{-}5\text{-units}}$, in MWh);

(b) Determine the annual electricity generation of the project electricity system, excluding power units registered as CDM project activities (AEG_{total}, in MWh). Identify the set of power units, excluding power units registered as CDM project activities, that started to supply electricity to the grid most recently and that comprise 20% of AEG_{total} (if 20% falls on part of the generation of a unit, the generation of that unit is fully included in the calculation) ($SET_{\geq 20\%}$) and determine their annual electricity generation ($AEG_{SET\text{-}\geq 20\%}$, in MWh);

(c) From $SET_{5\text{-units}}$ and $SET_{\geq 20\%}$ select the set of power units that comprises the larger annual electricity generation (SET_{sample});

Otherwise:

(d) Exclude from SET_{sample} the power units which started to supply electricity to the grid more than 10 years ago. Include in that set the power units registered as CDM project activities, starting with power units that started to supply electricity to the grid most recently, until the electricity generation of the new set comprises 20% of the annual electricity generation of the project electricity system (if 20% falls on part of the generation of a unit, the generation of that unit is fully included in the calculation) to the extent is possible. Determine for the resulting set ($SET_{sample\text{-}CDM}$) the annual electricity generation ($AEG_{SET\text{-}sample\text{-}CDM}$, in MWh);

If the annual electricity generation of that set is comprises at least 20% of the annual electricity generation of the project electricity system (i.e. $AEG_{SET\text{-}sample\text{-}CDM} \geq 0.2 \times AEG_{total}$), then use the sample group $SET_{sample\text{-}CDM}$ to calculate the build margin. Ignore steps (e) and (f).

Otherwise:

(e) Include in the sample group $SET_{sample-CDM}$ the power units that started to supply electricity to the grid more than 10 years ago until the electricity generation of the new set comprises 20% of the annual electricity generation of the project electricity system (if 20% falls on part of the generation of a unit, the generation of that unit is fully included in the calculation);

The sample group of power units m used to calculate the build margin is the resulting set ($SET_{sample-CDM->10yrs}$).

The Build Margin Emission Factor ($EF_{grid, BM, y}$) is calculated as follows:

$$EF_{grid,BM,y} = \frac{\sum_m EG_{m,y} \times EF_{EL,m,y}}{\sum_m EG_{m,y}} \tag{8}$$

Where:

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

Due to data's unavailability, the BM calculation follows the guidance provided by CDM EB in the deviation. First, calculate the newly installed capacity and its power generation technology mix, then the weights of different power technologies in the newly installed capacity, finally the BM emission factor base on the emission factors of different types of most advanced commercial generation technologies.[11]

Because the generating capacity of the coal-fired, oil-fired and gas-fired power plants cannot be separated from the existing statistical data, the BM calculation adopts the following method: First, use the available data in the energy balance tables on the most recent year to calculate the proportion of CO_2 emissions from solid, liquid and gaseous fuels corresponding to the total emissions of CO_2 emissions. Second, calculate the emission factor of the fossil fuel fired power generation in each grid using the above proportions as the weights and the emission factors of the most advanced commercial generation technologies as the reference. Finally, the BM emission factor is multiplied by the proportion of fossil fuel fired power generation and the proportion of fossil fuel fired power plants in the newly added 20% capacity. Concrete steps and the formula for BM are as follows:

Sub-step 5a: **Calculating the share of CO_2 emissions of different fuel-fired power plants in the total CO_2 emissions**

$$\lambda_{Coal,y} = \frac{\sum_{i \in COAL,j} F_{i,j,y} \times NCV_{i,y} \times EF_{CO_2,i,j,y}}{\sum_{i,j} F_{i,j,y} \times NCV_{i,y} \times EF_{CO_2,i,j,y}} \tag{9}$$

$$\lambda_{Oil,y} = \frac{\sum_{i \in OIL,j} F_{i,j,y} \times NCV_{i,y} \times EF_{CO_2,i,j,y}}{\sum_{i,j} F_{i,j,y} \times NCV_{i,y} \times EF_{CO_2,i,j,y}} \tag{10}$$

[11]http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File2975.pdf

$$\lambda_{Gas,y} = \frac{\sum_{i \in GAS,j} F_{i,j,y} \times NCV_{i,y} \times EF_{CO_2,i,j,y}}{\sum_{i,j} F_{i,j,y} \times NCV_{i,y} \times EF_{CO_2,i,j,y}} \quad (11)$$

Where:

$F_{i,j,y}$ = The amount of fuel *i* (in a mass or volume unit) consumed by project *j* in year *y*;

$NCV_{i,j}$ = Net calorific value (energy content) of fossil fuel type *i* consumed by province *j* (GJ/mass or volume unit)

$EF_{co2,i,j,y}$ = CO_2 emission coefficient of fossil fuel type *i* (tCO_2/mass or volume unit of the fuel), taking into account the carbon content of the fuels used by relevant provincial sub-grids *j* and the percent oxidation of fuel in year *y*;

COAL,*OIL*,and *GAS* refers to all forms of coal, oil and gas.

Sub-step 5b: **Calculating the Emission Factor of fuel-fired power technology**

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

Where:

$EF_{Coal,Adv,y}$, $EF_{Oil,Adv,y}$ and $EF_{Gas,Adv,y}$ represent the related Emission Factor of the commercially available most advanced coal, oil and gas fired power technology, please refer to Appendix 4 for more details.

Sub-step 5c: **Calculating the $EF_{grid,BM,y}$**

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

Where:

$CAP_{Total,y}$ = the newly increment of total installed capacity;

$CAP_{Thermal,y}$ = the newly increment of fuel-fired installed capacity.

Based on *2012 Baseline Emission Factors for Regional Power Grids in China* published by China DNA, the Build Margin Emission Factor ($EF_{grid,BM,y}$) of the ECPG could be obtained determined to be: 0.6889 t CO_2/MWh.

The $EF_{grid,OM,y}$ and $EF_{grid,BM,y}$ of the first crediting period of the proposed project is calculated *ex-ante* and will not change during the first crediting period, but will be updated once the first crediting period is over.

STEP 6: Calculate the combined margin emission factor

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

(a) Weighted average CM; or

(b) Simplified CM.

The weighted average CM method (option A) should be used as the preferred option.

The combined margin emissions factor is calculated as follows:

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

Where

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

$EF_{grid,BM,y}$ = Build margin CO_2 emission factor in year y (t CO_2/MWh)
w_{OM} = Weighting of operating margin emission factor (per cent)
w_{BM} = Weighting of build margin emission factor (per cent)

According to '*Tool to calculate the emission factor for an electricity system*', the weights of *OM* and *BM* for hydropower projects are as follows:

w_{OM} = 0.5, w_{BM} = 0.5

Therefore the combined baseline emission factor:

$EF_{grid,CM,y}$ = 0.82436×0.5+0.6889×0.5=0.7566 t CO_2/MWh (15)

According to the analysis from step 1.3 to step 1.8, the formula (5) will be equal to:

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

$$= \frac{0 \bullet EF_{BL,FF,y} + EG_{PJ,y} \bullet EF_{grid,CM,y} + 0 \bullet MIN(EF_{BL,FF,y}; EF_{grid,CM,y})}{0 + 0 + EG_{PJ,y} + 0}$$

$$= \frac{EG_{PJ,y} \bullet EF_{grid,CM,y}}{EG_{PJ,y}}$$

$$= EF_{grid,CM,y} \tag{16}$$

Step 2: Determination of baseline emissions due to uncontrolled burning or decay of biomass residues ($BE_{BR,y}$)

According to the analysis of baseline scenario in section B.4, the baseline for use of biomass residues is B1, which is the biomass residues are dumped or left to decay under mainly aerobic conditions. This applies, for example, to dumping and decay of biomass residues on fields.

The emissions are determined separately for biomass residues categories for which scenarios B1 and B3 (aerobic decay or uncontrolled burning) apply, and for biomass residues categories for which scenario B2 (anaerobic decay) apply:

$$BE_{BR,y} = BE_{BR,B1/B3,y} + BE_{BR,B2,y} \tag{17}$$

Where:
$BE_{BR,y}$ = Baseline emissions due to uncontrolled burning or decay of biomass residues in year y (tCO_2)
$BE_{BR,B1/B3,y}$ = Baseline emissions due to aerobic decay or uncontrolled burning of biomass residues in year y (tCO_2)
$BE_{BR,B2,y}$ = Baseline emissions due to anearobic decay of biomass residues in year y (tCO_2)

Step 2.1: Determination of $BE_{BR,B1/B3,y}$

According to the consolidated methodology ACM0018, the baseline emissions are calculated by multiplying the quantity of biomass residues with the net calorific value and an appropriate emission factor, as follows:

$$BE_{BR,B1/B3,y} = GWP_{CH4} \cdot \sum_{n} BR_{n,B1/B3,y} \cdot NCV_{n,y} \cdot EF_{BR,n,y} \tag{18}$$

Where:
$BE_{BR,B1/B3,y}$ = Baseline emissions due to uncontrolled burning or anaerobic decay of biomass residues in year y (tCO_2)
GWP_{CH4} = Global Warming Potential of methane valid for the commitment period (tCO_2/tCH_4)

$BR_{n,B1/B3,y}$ = Amount of biomass residues category *n* used in the project plant(s) included in the project boundary in year *y* for which B1 or B3 has been identified as the most plausible baseline scenario (tonnes on dry-basis)
$NCV_{n,y}$ = Net calorific value of the biomass residues category *n* in year *y* (GJ/tonnes on drybasis)
$EF_{BR,n,y}$ = CH_4 emission factor for uncontrolled burning of the biomass residues category *n* during the year *y* (tCH_4/GJ)
n = Categories of biomass residues

To determine the CH_4 emission factor, project participants may undertake measurements or use referenced default values. In the absence of more accurate information, it is recommended to use 0.0027 t CH_4 per ton of biomass as default value for the product of NCV_k and $EF_{burning,CH4,k,y}$. Then the uncertainty can be deemed to be greater than 100%, resulting in a conservativeness factor of 0.73. Thus, in this case an emission factor of 0.001971 t CH_4/t biomass should be used.

Step 2.2: Determination of $BE_{BR,B2,y}$

According to the analysis of baseline scenario in section B.4, the baseline for use of biomass residues is B1, which is the biomass residues are dumped or left to decay under mainly aerobic conditions. This applies, for example, to dumping and decay of biomass residues on fields. Therefore, this part for calculating $BE_{BR,B2,y}$ is not applicable.

Therefore, $BE_{BR,y} = BE_{BR,B1/B3,y}$.

Project emissions

Project emissions are calculated as follows:

$$PE_y = PE_{FF,y} + PE_{EL,y} + PE_{TR,y} + PE_{BR,y} + PE_{ww,y} \quad (19)$$

Where:
PE_y = Project emissions during year *y* (tCO_2e)
$PE_{FF,y}$ = Emissions during the year *y* due to fossil fuel consumption (tCO_2)
$PE_{EL,y}$ = Emission during the year y due to electricity consumed off-site for the processing of biomass residues (tCO_2)
$PE_{TR,y}$ = Emissions during the year *y* due to transport of the biomass residues to the project plant (tCO_2)
$PE_{BR,y}$ = Emissions from the combustion of biomass residues during the year *y* (tCO_2e)
$PE_{WW,y}$ = Emissions from wastewater generated from the treatment of biomass residues in year *y* (tCO_2e)

Determination of PE_{FFy}

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

· Emissions from on-site fossil fuel consumption for the generation of electric power. This includes all fossil fuels used at the project site in heat generators (e.g. boilers) for the generation of electric power; and

· Emissions from on-site fossil fuel consumption of auxiliary equipment and systems related to the generation of electric power. This includes fossil fuels required for the operation of auxiliary equipment related to the power plants (e.g. for pumps, fans, cooling towers, instrumentation and control, etc.) which are not accounted for in the first bullet, and

· Fossil fuels required for the operation of equipment related to the on-site or off-site preparation, storage, processing and transportation of fuels and biomass residues (e.g. for mechanical treatment of the biomass, conveyor belts, driers, pelletization, shredding, briquetting processes, etc.). For the proposed project, the operation of equipments does not use fossil fuels.

· If any fossilized or non-biodegradable materials are used in the processing of biomass residues and incorporated in the processed biomass residues (e.g. binders) then emissions arising from those materials should be accounted for when the processed biomass residues are combusted. For that purpose those materials should be deemed as fossil fuels. If net calorific values, carbon content and/or emission factors of those materials are available they could be used, otherwise the net calorific values, carbon content and/or emission factors of the most carbon intensive fossil fuel available in the country should be used. For the proposed project, no fossilized or non-biodegradable materials are used in the processing of biomass residues and incorporated in the processed biomass residues.

The latest approved version of the "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion" is used to calculate $PE_{FF,y}$. All combustion processes *j* as described in the first two bullets above are included.CO_2 emissions from combustion of respective fuels are calculated as follows:

$$PE_{FF,y} = \sum_i \left(FF_{projectplant,i,y} + FF_{projectsite,i,y}\right) \cdot NCV_i \cdot COEF_i \tag{20}$$

where:

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

$FF_{projectsite,i,y}$ =Quantity of fossil fuel type *i* combusted at the project site for other purposes that are attributable to the project activity during the year *y* (tons per year) . $FF_{projectsite,i,y}$ is calculated as zero in this PDD. The verified emission will be counted based on the actual data monitored on site;;

NCV_i =Net calorific value of fossil fuel type *i* (GJ / ton)

$COEF_i$ =CO_2 emission factor for fossil fuel type *i* (tCO_2e/GJ)

Determination of $PE_{EL,y}$

Emissions should be included that result from the generation of electric power required for the operation of equipment related to the off-site preparation, processing, storage and transportation of biomass residues (e.g. for mechanical treatment of the biomass, conveyor belts, driers, pelletization, shredding, briquetting processes, etc.). The latest approved version of the "Tool to calculate baseline, project and/or leakage emissions from electricity consumption" should be used to calculate $PE_{EL,y}$. Note that the electric power used on-site for the purposes described above are already accounted as part of $EG_{PJ,aux,y}$. $PE_{EL,y}$ should account thus only for the off-site use of electricity.

$$PE_{EL,y} = EG_{offsite,y} \times EF_{PJ,EL,y} \tag{21}$$

Where:

$EG_{offsite,y}$ = Quantity of electricity required for the operation of equipment related to the off-site preparation, processing, storage and transportation of biomass residues (e.g. for mechanical treatment of the biomass, conveyor belts, driers, pelletization, shredding, briquetting processes, etc.). The value of $EG_{offsite,y}$ is calculated as zero in this PDD. The verified emission will be counted based on the data monitored on site.

$EF_{PJ,EL,y}$ = Emission factor for electricity in year *y* (tCO_2/MWh). As the off-site electricity is from grid, therefore it equals to $EF_{grid,CM,y}$.

Determination of $PE_{TR,y}$

For the project, transportation is undertaken by vehicles. According to consolidated methodology ACM0018, project participants shall determine CO_2 emissions resulting from transportation of the biomass residues to the project plant using the latest version of the tool "Project and leakage emissions from road transportation of freight", thus the proposed project adopts the tool "Project and leakage emissions from transportation of freight"(ver01.1.0) to determine the CO_2 emissions resulting from transportation of the biomass residues to the project plant (*$PE_{TR,y}$).*

"*Project and leakage emissions from transportation of freight*" gives two options for $PE_{TR,y}$ calculation: monitoring fuel consumption (Option A) or using conservative default values (Option B). In this document, project participants choose Option B for $PE_{TR,y}$ calculation, therefore, $PE_{TR,y}$ are determined as follows:

$$PE_{TR,y} = PE_{TR,m} = \sum D_{f,m} \times FR_{f,m} \times EF_{CO2,f} \times 10^{-6} \quad (22)$$

Where:

$PE_{TR,y}$ = Project emission from transportation of the biomass residues to the project plant in year y (t CO_2)

$PE_{TR,m}$ = Project emission from transportation of freight monitoring period m (t CO_2)

$D_{f,m}$ = Return trip distance between the origin and destination of freight transportation activity f in monitoring period m (km)

$FR_{f,m}$ = Total mass of freight transported in freight transportation activity *f* in monitoring period m (t)

$EF_{CO2,f}$ = Default CO_2 emission factor for freight transportation activity *f* (g CO_2/t km)

f = Freight transportation activities conducted in the project activity in monitoring period m

Determination of $PE_{BR,y}$

Because the emissions due to uncontrolled burning or decay of biomass residues ($BE_{BR,y}$) is included in the calculation of baseline emissions, then emissions from the combustion of biomass residues also have to be included in the project scenario.

Corresponding emissions are calculated as follows:

$$PE_{BR,y} = GWP_{CH4} \cdot EF_{CH4,BR} \cdot \sum_{n} BR_{PJ,n,y} \cdot NCV_{n,y} \quad (23)$$

Where:

$PE_{BR,y}$ = Emissions from the combustion of biomass residues during the year *y* (tCO_2)

GWP_{CH4} = Global Warming Potential for methane valid for the relevant commitment period (tCO_2/tCH_4)

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

$BR_{PJ,n,y}$ = Quantity of biomass residues of category *n* used in power plants which are located at the project site and included in the project boundary in year *y* (tonnes on dry-basis/yr)

$NCV_{n,y}$ = Net calorific value of the biomass residues category *n* in year *y* (GJ/tonnes on dry-basis)

Determination of $PE_{WW,CH4,y}$

This emission source should be estimated in cases where wastewater originating from the treatment of the biomass is (partly) treated under anaerobic conditions and where methane from the waste water is not captured and flared or combusted. Project emissions from waste water are estimated as follows:

$$PE_{WW,CH4,y} = GWP_{CH4} \times V_{WW,y} \times COD_{WW,y} \times B_{o,WW} \times MCF_{WW} \quad (24)$$

Where:

$PE_{WW,CH4,y}$ = CH_4 emissions from wastewater generated from the treatment of biomass residues in year *y* (tCH_4)

GWP_{CH4} = Global Warming Potential for methane valid for the relevant commitment period (tCO_2/tCH_4)

$V_{WW,y}$ = Quantity of waste water generated in year *y* (m^3)

$COD_{WW,y}$ = Average chemical oxygen demand of the waste water in year *y* ($tCOD/m^3$)

$B_{o,WW}$ = Methane generation potential of the waste water (tCH_4/tCOD)

MCF_{WW} = Methane correction factor for the waste water (ratio)

There is no wastewater originating from the treatment of the biomass. Therefore, $PE_{WW,CH4,y}$ =0.

Leakage

The main potential source of leakage for this project activity is an increase in emissions from fossil fuel combustion or other sources due to diversion of biomass residues from other uses to the project plant as a result of the project activity. Changes in carbon stocks in the LULUCF sector are expected to be insignificant since this methodology is limited to biomass residues, as defined in the applicability

conditions above. The baseline scenarios for biomass residues for which this potential leakage is relevant are B5:, B6:, B7: and B8:.
According to the analysis of baseline scenario in section B.4, the baseline for use of biomass residues is B1&B3, which is the biomass residues are dumped or left to decay under mainly aerobic conditions. Therefore leakage effects do not need to be addressed according to consolidated methodology ACM0018, i.e. $L_y = 0$ tCO_2e.

B.6.2. Data and parameters fixed ex ante

Data / Parameter	GWP_{CH4}
Unit	tCO_2e/tCH_4
Description	Global warming potential for CH_4
Source of data	*Errata to Table 2.14 of IPCC AR4*
Value(s) applied	25
Choice of data or Measurement methods and procedures	Default value
Purpose of data	Calculation of baseline/project emissions
Additional comment	The value of 25 has been used for the estimated emission reduction calculation in the PDD, while for the request for issuance of the emission reductions achieved by the proposed project in the first commitment period, the value of 21 will be used for calculation, and for the request for issuance of the emission reductions achieved in the second commitment period, the value of 25 will be used for calculation.

Data / Parameter	Biomass residues categories and quantities used for the selection of the baseline scenario selection and assessment of additionality
Unit	- Type (i.e.branches and wood scrap.); - Source (obtained from an identified biomass residues producer, etc.); - Fate in the absence of the project activity (scenarios B1 & B3); - Use in the project scenario (scenarios P5); - Quantity (tonnes on dry-basis)
Description	Refer to Table B.3 in section B.4
Source of data	On-site assessment of biomass residues categories and quantities
Value(s) applied	(see table below)
Choice of data or Measurement methods and procedures	Use weight meters. Adjust for the moisture content in order to determine the quantity of dry biomass. Data monitored continuously and aggregated as appropriate, to calculate emissions reductions.
Purpose of data	Calculation of baseline/project emissions
Additional comment	This parameter is related to the procedure for the selection of the baseline scenario selection and assessment of additionality

Biomass residues category (k)	Biomass residues type	Biomass residues source	Biomass residues fate in the absence of the project activity	Biomass residues use in project scenario	Biomass residues quantity on dry-basis (tonnes)
1	Branches	Off-site from the nearby area	Dumped or burnt in an uncontrolled manner(B1&B3)	Electricity generation on-site (biomass-only boiler)	106,698 Where: Peach: 21,054 Apple: 21,411 Pear: 64,233
2	Wood scrap	Off-site from the nearby area	Dumped or burnt in an uncontrolled manner(B1&B3)	Electricity generation on-site (biomass-only boiler)	103,487

Data / Parameter	$EF_{CO2,f}$
Unit	g CO_2 / t km
Description	Default CO_2 emission factor for freight transportation activity *f*
Source of data	*"Project and leakage emissions from transportation of freight" (Ver01.1.0)*
Value(s) applied	245
Choice of data or Measurement	In *"Project and leakage emissions from transportation of freight" (Ver01.0.0)*, the default value of emission factors for Light vehicles and Heavy vehicles are 245 (g CO_2 / t km) and 129 (g CO_2 / t km)

methods and procedures	respectively. For conservativeness, project participants will use 245 (g CO_2 / t km) for $PE_{TR,m}$ calculations, no matter the freights are transported by Light vehicles or Heavy vehicles.
Purpose of data	Calculation of project emissions
Additional comment	-

Data / Parameter	$FC_{i,y}$
Unit	mass or volume unit
Description	Amount of fossil fuel type *i* consumed in the ECPG in year *y*.
Source of data	*China Energy Statistical Yearbook*
Value(s) applied	see Appendix 4 for details
Choice of data or Measurement methods and procedures	The data obtained from the official publication *China Energy Statistical Yearbook*, satisfying the requirement of latest version of Tool to calculate the emission factor for an electricity system.
Purpose of data	Calculation of baseline/project emissions
Additional comment	the three most recent years for which data is available at the time of submission of the CDM-PDD to the DOE for validation

Data / Parameter	$NCV_{i,y}$
Unit	GJ/mass or volume unit
Description	Net calorific value (energy content) of fossil fuel type *i* in year *y*.
Source of data	*China Energy Statistical Yearbook*
Value(s) applied	see Appendix 4 for details
Choice of data or Measurement methods and procedures	The data obtained from the official publication *China Energy Statistical Yearbook*, satisfying the requirement of latest version of Tool to calculate the emission factor for an electricity system.
Purpose of data	Calculation of baseline/project emissions
Additional comment	-

Data / Parameter	$EF_{CO2,i,y}$
Unit	tCO_2e/TJ
Description	CO_2 emission factor of fossil fuel type *i* in year *y*.
Source of data	*2006 IPCC Guideline for National Greenhouse Gas Inventories, Volume 2 Energy, table2.2-table 2.5*
Value(s) applied	see Appendix 4 for details
Choice of data or Measurement methods and procedures	Regional or national average default values are unavailable, so IPCC default values at the lower limit of the uncertainty at a 95% confidence interval are used, satisfying the requirement of latest version of Tool to calculate the emission factor for an electricity system.
Purpose of data	Calculation of baseline/project emissions
Additional comment	-

Data / Parameter	GEN_y
Unit	MWh
Description	electricity generated by all power sources serving the East China Power Grid, not including low-cost/must-run power plants/units, in year *y*.
Source of data	*China Power Electric Yearbook*
Value(s) applied	see Appendix 4 for details
Choice of data or Measurement methods and procedures	The data obtained from the official publication *China Power Electric Yearbook*, satisfying the requirement of latest version of Tool to calculate the emission factor for an electricity system.
Purpose of data	Calculation of baseline/project emissions
Additional comment	the three most recent years for which data is available at the time of submission of the CDM-PDD to the DOE for validation

Data / Parameter	AER_y
Unit	%
Description	the auxiliary electricity consumption rate of all power sources serving the ECPG, the Shanxi Yangcheng Grid and the Central China Grid.
Source of data	*China Power Electric Yearbook*
Value(s) applied	see Appendix 4 for details
Choice of data or Measurement methods and procedures	The data obtained from the official publication *China Power Electric Yearbook*, satisfying the requirement of latest version of Tool to calculate the emission factor for an electricity system.
Purpose of data	Calculation of baseline/project emissions
Additional comment	the three most recent years for which data is available at the time of submission of the CDM-PDD to the DOE for validation

Data / Parameter	$F_{i,j,y}$
Unit	tCe
Description	the consumption of fuel *i* in province *j* in year *y*.
Source of data	*China Energy Statistical Yearbook*
Value(s) applied	see Appendix 4 for details
Choice of data or Measurement methods and procedures	The data obtained from the official publication *China Energy Statistical Yearbook*, satisfying the requirement of latest version of Tool to calculate the emission factor for an electricity system.
Purpose of data	Calculation of baseline/project emissions
Additional comment	-

Data / Parameter	$Eff_{Coal,Adv,y}$
Unit	%
Description	Electricity supply efficiency of the best efficiency commercial coal-fired generation technology.
Source of data	*2012 Baseline Emission Factors for Regional Power Grids in China* published by China DNA on Oct. 15, 2012
Value(s) applied	39.65
Choice of data or Measurement methods and procedures	The data obtained from the China DNA, satisfying the requirement of latest version of Tool to calculate the emission factor for an electricity system.
Purpose of data	Calculation of baseline/project emissions
Additional comment	-

Data / Parameter	$Eff_{Oil,Adv,y}$
Unit	%
Description	Electricity supply efficiency of the best efficiency commercial oil-fired generation technology.
Source of data	*2012 Baseline Emission Factors for Regional Power Grids in China* published by China DNA on Oct. 15, 2012
Value(s) applied	51.93
Choice of data or Measurement methods and procedures	The data obtained from the China DNA, satisfying the requirement of latest version of Tool to calculate the emission factor for an electricity system.
Purpose of data	Calculation of baseline/project emissions
Additional comment	-

Data / Parameter	$Eff_{Gas,Adv,y}$
Unit	%
Description	Electricity supply efficiency of the best efficiency commercial gas-fired generation technology.
Source of data	*2012 Baseline Emission Factors for Regional Power Grids in China* published by China DNA on Oct. 15, 2012
Value(s) applied	51.93
Choice of data or Measurement methods and procedures	The data obtained from the China DNA, satisfying the requirement of latest version of Tool to calculate the emission factor for an electricity system.
Purpose of data	Calculation of baseline/project emissions
Additional comment	-

Data / Parameter	$CAP_{Total,y}$
Unit	MW
Description	the total installed capacity in the ECPG in year *y*
Source of data	*China Power Electric Yearbook*
Value(s) applied	see Appendix 4 for details
Choice of data or Measurement methods and procedures	The data obtained from the official publication *China Power Electric Yearbook*, satisfying the requirement of latest version of Tool to calculate the emission factor for an electricity system.
Purpose of data	Calculation of baseline/project emissions
Additional comment	For calculating the added capacity comprised 20% of the ECPG.

Data / Parameter	$CAP_{Thermal,y}$
Unit	MW
Description	the total installed capacity of thermal power in the ECPG in year *y*
Source of data	*China Power Electric Yearbook*
Value(s) applied	see Appendix 4 for details
Choice of data or Measurement methods and procedures	The data obtained from the official publication *China Power Electric Yearbook*, satisfying the requirement of latest version of Tool to calculate the emission factor for an electricity system.
Purpose of data	Calculation of baseline/project emissions
Additional comment	-

B.6.3. Ex ante calculation of emission reductions

>>

Baseline emissions

1. Calculation of Baseline emissions due to generation of electricity in year *y* ($BE_{EL,y}$)

1.1 Calculation of Net quantity of electricity generated in all power plants which are located at the project site and included in the project boundary in year *y* ($EG_{PJ,y}$)

Item	$EG_{PJ,aux,y}$ **(MWh)**	$EG_{PJ,gross,y}$ **(MWh)**	$EG_{PJ,y}$ **(MWh)**
I.D.	A	B	C
Data	16,380	234,000	217,620
Data source or calculation formula	Project Supplementary Feasibility Study Report/ Actual Operational Data in 2011/2012/2013	Project Supplementary Feasibility Study Report/ Actual Operational Data in 2011/2012/2013	C=B-A

1.2 Emission factor for electricity generation in the baseline in year *y* ($EF_{BL,EL,y}$)

Item	$EF_{grid,CM,y}$ **(tCO_2/MWh)**	$EF_{BL,EL,y}$ **(tCO_2/MWh)**
I.D.	D	E
Data	0.7566	0.7566
Data source	*2012 Baseline Emission Factors for Regional*	E=D

or calculation formula	*Power Grids in China*	

Calculation of Baseline emissions due to generation of electricity in year *y* ($BE_{EL,y}$)

Item	$EG_{PJ,y}$ (MWh)	$EF_{BL,EL,y}$ (tCO_2/MWh)	$BE_{EL,y}$ (tCO_2)
I.D.	C	E	F
Data	217,620	0.7566	164,651
Data source or calculation formula	-	-	F=C×E

2. Baseline emissions due to uncontrolled burning or decay of biomass residues in year *y* ($BE_{BR,y}$)

Item	$NCV_{n,y} \cdot EF_{BR,n,y}$ (tCH_4/ tons of dry matter)	GWP_{CH4} (tCO_2/tCH_4)	$BR_{n,B1/B3,y}$ (tons of dry matter)	$BE_{BR,y}$ (tCO_2)
I.D.	G	H	I	J
Data	0.001971	25	210,185	10,357
Data source or calculation formula	ACM0018	IPCC	Project Supplementary Feasibility Study Report/ Actual Operational Data in 2011/2012/2013	J=G×H×I

Calculation of Baseline emissions

Item	$BE_{EL,y}$ (tCO_2)	$BE_{BR,y}$ (tCO_2)	BE_y (tCO_2)
I.D.	F	J	K
Data	164,651	10,357	175,008
Data source or calculation formula	-	-	K=F+J

Project Emissions

1. Emissions during the year *y* due to fossil fuel consumption at the project site ($PE_{FF,y}$)

Item	$FF_{projectplant,n,y}$ (t)	$FF_{projectsite,n,y}$ (t)	$NCV_{i,y}$ (GJ/t)	$COEF_i$ (tCO_2/GJ)	$PE_{FF,y}$ (tCO_2)
I.D.	L	M	N	O	P
Data	10	0	42.652	0.0741	32
Data source or calculation formula	FSR	FSR	China Energy Statistical Yeabook	IPCC	P=(L+M)×N×O

2. Emissions during the year *y* due to electricity consumed off-site for the processing of biomass residues (tCO_2) ($PE_{El,y}$)

Item	$EG_{offsite,y}$ (MWh)	$EF_{PJ,EL,y}$ (tCO_2/MWh)	$PE_{El,y}$ (tCO_2)
I.D.	AF	E	AG
Data	0	0.7566	0
Data source or calculation formula	-	-	AG=AF×E

3. Emissions during the year *y* due to transport of the biomass residues to the project plant ($PE_{TR,y}$)

Item	$FR_{f,m}$ (t)	$D_{f,m}$ (km)	$EF_{CO2,f}$ ($gCO_2/t\ km$)	$PE_{TR,y}$ (tCO_2)
I.D.	Q	R	S	T
Data	356,850	100	245	8,743
Data source or calculation formula	Project Supplementary Feasibility Study Report/ Actual Operational Data in 2011/2012/2013	FSR	Tool ‘ Project and leakage emissions from transportation of freight’	T= $Q*R*S*10^{-6}$

4. Emissions from the combustion of biomass residues during the year *y* ($PE_{BR,y}$)

4-1 Emissions from the combustion of Pear branches during the year *y*

Item	GWP_{CH4} (tCO_2/tCH_4)	$EF_{CH4,BR}$ (tCH_4/GJ)	$NCV_{n,y}$ (GJ/ tons of dry matter)	$BR_{PJ,n,y}$ (tonnes on dry-basis/yr)	$PE_{BR,y}$ (tCO_2)
I.D.	H	U	V1	I1	W1
Data	25	0.0000411	16.62	64,233	1,097
Data source or calculation formula	IPCC	ACM0018	NCV Analysis Report		W1=H×I1×U×V1

4-2 Emissions from the combustion of Peach branches during the year *y*

Item	GWP_{CH4} (tCO_2/tCH_4)	$EF_{CH4,BR}$ (tCH_4/GJ)	$NCV_{n,y}$ (GJ/ tons of dry matter)	$BR_{PJ,n,y}$ (tonnes on dry-basis/yr)	$PE_{BR,y}$ (tCO_2)
I.D.	H	U	V2	I2	W2
Data	25	0.0000411	16.33	21,054	353
Data source or calculation formula	IPCC	ACM0018	NCV Analysis Report		W2=H×I2×U×V2

4-3 Emissions from the combustion of Apple branches during the year *y*

Item	GWP_{CH4} (tCO_2/tCH_4)	$EF_{CH4,BR}$ (tCH_4/GJ)	$NCV_{n,y}$ (GJ/ tons of dry matter)	$BR_{PJ,n,y}$ (tonnes on dry-basis/yr)	$PE_{BR,y}$ (tCO_2)
I.D.	H	U	V3	I3	W3
Data	25	0.0000411	16.07	21,411	354
Data source or calculation formula	IPCC	ACM0018	NCV Analysis Report		W3=H×I3×U×V3

4-4 Emissions from the combustion of wood scrap during the year *y*

Item	GWP_{CH4} (tCO_2/tCH_4)	$EF_{CH4,BR}$ (tCH_4/GJ)	$NCV_{n,y}$ (GJ/ tons of dry matter)	$BR_{PJ,n,y}$ (tonnes on dry-basis/yr)	$PE_{BR,y}$ (tCO_2)
I.D.	H	U	V4	I4	W4
Data	25	0.0000411	16.76	103,487	1,782
Data source or calculation formula	IPCC	ACM0018	NCV Analysis Report		W4=H×I4×U×V4

Thus, Emissions from the combustion of biomass residues during the year *y*
($PE_{BR,y}$)=W=W1+W2+W3+W4=1,097+353+354+1,782=3,586tCO_2

5. Emissions from wastewater generated from the treatment of biomass residues in year *y* ($PE_{WW,y}$)

Item	$V_{WW,y}$ (m^3/yr)	$COD_{WW,y}$ ($tCOD/m^3$)	$B_{o,WW}$ ($tCH_4/tCOD$)	MCF_{WW}	GWP_{CH4} (tCO_2/tCH_4)	$PE_{WW,CH4,y}$ (tCO_2)
I.D.	X	Y	Z	AA	H	AB
Data	0	NA	0.25	1	25	0
Data source or calculation formula	FSR	FSR	IPCC	ACM0018	IPCC	AB=X×Y×Z×AA×H

Calculation of project emission

Item	$PE_{TR,y}$ (tCO_2)	$PE_{FF,y}$ (tCO_2)	$PE_{EL,y}$ (tCO_2)	$PE_{BR,y}$ (tCO_2)	$PE_{WW,y}$ (tCO_2)	PE_y (tCO_2)
I.D.	T	P	AG	W	AB	AC
Data	8,743	32	0	3,586	0	12,361
Data source or calculation formula	-	-	-	-	-	AC=T+P+AG+W+AB

Leakage

As analysed in Section B.6.1., leakage effects do not need to be addressed according to consolidated methodology ACM0018, i.e. $L_y = 0$ tCO_2e.

Calculation of Emission reductions

Item	BE_y (tCO_2)	PE_y (tCO_2)	L_y (tCO_2)	ER_y (tCO_2)
I.D.	K	AC	AD	AE
Data	175,008	12,361	0	162,647
Data source or calculation formula	-	-	-	AE= K-AC-AD

B.6.4. Summary of ex ante estimates of emission reductions

Year	Baseline emissions (t CO_2e)	Project emissions (t CO_2e)	Leakage (t CO_2e)	Emission reductions (t CO_2e)
01/04/2012-31/03/2013	175,008	12,361	0	162,647
01/04/2013-31/03/2014	175,008	12,361	0	162,647
01/04/2014-31/03/2015	175,008	12,361	0	162,647
01/04/2015-31/03/2016	175,008	12,361	0	162,647
01/04/2016-31/03/2017	175,008	12,361	0	162,647
01/04/2017-31/03/2018	175,008	12,361	0	162,647
01/04/2018-31/08/2018	116,672	8,241	0	108,431
Total	**1,166,720**	**82,407**	**0**	**1,084,313**
Total number of crediting years	**7**[12]			
Annual average over the crediting period	**175,008**	**12,361**	**0**	**162,647**

B.7. Monitoring plan

B.7.1. Data and parameters to be monitored

[12] The start date of the crediting period under CDM is 01/09/2011. However, according to the Gold Standard (GS) requirements, the start date of the GS crediting period is the maximum of two years prior to the GS registration date, therefore, the start date of the GS crediting period is determined to be 01/04/2012. Thus, the total number of crediting years is calculated as 6+5/12=6.42, which is approximate to 7.

Data / Parameter	Biomass residues categories and quantities used in the project activity
Unit	- Type (i.e.branches and wood scrap.); - Source (obtained from an identified biomass residues producer, etc.); - Fate in the absence of the project activity (scenarios B1 & B3); - Use in the project scenario (scenarios P5); - Quantity (tonnes on dry-basis)
Description	Refer to table in section B4, which quantities of which biomass residues categories are used in which installation(s) under the project activity and what is their baseline scenario. The last column of Table B.3 corresponds to the quantity of each category of biomass residues (tonnes on dry-basis). These quantities should be updated every year of the crediting period as part of the monitoring plan so as to reflect the actual use of biomass residues in the project scenario. These updated values should be used for emissions reductions calculations. Along the crediting period, new categories of biomass residues (i.e. new types, new sources, with different fate) can be used in the project activity. In this case, a new line should be added to the table. If those new categories are of the type B1:,B2: or B3:, the baseline scenario for those types of biomass residues should be assessed using the procedures outlined in the guidance provided in the procedure for the selection of the baseline scenario and demonstration of additionality
Source of data	On-site measurements
Value(s) applied	See table below
Measurement methods and procedures	Use weight meters. Adjust for the moisture content in order to determine the quantity of dry biomass.

Biomass residues category (k)	Biomass residues type	Biomass residues source	Biomass residues fate in the absence of the project activity	Biomass residues use in project scenario	Biomass residues quantity (tonnes)
1	Branches	Off-site from the nearby area	Dumped or burnt in an uncontrolled manner(B1& B3)	Electricity generation on-site (biomass-only boiler)	106,698 Where: Peach: 21,054 Apple: 21,411 Pear: 64,233
2	Wood scrap	Off-site from the nearby area	Dumped or burnt in an uncontrolled manner(B1& B3)	Electricity generation on-site (biomass-only boiler)	103,487

Monitoring frequency	Data monitored continuously and aggregated as appropriate.
QA/QC procedures	Crosscheck the measurements with an annual energy balance that is based on purchased quantities and stock changes
Purpose of data	Calculation of baseline/project emissions
Additional comment	

Data / Parameter	$BR_{PJ,n,y}$
Unit	tonnes on dry-basis
Description	Quantity of biomass residues of category *n* used in power plants which are located at the project site and included in the project boundary in year *y*
Source of data	on-site measurement
Value(s) applied	Pear Branches: 64,233 tons Peach Branches: 21,054 tons Apple Branches: 21,411 tons Wood scrap: 103,487 tons Total: 210,185 tons
Measurement methods and procedures	Use weight meters. Adjust for the moisture content in order to determine the quantity of dry biomass.
Monitoring frequency	Data monitored continuously and aggregated as appropriate.
QA/QC procedures	Crosscheck the measurements with an annual energy balance that is based on purchased quantities and stock changes.
Purpose of data	Calculation of baseline/project emissions
Additional comment	The biomass residue quantities used should be monitored separately for (a) each type of biomass residue (e.g) and each source (e.g. produced on-site, obtained from biomass residues suppliers, obtained from a biomass residues market, obtained from an identified biomass residues producer, etc.)

Data / Parameter	$BR_{n,B1/B3,y}$
Unit	tons of dry matter
Description	Amount of biomass residues category *n* used in the project plant(s) included in the project boundary in year *y* for which B1 or B3 has been identified as the most plausible baseline scenario
Source of data	on-site measurement
Value(s) applied	Pear Branches: 64,233 tons Peach Branches: 21,054 tons Apple Branches: 21,411 tons Wood scrap: 103,487tons Total: 210,185 tons
Measurement methods and procedures	Use weight meters. Adjust for the moisture content in order to determine the quantity of dry biomass.
Monitoring frequency	Data monitored continuously and aggregated as appropriate.
QA/QC procedures	Crosscheck the measurements with an annual energy balance that is based on purchased quantities and stock changes.
Purpose of data	Calculation of baseline/project emissions
Additional comment	-

<table>
<tr><td>Data / Parameter</td><td>For biomass residues categories for which scenarios B1:, B2: or B3: is deemed a plausible baseline alternative, project participants shall demonstrate that this is a realistic and credible alternative scenario</td></tr>
<tr><td>Unit</td><td>tonnes</td></tr>
<tr><td>Description</td><td>- Quantity of available biomass residues of type n in the region
- Quantity of biomass residues of type n that are utilized (e.g. for energy generation or as feedstock) in the defined geographical region
- Availability of a surplus of biomass residues type n (which can not be sold or utilized) at the ultimate supplier to the project and a representative sample of other suppliers in the defined geographical region</td></tr>
<tr><td>Source of data</td><td>Surveys or statistics</td></tr>
<tr><td>Value(s) applied</td><td><table>
<tr><td>Biomass residues type</td><td>Quantity of available biomass residues</td><td>Quantity of biomass residues utilized</td><td>Surplus rate</td></tr>
<tr><td>Pear Branches</td><td>482,366</td><td>131,173</td><td>268%</td></tr>
<tr><td>Peach Branches</td><td>225,135</td><td>46,942</td><td>380%</td></tr>
<tr><td>Apple Branches</td><td>162,267</td><td>43,798</td><td>270%</td></tr>
<tr><td>Wood scrap</td><td>333,000</td><td>195,075</td><td>71%</td></tr>
</table></td></tr>
<tr><td>Measurement methods and procedures</td><td>At the validation stage for biomass residues categories identified ex-ante, and always that new biomass residues categories are included during the crediting period.</td></tr>
<tr><td>Monitoring frequency</td><td>-</td></tr>
<tr><td>QA/QC procedures</td><td>-</td></tr>
<tr><td>Purpose of data</td><td>Calculation of leakage</td></tr>
<tr><td>Additional comment</td><td>-</td></tr>
</table>

Data / Parameter	$FR_{f,m}$
Unit	tonnes
Description	Total mass of freight transported in freight transportation activity *f* in monitoring period m
Source of data	Records by project participants
Value(s) applied	356,850
Measurement methods and procedures	Data monitored continuously
Monitoring frequency	Data monitored continuously
QA/QC procedures	-
Purpose of data	Calculation of project emissions
Additional comment	-

Data / Parameter	$D_{f,m}$
Unit	km
Description	Return trip distance between the origin and destination of freight transportation activity f in monitoring period m
Source of data	Records by project participants
Value(s) applied	100
Measurement methods and procedures	Determined once for each freight transportation activity f for a reference trip based on the information given by the truck driver about the distance from biomass supply site to the project site.
Monitoring frequency	Determined once for each freight transportation activity f for a reference trip.
QA/QC procedures	Check consistency of distance records provided by the truckers by comparing recorded distances with other information from other sources (e.g. maps).
Purpose of data	Calculation of project emissions
Additional comment	If biomass is supplied from different sites, this parameter should correspond to the mean value of km travelled by trucks that supply the biomass residues to the project.

Data / Parameter	$EG_{PJ,gross,y}$
Unit	MWh
Description	Gross quantity of electricity generated in all power plants which are located at the project site and included in the project boundary in year *y*
Source of data	On-site measurements
Value(s) applied	234,000
Measurement methods and procedures	Use calibrated electricity meters.
Monitoring frequency	Continuous measurement and monthly recording
QA/QC procedures	The measurement and calibration will be undertaken no less than once per year according to relevant industrial standards by the qualified third party. The detailed procedures are stated in section B.7.3.
Purpose of data	Calculation of baseline emissions
Additional comment	-

Data / Parameter	$EG_{PJ,aux,y}$
Unit	MWh
Description	Total auxiliary electricity consumption required for the operation of the power plants at the project site
Source of data	On-site measurements
Value(s) applied	16,380
Measurement methods and procedures	Use calibrated electricity meters.
Monitoring frequency	Continuous measurement and monthly recording
QA/QC procedures	The measurement and calibration will be undertaken no less than once per year according to relevant industrial standards by the qualified third party. The detailed procedures are stated in section B.7.3.
Purpose of data	Calculation of baseline emissions
Additional comment	$EG_{PJ,aux,y}$ shall include all electricity required for the operation of equipment related to the preparation, storage and transport of biomass residues (e.g. for mechanical treatment of the biomass, conveyor belts, driers, etc.) and electricity required for the operation of all power plants which are located at the project site and included in the project boundary (e.g. for pumps, fans, cooling towers, instrumentation and control, etc.) ---

Data / Parameter	EG $_{off\text{-}site,\ y}$
Unit	MWh
Description	Gross quantity of electricity consumed off-site in year *y*
Source of data	The data will measured in each and every biomass processing station sites.
Value(s) applied	0
Measurement methods and procedures	Use calibrated electricity meters.
Monitoring frequency	Continuous measurement and record at least annually.
QA/QC procedures	The measurement and calibration will be undertaken according to relevant industrial standards by the qualified third party. The detailed procedures are stated in section B.7.3.
Purpose of data	Calculation of project emissions
Additional comment	-

Data / Parameter	$NCV_{n,y}$
Unit	GJ/tones on dry-basis
Description	Net calorific value of biomass residue category *n* in year *y*
Source of data	on-site measurement
Value(s) applied	Pear Branches: 16.62 Peach Branches: 16.33 Apple Branches: 16.07 Wood scrap: 16.76
Measurement methods and procedures	Measurements shall be carried out at reputable laboratories and according to relevant international standards. Measure the NCV based on dry biomass.
Monitoring frequency	At least every six months, taking at least three samples for each measurement.
QA/QC procedures	Check the consistency of the measurements by comparing the measurement results with measurements from previous years, relevant data sources (e.g. values in the literature, values used in the national GHG inventory) and default values by the IPCC. If the measurement results differ significantly from previous measurements or other relevant data sources, conduct additional measurements. Ensure that the NCV is determined on the basis of dry biomass.
Purpose of data	Calculation of project emissions
Additional comment	-

Data / Parameter	$NCV_{n,y} \cdot EF_{BR,n,y}$
Unit	tCH_4/tonnes
Description	
Source of data	IPCC 2006 Default Value; ACM0018
Value(s) applied	0.001971
Measurement methods and procedures	It is calculated using the conservative IPCC 2006 default values.
Monitoring frequency	-
QA/QC procedures	-
Purpose of data	Calculation of baseline emissions
Additional comment	To determine the CH_4 emission factor, project participants may undertake measurements or use referenced default values. In the absence of more accurate information, it is recommended to use 0.0027 t CH_4 per ton of biomass as default value for the product of NCV_k and $EF_{burning,CH4,k,y}$. The uncertainty of the CH_4 mission factor ($EF_{BR,n,y}$) is in many cases relatively high. In order to reflect this and for the purpose of providing conservative estimates of emission reductions, a conservativeness factor must be applied to the CH_4 emission factor. The level of the conservativeness factor depends on the uncertainty range of the estimate for the CH_4 emission factor. The default CH_4 emission factor of 0.0027 t CH_4/t biomass is used, the uncertainty can be deemed to be greater than 100%, resulting in a conservativeness factor of 0.73. Thus, in this case an emission factor of 0.001971 t CH_4/t biomass should be used.

Data / Parameter	Moisture content of the biomass residues
Unit	%
Description	Moisture content of the biomass residues type *k*
Source of data	on-site measurement
Value(s) applied	Pear Branches:40% Peach Branches: 41% Apple Branches: 40% Wood scrap: 42%
Measurement methods and procedures	Continuously, mean values calculated at least annually.
Monitoring frequency	Continuously, mean values calculated at least annually.
QA/QC procedures	-
Purpose of data	Calculation of baseline/project emissions
Additional comment	-

Data / Parameter	$FF_{projectplant,i,y}$
Unit	Tons/yr
Description	Quantity of fossil fuel type *i* combusted in the biomass residue fired power plant during the year *y*
Source of data	Data used in the PDD is obtained from the project owner. Actual data is to be obtained from continuously on-site measurements.
Value(s) applied	10
Measurement methods and procedures	● Use either mass or volume meters. In cases where fuel is supplied from small daily tanks, rulers can be used to determine mass or volume of the fuel consumed, with the following conditions: The ruler gauge must be part of the daily tank and calibrated at least once a year and have a book of control for recording the measurements (on a daily basis or per shift); ● Accessories such as transducers, sonar and piezoelectronic devices are accepted if they are properly calibrated with the ruler gauge and receiving a reasonable maintenance; ● In case of daily tanks with pre-heaters for heavy oil, the calibration will be made with the system at typical operational conditions.
Monitoring frequency	Continuously measurement and record at least annually.
QA/QC procedures	Cross-check the measurements with an annual energy balance that is based on purchased quantities and stock changes.
Purpose of data	Calculation of project emissions
Additional comment	-

Data / Parameter	$FF_{projectsite,i,y}$
Unit	Tons/yr
Description	Quantity of fossil fuel type *i* combusted at the project site for other purposes that are attributable to the project activity during the year *y*
Source of data	Data used in the PDD is assumed as zero. Actual data is to be obtained from continuously on-site measurements.
Value(s) applied	0
Measurement methods and procedures	● Use either mass or volume meters. In cases where fuel is supplied from small daily tanks, rulers can be used to determine mass or volume of the fuel consumed, with the following conditions: The ruler gauge must be part of the daily tank and calibrated at least once a year and have a book of control for recording the measurements (on a daily basis or per shift); ● Accessories such as transducers, sonar and piezoelectronic devices are accepted if they are properly calibrated with the ruler gauge and receiving a reasonable maintenance; ● In case of daily tanks with pre-heaters for heavy oil, the calibration will be made with the system at typical operational conditions.
Monitoring frequency	Continuously measurement and record at least annually.
QA/QC procedures	Cross-check the measurements with an annual energy balance that is based on purchased quantities and stock changes.
Purpose of data	Calculation of project emissions
Additional comment	-

Data / Parameter	$NCV_{i,y}$
Unit	GJ/t
Description	Net calorific value of the fossil fuel type *i*
Source of data	China Energy Statistical Yearbook 2007,Diesel NCV
Value(s) applied	42.652 for diesel
Measurement methods and procedures	The appropriateness of the data will be reviewed annually
Monitoring frequency	Annually
QA/QC procedures	-
Purpose of data	Calculation of project emissions
Additional comment	The plant is designed to use diesel at this stage. Should any other fossil fuel be used during operation, the same monitoring procedures apply.

Data / Parameter	$EF_{CH4,BF}$
Unit	tCH_4/GJ
Description	CH_4 emission factor for the combustion of biomass residues in the project plant
Source of data	IPCC 2006 Default Value; ACM0018
Value(s) applied	4.11×10^{-5} Where the default CH_4 emission factor of 30kg/TJ is used, the uncertainty is estimated to be 300%, resulting in a conservativeness factor of 1.37. Thus, in this case the value of this parameter is: $EF_{CH4,BF}$=30*1.37=41.1kg/TJ
Measurement methods and procedures	It is calculated using the conservative IPCC 2006 default values. The conservative factor is applied, as specified in the baseline methodology.
Monitoring frequency	-
QA/QC procedures	-
Purpose of data	Calculation of project emissions
Additional comment	-

Data / Parameter	$COEF_i$
Unit	tCO_2/GJ
Description	CO_2 emission factor for fossil fuel type *i*
Source of data	Data used in the PDD is obtained from *2006 IPCC Guidelines for National Greenhouse Gas Inventories*.
Value(s) applied	0.0741 for diesel IPCC 2006 default value (Volume2.Chapter2.P16) , diesel emission Factor
Measurement methods and procedures	The appropriateness of the data will be reviewed annually
Monitoring frequency	Annually
QA/QC procedures	-
Purpose of data	Calculation of project emissions
Additional comment	-

B.7.2. Sampling plan

>>

N/A

B.7.3. Other elements of monitoring plan

>>

Key contents of the monitoring plan for the project include:

1. Management Structure

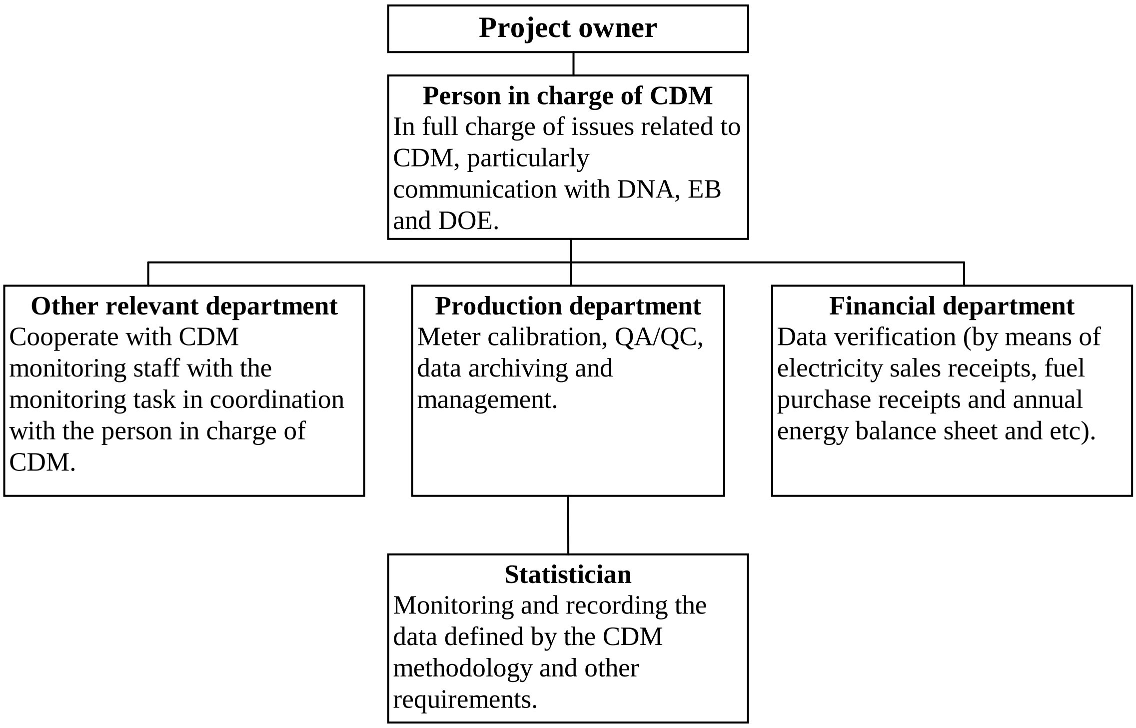

Figure B.3. Management Structure of Monitoring Plan

2. Training Plan

Prior to the commissioning of the proposed project, the task of training staff in charge of executing the monitoring plan will be completed, with the training contents including basic concepts and operation modality of CDM, methods of data monitoring and archiving for CDM projects, quality control and quality assurance of monitoring, and preparation and improvement of key documents of monitoring and verification. Contents and requirements of the training plan will be supplemented, modified and improved according to DOE's requirements, and training records will be kept as well.

3. Methods for Monitoring, Calibration of Meters & Metering

Data and parameters required to be monitored will be monitored as per Section B.7.1, and reading records will be readily available for DOE verification.

1) Monitoring of Electricity Generation, Auxiliary and Off-site Electricity Consumption

For the monitoring of electricity generation and on-site auxiliary electricity consumption, the project owner will define the metering arrangements and the required quality control procedures to ensure accuracy. The metering equipment will be properly calibrated and checked annually for accuracy according to Technical Administrative Code of Electric Energy Metering (DL/T448-2000). The project owner will prepare backup procedures to deal with any meter errors. Calibration is carried out at least annually by the Grid with the records being provided to the project owner, and these records will be maintained by the project owner and the third party designated. For cross-check the electricity generation and auxiliary consumption, the data of electricity supplied to the grid and purchased from the grid will be proved by the invoice or the power transaction note, which will be provided to DOE during the verification.

The off-site electricity consumption will be monitored by calibrated meters continuously in each and every biomass processing station. The metering equipment will be properly calibrated and will be recorded monthly. For cross-check the off-site electricity consumption, the electricity purchased from the grid will be proved by the power company, and the related evidence will be provided to DOE during the verification.

2) Biomass Residues Consumption Monitoring
Use weight meters and adjust for the moisture content. The project owner will conduct an energy balance analysis to verify the amounts of biomass residues purchased at biomass procurement department of the power plant and combusted by the boilers. If significant difference among the three sources is identified, the project owner will conduct further check the original records to find out reasons and correct. If the significant difference can't be resolved, the most conservative value of biomass utilized by the proposed project will be applied as monitoring results.

3)Fossil fuel consumption
Fossil fuel consumption by the boiler during operation will be recorded and monitored during the operational period of the proposed project. The diesel for boiler start-ups will be stored in barrels. And its consumption will be metered through the flow meter. All relevant records will be maintained for verification. The purchase receipt will be used for cross-check.

4. Error Disposal Procedure
Error disposal procedure will be implemented according to the stipulations in the Power Purchase Agreement, Parallel Operation Agreement, and Biomass purchase agreement and so on. The calibration and on-site verification will be implemented as per relevant national and sectoral norms to ensure the precision of meters. And all the records will be documented and maintained by the project owner for DOE's verification.

5. The Procedures for Emergency Preparedness
In order to avoid any kind of discrepancies in the monitoring procedures in cases of potential breakdowns the following emergency preparedness plan has been adopted at the plant.
I. There is a check meter available for main electricity supply meter to verify the monitored values.
II. The Distributed Control System (DCS) will automatically shut off the boilers upon detecting an emergency.

6. Improvement of Quality Assurance and Quality Control
The quality assurance and quality control procedures for recording, maintaining and archiving data shall be improved as part of this CDM project activity according to CDM EB rules and real practice in terms of the need for verification of the emission reductions on an annual basis according to this PDD.

7. Data Management System
·Specific staff will be appointed by the project owner to take the overall responsibility for monitoring greenhouse gas emission reductions and keeping all monitored data collected as part of monitoring archived electronically and be kept at least for 2 years after the end of the whole 3*7 year crediting period.
·Electronic data and documents, including readings from electric meters connected into the computer central control system, will be regularly copied and archived via optical discs and storage tapes, and kept at least two years after the end of the crediting period.
·Written data and documents, including receipts for cross-checking of data, will be copied and archived with an explanation of the department or company where the original copy is kept, and kept at least two years after the end of the crediting period.

8. Internal Review of Reported Results/Data
After the draft monitoring report, relevant data and documents required in Section B.7 were prepared, an internal review meeting will be held to evaluate the quality and risks of monitoring report. The meeting will focus on

I. If the data collected satisfy the requirement of verification.
II. If the calculation process is correct, conservative and transparent.
III. If there are risks of CERs deduction existed and how to mitigate.

SECTION C. Duration and crediting period
C.1. Duration of project activity
C.1.1. Start date of project activity
>>
12/08/2010 (the date of boiler contract signed)

C.1.2. Expected operational lifetime of project activity
>>
20 years

C.2. Crediting period of project activity
C.2.1. Type of crediting period
>>
Renewable crediting period

C.2.2. Start date of crediting period
>>
01/04/2012

C.2.3. Length of crediting period
7*3[13]

SECTION D. Environmental impacts
D.1. Analysis of environmental impacts
>>
The Environmental Impact Assessment (EIA) for this proposed project was carried out by Anhui Science Technical Consultancy Center. The EIA report was approved by Anhui Province Environmental Protection Bureau on 22/07/2010.

According to the Environmental Impact Assessment, environmental impacts possibly caused by the proposed project and protect and guard measures adopted by the project owner are analyzed as follows:

<u>Air Pollution</u>
The sources of dusts during the construction phase of the power plant are mainly from the excavation of earthwork, on-site stacking, transportation of construction materials, removal of existing unused building, and exhaust gas of the on-site road. In order to mitigate the impact of dusts to the surrounding environment, a baffle-plate or a concrete wall will be built during construction.
The main pollutant during the operational phase is the soot from boilers caused by biomass residues combustion. It will be treated by bag-type dust remover, the efficiency of which can reach to 99.95%. The concentration of the emissions of the main pollutant therefore is lower than the National Emission Standard for 3 periods of time, which is the Emission Standard of Air Pollutant Applied to Thermal Power Plant (GB13223-2003).
Due to the big consumption of biomass residues by the proposed project, the transportation of biomass residues may cause impact to the air quality along the transportation line if the vehicles used are not clean or road conditions are bad. To reduce the pollution from fuel scatter and road dusts during

[13] For the length of the first crediting period, please refer to the footnote 12.

transportation, solutions including the application of complete close structure for trestles and storage sheds, installation of dust remover at the hopper of boiler, frequent cleaning of the vehicles, transportation in covered-manner, and frequent cleaning of the roads will be undertaken.

Water Pollution
The wastewater emissions are mainly from domestic sewage, and the cooling system. The domestic sewage will be treated by a combined process of biology and chemistry to ensure the quality of output water accord with the Grade II of the Standard of Comprehensive Emissions of Wastewater. The wastewater from the cooling system will be neutralized and discharged directly. Due to the wastewater treatment to be conducted by the project, the treated water will be discharged after reaching the standard with few pollutants, resulting in little impact to the local water, during construction and operation phases.

Noise Pollution
Noises from the machine such as navvy, bulldozer, pile driver, and cement mixer are the major noise pollution sources. Therefore, engineering machines with low noises will be chosen to reduce the noise. The noise of the exhaust from the boilers is one of the main pollutions during operation of the power plant, and will be minimized by installation of noise reduction equipment and strengthening of management control. Through measures of sound insulation, noise reduction and vibration absorbing material applied to the equipments with high level of noise, noises from various sources can be effectively controlled. The noise assessment within the boundary of the plant demonstrates that the noise level monitored inside the proposed project for both daytime and night accords with the Category 3 of the Standard.

Solid waste Pollution
The domestic solid waste generated during construction will be disposed by municipal environmental and sanitary authority. The construction waste will be recycled, and the rest will be transported and dumped at the garbage plant appointed by the municipality. The ash from the boilers during power generation can be used as good fertilizer for agriculture. All the ash will be used as fertilizer in local farmlands, which will not bring any impact to the environment.

D.2. Environmental impact assessment
>>
Environmental impacts arising from the proposed project are considered insignificant; therefore, it is not necessary to make additional explanation here.

SECTION E. Local stakeholder consultation
E.1. Solicitation of comments from local stakeholders
>>
In Nov. 2010, the project owner carried out a survey on the local residents and comments received from the survey are summarized as follows.

E.2. Summary of comments received
>>
The survey was conducted through distributing and collecting responses to a questionnaire. In total 30 out of 30 questionnaires were returned with a 100% response rate. The basic structure of the respondents is illustrated in Table E1.

TableE1. Statistics on the basic conditions of people surveyed

	Range	Population	Ratio		Range	Population	Ratio
Age	① Below	6	20.00%	Sex	① Male	21	60%

	30						
	②30-40	16	53.00%				
	③40-50	8	27.00%		② Female	9	30%
	④ Above 50	0	0.00%				
Occupation	① worker	6	20%	Education	① Primary school	1	3.33%
	② Farmer	18	60.00%		③ Junior School	13	43.33%
	④ Manager	2	6.67%		② Senior school	6	20.00%
	⑤ Others	4	13.33%		③ College	5	16.67%
					④ University	5	16.67%

As shown in Table E1, people surveyed are representative of the public in terms of occupation and educational levels. Therefore their attitudes towards the Project can be a comprehensive reflection of the attitudes of the local residents possibly affected by the Project. Among the 30 responses to the questionnaire:

29 people surveyed (accounting for 97%) hold a supportive attitude towards the project (the rest one did not express his opinion), which was considered to reduce environmental pollution (77%), improve economy(90%), provide employment opportunity (76.67%).

As the suggestion towards the project, people surveyed supposed it is necessary to construct the project.

The survey shows that most of the residents at the project site consider that construction of the project will benefit the local economic development, but they still have some concerns about the air pollution and noise pollution possibly caused by the project, but they still have some concerns about the air pollution and noise pollution possibly caused by the project. The project owner has given adequate consideration to noise control in the process of project design and construction and taken appropriate measures. Compared to the baseline scenario, implementation of the project will reduce emissions of air pollutants as a whole; the advanced air pollution control technologies as mentioned in Section F.1 will be applied to effectively abate the air pollutant emissions.

E.3. Report on consideration of comments received

>>

The project owner has taken full consideration of relevant comments and suggestions from stakeholders in the process of project construction. People and local government are all very supportive of the Project therefore it is not necessary to modify the Project due to the comments received.

SECTION F. Approval and authorization

>>

Letters of Approval for Biomass Power Generation Project by Everbright Alternative Energy (Dangshan) Limited were issued by the China’s DNA on 13/06/2011, and were issued by UK’s DNA on 29/06/2011.

- - - - -

Appendix 1: Contact information of project participants

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Appendix 2: Affirmation regarding public funding

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

Appendix 3: Applicability of selected methodology

No other information.

Appendix 4: Further background information on ex ante calculation of emission reductions

The baseline information for calculation of OM, BM and CM emission factor of East China Power Grid is shown in 2012Baseline Emission Factors for Regional Power Grids in China by the Office of the National Coordination Committee on Climate Change of China at http://cdm.ccchina.gov.cn. The concrete process is shown in the following tables.

Table A1 Calculation of simple OM emission factor of the East China Power Grid in 2008

Fuels	Units	Shanghai	Jiangsu	Zhejiang	Anhui	Fujian	Total	Emission factor (tC/TJ)	OXID (%)	Fuel emission factor **(kgCO2/TJ)**	NCV **(MJ/t,km3)**	Emission **（tCO2e）**
		A	**B**	**C**	**D**	**E**	**F=A+B+C +D+E**	**G**	**H**	**I**	**J**	**K=F×I×J/100000 (quality unit); K=F×I×J/10000 (volume unit)**
Raw coal	10^4 ton	2964.04	10890.2	7316.17	4887.18	3264.88	**29322.47**	25.8	100	87,300	20,908	535,213,779
Washed coal	10^4 ton						**0**	25.8	100	87,300	26,344	0
Other washed coal	10^4 ton		513.34		33.49		**546.83**	25.8	100	87,300	8,363	3,992,351
Module coal	10^4 ton						**0**	26.6	100	87,300	20,908	0
Coke	10^4 ton			31.12			**31.12**	29.2	100	95,700	28,435	846,847
Coke oven gas	10^8 m^3	0.5	11.65	0.13	5.62	0.31	**18.21**	12.1	100	37,300	16,726	1,136,085
Other gas	10^8 m^3	98.42	77.84	3.57		6.36	**186.19**	12.1	100	37,300	5,227	3,630,092
Crude oil	10^4 ton			8.31			**8.31**	20	100	71,100	41,816	247,066
Gasoline	10^4 ton						**0**	18.9	100	67,500	43,070	0
Diesel	10^4 ton	5.85	4.04	2.05		1.04	**12.98**	20.2	100	72,600	42,652	401,930
Fuel oil	10^4 ton	24.43	0.39	13.48		1.81	**40.11**	21.1	100	75,500	41,816	1,266,316
LPG	10^4 ton						**0**	17.2	100	61,600	50,179	0
Refinery gas	10^4 ton	0.05	0.28		1.5	0.57	**2.4**	15.7	100	48,200	46,055	53,276
Natural gas	10^8 m^3	3.65	25.14	8.99		0.19	**37.97**	15.3	100	54,300	38,931	8,026,681
Other petroleunm products	10^4 ton	21.33	3.09				**24.42**	20	100	72,200	41,816	737267.9318
Other coking products	10^4 ton						**0**	25.8	100	95,700	28,435	0
Other energy	10^4 ton	15.88	62.57	34.54		8.99	**121.98**	0	0	0	0	0
Total												**555,551,691**

Data source: China Energy Statistical Yearbook 2009

Table A2 The fuel fired electricity generation and calculation of emission factor of East China Power Grid in 2008

Province	The fuel fired electricity generation（MWh）	The rate of electricity self-consumption（%）	The fuel fired electricity connected to the grid（MWh）
Shanghai	79,400,000	4.88	75,525,280
Jiangsu	273,500,000	5.51	258,430,150
Zhejiang	174,800,000	5.77	164,714,040
Anhui	107,400,000	5.72	101,256,720
Fujian	74,800,000	5.61	70,603,720
From Shanxi Yangcheng			16,903,640
From CCPG			35,684,610
Emission factor of Yangcheng			1.004945
Simple OM of CCPG			1.04205
The Total			**723,118,160**
Total Emission (tCO_2)			**609,724,008**
$EF_{OM,y}$ **for 2008**			**0.84319**
Data source: China Power Electric Yearbook 2009			

Table A3 Calculation of simple OM emission factor of the East China Power Grid in 2009

Fuels	Units	Shanghai	Jiangsu	Zhejiang	Anhui	Fujian	Total	Emission factor (tC/TJ)	OXID (%)	Fuel emission factor **(kgCO2/TJ)**	NCV **(MJ/t,km3)**	Emission （**tCO2e**）
		A	**B**	**C**	**D**	**E**	**F=A+B+ C+D+E**	**G**	**H**	**I**	**J**	**K=F×I×J/100000 (quality unit); K=F×I×J/10000 (volume unit)**
Raw coal	10^4 ton	2860.29	10875.32	7592.14	5782.21	3539.1	**30649.06**	25.8	100	87,300	20,908	559,427,607
Washed coal	10^4 ton						**0**	25.8	100	87,300	26,344	0
Other washed coal	10^4 ton		324.83		50.83		**375.66**	25.8	100	87,300	8,363	2,742,656
Coke	10^4 ton			50.46			**50.46**	29.2	100	95,700	28,435	1,373,132
Coke oven gas	10^8 m^3	1.02	8.96	0.29	5.64	0.47	**16.38**	12.1	100	37,300	16,726	1,021,915
Other gas	10^8 m^3	109.27	101.42	3.67		8.42	**222.78**	12.1	100	37,300	5,227	4,343,477
Crude oil	10^4 ton			3.36			**3.36**	20	100	71,100	41,816	99,897
Gasoline	10^4 ton						**0**	18.9	100	67,500	43,070	0
Diesel	10^4 ton	1.03	1.67	1.49		4.16	**8.35**	20.2	100	72,600	42,652	258,561
Fuel oil	10^4 ton	13.13		8.87		0.46	**22.46**	21.1	100	75,500	41,816	709,086
LPG	10^4 ton						**0**	17.2	100	61,600	50,179	0
Refinery gas	10^4 ton	0.06	0.17		1.97	14.15	**16.35**	15.7	100	48,200	46,055	362,946
Natural gas	10^8 m^3	5.37	22.78	8.87	0.23	5.74	**42.99**	15.3	100	54,300	38,931	9,087,885
Other petroleunm products	10^4 ton	18.6	5.31				**23.91**	20	100	72,200	41,816	721870.4443
Other coking products	10^4 ton						**0**	25.8	100	95,700	28,435	0
Other energy	10^4 ton	14.84	89.4	43.75	33.62	12.59	**194.2**	0	0	0	0	0
Total												**580,149,033**

Data source: China Energy Statistical Yearbook 2010

Table A4 The fuel fired electricity generation and calculation of emission factor of East China Power Grid in 2009

Province	The fuel fired electricity generation（MWh）	The rate of electricity self-consumption（%）	The fuel fired electricity connected to the grid（MWh）
Shanghai	78,200,000	5.22	74,117,960
Jiangsu	282,500,000	5.38	267,301,500
Zhejiang	185,500,000	5.66	175,000,700
Anhui	129,900,000	5.59	122,638,590
Fujian	88,600,000	5.1	84,081,400
From Shanxi Yangcheng			16,626,120
From CCPG			36,599,120
Emission factor of Yangcheng			0.964179
Simple OM of CCPG			0.95455
The Total			**776,365,390**
Total Emission (tCO_2)			**631,115,448**
$\boldsymbol{EF_{OM,y}}$ **for 2009**			**0.81291**
Data source: China Power Electric Yearbook 2010			

Table A5 Calculation of simple OM emission factor of the East China Power Grid in 2010

Fuels	Units	Shanghai	Jiangsu	Zhejiang	Anhui	Fujian	Total	Emission factor (tC/TJ)	OXID (%)	Fuel emission factor **(kgCO2/TJ)**	NCV **(MJ/t,km3)**	Emission **（tCO2e）**
		A	**B**	**C**	**D**	**E**	**F=A+B+C +D+E**	**G**	**H**	**I**	**J**	**K=F×I×J/100000 (quality unit); K=F×I×J/10000 (volume unit)**
Raw Coal	10^4 ton	3421.2	12612.92	8254.08	5230.09	3371.11	**32889.4**	25.8	100	87,300	20,908	600,319,825
Cleaned Coal	10^4 ton						**0**	25.8	100	87,300	26,344	0
Other Washed Coal	10^4 ton		230.14	2.25	1301.82		**1534.21**	25.8	100	87,300	8,363	11,201,112
Coke	10^4 ton						**0**	29.2	100	95,700	28,435	0
Coal Gangue	10^4 ton		20.69	1.04	236.33	34.67	**292.73**	25.8	100	87,300	8,363	2,137,192
Coke Oven Gas	10^8 m^3	0.67	10.8	0.26	5.28	0.19	**17.2**	12.1	100	37,300	16,726	1,073,073
Blast furnace gas	10^8 m^3	106.03	108.95	14.19	76.22	6.21	**311.6**	70.8	100	219,000	3,763	25,678,863
Converter gas	10^8 m^3	12.19	4.31	0.95	1.09	0.46	**19**	46.9	100	145,000	7,945	2,188,848
Other Gas	10^8 m^3						**0**	12.1	100	37,300	5,227	0
Crude Oil	10^4 ton			3.23			**3.23**	20	100	71,100	41,816	96,032
Gasoline	10^4 ton						**0**	18.9	100	67,500	43,070	0
Diesel Oil	10^4 ton	0.9	1.98	1.04		3.19	**7.11**	20.2	100	72,600	42,652	220,164
Fuel Oil	10^4 ton	17.53	0.06	5.14		0.73	**23.46**	21.1	100	75,500	41,816	740,658
Naphtha	10^4 ton						**0**	20.2	100	72,600	43,906	0
Lubricating oil	10^4 ton						**0**	20	100	71,900	41,398	0
Paraffin wax	10^4 ton						**0**	20	100	72,200	39,934	0
Solvent oil	10^4 ton						**0**	20	100	72,200	42,945	0
Petroleum asphalt	10^4 ton						**0**	21	100	69,300	38,931	0

Petroleum coke	10^4 ton	23.49		37.5			**60.99**	26.6	100	82,900	31,947	1,615,263
LPG	10^4 ton						**0**	17.2	100	61,600	50,179	0
Refinery Gas	10^4 ton	0.76	0.16		1.18	42.17	**44.27**	15.7	100	48,200	46,055	982,728
LNG	10^4 ton			2.76			**2.76**	15.3	100	54,300	51,434	77,083
Natural Gas	10^8 m^3	7.47	24.39	17.53		19.09	**68.48**	15.3	100	54,300	38,931	14,476,352
Other Petroleum Products	10^4 ton	0.05	1.22				**1.27**	20	100	72,200	41,816	38342.76304
Other Coking Products	10^4 ton						**0**	25.8	100	95,700	28,435	0
Other Energy	10^4 ton	15.59	112.68	49.33	28.77	1.1	**207.47**	0	0	0	0	0
Total												**660,845,535**
Data source: China Energy Statistical Yearbook 2011												

Table A6 The fuel fired electricity generation and calculation of emission factor of East China Power Grid in 2010

Province	The fuel fired electricity generation（MWh）	The rate of electricity self-consumption（%）	The fuel fired electricity connected to the grid（MWh）
Shanghai	94,200,000	4.98	89,508,840
Jiangsu	330,500,000	5.27	313,082,650
Zhejiang	208,200,000	5.34	197,082,120
Anhui	142,600,000	5.37	134,942,380
Fujian	89,100,000	5.17	84,493,530
From NCPG			16,547,520
From CCPG			40,113,670
Simple OM of NCPG			1.00211
Simple OM of CCPG			0.99213
The Total			**875,770,710**
Total Emission (tCO_2)			**717,225,962**
$EF_{OM,y}$ for 2010			**0.81897**
Data source: China Power Electric Yearbook 2011			

TableA7 The three years weighted average emission factor of East China Power Grid

Years	**2008**	**2009**	**2010**	Three years average emission factor （tCO_2e/MWh）
Total CO_2 emission(tCO_2e)	609,724,008	631,115,448	717,225,962	**0.82436**
The total fuel fired electricity connected to the grid(MWh)	723,118,160	776,365,390	875,770,710	
$EF_{OM,y}$	**0.84319**	**0.81291**	**0.81897**	

Table A8 Calculation the weight of CO_2 emissions from solid fuels, liquid fuels and gas fuels among the total emissions in ECPG

Fuels	Units	Shanghai	Jiangsu	Zhejiang	Anhui	Fujian	Total	NCV	Emission factor	Oxid	Emission
		A	B	C	D	E	F=A+B+C+D+E	G	H	I	J=F×G×H×I/100,000(quality unit); J=F×G×H×I/100,00 (volume unit)
Raw Coal	10^4t	3,421.20	12,612.92	8,254.08	5,230.09	3,371.11	32,889.40	20,908	87,300	1	600,319,825
Cleaned Coal	10^4t	0	0	0	0	0	0.00	26,344	87,300	1	0
Other Washed Coal	10^4t	0	230.14	2.25	1301.82	0	1,534.21	8,363	87,300	1	11,201,112
Briquettes	10^4t	0	0	0	0	0	0.00	20,908	87,300	1	
Coal Gangue	10^4t	0	20.69	1.4	236.33	34.67	293.09	8,363	87,300	1	2,139,820
Coke	10^4t	0	0	0	0	0	0.00	28,435	95,700	1	0
Other Coking Products	10^4t	0	0	0	0	0	0	28,435	95,700	1	0
Total of solid fuels											**613,660,758**
Crude Oil	10^4t	0	0	3.23	0	0	3.23	41,816	71,100	1	96,032
Gasoline	10^4t	0	0	0	0	0	0	43,070	67,500	1	0
Diesel Oil	10^4t	0.9	1.98	1.04	0	3.19	7.11	42,652	72,600	1	220,164
Fuel Oil	10^4t	17.53	0.06	5.14	0	0.73	23.46	41,816	75,500	1	740,658
Naphtha	10^4t	23.49	0	37.5	0	0	60.99	31,947	82,900	1	1,615,263
Other petroleum products	10^4t	0.05	1.22	0	0	0	1.27	41,816	75,500	1	40,095
Total of liquid fuels											**2,712,211**
LPG	10^4t	0	0	0	0	0	0	50,179	61,600	1	0
Coke Oven Gas	10^8m^3	0.67	10.8	0.26	5.28	0.19	17.2	16,726	37,300	1	1,073,073
Blast furnace gas	10^8m^3	106.03	108.95	14.19	76.22	6.21	311.6	3,763	219,000	1	25,678,863
Converter gas	10^8m^3	12.19	4.31	0.95	1.09	0.46	19	7,945	145,000	1	2,188,848
Other Gas	10^8m^3	0	0	0	0	0	0	5,227	37,300	1	0
Refinery Gas	10^4t	0.76	0.16	0	1.18	42.17	44.27	46,055	48,200	1	982,728

LNG	10^4t	0.00	0	2.76	0	0	2.76	51,434	54,300	1	77,083
Natural Gas	10^8m^3	7.47	24.39	17.53	0	19.09	68.48	38,931	54,300	1	14,476,352
Total of gas fuels											**44,476,947**
Other Energy	10^4t	15.59	112.68	49.33	28.77	1.1	207.47	0	0	1	0
Total of all fuels											**660,849,916**
Data source: China Energy Statistical Yearbook 2011											

Table A9 The emission factor of the most efficient commercial coal-fueled, oil-fueled and gas-fueled power plant

	Variable	Efficiency of electricity supply	Emission factor of the fuels(kgC/TJ)	OXID	Emission factor (tCO_2e/MWh)
		A	B	C	D=3.6/A/1,000,000×B×C
Coal-fueled power plant	$EF_{Coal,Adv,y}$	39.65%	87,300	1	0.7927
Oil-fueled power plant	$EF_{Oil,Adv,y}$	51.93%	75,500	1	0.5234
Gas-fueled power plant	$EF_{Gas,Adv,y}$	51.93%	54,300	1	0.3765

TableA10 the weight of CO_2 emission from solid, liquid and gas fuels among the total emissions and the thermal emission factor of ECPG

$\lambda_{Coal,y}$	$\lambda_{Oil,y}$	$\lambda_{Gas,y}$	$EF_{Thermal,y}$ (tCO_2e/MWh) ($\lambda_{Coal,y} * EF_{Coal,Adv,y} + \lambda_{Oil,y} * EF_{Oil,Adv,y} + \lambda_{Gas,y} * EF_{Gas,Adv,y}$)
0.9286	0.0041	0.0673	0.7636

Table A11 Calculation of BM emission factor of ECPG

	2007 installed capacity	*2008 installed capacity*	*2009 installed capacity*	*2010 installed capacity*	*Newly added installed capacity between 2007 and 2010*	*Weight in newly added installed capacity*
	A	B	C	C	D	E
Fossil fueled(MW)	138,650	148,700	157,970	172,710	52,660	90.23%
Hydro power(MW)	19,970	22,240	23,300	23,630	3,660	6.27%
Nuclear power(MW)	5,070	5,070	5,130	5,790	720	1.23%
Wind power(MW)	1,096	1,062	1,689	2,421	1,325	2.27%
Total(MW)	**164,786**	**177,072**	**188,089**	**204,551**	**58,365**	**100%**
Share in 2010 installed capacity					28.53%	
BM tCO_2/MWh	**0.6889**					
Data source: China Power Electric Yearbook 2009-2011						

CM＝0.5×OM+0.5×BM＝0.5×0.82436+0.5×0.6889＝0.7566 tCO_2e/MWh

Appendix 5: Further background information on monitoring plan

No other information.

Appendix 6: Summary of post registration changes

N/A

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History of the document

Version	Date	Nature of revision
04.1	11 April 2012	Editorial revision to change version 02 line in history box from Annex 06 to Annex 06b.
04.0	EB 66 13 March 2012	Revision required to ensure consistency with the “Guidelines for completing the project design document form for CDM project activities” (EB 66, Annex 8).
03	EB 25, Annex 15 26 July 2006	
02	EB 14, Annex 06b 14 June 2004	
01	EB 05, Paragraph 12 03 August 2002	Initial adoption.
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