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

CONTENTS

Annexes

SECTION A. General description of project activity

A.1 Title of the project activity:

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Straw generation project in Wei county Hebei province, P.R. China
PDD version 3.4
Date: Dec. 03, 2007

A.2. Description of the project activity:

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The proposed project is located in Wei county, Hebei province, generating by utilizing cotton straw as fuel. The install capacity of this project is 1×25MW and the water-cooling librated boiler of1×130t/h will be installed in the project. The annual straws' consumption is about 119,792t, and 126,500MWh electricity will be expected to deliver annually to North China Power Grid (NCPG).

When the proposed project is put into operation, the GHG emission reductions are from two components. Firstly, it will substitute some electricity generation of NCPG dominated by fossil fuel electricity, and thus will reduce the coal consumption. Secondly, the proposed project will use straw in high efficiency, which will reduce CH_4 emissions because the biomass is dumped or left to decay or burned in an uncontrolled manner in the absence of the proposed project. The estimated annual GHG emission reductions are130,638 tCO_2e.

The proposed project makes good use of the renewable straws as fuels. It will produce positive economic and environmental benefits and contributes to the local sustainable development through following aspects:

- By utilizing cotton straws as fuel, saving the amount of coal use and making the straws utilization in high efficiency, which is consistent with China's national energy policy and industry policy;
- To reduce the cotton wastes' pollution on environment while being treated, thus improve the local environment.
- The ash as by-product of straws burning can be turned back to the peasants as ash fertilizer for free, which is not only improve the environment but also benefit the peasants.
- To be helpful for advanced technology transfer to China since the key equipment and technology are from Denmark BWE Company.
- The proposed project will offer 100 job opportunities and will facilitate the development of the relevant industries to be benefit for the local economic development.

In a word, the proposed project can meet the demand of clean production from the aspects of resource utilizing in high efficiency, advanced technology promotion, energy saving, and pollution emission reduction, which will facilitate the local sustainable development.

A.3. Project participants:

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Name of Party involved (*) ((host) indicates a host	Private and/or public entity(ies)	Kindly indicate if the Party involved

Party)	project participants (*) (as applicable)	wishes to be considered as project participant (Yes/No)
P.R. China	National Bio Energy Co., Ltd., project owner and operator.	No
United Kingdom	Climate Change Capital Carbon Fund II s.à r.l. , CER buyer	No
United Kingdom	Climate Change Capital Carbon Managed Account Limited, CER buyer.	No

National Bio Energy Co., Ltd. is a shareholding company established with a registered equity capital of 500 million RMB (55% from the Shenzhen State Power Scientech Development Co., Ltd and 45% from Dragon Power Co. Ltd.). Its business focuses on investment, development and operation of biomass power generation plants in China.

Climate Change Capital Carbon Fund II s.à r.l. (C4F2)

C4F2 is the second private carbon fund managed by Climate Change Capital, and is currently the world's largest carbon fund. C4F2 partners with CDM and JI project developers around the world, purchasing carbon credits and providing finance for projects which reduce greenhouse gas emissions. C4F2's investors include two of the world's largest pension funds, ABP and PGGM of the Netherlands, as well as Standard Chartered Bank and the UK-based international energy company Centrica.

Climate Change Capital Carbon Managed Account (C4MA)

C4MA is a UK limited company, established for the purpose of procuring carbon credits for British Gas Trading, the trading arm of UK-based utility Centrica.

For detailed information, please refer to Annex I.

A.4. Technical description of the project activity:

A.4.1. Location of the project activity:

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A.4.1.1. Host Party(ies):

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P.R. China

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

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Hebei Province

A.4.1.3. City/Town/Community etc:

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Heying town, Wei County,Xingtai city

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

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Wei County lies in southeast of Hebei Province, to its north is Shijiangzhuang City of 138km, and to its west is Xingtai City of 75km.

The proposed project is located in 8km away from the north of Wei County centre. To its east is Xiangying of 1900m, to its southwest is Renliji of 1000m and to its southeast is Beitaiji of 1500m.

The detail location information of the project is shown in figure 1.

The proposed project is located between north latitude of 37°03′45″ and 37°03′53″, east longitude of 115º16′42″and 115º16´36″.

Figure 1: project location (Weixian County, Xingtai city, Hebei province, P R. China)

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

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Category 1, energy industries (renewable sources)

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

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The proposed project will install the water-cooling librated boiler of 1×130t/h with high temperature and high pressure, the equipment and advanced technology are imported from Denmark BWE Company, with burning completely and no knotting residue,. This technology has been operated successfully in some European countries such as Denmark, England and Germany, etc.

The install capacity of the proposed project is of 1×25MW with high temperature and high pressure, single-pumping. The centralized controlling room for boiler and a steam engine will be set up with DCS mode, and the control equipment is made in domestic. The boiler use one chimney with the height of 80 meters together .Natural cooling tower system of indirect will be used in the project.

Straws are packed by collecting stations as required and to be transported by cars to the factory after air-dried (sun-dried). And then straws will be crushed into broken segments (about 10kwh/ton of straw electricity is estimated, and will be monitored ex-post), then to be put into the boiler by transferring machine. Steam generated is used for power generation, which is delivered to the NCPG. At the same time, the soot and smog are collected by the hop-pocket dust catcher and then carried into ash storeroom. The dry ash and the residue of the boiler will be collected and transferred mechanically.

The implement of the proposed project will facilitate to the related advanced technology transfer from developed countries to China.

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

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Annual GHG emission reductions of the proposed project are estimated to be130,638 tCO_2e. For detailed calculation please refer to section B.6.4. During the first crediting period (1/3/2008-31/3/2015), the total GHG emission reductions of the proposed project are estimated to be 914,466 tCO_2e.

The crediting period is expected to be renewed to 21 years in total. As the project is planned to start from 1/3/2008 with the renewable crediting periods, the emission reductions during the first crediting period are estimated as:

Day/Month/Years	**Annual estimation of emission reductions in tonnes of CO_2e**
1/3/2008-31/3/2009	**130,638**
1/3/2009-31/3/2010	**130,638**
1/3/2010-31/3/2011	**130,638**
1/3/2011-31/3/2012	**130,638**
1/3/2012-31/3/2014	**130,638**
1/3/2013-31/3/2014	**130,638**
1/3/2014-31/3/2015	**130,638**
Total estimated reductions (tonnes of CO_2e)	914,466
Total number of crediting years	7
Annual average over the crediting period of estimated reductions (tonnes of CO_2e)	130,638

A.4.5. Public funding of the project activity:

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No public funding is involved in this project activity.

SECTION B. Application of a baseline and monitoring methodology

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

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Version 04 of ACM0006: "Consolidated baseline methodology for grid-connected electricity generation from biomass residues" and conjunction with the approved monitoring methodology (referred as The Methodology), Version 06 of ACM0002:"Consolidated baseline methodology for grid-connected electricity generation from renewable source" and Version 03 of "Tool for the Demonstration and Assessment of Additionality". More information about The Methodology can be found on the website: http://cdm.unfccc.int/methodologies/PAmethodologies/approved.html

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

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The proposed project is a newly built power plant fuelled with straws, and then a grid-connected renewable energy power generation project, which is full consistent with the applicability conditions of version 04 of ACM0006, detailed information is listed in the following table:

Comparison with applicability conditions of ACM0006 and the proposed Project

Applicability conditions of ACM0006	**The proposed project**
No other biomass types than biomass residues, as defined in the Methodology, are used in the project plant and these biomass residues are the predominant fuel used in the project plant (some fossil fuels may be co-fired);	Predominant fuels used by the proposed project are cotton straw.
For projects that use biomass residues from a production process (e.g. production of sugar or wood panel boards), the implementation of the project shall not result in an increase of the processing capacity of raw input (e.g. sugar, rice, logs, etc.) or in other substantial changes (e.g. product change) in this process;	The straws used by the proposed project are by-products of agriculture crops, not from a production process.
The biomass used by the project facility should not be stored for more than one year;	The straws are directly bought from the farmers at the temporary storage stations and the straws should not be stored for more than one year. Since the project is a newly installed power plant, all biomass residue for the project activity were collected at the 4th quarter of last year. In other words, the biomass stored currently has not exceeded the limitation of 1 year. In the entire crediting period, the biomass stored will not be exceeded the limitation of 1 year. From

	the view of net calorific value (NCV) of the straw and the usual consideration of economics, the biomass used in the plant will also not stored above 1 year. First, the biomass stored above 1 year will be decay and its NCV will decrease. From the energy utility, the owner prefers to use new biomass to the decay biomass. Secondly, the longer the biomass is stored, the more storehouses and workers needed, and more cost are needed. In fact the owner uses the biomass by "early bought biomass is used early". This strategy will save cost and storehouse, need smaller amount of active capital, and improve the energy efficiency.
No significant energy quantities, except from transportation of the biomass, are required to prepare the biomass residues for fuel combustion, i.e. projects that process the biomass residues prior to combustion (e.g. esterification of waste oils) are not eligible under this methodology.	Except from transportation of the straws, the proposed project has no significant consumption of fossil fuels (for straws rushing into broken segments, about 10kwh/ton of straw electricity is estimated, and will be monitored ex-post).

As described above, the proposed project activity is full consistent with the applicability conditions of ACM0006, and ACM0006 is applicable for the proposed project.

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

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According to the version 04 of ACM0006, the project boundary encompasses the power plant at the project site, the means for transportation of biomass to the project site, and all power plants connected physically to the electricity system that the CDM project power plant is connected to. The site where the biomass residues would have been left for decay or dumped in the project spatial extent

In this PDD, CH_4 emissions will be included for both project and baseline emissions.

According to ACM0006, the GHGs included in or excluded from the project boundary are listed as follows:

	Source	Gas	Included?	Justification/Explanation
Baseline	Grid 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	Main emission source as B1 is identified as the most likely baseline scenario in this PDD.
		N_2O	No	Excluded for simplification, this is

				conservative.
Project Activity	On-site fossil fuel and electricity consumption due to the project activity	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.
	Off-site transportation of biomass residues	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.
	Combustion of biomass residues for electricity	CO_2	No	It is assumed that CO_2 emissions from surplus biomass residues do not lead to changes of carbon pools in the LULUCF sector.
		CH_4	Yes	Main emission source as B1 or B3 is identified as the most likely baseline scenario in this PDD.
		N_2O	No	Excluded for simplification. This emission source is assumed to be very small.
	Storage of biomass residues	CO_2	No	It is assumed that CO2 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.

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

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The proposed project only generates electricity, and then the alternatives of the proposed project activity should be determined as follows:

1. **Power generation**

In ACM0006, six realistic and credible alternatives for power generation may be included, *inter alia*:

- P1: The proposed project activity not undertaken as a CDM project activity
- P2 :The proposed project activity (installation of a power plant), fired with the same type of biomass residues but with a lower efficiency of electrical generation2 (e.g. an efficiency

that is common practice in the relevant industry sector)

- P3: The generation of power in an existing plant, on-site or nearby the project site, using only fossil fuels
- P4: The generation of power in existing and/or new grid-connected power plants
- P5 :The continuation of power generation in an existing power plant, fired with the same type of biomass residues as (co-)fired in the project activity, and implementation of the project activity, not undertaken as a CDM project activity, at the end of the lifetime of the existing plant
- P6: The continuation of power generation in an existing power plant, fired with the same type of biomass residues as (co-)fired in the project activity and, at the end of the lifetime of the existing plant ,replacement of that plant by a similar new plant

As for P1, if the proposed project activity is not undertaken as a CDM project activity, it will be faced with investment barriers and technological barriers and can't be run commercially. Therefore, P1 can't become the most realistic baseline alternative for power generation.

As for P2, at present, the technology of biomass power generation just starts, even if the biomass power plants with lower power generation efficiency are not common practice in China. Therefore, P2 can't become the most realistic baseline alternative for power generation.

As for P3, there are none of fossil fuel fired power plants around the project site, so P3 is excluded.

As for P4, the current installed capacity and newly added capacity of NCPG grid that the proposed project is connected will meet the requirement of national laws and regulations, also financially viable. The same electricity generation with the proposed project is likely to be from existing and/or new grid-connected power plants.

As for P5 and P6, there are none of biomass power plants in the local areas. Therefore, P5 and P6 are excluded.

In conclusion, the most realistic and credible alternative for power generation is P4.

The proposed project is not a cogeneration project, and then there is no need to define the baseline scenario for the generation of heat.

2. Use of biomass

In ACM0006, eight realistic and credible alternatives for the use of biomass may be included, *inter alia*:

- B1: The biomass residues are dumped or left to decay under mainly aerobic conditions. This applies for example, to dumpling and decay of biomass residues on fields.
- B2: The biomass residues are dumped or left to decay under clearly anaerobic conditions. This applies, for example, to deep landfills with more than 5 meters. This does not apply to biomass residues that are stock-piled or left to decay on fields.
- B3: The biomass residues are burnt in an uncontrolled manner without utilizing it for energy purposes.
- B4: The biomass residues are used for heat and/or electricity generation at the project site.
- B5: The biomass residues are used for power generation, including cogeneration, in other existing or new grid connected power plants
- B6: The biomass residues are used for heat generation in other existing or new boilers at other sites
- B7: The biomass residues are used for other energy purposes, such as the generation of biofuels

- B8: The biomass residues are used for non-energy purposes, e.g. as fertilizer or as feedstock in processes (e.g. in the pulp and paper industry)

The proposed project will utilize the waste straw, which is otherwise dumped or left to decay or burned in an uncontrolled manner without utilizing it for energy purposes. There is no similar cogeneration project used straw as fuel, and other place plant will not use the straw resource due to the cost consideration. As described above, the local waste biomass are not utilized for energy purposes as B4, B5, B6 and B7.So, the four alternatives are excluded.

Secondly, according to the estimation from project owner, the straws consumed by the proposed project are about 0.119792 million tons, only accounting for 32% of total available cotton straws (0.38 million tons within 50 kilometers, source: Page 14 of FSR) of the biomass dumped or left to decay or burned in an uncontrolled manner, which has already taken account into the straws consumption for cooking, heating, fertilizers and feedstock etc. Considering the around county also can supply 0.5 million tons cotton straws per year for backup, the biomass used by the proposed project wills not impropriate the biomass as fertilizer. In other words, the proposed project will not change the use of biomass as fertilizer. Therefore, B8 is excluded.

According to the FSR of the proposed project, the major biomass residues used for generation are cotton straws, 85% of the cotton straws are dumped or left to decay or burned in an uncontrolled manner. Therefore, B2 is excluded.

In conclusion, the most realistic and credible alternative for biomass use is B1 or B3. According to the ACM0006, if the most likely baseline scenario for the use of the biomass residues is either that the biomass residues would be dumped or left to decay under mainly aerobic conditions (B1) or burnt in an uncontrolled manner without utilizing them for energy purposes (B3), baseline emissions are calculated assuming, for both scenarios viz., natural decay and uncontrolled burning, that the biomass residues would be burnt in an uncontrolled manner.

Then the scenario 2 is the most realistic baseline scenario.

Scenario	**Project type**	**Baseline scenario**		
		Power generation	Heat generation	Biomass use
2	Greenfield power project	P4	NA	B1 or B3

B.5. Description of how the anthropogenic emissions of GHG by sources are reduced below those that would have occurred in the absence of the registered CDM project activity (assessment and demonstration of additionality): >>

National Bio Energy Co., Ltd (NBE) considered the application of CDM for this project and others in 2005 and started negotiation on the CDM-related cooperation on this project and two others with Climate Change Capital early in 2006, as evidenced by a signed letter Expression of Interest (EOI) in January 2006 and signed a Deed of Exclusivity (LOE) in February 2006."

According to the version 04 of ACM0006 and version 03 of "Tools for the demonstration and assessment of additionality", the following steps are used to define the baseline scenario:

Step 1. Identification of alternatives to the project activity consistent with current laws and regulations

Sub-step 1a. Define alternatives to the project activity.

In the "Identification of the baseline scenario" of ACM0006, realistic and credible alternatives should be separately determined regarding:

- how power would be generated in the absence of the CDM project activity;
- what would happen to the biomass residues in the absence of the project activity; and
- In case of cogeneration projects: how the heat would be generated in the absence of the project activity.

The proposed project only generates electricity, then the alternatives of the proposed project activity should be determined as follows:

1. Power generation

In ACM0006, six realistic and credible alternatives for power generation may be included, *inter alia*:

- P1: The proposed project activity not undertaken as a CDM project activity
- P2 :The proposed project activity (installation of a power plant), fired with the same type of biomass residues but with a lower efficiency of electrical generation[2] (e.g. an efficiency that is common practice in the relevant industry sector)
- P3: The generation of power in an existing plant, on-site or nearby the project site, using only fossil fuels
- P4: The generation of power in existing and/or new grid-connected power plants
- P5 :The continuation of power generation in an existing power plant, fired with the same type of biomass residues as (co-)fired in the project activity, and implementation of the project activity, not undertaken as a CDM project activity, at the end of the lifetime of the existing plant
- P6: The continuation of power generation in an existing power plant, fired with the same type of biomass residues as (co-)fired in the project activity and, at the end of the lifetime of the existing plant ,replacement of that plant by a similar new plant

As for P1, if the proposed project activity is not undertaken as a CDM project activity, it will be faced with investment barriers and technological barriers and can't be run commercially. Therefore, P1 can't become the most realistic baseline alternative for power generation.

As for P2, at present, the technology of biomass power generation just starts, even if the biomass power plants with lower power generation efficiency are not common practice in China. Therefore, P2 can't become the most realistic baseline alternative for power generation.

As for P3, there are none of fossil fuel fired power plants around the project site, so P3 is excluded.

As for P4, the current installed capacity and newly added capacity of NCPG grid that the proposed project is connected will meet the requirement of national laws and regulations, also financially viable. The same electricity generation with the proposed project is likely to be from existing and/or new grid-connected power plants.

As for P5 and P6, there are none of biomass power plants in the local areas. Therefore, P5 and P6 are excluded.

In conclusion, the most realistic and credible alternative for power generation is P4.

The proposed project is not a cogeneration project, then there is no need to define the baseline scenario for the generation of heat.

2. Use of biomass

In ACM0006, eight realistic and credible alternatives for the use of biomass may be included, *inter alia*:

- B1: The biomass residues are dumped or left to decay under mainly aerobic conditions. This applies for example, to dumpling and decay of biomass residues on fields.
- B2: The biomass residues are dumped or left to decay under clearly anaerobic conditions. This applies, for example, to deep landfills with more than 5 meters. This does not apply to biomass residues that are stock-piled or left to decay on fields.
- B3: The biomass residues are burnt in an uncontrolled manner without utilizing it for energy purposes.
- B4: The biomass residues are used for heat and/or electricity generation at the project site.
- B5: The biomass residues are used for power generation, including cogeneration, in other existing or new grid connected power plants
- B6: The biomass residues are used for heat generation in other existing or new boilers at other sites
- B7: The biomass residues are used for other energy purposes, such as the generation of biofuels
- B8: The biomass residues are used for non-energy purposes, e.g. as fertilizer or as feedstock in processes (e.g. in the pulp and paper industry)

The proposed project will utilize the waste straw, which is otherwise dumped or left to decay or burned in an uncontrolled manner without utilizing it for energy purposes. There is no similar cogeneration project used straw as fuel, and other place plant will not use the straw resource due to the cost consideration. As described above, the local waste biomass are not utilized for energy purposes as B4, B5, B6 and B7.So, the four alternatives are excluded.

Secondly, according to the FSR, the straws consumed by the proposed project are about 0.119792 million tons, only accounting for 32% of total available straws (0.38 million tons within 50 kilometers, source: Page 14 of FSR) of the biomass dumped or left to decay or burned in an uncontrolled manner, which has already taken account into the straws consumption for cooking, heating, fertilizers and feedstock etc. Considering the around county also can supply 0.5 million tons cotton straws per year for backup, the biomass used by the proposed project wills not impropriate the biomass as fertilizer. In other words, the proposed project will not change the use of biomass as fertilizer. Therefore, B8 is excluded.

According to the FSR of the proposed project, the major biomass residues used for generation are cotton straws, 85% of the cotton straws are dumped or left to decay or burned in an uncontrolled manner. Therefore, B2 is excluded.

In conclusion, the most realistic and credible alternative for biomass use is B1 or B3.According to the ACM0006, if the most likely baseline scenario for the use of the biomass residues is either that the biomass residues would be dumped or left to decay under mainly aerobic conditions (B1) or burnt in an uncontrolled manner without utilizing them for energy purposes (B3), baseline emissions are calculated assuming, for both scenarios viz., natural decay and uncontrolled burning, that the biomass residues would be burnt in an uncontrolled manner.

Then the scenario 2 is the most realistic baseline scenario.

Scenario	**Project type**	**Baseline scenario**		
		Power generation	Heat generation	Biomass use
2	Greenfield power project	P4	NA	B1 or B3

Sub-step 1b. Enforcement of applicable laws and regulations

As for power generation, P1 (The proposed project activity not undertaken as a CDM project activity) and P4 (The generation of power in existing and/or new grid-connected power plants), are consistent with related laws and regulations in China.

As for biomass use, related policies and regulations have been issued, such as *Renewable Energy Promotion Law and Renewable Energy*. But the related regulations don't compel to use biomass.85% biomass has been dumped or left to decay or burned in an uncontrolled manner in the proposed project. Therefore, B1 or B3 is a common scenario in the real world.

Step 2 Investment analysis

The purpose of this step is to determine whether the proposed project activity is economically or financially less attractive than other alternatives without an additional revenue/funding, possibly from the sale of certified emission reductions (CERs). The investment analysis was conducted in the following steps:

Sub-step 2a. Determine appropriate analysis method

In the *Tools for the demonstration and assessment of additionality,* there are three options for investment analysis: simple cost analysis (option I), investment comparison analysis (option II) and benchmark analysis (option III).

Since the proposed project will earn the revenues not only from the CDM activity but also from electricity sales, the simple cost analysis method is not applicable. Because the proposed project owner only has two choices: building/not building the proposed project, if the proposed project activity is not undertaken as a CDM project activity, therefore option 2 is not applicable. The proposed project will use benchmark analysis based on the consideration that benchmark IRR or equity IRR of the power sector are available.

Sub-step 2b. Benchmark Analysis Method (Option3)

According to ***Interim Rules on Economic Assessment of Electric Engineering Retrofit Projects （2003）***, the financial benchmark rate of return (after tax) of Chinese power industry is 8% of the total investment, which has been used widely for Feasibility Studies of the power project investments. it is only stipulated the benchmark project IRR and not involved with the project life. So, the proposed project adopts this benchmark.

On the basis of above benchmark, calculation and comparison of financial indicators are carried out in sub-step 2c.

Sub-step 2c. Calculation and comparison of financial indicators

(1) Basic parameters for calculation of financial indicators

Key parameters for the calculation of financial indicators

Item	Unit	Value	Source
Capacity	MW	25	Project owner
Total Investment	Million Yuan	264.02	Project owner
Annual electricity output	GWh/year	126.5	Project owner

Electricity Tariff (Including VAT)	Yuan/kWh	0.589/0.339	0.589(in the first 15 operation years); 0.339(the rest years)
straw price	Yuan/t	208.3	Straw Purchase Agreement
Value Added Tax (VAT)	%	17	Feasibility Study
Income tax	%	33	Feasibility Study
Project life time	Year	25	Feasibility Study
Expected CERs Price	Euro/t CO_2e	10	
Exchange Rate	Yuan/Euro	10	
CERs crediting time	year	7*3	

(2) Comparison of IRR and NPV for the proposed project and the financial benchmark

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

The following table shows the IRR of the proposed project, with and without CDM revenues. Without CDM revenues, the IRR of total investment is lower than the benchmark 8%, thus financially attractive. With CDM/CERs revenue, the IRR will be significantly improved to 9.50%, higher than investment benchmark, then economically attractive.

Financial indicators of the proposed project (total investment)

Item	IRR benchmark=8%
Without CDM	4.02%
With CDM	9.50%

Sub-step 2d. Sensitivity analysis

The objective of sensitivity analysis is to show whether the conclusion regarding the financial attractiveness is robust to reasonable variations in the critical assumptions. For the proposed project, the following financial parameters were taken as uncertain factors for sensitive analysis of financial attractiveness:

- Total investment
- Annual output
- Straw price;

The tariff is not considered in the sensitivity analysis because the tariff of renewable power is regulated by the regulating entities (NDRC) based on the standard power tariff plus a subside price of 0.25yuan/kWh. The O&M cost is not considered in the sensitivity analysis because the major component of O&M cost is fuel cost and depreciation which will be analyzed for the straw price and total investment. Assuming the above three factors vary in the range of -10%-+10%, the FIRR of the proposed project (without income from CERs sales) varies to different extent, as shown in following Figure.

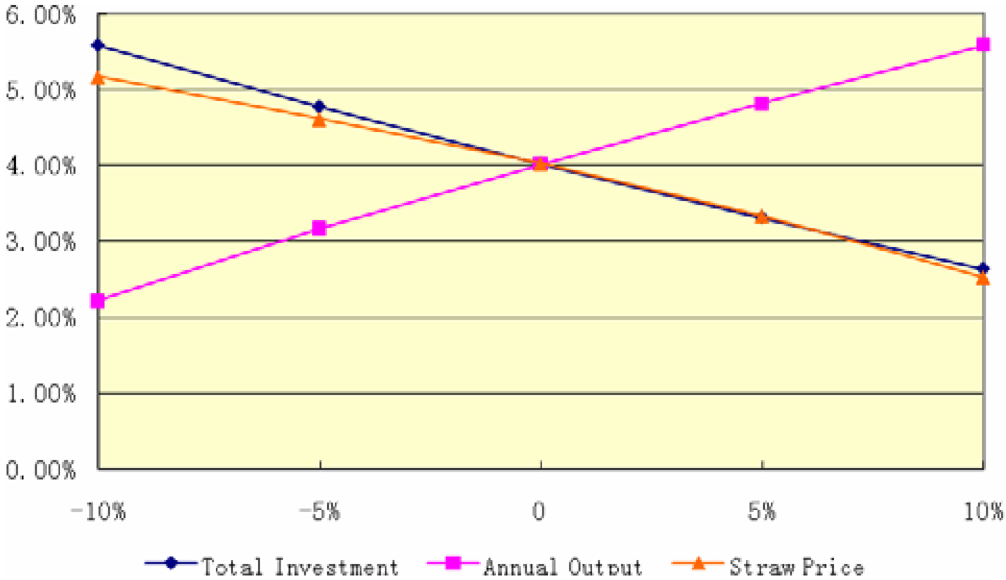

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Figure. Sensitivity analysis for different financial parameters (without CDM)

The change of annual output is the most important factor affecting the financial attractiveness of the proposed project. The next important factor for financial attractiveness is the total investment. The impact of the straw price is the slightest. Within the reasonable range of annual output, investment and straw price, the FIRR of proposed project is always lower than the investment benchmark, then lack of financial attractiveness.

When the above three financial parameters were fluctuated within the range of -10% to +10%, without the CDM revenue, the IRR of total investment has different fluctuation.

Step 3. Barrier analysis

This step is used to determine whether the proposed project activity faces real barriers that prevent the implementation of this type of proposed project activity; and do not prevent the implementation of at least one of the alternatives. Step 3 uses the following sub-steps:

Sub-step 3a. Identify barriers that would prevent the implementation of type of the proposed project activity:

List the barriers that would prevent the implementation of the type of proposed project activity from being carried out if the proposed project activity was not registered as a CDM activity, those barriers include:

- **Investment barriers**

Firstly, the biomass power generation is a greenfield project activity and its initial investment is much higher than the normal coal-fired power generation project, and the financial institutions lack necessary information about it, so the bank is reluctant to provide a loan for such project activity. Next, the capital market in China is not perfect, so the financing channels are too limited. Therefore, the financing is a key barrier to the commercialization of biomass power generation. Furthermore, because the biomass power generation projects haven't been in the list of the national tax favourable inventory, which increases the risk to invest biomass power generation projects.

The total investment of the proposed project is RMB 266.3 million yuan and 10,652 yuan per

kW(evidence is validated by DOE), due to the key burning boiler will be imported which is much higher than that of conventional coal-fired power plants and gas-fired power plants of the NCPG grid, which is between 3000~4700Yuan per kW[1].

Although prospective tariff policy and other incentives with respect to biomass power projects are currently in place, financial indicators of this kind of projects have not fundamentally changed and the loan repayment capability remains weak.

- **Technological barriers**

The key technology adopted by the proposed project is the biomass boiler imported from Denmark BWE Company. With this technology, the proposed project is possible to acquire higher efficiency and more advanced technology, but also bear technological risk. Since the technology of biomass power generation in China has not been commercialized, skilled and/or trained staffs are lacked to operate and maintain the facility, and there are no education/training institutions in China providing such training activities. At the same time, it is the first time for BWE in China. The proposed project owner is lack of experiences to operation and maintenance, without similar project for reference, the there are many uncertain risks during the operation. The CDM revenue can be used as a guarantee fund for the operation and maintenance and technical staffs train thus enable the project to overcome the technological barriers.

- **The risk for biomass collection**

The agriculture is still a small-scale peasant economy in Hebei and China. According to the statistics of 2005, the cultivated land per person in Hebei is 1.89 mu. Due to the biomass distribution is relatively dispersed and the project sponsor has to collect household by household which will increase the collection cost. Most important, the dispersed small-scale peasant economy means it will be impossible to hedge the straw price though a long-term contract. The lack of price hedge mechanism will greatly increase the risk of the proposed project. For example, the collection cost of the Shiliquan straw mix with coal generation project has increased from 100 Yuan/t originally to 400 Yuan/t after it is put into operation (http://www.newenergy.org.cn/html/2005-12/200517815.html).

Sub-step 3 b. Show that the identified barriers would not prevent the implementation of at least one of the alternatives (except the proposed project activity):

As mentioned in step 1, the scenario of the proposed project is scenario 2 of ACM0006. In the absence of the proposed project activities, the most plausible and credible alternative available to the proposed project is as follows: P4 (the generation of power in existing and/or new grid-connected power plants); B1 or B3.As for the power generation, because the fossil fuel fired power plants are dominated in North China Power Grid, the same electricity generation with the proposed project can be provided from grid. As for biomass, it is common practice in the local area that the biomass is dumped or left to decay or burned in an uncontrolled manner without utilizing it for energy purposes. In all, the identified barriers would not prevent the implementation of at least one of the alternatives (except the proposed project activity).

In all, the combinations of project types and baseline scenarios for the proposed project are as follows:

Combinations of project types and baseline scenarios

Scenario	**Project type**	**Baseline scenario**		
		Power generation	Heat generation	Biomass use
2	Greenfield power project	P4	NA	B1 or B3

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[1] http://cdm.unfccc.int/UserManagement/FileStorage/8JW8G9PJXUZXCHZMPMU6MQ3DDXU6BX(the proposed project of NM0215/ACM0013)

Step 4. Comment practice analysis

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

There is no similar scale project activities used straw as fuel in Hebei province.

By 30th, Oct. 2006, there is no similar project putting into operation within Hebei province. And only Jinzhou straw generation project is under construction, which is facing the similar barriers and under the CDM application to overcome its barriers.

Sub-step 4b. Discuss any similar options that accruing.

As described above, there is no similar project putting into operation within Hebei province then the proposed project is not a common practice.

If the proposed project can be successfully registered by EB, the CERs sales revenue will help the project owner to gain the investment return equivalent to that of the benchmark or more, and to reduce the risks associated with the uncertainty of the electricity tariff and biomass price. Furthermore, the CDM revenue, which will be in foreign currency, can reduce foreign exchange risk associated with the purchase of foreign equipment and relieve the pressure of repayment. All of these are important insurances for the proposed project's successful implement. In addition, because the operation and maintenance cost is high, the CER revenue can be one of the fund sources for the technical maintenance.

To summarize, it can be proved that the proposed project meets the additionality criteria in the aspects of environment, investment and technology.

In conclusion, the proposed project is additional.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

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Step 0: Grid Boundary Selection

According to the ACM0006, the capacity of the project plant is of more than 15MW and the baseline scenario has been identified as scenario 2, then the CO_2 emission factor for the electricity displaced can be calculated as a combined margin following the guidance of ACM0002 and the net quantity of electricity generation in the project plant is adopted.

According to the version 06 of ACM0002, for the purpose of determining the build margin (BM) and operating margin (OM) emission factor, a (regional) project electricity system is defined by the spatial extent of the power plants that can be dispatched without significant transmission constraints. Similarly, a connected electricity system, e.g. national or international, is defined as a (regional) electricity system that is connected by transmission lines to the project electricity system and in which power plants can be dispatched without significant transmission constraints. In determining the project electricity system, project participants should justify their assumptions. When the application of this methodology does not result in a clear gird boundary, the following choices could be adopted:

(a) Use the delineation of grid boundaries as provided by the DNA of the host country if available; or
(b) Use, where DNA guidance is not available, and the following definition of boundary: In large countries with layered dispatch systems (e.g. state/provincial/regional/national) the regional grid

definition should be used. A state/provincial grid definition may indeed in many cases be too narrow given significant electricity trade among states/provinces that might be affected, directly or indirectly, by a CDM project activity; In other countries, the national (or other largest) grid definition should be used by default.

The Chinese DNA has given its guidance for the grid boundary selection (see also: http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File1053.pdf), the North China Power Grid (NCPG) is selected as the grid boundary.

Step 1: Baseline Emission Calculation

Sub-step 1a: Calculate the Operating Margin emission factor ($EF_{OM,y}$)

According to The Methodology, four alternatives could be used to calculate the OM:
a) Simple OM
b) Simple adjusted OM, or
c) Dispatch Data Analysis OM, or
d) Average OM.

Dispatch data analysis should be the first methodological choice. Where this option is not selected project participants shall justify why and may use the simple OM, the simple adjusted OM or the average emission rate method taking into account the provisions outlined hereafter.

The Simple OM method (a) can only be used where low-cost/must run resources constitute less than 50% of total grid generation in: 1) average of the five most recent years, or 2) based on long-term normals for hydroelectricity production.

The average emission rate method (d) can only be used where low-cost/must run resources constitute more than 50% of total grid generation and detailed data to apply option (b) is not available, and where detailed data to apply option (c) above is unavailable.

The Simple OM, simple-adjusted OM, and average OM emission factors can be calculated using either of the two following data vintages for years(s) y:

- (ex-ante) the full generation-weighted average for the most recent 3 years for which data are available at the time of PDD submission, if or,
- the year in which project generation occurs, if $EF_{OM,y}$ is updated based on ex-post monitoring.

For The Project, the simple Operating Margin emission factor was chosen based on the following two reasons:
1. In China, the State Grid Corporation run the interregional dispatch system and each regional grid corporation run the intraregional dispatch system. The dispatch information is regarded as business secrets and not available to the public.
2. For the most recent 5 years (2000-2004), the low-cost/must run resources constitute less than 50% of total: 1.13%, 0.85%, 0.89%, 0.86% and 0.76% for 2000, 2001, 2002, 2003 and 2004.

As a result, the simple OM method can be used.

The OM in this PDD is also calculated ex-ante based on the most recent 3 years data.

The Simple OM emission factor is calculated as the generation-weighted average emissions per electricity unit (tCO_2/MWh) of all generating sources serving the system, not including low-operating cost and must-run power plants:

$$EF_{OM,y} = \frac{\sum_{i,j} F_{i,j,y} \times COEF_{i,j}}{\sum_{j} GEN_{j,y}} \quad (1)$$

Where,

$F_{i,j,y}$ is the amount of fuel i consumed (ton for solid and liquid fuel, m^3 for gas fuel) by relevant power sources j in years y,

j refers to the power sources delivering electricity to the grid, not including low-operating cost and must-run power plants, and including imports to the grid.

$COEF_{i,j,y}$ is the CO_2 emission coefficient of fuel i (tCO_2/t for solid and liquid fuel, tCO_2/m^3 for gas fuel), taking into account the carbon content of the fuels used by relevant power sources j and the percent oxidation of the fuel in years y, and

$GEN_{j,y}$ is the electricity (MWh) delivered to the grid by source j. In the China Electric Power Year Book and other data resources, only generation data is available.

Sub-step 1b. Calculate the Build Margin emission factor ($EF_{BM,y}$)

According to The Methodology, the BM is calculated as the generation-weighted average emission factor of a sample of power plants m, as follows:

$$EF_{BM,y} = \frac{\sum_{i,m} F_{i,m,y} \times COEF_{i,m,y}}{\sum_{m} GEN_{m,y}} \quad (2)$$

Where

$F_{i,m,y}$ is the amount of fuel i (tce) consumed by plant m in year y.

$COEF_{i,m,y}$ is the CO_2 emission coefficient (tCO_2/tce) of fuel i, taking into account the carbon content of the fuels used by plant m and the percent oxidation of the fuel in year y.

$GEN_{m,y}$ is the electricity (MWh) delivered to the grid by plant m, equals to generation minus plant self consumption:

Project participants shall choose between one of the following two options. The choice among the two options should be specified in the PDD, and cannot be changed during the crediting period.

Option 1. Calculate the Build Margin emission factor $EF_{BM,y}$ *ex-ante* based on the most recent information available on plants already built for sample group m at the time of PDD submission. The sample group m consists of either the five power plants that have been built most recently, or the power plant capacity additions in the electricity system that comprise 20% of the system generation (in MWh) and that have been built most recently. Project participants should use from these two options that sample group that comprises the larger annual generation.

Option 2. For the first crediting period, the Build Margin emission factor $EF_{BM,y}$ must be updated annually *ex-post* for the year in which actual project generation and associated emissions reductions occur. For subsequent crediting periods, $EF_{BM,y}$ should be calculated *ex-ante*, as described in option 1 above. The

sample group *m* consists of either the five power plants that have been built most recently, or the power plant capacity additions in the electricity system that comprise 20% of the system generation (in MWh) and that have been built most recently. Project participants should use from these two options that sample group that comprises the larger annual generation.

In this PDD, the BM is determined ex-ante based on option 1.
A direct application of this approach is difficult in China. The Executive Board (EB) has provided guidance on this matter with respect to the application of the AMS-1.D and AM0005 methodologies for projects in China on 7 October 2005 in response to a request for clarification by DNV on this matter. The EB accepted the use of capacity additions to identify the share of thermal power plants in additions to the grid instead of using power generation.

The calculation of the published BM Emission Factor is based on this approach and is described below:

First， we calculate the share of the CO_2 emission factors of the solid fuel, liquid fuel and gas fuel in total emissions respectively by using the latest energy balance data available.

Second, the calculated shares are the weights. Using the emission factor for advanced efficient technology we calculate the BM emission factor for thermal power;

Third, use the BM emission factor to multiply the emission factor of the thermal power with the share of the thermal power in 20% of the newly-added capacity of the power grid.

Detailed steps and formulas are as below:
.
First, we calculate the share of CO_2 emissions of the solid, liquid and gas fuel in total emissions respectively .

$$\lambda_{Coal} = \frac{\sum_{i \in COAL, j} F_{i,j,y} \times COEF_{i,j}}{\sum_{i,j} F_{i,j,y} \times COEF_{i,j}} \quad (3)$$

$$\lambda_{Oil} = \frac{\sum_{i \in OIL, j} F_{i,j,y} \times COEF_{i,j}}{\sum_{i,j} F_{i,j,y} \times COEF_{i,j}} \quad (4)$$

$$\lambda_{Gas} = \frac{\sum_{i \in GAS, j} F_{i,j,y} \times COEF_{i,j}}{\sum_{i,j} F_{i,j,y} \times COEF_{i,j}} \quad (5)$$

with:

- $F_{i,j,y}$ *the amount of the fuel* i *consumed in y year of j province* (measured in tce;
- $COEF_{i,j,y}$ the emission afctor of fuel i (measured in tCO_2/tce） while taking into account the carbon content and oxidation rate of the fuel *i* consumed in *y* year;
- *COAL,OIL* and *GAS subscripts standing for the solid fuel, liquid fuel and gas fuel*

Second, we calculate the emission factor of the thermal power

$$EF_{Thermal} = \lambda_{Coal} \times EF_{Coal,Adv} + \lambda_{Oil} \times EF_{Oil,Adv} + \lambda_{Gas} \times EF_{Gas,Adv} \quad (6)$$

While $EF_{Coal,Adv}$, $EF_{Oil,Adv}$ and $EF_{Gas,Adv}$ represent the emission factors of advanced coal-fired , oil-fired and gas-fired power generation technology, see detailed parameter and calculation in Annex 2.

Third, we calculate BM of the power grid

$$EF_{BM,y} = \frac{CAP_{Thermal}}{CAP_{Total}} \times EF_{Thermal} \quad (7)$$

While CAPTotal represents the total newly-added capacity and CAPThermal represents newly-added thermal power capacity.

Sub-step 1c. Calculate the Baseline emission factor (EF_y)

The baseline emission factor is calculated as the weighted average of the OM ($EF_{OM,y}$) and the BM ($EF_{BM,y}$):

$$EF_{\text{electricity},y} = w_{OM} \times EF_{OM,y} + w_{BM} \times EF_{BM,y} \text{ ,} \quad (8)$$

Where the weight w_{OM} and w_{BM} by default, are 50%.

Sub-step 1d. Calculate the Baseline emission ($BE_{electricity,y}$)

The baseline emissions are the product of the baseline emissions factor ($EF_{electricity,y}$ in tCO_2/MWh) times the electricity supplied by the project activity (EG_y in MWh), then

$$BE_{electricity,y}=EG_y \times EF_{electricity,y} \quad (9)$$

Step2 Baseline Emission due to natural decay or uncontrolled burning of anthropogenic sources of biomass residues

According to ACM0006, scenario 2 is applicable. According to the ACM0006, if the most likely baseline scenario for the use of the biomass residues is either that the biomass residues would be dumped or left to decay under mainly aerobic conditions (B1) or burnt in an uncontrolled manner without utilizing them for energy purposes (B3), baseline emissions are calculated assuming, for both scenarios viz., natural decay and uncontrolled burning, that the biomass residues would be burnt in an uncontrolled manner.
Baseline emissions due to uncontrolled burning of biomass residues are determined in two steps:

Step 2a Determination of the quantity of biomass residues used as a result of the project activity.
As the baseline scenario has been identified as scenario 2, the total quantity of biomass residues used in the project plant is attributable to project activity and hence $BF_{PJ,k,y}=BF_{k,y}$.

Step 2b Estimation of methane emissions, consistent with the baseline scenario for the use of biomass residues.

As the baseline scenario for biomass residue use has been identified as B1 and B3, then the methane emissions can be calculated by multiplying the quantity of biomass that would not be use in the absence of the project activity with the net calorific value and an appropriate emission factor:

$$BE_{biomass,y} = GWP_{CH_4} \times \sum_k BF_{PJ,k,y} \times NCV_k \times EF_{burning,CH4,k,y} \text{ ,} \qquad (10)$$

Where:

GWP_{CH4} is the Global Warming Potential for methane valid for the relevant commitment period which is equal to 21 in this PDD.

$BF_{PJ,k,y}$ is the incremental quantity of biomass residue type *k* used as fuel in the project plant during the year y in tons, *k*=C for cotton straw. Based on the project feasibility study report, the annual used straw will be 105,417 tons (in dry matter).

NCV_k is the net calorific value of the straw type *k* in TJ per tons in dry matter, k=C for cotton straw.

$EF_{burning,CH4,k,y}$ is the CH_4 emission factor for uncontrolled burning of the straw in tCH_4/TJ.

As there is no accurate information about the CH_4 emission factor, the default value of 0.0027 tCH_4/tons is adopted in the PDD according to ACM0006. Considering the uncertainty is greater than 100%, then a conservativeness factor of 0.73 from table 5 of the version 04 of ACM0006 is used in this PDD, thus the CH4 emission factor of 0.001971 tCH_4/t biomass should be used.

Step3 Project Emissions

As described in ACM0006, the project emissions include CO_2 emissions from transportation of straws to the project site (PET_y), CO_2 emissions from on-site consumption of fossil fuels due to the project activity ($PEFF_y$), CO_2 emissions from consumption of electricity ($PE_{EC,y}$) and CH_4 emission from the controlled combustion of straw ($PE_{biomas,CH4,y}$).
Then the project emission can be calculated as:

$$PE_y = PET_y + PEFF_y + PE_{EC,y} + GWP_{CH_4} \times PE_{Biomass,CH4,y} \text{ ,} \qquad (11)$$

Where:

GWP_{CH4} is the Global Warming Potential for methane valid for the relevant commitment period, which is equal to 21 in the PDD.

Sub-step3a **Methane emissions from combustion of straws (*$PE_{biomass,CH4,y}$*)**

Methane emissions from combustion of straws can be calculated as follows:

$$PE_{Biomass,CH4,y} = EF_{CH4,BF} \times \sum_k BF_{k,y} \times NCV_k \text{ ,} \qquad (12)$$

where:

$BF_{k,y}$ is the quantity of straw type k used as fuel in the project plant during the year y in tons in dry matter, k=C for cotton straw. Based on the project feasibility study report, the annual used straw will be 105,417 tons (in dry matter).

NCV_k is the net calorific value of the straw type k in TJ per tons, k=C for cotton straw. Based on the project feasibility study report, NCV_c=0.01744 TJ/t.

$EF_{CH4,BF}$ is the CH_4 emission factor for controlled burning of the straw in tCH_4/TJ. According to the IPCC default value provided in table 3 of ACM0006, the CH_4 emission factor of combustion of biomass in

agriculture is 0.03 tCH_4/TJ. Considering a conservativeness factor of 1.37 from table 4 of the version 04 of ACM0006, the CH_4 emission factor in this PDD is taken as 0.0411 tCH_4/TJ.

Sub-step 3b **Carbon dioxide emissions from combustion of fossil fuels for transportation of straws (*PET_y*)**

The straws will be transported by trucks to the project plant from collecting stations. The emissions from diesel consumed for transportation are a major source of project emission which can be calculated as follows:

$$PET_y = \frac{\sum_k BF_{k,y}}{TL_y} \times AVD_y \times EF_{km,CO_2,y} , \tag{13}$$

Where:

$BF_{k,y}$ is the quantity of biomass residue type *k* combusted in the project plant during the year *y*.

TL_y is the average truck load of the trucks used during the year *y*.

AVD_y is the average round trip distance (from and to) between the biomass residue fuel supply sites and the site of the project plant during the year y.

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

The average CO_2 emission factor for straws transportation is calculated as follows:

$$EF_{km,CO2,y} = DPK \times Density_d \times NCV_d \times EF_d \tag{14}$$

Where:

NCV_d is the net calorific value of diesel in TJ per tons, which is equal to 0.042652 TJ/t in the PDD.
EF_d is the emission factor of diesel in tC/TJ taken as 74.1 tCO_2/TJ.
DPK is the diesel consumption per km tons for the full-load truck in L/km.
$Density_d$ is the density of diesel in t/L, taken as 0.00086 t/L in this PDD.

Sub-step 3c **Carbon dioxide emissions from on-site consumption of fossil fuels (*$PEFF_y$*)**

The only fossil fuel used in the proposed project site is diesel which will be used for unit start-up and mechanical preparation. Then the carbon dioxide emissions from on-site consumption of fossil fuels can be calculated as follows:

$$PEFF_y = (FF_{project,plant,d,y} + FF_{project,site,d,y}) \times NCV_d \times EF_d , \tag{15}$$

Where:

$FF_{project,plant,d,y}$ is the diesel consumption in straws-fired boilers during the year *y*.

$FF_{project,site,d,y}$ is the diesel consumption for mechanical preparation of straws during the year *y*.

NCV_d is the net calorific value of diesel in TJ per tons, which is equal to 0.042652 TJ/t in the PDD.

EF_d is the emission factor of diesel in tCO_2/TJ taken as 74.1 tCO_2/TJ.

Sub-step 3d **Carbon dioxide emissions from electricity consumption ($PE_{EC,y}$)**

The electricity consumption due to straw cracker is estimated as the product of electricity consumption and an appropriate grid emission factor, as follows:

$$PE_{EC,y} = EC_{PJ,y} \times EF_{grid,y} , \tag{16}$$

Where:
$PE_{EC,y}$ is the CO_2 emissions from on-site electricity consumption attributable to the project activity (tCO_2/yr);
$EC_{PJ,y}$ is the on-site electricity consumption attributable to the project activity during the year y (MWh);
$EF_{grid,y}$ is the CO_2 emission factor for grid electricity during the year y (tCO_2/MWh), which is equal to the $EF_{electricity,y}$ calculated in the step 1 in this section because they are in the same grid boundary.

$EC_{PJ,y}$=1197.92 MWh, which is based on the expert estimation that 10kWh is needed for cracker to smash 1 ton of straw. This data will be monitored in monitoring plan.

Step4 Leakage.

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

According to the FSR of the proposed project, the annual available cotton straws in Weixian county is 0.38 million tons within 50 kilometers (FSR). According to the project feasibility study report, the annual straws consumption of the proposed project is expected to be 0.119792 million tons per year. The available straws within project region is 217% larger than that is utilized, which is already taken account into the straws consumption for cooking, heating, fertilizers and feedstock etc. much greater than 25% requested by ACM0006. To conclude, the leakage can be neglected.

If for a certain type of biomass residue *k* used in the project activity, leakage effects cannot be ruled out with one of the approaches above; leakage effects for the year y shall be calculated as follows:

$$L_y = EF_{CO2,LE} \times \sum_k BF_{PJ,k,y} \times NCV_k , \tag{15}$$

Where:
L_k is the leakage emissions during the year y in tCO_2/yr.
$EF_{CO2,LE}$ is the CO_2 emission factor of the most carbon intensive fuel used in the country (tCO_2/GJ);
$BF_{PJ,k,y}$ is the incremental quantity of biomass residue type k used as a result of the project activity in the project plant during the year y (tons of dry matter).
k is the type of biomass residues for which leakage effects could not be ruled out with L2 above.
NCV_k is the net calorific value of the biomass residue type k (GJ/ton of dry matter).

Step5 Emission Reduction

The emission reduction due to project activity can be calculated as follows:

$$ER_y = ER_{electricity,y} + BE_{biomass,y} - PE_y - L_y , \tag{16}$$

Where:

ER_y is the emission reduction in year y in tCO_2e.

$BE_{biomass,y}$ is the emission due to uncontrolled burning of straws in tCO_2e.

$ER_{electricity,y}$ is the emission reduction due to the displacement of electricity in tCO_2.

PE_y is the project emission in tCO_2e.

L_y is the leakage in tCO_2e.

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

(Copy this table for each data and parameter)

Data / Parameter:	**$EF_{OM,y}$**
Data unit:	tCO_2/MWh
Description:	Operation Margin Emission Factor of NCPG
Source of data used:	Chinese DNA
Value applied:	1.1208
Justification of the choice of data or description of measurement methods and procedures actually applied :	This operation margin emission factor is calculated and recommended by Chinese DNA, see also http://cdm.ccchina.gov.cn/ .
Any comment:	

Data / Parameter:	**$EF_{BM,y}$**
Data unit:	tCO_2/MWh
Description:	Build Margin Emission Factor of NCPG
Source of data used:	Chinese DNA
Value applied:	0.9397
Justification of the choice of data or description of measurement methods and procedures actually applied :	This build margin emission factor is calculated and recommended by Chinese DNA, see also http://cdm.ccchina.gov.cn/ .
Any comment:	

Data / Parameter:	**EF_d**
Data unit:	tCO_2/TJ
Description:	Emission factor of diesel used for straws transportation and on-site fuel use
Source of data used:	IPCC default value
Value applied:	74.1
Justification of the choice of data or description of measurement methods and procedures actually applied :	IPCC default value, 2006 IPCC Guidelines for National Greenhouse Gas Inventories" Volume 2 Energy,
Any comment:	

Data / Parameter:	**GWP_{CH4}**
Data unit:	tCO_2e/tCH_4
Description:	Global warming potential for CH_4
Source of data used:	IPCC
Value applied:	21 for the first commitment period and will be updated according to any future COP/MOP decisions.
Justification of the choice of data or description of measurement methods and procedures actually applied :	IPCC default value, 2006 IPCC Guidelines for National Greenhouse Gas Inventories" Volume 2 Energy,
Any comment:	

Data / Parameter:	**$Density_d$**
Data unit:	t/L
Description:	Density of diesel used for straws transportation
Source of data used:	National standard value：GB/T19147-2003
Value applied:	0.00086
Justification of the choice of data or description of measurement methods and procedures actually applied :	According to the national standard GB/T19147-2003, the density of diesel should be 0.82-0.86 kg/L. The upper limit used here will lead to an overestimation of project emission, thus a conservative estimation.
Any comment:	

Data / Parameter:	**$EF_{burning,CH4,k,y}$*NCV_k**
Data unit:	tCH_4/t
Description:	CH_4 emission factor for uncontrolled burning of the straw.
Source of data used:	Version 04 of ACM0006
Value applied:	0.001971
Justification of the choice of data or description of measurement methods and procedures actually applied :	According to the IPCC default value provided in table 5 of ACM0006, the CH_4 emission factor of combustion of biomass in power plant is 0.0027 tCH_4/t. Considering a conservativeness factor of 0.73, the CH_4 emission factor in this PDD is taken as 0.001971 tCH_4/TJ.
Any comment:	

Data / Parameter:	**$EF_{CH4,BF}$**
Data unit:	tCH_4/TJ
Description:	CH_4 emission factor for controlled burning of the straw.
Source of data used:	Version 04 of ACM0006
Value applied:	0.0411
Justification of the choice of data or description of	According to the IPCC default value provided in table 3 of ACM0006, the CH_4 emission factor of combustion of biomass in agriculture is 0.03 tCH_4/TJ. Considering a conservativeness factor of 1.37, the CH_4 emission factor in this

measurement methods and procedures actually applied :	PDD is taken as 0.0411 tCH_4/TJ. This value will be fixed in the entire crediting period or updated according to IPCC guidelines annually.
Any comment:	

Data / Parameter:	**NCV_i**
Data unit:	TJ/t
Description:	Net calorie value of fossil fuel type i.
Source of data used:	National default value
Value applied:	i=d for diesel and NCV_d=0.042652
Justification of the choice of data or description of measurement methods and procedures actually applied :	The net calorific value of diesel should be collected from the latest China Energy Statistical Yearbook.
Any comment:	As a national specific value, the uncertainty is low.

Data / Parameter:	**$FF_{project,plant,d,y}$**
Data unit:	Tons
Description:	Quantity of diesel combusted in the straw-fired boiler during the year y
Source of data used:	Power plant
Value applied:	*3*
Justification of the choice of data or description of measurement methods and procedures actually applied :	The power plant will build diesel account for each boiler and will be reported and documented monthly.
Any comment:	

Data / Parameter:	**$FF_{project,site,d,y}$**
Data unit:	Tons
Description:	Quantity of diesel combusted in the straw forklift during the year y
Source of data used:	Power plant and straw brokers
Value applied:	*40*
Justification of the choice of data or description of measurement methods and procedures actually applied :	The power plant will collect diesel purchase receipt from fuel station and will document these data monthly. The quantity of diesel combusted is equal to the quantity of stock at the start of the year plus the purchased amount and then minus the stock at the end of the year.
Any comment:	

Data / Parameter:	**NCV_k**

Data unit:	TJ/t
Description:	The net calorie value of straws type k consumed by the proposed project
Source of data used:	Power plant and the department who is responsible for the straw collection and transportation.
Value applied:	k=c for cotton straw and NCV_c= 0.01744
Justification of the choice of data or description of measurement methods and procedures actually applied :	The net calorific value of straws (*k*=C for cotton straw) should be measured and reported by qualified test institution. For each test, at least three samples should be measured and the average NCV should be used.
Any comment:	

Data / Parameter:	$\mathbf{EC_{PJ,y}}$
Data unit:	MWh
Description:	On-site electricity consumption attributable to the project activity during the year y.
Source of data used:	Calculate conservatively, due to the straw smash activity is dispersed and can not measured direct every place.
Value applied:	1197.92
Justification of the choice of data or description of measurement methods and procedures actually applied :	This data will be calculated conservatively as the product of the weight of straw smashed (in tons) and the electricity consumption factor (kWh/ton). The electricity factor can be calculated as follows: 1) Collecting all the nameplate power (in kW) and capacity (t/h) of every straw crackers, 2) calculating the electricity factor corresponding to each cracker which equals to power/capacity (in kWh/t), 3) using the largest number as a conservative electricity factor for the calculation.
Any comment:	

B.6.3 Ex-ante calculation of emission reductions:

>>

As described in the previous section, the OM and BM are ex-ante determined as: 1.0585 tCO_2/MWh and 0.9066 tCO_2/MWh, then the baseline emission factor is the weighted average of OM and BM:

$EF_{electricity,y}$=0.5×1.1208+0.5×0.9397=1.03025 tCO_2/MWh.

The annual electricity supply is expected to be EG_y=126,500 MWh, then the baseline emission for generation is : $BE_{electricity,y}=EG_y \times EF_{electricity,y}$=130,327 tCO_2.

According to the FSR of the proposed project, the major straw will be cotton straw and the annual consumption is expected to be 105,417 tonne (in dry matter). According to the page 3 of the version 4 of ACM0006, in case scenario 2, the baseline emissions due to uncontrolled burning or decay of the biomass residues should be determined consistent with the most plausible baseline scenario for the use of the biomass residues, which is the uncontrolled burning of biomass for conservative estimation. Therefore, the baseline emission due to uncontrolled burning of biomass can be calculated as follows: $BE_{biomass,y}$=21×105417×0.001971=4,363 tCO_2e.

The methane emissions from combustion of straws can be calculated as follows: $PE_{biomass,CH4,y}$=0.0411×105417×0.01744=76 tCH_4.

The average CO_2 emission factor can be calculated as: $EF_{km,CO2,y}$=0.1*0.00086*0.042652*74.1=0.000272 tCO_2/km, (source: **DPK_y** refer to B.7.1)then the emission due to straw transportation can be calculated as: PET_y=119792/3*100*0.000272=1086 tCO_2.(source: **$EC_{PJ,y}$** refer to B.7.1).

The carbon emission due to on-site electricity consumption can be calculated as: $PE_{EC,y}$= 1197.92×1.03025=1234 tCO_2

The carbon dioxide emissions from on-site consumption of fossil fuels can be calculated as: $PEFF_y$=43×0.042652×74.1=136 tCO_2.

Then the project emissions can be calculated as: PE_y=1086+136+1234+76×21=4,052 tCO_2e.

The emission reduction can be calculated as: ER_y= 130,327+4363-4052=130,638 tCO_2e.

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

>>

The crediting period is expected to be renewed to 21 years in total. As the project is planned to start from 1/3/2008 with the renewable crediting periods, the emission reductions during the first crediting period are estimated as:

Day/Month/Years	Estimation of Project activity Emission (tonnes of CO2e)	Estimation of baseline emission (tonnes of CO2 e)	Estimation of leakage (tonnes of CO2e)	Estimation of Emission reductions (tonnes of CO2 e)
1/3/2008-31/3/2009	4,052	**134,690**	0	**130,638**
1/3/2009-31/3/2010	4,052	**134,690**	0	**130,638**
1/3/2010-31/3/2011	4,052	**134,690**	0	**130,638**
1/3/2011-31/3/2012	4,052	**134,690**	0	**130,638**
1/3/2012-31/3/2014	4,052	**134,690**	0	**130,638**
1/3/2013-31/3/2014	4,052	**134,690**	0	**130,638**
1/3/2014-31/3/2015	4,052	**134,690**	0	**130,638**
Total(tCO_2e)	28,364	942,830	0	914,466

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

B.7.1 Data and parameters monitored:
(Copy this table for each data and parameter)

Data / Parameter:	**EG_y**
Data unit:	MWh
Description:	Annual electricity delivered to the grid by the proposed project
Source of data to be used:	Electricity meter
Value of data applied for the purpose of calculating expected emission reductions in section B.5	126,500 MWh
Description of measurement methods and procedures to be applied:	This parameter will be hourly measured and monthly recorded. The relevant data will be kept during the crediting period and two years after. The electricity meter will be operated by the power distribution company and adjusted according to relevant national standard including “Technical administrative code of electric energy metering” DL/T 448-2000, “Verification regulation of electric energy metering appliance” SD 109-83, “Electricity Law”, “Metrology law of the PR China”. The accuracy of the metering equipment is 0.5s. The metering equipment will be calibrated annually. The net electricity delivered to the grid by the proposed project will be calculated as follows: EG_y=A-A’-B, where A is the electricity delivered to the grid by the unit of the proposed project, measured by main ammeters. A’ is the electricity consumed by the units from the grid, also measured through ammeter. B is measured by an ammeter connected with an emergence line to measure the electricity consumed by the proposed projects in case of emergence.
QA/QC procedures to be applied:	The data is monitored through the ammeter, and rechecked by comparing with the electricity sales receipt from power corporation monthly.
Any comment:	

Data / Parameter:	**$BF_{k,y}$**
Data unit:	tons
Description:	Weigh bridges
Source of data to be used:	Daily operation record
Value of data applied for the purpose of calculating expected emission reductions in section B.5	*k*=c and 119,792 tons
Description of measurement methods and procedures to be applied:	The weigh bridges (SCS/ZCS) will be operated by staffs appointed by the project company to be responsible for the record and monitor of straws purchased and consumed in the project plant, and build straws account rechecked by comparing with the purchase receipt and stock change record. The record will be reported and documented monthly. The weigh bridges will be calibrated annually according to national standard JJG555-96. The accuracy of weight will be 1.0e

	for 0-500e, 2.0e for 500-2000e and 3.0e for >2000e.
QA/QC procedures to be applied:	Recorded each time by weigh Bridge, and crosscheck by the purchase receipt and stock change record
Any comment:	

Data / Parameter:	**Moisture content of the biomass residues**
Data unit:	% water content
Description:	Moisture content of each biomass residue type k
Source of data to be used:	On-site measurements
Value of data applied for the purpose of calculating expected emission reductions in section B.5	12%,from EIA
Description of measurement methods and procedures to be applied:	The moisture should be measured each time of truck straw enter into the plant, and mean values will be calculated at least annually.
QA/QC procedures to be applied:	Three samples should be analysed at the same time and reported. And the average of moisture content of these samples should be used. The measurement type is HMT2 and the accuracy is 12（±0.4).
Any comment:	

Data / Parameter:	$\mathbf{FF_{project,plant,d,y}}$
Data unit:	Tons
Description:	Quantity of diesel combusted in the straw-fired boiler start-up during the year y
Source of data to be used:	Power plant daily operation record
Value of data applied for the purpose of calculating expected emission reductions in section B.5	*3*
Description of measurement methods and procedures to be applied:	The power plant will measure diesel consumption for each boiler start-up and will be reported and documented monthly.
QA/QC procedures to be applied:	The amount of diesel consumed will be recorded monthly and crosschecked by an annual energy balance that is based on purchased quantities and stock (at power plant) changes.
Any comment:	

Data / Parameter:	$\mathbf{FF_{project,site,d,y}}$
Data unit:	Tons
Description:	Quantity of diesel combusted in the straw forklift during the year y

Source of data to be used:	Power plant and straw brokers daily operation record
Value of data applied for the purpose of calculating expected emission reductions in section B.5	*40*
Description of measurement methods and procedures to be applied:	The power plant will collect diesel purchase receipt from fuel station and will document these data monthly. The quantity of diesel combusted is equal to the quantity of stock (different stock from the parameter above, which is at fuel station) at the start of the month plus the purchased amount and then minus the stock at the end of the month.
QA/QC procedures to be applied:	The amount of diesel consumed will be recorded monthly and crosschecked by an annual energy balance that is based on purchased quantities and stock changes of different straw brokers.
Any comment:	

Data / Parameter:	**NCV_k**
Data unit:	TJ/t
Description:	The net calorie value of straws type k consumed by the proposed project
Source of data to be used:	Daily operation record of power plant and the department who is responsible for the straw collection and transportation.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	k=c for cotton straw and NCV_c= 0.01744
Description of measurement methods and procedures to be applied:	The net calorific value of straws (*k*=C for cotton straw) should be measured and reported by qualified test institution. For each test, at least three samples should be measured and the average NCV should be used. Frequency of the NCV measurement: The analysis will be made every six months.
QA/QC procedures to be applied:	Three samples (dry matter) should be analysed at the same time by the test institution and reported. And the average of NCV of these samples should be used in the emission reduction calculation. The equipment for testing will be SDACM3000 with an accuracy of 0.2%. This equipment will be calibrated every three months according to the step 10 of national standard GB5186. Frequency of the NCV measurement: the analysis will be made every six months.
Any comment:	

Data / Parameter:	**NCV_i**
Data unit:	TJ/t
Description:	Net calorie value of fossil fuel type i.
Source of data to be used:	National default value
Value of data applied for the purpose of	i=d for diesel and NCV_d=0.042652

calculating expected emission reductions in section B.5	
Description of measurement methods and procedures to be applied:	The net calorific value of diesel should be collected from the latest China Energy Statistical Yearbook.
QA/QC procedures to be applied:	As a national specific value, the uncertainty is low.
Any comment:	

Data / Parameter:	**$EC_{PJ,y}$**
Data unit:	MWh
Description:	On-site electricity consumption attributable to the project activity during the year y.
Source of data to be used:	Calculate
Value of data applied for the purpose of calculating expected emission reductions in section B.5	1197.92 10 kwh/ton straw is ex-ante estimated by the project owner, then the total electricty consumption will be 119,792*10/1000=1197.92MWh Which will be ex-post monitored
Description of measurement methods and procedures to be applied:	This data will be calculated conservatively as the product of the weight of straw smashed (in tons) and the electricity consumption factor (kWh/ton). The electricity factor can be calculated as follows: 1) Collecting all the nameplate power (in kW) and capacity (t/h) of every straw crackers, 2) calculating the electricity factor corresponding to each cracker which equals to power/capacity (in kWh/t), 3) using the largest number as a conservative electricity factor for the calculation.
QA/QC procedures to be applied:	Cross-check measurement results with invoices for purchased electricity if available.
Any comment:	

Data / Parameter:	**AVD_y**
Data unit:	Km
Description:	Average round trip distance between biomass fuel supply sites and the project site
Source of data to be used:	Power plant and the department who is responsible for the straw collection and transportation.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	100
Description of measurement methods and procedures to be applied:	A staff will be appointed by the project company to be responsible for the record and monitor of recording average round trip for each trucks and the record will be reported and documented monthly.
QA/QC procedures to	Check consistency of distance records provided by the truckers by comparing

be applied:	recorded distances with other information from other sources (e.g. maps)
Any comment:	

Data / Parameter:	**TL_y**
Data unit:	Tons
Description:	Average truck load of the trucks used for transportation of biomass
Source of data to be used:	Power plant and the department who is responsible for the straw collection and transportation.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	3 Measured by weight bridge, and same as $BF_{k,y}$.
Description of measurement methods and procedures to be applied:	A staff will be appointed by the project company to be responsible for the record of load for each trucks and the record will be reported and documented monthly. Measured by weight bridge, and same as $BF_{k,y}$.
QA/QC procedures to be applied:	Check consistency of load record with straws receipts.
Any comment:	

Data / Parameter:	**DPK_y**
Data unit:	L/km
Description:	The diesel consumption per km for the full-load truck in L/km
Source of data to be used:	Power plant and the department who is responsible for the straw collection and transportation.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	0. 1, ex-ante estimated by the project owner and will be ex-post monitored
Description of measurement methods and procedures to be applied:	The DPK of each typical type of truck which will be used for straws transportation should be tested and recorded annually. The average DPK will be used for emission reduction calculation. In case such value is not available, the nameplate DPK is an alternative solution in a conservative estimation, viz.two times of the consumption of the nameplate DPK.
QA/QC procedures to be applied:	This data should be tested and reported by qualified test institution with signature or tamped test report. When using the tested data, at least three trucks should be tested for each major type and average value should be used in the ER calculation. In case such value is not available, the nameplate DPK is an alternative solution in a conservative estimation, viz.,two times of the consumption of the nameplate DPK.
Any comment:	

Data / Parameter:	**$EF_{km,CO2,y}$**
Data unit:	tCO_2/km
Description:	Average CO_2 emission factor for the trucks during the year y.

Source of data to be used:	Conduct sample measurements of the fuel type, fuel consumption and distance traveled for all truck types. Calculate CO_2 emissions from fuel consumption by multiplying with appropriate net calorific values and CO_2 emission factors. For net calorific values and CO_2 emission factors, use reliable national default values or, if not available, (country-specific) IPCC default values. See the previous three tables for detail.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	0.000272
Description of measurement methods and procedures to be applied:	Calculated by other parameters. This data will be calculated annually.
QA/QC procedures to be applied:	As a result from calculation, the uncertainty is low.
Any comment:	

Data / Parameter:	**---**
Data unit:	Tons
Description:	Quantity of available biomass residues of type *k* in the region
Source of data to be used:	Official surveys or statistics
Value of data applied for the purpose of calculating expected emission reductions in section B.5	380,000,from FSR
Description of measurement methods and procedures to be applied:	The data come from official information should be applied. If the data is not available, the calculation and estimation based on official information should be adopted. The quantity of surplus supply is the difference between available biomass and biomass used for other purposes than generation.
QA/QC procedures to be applied:	Uncertainty level of data is low, which can be rechecked by the planting area and output of cotton.
Any comment:	

Data / Parameter:	**---**
Data unit:	Tons
Description:	Quantity of biomass residues of type k that are utilized (e.g. for energy generation or as feedstock) in the defined geographical region.
Source of data to be used:	Official surveys or statistics
Value of data applied for the purpose of calculating expected emission reductions in section B.5	50,400
Description of	The data come from official information should be applied. If the data is not

measurement methods and procedures to be applied:	available, the calculation and estimation based on official information should be adopted. The quantity of surplus supply is the difference between available biomass and biomass used for other purposes than generation.
QA/QC procedures to be applied:	Uncertainty level of data is low, which can be rechecked by the planting area and output of cotton.
Any comment:	

Data / Parameter:	$EF_{burning,CH4,k,y}*NCV_k$
Data unit:	tCH_4/t
Description:	CH_4 emission factor for uncontrolled burning of the straw.
Source of data to be used:	Version 04 of ACM0006
Value of data applied for the purpose of calculating expected emission reductions in section B.5	0.001971
Description of measurement methods and procedures to be applied:	Updated according to IPCC guidelines annually.
QA/QC procedures to be applied:	Uncertainty level of data is low,
Any comment:	

Data / Parameter:	$EF_{CH4,BF}$
Data unit:	tCH_4/TJ
Description:	CH_4 emission factor for controlled burning of the straw.
Source of data to be used:	Version 04 of ACM0006
Value of data applied for the purpose of calculating expected emission reductions in section B.5	0.0411
Description of measurement methods and procedures to be applied:	This data will be collected from latest methodology or IPCC guidelines. If the IPCC value is updated, the latest value of IPCC will be adopted.
QA/QC procedures to be applied:	Uncertainty level of data is low,
Any comment:	

Data / Parameter:	$EF_{CO2,\ LE}$
Data unit:	tCO_2/GJ
Description:	CO_2 emission factor of the most carbon intensive fuel used in the country
Source of data to be used:	The latest National Communication of China and the latest IPCC default value for coke

Value of data applied for the purpose of calculating expected emission reductions in section B.5	0.107 (coke)
Description of measurement methods and procedures to be applied:	This data will be collected from latest national communication and IPCC guidelines annually. If the IPCC value is updated, the latest value of IPCC will be adopted.
QA/QC procedures to be applied:	Uncertainty level of data is low,
Any comment:	

Data / Parameter:	**EF_d**
Data unit:	tCO_2/TJ
Description:	Emission factor of diesel used for straws transportation and on-site fuel use
Source of data to be used:	2006 IPCC Guidelines for National Greenhouse Gas Inventories Table1.4 of Volume 2: Energy, page 1.23
Value of data applied for the purpose of calculating expected emission reductions in section B.5	74.1 2006 IPCC Guidelines for National Greenhouse Gas Inventories Table1.4 of Volume 2: Energy, page 1.23
Description of measurement methods and procedures to be applied:	This data will be collected from latest methodology or IPCC guidelines. If the IPCC value is updated, the latest value of IPCC will be adopted.
QA/QC procedures to be applied:	Uncertainty level of data is low,
Any comment:	

B.7.2 Description of the monitoring plan:

>>

The monitoring plan is shown as follows:

1. Monitor operational and management scheme

The project operator plans to appoint a Chinese CDM project director and a monitoring manager. The respective responsibilities are as follows：

Chinese CDM project director：Receive the report from monitoring manager; manage the CDM project jointly with CERs buyer; Coordinate with the Chinese Government and stakeholders; submit the monitoring report to DOE and deliver to CERs.

Monitoring manager: Based on monitoring manual guideline, records the net electricity supplied monthly and aggregately annually, prepares the monitoring report, etc. Monitoring manager is responsible to the Chinese CDM project director.

2. Measuring meters O&M and calibration

Measuring meters will be used and calibrated according to requirements of B.7.1.

In addition, the project owner will train the appointed monitoring manager and monitoring engineers to operate these meters.

The monitoring plan will be incorporated into the existing monitoring system, implemented according to special monitoring manual to ensure reliable, transparent and comprehensive monitoring.

3. deviations treatment

In case deviations in the monitoring data are found, the Monitoring Engineer will study the operating parameters to identify the reason for the deviation and take remedial measures.

4. Monitoring report

Monitoring report will be prepared by the monitoring manager and submit to Chinese CDM project director for final review, who will submit the report to the DOE.

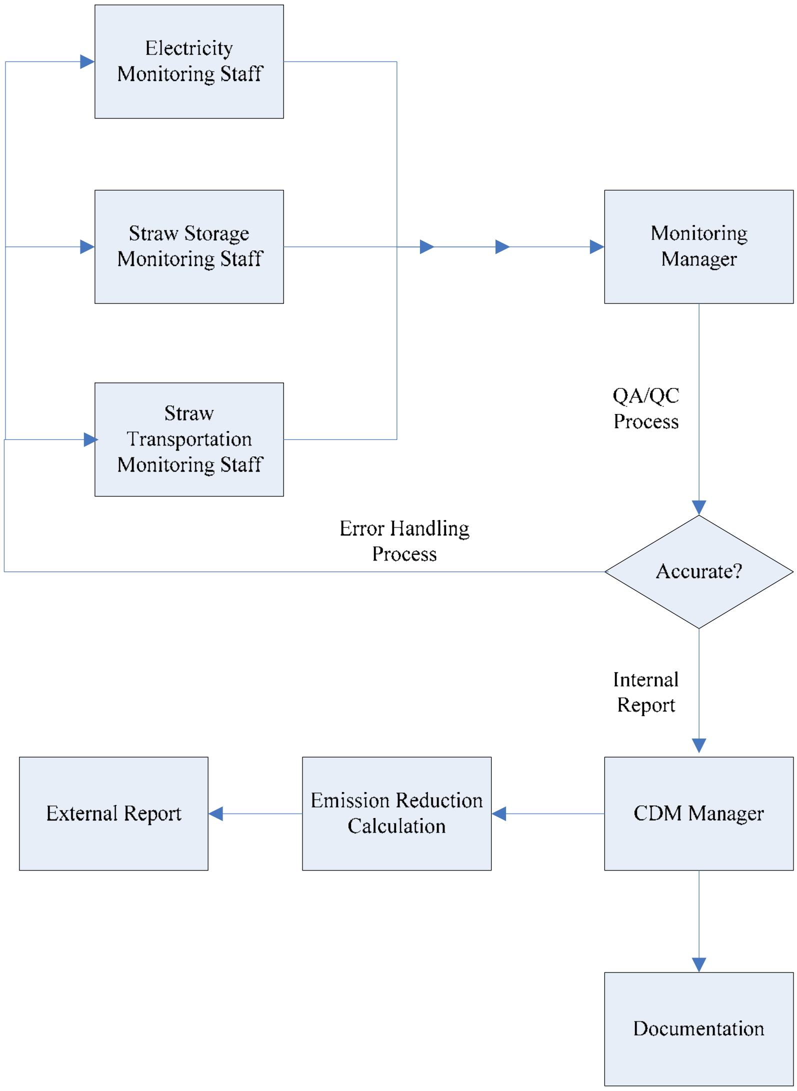
5. monitoring data

Some monitoring data will be continually recorded and keep in the electric archives automatically, and at the same time, a paper hard record will be created for archives, the relevant data will be kept during the crediting period and two years after. Some hand recorded data should be also kept in the electric archives, the relevant data will be kept during the crediting period and two years after.

6. monitoring points and record frequency

As B.7.1, the net electricity output will be continually measured and monthly recorded which will be rechecked by electricity sale invoice. Record frequency for other data could be found in B.7.1

This monitoring plan will be implemented by professional staff authorized by the project sponsor. The management structure is illustrated as follows:



Parameter to be monitored

Please refer to section B 7.1 of this PDD.

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

>>

The baseline study and monitoring methodology was completed on 03/12/2007 by:

Dr Fei TENG, Global Climate Change Institute, Tsinghua University.
Address: Room C402, Energy Science Building, Tsinghua University, 100084, Beijing, China.
Telephone: +8610-62784805
Email: tengfei@tsinghua.edu.cn

Dr Sheng ZHOU, Global Climate Change Institute, Tsinghua University.
Address: Room C503, Energy Science Building, Tsinghua University, 100084, Beijing, China.
Telephone: +8610-62795352
Email: zhshinet@tsinghua.edu.cn

(Not the project participants listed in Annex 1)

SECTION C. Duration of the project activity / crediting period

C.1 Duration of the project activity:

C.1.1. Starting date of the project activity:

>>
15/07/2006(start construction)

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

>>
25 years

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

C.2.1. Renewable crediting period

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

>>
17/3/2008 or the date after registration

C.2.1.2. Length of the first crediting period:

>>
7 years

C.2.2. Fixed crediting period:

Not applicable

C.2.2.1. Starting date:

>>

C.2.2.2. Length:

>>

SECTION D. Environmental impacts

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

>>
The environmental impact assessment (EIA) for this project has approved by Hebei Environmental Protection Bureau in March 2006. For detailed information, please refer to “Environmental impact report of straw biomass generation project, Wei County, Hebei Province”

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

>>

The EIA report shows that the proposed project is the resources comprehensive utilization project, which is consistent with China's national energy policy and industry policy. Since the project owner has taken all effective measures to make sure the pollutants emission meet the requirements, the proposed project will have no significant impact on the local environment.

Environmental impact during the period of construction

The pollutions caused in construction period are summarized as follows:

Noise: Noise from construction materials, equipment transportation vehicles is about 90dB (A); the noise from construction machinery, such as building foundation excavation and concrete preparation, casting is between 75 and 105dB (A).

Waste gas: A secondary dust caused by dust of building materials: cement, lime and foundation excavation temporarily stockpiling and those of transport vehicles entering and leaving the factory site.

Solid waste: Construction solid waste is from excavating the foundation. According to the "Hazardous Waste Identification Standards (" GB5085.1~5085.3-1996), such solid waste is not hazardous waste.

The project owner will take some measures to prevent or mitigate the above negative impact, such as making noisy equipment operate in the shed, not building at the noon (12:00～14:00) and at night (22:00～ 6:00) to alleviate the negative impact of noise on residents living. In addition, to reduce dust by establishing preventing dust net and spraying water. The construction noise and dust are temporary impact, through the project owner taking the appropriate measures, and it will have no significant impact on the surrounding environment.

Environmental impact during the period of operation

Environmental impact conclusions during operation time are as follows:

Waste water

Waste water of the proposed project mainly includes residential drainage and industrial effluent wastewater. Residential drainage will be treated using secondary biological treatment and the treated water will be utilized comprehensively; Industrial effluent water meets the level II quality of "wastewater discharge standards" (GB8978-1996) and will direct emits. In addition, the COD of the waste water will be continuous monitored automatically.

Waste gas

Crop straws, mainly cotton straw, are used as fuels in the project. Comparing to the traditional coal-fired power plant, the sulphur and ash in the biomass is low, which will have little impact on the surrounding atmosphere. the proposed project installs the hop-pocket dust catcher (dust removal efficiency is 99%) to collect the ash and soot, and also use a 80m—high chimney to dilute emitting soot, which meets the "waste gas pollutants emission standards for thermal plants" (GB13223-2003). the smoke and flue gas by-produced by the project activity will be monitored and shall not exceed the upper limit of the relevant national standards: the dust, SO_2 and NO_x emission will be less than 16.2mg/m3, 219.8mg/m3 and 300mg/m3 respectively (EIA).

Solid waste

The solid waste in the proposed project are mainly slag and fugitive ash and collected by dust catcher,, the ash is a good fertilizer and can be directly used in the field.

Noise

The noise sources of the proposed project are from fan, steam generator and pumps, etc. The project owner will install noise elimination in fans and sound insulation by putting noisy equipment into workshop, and plant trees in the project plant and other measures to decrease the noise influences.

Ecological Environmental Impact Analysis

The project owner will strengthen virescence work, making green vegetation in the plant area cover more than 30% and also setting up 10m-wide green belt around a fence and thus compensating the damage caused to the ecological environment and gradually improving the quality of the ecological environment.

Fuel transportation impact on the environment

The fuels of the proposed project are straws collected from collecting stations and then to be transported to the factory. No sensitive areas along transportation routes and straws transported are all packed and will not produce secondary dust. Transport vehicles avoid crossing neighbourhood areas in order to reduce the impact on the residents.

In short, the project has reached an advanced level in saving energy, reducing emissions purity and amount of pollutants and other aspects by choosing clean production equipment and advanced technology, so there is little impact on of the surrounding environment of the project's operation.

SECTION E. Stakeholders' comments

>>

1. The project owner has carried out investigation on the public's comments on this project by questionnaires and collected comments and suggestions by local stakeholders (EIA requirments).

2. the questionnaire of stakeholders comments for CDM activity requirements

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

>>

1. Stakeholders comments collection required by China EIA

According to China's environmental protection laws and regulatory requirements, public participation investigations of environmental impact assessment should be carried out, collect the suggestions of local residents, to improve the environmental and social benefits.

Survey Formats

Public participation investigations have been carried out on the local stakeholder of the surrounding areas by questionnaires, which reflect the public views on the present environment in the region and their suggestions and demands on environmental protection of the proposed projects.

Investigation scope by questionnaires

Questionnaires have been distributed to varied local residents in the project location in a fair and all-sided manner. The Investigated stakeholders are mainly residents from several villages nearby, such as those of xiangying village, renliji village, etc.

49 questionnaires were distributed and all of them had been returned. The investigation had taken fully account into the public advice of different ages, civilizations and occupations to make the investigated stakeholders more representative. Of all the investigated stakeholders, 42 are men, accounting for 85.7%; 7 are women, 14.3%; there are also some local government officers ,workmen, peasants and other occupations, including 2 leaders, accounting for 4.1%; 5 are government officers, 10.2%;2 are workmen, 4.1%; 40 are peasants, 81.6%.

Major investigated issues

For detailed information, please refers to E.2: Comments from the questionnaires

2. Stakeholders comments collection required by CDM requirements

To facilitate the local stakeholders know about CDM activity, the addition questionnaire activity is also carried out after the project owner made a introduction of CDM activity and the how to GHG emission reduction occurs from the proposed project activity.

The questionnaires distribution is similar as above. And totally 95 questionnaires were distributed and all of them had been returned. Among the 95 people, of whom 28 were women and 67 were men, with an average age of 45.29 years old, The investigation participants are from near villages, including Heying township (BeiTaiji Village, xiangying Village， Dongzhongying Village, Renlixi village, Xizhongying Village, Zhao Village), Hulu township (ZhangHulu Village, Yanhonglong Village, Qianzaoke Village). The Investigators has lived there at least 19 years.

The Investigation scope and the Comments from the questionnaires please refer to E.2:

E.2. Summary of the comments received:

>>

Comments from the questionnaires are summarized below：

1. Stakeholders comments collection required by China EIA

Issues		Stat. Result		
view on environment	options	Care very much	care	don’t care
	persons	34	14	1
	%	69.4	28.6	2.0
The degree of knowing about the project	options	know	Generally know	Don't know
	persons	11	21	17
	%	22.4	42.9	34.7
The economic benefits of the	options	promote	decrease	Generally promote
	persons	42	0	7

project	%	85.7	0	14.3
Impact on residents' living	options	Good than bad	Bad than good	No impact
	persons	43	0	6
	%	87.8	0	12.2
Location reasonable?	options	reasonable	unreasonable	Not care
	persons	44	0	5
	%	89.8	0	10.2
Attitude to the project	options	support	Not support	Not care
	persons	42	0	7
	%	85.7	0	14.3

2. Stakeholders comments collection required by CDM requirements

According to the questionnaires result, 100% support the construction of the proposed project. Most of them think it will reduce pollution from biomass residues dump or uncontrolled burnt, Increase income, Increase job opportunity, Improve living.

8 persons think it will result in waster decrease, 32 persons think it will result in fuel price increase and 8 persons think it will result in increase environment pollution.

As shown above, the local public know much about the project, the majority of respondents support the project and they think the project can promote local economic development and improve living conditions of local residents. For the project site, the public in general agree and think it is reasonable.

Because certain power plant construction will affect the local environment, the public participant also made some rational recommendations. For example, "choose efficient pollution control facilities, and to ensure its stable operation," "strengthen the management of transport vehicles." and so on. Therefore, project owner should give sufficient attention to the public suggestions and strengthen environmental protection facilities maintenance and management in their day-to-day operation, and strengthen the management of transport vehicles, avoiding impact on residents.

In short, the public strongly support the proposed project.

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

>>

The public strongly support for the proposed project, the project owner should make good use of various environmental investment and ensure the implement of environmental protection facilities;

Strengthen plants green in a well-planned, step-by-step, and make green area cover 30%;

Strengthen the management and day-to-day maintenance of equipment and reduce accident ratio and sewage amount;

Strengthen management during construction, reducing impact on the surrounding environment by second noise and dust;

To ensure that only straws will be used in boilers burning in producing, banning to blend coal;

Because there is no similar enterprises in operation in China, so the project owner should actively study the advanced technology and advanced management experience of environmental protection of Straw generating company aboard and improve plant environmental protection system, and conduct the necessary environmental education and promotion to the staff .

For the worrying about the fuel price increase, because the waste biomass residues are much more than that the consumption by the proposed project, it will make little effect on the fuel price increase.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

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Annex 2

INFORMATION REGARDING PUBLIC FUNDING

No public funding is involved in this project activity.

Annex 3

BASELINE INFORMATION

Table A3-1`. Calculation of the Combined Margin Emission Factor

	Emission factor A	Value and Source B	Weight C	Weighted value D = B * C
1	EF_{OM}	1.1208 Table A3-2	0.5	0.5604
2	EF_{BM}	0.9397 Table A3-5	0.5	0.46985
3	CM			1.03025

Table A3-2. Calculation of the Operating Margin Emission Factor

	Variable	2003 A	2004 B	2005 C	Total D
1	Supply of thermal power to North China Power Grid (MWh)	425364906 Table A3-3c	489173110 Table A3-3b	560751013 Table A3-3a	1475289029 D1 = A1 + B1 + C1
2	Imports of power from other grids (MWh)	4244380 Files cited above	4514550 Files cited above	23423000 Files cited above	32181930 D2 = A2 + B2 + C2
3	Total power supply for calculation EF_{OM} (MWh)	429609286 A3 = A1 + A2	493687660 B3 = B1 + B2	584174013 C3 = C1 + C2	1507470959 D3 = D1 + D2
4	CO2 emissions associated with thermal power generation on North China Power Grid (tCO2)	455551793.43 Table A3-4c	549031577.7 Table A3-4b	647686276.3 Table A3-4a	1652269647.43 D4 = A4 + B4 + C4
5	CO2 emissions associated with power imports from other grids (tCO2)	174151899 Files cited above	199754431 Files cited above	207282748 Files cited above	581189078 D2 = A2 + B2 + C2
6	Total CO2 emissions for calculation EF_{OM} (tCO2)	460375781 A6 = A4 + A5	554332148 B6 = B4 + B5	674805425 C6 = C4 + C5	1689513354 D6 = D4 + D5
7	EFOM (tCO2/MWh)	1.0716 A6 / A3	1.1228 B6 / B3	1.155 C6 / C3	1.1208 D6 / D3

Table A3-3a. Calculation of thermal power supply to NCPG, 2005

	Grid	Thermal Power generation (MWh) A	Self-consumption (%) B	Thermal power supply (MWh) C = A * (100 - B) / 100
1	Beijing	20880000	7.73	19,265,976
2	Tianjin	36993000	6.63	34,540,364
3	Hebei	134348000	6.57	125,521,336
4	Shanxi	128785000	7.42	119,229,153
5	Inner Mongolia	92345000	7.01	85,871,616
6	Shandong	189880000	7.14	176,322,568

7	Total			560,751,013

Source: Files mentioned above. Original data are from China Electric Power Yearbook 2006, p. 591-592.

Table A3-3b. Calculation of thermal power supply to NCPG, 2004

	Grid	Thermal Power generation (MWh) A	Self-consumption (%) B	Thermal power supply (MWh) C = A * (100 - B) / 100
1	Beijing	18579000	7.94	17103827
2	Tianjin	33952000	6.35	31796048
3	Hebei	124970000	6.5	116846950
4	Shanxi	104926000	7.7	96846698
5	Inner Mongolia	80427000	7.17	74660384
6	Shandong	163918000	7.32	151919202
7	Total			489173110

Source: Files mentioned above. Original data are from China Electric Power Yearbook 2005, p. 472-474.

Table A3-3c. Calculation of thermal power supply to North China Power Grid, 2003

	Grid	Thermal Power generation (MWh) A	Self-consumption (%) B	Thermal power supply (MWh) C = A * (100 - B) / 100
1	Beijing	18608000	7.52	17208678
2	Tianjin	32191000	6.79	30005231
3	Hebei	108261000	6.5	101224035
4	Shanxi	93962000	7.69	86736322
5	Inner Mongolia	65106000	7.66	60118880
6	Shandong	139547000	6.79	130071759
	Total			425364906

Source: Files mentioned above. Original data are from China Electric Power Yearbook 2004, p. 670, p. 709.

Table A3-4a. Calculation of CO_2 emissions from fuels for thermal power production, North China Power Grid, 2005.

Fuel	Unit	Beijing	Tianjin	Hebei	Shanxi	Inner Mongolia	Shandong	Northern China Grid	Carbon coefficient	Oxidation factor	NCV	CO2 emissions
									(TC/TJ)	(Fraction)	(TJ/unit)	(tCO2)
								A	B	C	D	E = A*B*C*D*44/12
Raw coal	10^4 Tons	897.75	1675.2	6726.5	6176.5	6277.2	10405.4	**32158.53**	25.8	100	20908	636062535.8
Clean coal	10^4 Tons						42.18	**42.18**	25.8	100	26344	1051185.664
Other washed coal	10^4 Tons	6.57		167.45	373.65		108.69	**656.36**	25.8	100	8363	5192725.191
Coke	10^4 Tons					0.21	0.11	**0.32**	25.8	100	28435	8607.8432
Coke oven gas	10^8 m^3	0.64	0.75	0.62	21.08	0.39		**23.48**	12.1	100	16726	1742396.483
Other gas	10^8 m^3	16.09	7.86	38.83	9.88	18.37		**91.03**	12.1	100	5227	2111027.27
Crude oil	10^4 Tons					0.73		**0.73**	20	100	41816	22385.49867
Gasoline	10^4 Tons			0.01				**0.01**	18.9	100	43070	298.4751
Diesel	10^4 Tons	0.48		3.54		0.12		**4.14**	20.2	100	42652	130786.3867
Fuel oil	10^4 Tons	12.25		0.23		0.06		**12.54**	21.1	100	41816	405689.6325
LPG	10^4 Tons							**0**	17.2	100	50179	0
Refinery gas	10^8 m^3			9.02				**9.02**	18.2	100	46055	277221.0107
Natural gas	10^8 m^3	0.28	0.08		2.76			**3.12**	15.3	100	38931	681417.0792
Other petroleum products	10^4 Tons							**0**	20	100	38369	0
Other coking products	10^4 Tons							**0**	25.8	100	28435	0
Other E (standard coal)	10^4 Tce	8.58		32.35	69.31	7.27	118.9	**236.41**	0	100	0	0
Total											Total	647686276.3

Data source: Fuel consumption data are from China Energy Statistical Yearbook 2000-2002, p. 452-487. Net calorific values are from the files mentioned above and crosschecked against China Energy Statistical Yearbook, 2004 p. 302; Oxidation factors are from the files mentioned above and crosschecked against IPCC default values, see 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Workbook; fuel emission coefficients are from the files mentioned above and corsschecked against IPCC default values, see 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Workbook,

Table A3-4b. Calculation of CO2 emissions from fuels for thermal power production, North China Power Grid, 2004.

Fuel	Unit	Beijing	Tianjin	Hebei	Shanxi	Inner Mongolia	Shandong	Northern China Grid	Carbon coefficient	Oxidation factor	NCV	CO2 emissions
									(TC/TJ)	(Fraction)	(TJ/unit)	(tCO2)
								A	B	C	D	E = A*B*C*D*44/12
Raw coal	10^4 Tons	823.09	1410	6299.8	5213.2	4932.2	8550	**27228.29**	25.8	100	20908	538547476.6
Clean coal	10^4 Tons						40	**40**	25.8	100	26344	996856.96
Other washed coal	10^4 Tons	6.48		101.04	354.17		284.22	**745.91**	25.8	100	8363	5901190.882
Coke	10^4 Tons					0.22		**0.22**	25.8	100	28435	5917.8922
Coke oven gas	10^8 m^3	0.55		0.54	5.32	0.4	8.73	**15.54**	12.1	100	16726	1153187.451
Other gas	10^8 m^3	17.74		24.25	8.2	16.47	1.41	**68.07**	12.1	100	5227	1578574.385
Crude oil	10^4 Tons							**0**	20	100	41816	0
Gasoline	10^4 Tons								18.9	100	43070	0
Diesel	10^4 Tons	0.39	0.84	4.66				**5.89**	20.2	100	42652	186070.4874
Fuel oil	10^4 Tons	14.66		0.16				**14.82**	21.1	100	41816	479451.3838
LPG	10^4 Tons							**0**	17.2	100	50179	0
Refinery gas	10^8 m^3		0.55	1.42				**1.97**	18.2	100	46055	60546.05223
Natural gas	10^8 m^3		0.37		0.19			**0.56**	15.3	100	38931	122305.6296
Other petroleum products	10^4 Tons							**0**	20	100	38369	0
Other coking products	10^4 Tons							**0**	25.8	100	28435	0
Other E (standard coal)	10^4 Tce	9.41		34.64	109.73	4.48		**158.26**	0	100	0	0
Total												549031577.7

Data source: Fuel consumption data are from China Energy Statistical Yearbook 2000-2002, p. 452-487. Net calorific values are from the files mentioned above and crosschecked against China Energy Statistical Yearbook, 2004 p. 302; Oxidation factors are from the files mentioned above and crosschecked against IPCC default values, see 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Workbook; fuel emission coefficients are from the files mentioned above and corsschecked against IPCC default values, see 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Workbook,

Table A3-4c. Calculation of CO2 emissions from fuels for thermal power production, North China Power Grid, 2003.

Fuel	Unit	Beijing	Tianjin	Hebei	Shanxi	Inner Mongolia	Shandong	Northern China Grid	Carbon coefficient	Oxidation factor	NCV	CO2 emissions
									(TC/TJ)	(Fraction)	(TJ/unit)	(tCO2)
								A	B	C	D	E = A*B*C*D*44/12
Raw coal	10^4 Tons	714.73	1052.74	5482.64	4528.5	3949.3	6808	**22535.94**	25.8	100	20908	445737636.11
Clean coal	10^4 Tons						9.41	**9.41**	25.8	100	26344	234510.60
Other washed coal	10^4 Tons	6.31		67.28	208.21		450.9	**732.7**	25.8	100	8363	5796681.31
Coke	10^4 Tons					2.8		**2.8**	25.8	100	28435	75318.63
Coke oven gas	10^8 m^3	0.24	1.71		0.9	0.21	0.02	**3.08**	12.1	100	16726	228559.67
Other gas	10^8 m^3	16.92		10.63		10.32	1.56	**39.43**	12.1	100	5227	914399.71
Crude oil	10^4 Tons						29.68	**29.68**	20	100	41816	910139.18
Gasoline	10^4 Tons						0.01	**0.01**	18.9	100	43070	298.48
Diesel	10^4 Tons	0.29	1.35	4		2.91	5.4	**13.95**	20.2	100	42652	440693.26
Fuel oil	10^4 Tons	13.95	0.02	1.11		0.65	10.07	**25.8**	21.1	100	41816	834672.45
LPG	10^4 Tons							**0**	17.2	100	50179	0.00
Refinery gas	10^8 m^3			0.27			0.83	**1.1**	18.2	100	46055	33807.44
Natural gas	10^8 m^3		0.5				1.08	**1.58**	15.3	100	38931	345076.60
Other petroleum products	10^4 Tons							**0**	20	100	38369	0.00
Other coking products	10^4 Tons							**0**	25.8	100	28435	0.00
Other E (standard coal)	10^4 Tce	9.83					39.21	**49.04**	0	100	0	0.00
Total												455551793.43

Data source: Fuel consumption data are from China Energy Statistical Yearbook 2000-2002, p. 452-487. Net calorific values are from the files mentioned above and crosschecked against China Energy Statistical Yearbook, 2004 p. 302; Oxidation factors are from the files mentioned above and crosschecked against IPCC default values, see 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Workbook; fuel emission coefficients are from the files mentioned above and corsschecked against IPCC default values, see 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Workbook,

Table A3-5. Calculation of the BM Emission Factor, NCPG

$EF_{thermal}$ (tCO2/MWh)	Share of thermal power in added capacity, 2004-2001	EF_{BM} (tCO2/MWh)
A	B	C = A * B
0.9465	99.28%	0.9397
Table A3-6	Table A3-9	

Table A3-6. Calculation of EF thermal

		λ A	EF_{adv} B	$EF_{thermal}$ calculation C = A * B
1	Coal	99.17%	0.9508	0.9429
		Table A3-8	Table A3-7	
2	Gas	0.74%	0.4237	0.0031
		Table A3-8	Table A3-7	
3	Oil	0.08%	0.5843	0.0005
		Table A3-8	Table A3-7	
4	$EF_{thermal}$[2]			0.9465

Table A3-7. Calculation of Emission factors of fuel using advanced technologies

Fuel	Efficiency (%) A	Carbon coefficient (tc/TJ) B	Oxidation factor C	EF_{adv} (tCO2/MWh) D=(3.6/(A*1000))*B*C*44/12
Coal	35.82%	25.8	1	0.9508
Gas	47.67%	15.3	1	0.4237
Oil	47.67%	21.1	1	0.5843

Source: Files downloaded and mentioned above.

Table A3-8. Calculation of λs for the calculation of the BM, North China Power Grid.[3]

Fuel	Unit	Northern China Grid	NCV	Carbon coefficient	Oxidation factor	CO2 emissions
			(TJ/unit)	(TC/TJ)	(Fraction)	(tCO2)
		A	B	C	D	E = A*B*C*D*44/12
Raw coal	10^4 Tons	3218.53	20908 kJ/kg	25. 80	1	636,062,536
Clean coal	10^4 Tons	42.18	26344 kJ/kg	25. 80	1	1,051,186
Other washed coal	10^4 Tons	656.36	8363 kJ/kg	25. 80	1	5,192,725
Coke	10^4 Tons	0.32.	28435 kJ/kg	29. 50	1	8,608
Coal, total						**642,315,054**
Natural Gas	10^8 m^3	31.2	38931 kJ/m^3	15. 30	1	681,417

2 Rounded downward.

3 Data are from Table A4a.

Coke Oven Gas	10^8 m^3	234.8	16726 kJ/m^3	12.10	1	1,742,396
Other Gas	10^8 m^3	910.3	5227 kJ/m^3	12.10	1	2,111,027
LPG	10^4 Tons	0	50179 kJ/kg	17.20	1	0
Refinery gas	10^8 m^3	9.02	46055 kJ/m^3	18.20	1	277,221
Gas total						**4,812,062**
Crude oil	10^4 Tons	0.73	41816 kJ/kg	20.00	1	22,385
Gasoline	10^4 Tons	0.01	43070 kJ/kg	18.90	1	298
Diesel	10^4 Tons	4.14	42652 kJ/kg	20.20	1	130,786
Fuel oil	10^4 Tons	12.54	41816 kJ/kg	21.10	1	405,690
Other petroleum products	10^4 Tons	0	38369 kJ/kg	20.00	1	0
Oil total						**559,160**
Total						**647,686,276**

λcoal	99.17%
λgas	0.74%
λoil	0.08%

Note that λ is calculated as the share of coal, gas respectively oil in total CO2 emissions.

Table A3-9. Calculation of the share of thermal power in recently added capacity

Installed capacity	**2003** **A**	**2004** **B**	**2005** **C**	**Capacity added in 2003-2005** **D=C-A**	**Share in added capacity**
Thermal (MW)	84006.6	93594.9	111068.7	27062.1	99.28%
Hydropower (MW)	3266	3250.7	3216.2	-49.8	-0.18%
Nuclear (MW)	0	0	0	0	0.00%
Other (MW)	90.1	137.7	335.5	245.4	0.90%
Total (MW)	87362.7	96983.1	114620.4	27257.7	100.00%
Percentage of 2004 capacity	76.22%	84.61%	100%		

Source: China Electric Power Yearbook 2005, p. 472-474; China Electric Power Yearbook 2004, p. 670, p.709; China Electric Power Yearbook 2003, p. 591-592.

Annex 4

MONITORING INFORMATION

Please refer to B.7.2 of this PDD

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