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

CONTENTS

SECTION A. General description of project activity

A.1 Title of the project activity:

Shandong Gaotang 30MW Biomass Power Generation Project

Version：05

Date: 24/09/2007

Revision history of this document:

Version Number	Date	Description
01	20/11/2006	Internal Draft Version
02	20/01/2007	PDD submitted to DNA for LOA
03	10/04/2007	PDD submitted for GSP
04	22/07/2007	PDD revised to address DOE's comments based on the document review and on-site interview
05	24/09/2007	PDD submitted for registration request

A.2. Description of the project activity:

The proposed Shandong Gaotang 30MW Biomass Power Generation Project (hereafter referred to as the Project) is located in Gaotang County, Liaocheng City, Shandong Province, P.R.China. Gaotang County, with rich agricultural resources, is one of the biggest agriculture bases in the northwest of Shandong province. The implementation of the proposed project will realize biomass comprehensive utilization in the province and serve as a demonstration project in China.

The project will utilize local surplus biomass residues (mainly as cotton stalk) for generating electricity. The install capacity is 30MW and the straw-fired boiler is imported from Denmark BWE Company, which is a world leading company in biomass boilers production and biomass cogeneration. The proposed project will assist in transferring advanced biomass technology to China. It is estimated that the Project can deliver 145,000 MWh/y of electricity to the North China Grid, which consume nearly 121,000 tons cotton stalk per year.

The technology of straw-fired power generation applied to the proposed project is still at a nascent stage in China and involves much higher investment risks and lower financial attractiveness compared with the mature coal-fired power generating technology. In order to reduce the investment risks of the project, incentive from the CDM was seriously considered by the project owner even in the planning phase[1]. E.g., from the *Letter of Intention* given by local Gaotang County Government on 12 January 2006, it is demonstrated that local government encouraged the project owner to develop the project as CDM project. And at the first Board Meeting of National Bio Energy Gaotang Co., Ltd on 18 January 2006, all the members of the Board fully recognized the contribution of the CDM revenues to the financial attractiveness of the project and therefore agreed to develop the project as CDM project.

Then the project was approved by Shandong Development and Reformation Commission in June, 2006,

[1] The CDM consideration evidences such as later-mentioned *Letter of Intention* on 12 January 2006 and the final decision report of the first Board Meeting on 18 January 2006 were supplied to DOE for verifying.

and put into trial operation on 29 January 2007. At the moment of the writing of this version of the PDD, the project is in full operation, which will help reduce GHG emissions from the high-growth, coal-dominated power generation of North China Grid. Moreover, the proposed project will use cotton stalk for energy purpose in high efficiency, which will reduce CH4 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 are 140,695 tCO2e.

The proposed project mainly adopts renewable cotton stalk as fuels, which will contribute to the sustainable development in the region as list in following aspects:

- By using cotton stalk as fuels for power generation, saving the amount of coal use and making the straws utilization in high efficiency, which will assist China in stimulating and accelerating the commercialization of grid-connected renewable energy technologies and markets in China.
- The ash as by-product of stalk burning can be used as ash fertilizer, which will amount to over 4,580 tons in one year.
- The project will improve the livelihoods of local people by creating employment opportunities, and promoting the local tourism industry.
- The project will facilitate the local relevant industry such as stalk purchase, stalk transport and stalk storage.
- The project will reduce GHG emissions compared to a business-as-usual scenario.

In a word, the proposed project will contribute to the sustainable development in the region by reducing pollution, creating employment opportunities, promoting the local tourism industry and improving the livelihoods of local people.

A.3. Project participants:

Name of Party involved (*)((host) indicates a host Party)	Private and/or public entity(ies) project participants (*) (as applicable)	Kindly indicate if the Party involved wishes to be considered as project participant (Yes/No)
People's Republic of China (host)	National Bio Energy Co., Ltd.	No
United Kingdom	EDF Trading Limited	No
(*) In accordance with the CDM modalities and procedures, at the time of making the CDM-PDD public at the stage of validation, a Party involved may or may not have provided its approval. At the time of requesting registration, the approval by the Party(ies) involved is required.		

Please see Annex 1 for detailed contact information.

A.4. Technical description of the project activity:

A.4.1. Location of the project activity:

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A.4.1.1. Host Party(ies):

People's Republic of China

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

Shandong Province

A.4.1.3. City/Town/Community etc:

Gaotang County, Liaocheng City

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

The project site is located in Gaotang Economic Development Zone, which is 5 kilometres to the northwest of Gaotang county seat .The Project has geographical coordinates with east longitude of 116°10′39″ and north latitude of 36°54′36″ . Geographical location of the project is shown in Figure A-1 and Figure A-2.

Figure A-1: Location of the Shandong Province in China

Figure A-2: Location of the proposed project

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

Sectoral scope 1: energy industries (renewable sources)

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

The proposed project will install the Straw Direct Burning boiler of 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 in Denmark, England and Germany. Key technical specifications of BWE boiler are listed as Table A-1 below.

Table A-1 Key Technical specifications of BWE boiler

Parameters Name	Unit	Value
boiler maximum continuous rating	t/h	130
Superheated Steam pressure	MPa	9.2
Superheated Steam temperature	^{o}C	540
Boiler feed-water temperature	^{o}C	210

Boiler Exhaust Temperature	°C	130 °C
Boiler Efficiency	%	≥ 92
Boiler Dirt-discharge Rate	%	2%

Other two key equipments are turbine and generator, technologies of which are all developed by domestic manufacturers. Key technical specifications of turbine and generator are listed as Table A-2 and Table A-3 respectively.

Table A-2 Key technical specifications of turbine

Parameters Name	Unit	Data
Model	/	N30-8.83/535
Rated Output	MW	30
Rated Rotation Speed	r/min	3000
Rated Flow	t/h	120
Rated Pressure	MPa	8.83
Rated Temperature	°C	535

Table A-3 Key technical specifications of Generator

Parameters Name	Unit	Data
Model	/	QF-30-2
Rated Output	MW	30
Rated Voltage	kV	6.3
Rated Electric Current	A	3473
Rated Rotation Speed	r/min	3000

Fuel supply system is another very important technical system of the project. In order to guarantee the fuel supply of the project, seven individual stalk collection stations around the project site and one large stalk collection station at the project site are constructed. The farmers sell their cotton stalks in the nearest stalk collection, which will be cut into pieces, bundled regularly and transported to one large stalk collection station at the project site. The names of 7 individual stalk collection stations and whose distances to the project are listed in following Table A-4.

Table A-4 Information of 7 individual stalk collection stations

Station Num	Station Name	Transportation Distance to the Project Site (km)
1	Liangcun	11
2	Tianzai	25
3	Dongzhuang	28
4	Fengzhuang	24
5	Liulishi	34
6	Wangxianzhuang	28
7	Liuzhenzhuang	29

The transportation of the cotton stalks from the individual stalk collection stations to the large stalk collection station at the project site would be sub-contracted by the project entity, with a local logistics firm named as Gaotang Third Transportation Co., Ltd. At the project site the fuel is unloaded in a receiver bunker and is stored in a large storage building which can accommodate approximately a biomass amount for 5-7 days of burning, and from there it is automatically reclaimed and transported to two small buffer

silos in the boiler building.

The implementation of the proposed project will facilitate the technology transfer from developed countries to China.

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

The project activity is expected to generate an estimated annual emission reduction of 140,695 tCO_2 and 984,865 tCO_2 during the first crediting period of the project (01/12/2007-30/11/2014).

Year	Annual estimation of emission reductions(tCO_2)
2007	11,725
2008	140,695
2009	140,695
2010	140,695
2011	140,695
2012	140,695
2013	140,695
2014	128,970
Total estimated reductions(tCO_2) during the first crediting period	984,865
Total number of crediting years	7
Annual average of estimated reductions over the crediting period(tCO_2)	140,695

A.4.5. Public funding of the project activity:

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

SECTION B. Application of a baseline and monitoring methodology

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

The approved baseline and monitoring methodology applied in the proposed project activity is ACM0006 Version 4–"Consolidated methodology for grid-connected electricity generation from biomass residues".

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

ACM0002: "Consolidated baseline and monitoring methodology for grid-connected electricity generation from renewable sources" and conjunction with the approved monitoring methodology (Version 06)[2]

Version 03 of the tool for demonstration and assessment of additionality[1]

[2] http://cdm.unfccc.int/methodologies/approved

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

The approved baseline and monitoring methodology ACM0006 "Consolidated methodology for grid-connected electricity generation from biomass residues" are applicable to grid-connected and biomass residue fired electricity generation project activities, including cogeneration plants.

The methodology is applicable under the following conditions:

- No other biomass types than biomass residues, as defined above, 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);
- For projects that use biomass residues from a production process (e.g. production of sugar or wood panel boards), the implementation of the project shall not result in an increase of the processing capacity of raw input (e.g. sugar, rice, logs, etc.) or in other substantial changes (e.g. product change) in this process;
- The biomass residues used by the project facility should not be stored for more than one year;
- No significant energy quantities, except from transportation or mechanical treatment of the biomass residues, are required to prepare the biomass residues for fuel combustion, i.e. projects that process the biomass residues prior to combustion (e.g. esterification of waste oils) are not eligible under this methodology.

The proposed project is a new biomass residue fired power generation plant, which meets all above-mentioned applicability conditions of methodology ACM0006 because:

- Predominant fuels used by the proposed project are cotton stalk;
- The cotton stalk used by the proposed project are byproducts of agriculture crops, not from a production process;
- The cotton stalk are directly bought from the farmers at the temporary storage stations and the straws should not be stored for more than one year;
- Except from transportation of the cotton stalk, the proposed project has no significant consumption of fossil fuels.

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

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

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 North China Power Grid that the proposed project connected to. This is in line with the default definition of the boundary given in the baseline methodology ACM0002, which is used for determining the emissions associated with grid electricity generation. The proposed project is connected to North China Power Gird.

In this PDD, CH_4 emissions will be included for both project and baseline emissions. According to ACM0006, the GHGs included or excluded from the project boundary are listed as follows:

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

	Source	Gas	Included?	Justification/Explanation
Baseline	Electricity generation in fossil fuel fired power that is dispatched due to the project activity	CO_2	Yes	Main emission source
		CH_4	No	Excluded for simplification. This is conservative.
		N_2O	No	Excluded for simplification. This is conservative.
	Uncontrolled burning or decay of Surplus biomass	CO_2	No	It is assumed that CO2 emissions from surplus biomass residues do not lead to changes of carbon pools in the LULUCF sector.
		CH_4	Yes	B1 is the most likely baseline scenario.
		N_2O	No	Excluded for simplification. This is conservative.
Project Activity	On-site fossil fuel and electricity consumption due to the project activity (stationary or mobile)	CO_2	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	Included as emission sources by project activity
		CH_4	No	Excluded for simplification. This emission source is assumed to be very small.
		N_2O	No	Excluded for simplification. This emission source is assumed to be small.
	Combustion of biomass residues for electricity and / or heat generation	CO_2	No	It is assumed that CO2 emissions from surplus biomass do not lead to changes of carbon pools in the LULUCF sector.
		CH_4	Yes	CH4 emissions will be caused during the course of power/heat generation.
		N_2O	No	Excluded for simplification. This emission source is assumed to be small
	Biomass storage	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:

According to the description in the approved baseline methodology 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 reasonable and feasible baseline scenarios of the proposed project are identified below from three parts mentioned above-mentioned.

1. Power generation

In order to determine the most plausible baseline scenario for power generation, detailed analyses are summarized in Table B-2:

Table B-2 Identifying the most plausible baseline scenario for power generation

Series	Alternative	Included?	Justification/Explanation
P1	The proposed project activity not undertaken as a CDM project activity	Yes	It seems to be a plausible alternative without considering the investment barriers.
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)	No	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, Alternative P2 can't become the most realistic baseline alternative for power generation.
P3	The generation of power in an existing plant, on-site or nearby the project site, using only fossil fuels	No	There are none of fossil fuel fired power plants on-site or nearby the project site, so P3 is excluded.
P4	The generation of power in existing and/or new grid-connected power plants	Yes	The generation of power from North China Grid will meet the requirement of national laws and regulations, also financially viable. Hence, the Alternative P4 is a feasible alternative.
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	No	There are none of biomass power plants in the local areas, so P5 is excluded.
P6	The continuation of power	No	There are none of biomass power plants in

	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		the local areas, so P6 is excluded.

As analyzed above, Alternative P1 and Alternative P4 are considered as plausible baseline scenarios. However, according the benchmark analysis in the latter step, the proposed project activity not undertaken as a CDM project activity will be faced with investment barriers and technological barriers and can't be run commercially, So P1 has to be excluded. Therefore, the most plausible baseline scenario for power generation is the Alternative P4.

2. Use of biomass

The proposed project mainly uses biomass residues from cotton stalk. Without the proposed project activity, the baseline scenario is that a huge amount of cotton stalk are left in the field to natural decay or burnt in an uncontrolled manner. According to statistic data from investigation group constituted by Gaotang County Government, the annual cotton stalk output within 50 km around the project site is 773,800 tons.

Detailed analyses on each alternative are summarized in Table B-3.

Table B-3 Identifying the most plausible baseline scenario for biomass use

Series	Alternative	Included?	Justification/Explanation
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.	Yes	Around the site of the proposed project, a certain number of surplus biomass residues would be dumped or left to decay. Alternative B1 is a realistic baseline alternative for unused biomass.
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.	No	There is no deep landfill with more than 5 meters around the site of the proposed project, hence, the unused biomass residues are impossible dumped or left to decay under clearly anaerobic conditions. Therefore, B2 is excluded.
B3	The biomass residues are burnt in an uncontrolled manner without utilizing it for energy purposes.	Yes	Around the site of the proposed project, a certain number of surplus biomass residues would be burnt in an uncontrolled manner without utilizing it for energy purposes. Therefore, Alternative B3 is one realistic baseline alternative for unused biomass.
B4	The biomass residues are used for heat and/or electricity generation at the project site	No	There is no heat or power generation project around at the project site that uses biomass residues as fuel. Therefore, B4 is excluded.

B5	The biomass residues are used for power generation, including cogeneration, in other existing or new grid connected power plants	No	There is no generation or cogeneration project using biomass residues as fuel close to proposed project. Considering the cost of biomass transportation, other existing or new grid-connected power plants will not use theses surplus biomass residues. Therefore, B5 is excluded.
B6	The biomass residues are used for heat generation in other existing or new boilers at other sites	No	There is no biomass boiler using biomass residues as fuel close to proposed project. Considering the cost of biomass transportation, other existing or new boilers at other places will not use these surplus biomass residues. So alternative B6 is not a realistic baseline alternative for unused biomass
B7	The biomass residues are used for other energy purposes, such as the generation of bio-fuels	No	There is no other energy generation project that has needs to the surplus biomass residues consumed by the proposed project. Therefore, B7 is excluded.
B8	The biomass residues are used for non-energy purposes, e.g. as fertilizer or as feedstock in processes (e.g. in the pulp and paper industry)	No	Currently, There is no company using biomass residues for non-energy purpose around the project site such as fertilizer or as feedstock in processes. So alternative B8 is excluded.

As analyzed above, the most realistic and credible alternative for biomass use is B1 or B3.

3. Heat generation

The proposed project is not a cogeneration projects and then dose not generates heat, so alternatives of heat generation are not considered.

In conclusion, the scenario 2 is the most realistic baseline scenario (Table B-4).

Table B-4 Baseline Scenario

Scenario	**Project Type**	**Baseline Scenario**		
		Power Generation	Use of biomass	Heat Generation
2	Power Greenfield Project	P4	B 1 or B3	No Heat

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):

The project uses the *Tool for the Demonstration and Assessment of Additionality* (version 3), which was revised in the EB 29, to demonstrate its additionality. The tool includes the following steps:

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

Define realistic and credible alternatives to the project activity(s) that can be (part of) the baseline scenario through the following sub-steps:

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.

Detailed description of each alternative above-mentioned are carried out in Section B.4.

As it is discussed in Section B.4, the plausible baseline scenario for power generation is the alternative P1 (The proposed project activity not undertaken as a CDM project activity) and P4 (Supply of equivalent power generation by the North China Grid); the plausible baseline scenario for unused biomass residues is the Alternative B1 (biomass residues are dumped or left to decay) and Alternative B3 (biomass residues are burnt in an uncontrolled manner).

Sub-step 1b. Consistency with mandatory laws and regulation

As for power generation, P1 (The proposed project activity not undertaken as a CDM project activity) and P4 (Supply of equivalent power generation by the North China Grid), 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 currently there are no related regulations that compel to use biomass. Biomass has been dumped or left to decay or burned in an uncontrolled manner are ubiquitous both in China and near the project site. Therefore, B1 or B3 is a common scenario in the real world.

According to *Tool for the Demonstration and Assessment of Additionality*, if the proposed project activity is the only alternative amongst the ones considered by the project participants that is in compliance with all regulations with which there is general compliance, then the proposed CDM project activity is not additional. Based on the above analysis, besides baseline scenario, most of alternatives are in line with the existing Chinese laws and regulations although some of them are excluded from baseline scenario with reasonable explanations in Section B.4; the proposed project activity is not the only alternative amongst the ones identified that is in compliance with legal and regulatory requirements. Therefore, the proposed CDM project activity may be additional. The further analysis of proposed project will be further demonstrated in latter step.

Step 2. Investment Analysis

The purpose of investment analysis is to determine whether the proposed project activity is economically or financially less attractive than other alternatives without the revenue from the sale of certified emission reductions (CERs). To conduct the investment analysis, use the following sub-steps:

Sub-step 2a. Determine appropriate analysis method

The *Tools for the Demonstration and Assessment of Additionality* recommends three analysis methods, including simple cost analysis (Option I), investment comparison analysis (Option II) and benchmark analysis (Option III).

The proposed project generates financial and economic benefits through the sales of electricity other than CDM related income therefore the simple cost analysis (Option I) cannot be taken. And the investment comparison analysis (Option II) is only applicable to projects where alternatives should be similar investment projects. The alternative baseline scenario of power generation the proposed project is the North China Grid rather than a new investment project. Out of the investment comparison analysis (Option II) and the benchmark analysis (Option III) shall be chosen.

Sub-step 2b. Option III. Apply benchmark Analysis

In accordance with *Interim Rules on Economic Assessment of Electrical Engineering Retrofit Projects* issued by former State Power Corporation of China, there is not yet such a financial internal rate of return (IRR) as benchmark in China's power generation industry to date. However, the project IRR shall not be lower than 8 percent considering economic assessments of hydropower projects, fossil fuel fired projects, transmission and substation projects, especially the interest rate of commercial loans over five years[3]. Nowadays many of China's existing power projects have applied it as the benchmark IRR.

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

1) Parameters needed for calculation of key financial indicators

According to the feasibility study of proposed project, parameters needed for calculation of key financial indicators are as follows:

Table B-5 Parameters for calculation of key financial indicators

Series	Account Title	Unit	Data	Data Source
1	Capacity	MW	30	FSR
2	Construction Period	Year	1	FSR
3	Operation Life	Year	20	FSR
4	Total Investment Capital Assets	1000RMB	29,0960	FSR
5	Gross Annual Electricity Generated	GWh	165	FSR
6	Electricity Consumption Rate for power generation	%	12.0	FSR
8	Depreciation Period	Year	15	FSR
9	Repair	%	2.50	FSR
10	Insurance	%	0.25	FSR
11	Average Personal Pay	RMB/year	30,000	FSR
12	Welfare Rate	%	60.5	FSR
13	Accumulation fund	%	10	FSR
14	commonweal fund	%	5	FSR
15	Cotton Stalk Consumption for Electricity	kg/MWh	702.35	FSR
16	Price of Cotton Stalk	RMB/ton	280	Footnote[4]

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

[4] The price of cotton stalk is referenced from the Cotton Stalk Purchase Agreement, which were sent to DOE for Verifying.

17	Feed-in-Tariff (including VAT,from 1st to 15th year)	RMB/MWh	594	Footnote[5]
18	Feed-in-Tariff (including VAT,from 16th to 20th year)	RMB/MWh	344	Footnote[5]
19	Water Fee	RMB/MWh	4.5	FSR
20	Average Material Fee	RMB/MWh	6	FSR
21	Other Fee	RMB/MWh	8	FSR
22	Persons	Person	50	FSR
23	Income Tax	%	33	FSR
24	Value Added Tax	%	17	FSR
25	City maintenance& Construction tax	%	7	FSR
26	Education addition Fee	%	4	FSR
27	Currency exchange rate (Euro:RMB)	RMB/Euro	10	Currency Rate
28	CERs price	Euro/tCO2e	7	Expected

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

In accordance with benchmark analysis (Option III), if the financial indicators of the proposed project, such as the project IRR[6], are lower than the benchmark, the proposed project is not considered to be financially attractive.

Table B-6 shows the project IRR of the proposed project with and without the sales of CERs. Without the sales of CERs the project IRR is 4.46 percent which is lower than the financial benchmark. Thus the proposed project is not considered to be financially attractive.

However, taking into account the CDM revenues, the project IRR is 9.93 percent, which is higher than the financial benchmark. Therefore the CDM revenues enable the project to overcome the investment barrier and demonstrate the additionality of the proposed project.

Table B-6 Project IRR of the proposed project

	Project IRR
Without CERs	4.46%
With CERs	9.93%

Sub-step 2d. Sensitivity analysis

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[5] According to Clause 7 of the *Tentative Management Measures for Price and Sharing of Expenses for Electricity Generation from Renewable Energy* (Document No. NDRC Energy [2006]7), "the feed-in-tariff of biomass power generation project is decided by the government. Price administration agency of the State Council will stipulate region-specific benchmark tariff, and tariff standards will be composed of the benchmark tariff for the desulphrized coal-fired generator of various provinces (autonomous regions, municipalities directly under the Central Government) in 2005 and the subsidized tariff. The standard subsidized tariff is 0.25 RMB/kWh. Beginning from the date when the power generation project is put into operation, subsidized tariff can be continued for 15 years, and after that the subsidized tariff will be cancelled."

The benchmark feed-in-tariff (including VAT) for the desulphrized coal-fired generator of Shandong Province in 2005 is 0.344 RMB/kWh[5] (Notification by Shandong NDRC and Shandong Price Administration Agency on implementing coal and electricity price linkage mechanism in Shandong Province, Document No. Lu Jia Ge Fa[2005]72). Thus the feed-in-tariff of the project in first 15 years calculated as 0.594 RMB/kWh (0.344+0.25).

[6] For the benchmark analysis, the IRR shall be calculated as project IRR.

The sensitivity analysis shall show whether the conclusion regarding the financial attractiveness is robust to reasonable variations in the critical assumptions. For the proposed project, four parameters were selected as sensitive factors to check out the financial attractiveness:

1) Total Investment for Capital Assets

2) Annual Electricity Generated

3) Annual O&M cost (excluding fuel cost)

4) Cotton Stalk Price

The results of sensitive analysis are shown in Table B-7and Figure B-1 below.

Table B-7 Sensibility analysis of the proposed project

	-10%	-5%	0%	5%	10%
Total investment	6.52%	5.46%	4.46%	3.51%	2.61%
Annual Electricity Generated	2.27%	3.39%	4.46%	5.48%	6.45%
Annual O&M cost	5.29%	4.88%	4.46%	4.02%	3.57%
Cotton Stalk Price	6.42%	5.47%	4.46%	3.36%	2.16%

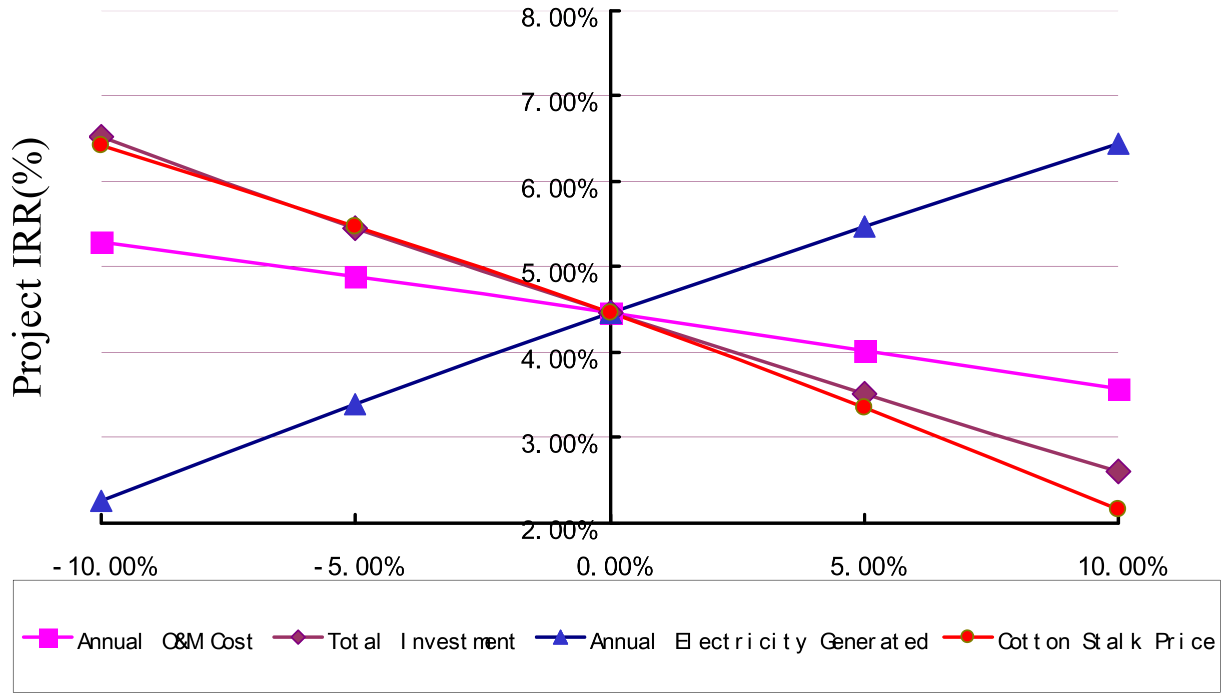

Figure B-1 Sensibility analysis of the proposed project

The project IRR of the proposed project varies to different degrees in accordance with the fluctuation of four parameters within the range of negative 10 percent to positive 10 percent. It could be seen that the project IRR is below the benchmark IRR even when the total investment drops by 10 percent.

To conclude, the sensitivity analysis shows that without CER revenue, IRR of the project is difficult to reach the benchmark 8%, which supports the conclusion that the proposed project is unlikely to be financially attractive.

Step 3. Barrier analysis

This step is used to determine whether the proposed project activity faces barriers that:
(a) Prevent the implementation of this type of proposed project activity; and
(b) Do not prevent the implementation of at least one of the alternatives.
Use the following sub-steps:

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

Establish that there are barriers that would prevent the implementation of the type of proposed project activity from being carried out if the project activity was not registered as a CDM activity. Such barriers may include, among others:

Cost Disadvantage Barrier

In China the approximate investment costs of the biomass power generation project adopted direct burning technology is about 10,000 RMB/kW, which is nearly 4 times higher than that of the coal-fired power plant[7]. As far as this project is concerned, the investment cost is 9,939 RMB/kW because the direct burning boiler is imported from Denmark BWE Company. Therefore, developing the proposed biomass cogeneration projects needs much more capital and revenue than those of same scale coal-fired power plant.

In addition, since biomass power generation is a relatively young technology comparing to the common fossil fuel power plants technology, the effects of combusting biomass fuels on the life cycle of the plant equipment are not yet established, which also increases the investment risks;

Without the CDM revenues, despite t prospective tariff policy and other incentives with respect to biomass power generation projects are currently in place, as mentioned in Step 2 financial indicators of this kind of projects have not fundamentally changed (IRR: 4.46%) and loan repayment capability remains weak, so the project would face financing barriers. However, with the CDM revenues, the indicator will be improved, and then investment/financing barriers can be overcome effectively.

Technology Barrier

Biomass power generation technology is still in the stage of research & development and project demonstration in China[8], and there lacks particularly the self-developed and mature straw direct burning boiler technology, so the key technology adopted by the proposed project is the biomass boiler imported from Denmark BWE Company.

With this imported technology, the proposed project is possible to acquire higher efficiency and more advanced technology, but also bear technological risk. Since the technology of biomass cogeneration in

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7 http://www.newenergy.org.cn/html/2006-10/20061027_12214.html
8 http://nyj.ndrc.gov.cn/zywx/t20060206_58771.htm, *Directive Catalogue on Renewable Industry Development*, Degree No. 2517 of NDRC Energy.

China has not been commercialized, skilled and/or trained staffs are lacked to operate and maintain the facility, and there are no special education/training institutions in China providing such training activities. At the same time, the proposed project owner is lack of experiences to operation and maintenance, 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.

Price risk for biomass residue

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 biomass based power generation project, for example, after Shandong Shiliquan straw mix with coal generation project[9] is commissioning, and the straw price of the Shiliquan project has increased from 100 RMB/t to 400 RMB/t, which leads to the significant increase in the power generation cost of Shliliquan project[10]. The project also purchases biomass residues from dispersed farmers and without a long-term contract to hedge the straw price thus the changes in straw price will also be a potential risk.

Biomass collection& Storage barriers

Biomass resource is widely dispersed in small quantities in the project site. Therefore, the collection and transportation work of the huge amount of biomass materials to the project site or closest collection point becomes a constraint. Apart from this, the expense of collection and transportation charges will increase every year due to the increasing trend in the cost of labor and transportation cost;

Another big problem is the storage of biomass. Unlike the normal thermal power plant, biomass firing plant has to consume much higher quantity of fuel which is rather difficult to maintain in plant lifetime operation period. The characteristics of biomass fuels change quickly within very short period of time and the low bulk density (weight per unit volume) make sit difficult to handle and store; in addition, Comparing with the coal firing, biomass has lower burning point which might cause fire easily while storage, so there existed high risks of fire.

Sub-step 3b. 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 Section B.4, the baseline scenario of the proposed project is scenario 2 of ACM0006, so the whether the barriers identified above would prevent the implementation of the alternatives are carried out respectively as following:

Alternatives to power generation

In the absence of the proposed project activities, the most plausible and credible alternative available to power generation is P4 (the generation of power in existing and/or new grid-connected power plants). 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. Therefore the investment barrier,

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[9] Shandong Shiliquan straw mix with coal generation project is outside the project boundary of the project (it is nearly more than 250 kilometres from the project site).

[10] http://www.newenergy.org.cn/html/2005-12/200517815.html

technology barrier and other barriers mentioned above of the proposed project will not be applicable to existing or new coal-fired plants power generation in the Grid.

Alternatives to unused biomass

In the absence of the proposed project activities, the most plausible and credible alternative available to unused biomass is that such biomass would be dumped, left to decay (B1) or burned in an uncontrolled manner without utilizing it for energy purposes (B3). 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. So the biomass usage alternative will not incur any barrier. Therefore the investment barrier, technology barrier and other barriers mentioned above of the proposed project will not be applicable to alternatives of unused biomass.

As analyzed above, the proposed project activity faces 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. Hence, the proposed project activity may be additional.

Step 4 Common practice analysis

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

Till the end of 2006, there are two biomass direct fired power generation project that has been put into operation in Shandong province, they are Shandong Shiliquan Power Plant Coal-fired Boiler Retrofit to Co-fired Boiler Project[11]and Shandong Shanxian 25MW Biomass Power Plant[12].

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

Shandong Shiliquan Power Plant Coal-fired Boiler Retrofit to Co-fired Boiler Project was put into operation in Dec., 2005. Straw co-fired in the boiler accounts for less than 20%[13] of fuel, which is much different from the Project. Moreover, Shandong Shiliquan Power Plant Coal-fired Boiler Retrofit to Co-fired Boiler Project also faces great difficulty such as straw price increasing. The existence of this project will not influence the additionality of the Project.

Shandong Shanxian 25 MW Biomass Power Plant Project was put into operation in November, 2006, which also seeks CDM for overcoming the barriers such as financially unattractive[14]. This fact provides further evidence of the additionality of the Project.

Therefore, the existence of these projects will not influence the additionality of the Project. Therefore, the proposed project is evident not a common practice.

[11] http://www.1718vip.com/newscn/news_view.asp?newsid=2818.

[12] http://cdm.ccchina.gov.cn/web/NewsInfo.asp?NewsId=1394

[13] http://jjdb.dzwww.com/xinwen/200604/t20060428_1452925.htm.

[14] http://cdm.unfccc.int/Project

To summarize, it can be proved that the proposed project activity is additional and not (part of) baseline scenario. Without the CDM revenues, the project activity would not be implemented smoothly. Instead, the equivalent electricity will be provided by the North China Grid. As a result, the reduction of GHG emissions would not be realized. The above additionality analysis provides sufficient evidence that the registration of the CDM revenues can enable the project to overcome the barriers it faces.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

According to the analysis in Section B.4, the baseline scenario applying to the proposed project is shown below:

Table B-8 Combination of the baseline scenario for the proposed project

Scenario	Project type	Baseline scenario		
		Power generation	Heat generation	Biomass use
2	Greenfield power project	P4	N/A	B1 or B3

Based on the description of the methodology, the emission reductions by the project activity during a given year y can be calculated as follows:

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

ER_y: Emissions reductions of the project activity during the year y (tCO2/yr)
$ER_{electricity,y}$: Emission reductions due to displacement of electricity during the year y (tCO2/yr)
$ER_{heat,y}$: Emission reductions due to displacement of heat during the year y (tCO2/yr)
$BE_{biomass,y}$: Baseline emissions due to natural decay or burning of anthropogenic sources of biomass residues during the year y (tCO2e/yr)
PE_y : Project emissions during the year y (tCO2/yr)
L_y: Leakage emissions during the year y (tCO2/yr)
The details of the calculation are elaborated shown below:

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

Since the capacity of the proposed project plant (30MW) is more than 15MW, 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 will be adopted.

According to the ACM0002, it is required to estimate the Operating Margin (OM) and Build Margin (BM) emission factor ex-ante, and through weighted average of OM and BM, the Combined Margin baseline emission factor of the North China Grid can be obtained, and the emission reductions due to displacement of electricity can be estimated. The details are shown below.

STEP 1. Calculate the Operating Margin emission factor(s) ($EF_{OM,y}$) based on one of the four following methods:

(a) Simple OM, or
(b) Simple adjusted OM, or
(c) Dispatch Data Analysis OM, or
(d) Average OM.

The method (c) requires the detailed operation and dispatch data of power plants in the grid. But there is no publicly available dispatch data for the North China Grid. Therefore, the method (c) is not applicable.

The method (b), simple adjusted OM, needs the annual load duration curve of the grid. Based on the same reason stated in the above paragraph, the necessary data for the method (b) are difficult to obtain, so the method (b) is not applicable.

The method (d), average OM, is applicable only if low-cost/must run resources[15] constitute more than 50% of total amount of power generation in the grid. According to the data from *China Power Yearbook 2005*, the total power generation of the North China Grid in 2004 is 530,804,000 MWh[16], in which coal-fired power generation is 526,772,000 MWh, accounting for 99.24%. Therefore, the North China Grid generation system is dominated by coal-fired power, and this fact will not change in a quite long time ahead. So the method (d) is not applicable.

The Simple OM method (a) is applicable if low-cost/must run resources constitute less than 50% of total amount of power generation in the grid in average of the five most recent years. The share of the low-cost/must run resources in the North China Grid are 4.5% (1999), 5.2% (2000), 4.4% (2001), 4.5% (2002),3.6% (2003), and 3.2% (2004) respectively. Therefore, it is reasonable to select the method (a) to calculate the OM emission factor.

According to the ACM0002, the Simple OM emission factor ($EF_{OM, simple,y}$) is calculated as the generation-weighted average emissions per electricity unit (tCO_2/MWh) of all generating sources that serve the system, excluding low-operating cost and must-run power plants. The formula of $EF_{OM,simple,y}$ calculation is

$$EF_{OM,simple,y} = \frac{\sum_{i,j} F_{i,j,y} \cdot COEF_{i,j,y}}{\sum_{j} GEN_{j,y}} \qquad (2)$$

where:

$F_{i,j,y}$ is the amount of fuel *i* (in a mass or volume unit) consumed by relevant power sources j in year(s) *y*, while *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[17];

$COEF_{i,j,y}$ is the CO_2 emission coefficient of fuel *i* (tCO_2 / mass or volume unit of the fuel), taking into account the carbon content of the fuels used by relevant power sources *j* and the percent oxidation of the fuel in year(s) *y*;

And $GEN_{j,y}$ is the electricity (MWh) delivered to the grid by the source *j*.

The CO_2 emission coefficient $COEF_{i,j,y}$ is obtained as

[15] Low operating cost and must run resources typically include hydro, geothermal, wind, low-cost biomass, nuclear and solar generation. If coal-fired power is obviously a must-run, it should also be included in this list, i.e. excluded from the set of plants.

[16] *China Electric Power Yearbook 2005,* P474

[17] As described above, imports from a connected electricity system should be considered as one power source j.

$$COEF_{i,j,y} = NCV_i \cdot EF_{CO2,i} \cdot OXID_i \tag{3}$$

Where:

NCV_i is the net calorific value (energy content) per mass or volume unit of a fuel *i;*

$OXID_i$ is the oxidation factor of the fuel *i,* (use default values of *IPCC*);

$EF_{CO_2,ii}$ is the CO_2 emission factor per unit of energy of the fuel *i*.

If available, local values of NCV_i and $EFCO_{2,i}$ shall be used. If not, country-specific values are preferable to IPCC default values. In this PDD, NCV_i of different fuels are obtained from *China Energy Statistical Yearbook 2004*. With regard to the fuel types where NCV_i fluctuate in a certain range, the floor values of the fluctuation range are used for conservatism. $EFCO_{2,i}$ of fossil fuel come from IPCC default values.

The Simple OM Emission Factor ($EF_{OM, simple,y}$) of the proposed project is calculated on the basis of the fuel consumption data for electricity generation of the North China Grid, excluding those of low-operating cost and must-run power plants, such as wind power, hydropower and nuclear etc. These data are obtained from the *China Electric Power Yearbook* (2003~2005, published annually) and *China Energy Statistical Yearbook* (2000~2005). Based on these data, the Simple OM Emission Factor ($EF_{OM, simple,y}$) of the North China Grid is calculated as 1.069 tCO_2e/MWh (see Annex 3 for details).

For the proposed project, the renewable crediting period, i.e. 7*3 years, is adopted.

STEP 2. Calculate the Build Margin emission factor ($EF_{BM,y}$):

According to ACM0002, $EF_{BM,y}$ is determined by the formula as follow:

$$EF_{BM,y} = \frac{\sum_{i,m} F_{i,m,y} \cdot COEF_{i,m,y}}{\sum_{m} GEN_{m,y}} \tag{4}$$

where $F_{i,m,y}$, $COEF_{i,m}$ and $GEN_{m,y}$ are analogous to the variables described for the simple OM method in step 1 for plants m.

ACM0002 provides two options for sample group m:

(1) The five power plants that have been built most recently, or
(2) The power plants capacity additions in the electricity system that comprise 20% of the system generation (in MWh) and that have been built most recently.

The one with larger annual generation should be used.

In the North China Grid, the information on the five power plants built most recently is not available. According to the EB's guidance on DNV deviation request, the EB accepted the following deviation18:

- Use of capacity additions during last 1 - 3 years for estimating the build margin emission factor for grid electricity;

[18] http://cdm.unfccc.int/Projects/Deviations

- Use the efficiency level of the best technology commercially available in the provincial/regional or national grid of China, as a conservative proxy, for each fuel type in estimating the fuel consumption to estimate the build margin (BM).

Therefore, this proposed project uses the alternative method to calculate $EF_{BM,Y}$, and the formula is

$$EF_{BM,y} = \left[EF_{BTCA\_fire,y} \times CAP_{fire,y-n,y}\right] / \left[\sum_j CAP_{j,y-n,y}\right] \quad (5)$$

Where $CAP_{fire,y-n,y}$ is the incremental installed capacity of fuel-fired power (MW) in *y* year compared to that of *y-n* year;

$\sum_j CAP_{j,y-n,y}$ is the total incremental installed capacity of various power sources in the grid during the years from y to y-n year;

$\left[CAP_{fire,y-n,y}\right] / \left[\sum_j CAP_{j,y-n,y}\right]$ represents the share of incremental installed capacity of fuel-fired power in the whole incremental installed capacity.

where, *n* is fixed by:

Starting from *y* year, the differences of installed capacity between *y* year and *y-1* year, y year and *y-2* year,…*y* year and *y-n* year, *y* year and *y-n-1* year, …are calculated respectively, and then divided by the installed capacity of *y* year. The year that can make the left-hand side of the following formula greater than 20% will be regarded as *n*. The formula is as follows:

$$\frac{\sum_j CAP_{j,y-n}}{\sum_j CAP_{j,y}} \geq 20\% \quad (6)$$

$EF_{BTCA\_fire,y}$ is the emission factor of fuel-fired power with best technology commercially available (BTCA). It represents the trend of decreased coal consumption in the fuel-fired power generation brought by technology advancement in the coming years. Compared with the method for $EF_{BM,y}$ provided by ACM0002 Methodology, the value of $EF_{BTCA\_fire,y}$ is lower than that of other types of fuel-fired power plants to be built in the grid, because the emission factor of the alternative method reflects the fuel efficiency of the fuel-fired power plants which use the best technology commercially available. Therefore, the building margin factor through this method is conservative.

The following section describes the process of calculating $EF_{BTCA\_fire,y}$ for the North China Grid.

According to the data from *China Power Yearbook 1999-2005*, and with the year 2004 regarded as the most recent year of *y,* the incremental installed capacity between year 2001and year 2004 are used for $EF_{BM,y}$ calculation.

The calculation for value of $EF_{BTCA\_fire,y}$ is based on the 320g/kWh of standard coal consumption for fuel-fired power generation. According to statistic information in China, the standard coal consumption for fuel-fired power generation in 2000 is 350g/kWh. And if various measures aimed at improving energy efficiency can be carried out, the value of 350g/kWh is expected to reduce to 320g/kWh by 2010.

As the gas/oil consumption in the North China Grid is very small and negligible, emission factor of the best technology (320g/kWh) is treated as $EF_{BTCA\_fire,y}$.

By multiplying the value of $\left[CAP_{fire,y-n,y}\right]/\left[\sum_j CAP_{j,y-n,y}\right]$ with the value 0.886 of $EF_{BTCA\_fire,y}$, the value of $EF_{BM,y}$ is 0.880. (See Annex 3 for details)

Step3. Calculate the baseline emission factor EF_y

Based on ACM0002, the baseline emission factor EF_y should be calculated as the weighted average of the Operating Margin emission factor ($EF_{OM,y}$) and the Build Margin emission factor($EF_{BM,y}$), where the weights w_{OM} is 0. 5 and w_{BM} is 0. 5 by default, and ($EF_{OM,y}$) and ($EF_{BM,y}$) are calculated as described in Step 1 and 2.

$$EF_y = 1.069*0.5+0.880*0.5 = 0.975\ (tCO_2e/MWh) \quad (7)$$

Step4. Calculate the Emission reductions ($ER_{electricity,y}$)

Therefore, baseline emissions can be calculated as below:

$$ER_{electricity,y} = EG_y * EF_{electricity,y} \quad (8)$$

According to the feasibility report, EG_y is expected to be 145,000 MWh

2. Emission reductions due to displacement of heat ($ER_{heat,y}$)

Emission reductions due to displacement of heat ($ER_{heat,y}$) is not considered for the proposed project.

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

According to ACM0006, for the scenario 2, Baseline emissions due to natural decay or burning of anthropogenic sources of biomass residues ($BE_{biomass,y}$) should be determined consistent with the most plausible baseline scenario for the use of the biomass. In details the $BE_{biomass,y}$ is determined in two steps:

Step 1 Determination of the quantity of biomass residues used as a result of the project activity.
Since 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 $BF_{PJ,k,y}=BF_{k,y}$ = 109,371.9 tons of dry cotton stalks (the annual 121, 000 tons of cotton stalks are consumed with the moisture content of 9.61%)

Step 2 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:

$$BE_{biomass,y} = GWP_{CH4} * \sum_k BF_{PJ,k,y} * NCV_k * EF_{burning,CH4,k,y} \quad (9)$$

Where:
GWP_{CH4}: the Global Warming Potential for methane valid for the relevant commitment period which is equal to 21 in this PDD.
$BF_{PJ,k,y}$: the incremental quantity of biomass residue type k used as fuel in the project plant during the year y in tons. Based on the project feasibility study report, the annual used cotton stalk will be 109,371.9 tons of dry cotton stalks.
NCV_k : the net calorific value of the cotton stalk in GJ per tons of dry cotton stalks, for the proposed project, the value of 15.89 is applied.
$EF_{burning,CH4,k,y}$: the CH_4 emission factor for uncontrolled burning of the cotton stalk 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%, therefore a conservativeness factor of 0.73 is used in this PDD, thus the CH_4 emission factor of 0.001971 tCH_4/ T biomass residues should be used.

4. PE_y : Project emissions during the year y (tCO2/yr)

As described in ACM0006, the project emissions include CO_2 emissions from transportation of cotton stalks to the project site (PET_y), CO2 emissions from on-site consumption of fossil fuels due to the project activity ($PEFF_y$), CO2 emissions from consumption of electricity ($PE_{EC,y}$) and CH_4 emission from the controlled combustion of cotton stalk ($PE_{biomas,CH4,y}$).

Then the project emission can be calculated as:

$$PE_y = PET_y + PEFF_y + PE_{EC,y} + GWP_{CH4} * PE_{biomass,CH4,y} \qquad (10)$$

Step1 Methane emissions from combustion of cotton stalks ($PE_{biomass,CH4,y}$)

Methane emissions from combustion of cotton stalks can be calculated as follows:

$$PE_{biomass,CH4,y} = EF_{CH4,BF} * \sum_k BF_{,k,y} * NCV_k \qquad (11)$$

where:

$BF_{k,y}$: the quantity of cotton stalk used as fuel in the project plant during the year y in tons,. Based on the project feasibility study report, the annual used cotton stalk will be 109,371.9 tons of dry cotton stalks.
NCV_k : the net calorific value of the cotton stalk in GJ per tons. Based on the project feasibility study report, it is taken as 15.89 GJ/ton.
$EF_{CH4,BF}$: the CH_4 emission factor for controlled burning of the cotton stalk 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, the CH_4 emission factor in this PDD is taken as 0.0000411 tCH_4/GJ.

Step 2 Carbon dioxide emissions from combustion of fossil fuels for transportation of cotton stalks (PET_y)

Transporting biomass from the suppliers to the proposed project site is normally done by trucks, which results in direct GHG emissions. The emissions related to biomass transportation to the plant in year *y* can be calculated as follows:

$$PET_y = \frac{\sum_k BF_{k,y}}{TL_y} * AVD_y * EF_{km,co2,y} \qquad (12)$$

where:

PET_y : CO2 emissions during the year *y* due to transport of the biomass residues to the project plant (tCO2/yr)

AVD_y : Average round trip distance (from and to) between the biomass residue fuel supply sites and the site of the project plant during the year *y* (km). All the cotton stalk supply sites are within 50 kilometres away around the site of the proposed project, therefore the conservative value of 100 is chosen to calculate.

$EF_{km,CO2,y}$: Average CO2 emission factor for the trucks measured during the year *y* (tCO2/km). Since the truck applied in the proposed project has the truck load of 5 tons, the IPCC default of 0.001011 for the Heavy Duty Diesel Vehicle is applied.

$BF_{k,y}$: Quantity of biomass residue type *k* combusted in the project plant during the year *y* (ton). For the proposed project the annual consumption of the cotton stalk is 109,371.9 tons of dry cotton stalks

TL_y : Average truck load of the trucks used (ton) during the year *y*. For the proposed project the truck load will be 5 tons.

Step 3 Carbon dioxide emissions from on-site consumption of fossil fuels ($PEFF_y$)

The boiler does not need fossil fuel for start-ups, but some machines, which are for the preparation and on-site transportation, could consume some diesel, which is estimated to be 100 tons/y. The diesel consumed will be consist with the types of the machines applied and the operational situations, and it will be monitored ex-post during the operational period as described in B.7. The GHG emissions from on-site consumption of fossil fuels will be calculated as follows:

$$PEFF_y = \sum_i (FF_{project.plant,i,y} + FF_{project.site.i.y}) * NCV_i * COEF_i \qquad (13)$$

where:

$FF_{project\ plant,i,y}$: Quantity of fossil fuel type i combusted in the project plant during the year *y* (ton/year), which is 0.

$FF_{project\ plant,i,y}$: Quantity of fossil fuel type i combusted at the project plant during the year *y* (ton/year), which is considered 100 tons.

NCV_i : Net calorific value of diesel (GJ/ton), which is 42.652 GJ/ton

$COEF_i$: CO2 emission factor for the diesel (tCO2/ GJ), which is 0.0741 tCO2/ GJ

Step 4 Carbon dioxide emissions from electricity consumption ($PE_{EC,y}$)

All the on-site electricity consumption is provided by the proposed project itself, therefore, the Carbon dioxide emissions from electricity consumption on-site is not considered, since $EG_{,PJ,y}$ used in the calculation above is the net power delivered to the grid.
The electricity consumption at the 8 biomass residue storage sites is assumed 10 KWh/ton cotton stalk. Therefore this value is considered to be 1,210 MWh/year (10 KWh/ton cotton stalks multiply 121,000 tons cotton stalks) for calculation in PDD. The power meters will be installed to measure the actual power purchased from the grid.

Therefore, $PE_{EC,y} = EG_{,PJ,y} * EF_{,grid,y}$

$EF_{,grid,y}$= 0.975 tCO_2e/MWh, as calculated above.

5. L_y: Leakage emissions during the year y (tCO2/yr)

An important aspect of the leakage issue relates to whether the proposed project displaces current use of biomass as a fuel. If this occurs and drives current users of biomass to resort to more carbon intensive fuels, the amount of such fuel switch must be deducted from the project's emission reduction benefits.

A detailed survey of the biomass supply / demand situation in the area has been arranged. The total production of cotton stalks within 50 kilometres away around the site of the proposed project is 773,800 tonnes per year. Currently, almost no cotton stalks are utilized for household fuel, livestock and etc. Furthermore, there are no industries that take cotton stalks as fuel or raw materials. The implementation of the project needs a supply of 121,000 tonnes of cotton stalks per year, therefore the quantity of available cotton stalks in this region is about 640% larger than the quantity of cotton stalks that are expected to be utilized.

From the above-mentioned background, it is known that the biomass supply is far more than the demand by the proposed project. The conclusion is the biomass supply to the proposed project is sufficient and will not lead to the displacement of the current use of biomass as a fuel.

Therefore, the situation complies with the approach L_2, and the leakage for the proposed project activity is considered zero:

$$L_y = 0 \quad (14)$$

The supply / demand status within the proposed project influence area will be periodically monitored as indicated in the chosen baseline and monitoring methodologies applied to this project activity.

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

Data / Parameter:	GWP_{CH4}
Data unit:	tCO2e/tCH4
Description:	Global Warming Potential for CH4
Source of data used:	IPCC default value
Value applied:	21 for the first commitment period.
Justification of the choice of data or description of measurement methods and procedures actually applied :	

Any comment:	Shall be updated according to any future COP/MOP decisions.

Data / Parameter:	*NCVi*
Data unit:	GJ/tonne
Description:	Net Calorific Value of cotton stalk in the proposed project
Source of data used:	China Energy Statistical Yearbook 2005
Value applied:	15.89
Justification of the choice of data or description of measurement methods and procedures actually applied :	
Any comment:	Shall be updated according to China Energy Statistical Yearbook new version.

Data / Parameter:	$EF_{km,CO2,y}$
Data unit:	tCO2/km
Description:	Average CO2 emission factor for transportation of biomass with trucks
Source of data used:	IPCC 2006 default value from the Moderate Control index for the US heavy Duty Diesel Vehicle
Value applied:	0.001011
Justification of the choice of data or description of measurement methods and procedures actually applied :	
Any comment:	IPCC value from the latest version published will be utilized

Data / Parameter:	Net Calorific Value (NCV) of the diesel
Data unit:	GJ/tonne
Description:	Net Calorific Value (NCV) of diesel combusted in the proposed project
Source of data used:	China Energy Statistical Yearbook 2005
Value applied:	42.652
Justification of the choice of data or description of measurement methods and procedures actually applied :	
Any comment:	

Data / Parameter:	$COEF_i$
Data unit:	tCO2/ GJ
Description:	CO2 emission factor for the diesel (tCO2/ GJ)
Source of data used:	2006 IPCC Guidelines for National Greenhouse Gas Inventories
Value applied:	0.0741
Justification of the choice of data or	

description of measurement methods and procedures actually applied :	
Any comment:	

Data / Parameter:	$COEF_i$
Data unit:	$tCO2/GJ$
Description:	CO2 emission factor for the coal (tCO2/ GJ)
Source of data used:	2006 IPCC Guidelines for National Greenhouse Gas Inventories
Value applied:	0.0946
Justification of the choice of data or description of measurement methods and procedures actually applied :	
Any comment:	

Data / Parameter:	$F_{i,j,y}$
Data unit:	Mtons, Mm^3
Description:	the amount of fuel *i* (in a mass or volume unit) consumed by relevant power sources j in year(s) *y*
Source of data used:	China Energy Statistical Yearbook（2000~2005）
Value applied:	See Annex 3 for details
Justification of the choice of data or description of measurement methods and procedures actually applied :	Official statistical data
Any comment:	

Data / Parameter:	NCV_i
Data unit:	TJ/ mass or volume unit of a fuel
Description:	the net calorific value (energy content) per mass or volume unit of a fuel *i*
Source of data used:	China Energy Statistical Yearbook（2005）
Value applied:	See Annex 3 for details
Justification of the choice of data or description of measurement methods and procedures actually applied :	Local values
Any comment:	

Data / Parameter:	$EF_{CO2,i}$
Data unit:	KgCO2/TJ
Description:	the Effective CO2 emission factor
Source of data used:	2006 IPCC Guidelines for National Greenhouse Gas Inventories
Value applied:	See Annex 3 for details
Justification of the choice of data or description of measurement methods and procedures actually applied :	IPCC default value
Any comment:	

Data / Parameter:	*BTCA*
Data unit:	*g/kWh*
Description:	fuel consumption for best technology commercially available
Source of data used:	*Fuel-fired Power Generation.* http://www.ccchina.gov.cn/source/fa/fa2002082803.htm
Value applied:	320g/kWh
Justification of the choice of data or description of measurement methods and procedures actually applied :	According to China's statistical data, the standard coal consumption for fuel-fired power generation in 2000 is 350g/kWh. And if various measures aimed at improving energy efficiency could be carried out, the value of 350g/kWh is expected to reduce to 320g/kWh by 2010[19]. Therefore, the value of $EF_{BTCA\_fire,y}$ is conservative.
Any comment:	

Data / Parameter:	CAP_{fire-y}
Data unit:	MW
Description:	installed capacity of fuel-fired power in year y within the north china grid
Source of data used:	China Electric Power Yearbook
Value applied:	See Annex 3 for details
Justification of the choice of data or description of measurement methods and procedures actually applied :	Official statistical data
Any comment:	

Data / Parameter:	CAP_y
Data unit:	MW
Description:	Total installed capacity of various power in year y within the north china grid
Source of data used:	China Electric Power Yearbook
Value applied:	See Annex 3 for details

[19] *Fuel-fired Power Generation.* http://www.ccchina.gov.cn/source/fa/fa2002082803.htm

Justification of the choice of data or description of measurement methods and procedures actually applied :	Official statistical data
Any comment:	

B.6.3 Ex-ante calculation of emission reductions:

The emission reductions by the proposed project are calculated as follows:

$ER_y = ER_{heat,y} + ER_{electricity,y} + BE_{biomass,y} - PE_y - L_y$

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

As described above, EG_y is 145,000 MWh and $EF_{electricity,y}$ is estimated to be 0.975tCO_2e/MWh, therefore $ER_{electricity,y} = EG_y * EF_{electricity,y}$ = 141,375 tCO_2/y .

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

Emission reductions due to displacement of heat ($ER_{heat,y}$) is not considered for the proposed project. Therefore, $ER_{heat,y}$=0 tCO_2/y

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

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

As described above, where:
GWP_{CH4} = 21
$BF_{PJ,k,y}$ = 109,371.9 tons
NCV_k and $EF_{burning,CH4,k,y}$= 0.001971 tCH_4/ton

Therefore, $BE_{biomass,y}$ is calculated to be 4527 tCO2/y

PE_y : Project emissions during the year y (tCO2/yr)

The project emission can be calculated as:

$PE_y = PET_y + PEFF_y + PE_{EC,y} + GWP_{CH4} * PE_{biomass,CH4,y}$

1. Equivalent carbon dioxide emissions from Methane emissions due to combustion of cotton stalks (GWP_{CH4} *$PE_{biomass,CH4,y}$)

Methane emissions from combustion of cotton stalks can be calculated as follows:
$PE_{biomass,CH4,y} = EF_{CH4,BF} * BF_{,k,y} * NCV_k$

As described above where:

$BF_{k,y}$=109,371.9 tons
NCV_k =15.89 GJ/t.
$EF_{CH4,BF}$ = 0.0000411 tCH_4/GJ.

Since GWP_{CH4}=21, $GWP_{CH4} * PE_{biomass,CH4,y}$ will be calculated to be 1,500 tCO2/y

2. Carbon dioxide emissions from combustion of fossil fuels for transportation of cotton stalks (PET_y)

$$PET_y = \frac{\sum_k BF_{k,y}}{TL_y} * AVD_y * EF_{km,co2,y}$$

As described above, where:

AVD_y =100Km

$EF_{km,CO2,y}$ = 0.001011 tCO_2/Km

$BF_{k,y}$ = 109,371.9 tons

TL_y=5 t
Therefore, PET_y is calculated to be 2,212 tCO2/y

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

$$PEFF_y = \sum_i (FF_{project.plant,i,y} + FF_{project.site.i.y}) * NCV_i * COEF_i \qquad (13)$$

where:
$FF_{project\ plant,i,y}$ =0t
$FF_{project\ plant,i,y}$ =100t
NCV_i = 42.652 GJ/t

$COEF_i$ =0.0741 tCO2/ GJ

Therefore, $PEFF_y$ is calculated to be 316 tCO2/y

4. Carbon dioxide emissions from electricity consumption ($PE_{EC,y}$)

$PE_{EC,y} = EG_{,PJ,y} * EF_{,grid,y}$

$EG_{,PJ,y}$= 1210 MWh,
$EF_{,grid,y}$= 0.975 tCO_2e/MWh,
Therefore, $PE_{EC,y}$ is calculated to be 1180 tCO2/y

L_y: Leakage emissions during the year y (tCO2/yr)

Since the situation for the proposed project complies with the approach 2 L_2, the leakage for the proposed project activity is considered 0 ($LE_y = 0$).

To conclude,
ER_y=140,695 tCO2/y

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

Year	Estimation of project activity emissions (tonnes of CO_2)	Estimation of baseline emissions (tonnes of CO_2)	Estimation of leakage (tonnes of CO_2)	Estimation of emission reductions (tonnes of CO_2)
2007	434	12,159	0	11,725
2008	5,207	145,902	0	140,695
2009	5,207	145,902	0	140,695
2010	5,207	145,902	0	140,695
2011	5,207	145,902	0	140,695
2012	5,207	145,902	0	140,695
2013	5,207	145,902	0	140,695
2014	4,773	133,743	0	128,970
Total (tonnes of CO2)	36,449	1,021,314	0	984,865

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

B.7.1 Data and parameters monitored:

Data / Parameter:	EG_y
Data unit:	MWh
Description:	Electricity delivered to grid in year y
Source of data to be used:	Measured by meters with the accuracy of 0.2%
Value of data applied for the purpose of calculating expected emission reductions in section B.5	145,000
Description of measurement methods and procedures to be applied:	Continuous on-site measurements and monthly recording by the project owner.

QA/QC procedures to be applied:	According to national standard (DL/T448 – 2000), meters will be calibrated periodically. Data measured by meters will be cross checked by the electricity sales documents.
Any comment:	

Data / Parameter:	$BF_{cotton,y}$
Data unit:	tonne
Description:	Quantity of cotton stalk combusted in the project plant during the year y
Source of data to be used:	Records from Project Procurement department of plant
Value of data applied for the purpose of calculating expected emission reductions in section B.5	121,000
Description of measurement methods and procedures to be applied:	Use weight meters. Meters at the weighing station will undergo maintenance subject to national standard JJG907-2003. Any direct measurement with mass or volume meters at the plant site should be cross checked with an annual energy balance which again is based on purchased quantities.
QA/QC procedures to be applied:	Crosscheck the measurements with an annual energy balance that is based on purchased quantities and stock changes.
Any comment:	

Data / Parameter:	$BF_{,k,y}$
Data unit:	tonne
Description:	Excluding cotton stalk quantity of biomass fuel type k combusted in the project plant during the year y
Source of data to be used:	Project Records from Project Procurement department of plant
Value of data applied for the purpose of calculating expected emission reductions in section B.5	0
Description of measurement methods and procedures to be applied:	Use weight meters. Meters at the weighing station will undergo maintenance subject to national standard JJG907-2003. Any direct measurement with mass or volume meters at the plant site should be cross checked with an annual energy balance which again is based on purchased quantities.
QA/QC procedures to be applied:	Crosscheck the measurements with an annual energy balance that is based on purchased quantities and stock changes.
Any comment:	In case other biomass types are combusted in the project, they should be monitored.

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 by moisture analyzer

Value of data applied for the purpose of calculating expected emission reductions in section B.5	9.61
Description of measurement methods and procedures to be applied:	Continuously monitored by moisture analyzer. Moisture content of the biomass residues will be both measured in collection point and in power plant.
QA/QC procedures to be applied:	
Any comment:	In case of dry biomass, monitoring of this parameter is not necessary

Data / Parameter:	NCV_i
Data unit:	GJ / tonne
Description:	Net Calorific Value of cotton stalk
Source of data to be used:	China Energy Statistical Yearbook
Value of data applied for the purpose of calculating expected emission reductions in section B.5	0.01589
Description of measurement methods and procedures to be applied:	The Value for Cotton stalk is utilized from the China Energy Statistical Yearbook, which Shall be updated according to China Energy Statistical Yearbook new version.
QA/QC procedures to be applied:	Check consistency of data from the different resources. If the values differ significantly, the most conservative will be used.
Any comment:	

Data / Parameter:	NCV_i
Data unit:	GJ / tonne
Description:	Net Calorific Value of other biomass fuel types
Source of data to be used:	China Energy Statistical Yearbook
Value of data applied for the purpose of calculating expected emission reductions in section B.5	N/A
Description of measurement methods and procedures to be applied:	The Values for other biomass fuel types are utilized from the China Energy Statistical Yearbook, which Shall be updated according to China Energy Statistical Yearbook new version.
QA/QC procedures to be applied:	Check consistency of data from the different resources. If the values differ significantly, the most conservative will be used.
Any comment:	

Data / Parameter:	AVD_y
Data unit:	km
Description:	Average return trip distance between biomass fuel supply sites and the project site
Source of data to be used:	Records by project participants
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:	Distance travelled by trucks will be continuously monitored and recorded. Data will be archived 2 years following the end of the crediting period.
QA/QC procedures to be applied:	Check consistency of distance records provided by the truckers by comparing recorded distances with information from other sources (e.g. maps).
Any comment:	If biomass is supplied from different sites, this parameter should correspond to the mean value of km travelled by trucks that supply the biomass plant

Data / Parameter:	Tl_y
Data unit:	tonne
Description:	Average load of the trucks used for transportation of biomass
Source of data to be used:	On-site measurement
Value of data applied for the purpose of calculating expected emission reductions in section B.5	5
Description of measurement methods and procedures to be applied:	All the trucks will be weighed by a weigh bridge (S/ZCS-30) with the accuracy shown below : 1. When the truck load is below 5 ton, the accuracy is ± 10kg. 2. When the truck load is between 5 ton and 20 ton, the accuracy is ± 20kg. 3. When the truck load is more than 20 ton, the accuracy is ± 30kg. Therefore, Tl_y can be determined by averaging the weights of each truck carrying biomass to the project plant. Data will be archived 2 years following the end of the crediting period.
QA/QC procedures to be applied:	As per the methodology no QA/QC procedures are specified for this parameter.
Any comment:	

Data / Parameter:	$EF_{km,CO2,y}$
Data unit:	tCO2/km
Description:	Average CO2 Emission Factor for transportation of biomass with trucks
Source of data to be	IPCC 2006 default value from the Moderate Control index for the US heavy

used:	Duty Diesel Vehicle
Value of data applied for the purpose of calculating expected emission reductions in section B.5	0.001011
Description of measurement methods and procedures to be applied:	Shall be updated according to IPCC latest version. Minimal of two years after last issuance of CERs
QA/QC procedures to be applied:	
Any comment:	

Data / Parameter:	$FF_{project\ plant,i,y}$
Data unit:	Tonne/year
Description:	Quantity of diesel combusted at the project site for other purposes that are attributable to the project activity during the year y.
Source of data to be used:	Project Records from Project Procurement department of plant
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:	Use weight meters. It will be continuously monitored and recorded. The data will be crosschecked by purchase receipts. Data will be archived 2 years following the end of the crediting period.
QA/QC procedures to be applied:	The consistency of metered diesel consumption should be crosschecked with purchase receipts.
Any comment:	

Data / Parameter:	$EF_{CO2,FF,i}$
Data unit:	tCO2/GJ
Description:	CO2 Emission Factor for diesel
Source of data to be used:	Accurate and reliable local or national data where available. Where such data is not available, use IPCC default values.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	0.0741
Description of measurement methods and procedures to be applied:	The available default values are used, but will be reviewed for the appropriateness of the data annually
QA/QC procedures to be applied:	Check the default values used with IPCC values.

Any comment:	

Data / Parameter:	NCV_i
Data unit:	GJ / mass or volume unit
Description:	Net Calorific Value of fossil fuels combusted at the project site for other purposes that are attributable to the project activity during the year y
Source of data to be used:	China Energy Statistical Yearbook
Value of data applied for the purpose of calculating expected emission reductions in section B.5	N/A
Description of measurement methods and procedures to be applied:	The Values for the fossil fuels are utilized from the China Energy Statistical Yearbook, which Shall be updated according to China Energy Statistical Yearbook new version.
QA/QC procedures to be applied:	Check consistency of data from the different resources. If the values differ significantly, the most conservative will be used.
Any comment:	

Data / Parameter:	$EF_{burning,CH4,k,y}$
Data unit:	tCH4/GJ
Description:	CH4 emission factor for uncontrolled burning of the biomass residue type k during the year y
Source of data to be used:	In the baseline methodology
Value of data applied for the purpose of calculating expected emission reductions in section B.5	In the baseline methodology, NCV_k * $EF_{burning,CH4,k,y}$= 0.001971 tCH_4/ton is applied.
Description of measurement methods and procedures to be applied:	The conservative factor is applied, as specified in the baseline methodology
QA/QC procedures to be applied:	
Any comment:	

Data / Parameter:	$EG_{PJ,y}$
Data unit:	MWh
Description:	Electricity consumption at the biomass residue storage sites
Source of data to be used:	Measured by meters
Value of data applied for the purpose of calculating expected	1210

emission reductions in section B.5	
Description of measurement methods and procedures to be applied:	Continuous on-site measurements and monthly recording by the project owner.
QA/QC procedures to be applied:	According to national standard (DL/T448 – 2000), meters will be calibrated periodically. Data measured by meters will be cross checked by the electricity sales documents.
Any comment:	

Data / Parameter:	
Data unit:	Tons
Description:	Quantity of cotton stalks that are utilized in the defined geographical region
Source of data to be used:	Surveys or statistics from local agricultural bureau if national statistics is not available
Value of data applied for the purpose of calculating expected emission reductions in section B.5	
Description of measurement methods and procedures to be applied:	Annually
QA/QC procedures to be applied:	
Any comment:	This parameter is applicable since approach L 2 is utilized to rule out leakage.

Data / Parameter:	
Data unit:	Tons
Description:	Quantity of cotton stalks in the region
Source of data to be used:	Surveys or statistics from local agricultural bureau if national statistics is not available
Value of data applied for the purpose of calculating expected emission reductions in section B.5	
Description of measurement methods and procedures to be applied:	Annually
QA/QC procedures to be applied:	
Any comment:	This parameter is applicable since approach L 2 is utilized to rule out leakage.

B.7.2 Description of the monitoring plan:

According to the approved consolidated monitoring methodology ACM0006: "Consolidated monitoring methodology for grid-connected electricity generation from biomass residues" and relevant regulations, a monitoring plan will be made to ensure the application of monitoring.

The application of monitoring mainly includes two parts, data management system and CDM working group. The training about operating information was carried out on 26th, Sep. 2006 for relevant staffs, and the CDM information and monitoring regulations were introduced to the relevant staffs on 19th, Oct. 2006. The main framework is shown in Figure B-2 and details are shown below:

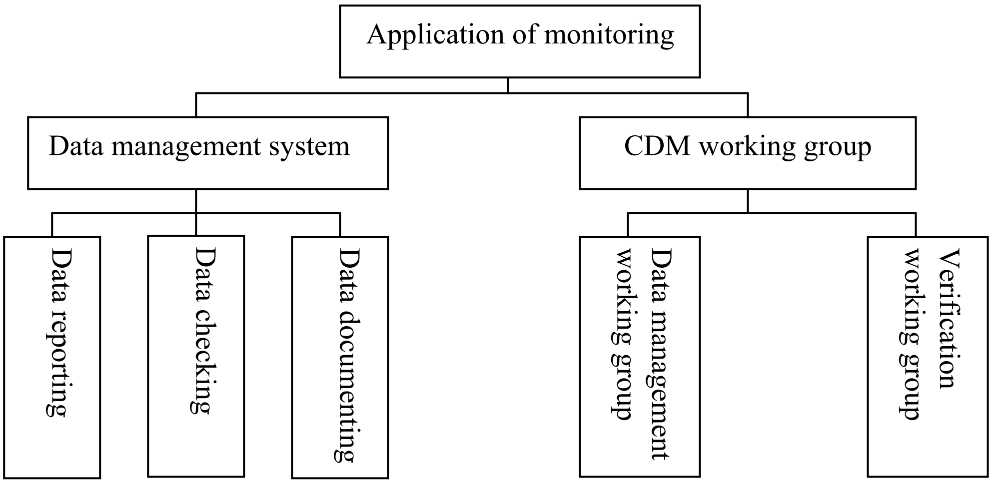

Figure B-2 the main framework for application of monitoring

1. Responsibility

Overall responsibility for daily monitoring and reporting lies with the project company. A CDM group will be established within the project company to carry out the monitoring work. Its staffs will include all relevant people relevant to the data management system and be trained by the experts of the project consultancy.

2. Key definitions

The monitoring plan will use the following definitions of monitoring and verification.

Monitoring: the systematic surveillance of the project's performance by measuring and recording performance-related indicators relevant in the context of GHG emission reductions.

Verification: the periodic ex-post auditing of monitoring results, the assessment of achieved emission reductions and of the project's continued conformance with all relevant project criteria by a selected Designated Operational Entity (DOE).

3. Calibration of Meters & Metering

All meters and instruments will be maintained and calibrated regularly as per industry practices. Maintenance and calibration of meters will be implemented according to national standards and rules. And all the records will be documented and maintained by the project owner.

4. Monitoring

All relevant parameters listed in Section B 7.1 will be monitored according to the methodology requirements and description of measurement methods and procedures to be applied. The results and data will be recorded and well documented. The data and meter reading will be readily accessible for DOE. Calibration tests records will be maintained for verification.

5. Quality Assurance and Quality Control

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

6. Disposal of urgency

Disposal of urgency will be implemented according to the stipulations in the Power Purchase Agreement, Parallel Operation Agreement, Heat Supply Agreement, Fuel Purchase Agreement, and so on. If other fossil fuels are combusted except diesel, the species and amount of the fossil fuel should be recorded in details. The leakage led by this scenario should be calculated precisely and clearly.

7. Data management system

This provides information on record keeping of the data collected during monitoring. Record keeping is the most important exercise in relation to the monitoring process. Without accurate and efficient record keeping, project emission reductions cannot be verified. Below follows an outline of how project related records would be managed.

Overall responsibility for monitoring of GHG emissions reduction will rest with the CDM responsible persons of the working group. The CDM manual sets out the procedures for tracking information from the primary sources to the end-data calculations in paper document format. It is the responsibility of the working group to provide additional necessary data and information for validation and verification requirements of respective DOE. Physical documentation such as paper-based maps, diagrams and environmental assessment will be collated for monitoring, if they are necessary. All paper-based information will be stored by the working group and kept at least one copy.

8. Verification and Monitoring Results

The verification of the monitoring results of the project is a mandatory process required for all CDM projects. The main objective of the verification is to independently verify that the project has achieved the emission reductions as reported and projected in the PDD.

The responsibilities for verification of the project are as follows:

- Sign a verification service agreement with specific DOE and agree to a time framework set by the EB for carrying out verification activities while taking into account the buyer’s schedule. The proposed project owner will make the arrangements for the verification and will prepare for the audit and verification process to the best of its abilities.
- The proposed project owner will facilitate the verification through providing the DOE with all required necessary information, before, during and, in the event of queries, after the verification.
- The project owner will fully cooperate with the DOE and instruct its staff and management to be available for interviews and respond honestly to all questions from the DOE.
- DOE must be an Accredited Entity with a proven track record in environmental auditing and verification, experience with CDM projects and work in developing countries. The DOE should be accredited by the CDM Executive Board.
- If the proposed project owner deems that requirements of DOE go beyond the scope of verification, they should contact the CDM consultant to determine whether the requirements of DOE are reasonable. If considered unreasonable, a rejection letter in a written format should be provided to the DOE with justifiable reasons. If the project owner and the DOE cannot reach an agreement, the matter will be submitted to EB or UNFCCC for arbitration.

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 of the proposed project was completed on 25/12/2006. The persons involved in baseline and monitoring study is Zhao Xin. Email: bzxin@yahoo.com.cn. The above persons are 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:

>>
01/05/2006

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

>>
20 years

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

C.2.1. Renewable crediting period

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

10/12/2007

C.2.1.2. Length of the first crediting period:

7 years

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

>>
Not applicable

C.2.2.2. Length:

>>
Not applicable

SECTION D. Environmental impacts

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

>>
The Environmental Impact Statement Form was completed by the project owner, and approved by the

Shandong Environmental Protection Bureau in April, 2006.

According to the Environmental Impact Statement Form of the Project, the environmental impacts arising from the Project are analyzed respectively for the construction phase and the operation phase.

Construction Phase

Noise

Noises generated during the construction period are mainly from construction machines. Since the plant area is 500 m away from the nearest village, noises generated will have little impact on the neighboring residents after relevant measures have been taken. Measures such as making efforts to avoid construction during night, isolating the main working and resting area far from the intensive noise sources, establishing necessary watch room, etc., will be taken, and working staff will be protected and isolated from noises.

Dust

During construction of the Project, foundation excavation, piling up of discarded earth, loading and unloading of raw materials, mixing of concrete and running of vehicles may generate dust at the working site and the surrounding area. Sprinkling water on the surface of discarded earth, timely clearing of the discarded earth, avoiding over loading and spilling in the process of shipping, and the like measures will be taken to reduce the impacts of the dust on the surrounding environment. Dust generated by construction will automatically disappear after completion of the construction.

Waste water

Waste water generated during construction of the Project is mainly residential waste water, which will be discharged after the septic tank treatment. The amount of waste water generated during construction is small, thus having little impact on the environment.

Solid waste

Solid waste generated during construction of the Project is mainly discarded broken bricks and stones, residues from the washing process, various packing stuffs and residential garbage. Discarded broken bricks and stones as well as residues will be used to fill the nearby roadbed. Various packing stuffs will be uniformly recycled or sold to salvage station. Residential garbage will be collected for uniform disposal by the environmental sanitation agencies. The above-mentioned solid waste will not have harmful impacts on the surround environment.

Operation Phase

Waste gas

Air pollutants emitted during construction of the Project are largely flue gas, SO_2 and NO_x. Since sulphur content of the straw is low and cyclone plus bag-type two-step dust extractor as well as low-nitrogen combustion system are employed, waste gas emissions from the Project are far lower than the requirement of *Emission Standard of Air Pollutants for Thermal Power Plants (GB13223-2003)*, details of which can be referred to Table D-1. After being dedusted, flue gas of the Project will be emitted passing a 120 m high chimney with an inner diameter of 3 m, which reduces the impacts of unorganized low-altitude emissions resulting from combusting straw on the environment and contributes to the improvement of regional environmental status.

Table D-1. Emissions of air pollutants by the Project

Item	Phase III standard (mg/m^3) of *Emission standard of air pollutants for thermal power plants* (GB13223-2003)	Emission concentration of the Project (mg/m^3)
SO_2	<400	232.9
NO_x	<450	220
Flue gas	<50	13.93

Noise

Measures such as employing low-noise equipment, adopting noise damping, sound isolation and damping measures, establishing noise isolation belt, strengthening worker protection and reinforcing planting work within the plant area and so on will be taken by the Project to reduce the impacts of noises on the working staff and the surrounding environment.

Both the normal operation and air discharge process by the boilers of the Project satisfy the Category 2 standard of Standard of environmental noise of urban area (GB3096-93), which have very little impact on the surrounding sensitive targets. According to the Category II standard of Standard of noise at boundary of industrial enterprises (GB12348-90), noise protection distance within the plant area of the Project is 62 m. Currently, no targets sensitive to noises exist in the area and new establishment of noise-sensitive targets is forbidden in the process of development and construction.

Waste water

Separate system is adopted by the Project for residential waste water. Residential waste water (2.4 m^3/d) will be used for watering the plants in the plant area after contact oxidation process treatment; rain will be directly discharged into Majia River by the drainage pump of the plant.

Waste water containing oil will be recycled after proper disposal; other industrial waste water will be discharged into Majia River after being collected in the sewer for industrial waste water. Annual discharge of waste water generated by the Project is 261.3 thousand m^3, and various pollutants index satisfy the Category 1 standard of Integrated wastewater discharge standard. COD concentration of the waste water is only 30 mg/L, meaning the water quality is far better than that of Majia River.

Solid waste

Ash resulting from combustion of fuels by the Project will be used as fertilizers in the farmland of the Project location, which not only reduces the burden on farmers, but also achieves the integrated utilization of ash. Annual generation by the Project of residential garbage is 13.75 t, which will be disposed by the environmental sanitation agencies and has little impact on the environment.

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

>>

According to the results of EIA and the reply from the Environmental Protection Bureau, the impacts on the environment are not significant.

SECTION E. Stakeholders' comments

>>

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

>>

From Jan., to Apr., 2006, assisted by the local government, to investigate the impacts on local ecological environment, the project owner carried out a survey of the local residents who might be affected by the project activities by delivering and colleting questionnaire.

Five staff delivered the questionnaires to the residents within Gaotang county randomly, especially the people living closed to the project and around the roads, where the transportation of the materials and equipments pass by. Following this way, 61 questionnaires were delivered, and the whole process of the delivery and collection of the questionnaires are completed until the middle of Apr, 2006.

Comments received through the survey are summarized as follows. The government of Gaotang County issued a support letter for the Project which is available for DNA and DOE.

E.2. Summary of the comments received:

The survey was conducted through delivering and collecting responses to a questionnaire. Totally 61 questionnaires returned out of 61 with 100% response rate. The basic structure of the respondents is illustrated in Table E-1.

Table E-1. Structure of the respondents

Structure of gender		
Gender	**Number**	**Percentage (%)**
Male	49	83.05
Female	10	16.95
Left blank	0	0

Structure of educational level		
Educational level	**Number**	**Percentage (%)**
Senior high school and higher	11	18.64
Junior high school	38	64.41
Elementary school	6	10.17
Left blank	4	6.78

Structure of age		
Age	**Number**	**Percentage (%)**
30 and younger	15	25.43
31~40	29	49.15
41~50	11	18.64
51~60	4	6.78

It can be seen that respondents are adequately representative in terms of gender, age and educational level, and their attitudes towards the impacts of the Project can be a comprehensive reflection of the attitudes of the residents possibly affected by the Project. Of the 61 respondents:

·57 respondents (96.62%) support the construction of the Project, 1 respondent (1.69%) holds a neutral attitude and 1 respondent (1.69%) leaves the question unanswered.

·Respondents consider that positive impacts possibly caused by the construction of the Project include increased income (94.9%), reduction of air pollutants emission from decay and uncontrolled burning of biomass residues (81.36%), increased employment opportunities (64.4%) and improved living standards (67.8%).

·A few respondents are concerned that construction of the Project might cause a reduction of water supply (15.25%), an increase of fuel price (13.56%), increase of noise (5.08%), increase of environment pollutions (5.08%) and land occupation (1.69%).

The public investigation shows that the government and authorities at all levels support the project construction actively, confirm its social and environmental benefits, and wish the construction could be started early and accelerated. The project probably will lead to some concerns, but all concerns can be explained or solved in a reasonable way.

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

>>

The residents and local government are all very supportive of the Project. The Project owner has taken full consideration of the comments and suggestions given by stakeholders during preparation of the Project, therefore there has been no need to modify the Project due to the comments received.

Based on the concern of few respondents, the following aspects have been given consideration by the Project:

·Water source of the Project is the Nanwang Reservoir and back up water source for the Project is the underground water of the Project site. Since the remaining water source of the Nanwang Reservoir after the water demand from agriculture users and industry users are satisfied is about 3.6 times the water demand of the Project, and the underground water employed by the Project has been basically unexploited before[20], the implementation of the Project will not reduce the water supply of the Project location;

·Major fuel employed by the Project is biomass residues, and light diesel oil is for start-up only which results in very low consumption, thus the Project will not impact the fuel price in the local area.

·Complete noise protection measures have been designed in the Project, and both the normal operation and steam discharge process by the boilers of the Project satisfy the Category 2 standard of Standard of environmental noise of urban area (GB3096-93), which have very little impact on the surrounding sensitive targets and basically will not impact the life of local residents.[21]

·As mentioned in D.1, emission of various pollutants from the Project satisfy or surpass the national standards, which can effectively reduce the impacts of unorganized low-altitude emissions resulting from combusting straw on the environment and contribute to the improvement of regional environmental status.

·Design of compact layout will be adopted by the Project, and the space between buildings and the width of pipeline aisle of the Project will be reduce as possible to reduce land occupation.

20 Approval by Gaotang County Water Authority on water use application by National Bio Energy Biomass Power Generation Project, Document No. Gaoshuizi[2006]4.

21 Environmental Impact Statement Form of the Project.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Organization:	National Bio Energy Co., Ltd.
Street/P.O.Box:	No.26B, Financial Street, Xicheng District, Beijing
Building:	Floor 9, Huashi Building
City:	Beijing
State/Region:	-
Postfix/ZIP:	100032
Country:	P. R. China
Telephone:	+86 10 83582537
FAX:	+86 10 83582500
E-Mail:	gx@nbe.cn
URL:	-
Represented by:	
Title:	CDM Project Manager
Salutation:	Ms.
Last Name:	Guo
Middle Name:	-
First Name:	Xin
Department:	-
Mobile:	-
Direct FAX:	+86 10 83582500
Direct tel:	+86 10 83582537
Personal E-Mail:	gx@nbe.cn

Organization:	EDF Trading Limited
Street/P.O.Box:	71 High Holborn
Building:	-
City:	London
State/Region:	-
Postfix/ZIP:	WC1V 6ED
Country:	United Kingdom
Telephone:	+44 207 061 4000
FAX:	+44 207 061 5000
E-Mail:	-
URL:	www.edftrading.com
Represented by:	
Title:	Vice Head of Origination and Corporate Development
Salutation:	Mr.
Last Name:	Joubert
Middle Name:	-
First Name:	Francois
Department:	-
Mobile:	-
Direct FAX:	+44 207 061 5208
Direct tel:	+44 207 061 4208
Personal E-Mail:	francois.joubert@edftrading.com

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

There is no public funding for the proposed project.

ANNEX 3
BASELINE INFORMATION

Table An3-1. Installed capacities of North China Grid (2001)

	Hydro	Coal	Nuclear	Other	Total
Beijing	1058.1	3412.5	0	0	4470.6
Tianjin	5	5632	0	0	5637
Hebei	742.6	16474.9	0	0	17217.5
Shanxi	795.9	13415.9	0	0	14211.8
Shandong	56.2	20957.7	0	0	21013.9
Inner Mongolia	566.2	8898.3	0	0	9464.5
Total	3224	68791.3	0	0	72015.3

Data Source：China Electric Power Yearbook 2002，P616

Table An3-2. Installed capacities of North China Grid (2002)

2002	Hydro	Coal	Nuclear	Other	Total
Beijing	1038.5	3407.5	0	0	4446
Tianjin	5	6245.5	0	0	6250.5
Hebei	775.9	16745.7	0	13.5	17535.1
Shanxi	795.3	14328	0	0	15123.3
Shandong	50.8	24301.6	0	0	24352.4
Inner Mongolia	592.1	9778.7	0	76.6	10447.4
Total	3257.6	74807	0	90.1	78154.7

Data Source：China Electric Power Yearbook 2003，P593

Table An3-3. Installed capacities of North China Grid (2003)

2002	Hydro	Coal	Nuclear	Other	Total
Beijing	1058.1	3347.5	0	0	4405.6
Tianjin	5	6008.5	0	0	6013.5
Hebei	764.3	17698.7	0	13.5	18476.5
Shanxi	795.7	15035.8	0	0	15831.5
Shandong	50.8	30494.4	0	0	30545.2
Inner Mongolia	592.1	11421.7	0	76.6	12090.4
Total	3266	84006.6	0	90.1	87362.7

Data Source：China Electric Power Yearbook 2004，P709

Table An3-4. Installed capacities of North China Grid (2004)

2002	Hydro	Coal	Nuclear	Other	Total
Beijing	1055.9	3458.5	0	0	4514.4
Tianjin	5	6008.5	0	0	6013.5
Hebei	783.8	19932.7	0	13.5	20730
Shanxi	787.3	17693.3	0	0	18480.6
Shandong	50.8	32860.4	0	12.3	32923.5
Inner Mongolia	567.9	13641.5	0	111.7	14321.1
Total	3250.7	93594.9	0	137.5	96983.1

Data Source：China Electric Power Yearbook 2005，P473

Table An3-5 Calculation of simple OM emission factor of the North China Grid (2002)

Fuel types	unit	Provinces in the Regional Grid						Subtotal	Effective CO2 Emission Factor (tCO2/TJ)	average low Caloric value ($MJ/t,m^3,tce$)	CO_2 emisson (tCO_2e)
		Beijing	Tianjin	Hebei	Shanxi	Shandong	Inner mongolia				
		A	*B*	*C*	*D*	*E*	*F*	*F=A+B+C+D+E+F*	*G*	*H*	*=F*G*H*
raw coal	Mtons	6.9184	10.5274	49.8801	40.3739	51.6286	32.18	191.5084	94.6	20908	378783851.5
cleaned coal	Mtons	0	0	0	0	0.8071	0	0.8071	94.6	26344	2011408.131
other washed coal	Mtons	0.0343	0	0.652	1.3556	1.0632	0	3.1051	94.6	8363	2456568.193
coke	Mtons	0	0	0	0	0	0	0	94.6	28435	0
coke oven gas	Mm^3	17	171	0	75	4	16	283	44.4	16.726	210165.5352
other coal gas	Mm^3	1582	0	734	0	0	1035	3351	44.4	5.227	777696.0588
crude oil	Mtons	0	0	0	0	0.1498	0	0.1498	73.3	41816	459153.8974
gasoline	Mtons	0	0	0	0	0.0065	0	0.0065	69.3	43070	19400.8815
kerosene	Mtons	0	0	0	0	0	0	0	71.5	43070	0
diesel oil	Mtons	0.0026	0.0235	0.0412	0	0.1002	0.016	0.1835	74.1	42652	579954.1722
fuel oil	Mtons	0.1394	0.0004	0.0122	0	0.2033	0.0042	0.3595	77.4	41816	1163542.745
LPG	Mtons	0	0	0	0	0	0	0	63.1	50179	0
Refinery gas	Mtons	0	0	0.0027	0	0	0	0.0027	57.6	46055	7162.4736
Natural gas	Mm^3	0	55	0	0	0	2	57	56.1	38.931	124489.6587
other petroleum products	Mtons	0	0	0	0	0	0	0	73.3	41816	0
other coking products	Mtons	0	0	0	0	0	0	0	107	29271.2	0
fired electricity generated	TWh	16.464063	25.33278	94.184816	75.691971	115.7314	47.3074074	374.7124374			
electricity imported	TWh							2.918		Total tCO2e Emission	386593393.3
Result	a. total CO2 emission in North China Grid(tCO2e)										386593393.3
	b. total generatoin in North China Grid(TWh)										377.6304374
	c. OM emission factor (tCO2/MWh) (a/b/10^6)										1.023734728
Data Source	Effective CO2 Emission Factor: 2006 IPCC Guidelines for National Greenhouse Gas Inventories										
	Fuel Consumption ,Fire Generated Electricity Data and Average Low Caloric Value: China Energy Statistical Yearbook										
	Electricity Imported: China Electric Power Yearbook										

Table An3-6 Calculation of simple OM emission factor of the North China Grid (2003)

Fuel types	unit	Provinces in the Regional Grid						Subtotal	Effective CO2 Emission Factor (tCO2/TJ)	average low Caloric value (MJ/t,m³,tce)	CO_2 emisson (tCO_2e)
		Beijing	Tianjin	Hebei	Shanxi	Shandong	Inner Mongolia				
		A	*B*	*C*	*D*	*E*	*F*	*F=A+B+C+D+E+F*	*G*	*H*	*=F*G*H*
raw coal	Mtons	7.1473	10.5274	54.8264	45.2851	68.08	39.4932	225.3594	94.6	20908	445737636.1
cleaned coal	Mtons	0	0	0	0	0.0941	0	0.0941	94.6	26344	234510.5998
other washed coal	Mtons	0.0631	0	0.6728	2.0821	4.509	0	7.327	94.6	8363	5796681.315
coke	Mtons	0	0	0	0	0	0.028	0.028	94.6	28435	75318.628
coke oven gas	Mm^3	24	171	0	9	2	21	227	44.4	16.726	168578.0088
other gas	Mm^3	1692	0	1063	0	156	1032	3943	44.4	5.227	915086.7084
crude oil	Mtons	0	0	0	0	0.2968	0	0.2968	73.3	41816	909725.479
Gasoline	Mtons	0	0	0	0	0.0001	0	0.0001	69.3	43070	298.4751
Kerosene	Mtons	0	0	0	0	0	0	0	71.5	43070	0
Diesel Oil	Mtons	0.0029	0.0135	0.04	0	0.054	0.0291	0.1395	74.1	42652	440891.5914
fuel oil	Mtons	0.1395	0.0002	0.0111	0	0.1007	0.0065	0.258	77.4	41816	835032.0672
LPG	Mtons	0	0		0	0	0	0	63.1	50179	0
Refinery gas	Mtons	0	0	0.0027	0	0.0083	0	0.011	57.6	46055	29180.448
Natural gas	Mm^3	0	50	0	0	108	0	158	56.1	38.931	345076.5978
Other Petroleum Products	Mtons	0	0	0	0	0	0	0	73.3	41816	0
Other Coking Products	Mtons	0	0	0	0	0	0	0	107	29271.2	0
fired electricity generated	TWh	17.2086784	30.0052311	101.224035	86.7363222	130.071759	60.1188804	425.3649058		Total	455488016
electricity imported	TWh							4.244			
Result	a. total CO2 emission in North China Grid(tCO2e)								455488016		
	b. total generatoin in North China Grid(TWh)								429.6089058		
	c. OM emission factor (tCO2/MWh)		(a/b/10^6)						1.060238766		
Data Source	Effective CO2 Emission Factor: 2006 IPCC Guidelines for National Greenhouse Gas Inventories										
	Fuel Consumption ,Fire Generated Electricity Data and Average Low Caloric Value: China Energy Statistical Yearbook										

	Electricity Imported: China Electric Power Yearbook

Table An3-7 Calculation of simple OM emission factor of the North China Grid (in 2004)

Fuel types	**unit**	**Provinces in the Regional Grid**						**Subtotal**	**Effective CO2 Emission Factor**	**average low Caloric value**	**CO_2 emisson**
		Beijing	**Tianjin**	**Hebei**	**Shanxi**	**Shandong**	**Inner mongolia**		**(tCO2/TJ)**	**(MJ/t,m^3,tce)**	**(tCO_2e)**
		A	*B*	*C*	*D*	*E*	*F*	*F=A+B+C+D+E+F*	*G*	*H*	*=F*G*H*
raw coal	Mtons	8.2309	14.1	62.998	52.13	85.5	49.322	272.2809	94.6	20908	538543520.8
cleaned coal	Mtons	0	0	0	0	0.4	0	0.4	94.6	26344	996856.96
other washed coal	Mtons	0.0648	0	1.0104	3.5417	2.8422	0	7.4591	94.6	8363	5901190.882
coke	Mtons	0	0	0	0	0	0.0022	0.0022	94.6	28435	5917.8922
coke oven gas	Mm^3	55	0	54	532	873	40	1554	44.4	16.726	1154053.858
other gas	Mm^3	1774	0	2425	820	141	1647	6807	44.4	5.227	1579760.392
crude oil	Mtons	0	0	0	0	0	0	0	73.3	41816	0
Gasoline	Mtons	0	0	0	0	0	0	0	69.3	43070	0
Kerosene	Mtons	0	0	0	0	0	0	0	71.5	43070	0
Diesel Oil	Mtons	0.0039	0.0084	0.0466	0	0	0	0.0589	74.1	42652	186154.2275
fuel oil	Mtons	0.1466	0	0.0016	0	0	0	0.1482	77.4	41816	479657.9549
LPG	Mtons	0	0	0	0	0	0	0	63.1	50179	0
Refinery gas	Mtons	0	0.0055	0.0142	0	0	0	0.0197	57.6	46055	52259.5296
Natural gas	Mm^3	0	37	0	19	0	2	58	56.1	38.931	126673.6878
Other Petroleum Products	Mtons	0	0	0	0	0	0	0	73.3	41816	0
Other Coking Products	Mtons	0	0	0	0	0	0	0	107	29271.2	0
fired electricity generated	TWh	17.10383	31.79605	116.847	96.846698	151.9192024	74.6603841	489.1731099		Total	549026046.2
electricity imported	TWh							4.5			
	a. total CO2 emission in North China Grid(tCO2e)								549026046.2		
Result	b. total generatoin in North China Grid(TWh)								493.6731099		
	c. OM emission factor		(a/b/10^6)						1.112124674		

	(tCO2/MWh)								
	Effective CO2 Emission Factor: 2006 IPCC Guidelines for National Greenhouse Gas Inventories								
Data Source	Fuel Consumption ,Fire Generated Electricity Data and Average Low Caloric Value: China Energy Statistical Yearbook								
	Electricity Imported: China Electric Power Yearbook p297								

Table An3-8 Generation weighted OM Factor

	OM	Electricity generated (TWh)	Generation Weight	weight*OM
OM 2002	1.024	377.6304374	0.290281207	0.297170953
OM 2003	1.060	429.6089058	0.3302366	0.350129645
OM2004	1.112	493.6731099	0.379482192	0.422031509
Generation-weighted OM (/tCO2MWh)	1.069			

Table An3-9----CO2 Emission Factor for Best Commercially Available Technology

A	B	C	D	E	F
CO_2 Emission Factor tCO_2/GJ	Fuel Energy Value GJ/tSCE	CO_2 Emission Factor $tCO_2/tSCE$	Coservative efficiency factor (gce/kWh)	Coservative efficiency factor (tce/MWh)	Emissions Rate tCO_2/MWh
2006 IPCC Guidelines for National Greenhouse Gas Inventories	The General Code for Comprehensive Energy Consumption Calculation (Chinese National Standard GB2589-81)	=A*B	see Table 6-1	=I6/1000; g->ton; kWh->MWh;	=F6*H6
0.094600	29.270000	2.768942	320.000000	0.320000	0.886061
* SCE: Standard Coal Equivalent					

Table An3-10 Incremental installed capacity from 2001 to 2004

TABLE A3	A	B	C	D	E	F	G	H	K	L
	Installed Capacity 2001	Installed Capacity 2002	Installed Capacity 2003	Installed Capacity 2004	New Capacity Additions 2004-2002	Split of New Capacity	New Capacity Additions 2004-2001	Split of New Capacity	Emissions Factor	Weighted Average Build Margin Emissions Factor
	MW	MW	MW	MW	MW	%	MW	%	tCO_2/MWh	tCO_2/MWh
					=D-B		*=D-A*			*= H * K*
Hydro	3224.0	3257.6	3,266.0	3,250.7	-6.9	-0.04%	26.7	0.11%	0.000	0.000
Coal	68791.3	74807.0	84,006.6	93,594.9	18,787.9	99.78%	24,803.6	99.34%	0.886	0.880
Nuclear	0.0	0.0	0.0	0.0	0.0	0.00%	0.0	0.00%	0.000	0.000
Other (wind)	0.0	90.1	90.1	137.5	47.4	0.25%	137.5	0.55%	0.000	0.000
Total / % Change	72015.3	78154.7	87362.7	96983.1	18,828.4	**19.4%**	24,967.8	**25.7%**		0.880

Table An3-11 Calculation of combined emission factor

OM Factor(tCO_2e/MWh)	BM Factor (tCO_2e/MWh)	Combined Emission Factor* (tCO_2e/MWh)
1.069	0.880	**0.975**

***Combined Emission Factor =0.5* OM+0.5*BM**

Annex 4

MONITORING INFORMATION

No additional information