Project design document form for CDM project activities

(Version 06.0)

Complete this form in accordance with the Attachment "Instructions for filling out the project design document form for CDM project activities" at the end of this form.

PROJECT DESIGN DOCUMENT (PDD)	
Title of the project activity	Shandong Gaotang 30MW Biomass Power Generation Project
Version number of the PDD	10
Completion date of the PDD	30/07/2015
Project participant(s)	National Bio Energy Co., Ltd. (as the project owner) EDF Trading Limited (as the CER buyer)
Host Party	People's Republic of China
Sectoral scope and selected methodology(ies), and where applicable, selected standardized baseline(s)	Sectoral Scope: 1 Energy industries (renewable- / non-renewable sources) Consolidated Methodology ACM0018: "Electricity generation from biomass residues in power-only plants" (Version 03.0)
Estimated amount of annual average GHG emission reductions	123,527

SECTION A. Description of project activity

A.1. Purpose and general description of project activity

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The 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. The Project is invested, constructed and operated by the National Bio Energy Co., Ltd. The Project will install one 130 tonne/h boiler and one 30MW steam turbine generator. Cotton stalk, wood residues and wheat bran are used as fuel for power generation. The annual net quantity of electricity supply of the Project is expected to be 187,626 MWh, which will be delivered to North China Power Grid (NCPG). The implementation of the Project needs a supply of 247,506 tonnes (on wet-basis) of biomass residue per year.

In the absence of the Project, the biomass residues used in the Project are dumped or left to decay mainly under aerobic conditions, and the equivalent amount of power generated by this Project would be provided by NCPG which the Project is connected to. This is the same with the baseline scenario of the Project.

The Project will achieve emission reductions via avoiding CO_2 emissions from the same amount of electricity generation from North China Power Grid, which is mainly composed of traditional fossil fuel fired power plants. Moreover, the project used biomass residues (cotton stalk, wood residues and wheat bran) for energy purpose in high efficiency, which will reduce CH_4 emissions because the biomass is dumped or left to decay mainly under aerobic conditions in the absence of the Project. The estimated annual average GHG emission reductions are 123,527 tCO_2e, and total GHG emission reductions for the second crediting period are 864,689 tCO_2e.

The Project adopts renewable cotton stalk, wood residues and wheat bran as fuels, which will contribute to the sustainable development in the region as list in following aspects:

- By using biomass residues as fuels for power generation, saving the amount of coal use and making the biomass residues 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 biomass residues burning can be used as ash fertilizer, which will amount to over 9,368 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 biomass residues purchase, transport and storage.
- The project will reduce GHG emissions compared to a business-as-usual scenario.

In a word, the 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.

The proposed Project is not a CPA that has been excluded from a registered CDM PoA as a result of erroneous inclusion of CPAs.

A.2. Location of project activity

A.2.1. Host Party

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People's Republic of China.

A.2.2. Region/State/Province etc.

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Shandong Province.

A.2.3. City/Town/Community etc.

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Gaotang County, Liaocheng City.

A.2.4. Physical/Geographical location

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The project site is located in Gaotang Economic Development Zone, which is 5 kilometers 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 project

A.3. Technologies and/or measures

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In the absence of the Project, the biomass residues used in the Project are dumped or left to decay mainly under aerobic conditions, and the equivalent amount of power generated by this Project would be provided by NCPG which the Project is connected to. This is the same with the baseline scenario of the Project.

The project has installed 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	^oC	540
Boiler feed-water temperature	^oC	210
Boiler Exhaust Temperature	^oC	130 ^oC
Boiler Efficiency	%	≥92
Boiler Dirt-discharge Rate	%	2%
Lifetime	year	20

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	^oC	535
Lifetime	year	20

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
Lifetime	year	20

The operating hour of the Project is 7,000 hrs with a PLF of 79.91%, and the implementation of the Project needs a supply of 247,506 tonnes (on wet-basis) of biomass residue per year. The annual net quantity of electricity supply of the Project is expected to be 187,626 MWh, which will be delivered to NCPG.

In order to guarantee the fuel supply of the project, seven individual biomass residues collection stations around the project site and one large biomass residues collection station at the Project site have been constructed. The farmers sell their cotton stalk, wood residues and wheat bran in the nearest biomass residues collection, which will be cut into pieces, bundled regularly and transported to one large biomass residues collection station (Guguantun station) at the project site.

The names of 7 individual biomass residues collection stations and their 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	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 implementation of the project will facilitate the technology transfer from developed countries to China.

The Project will combust biomass residues that causes CH_4 emissions, consume certain diesel fuel for biomass residue treatment and normal operation that causes CO_2 emissions, and the transportation for biomass residue collection will also generate CO_2 emissions. Figure A-3 shows the technical process of the Project.

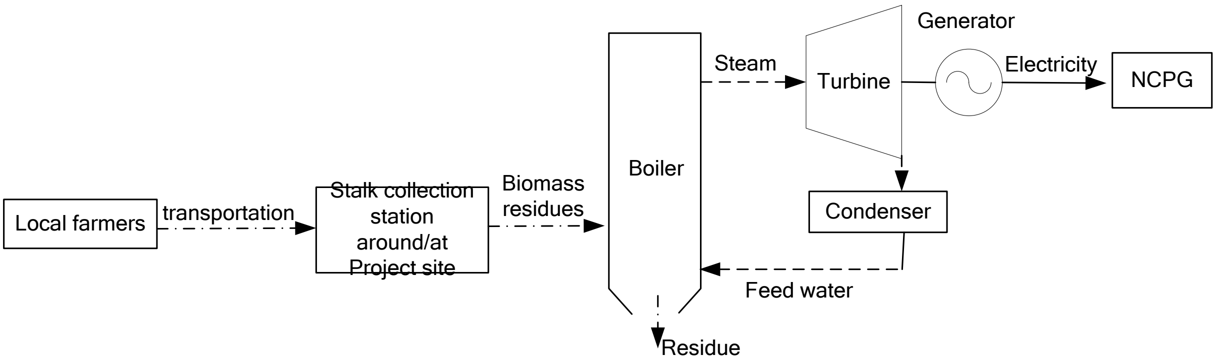

Figure A-3 Technical process of the Project

To monitor the baseline emissions and the project emissions of the Project, the following data will be monitored:

The quantity of net electricity generation supplied by the project plant/unit to the grid will be monitored by electricity meter(s) installed at the local substation.

The transportation distance will be recorded on Project site. Mass of freight will be measured by weight meter(s).

The biomass quantity and type will be monitored by weight meter(s), and the moisture content will be monitored by moisture analyzer for each batch of biomass of homogeneous quality.

Measurements of net calorific value of biomass residues will be carried out at reputed laboratories and according to relevant international standards.

The quantity of fossil fuel consumed will be measured by flow meter(s).

A.4. Parties and project participants

Party involved (host) indicates host Party	Private and/or public entity(ies) project participants (as applicable)	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
People's Republic of China (host)	National Bio Energy Co., Ltd.	No

United Kingdom	EDF Trading Limited	No

A.5. Public funding of project activity

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There is no public funding for the Project.

SECTION B. Application of selected approved baseline and monitoring methodology and standardized baseline

B.1. Reference of methodology and standardized baseline

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Approved consolidated Methodology ACM0018: Electricity generation from biomass residues in power-only plants, Version 03.0.

http://cdm.unfccc.int/methodologies/DB/DAZTTA5JRVU3J4W4PEFMT4ZOQW0DFM

Methodological Tool: “Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period” (Version 03.0.1).

https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-11-v3.0.1.pdf/history_view

Methodological Tool: “Tool to calculate the emission factor for an electricity system” (Version 04.0).

https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v4.0.pdf/history_view

Methodological Tool: “Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion” (Version 02).

http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-03-v2.pdf/history_view

Methodological Tool: “Tool to calculate baseline, project and/or leakage emissions from electricity consumption” (Version 01).

http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-05-v1.pdf/history_view

Methodological Tool: “Project and leakage emissions from transportation of freight” (Version 01.1.0).

http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-12-v1.1.0.pdf/history_view

B.2. Applicability of methodology and standardized baseline

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The applicability of the Methodology ACM0006 (Version 12.1.1) was restricted to power and heat projects due to the approval of a new consolidated methodology ACM0018 for power-only projects. Therefore, applicable Methodology ACM0018 (Version 03.0) is selected for the second crediting period for the Project.

The Project is a Greenfield biomass residues power generation project which the biomass residues used are obtained off-site from the nearby area and satisfies all applicable conditions of the ACM0018 (Version 03.0) as analysed below.

Applicable conditions of the methodology ACM0018	The Project
(a) No other biomass types than biomass residues, as defined in the methodology, are	The Project will only use biomass residues comprising cotton stalk, wood residues and

used in the project plant.	wheat bran.
(b) Fossil fuels may be co-fired in the project plant. However, the amount of fossil fuels co-fired shall not exceed 80 per cent of the total fuel fired (i.e. fossil fuels and biomass) on an energy basis.	The Project will not co-fire fossil fuels.
(c) For the 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, longs, etc.) or in other substantial changes (e.g. product change) in this process.	The cotton stalk used by the Project is by-products of agriculture crops, not from a production process. The wood residues are collected from local woodwork factories through wholesalers and retailers. The wheat bran comes from one supplier-Shandong Quanlin Paper factory. For wholesaler Gaotang County Wood Plate Process Company, Gaotang County Qingyuan Biomass Fuel Co.Ltd, 63 retailers, and Shandong Quanlin Paper factory have provided statement to prove that all the wood residues and wheat bran supplied by them are the biomass resides and do not result in any increase of processing capacity of raw input or in other substantial changes in the wood plate production process.
(d) The biomass residues used by the project facility should not be stored for more than one year.	Stored for a long time will decrease the calorific value of the biomass residues and will affect the equipment's performance. So regulations on the storage of the fuel in the plant storage site will be made to guarantee that the storage time of the biomass residues will be no more than half year.
(e) Projects that chemically process the biomass residues prior to combustion (e.g. by means of esterification, fermentation and gasification) are not eligible under this methodology. The biomass residues can however be processed physically such as by means of drying, pelletization, shredding and briquetting.	No chemical process is involved in the Project prior to biomass residues combustion. The biomass residues however will be processed physically such as drying and shredding prior to combustion.
(f) No power and heat plant operates at the project site during the crediting period.	No power and heat plant is operating at the project site now or during the second crediting period.
(g) If any heat which is generated for purposes other than power generation (e.g. heat which is produced in boilers or extracted from the header to feed thermal loads in the process) during the crediting period or was generated prior to the implementation of the project activity, by any on-site or off-site heat generation equipment connected to the project site, the following conditions should apply: (i) The implementation of the project activity does not influence directly or indirectly the operation of the heat generation equipment, i.e. the heat generation equipment would operate in the same manner in the absence of the project	There is no heat generated by on site or off-site heat generation equipment connected to the project and used for purposes other than power generation. Also, there will be no heat generated during the second crediting period and used for purpose other than power generation

activity. (ii) The heat generation equipment does not influence directly or indirectly the operation of the project plant(e.g. no fuels are diverted from the heat generation equipment to the project plant); and (iii) The amount of fuel used in the heat generation equipment can be monitored and clearly differentiated from any fuel used in the project activity.	
(h) In the case of fuel switch project activities, the use of biomass residues or the increase in the use of biomass residues as compared to the baseline scenario is technically not possible at the project site without a capital investment in : (i) The retrofit or replacement of existing heat generators/boilers; or (ii) The installation of new heat generators/boilers; or (iii) A new dedicated biomass residues supply chain established for the purpose of the project (e.g. collecting and cleaning contaminated new sources of biomass residues that would otherwise not be used for energy purposes); (iv) Equipment for preparation and feeing of biomass residues	The Project is not a fuel switch project activity.

As analysis in Section B.4 below, the baseline scenario for power generation is scenario P5, and for biomass use the baseline scenario is scenario B1, either of which is one of the applicability condition for applying the ACM0018 (Version 03.0) for the Project.

Therefore, the ACM0018 (Version 03.0) is applicable to the Project.

B.3. Project boundary

The Project is a greenfield biomass residue fired power plant. There is no other power plant that has been operated at the project site during the most recent three years prior to the start of the project activity. No boiler or other heat generation equipment has been operated at the project site during the most recent three years prior to the start of the project activity. The Project will install one 130 tonne/h boiler and one 30MW steam turbine generator. Cotton stalk, wood residues and wheat bran are used as fuel for power generation. Prior to the implementation of the Project, there was no power plant or heat generation equipment operated at the Project site. In the absence of the Project, the same electricity generated by the Project was supplied by the NCPG which the Project is connected to. According to ACM0018 (Version 03.0), the spatial extent of the Project boundary encompasses:

- The Project activity power-only plant.
- All power plants connected physically to the NCPG.
- The trucks which transport biomass residues to the project site.
- The site where the biomass residues would have been left for decay or dumped.
- The biomass residues used in the Project only involve simple physical processing prior to combustion, such as drying or necessary shredding, and these processing equipments are also

included in the Project boundary.

Table B-1 illustrates which emissions sources are included and which are excluded from the project boundary for determination of both baseline and project emissions. Figure B-1 shows the flow diagram of the Project boundary.

Table B-1: Emission sources included in or excluded from the project boundary

Source		GHGs	Included?	Justification/Explanation
Baseline scenario	Electricity generation	CO_2	Yes	Main emission source
		CH_4	No	Excluded for simplification. This is conservative
		N_2O	No	Excluded for simplification. This is conservative
	Uncontrolled burning or decay of surplus biomass residues	CO_2	No	It is assumed that CO_2 emissions from surplus biomass residues do not lead to changes of carbon pools in the LULUCF sector
		CH_4	Yes	B1 is the most likely baseline scenario
		N_2O	No	Excluded for simplification. This is conservative
Project scenario	On-site fossil fuel consumption	CO_2	Yes	May be an important emission source
		CH_4	No	Excluded for simplification. This emission source is assumed to be very small
		N_2O	No	Excluded for simplification. This emission source is assumed to be very small
	On-site and off-site transportation and processing of biomass residues	CO_2	Yes	May be an important emission source
		CH_4	No	Excluded for simplification. This emission source is assumed to be very small
		N_2O	No	Excluded for simplification. This emission source is assumed to be very small
	Combustion of biomass residues for electricity	CO_2	No	It is assumed that CO_2 emissions from surplus biomass do not lead to changes of carbon pools in the LULUCF sector
		CH_4	Yes	This emission source must be included if CH_4 emissions from uncontrolled burning or decay of biomass residues in the baseline scenario are included
		N_2O	No	Excluded for simplification. This emission source is assumed to be small
	Storage of biomass residues	CO_2	No	It is assumed that CO_2 emissions from surplus biomass residues do not lead to changes of carbon pools in the LULUCF sector.
		CH_4	No	Excluded for simplification. Since biomass residues are stored for not longer than one year, this emission source is assumed to be small.
		N_2O	No	Excluded for simplification. This emissions source is assumed to be very small.
	Waste water from the treatment of biomass residues	CO_2	No	Excluded for simplification. This emissions source is assumed to be very small.
		CH_4	Excluded	There is no waste water treated under anaerobic condition.
		N_2O	Excluded	There is no waste water treated under anaerobic condition.

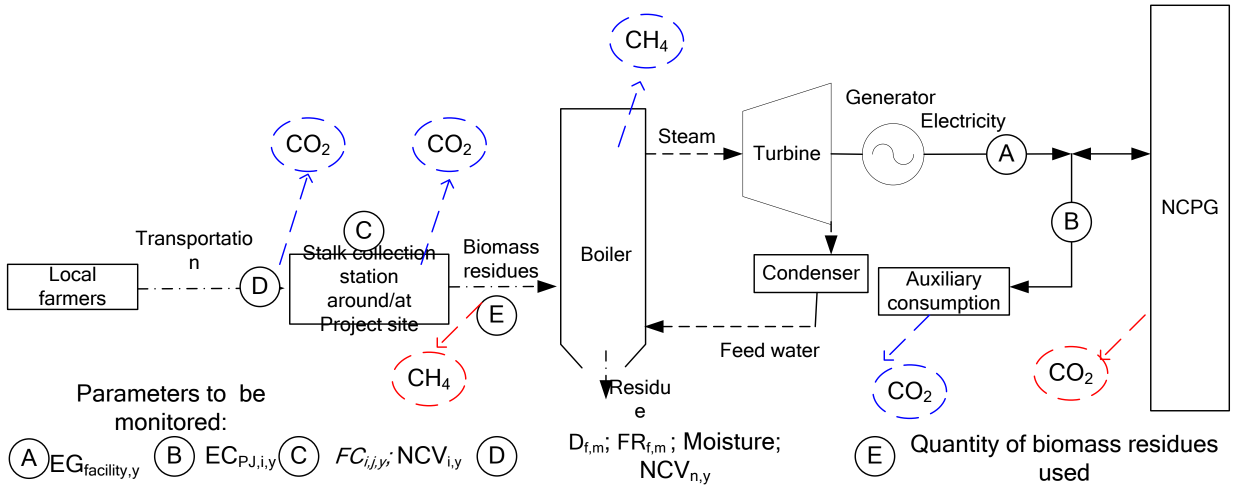

Figure B.1 Flow diagram of the project boundary

B.4. Establishment and description of baseline scenario

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According to the accepted revised PDD (Version 07) and ACM0018 (Version 03.0):

The scenario for electric power is:

P5: The generation of power in the grid.

The baseline scenarios for the use of each biomass residues categories are listed in Table B-2:

Table B-2: Baseline scenarios in the first crediting period

Biomass residues category (*k*)	Biomass residues type	Biomass residues source	Biomass residues fate in the absence of the project activity	Biomass residues use in project scenario	Biomass residues quantity (tonnes on dry-basis)
1	Cotton stalk	Off-site from local farmers and retailers	Dumped (B1) and burnt (B3)	Electricity generation on-site (biomass-only boiler)	67,833
2	Wood residues	Off-site from wholesalers and retailers	Dumped (B1)	Electricity generation on-site (biomass-only boiler)	96,795
3	Wheat bran	Off-site from certain supplier	Dumped (B1)	Electricity generation on-site (biomass-only boiler)	12,498

At the validation stage, an ex ante estimation of these quantities should be provided. These quantities should be updated every year of the crediting period as part of the monitoring plan so as to reflect the actual use of biomass residues in the project scenario. These updated values should be used for emissions reductions calculations. Along the crediting period, new categories of biomass residues (i.e. new types, new sources, with different fate) can be used in the project activity. In this case, a new line should be added to the table.

For the second crediting period, the continued validity of the original baseline should be assessed. According to the "Methodological Tool: Assessment of the validity of the original/current baseline and update the baseline at the renewal of the crediting period" (version 03.0.1), the stepwise procedure as follows should be adopted to assess the continued validity of the baseline and to update the baseline at the renewal of a crediting period:

Step 1: Assess the validity of the current baseline for the next crediting period

Step 1.1: Assess compliance of the current baseline with relevant mandatory national and/or sectoral policies

In China, the Renewable Energy Law has been put into effect since 2006, which encourages the development of renewable energy projects[1]. However, although renewable energy projects have been developed rapidly in recently years, grid connected power generation in China is still dominated by fossil-fuel power plants[2].

A Notice about Prohibiting to Burn Agricultural Straw in an Uncontrolled Manner was issued by Ministry of Agriculture of the People's Republic of China on 14/06/2007[3], and it is not eligible to burn biomass residues in an uncontrolled manner without any energy purpose. Therefore, the baseline scenario B3 is excluded.

Since the above sectoral policy has come into effect after the submission of the project activity for validation, the current baseline scenarios needs to be updated in the second crediting period as in Table B-3:

Table B-3: Baseline scenarios for each biomass residues categories in the second crediting period

Biomass residues category (*k*)	**Biomass residues type**	**Biomass residues source**	**Biomass residues fate in the absence of the project activity**	**Biomass residues use in project scenario**	**Biomass residues quantity (tonnes on dry-basis)**
1	Cotton stalk	Off-site from local farmers and retailers	Dumped (B1)	Electricity generation on-site (biomass-only boiler)	67,833
2	Wood residues	Off-site from wholesalers and retailers	Dumped (B1)	Electricity generation on-site (biomass-only boiler)	96,795
3	Wheat bran	Off-site from certain supplier	Dumped (B1)	Electricity generation on-site (biomass-only boiler)	12,498

Step 1.2: Assess the impact of circumstances

There are no new relevant circumstances in the biomass power generating sector applicable to the Project Activity, in comparison to the time of the submission of the project activity for validation, which could impact the validity of the current baseline for the next crediting period. The scenario has been updated in above *step1.1*.

Step 1.3: Assess whether the continuation of use of current baseline equipment(s) or an investment is the most likely scenario for the crediting period for which renewal is requested.

[1] http://www.gov.cn/ziliao/flfg/2005-06/21/content_8275.htm
[2] China Electric Power Yearbook 2013
[3] http://www.gov.cn/zwgk/2007-06/14/content_648934.htm

The project activity consists of the implementation of biomass residues fired power plant where no electricity was generated prior to its implementation. In the absence of the CDM project activity, the project owner would not have constructed the plant and electricity would have been generated by other power plants connected to the grid, and biomass residues used in the Project would have been dumped or left to decay mainly under aerobic conditions.

Therefore, this *sub-step* is not applicable since the identified baseline scenario at the validation of the project activity did not correspond to the *continuation of use of the current equipment(s) without any investment and, the projects proponents or third party (or parties) would undertake an investment later due, for example, to the end of the technical lifetime of the equipment(s) before the end of the crediting period or the availability of a new technology.*

Step 1.4: Assessment of the validity of the data and parameters

According to the "Methodological tool: *Assessment of the validity of the original/current baseline and update of the baseline at the renewal of a crediting period*" (Version 03.0.1), updates should be undertaken in the following cases:

• *Where IPCC default values are used, the values should be updated if any new default values have been adopted and published by the IPCC, for example, in guidelines for national GHG inventories, IPCC assessment report or special reports by the IPCC;*

• *Where emission factors, values or emission benchmarks are used and determined only once for the crediting period, they should be updated, except if the emission factors, values or emission benchmarks are based on the historical situation at the site of the project activity prior to the implementation of the project and cannot be updated because the historical situation does not exist anymore as a result of the CDM project activity.*

The values used for the calculation of $EF_{grid,OM,y}$, $EF_{grid,BM,y}$ and GWP_{CH4} are updated in the second crediting period.

Step 2: Update the current baseline and the data and parameters

Step 2.1: Update the current baseline

The baseline for the second crediting period has been updated based on the latest approved version of the ACM0018 (Version 03.0). This update was applied in the context of the sectoral policies and circumstances that is applicable at the time of requesting for renewal of the crediting period.

Step 2.2: Update the data and parameters

Considering the changes on circumstances related to calculation of CO_2 emission factor, global warming potential for methane second commitment period and other relevant parameters, the baseline emissions were reviewed in this second crediting period following the latest version of the *"Methodological Tool: Tool to calculate the emission factor for an electricity system"(Version 04.0)*. See sections B.6.1, B.6.2 and B.6.3 of this PDD.

B.5. Demonstration of additionality

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Not applicable for the second crediting period.

B.6. Emission reductions

B.6.1. Explanation of methodological choices

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Emission reductions are calculated as follows:

$$ER_y = BE_y - PE_y - LE_y \quad \text{Equation (1)}$$

Where:

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

Baseline emissions

Baseline emissions are calculated as follows:

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

Where:

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

Baseline emissions are determined through the following steps:

Step 1: Determination of $BE_{EL,y}$

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

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

Where:

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

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

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

$$EG_{PJ,y} = EG_{PJ,gross,y} - EG_{PJ,aux,y} \quad \text{Equation (4)}$$

Where:

$EG_{PJ,y}$	=	Net quantity of electricity generated in all power plants which are located at the project site and included in the project boundary in year *y* (MWh)
$EG_{PJ,gross,y}$	=	Gross quantity of electricity generated in all power plants which are located at the project site and included in the project boundary in year *y* (MWh)
$EG_{PJ,aux,y}$	=	Total auxiliary electricity consumption required for the operation of the power plants at the project site (MWh)

According to ACM0018 (Version 03.0), it is assumed that transmission and distribution losses in the electricity grid are not influenced significantly by the project activity and are therefore not accounted for. However, PPs decide to voluntarily consider the transmission and distribution losses in the electricity grid, which is more conservative.

Therefore,

$$EG_{PJ,y} = EG_{facility,y} \quad \text{Equation (5)}$$

$$EG_{facility,y} = EG_{PJ\ to\ GRID,y} - EG_{GRID\ to\ PJ,y} \quad \text{Equation (6)}$$

Where:

$EG_{facility,y}$	=	Quantity of net electricity generation supplied by the project plant/unit to the grid in year *y* (MWh), which is conservative
$EG_{PJ\ to\ GRID,y}$	=	Quantity of electricity supplied by the Project to the grid in year y (MWh);
$EG_{GRID\ to\ PJ,y}$	=	Quantity of electricity delivered to the Project from the grid in year y (MWh).

According to the accepted revised PDD (Version 07) and the Power Purchase Agreement signed by the project owner and the grid company, bidirectional electricity meter installed at the local substation is used for monitoring the quantity of $EG_{PJ\ to\ GRID,y}$ and $EG_{GRID\ to\ PJ,y}$.

The baseline emissions are calculated using the result of $EG_{PJ\ to\ GRID,y}$ minus $EG_{GRID\ to\ PJ,y}$, which is more conservative than using $EG_{PJ,gross,\ y}$ -$EG_{PJ,aux,y}$, since the monitoring point is at the grid side and power imported from the grid is deducted.

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

The electricity generated under the project activity could be generated in the baseline in three different ways, depending on the baseline scenario and the particular situation of the project activity:

a) Use of biomass residues at the project site. Electricity could be generated with biomass residues in power plants at the project site.

b) Use of fossil fuels at the project site. Electricity could be generated with fossil fuels in power plants at the project site.

c) Power generation in the electricity grid. Electricity could be generated by power plants in the electricity grid.

For some project types, electricity would be generated in the baseline by a combination of these three ways. Therefore, $EF_{BL,EL,y}$ is a weighted average baseline emission factor: It is determined based on each of the three ways electricity could be generated (grid, biomass residues, fossil fuels), multiplied with its respective emission factor over the total amount of electricity produced in the baseline.

For the project activity, the project activity exports all electricity to the grid and no electricity would be produced at the project site in the baseline scenario.

ACM0018 gives an approach to calculated $EF_{BL,EL,y}$ as follows::

$$EF_{BL,EL,y} = \frac{EG_{BL,FF,y} \times EF_{BL,FF,y} + EG_{BL,grid,y} \times EF_{grid,CM,y} + EG_{BL,FF/grid,y} \times \text{MIN}\left(EF_{BL,FF,y}, EF_{grid,CM,y}\right)}{EG_{BL,BR,y} + EG_{BL,FF,y} + EG_{BL,grid,y} + EG_{BL,FF/grid,y}}$$ Equation (7)

Where:

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

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

Step 1.2.1 Determination of $EG_{BL,BR,y}$

In the baseline scenario for the project activity, there is no biomass residues would be used for electricity generation in power-only plants in the baseline. Therefore, according to ACM0018: $EG_{BL,BR,y}$=0.

Step 1.2.2 Determination of $EG_{BL,FF,y}$

In the baseline scenario for the project activity, there is no fossil fuels would be used for electricity generation in the baseline scenario at the project site. Therefore, according to ACM0018: $EG_{BL,FF,y}$=0.

Step 1.2.3 Determination of $EG_{BL,grid,y}$

In the baseline scenario for the project activity, the electricity supplied by the project will replace equivalent amount of electricity in the power grid. Therefore, according to ACM0018 (Version 03.0), $EG_{BL,grid,y} = EG_{PJ,y}$.

Step 1.2.4 Determination of $EG_{BL,FF/grid,y}$

$EG_{BL,FF/grid,y}$ represents the amount of electricity that could be generated in the baseline in the grid or at the project site using fossil fuels. $EG_{BL,FF/grid,y}$ corresponds to the remainder of electricity generation, i.e. the amount that exceeds the minimum amount of electricity that would be generated by power plants in the electricity grid ($EG_{BL,grid,y}$), the minimum amount of electricity that could be generated with fossil fuels at the project site ($EG_{BL,FF,y}$), and the amount of electricity that would be generated with biomass residues at the project site ($EG_{BL,BR,y}$). Accordingly, $EG_{BL,FF/grid,y}$ is calculated as follows:

$$EG_{BL,FF/grid,y} = EG_{PJ,y} - EG_{BL,BR,y} - EG_{BL,FF,y} - EG_{BL,grid,y} \quad \text{Equation (8)}$$

Where:

$EG_{BL,FF/grid,y}$	=	Amount of electricity that could be generated in the baseline either by power plants in the electricity grid or by power plants at the project site using fossil fuels in year *y* (MWh)
$EG_{PJ,y}$	=	Electricity generated in power plants included in the project boundary in year *y* (MWh)
$EG_{BL,BR,y}$	=	Amount of electricity that would be generated with biomass residues in power-only plants operated at the project site in the baseline in year *y* (MWh)
$EG_{BL,FF,y}$	=	Minimum amount of electricity that would be generated with fossil fuels at the project site in the baseline in year *y* (MWh)
$EG_{BL,grid,y}$	=	Minimum amount of electricity that would be generated by power plants in the electricity grid in the baseline in year *y* (MWh)

According to the analysis from Step 1.2.1 to Step 1.2.3, the above function about be calculated as below:

$$EG_{BL,FF/grid,y} = EG_{PJ,y} - EG_{BL,BR,y} - EG_{BL,FF,y} - EG_{BL,grid,y} = EG_{PJ,y} - 0 - 0 - EG_{PJ,y} = 0$$

Step 1.2.5 Determination of $EF_{BL,FF,y}$

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

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

Step 1.2.6 Determination of $EF_{grid,CM,y}$

$EF_{grid,CM,y}$ should be determined as the combined margin CO_2 emission factor for grid connected power generation in year *y*, calculated using the "Tool to calculate the emission factor for an electricity system, Version 04.0". The Tool is applied in the following six steps:

a) Step 1: Identify the relevant electricity systems;
b) Step 2: Choose whether to include off-grid power plants in the project electricity system (optional);
c) Step 3: Select a method to determine the operating margin (OM);
d) Step 4: Calculate the operating margin emission factor according to the selected method;
e) Step 5: Calculate the build margin (BM) emission factor;
f) Step 6: Calculate the combined margin (CM) emission factor.

<u>Step 1: Identify the relevant electricity systems</u>

In accordance with the "Methodology Tool: Tool to Calculate the Emission Factor for an Electricity System" (Version 04.0), the project electricity system of the Project is identified according to the delineation of the project electricity system and connected electricity systems published by China's DNA.
The Project is located in Shandong Province. According to the 2014 Baseline Emission Factors for Regional Power Grids in China issued by China's DNA which provides the delineation of relevant electric power systems, the North China Power Grid is the relevant electric power system of the Project. Since North China Power Grid imports electricity from Northeast China Grid and Northwest China Grid, the connected electric power system is the Northeast China Grid and Northwest China Grid, and Option (b) (the simple operating margin emission rate of the exporting grid) provided in "Methodology Tool: Tool to Calculate the Emission Factor for an Electricity System" (Version 04.0) is chosen to calculate the operating margin of the exporting grid.

<u>Step 2: Choose whether to include off-grid power plants in the project electricity system (optional)</u>

Option I (only grid power plants are included in the calculation) provided in "Methodology Tool: Tool to Calculate the Emission Factor for an Electricity System" (Version 04.0) is chosen to calculate the operating margin and build margin emission factor.

<u>Step 3: Select a method to determine the operating margin (OM)</u>

Four methods are provided in the "*Tool to calculate the emission factor for an electricity system"* for the calculation of Operating Margin Emission Factor(s) ($EF_{grid,OM,y}$), they are:

(a) Simple OM, or

(b) Simple adjusted OM, or

(c) Dispatch data analysis OM, or

(d) Average OM.

As per the *"Tool to calculate the emission factor for an electricity system"*, with reference to the *2014 Baseline Emission Factors for Regional Power Grids in China* issued by China's DNA, method (a) simple OM is employed for calculation of the operating margin emission factor(s) ($EF_{grid,OM,y}$) of the Project.
As per the "Methodology Tool: Tool to Calculate the Emission Factor for an Electricity System" (Version 04.0), the simple OM method only can be used when low-cost/must run resources constitute less than 50% of total grid generation in: 1) average of the five most recent years, or 2) based on long-term averages for hydroelectricity production. Among the total electricity generation of the North China Power Grid which the Project is connected to, the amount of low-cost/must run resources accounts for about 4.933% in 2012, 3.793% in 2011, 3.142% in 2010, 2.009% in 2009

and 1.212% in 2008[4], all less than 50%. Thus, the method (a) simple OM can be used to calculate the baseline emission factor of operating margin ($EF_{grid,OM,y}$) for the Project.

The emission factors were determined ex ante (A 3-year generation-weighted average, based on the most recent data available at the time of submission of the CDM-PDD to the DOE for validation) and will not be updated during the second crediting period.

<u>Step 4: Calculate the operating margin emission factor according to the selected method</u>

Two options are provided in the “Methodology Tool: Tool to Calculate the Emission Factor for an Electricity System” (Version 04.0) for the determination of the simple OM emission factor ($EF_{grid,OMsimple,y}$).

Since the data on net electricity generation and CO_2 emission factor of each power unit in the North China Power Grid are not available, Option A can’t be used. As summarized in Appendix 4, only nuclear and renewable power generation are considered as low-cost / must-run power sources and the quantity of electricity supplied to the grid by these sources is known. Moreover, off-grid power plants are not included in the calculation (Option I has been chosen in Step 2). Therefore, Option B (based on data on the total net electricity generation of all power plants serving the system and the fuel types and total fuel consumption of the project electricity system) is adopted to calculate the simple OM emission factor ($EF_{grid,OMsimple,y}$). The formula of $EF_{grid,OMsimple,y}$ calculation is

$$EF_{grid,OMsimple,y} = \frac{\sum_i FC_{i,y} \times NCV_{i,y} \times EF_{CO2,i,y}}{EG_y} \quad \text{Equation (9)}$$

$$EG_y = \sum_j GEN_{j,y} \times \left(1 - r_{j,y}\right) \quad \text{Equation (10)}$$

Where:

$EF_{grid,OMsimple,y}$	=	Simple operating margin CO_2 emission factor in year *y* (tCO_2e /MWh)
$FC_{i,y}$	=	Amount of fossil fuel type *i* consumed in the project electricity system in year *y* (mass or volume unit)
$NCV_{i,y}$	=	Net calorific value (energy content) of fossil fuel type *i* in year *y* (GJ/ mass or volume unit)
$EF_{CO2,i,y}$	=	CO_2 emission factor of fossil fuel type *i* in year *y* (tCO_2e /GJ)
EG_y	=	Net electricity generated and delivered to the grid by all power sources serving the system, not including low-cost / must-run power plants / units, in year *y* (MWh)
i	=	All fossil fuel types combusted in power sources in the project electricity system in year *y*
y	=	The relevant year as per the data vintage chosen in Step 3

[4] Date source: China Electric Power Yearbook 2009~2013

$GEN_{j,y}$ = Total thermal power generation of province j of the electricity system in year y

$r_{j,y}$ = Auxiliary electricity consumption rate of province j of the electricity system in year y

With reference to the *2014 Baseline Emission Factors for Regional Power Grids in China* issued by China's DNA, the simple OM emission factor ($EF_{grid,OM,y}$) of the North China Power Grid is 1.0580 tCO_2e/MWh (see Appendix 4 for details).

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

According to "Methodology Tool: Tool to Calculate the Emission Factor for an Electricity System" (Version 04.0), project participants shall choose between one of the following two options to calculate the Build Margin Emission Factor ($EF_{grid,BM,y}$).

Option 1. Calculate the Build Margin emission factor ($EF_{grid,BM,y}$) ex-ante based on the most recent information available on plants already built for sample group m at the time of PDD submission.

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

Option 1, calculate the Build Margin emission factor ($EF_{grid,BM,y}$) ex-ante based on the most recent information available on plants already built for sample group m at the time of PDD submission is employed by the Project.

According to "Methodology Tool: Tool to Calculate the Emission Factor for an Electricity System" (Version 04.0), calculate the Build Margin Emission Factor ($EF_{grid,BM,y}$) to the using equation (4):

$$EF_{grid,BM,y} = \frac{\sum_m EG_{m,y} \times EF_{EL,m,y}}{\sum_m EG_{m,y}}$$ Equation (11)

Where:

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

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

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

m = Power units included in the build margin

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

Currently, it is very difficult to get the capacity margin data of power plants in China, since these data as well as net quantity of electricity generated and delivered to the grid and fuel consumption

data in power unit *m* are regarded as commercial secrets or only for internal usage. Then the following deviation[5] approved by the EB was adopted to calculate the Build Margin emission factor.

According to the guidance from the CDM Executive Board for a deviation of the baseline methodology of AM0005, which had combined into the baseline methodology of ACM0002, the following deviation was adopted to calculate the Build Margin emission factor.

1) Use the efficiency level of the best technologies commercially available in the provincial/regional or national grid of China, as a conservative proxy, for fuel *i* consumption estimation to estimate the $EF_{grid,BM,y}$.

2) Use capacity additions during last several years for estimating the $EF_{grid,BM,y}$, i.e. the capacity addition over last several years, whichever results in a capacity addition that is closest to 20% of total installed capacity. For the Project, the data from Year 2009 to 2012 is used to calculate $EF_{grid,BM,y}$

3) Use installed capacity to replace annual power generation to estimate weights.

BM is calculated by the following steps and formula:

Step a. Calculate the power generation emissions of solid fuel, liquid fuel and gas fuel and each share in the total emissions based on the *Energy Balance Table* of the most recent year.

$$\lambda_{Coal} = \frac{\sum_{i \in COAL, j} FC_{i,j,y} \times NCV_{i,y} \times EF_{CO2,i,y}}{\sum_{i,j} FC_{i,j,y} \times NCV_{i,y} \times EF_{CO2,i,y}}$$ Equation (12)

$$\lambda_{Oil} = \frac{\sum_{i \in OIL, j} FC_{i,j,y} \times NCV_{i,y} \times EF_{CO2,i,y}}{\sum_{i,j} FC_{i,j,y} \times NCV_{i,y} \times EF_{CO2,i,y}}$$ Equation (13)

$$\lambda_{Gas} = \frac{\sum_{i \in GAS, j} FC_{i,j,y} \times NCV_{i,y} \times EF_{CO2,i,y}}{\sum_{i,j} FC_{i,j,y} \times NCV_{i,y} \times EF_{CO2,i,y}}$$ Equation (14)

Where:

$FC_{i,j,y}$	=	Amount of fuel i (in a mass or volume unit) consumed by power plant j in year(s) y
$NCV_{i,y}$	=	Net calorific value (energy content) of fossil fuel type i in year y (GJ/ mass or volume unit)
$EF_{CO2,i,y}$	=	CO_2 emission factor of fossil fuel type i in year y (tCO_2/GJ)

COAL, OIL and GAS are footnote group for solid fuels, liquid fuels and gas fuels.

Step b. Calculate the emission factor for thermal power of the grid based on the result of Step a and the efficiency level of the best technology commercially available in China.

$$EF_{Thermal} = \lambda_{Coal} \times EF_{Coal,Adv} + \lambda_{Oil} \times EF_{Oil,Adv} + \lambda_{Gas} \times EF_{Gas,Adv}$$ Equation (15)

[5] Source: http://cdm.unfccc.int/UserManagement/FileStorage/AM_CLAR_QEJWJEF3CFBP1OZAK6V5YXPQK

Where $EF_{Coal,Adv}$, $EF_{Oil,Adv}$ and $EF_{Gas,Adv}$ are emission factor proxies of efficiency level of the best coal fired, oil fired and gas fired power generation technology commercially available in China.

Step c. Calculate BM of the grid based on the result of Step b and the share of thermal power of recent 20% capacity additions.

$$EF_{grid,BM,y} = \frac{CAP_{Thermal}}{CAP_{Total}} \times EF_{Thermal}$$ Equation (16)

Where:

CAP_{Total}	=	Total newly added electricity generation capacity (MW)
$CAP_{Thermal}$	=	Newly added electricity generation capacity of thermal power (MW)

The data on different fuel consumptions for power generation and the net caloric values of the fuels are obtained from the *China Energy Statistical Yearbook* 2013. The emission factors and oxidation factors of the fuels employed are obtained from Table 1.3 and Table 1.4 on page 1.21-1.24 of volume 2 of 2006 *IPCC Guidelines for National Greenhouse Gas Inventories*.

With reference to the *2014 Baseline Emission Factors for Regional Power Grids in China* issued by China's DNA, the Build Margin emission factor ($EF_{grid,BM,y}$) of the North China Power Grid is 0.5410 tCO_2e/MWh.

<u>Step 6: Calculate the combined margin (CM) emission factor.</u>

Based on "Methodology Tool: Tool to Calculate the Emission Factor for an Electricity System" (Version 04.0), the baseline emission factor ($EF_{grid,CM,y}$) is calculated as the weighted average of the operating margin emission factor ($EF_{grid,OM,y}$) and the build margin emission factor ($EF_{grid,BM,y}$), as

$$EF_{grid,CM,y} = EF_{grid,OM,y} \times \omega_{OM} + EF_{grid,BM,y} \times \omega_{BM}$$ Equation (17)

According to "Methodology Tool: Tool to Calculate the Emission Factor for an Electricity System" (Version 04.0), for the second crediting period, the weight w_{OM} is 0.25 and the weight w_{BM} is 0.75 for biomass power projects. Therefore the combined baseline emission factor:

$EF_{grid,CM,y}$ =0.25×1.0580+0.75×0.5410 =0.6702 (tCO_2e/MWh).

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

According to ACM0018 (Version 03.0) and analysis in Section B.4,

$$BE_{BR,y} = BE_{BR,B1/B3,y}$$ Equation (18)

Where:

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

For the biomass residues categories, as described in the biomass residues categories table, for which the most likely baseline scenario is the biomass residues would be dumped or left to decay under mainly aerobic conditions (B1), baseline emissions are calculated assuming that the biomass residues would be burnt in an uncontrolled manner.

Baseline emissions are calculated by multiplying the quantity of biomass residues with the net calorific value and an appropriate emission factor, as follows:

$$BE_{BR,B1/B3,y} = GWP_{CH4} \times \sum_{n} BR_{n,B1/B3,y} \times NCV_{n,y} \times EF_{BR,n,y} \quad \text{Equation (19)}$$

Where:

$BE_{BR,B1/B3,y}$	=	Baseline emissions due to aerobic decay or uncontrolled burning of biomass residues in year *y* (tCO_2)
GWP_{CH4}	=	Global warming potential of methane valid for the commitment period (tCO_2/tCH_4)
$BR_{n,B1/B3,y}$	=	Amount of biomass residues category *n* used in the project plant(s) included in the project boundary in year *y* for which B1 or B3 has been identified as the most plausible baseline scenario (tonnes on dry-basis)
$NCV_{n,y}$	=	Net calorific value of the biomass residues category *n* in year *y* (GJ/tonnes on dry-basis)
$EF_{BR,n,y}$	=	CH_4 emission factor for uncontrolled burning of the biomass residues category n during the year *y* (tCH_4/GJ)
n	=	Categories of biomass residues

To determine the CH_4 emission factor, project participants may undertake measurements or use referenced default values. In the absence of more accurate information, it is recommended to use 0.0027 tCH_4 per ton of biomass as default value for the product of $NCV_{n,y}$ and $EF_{BR,n,y}$.[6] Considering the uncertainty of the CH_4 emission factor ($EF_{BR,n,y}$) is greater than 100 per cent, a conservativeness factor of 0.73 is applied. Thus, emission factor of 0.001971tCH_4/t biomass should be used.

Project emissions

Project emissions are calculated as follows:

$$PE_y = PE_{FF,y} + PE_{EL,y} + PE_{TR,y} + PE_{BR,y} + PE_{WW,y} \quad \text{Equation (20)}$$

Where:

PE_y	=	Project emissions during year *y* (tCO_2e)
$PE_{FF,y}$	=	Emissions during the year *y* due to fossil fuel consumption (tCO_2)
$PE_{EL,y}$	=	Emissions during the year *y* due to electricity use off-site for the processing of biomass residues (tCO_2)

[6] 2006 IPCC Guidelines, Volume 4, Table 2.5, default value for agricultural residues.

$PE_{TR,y}$	=	Emissions during the year *y* due to transport of the biomass residues to the project plant (tCO_2)
$PE_{BR,y}$	=	Emissions from the combustion of biomass residues during the year *y* (tCO_2e)
$PE_{WW,y}$	=	Emissions from waste water generated from the treatment of biomass residues in year *y* (tCO_2e)

Determination of PE_{FFy}

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

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

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

(c) Fossil fuels required for the operation of equipment related to the on-site or off-site preparation, storage, processing and transportation of fuels and biomass residues (e.g. for mechanical treatment of the biomass, conveyor belts, driers, pelletization, shredding, briquetting processes, etc.);

(d) If any fossilized or non-biodegradable materials are used in the processing of biomass residues and incorporated in the processed biomass residues (e.g. binders) then emissions arising from those materials should be accounted for when the processed biomass residues are combusted. For that purpose those materials should be deemed as fossil fuels. If net calorific values, carbon content and/or emission factors of those materials are available they should be used, otherwise the net calorific values, carbon content and/or emission factors of the most carbon intensive fossil fuel available in the country should be used.

As the Project will not co-fire fossil fuel and will not use any fossilized or non-biodegradable materials in the processing of biomass residues, only emission source (c) and emission source (d) listed above need to be considered.

As there is diesel consumption for the operation of equipment during biomass residues preparation and on-site transportation, only emission source c) should be considered for the Project.

“Methodological Tool: Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion” (Version 02) should be used to calculate $PE_{FF,y}$.

$$PE_{FF,y} = \sum_i FC_{i,j,y} \times COEF_{i,y} \qquad \text{Equation (21)}$$

Where:

$FC_{i,j,y}$	=	Is the quantity of fuel type i combusted in process j during the year y (mass or volume unit/yr)
$COEF_{i,y}$	=	Is the CO_2 emission coefficient of fuel type i in year y (tCO_2/mass or volume unit)
i	=	Are the fuel types combusted in process j during the year y

The CO_2 emission coefficient $COEF_{i,y}$ can be calculated using two options, depending on the availability of data on the fossil fuel type *i*. For the Project, necessary data of Option A are not available. Therefore, Option B is chosen to calculate $COEF_{i,y}$.

$$COEF_{i,y} = NCV_{i,y} \times EF_{CO2,i,y}$$ Equation (22)

Where:

$NCV_{i,y}$	=	Is the weighted average net calorific value of the fuel type i in year y (GJ/mass or volume unit)
$EF_{CO2,i,y}$	=	Is the weighted average CO_2 emission factor of fuel type i in year y (tCO_2/GJ)

Determination of $PE_{EL,y}$

According to ACM0018 (Version 03.0), $PE_{EL,y}$ should account only for the off-site use of electricity, using "Methodological Tool: Tool to calculate baseline, project and/or leakage emissions from electricity consumption" (Version 01) as below:

The off-site electricity is imported from the grid, according to "Methodological Tool: Tool to calculate baseline, project and/or leakage emissions from electricity consumption" (Version 01), Option A1 (Calculate the combined margin emission factor of the applicable electricity system, using the procedures in the latest approved version of the "Tool to calculate the emission factor for an electricity system" (Version 04.0) is chosen for the $PE_{EL,y}$ calculation.

$$EF_{EL,j,y} = EF_{grid,CM,y}$$ Equation (23)

$$PE_{EL,y} = \sum_j EC_{PJ,j,y} \times EF_{EL,j,y} \times (1 + TDL_{j,y})$$ Equation (24)

Where:

$EC_{PJ,j,y}$	=	Quantity of electricity consumed by the project electricity consumption source *j* in year *y* (MWh/yr)
$EF_{EL,j,y}$	=	Emission factor for electricity generation for source *j* in year *y* (tCO_2/MWh)
$TDL_{j,y}$	=	Average technical transmission and distribution losses for providing electricity to source *j* in year *y*

According to "Methodological Tool: Tool to calculate baseline, project and/or leakage emissions from electricity consumption"(Version 01),

$EF_{EL,j,y} = EF_{grid,CM,y} =$ 0.6702 (tCO_2e/MWh)

$TDL_{j,y} = 20\%$

Determination of $PE_{TR,y}$

"Methodological Tool: Project and leakage emissions from transportation of freight" (Version 01.1.0) gives two options for $PE_{TR,y}$ calculation: monitoring fuel consumption (Option A) or using conservative default values (Option B).

In this PDD, project participants choose Option B for $PE_{TR,y}$ calculation, therefore, $PE_{TR,y}$ are determined as follows:

$$PE_{TR,m} = \sum_{f} D_{f,m} \times FR_{f,m} \times EF_{CO2,f} \times 10^{-6}$$ Equation (25)

Where:

$PE_{TR,m}$	=	Project emissions from road transportation of freight monitoring period *m* (tCO_2e)
$D_{f,m}$		Return trip distance between the origin and destination of freight transportation activity *f* in monitoring period *m* (km)
$FR_{f,m}$	=	Total mass of freight transported in freight transportation activity *f* in monitoring period *m* (t)
$EF_{CO2,f}$	=	Default CO_2 emission factor for freight transportation activity *f* (g CO_2/t km)
f	=	Freight transportation activities conducted in the project activity in monitoring period *m*

$PE_{TR,m}$ in the tool corresponds to the parameter $PE_{TR,y}$ in this methodology and the monitoring period *m* is one year.

Determination of $PE_{BR,y}$

$$PE_{BR,y} = GWP_{CH4} \times EF_{CH4,BR} \times \sum_{n} BR_{PJ,n,y} \times NCV_{n,y}$$ Equation (26)

Where:

GWP_{CH4}	=	Global Warming Potential for methane valid for the relevant commitment period (tCO_2/tCH_4)
$EF_{CH4,BR}$	=	CH_4 emission factor for the combustion of biomass residues in the project plant (tCH_4/GJ)
$BR_{PJ,n,y}$	=	Quantity of biomass residues of category *n* used in power plants which are located at the project site and included in the project boundary in year *y* (tonnes on dry-basis/yr)
$NCV_{n,y}$	=	Net calorific value of the biomass residues category *n* in year *y* (GJ/tonnes on dry-basis)

Since cotton stalk, wood residues and wheat bran are all belonged to wood waste, IPCC default value is used to determine the CH_4 emission factor, according to the IPCC default value provided in ACM0018, the CH_4 emission factor of combustion of biomass of wood waste 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.

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

According to ACM0018 (Version 03.0), $PE_{WW,CH4,y}$ is not considered for the project activity.

Leakage

The main potential source of leakage for this project activity is an increase in emissions from fossil

fuel combustion or other sources due to diversion of biomass residues from other uses to the project plant as a result of the project activity. Changes in carbon stocks in the LULUCF sector are expected to be insignificant since this methodology is limited to biomass residues, as defined in the applicability conditions above. The baseline scenarios for biomass residues for which this potential leakage is relevant are B5, B6, B7 and B8. According to the analysis of baseline scenario in section B.4, the baseline for use of biomass residues is B1, which is the biomass residues are dumped or left to decay under mainly aerobic conditions. Therefore leakage effects do not need to be addressed according to consolidated methodology ACM0018, i.e. $LE_y=0$ tCO_2e.

B.6.2. Data and parameters fixed ex ante

Data / Parameter	$EF_{grid,OM,y}$
Unit	tCO_2e/MWh
Description	The operating margin emission factor
Source of data	*2014 Baseline Emission Factors for Regional Power Grids in China*
Value(s) applied	1.0580
Choice of data or Measurement methods and procedures	The data obtained from the *2014 Baseline Emission Factors for Regional Power Grid in China* issued by China’s DNA are reliable.
Purpose of data	Applied for calculating baseline emissions
Additional comment	-

Data / Parameter	$EF_{grid,BM,y}$
Unit	tCO_2e/MWh
Description	The building margin emission factor
Source of data	*2014 Baseline Emission Factors for Regional Power Grids in China*
Value(s) applied	0.5410
Choice of data or Measurement methods and procedures	The data obtained from the *2014 Baseline Emission Factors for Regional Power Grid in China* issued by China’s DNA are reliable.
Purpose of data	Applied for calculating baseline emissions
Additional comment	-

Data / Parameter	$EF_{grid,CM,y}$
Unit	tCO_2e/MWh
Description	The combined margin emission factor
Source of data	*2014 Baseline Emission Factors for Regional Power Grids in China*
Value(s) applied	0.6702
Choice of data or Measurement methods and procedures	The data obtained from the *2014 Baseline Emission Factors for Regional Power Grid in China* issued by China’s DNA are reliable.
Purpose of data	Applied for calculating baseline emissions
Additional comment	-

Data / Parameter	$GEN_{j,y}$

Unit	MWh
Description	Total power generation of province j of North China Power Grid in year y
Source of data	*China Electric Power Yearbook* 2011~2013 edition
Value(s) applied	See Appendix 4 for details.
Choice of data or Measurement methods and procedures	The data obtained from the *China Electric Power Yearbook* issued by authorized entity in China are reliable.
Purpose of data	Applied for calculating OM
Additional comment	-

Data / Parameter	$r_{j,y}$
Unit	%
Description	Auxiliary electricity consumption rate of province j of North China Power Grid in year y
Source of data	*China Electric Power Yearbook* 2011~2013 edition
Value(s) applied	See Appendix 4 for details.
Choice of data or Measurement methods and procedures	The data obtained from the *China Electric Power Yearbook* issued by authorized entity in China are reliable.
Purpose of data	Applied for calculating OM
Additional comment	-

Data / Parameter	$NCV_{i,y}$
Unit	TJ per mass or volume unit of fuel i
Description	Net caloric value of fuel i
Source of data	*China Energy Statistical Yearbook* 2013 edition
Value(s) applied	See Appendix 4 for details.
Choice of data or Measurement methods and procedures	The data obtained from the *China Energy Statistical Yearbook* issued by authorized entity in China are reliable.
Purpose of data	Applied for calculating OM and BM
Additional comment	-

Data / Parameter	$EF_{CO2,i,y}$
Unit	tC/TJ
Description	CO_2 emission factor per unit of energy of the fuel i
Source of data	*2006 IPCC Guideline for National Greenhouse Gas Inventories*
Value(s) applied	See Appendix 4 for details.
Choice of data or Measurement methods and procedures	The data obtained from *2006 IPCC Guideline for National Greenhouse Gas Inventories* are reliable.
Purpose of data	Applied for calculating OM and BM
Additional comment	-

Data / Parameter	$CAP_{j,y}$
Unit	MW
Description	Total installed capacity of province j of North China Power Grid in year y
Source of data	*China Electric Power Yearbook* 2010~2013 edition
Value(s) applied	See Appendix 4 for details.
Choice of data or Measurement methods and procedures	The data obtained from the *China Electric Power Yearbook* issued by authorized entity in China are reliable.
Purpose of data	Applied for calculating BM
Additional comment	-

Data / Parameter	$CAP_{Thermal}$
Unit	MW
Description	The amount of the installed capacity of newly added fuel-fired power plants of the North China Power Grid in the year 2009-2012
Source of data	*China Electric Power Yearbook* 2010~2013 edition
Value(s) applied	See Appendix 4 for details.
Choice of data or Measurement methods and procedures	The data obtained from the *China Electric Power Yearbook* issued by authorized entity in China are reliable.
Purpose of data	Applied for calculating BM
Additional comment	-

Data / Parameter	CAP_{Total}
Unit	MW
Description	The amount of incremental installed capacity of the North China Power Grid in the year 2009-2012
Source of data	*China Electric Power Yearbook* 2010~2013 edition
Value(s) applied	See Appendix 4 for details.
Choice of data or Measurement methods and procedures	The data obtained from the *China Electric Power Yearbook* issued by authorized entity in China are reliable.
Purpose of data	Applied for calculating BM
Additional comment	-

Data / Parameter	$FC_{i,j,y}$
Unit	t or m^3
Description	Consumption of fuel i of province j of province j of North China Power Grid in year y
Source of data	*China Energy Statistical Yearbook* 2011~2013 edition
Value(s) applied	See Appendix 4 for details.
Choice of data or Measurement methods and procedures	The data obtained from the *China Energy Statistical Yearbook* issued by authorized entity in China are reliable.

Purpose of data	Applied for calculating OM and BM
Additional comment	-

Data / Parameter	$FC_{adv,coal}$
Unit	gce/kWh
Description	Weighted average fuel consumption for power generation of top 20 sets of 600 MW~1,000 MW coal fired power generation units set up in 2012 (taken as efficiency level of the best technology commercially available in China)
Source of data	*2013 Baseline Emission Factors for Regional Power Grid in China* issued by China's DNA
Value(s) applied	307
Choice of data or Measurement methods and procedures	The data obtained from the *2014 Baseline Emission Factors for Regional Power Grid in China* issued by China's DNA are reliable.
Purpose of data	Applied for calculating BM
Additional comment	-

Data / Parameter	$FC_{adv,oil/gas}$
Unit	gce/kWh
Description	Weighted average fuel consumption for power generation of 390 MW oil/gas fired combined cycle power generation units (taken as efficiency level of the best technology commercially available in China)
Source of data	*2014 Baseline Emission Factors for Regional Power Grid in China* issued by China's DNA
Value(s) applied	232.3
Choice of data or Measurement methods and procedures	The data obtained from the *2014 Baseline Emission Factors for Regional Power Grid in China* issued by China's DNA are reliable.
Purpose of data	Applied for calculating BM
Additional comment	-

Data / Parameter	GWP_{CH4}
Unit	tCO_2e/tCH_4
Description	Global warming potential for methane valid for the relevant commitment period
Source of data	IPCC
Value(s) applied	25 for the second commitment period according to the decision 4/CMP.7. Shall be updated according to any future COP/MOP decisions.
Choice of data or Measurement methods and procedures	-
Purpose of data	Applied for calculating baseline emissions and project emissions
Additional comment	-

Data / Parameter	Biomass residues categories and quantities used for the selection of the baseline scenario selection and assessment of additionality

Unit	• Type ; • Source; • Fate in the absence of the project activity (Scenarios B); • Use in the project scenario (Scenarios P); • Quantity (tonnes on dry-basis)
Description	Refer to Table B-2 in section B.4
Source of data	Operation data according to the accepted revised PDD (Version 07)
Value(s) applied	See table below
Choice of data or Measurement methods and procedures	Operation data according to the accepted revised PDD (Version 07)
Purpose of data	Applied for calculating baseline emissions
Additional comment	-

Biomass residues category (*k*)	**Biomass residues type**	**Biomass residues source**	**Biomass residues fate in the absence of the project activity**	**Biomass residues use in project scenario**	**Biomass residues quantity (tonnes on dry-basis)**
1	Cotton stalk	Off-site from local farmers and retailers	Dumped (B1)	Electricity generation on-site (biomass-only boiler)	67,833
2	Wood residues	Off-site from wholesalers and retailers	Dumped (B1)	Electricity generation on-site (biomass-only boiler)	96,795
3	Wheat bran	Off-site from certain supplier	Dumped (B1)	Electricity generation on-site (biomass-only boiler)	12,498

B.6.3. Ex ante calculation of emission reductions

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B.6.3.1 Baseline emissions

B.6.3.1.1 Baseline emissions due to generation of electricity $BE_{EL,y}$

According to Section B.6.1, $EF_{BL,EL,y} = EF_{grid,CM,y}$= 0.6702 tCO_2e/MWh

$EG_{PJ,y}$ = 187,626 MWh

$BE_{EL,y} = EG_{PJ,y} \times EF_{BL,EL,y}$ = 187,626 MWh ×0.6702 tCO_2e/MWh = 125,746 tCO_2e

B.6.3.1.2 Baseline emissions due to uncontrolled burning or decay of biomass residues $BE_{BR,y}$

According to ACM0018 (Version 03.0), GWP_{CH4} = 25 tCO_2/tCH_4

$NCV_{n,y} \times EF_{BR,n,y}$ = 0.001971 t CH_4/ton

$\sum_n BR_{n,B1/B3,y}$ = $BF_{1,B1,y}$ + $BF_{2,B1,y}$ + $BF_{3,B1,y}$[7] = 67,833 + 96,795 + 12,498 = 177,126 ton

$BE_{BR,B1/B3,y} = GWP_{CH4} \times \sum_n BR_{n,B1/B3,y} \times NCV_{n,y} \times EF_{BR,n,y}$

= 25 tCO_2/tCH_4 ×0.001971 t CH_4/ton×177,126 ton = 8,727 tCO_2e

$BE_y = BE_{EL,y} + BE_{BR,y}$ = 125,746 tCO_2e + 8,727 tCO_2e = 134,473 tCO_2e

B.6.3.2 Project emissions

B.6.3.2.1 Determination of PE_{FFy}

The Project is estimated to consume 100t diesel a year, $FC_{i,j,y}$= 100 t

The $NCV_{diesel,y}$ is 43.3 GJ/t and $EF_{CO2,diesel,y}$is 0.0748tCO_2e/GJ as IPCC default value.

$PE_{FF,y} = \sum_i FC_{i,j,y} \times COEF_{i,y} = \sum_i FC_{i,j,y} \times (NCV_{i,y} \times EF_{CO2,i,y})$

= 100 t ×43.3 GJ/t ×0.0748tCO_2e/GJ = 324 tCO_2e

B.6.3.2.2 Determination of $PE_{EL,y}$

According to the accepted revised PDD (Version 07), $EC_{PJ,j,y}$ = 2,475 MWh

$EF_{EL,j,y} = EF_{grid,CM,y} =$ 0.6702 tCO_2e/MWh

$TDL_{j,y} = 20\%$

$PE_{EL,y} = \sum_j EC_{PJ,j,y} \times EF_{EL,j,y} \times (1 + TDL_{j,y})$

= 2,475 MWh ×0.6702 tCO_2e/MWh ×（1+20%）= 1,991 tCO_2e

B.6.3.2.3 Determination of $PE_{TR,y}$

$D_{f,m}$ 100 km

$FR_{f,m}$ = 247,506 t

$EF_{CO2,f}$ = 245 g CO_2 / t km for Heavy vehicles, and this is conservative.

$$PE_{TR,m} = \sum_f D_{f,m} \times FR_{f,m} \times EF_{CO2,f} \times 10^{-6}$$

= 100 km ×247,506 t ×245 g CO_2 / t km ×10^{-6} = 6,064 tCO_2e

B.6.3.2.4 Determination of $PE_{BR,y}$

According to ACM0018 (Version 03.0), GWP_{CH4} =25 $tCO_2/t\ CH_4$

$EF_{CH4,BR}$ = 0.0000411 tCH_4/GJ

$BR_{PJ,1,y}$= 67,833 t, $BR_{PJ,2,y}$= 96,795 t, $BR_{PJ,3,y}$= 12,498 t

$NCV_{1,y}$ = 13.71GJ/t, $NCV_{2,y}$ = 14.66GJ/t, $NCV_{3,y}$ = 11.87 GJ/t

$PE_{BR,y} = GWP_{CH4} \times EF_{CH4,BR} \times \sum_n BR_{PJ,n,y} \times NCV_{n,y}$

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[7] BF_1=Cotton straw; BF_2=Wood residues; BF_3=Wheat bran

= 25 tCO_2/t CH_4 ×0.0000411 tCH_4/GJ × (67,833 t×13.71GJ/t + 96,795 t ×14.66GJ/t + 12,498 t ×11.87 GJ/t) = 2,567 tCO_2e

$$PE_y = PE_{FF,y} + PE_{EL,y} + PE_{TR,y} + PE_{BR,y} + PE_{WW,y}$$

= 324 tCO_2e + 1,991 tCO_2e + 6,064 tCO_2e + 2,567 tCO_2e = 10,946 tCO_2e

B.6.3.3 Leakage

LE_y=*0* tCO_2e

Emission reductions are calculated as follows:

$ER_y = BE_y - PE_y - LE_y$ = 134,473 tCO_2e - 10,946 tCO_2e - 0 tCO_2e = 123,527 tCO_2e

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

Year	Baseline emissions (t CO_2e)	Project emissions (t CO_2e)	Leakage (t CO_2e)	Emission reductions (t CO_2e)
20/03/2015-19/03/2016	134,473	10,946	0	123,527
20/03/2016-19/03/2017	134,473	10,946	0	123,527
20/03/2017-19/03/2018	134,473	10,946	0	123,527
20/03/2018-19/03/2019	134,473	10,946	0	123,527
20/03/2019-19/03/2020	134,473	10,946	0	123,527
20/03/2020-19/03/2021	134,473	10,946	0	123,527
20/03/2021-19/03/2022	134,473	10,946	0	123,527
Total	**941,311**	**76,622**	**0**	**864,689**
Total number of crediting years	**7**			
Annual average over the crediting period	**134,473**	**10,946**	**0**	**123,527**

B.7. Monitoring plan

B.7.1. Data and parameters to be monitored

Data / Parameter	$EG_{facility,y}$
Unit	MWh
Description	Quantity of net electricity generation supplied by the project plant/unit to the grid in year *y*
Source of data	On-site measurements
Value(s) applied	187,626

Measurement methods and procedures	Use calibrated electricity meter(s) $EG_{facility,y} = EG_{PJ\ to\ GRID,y} - EG_{GRID\ to\ PJ,y}$ $EG_{PJ\ to\ GRID,y}$: Quantity of electricity supplied by the Project to the grid in year y; $EG_{GRID\ to\ PJ,y}$: Quantity of electricity delivered to the Project from the grid in year y. The accuracy level of the meter(s) is 0.5, and will be calibrated by qualified third party at least once a year according to relevant national standards.
Monitoring frequency	Data monitored continuously and aggregated as appropriate
QA/QC procedures	The consistency of metered electricity generation should be cross-checked with receipts from electricity sales and the quantity of fuels fired
Purpose of data	Applied for calculating baseline emissions
Additional comment	According to ACM0018 (Version 03.0), it is assumed that transmission and distribution losses in the electricity grid are not influenced significantly by the project activity and are therefore not accounted for, i.e.,$EG_{PJ,y} = EG_{PJ,gross,y} - EG_{PJ,aux,y}$. However, PPs decide to voluntarily consider the transmission and distribution losses in the electricity grid, which is more conservative. According to accepted revised PDD (Version 07) and the Power Purchase Agreement signed by the project owner and the grid company, bidirectional electricity meter installed at the local substation is used for monitoring the quantity of $EG_{PJ\ to\ GRID,y}$ and $EG_{GRID\ to\ PJ,y}$. The baseline emissions are calculated using the result of $EG_{PJ\ to\ GRID,y}$ minus $EG_{GRID\ to\ PJ,y}$, which is more conservative than using $EG_{PJ,gross,\ y}$ minus $EG_{PJ,aux,y}$, since the monitoring point is at the grid side and power imported from the grid is deducted.

Data / Parameter	Biomass residues categories and quantities used in the project activity
Unit	• Type; • Source; • Fate in the absence of the project activity (Scenario B); • Use in the project scenario (Scenario P); • Quantity (tonnes on dry-basis)
Description	Biomass residues categories and quantities used in the project activity
Source of data	On-site measurements

Value(s) applied	**Biomass residues category (*k*)** / **Biomass residues type** / **Biomass residues source** / **Biomass residues fate in the absence of the project activity** / **Biomass residues use in project scenario** / **Biomass residues quantity (tonnes on dry-basis)** 1 / Cotton stalk / Off-site from local farmers and retailers / Dumped (B1) and burnt (B3) / Electricity generation on-site (biomass-only boiler) / 67,833 2 / Wood residues / Off-site from wholesalers and retailers / Dumped (B1) / Electricity generation on-site (biomass-only boiler) / 96,795 3 / Wheat bran / Off-site from certain supplier / Dumped (B1) / Electricity generation on-site (biomass-only boiler) / 12,498
Measurement methods and procedures	Use weight meter(s). Adjust for the moisture content in order to determine the quantity of dry biomass. The accuracy of the weight meter(s) should be in line with national standard. The weight meter(s) will be calibrated periodically by qualified third party(ies) in line with national standard.
Monitoring frequency	Data monitored continuously and aggregated as appropriate
QA/QC procedures	Cross-check the measurements with an annual energy balance that is based on purchased quantities and stock changes
Purpose of data	Applied for calculating baseline emissions and project emissions
Additional comment	-

Value(s) applied (detail):

Biomass residues category (*k*)	Biomass residues type	Biomass residues source	Biomass residues fate in the absence of the project activity	Biomass residues use in project scenario	Biomass residues quantity (tonnes on dry-basis)
1	Cotton stalk	Off-site from local farmers and retailers	Dumped (B1) and burnt (B3)	Electricity generation on-site (biomass-only boiler)	67,833
2	Wood residues	Off-site from wholesalers and retailers	Dumped (B1)	Electricity generation on-site (biomass-only boiler)	96,795
3	Wheat bran	Off-site from certain supplier	Dumped (B1)	Electricity generation on-site (biomass-only boiler)	12,498

Data / Parameter	$BR_{n,B1/B3,y}$
Unit	tonnes on dry-basis
Description	Amount of biomass residues category *n* used in the project plant(s) included in the project boundary in year *y* for which B1 or B3 has been identified as the most plausible baseline scenario
Source of data	On-site measurements
Value(s) applied	see table below
Measurement methods and procedures	Use weight meter(s), the accuracy of the weight meter(s) should be in line with national standard. The weight meter(s) will be calibrated periodically by qualified third party(ies) in line with national standard. Adjust for the moisture content in order to determine the quantity of dry biomass
Monitoring frequency	Data monitored continuously and aggregated as appropriate
QA/QC procedures	Cross-check the measurements with an annual energy balance that is based on purchased quantities and stock changes
Purpose of data	Applied for calculating baseline emissions

Biomass residues category (*k*)	Biomass residues type	Biomass residues quantity (tonnes)
1	Cotton stalk	67,833
2	Wood residues	96,795
3	Wheat bran	12,498

Additional comment	The biomass residue quantities used should be monitored separately for (a) each type of biomass residue (e.g.) and each source (e.g. produced on-site, obtained from biomass residues suppliers, obtained from a biomass residues market, obtained from an identified biomass residues producer, etc.)

Data / Parameter	**For biomass residues categories for which scenarios B1, B2 or B3 is deemed a plausible baseline alternative, project participants shall demonstrate that this is a realistic and credible alternative scenario**
Unit	Tones
Description	• Quantity of available biomass residues of type n in the region; • Quantity of biomass residues of type n that are utilized (e.g. for energy generation or as feedstock) in the defined geographical region; • Availability of a surplus of biomass residues type n (which cannot be sold or utilized) at the ultimate supplier to the project and a representative.
Source of data	Surveys or statistics
Value(s) applied	(see table below)
Measurement methods and procedures	-
Monitoring frequency	At the validation stage for biomass residues categories identified ex ante, and always that new biomass residues categories are included during the crediting period.
QA/QC procedures	-
Purpose of data	-
Additional comment	-

Biomass residue type	Annual available amount (t)	Other use, excluding the Project (t)	The Project use (t)
Cotton stalk	966,614	204,070	90,215
Wood residues	1,226,463	316,150	140,630
Wheat bran	90,450	13,300	16,661

Data / Parameter	$EF_{BR,n,y}$
Unit	t CH_4/GJ
Description	CH_4 emission factor for uncontrolled burning of the biomass residues category *n* during the year *y*
Source of data	Default values in ACM0018 (Version 03.0)
Value(s) applied	To determine the CH_4 emission factor, project participants may undertake measurements or use referenced default values. In the absence of more accurate information, it is recommended to use 0.0027 tCH_4 per ton of biomass as default value for the product of NCV_k and $EF_{burning,CH4,k,y}$.[8] Considering the uncertainty of the CH_4 emission factor ($EF_{BR,n,y}$) is greater than 100 per cent, a conservativeness factor of 0.73 is applied. Thus, emission factor of 0.001971tCH_4/t biomass should be used.

[8] 2006 IPCC Guidelines, Volume 4, Table 2.5, default value for agricultural residues.

Measurement methods and procedures	-
Monitoring frequency	-
QA/QC procedures	-
Purpose of data	Applied for calculating baseline emissions
Additional comment	-

Data / Parameter	$FC_{i,j,y}$
Unit	Mass or volume unit per year (e.g. ton/yr or m^3/yr)
Description	Quantity of fuel type i combusted in process j during the year y
Source of data	On-site measurements
Value(s) applied	Diesel:100 ton/yr
Measurement methods and procedures	Use flow meter(s). The accuracy of the flow meter(s) should be in line with national standard. The flow meter(s) will be calibrated periodically by qualified third party(ies) in line with national standard.
Monitoring frequency	Continuously
QA/QC procedures	Cross-check the measurements with an annual energy balance that is based on purchased quantities and stock changes. The quantity shall be cross-checked with the quantity of fuel purchase receipts and stock changes. The volume quantity of diesel will be multiplied by density of diesel ρ_{diesel} to get the mass quantity of diesel. Where the purchased fuel invoices can be identified specifically for the CDM project, the metered fuel consumption quantities should also be cross-checked with available purchase invoices from the financial records.
Purpose of data	Applied for calculating project emissions
Additional comment	-

Data / Parameter	ρ_{diesel}
Unit	kg/liter
Description	Density of diesel
Source of data	The national standard “automobile diesel fuel GB 19147-2013” or other equivalent /substitutional standards
Value(s) applied	0.85
Measurement methods and procedures	-
Monitoring frequency	-
QA/QC procedures	Default value from national standards will be used and reviewed as appropriate
Purpose of data	Applied for calculating project emissions
Additional comment	-

Data / Parameter	$NCV_{i,y}$
Unit	GJ/mass or volume unit
Description	Net calorific value of the fossil fuel type i in year y

Source of data	IPCC default values at the upper limit of the uncertainty at a 95% confidence interval as provided in Table 1.2 of Chapter 1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories
Value(s) applied	Diesel: 43.3
Measurement methods and procedures	-
Monitoring frequency	Any future revision of the IPCC Guidelines should be taken into account
QA/QC procedures	-
Purpose of data	Applied for calculating project emissions
Additional comment	-

Data / Parameter	$EF_{CO2,i,y}$
Unit	tCO_2e/GJ
Description	CO2 emission factor for fossil fuel type *i* in year *y*
Source of data	IPCC default values at the upper limit of the uncertainty at a 95% confidence interval as provided in Table 1.2 of Chapter 1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories
Value(s) applied	Diesel: 0.0748
Measurement methods and procedures	-
Monitoring frequency	Any future revision of the IPCC Guidelines should be taken into account
QA/QC procedures	-
Purpose of data	Applied for calculating project emissions
Additional comment	-

Data / Parameter	$EC_{PJ,j,y}$
Unit	MWh
Description	Quantity of electricity consumed by the project electricity consumption source *j* in year *y*
Source of data	On-site measurements
Value(s) applied	2,475
Measurement methods and procedures	The electricity consumed for the preparation of the biomass residue in all collection stations is continuously measured by meters installed at the out-site collection stations. The accuracy level of the meters is 2.0, and will be calibrated periodically by qualified third party according to relevant national standards.
Monitoring frequency	Continuously
QA/QC procedures	
Purpose of data	Applied for calculating project emissions
Additional comment	

Data / Parameter	$TDL_{j,y}$
Unit	-
Description	Average technical transmission and distribution losses for providing electricity to source *j* in year *y*
Source of data	"Methodological Tool: Tool to calculate baseline, project and/or leakage emissions from electricity consumption" (Version 01)

Value(s) applied	20%
Measurement methods and procedures	Any future revision of the “Methodological Tool: Tool to calculate baseline, project and/or leakage emissions from electricity consumption” should be taken into account
Monitoring frequency	Annually.
QA/QC procedures	-
Purpose of data	Applied for calculating project emissions
Additional comment	-

Data / Parameter	$D_{f,m}$
Unit	km
Description	Return trip distance between the origin and destination of freight transportation activity *f* in monitoring period *m*
Source of data	Records of vehicle operator or records by project participants
Value(s) applied	100
Measurement methods and procedures	-
Monitoring frequency	Determined once for each freight transportation activity *f* for a reference trip using the vehicle odometer or any other appropriate sources. To be updated whenever the road distance changes.
QA/QC procedures	-
Purpose of data	Applied for calculating project emissions
Additional comment	-

Data / Parameter	$FR_{f,m}$
Unit	tonnes
Description	Total mass of freight transported in freight transportation activity *f* in monitoring period *m*
Source of data	Records by project participants or records by truck operators
Value(s) applied	247,506
Measurement methods and procedures	Use weight meters. Data monitored continuously and aggregated as appropriate. The accuracy of the weight meter(s) should be in line with national standard. The weight meter(s) will be calibrated periodically by qualified third party(ies) in line with national standard.
Monitoring frequency	Continuously
QA/QC procedures	-
Purpose of data	Applied for calculating project emissions
Additional comment	-

Data / Parameter	$EF_{CO2,f}$
Unit	g CO_2/t km
Description	Default CO_2 emission factor for freight transportation activity *f*
Source of data	Tool: Project and leakage emissions from transportation of freight, Version 01.1.0.
Value(s) applied	<table><tr><td>Vehicle class</td><td>Emission factor (g CO₂/t km)</td></tr><tr><td>Light vehicles</td><td>245</td></tr><tr><td>Heavy vehicles</td><td>129</td></tr></table>

Measurement methods and procedures	Any future revision of the “Methodological Tool: Project and leakage emissions from transportation of freight” should be taken into account.
Monitoring frequency	-
QA/QC procedures	-
Purpose of data	Applied for calculating project emissions
Additional comment	-

Data / Parameter	$BR_{PJ,n,y}$
Unit	tonnes on dry-basis
Description	Quantity of biomass residues of category *n* used in power plants which are located at the project site and included in the project boundary in year *y*
Source of data	On-site measurements
Value(s) applied	see table below
Measurement methods and procedures	Use weight meters. Adjust for the moisture content in order to determine the quantity of dry biomass The accuracy of the weight meter(s) should be in line with national standard. The weight meter(s) will be calibrated periodically by qualified third party(ies) in line with national standard.
Monitoring frequency	Data monitored continuously and aggregated as appropriate
QA/QC procedures	Cross-check the measurements with an annual energy balance that is based on purchased quantities and stock changes
Purpose of data	Applied for calculating project emissions
Additional comment	The biomass residue quantities used should be monitored separately for (a) each type of biomass residue (e.g.) and each source (e.g. produced on-site, obtained from biomass residues suppliers, obtained from a biomass residues market, obtained from an identified biomass residues producer, etc.)

Biomass residues category (*k*)	**Biomass residues type**	**Biomass residues source**	**Biomass residues quantity (tonnes)**
1	Cotton stalk	Off-site from local farmers and retailers	67,833
2	Wood residues	Off-site from wholesalers and retailers	96,795
3	Wheat bran	Off-site from certain supplier	12,498

Data / Parameter	$NCV_{n,y}$
Unit	GJ/tonnes on dry-basis
Description	Net calorific value of biomass residues of category *n* in year *y*
Source of data	On-site measurements
Value(s) applied	see table below

Biomass residues category (*k*)	Biomass residues type	NCV (GJ/t)
1	Cotton stalk	13.71
2	Wood residues	14.66
3	Wheat bran	11.87

Measurement methods and procedures	Measurements shall be carried out at reputed laboratories and according to relevant international standards. Measure the NCV on dry-basis
Monitoring frequency	At least every six months, taking at least three samples for each measurement
QA/QC procedures	Check the consistency of the measurements by comparing the measurement results with measurements from previous years, relevant data sources (e.g. values in the literature, values used in the national GHG inventory) and default values by the IPCC. If the measurement results differ significantly from previous measurements or other relevant data sources, conduct additional measurements. Ensure that the NCV is determined on the basis of dry biomass
Purpose of data	Applied for calculating project emissions
Additional comment	-

Data / Parameter	$EF_{CH4,BR}$
Unit	tCH_4/GJ
Description	CH_4 emission factor for the combustion of biomass residues in the project plant
Source of data	Default value in ACM0018 version 03.0
Value(s) applied	IPCC default value is used to determine the CH_4 emission factor, according to the IPCC default value provided in ACM0018, the CH_4 emission factor of combustion of biomass of wood waste 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.
Measurement methods and procedures	-
Monitoring frequency	-
QA/QC procedures	-
Purpose of data	Applied for calculating project emissions
Additional comment	-

Data / Parameter	Moisture content of the biomass residues
Unit	% water content
Description	Moisture content of each biomass residues type *k*
Source of data	On-site measurements
Value(s) applied	<table><tr><th>Biomass residues category (*k*)</th><th>Biomass residues type</th><th>Moisture (%)</th></tr><tr><td>1</td><td>Cotton stalk</td><td>24.81</td></tr><tr><td>2</td><td>Wood residues</td><td>31.17</td></tr><tr><td>3</td><td>Wheat bran</td><td>24.99</td></tr></table>
Measurement methods and procedures	Moisture content of the biomass residues is on site measured by moisture analyzer. The moisture analyzer will be calibrated once a year by qualified third party(ies) in line with national standard..
Monitoring frequency	The moisture content should be monitored for each batch of biomass of homogeneous quality. The weighted average should be calculated for each monitoring period and used in the calculations
QA/QC procedures	-
Purpose of data	Applied for calculating baseline emissions and project emissions

Additional comment	In case of dry biomass, monitoring of this parameter is not necessary

B.7.2. Sampling plan

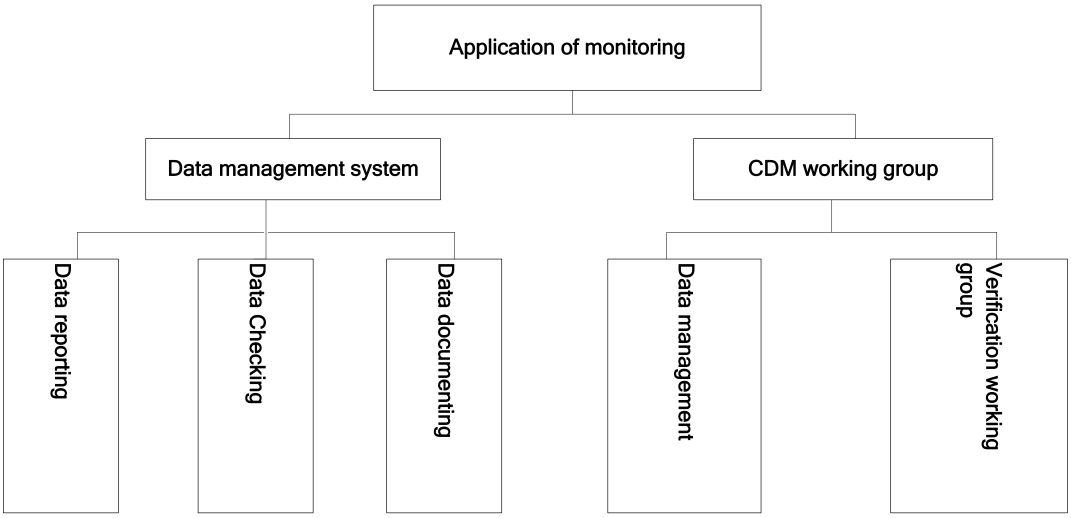
>>

Not applicable to the Project.

B.7.3. Other elements of monitoring plan

>>

The application of monitoring mainly includes two parts, data management system and CDM working group. The main framework is shown are shown below:



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, 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.

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 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 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 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 application of methodology and standardized baseline and contact information of responsible persons/ entities

>>
Date of completion: 30/07/2015
Entity: EDF Trading Limited
Email: cdm.team@edftrading.com

SECTION C. Duration and crediting period

C.1. Duration of project activity

C.1.1. Start date of project activity

>>

01/05/2006

C.1.2. Expected operational lifetime of project activity

>>

20 years 0 month

C.2. Crediting period of project activity

C.2.1. Type of crediting period

>>

The Project applies the renewable crediting period (7years×3). The first crediting period is from 20/03/2008 to 19/03/2015, and the second crediting period (requested) is from 20/03/2015 to 19/03/2022.

C.2.2. Start date of crediting period

>>

20/03/2015

C.2.3. Length of crediting period

7 years 0 month in the second crediting period

SECTION D. Environmental impacts

D.1. Analysis of environmental 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.

<u>Construction Phase</u>

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 NOx. 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/m3) of *Emission standard of air pollutants for thermal power plants* (GB13223-2003) Emission concentration of the Project	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 m3/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 m3, 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. Environmental impact assessment

>>

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

SECTION E. Local stakeholder consultation

E.1. Solicitation of comments from local stakeholders

>>

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 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			Structure of educational level			Structure of age		
Gender	Number	Percentage	Educational level	Number	Percentage	Age	Number	Percentage

		(%)
Male	49	83.05
Female	10	16.95
Left blank	0	0

		(%)
Senior high school and higher	11	18.64
Junior high school	38	64.41
Elementary school	6	10.17
Left blank	4	6.78

		(%)
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 consideration of 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[9], 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.[10]

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

[10] Environmental Impact Statement Form of the Project.

·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.

SECTION F. Approval and authorization

>>

The letter of approval from People's Republic of China (the host Party) for the project activity was obtained on 22/05/2007.

The letter of approval from the United Kingdom for the project activity was obtained on 06/06/2007.

- - - - -

Appendix 1. Contact information of project participants and responsible persons/ entities

Project participant and/or responsible person/ entity	☒ Project participant ☐ Responsible person/ entity for application of the selected methodology (ies) and, where applicable, the selected standardized baselines to the project activity
Organization name	National Bio Energy Co., Ltd.
Street/P.O. Box	No.1 Beishatan Deshengmenwai, Chaoyang District
Building	Old Administration Building
City	Beijing
State/Region	-
Postcode	100083
Country	P. R. China
Telephone	+86 10 58681511
Fax	+86 10 58681588
E-mail	wcl@nbe.cn
Website	
Contact person	
Title	CDM Project Manager
Salutation	Mr.
Last name	Wang
Middle name	-
First name	Chunli
Department	
Mobile	
Direct fax	+86 10 58681588
Direct tel.	+86 10 58681511
Personal e-mail	wcl@nbe.cn

Project participant and/or responsible person/ entity	☒ Project participant ☒ Responsible person/ entity for application of the selected methodology (ies) and, where applicable, the selected standardized baselines to the project activity
Organization name	EDF Trading Limited
Street/P.O. Box	80 Victoria Street
Building	Cardinal Place, 3rd Floor
City	London
State/Region	-
Postcode	SW1E5JL
Country	United Kingdom
Telephone	+44 207 061 4000
Fax	+44 207 061 5000
E-mail	cdm.team@edftrading.com
Website	
Contact person	Francois Joubert

Title	Executive Vice President
Salutation	Mr.
Last name	Joubert
Middle name	-
First name	Francois
Department	-
Mobile	-
Direct fax	+44 207 061 5000
Direct tel.	+44 207 061 4000
Personal e-mail	cdm.team@edftrading.com

Appendix 2. Affirmation regarding public funding

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

Appendix 3. Applicability of methodology and standardized baseline

Please refer to B.2. in the PDD.

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

To determine the simple OM emission factor ($EF_{OM,y}$) and the Build Margin emission factor ($EF_{BM,y}$) for the Project, data recommended in the *2014 Baseline Emission Factors for Regional Power Grid in China* issued by China's DNA are adopted.

The following tables summarise the numerical results from the equations listed in the *Tool to calculate the emission factor for an electricity system*. Information provided by the tables includes data, data sources and the underlying calculations.

Table A1. Thermal power generation of North China Power Grid in 2010

	Electricity generation (MWh)	Auxiliary electricity consumption (%)	Electricity delivered to the grid (MWh)
Beijing	26,300,000	6.2	24,669,400
Tianjin	55,600,000	6.63	51,913,720
Hebei	199,800,000	6.73	186,353,460
Shanxi	210,800,000	8.03	193,872,760
Inner Mongolia	240,700,000	7.74	222,069,820
Shandong	306,400,000	6.98	285,013,280
Total	1,039,600,000		963,892,440

Data source: China Electric Power Yearbook 2011.

Table A2. Thermal power generation of North China Power Grid in 2011

	Electricity generation (MWh)	Auxiliary electricity consumption (%)	Electricity delivered to the grid (MWh)
Beijing	25,800,000	6	24,252,000
Tianjin	61,200,000	6.4	57,283,200
Hebei	215,100,000	6.5	201,118,500
Shanxi	229,600,000	8	211,232,000
Inner Mongolia	288,900,000	7.6	266,943,600
Shandong	312,900,000	6.8	291,622,800
Total	1,133,500,000		1,052,452,100

Data source: China Electric Power Yearbook 2012.

Table A3. Thermal power generation of North China Power Grid in 2012

	Electricity generation (MWh)	Auxiliary electricity consumption (%)	Electricity delivered to the grid (MWh)
Beijing	28,300,000	5.4	26,771,800
Tianjin	58,200,000	6.3	54,533,400
Hebei	217,800,000	6.4	203,860,800
Shanxi	245,400,000	7.6	226,749,600
Inner Mongolia	302,900,000	7.4	280,485,400
Shandong	324,100,000	5.7	305,626,300
Total	1,176,700,000		1,098,027,300

Data source: China Electric Power Yearbook 2013.

Table A4. Calculation of the simple operating margin emission factor of North China Power Grid in 2010

Energy	Unit	Beijing	Tianjin	Hebei	Shanxi	Inner Mongolia	Shandong	Total	Effective Carbon Emission Factor	Oxidation Rate	Fuel Emission factor	NCV	CO_2Emission（tCO_2e）
									（tc/TJ）	（%）	($kgCO_2$/TJ)	（MJ/t, m^3）	L=G×J×K/100000(mass unit)
		A	B	C	D	E	F	G=A+B+C+D+E+F	H	I	J	K	L=G×J×K/10000 (volume unit)
Raw coal	10^4t	688.66	2499.57	8896.45	9347.83	13864.67	13605.64	48,902.82	25.8	100	87,300	20,908	892,607,720
Cleaned coal	10^4t						0.87	0.87	25.8	100	87,300	26,344	20,009
Other washed coal	10^4t	5.38		131.11	620.21	88.54	646.71	1,491.95	25.8	100	87,300	8,363	10,892,576
Briquetted coal	10^4t	1.53					41.98	43.51	26.6	100	87,300	20,908	794,174
Coke	10^4t							0.00	29.2	100	95,700	28,435	0
Gangue	10^4t			252.29	2120.95	601.17	898.03	3,872.44	25.8	100	87,300	8363	28,272,293
Coke oven gas	10^8m^3	0.04	1.75	17.20	20.41	4.40	11.86	55.66	12.1	100	37,300	16726	3,472,515
Blast Furnace Gas	10^8m^3	12.89	18.53	295.02	41.74	49.56	203.79	621.53	70.8	100	219,000	3763	51,220,101
Converter Gas	10^8m^3			8.48	0.07			8.55	46.9	100	145,000	7945	984,981
Other coal gas	10^8m^3							0.00	12.1	100	37,300	5,227	0
Raw oil	10^4t							0.00	20	100	71,100	41,816	0
Gasoline	10^4t							0.00	18.9	100	67,500	43,070	0

Diesel	10^4t	0.10	2.27			0.55	2.66	5.58	20.2	100	72,600	42,652	172,787
Fuel oil	10^4t	0.49		0.17		0.01	3.24	3.91	21.1	100	75,500	41,816	123,443
Naphtha	10^4t							0.00	20.2	100	72,600	43,906	0
Lubricants	10^4t							0.00	20	100	71,900	41,398	0
Paraffin Waxes	10^4t							0.00	20	100	72,200	39,934	0
White Spirit	10^4t							0.00	20	100	72,200	42,945	0
Bitumen Asphalt	10^4t							0.00	21	100	69,300	38,931	0
Petroleum Coke	10^4t	6.97	12.47				2.82	22.26	26.6	100	82,900	31947	589,535
LPG	10^4t							0.00	17.2	100	61,600	50,179	0
Refinery gas	10^4t	1.37			2.12		2.41	5.90	15.7	100	48,200	46,055	130,971
Natural gas	10^8m^3	16.08	0.57	0.22	6.16	0.18	0.16	23.37	15.3	100	54,300	38,931	4,940,309
Other petroleum products	10^4t	0.85					28.14	28.99	20	100	72,200	41,816	875,241
Other coke products	10^4t			7.99			3.40	11.39	25.8	100	95,700	28,435	309,948
Other energy	10^4t Ce	20.42	17.07	45.53	34.66	20.80	38.56	177.04	0	0	0	0	0
Total emission of North China Power Grid (tCO_2e)													995,406,604

Data source: China Energy Statistical Yearbook 2011

Table A5. Calculation of the simple operating margin emission factor of North China Power Grid in 2011

Energy	Unit	Beijing	Tianjin	Hebei	Shanxi	Inner Mongolia	Shandong	Total	Effective Carbon Emission	Oxidation Rate	Fuel Emission factor	NCV	CO_2 Emission （tCO_2e）

									Factor				
									（tc/TJ）	（%）	($kgCO_2$/TJ)	（MJ/t, m^3）	L=G×J×K/100000(mass unit)
		A	B	C	D	E	F	G=A+B+C+D+E+F	H	I	J	K	L=G×J×K/10000 (volume unit)
Raw coal	10^4t	680.97	2828.45	10070.31	10326.00	18998.38	13784.68	56,688.79	25.8	100	87,300	20,908	1,034,722,570
Cleaned coal	10^4t				11.93	2.84	1.67	16.44	25.8	100	87,300	26,344	378,092
Other washed coal	10^4t			85.86	642.47	185.09	724.81	1,638.23	25.8	100	87,300	8,363	11,960,552
Briquetted coal	10^4t	1.23					32.34	33.57	26.6	100	87,300	20,908	612,743
Gangue	10^4t			279.36	2101.12	896.55	960.13	4,237.16	25.8	100	87,300	8,363	30,935,077
Coke oven gas	10^8m^3		1.52	18.47	22.01	6.00	15.55	63.55	12.1	100	37,300	16,726	3,964,756
Blast Furnace Gas	10^8m^3		16.08	298.60	36.90	60.32	159.41	571.31	70.8	100	219,000	3,763	47,081,486
Converter Gas	10^8m^3		1.75	10.62	1.02		12.69	26.08	46.9	100	145,000	7,945	3,004,481
Other coal gas	10^8m^3						0.53	0.53	12.1	100	37,300	5,227	10,333
Diesel	10^4t	0.09		1.96		0.56	1.76	4.37	20.2	100	72,600	42,652	135,319
Fuel oil	10^4t	0.25		0.08		0.02	1.68	2.03	21.1	100	75,500	41,816	64,089
Petroleum Coke	10^4t	5.87	15.42				13.63	34.92	26.6	100	82,900	31,947	924,823
LPG	10^4t	0.01						0.01	17.2	100	61,600	50,179	309
Refinery gas	10^4t	0.41	0.02	2.02			3.27	5.72	15.7	100	48,200	46,055	126,975
Natural gas	10^8m^3	15.70	0.57	0.15	5.85	0.12	0.13	22.52	15.3	100	54,300	38,931	4,760,623
Other	10^4t	0.87		2.32			4.91	8.10	20	100	72,200	41,816	244,548

petroleum products													
Other coke products	10^4t			9.81			1.29	11.10	25.8	100	95,700	28,435	302,056
Other energy	10^4t Ce	18.56	14.29	60.70	65.98	12.63	53.00	225.16	0	0	0	0	0
Total emission of North China Power Grid (tCO_2e)													1,139,228,834

Data source: China Energy Statistical Yearbook 2012

Table A6. Calculation of the simple operating margin emission factor of North China Power Grid in 2012

Energy	Unit	Beijing	Tianjin	Hebei	Shanxi	Inner Mongolia	Shandong	Total	Effective Carbon Emission Factor	Oxidation Rate	Fuel Emission factor	NCV	CO_2Emission （tCO_2e）
									（tc/TJ）	（%）	($kgCO_2$/TJ)	（MJ/t, m^3）	L=G×J×K/100000(mass unit)
		A	B	C	D	E	F	G=A+B+C+D+E+F	H	I	J	K	L=G×J×K/100000 (volume unit)
Raw coal	10^4t	649.56	2746.38	9577.14	10836.33	20226.39	13276.35	57,312.15	25.8	100	87,300	20,908	1,046,100,563
Cleaned coal	10^4t				16.23	1.06	5.52	22.81	25.8	100	87,300	26,344	524,591
Other washed coal	10^4t			89.04	694.67	34.20	2085.85	2,903.76	25.8	100	87,300	8,363	21,200,058
Briquetted coal	10^4t	1.48					31.03	32.51	26.6	100	87,300	20,908	593,395
Gangue	10^4t			170.44	2049.50	611.56	591.26	3,422.76	25.8	100	87,300	8,363	24,989,225
Coke oven gas	10^8m^3		1.10	17.46	20.31	6.14	16.94	61.95	12.1	100	37,300	16,726	3,864,935
Blast Furnace Gas	10^8m^3		11.69	322.33	44.80	50.72	231.53	661.07	70.8	100	219,000	3,763	54,478,580

Converter Gas	10^8m^3		2.33	18.11	1.27		17.09	38.80	46.9	100	145,000	7,945	4,469,857
Other coal gas	10^8m^3						0.74	0.74	12.1	100	37,300	5,227	14,428
Other coke products	10^4t			13.43			3.35	16.78	25.8	100	95,700	28,435	456,622
Raw oil	10^4t		8.12			0.05		8.17	20	100	71,100	41,816	242,904
Gasoline	10^4t						0.01	0.01	18.9	100	67,500	43,070	291
Diesel	10^4t	0.10		1.32		0.71	2.06	4.19	20.2	100	72,600	42,652	129,745
Fuel oil	10^4t	0.13		0.03		0.01	0.50	0.67	21.1	100	75,500	41,816	21,153
Petroleum Coke	10^4t	5.69	17.43				15.57	38.69	26.6	100	82,900	31,947	1,024,668
Refinery gas	10^4t	0.48	0.03	0.60			2.03	3.14	15.7	100	48,200	46,055	69,703
Other petroleum products	10^4t	0.60		2.26			0.10	2.96	20	100	72,200	41,816	89,366
Natural gas	10^8m^3	21.22	0.61	0.27	5.21	0.13	0.13	27.57	15.3	100	54,300	38,931	5,828,169
Other energy	10^4t Ce	19.67	12.65	121.97	85.54	45.49	60.96	346.28	0	0	0	0	0
Total emission of North China Power Grid (tCO_2e)													1,164,098,254

Data source: China Energy Statistical Yearbook 2013

Table A7. Power import by North China Power Grid from 2009 to 2012

	2010	2011	2012
Net electricity import from Northeast China Grid (MWh)	8,815,880	10,045,670	10,926,140
Emission factor of Northeast China Grid (tCO_2e/MWh)	1.10570	1.15460	1.1225
Net electricity import from Northwest China Grid (MWh)	2,048,870	25,697,020	27,079,710
Emission factor of Northwest China Grid (tCO_2e/MWh)	0.9853	0.94040	0.9546
Total Power supply of North China Power Grid(MWh)	1,007,173,074	1,174,993,042	1,202,213,138
Total emission of North China Power Grid (tCO_2e)	974,757,190	1,088,194,790	1,136,033,150
Emission Factor of North China Power Grid (tCO_2e/MWh)	1.0333	1.0798	1.0583

Based on the data provided in Table A1~A7, the operating margin emission factor of North China Power Grid is **1.0580** tCO_2e/MWh.

Table A8. Data and results of Step a in Section B.6.

		Beijing	Tianjin	Hebei	Shanxi	Inner Mongolia	Shandong	Total	NCV	Emission Factor	CO_2 Emissions（tCO2e）
Fuel Type	Unit	A	B	C	D	E	F	G=A+B+C+D+E+F	H	I	J=G×H×I/100000 (mass unit), J=G×H×I /10000 (volume unit)
Raw coal	10^4t	649.56	2746.38	9577.14	10836.33	20226.39	13276.35	57,312.15	20,908	87,300	1,046,100,563
Cleaned coal	10^4t				16.23	1.06	5.52	22.81	26,344	87,300	524,591
Other washed coal	10^4t			89.04	694.67	34.20	2085.85	2,903.76	8,363	87,300	21,200,058
Briquetted coal	10^4t	1.48					31.03	32.51	20,908	87,300	593,395
Gangue	10^4t			170.44	2049.50	611.56	591.26	3,422.76	8,363	87,300	24,989,225
Other coke products	10^4t			13.43			3.35	16.78	28,435	95,700	456,622
Sub-total											1,093,864,455
Raw oil	10^4t		8.12			0.05		8.17	41,816	71,100	242,904
Gasoline	10^4t						0.01	0.01	43,070	67,500	291
Diesel	10^4t	0.10		1.32		0.71	2.06	4.19	42,652	72,600	129,745
Fuel oil	10^4t	0.13		0.03		0.01	0.50	0.67	41,816	75,500	21,153
Petroleum Coke	10^4t	5.69	17.43				15.57	38.69	31,947	82,900	1,024,668
Other petroleum products	10^4t	0.60		2.26			0.10	2.96	41,816	72,200	89,366
Sub-total											1,508,126
Coke oven gas	10^8m^3		1.10	17.46	20.31	6.14	16.94	61.95	16,726	37,300	3,864,935
Blast Furnace Gas	10^8m^3		11.69	322.33	44.80	50.72	231.53	661.07	3,763	219,000	54,478,580

Converter Gas	10^8m^3		2.33	18.11	1.27		17.09	38.80	7,945	145,000	4,469,857
Other coal gas	10^8m^3						0.74	0.74	5,227	37,300	14,428
Refinery gas	10^4t	0.48	0.03	0.60			2.03	3.14	46,055	48,200	69,703
Natural gas	10^8m^3	21.22	0.61	0.27	5.21	0.13	0.13	27.57	38,931	54,300	5,828,169
Sub-total											68,725,673
Other energy	10^4tCe	19.67	12.65	121.97	85.54	45.49	60.96	346.28	0	0	0
Total											1,164,098,254

Calculated with the data provided in Table A8 and formula (5)~(6), the value of $\lambda_{Coa,yl}$ is 93.97%, the value of $\lambda_{Oil,y}$ is 0.13% and the value of $\lambda_{Gas,y}$ is 5.90%.

	$FC_{adv, coal/oil/gas}$ (%)	Emission factor of fossil fuel ($kgCO_2/TJ$)	Emission factor (tCO_2/MWh)
	A	B	C=3.6/A/10,000×B
$EF_{Coal,Adv,y}$	40.03	87,300	0.7851
$EF_{Oil,Adv,y}$	52.90	75,500	0.5138
$EF_{Gas,Adv,y}$	52.90	54,300	0.3695

Therefore,

$$EF_{Thermal,y} = \lambda_{Coal,y} \times EF_{Coal,Adv,y} + \lambda_{Oil,y} \times EF_{Oil,Adv,y} + \lambda_{Gas,y} \times EF_{Gas,Adv,y} = 0.76022\ tCO_2e/MWh$$

Table A9. Installed capacity of the North China Power Grid in 2012

Installed Capacity	Unit	Beijing	Tianjin	Hebei	Shanxi	Inner Mongolia	Shandong	Total
Coal	MW	6,140	11,100	39,990	50,110	68,180	60,190	235,710
Hydro	MW	1,020	5	1,790	2,430	1,077	1,080	7,402
Nuclear	MW	-	-	-	-	-	-	-
Other(wind)	MW	150	232	6,900	2,007	3,886	17,140	30,315
Total	MW	7,310	11,337	48,680	54,547	73,143	78,410	273,427

Source: China Electric Power Yearbook 2013

Table A10. Installed capacity of the North China Power Grid in 2011

Installed Capacity	Unit	Beijing	Tianjin	Hebei	Shanxi	Inner Mongolia	Shandong	Total
Coal	MW	5,140	10,830	38,100	46,510	59,550	64,480	224,610
Hydro	MW	1,050	10	1,790	2,430	850	1,069	7,199
Nuclear	MW	-	-	-	-	-	-	-
Other(wind)	MW	150	130	4,617	927	14,657	2,497	22,978
Total	MW	6,340	10,970	44,507	49,867	75,057	68,046	254,787

Source: China Electric Power Yearbook 2012

Table A11. Installed capacity of the North China Power Grid in 2010

Installed Capacity	Unit	Beijing	Tianjin	Hebei	Shanxi	Inner Mongolia	Shandong	Total
Coal	MW	5,140	10,910	36,640	42,100	54,020	60,020	208,830
Hydro	MW	1,050	10	1,790	1,820	850	1,070	6,590
Nuclear	MW	-	-	-	-	-	-	-
Other(wind)	MW	110	30	3,720	370	9,730	1,399	15,359
Total	MW	6,300	10,950	42,150	44,290	64,600	62,489	230,779

Source: China Electric Power Yearbook 2011

Table A12. Installed capacity of the North China Power Grid in 2009

Installed Capacity	Unit	Beijing	Tianjin	Hebei	Shanxi	Inner Mongolia	Shandong	Total
Coal	MW	5,120	10,030	35,140	39,150	48,300	58,860	196,600
Hydro	MW	1,050	10	1,790	1,610	830	1,060	6,350
Nuclear	MW	0	0	0	0	0	0	-
Other(wind)	MW	50	0	1,360	120	6,420	860	8,810
Total	MW	6,220	10,040	38,290	40,880	55,550	60,780	211,760

Source: China Electric Power Yearbook 2010

Table A13. Calculation of BM emission factor of North China Power Grid

	Installation in year 2009	Installation in year 2010	Installation in year 2011	Installation in year 2012	New Additions from 2009 to 2012*	New Additions from 2010 to 2012*	New Additions from 2011to 2012*	The portion of Capacity Additions 2009-2012
Thermal Power （MW）	196,600	208,830	224,610	235,710	50,248	31,135	11,100	71.17%
Hydro Power （MW）	6,350	6,590	7,199	7,402	-1,148	212	203	-1.63%
Nuclear Power （MW）	0	0	0	0	0	0	0	0.00%
Wind Power and Others （MW）	8,810	15,359	22,978	30,315	21,505	14,956	7,337	30.46%
Total（MW）	211,760	230,779	254,787	273,427	70,605	46,303	18,640	100.00%
Percentage compared with installation of 2012					25.82%	16.93%	6.82%	

$EF_{grid,BM,y}$ = 0.76022×71.17%=0.5410 tCO_2/MWh

$EF_{grid,CM,y} = 0.25 \times EF_{grid,OM,y} + 0.75 \times EF_{grid,BM,y}$ =0.25×1.0580+0.75×0.5410=0.6702(tCO_2e/MWh).

The value of parameters above that are not monitored throughout the second crediting period are based on the most recent data source available at the time of submission of the PDD.

Appendix 5. Further background information on monitoring plan

Please refer to B.7.3.

Appendix 6. Summary of post registration changes

Two permanent changes from project description in registered PDD occurred during the project actual activities, include:

Change 1: three types of biomass residues (cotton stalk, wood residues and wheat bran) have been applied to the Project;

Change 2: higher power generation.

These changes described in the revised PDD version 7 have been approved by EB on 02/03/2012.

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Document information

Version	*Date*	*Description*
06.0	9 March 2015	Revisions to: • Include provisions related to statement on erroneous inclusion of a CPA; • Include provisions related to delayed submission of a monitoring plan; • Provisions related to local stakeholder consultation; • Provisions related to the Host Party; • Editorial improvement.
05.0	25 June 2014	Revisions to: • Include the Attachment: Instructions for filling out the project design document form for CDM project activities (these instructions supersede the "Guidelines for completing the project design document form" (Version 01.0)); • Include provisions related to standardized baselines; • Add contact information on a responsible person(s)/ entity(ies) for the application of the methodology (ies) to the project activity in B.7.4 and Appendix 1; • Change the reference number from *F-CDM-PDD* to *CDM-PDD-FORM;* • Editorial improvement.
04.1	11 April 2012	Editorial revision to change version 02 line in history box from Annex 06 to Annex 06b
04.0	13 March 2012	Revision required to ensure consistency with the “Guidelines for completing the project design document form for CDM project activities” (EB 66, Annex 8).
03.0	26 July 2006	EB 25, Annex 15

Version	*Date*	*Description*
02.0	14 June 2004	EB 14, Annex 06b
01.0	03 August 2002	EB 05, Paragraph 12 Initial adoption.

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