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

CONTENTS

Annexes

SECTION A. General description of project activity

A.1 Title of the project activity:

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Title: Shenmu County Hengsheng Coal Chemical Co., Ltd. 30MW Semi-coke Waste Gas Power Generation Project
Version: 02
Date: 21/10/2010

PDD Version 01	12/12/2009	PDD for GSP
PDD Version 02	21/10/2010	Revised PDD for Registration

A.2. Description of the project activity:

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Shenmu County Hengsheng Coal Chemical Co., Ltd. 30MW Semi-coke Waste Gas Power Generation Project (hereinafter referred to as "the proposed project") is located in the plant area of Shenmu County Hengsheng coal chemical Industry Co., Ltd. (hereinafter referred to as "Hengsheng Company") in Shenmu County, Shaanxi Province. The purpose of the proposed project is to recover waste tail gas from the semi-coke plant for electricity generation which will be delivered to Northwest China Power Grid.

The semi-coke plant, consisting of 18 smaller semi-coke facilities, has an annual production capacity of 900,000 tonnes and it was an existing plant. In the pre-project situation, the semi-coke plant generated $4.35*10^8$ Nm^3 per year, which was flared and released to the atmosphere previous to the proposed project.

In the absence of the proposed project, the remaining waste gas was released to the atmosphere after incineration because of its low heat value and the electricity was supplied by the Northwest China Power Grid. The baseline scenario identified in the section B.4 is that the waste gas is flared and released to the atmosphere and the power is provided by the Northwest China Power Grid, which is the same as the pre-project situation.

The Hengsheng Company is mainly engaged in semi-coke production. In the proposed project, it is supposed to consume $4.16*10^8$ Nm^3 waste gas from the semi-coke plant annually.The proposed project activity involves installation of two 75t/h gas-fired boilers, two 15MW condensing steam turbines and generators. The waste gas from the semi-coke plant is transformed into steam in two gas-fired boilers and generates power by two condensing steam turbines & generators. The electricity generated is supplied to the Yulin power grid, which is connected to the Northwest China Power Grid through Shaanxi power grid. Thus, the implementation of the project activity will supply 153.0GWh electricity to the Northwest China Power Grid per year, resulting in estimated emission reductions of 127,594tCO_2e/a.

Contribution to sustainable development:

1. Promoting the utilization of waste energy, reducing the discharge of waste coal gas, and the heat pollution;
2. Reducing dependence on fossil fuels and the pollution on atmosphere caused by waste gas;
3. Leading to 105[1] job opportunities increment by the project during operation phase;

[1] The source of data for the estimated number of jobs to be created is the FSR.
*All the data cited in the PDD is derived from the FSR unless otherwise specified.

4. Prompting the spread and deployment of waste gas based power generation technology.

A.3. Project participants:

>>**Table A.1 Project Participants**

Name of Party involved (*) ((host) indicates a host Party)	Private and/or public entity(ies) project participants (*) (as applicable)	Kindly indicate if the Party involved wishes to be considered as project participant (Yes/No)
People's Republic of China (host)	Shenmu County Hengsheng Coal Chemical Co., Ltd. (private entity)	No
United Kingdom of Great Britain and Northern Ireland	Endesa Carbono S.L. (private entity)	No

(*) In accordance with the CDM modalities and procedures, at the time of making the CDM-PDD public at the stage of validation, a Party involved may or may not have provided its approval. At the time of requesting registration, the approval by the Party(ies) involved is required.

A.4. Technical description of the project activity:

A.4.1. Location of the project activity:

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A.4.1.1. Host Party(ies):

>>People's Republic of China

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

>>Shaanxi Province

A.4.1.3. City/Town/Community etc:

>>Ningtiaota Industry Zone, Sunjiacha Town, Shenmu County

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

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The project activity is located in the Ningtiaota Industry Zone, Sunjiacha Town, Shenmu County, P. R. China. The latitude is N39°00'12", and the longitude is E110°14'55". The maps below show the location of the project activity.

Figure 1: The location of the Shaanxi Province in China

Figure 2 the proposed project activity in Shenmu County

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

>>The project activity falls into Sectoral Category 1: Energy Industries and Scope 4, Manufacture Industry.

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

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- **The scenario existing prior to the start of the implementation of the project activity**

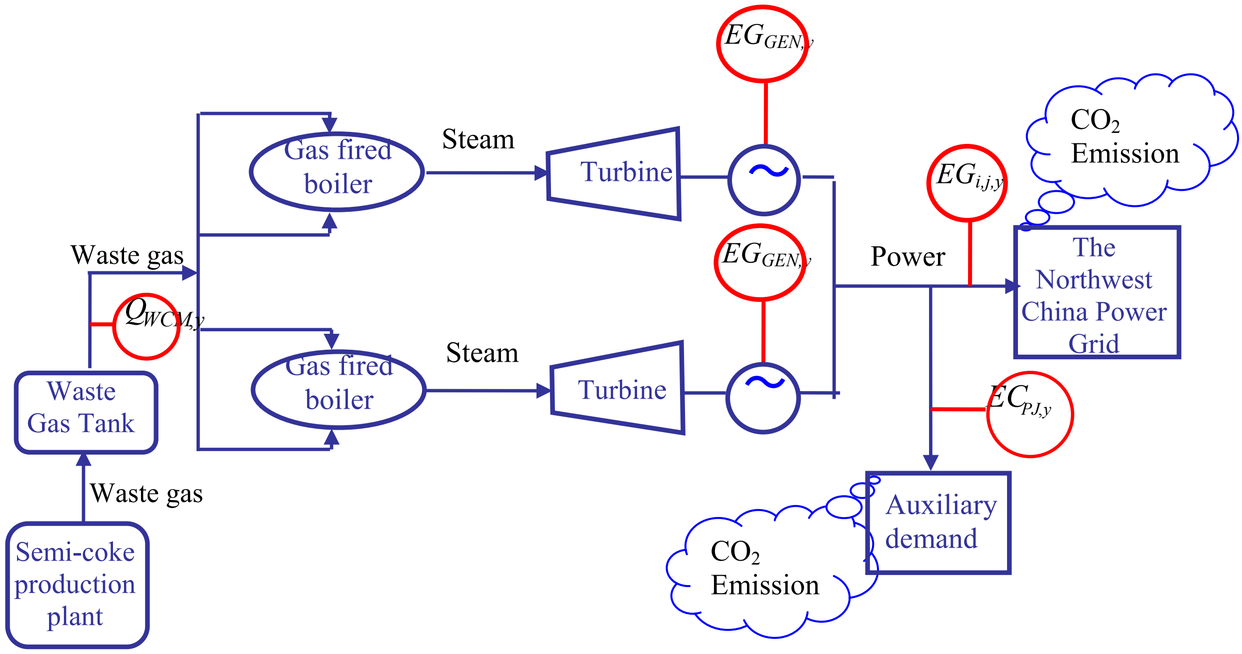
The semi-coke plant with an annual production capacity of 900,000 tonnes is an existing plant. The semi-coke plant generated about $4.35*10^8$ Nm^3 per year, which was flared and released to the atmosphere in the pre-project situation.

- **The baseline scenario**

In the baseline scenario, all the waste gas was released to the atmosphere after incineration, and the equivalent amount of electricity that would be supplied by the proposed project was provided from the Northwest China Grid which is dominated by fossil fuel based plants, as identified in the section B.4.

- **The scope of activities/ measures that are being implemented within the project activity**

The proposed project activity recovers waste gas from semi-coke plant for power generation and the electricity generated will be exported to the Northwest China Power Grid. The waste gas from semi-coke production process is diverted by an overhead pipeline from the tail gas outlet into the main pipe outside the boiler room, and then it is transported into the boiler by the branch pipe as fuel gas. The project activity involves the installation of two 75t/h boilers and two 15MW condensing turbine& generators which will combust about $4.16*10^8$ Nm^3 waste gas per year (hereafter referred to as SCG is abbreviation for semi-coke gas). The net electricity supply of the Project is estimated to be 153.00GWh per year. The electricity will be supplied to the Yulin Power Grid through the transformer. The Yulin power grid is the sub-grid of the Northwest Power Grid. In the monitoring process, flow meters will be installed at the exit of the waste gas tank to measure the waste gas recovered. And electricity meters will be installed to measure the power generation, the auxiliary power consumption and the net electricity exported to the Grid separately (see the detail in section B.7). The main emissions sources are from the supplemental electricity consumption and the greenhouse gases is CO_2.



- **Energy and mass flows:**

According to the gas balance conducted by an accredited third party entity, the semi-coke facility generated 4.35*10^8 Nm^3 waste gas per year with the calorific value of 7524kJ/Nm^3, which was flared to the atmosphere in the pre-project situation, will be recovered and transmitted to the waste gas power plant for generating power with the operating time of 6000 hours under the proposed project activity.

The key technical indicators of the gas fired boiler, turbine and generator are listed in Table A.2. All the boilers, turbines and generators are made in China. Some initial training involves operation and maintenance of the power generating equipment such as boilers, turbines, generators, cooling systems and other equipments will be carried out before the implement of the project (see the detail in section B.7). The implementation of the project will demonstrate and promote the application of waste gas based power generation technology in China.

Table A.2. Key technical indicators of the main equipments

Boiler	**Turbine**	**Generator**
Model type: NG-75/3.82-Q Rated steam generation capacity: 75 t/h Rated steam pressure: 3.82 MPa Rated steam temperature: 450℃ Lifetime: 15 years Age: 0 year Annual running time: 6000h	Type: Condensing turbine Model type: N15-3.43 Rated power: 15MW Intake steam temperature: 435℃ Intake steam pressure: 3.43 MPa Lifetime: 15 years Age: 0 year Annual running time: 6000h	Model type: QF-15-2 Rated power: 15MW Rated Voltage: 10.5KV Lifetime: 15 years Age: 0 year Annual running time: 6000h

All the technology employed is the domestic technology and there is no technology transfer.

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

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The proposed project activity chooses the fixed crediting period and the crediting period of the proposed project activity is from January 1st 2011 to December 31st 2020. The Table A.3 shows the estimated amount of emission reductions over the crediting period.

Table A.3 Estimated amount of emission reductions

Years	**Annual estimation of emission reductions in tonnes of CO2e**
Year 2011	127,594
Year 2012	127,594
Year 2013	127,594
Year 2014	127,594
Year 2015	127,594
Year 2016	127,594
Year 2017	127,594
Year 2018	127,594
Year 2019	127,594
Year 2020	127,594
Total estimated reductions (tonnes of CO2e)	1,275,940

Total number of crediting years	10
Annual average over the crediting period of estimated reductions (tonnes of CO_2e)	127,594

A.4.5. Public funding of the project activity:

>>No public funding from Annex 1 is involved in the project activity.

SECTION B. Application of a baseline and monitoring methodology

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

>>
The methodology applied to the Project is ACM0012 "Consolidated baseline methodology for GHG emission reductions from waste energy recovery projects (ACM0012 version 03.2)"
http://cdm.unfccc.int/UserManagement/FileStorage/0M4N9567GH1J7UAJ89YNQ299K1MYSI

The grid emission factor is calculated using the "Tool to calculate the emission factor for an electricity system" (Version 02)
http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v2.pdf

The "Tool for the demonstration and assessment of additionality (version 05.2)" are also applied to the project as required by the methodology ACM0012 version 03.2).
http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v5.2.pdf

More information could be found at the UNFCCC CDM website:
(http://cdm.unfccc.int/methodologies/PAmethodologies/approved.html).

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

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The consolidated methodology (ACM0012, Version 03.2) is for the following types of project activities:

- Type-1: All the waste energy in identified WECM stream/s that will be utilized in the project activity is, or would be flared or released to atmosphere in the absence of the project activity at the existing or new facility. The waste energy is an energy source for:
  - Cogeneration; or
  - Generation of electricity; or
  - Direct use as process heat source; or
  - For generation of heat in element process (e.g. steam, hot water, hot oil, hot air); or
  - For generation of mechanical energy.
- Type-2: An existing industrial facility, where the project activity is implemented, that captures and utilizes a portion of the waste gas stream(s) considered in the project activity, and meet the following criteria:
  - The project activity is to increase the capture and utilization of waste gas for generation of electricity that is flared or vented in the absence of the project activity, and not only the replacement/modification/expansion of existing generation equipment with or to a more efficient equipment;
  - The portion of waste gas captured prior to implementation of the project activity is used for generation of captive electricity. The use of a portion of the waste gas in the baseline for the purpose of heat generation or other use prior to implementation of the project activity is also permitted under this methodology provided the generation of heat or other use in crediting period remain same as that in the baseline;
  - If the project participant uses a part of the electricity generated in the project activity onsite and exports the remainder, both shall be monitored. In such situations it shall be demonstrated that the electricity generated for own consumption from waste gas

is not reduced in the project activity;

- Emission reductions generated in the project activity are attributable to the amount of waste gas captured and utilized in the project activity that is was flared or vented in the absence of the project activity and to the increase in energy efficiency of the new power generating facility;
- No auxiliary fossil fuel (except start-up fuel) is used in the waste gas boiler for the generation of captive electricity in the absence of the project.

For project activities that use waste pressure, the consolidated methodology is applicable where waste pressure is used to generate electricity only.

The semi-coke plant, consisting of 18 smaller semi-coke facilities, has an annual production capacity of 900,000 tonnes. The surplus gas was flared and released to the atmosphere since the semi-coke plant was commissioned. The proposed project activity is to recover the waste gas for power generation. Before the proposed project, the surplus was flared. Thus, according to the description above, the project activity belongs to the Type-1 projects.

According to the description above, the project activity belongs to Type-1 project.

The table B.1 below shows the reason for why the methodology is applicable to the project activity.

Table B.1：Reason for the applicability to project activity

No.	**Applicability Conditions as per ACM0012**	**Situation of this Project Activity**	Yes/No
1	If the project activity is based on the use of waste pressure to generate electricity, electricity generated using waste pressure should be measurable.	This project activity does not use waste pressure.	Yes
2	Energy generated in the project activity may be used within the industrial facility or exported from the industrial facility.	The electricity is supplied to the Northwest China Power Grid.	Yes
3	The electricity generated in the project activity may be exported to the grid or used for captive purposes.	The electricity is exported to the Northwest China Power Grid.	Yes
4	Energy in the project activity can be generated by the owner of the industrial facility producing the waste energy or by a third party (e.g. ESCO) within the industrial facility.	Energy in the project activity is generated by the owner of the industrial facility i.e. the project proponent Hengsheng Company itself.	Yes
5	Regulations do not constrain the industrial facility that generates waste energy from using fossil fuels prior to the implementation of the project activity.	There are no such regulations on Hengsheng Company which restrict the generation of the waste gas from using the fossil fuels before implementation of the project activity.	Yes

6	The methodology covers both new and existing facilities. For existing facilities, the methodology applies to existing capacity. If capacity expansion is planned, the added capacity must be treated as a new facility.	For the case of the project activity under consideration, the semi-coke plant was consolidated a number of smaller semi-coke facilities, and it is an existing facility, so the methodology is applicable.	Yes
7	The emission reductions are claimed by the generator of energy using waste energy.	Shenmu Hengsheng Coal Chemicals Co., Ltd. will claim the emission reductions for electricity generation through waste gases.	Yes
8	In cases where the energy is exported to other facilities, an official agreement exists between the owners of the project energy generation plant (henceforth referred to as generator, unless specified otherwise) with the recipient plant(s) that the emission reductions would not be claimed by recipient plant(s) for using a zero-emission energy source.	The electricity generated by the proposed project activity will mainly supply to the local grid and the credits are only claimed by the generator of the electricity.	Yes
9	For those facilities and recipients, included in the project boundary, which prior to implementation of the project activity (current situation) generated energy on-site (sources of energy in the baseline), the credits can be claimed for minimum of the following time periods: ✓ The remaining lifetime of equipments currently being used; and ✓ Credit period	There is no any energy generated plant on-site, prior to implementation of the project activity (current situation). Hence, the fixed crediting period of 10 years is selected.	Yes
10	Waste energy that is released under abnormal operation (for example, emergencies, shut down) of the plant shall not be accounted for.	As emission reductions are only claimed by actual net output electricity and no electricity can be generated under abnormal conditions, any waste gas flared under abnormal operation (emergencies, shut down) of the plant will not be accounted for.	Yes
11	This methodology is not applicable to projects where the waste gas/heat recovery project is implemented in a single-cycle power plant (e.g. gas turbine or diesel generator) to generate power.	The proposed project is not implemented in a single-cycle power plant to generate power.	Yes

Demonstration of use of waste energy in absence of CDM project activity

For Type-1 project activities: It shall be demonstrated that the waste energy utilized in the project activity was flared or released into the atmosphere (or wasted in case of project activity recovering waste pressure) in the absence of the project activity at the existing facility by either one of the following ways.

• By **direct measurements** of the energy content and amount of the waste energy produced for at least *three years* prior to the start of the project activity;

• Providing an **Energy balance** of the relevant sections of the plant to prove that the waste energy was not a source of energy before the implementation of the project activity. For the energy balance applicable process parameters are required. The energy balance must demonstrate that the waste energy was not used and also provide conservative estimations of the energy content and amount of waste energy released;

• **Energy bills** (electricity, fossil fuel) to demonstrate that all the energy required for the process (e.g. based on specific energy consumption specified by the manufacturer) has been procured commercially. Project participants are required to demonstrate through the financial documents (e.g. balance sheets, profit and loss statement) that no energy was generated by waste energy and sold to other facilities and/or the grid. The bills and financial statements should be audited by competent authorities;

• **Process plant** manufacturer's original design specifications and layout diagrams from the facility could be used as an estimate of the quantity and energy content of the waste energy produced for the rated plant capacity/per unit of product produced;

• On site checks conducted by the DOE prior to project implementation can confirm that no equipment for waste energy recovery and utilization, on the WECM stream recovered under the project activity, had been installed prior to the implementation of the CDM project activity.

For the proposed project, the semi-coke plant with an annual production capacity of 900,000 tonnes is an existing plant. The waste gas is flared and released to the atmosphere since the semi-coke plant was commissioned. It can be proved by on site checks conducted by the DOE at the time of validation that the waste gas utilized in the project activity would be released into the atmosphere after incineration in the absence of the project activity because of low heat value.

Based on the above analysis, it can therefore be concluded that the project activity meets all the applicability conditions required by methodology ACM0012. And also the baseline scenario identified in the section B.4 is also in line with the methodology ACM0012 version 03.2.

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

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As per ACM0012, the project boundary is:

The geographical extent project boundary shall include the following:

1. The industrial facility where waste energy is generated, including the part of the industrial facility where the waste gas was utilized for generation of captive electricity prior to implementation of the project activity);

2. The facility where process heat in the element process/steam/electricity/mechanical energy is generated (generator of process heat/steam/electricity/mechanical energy). Equipment providing auxiliary heat to the waste energy recovery process shall be included within the project boundary; and

3. The facility/s where the process heat in the element process/steam/electricity/mechanical energy is used (the recipient plant(s)) and/or grid where electricity is exported, if applicable.

The geographical extent of this project boundary comprises the cokery (waste gas sources), power generating equipment and the power plants connected physically to the electricity grid that the proposed project activity will affect. The following figure 4 will illustrate the project boundary of the proposed

project.

For the proposed project, the facility where electricity generated is connected to the Northwest China Grid. As per the Tool to calculate the emission factor for an electricity system, the spatial extent of the project is the power plants that are physically connected through transmission and distribution lines to the project activity. As Chinese DNA has published a delineation of the project electricity system and connected electricity system, the Northwest China includes the Shaanxi, Gansu, Qinghai, Ningxia, Xinjiang Grid.

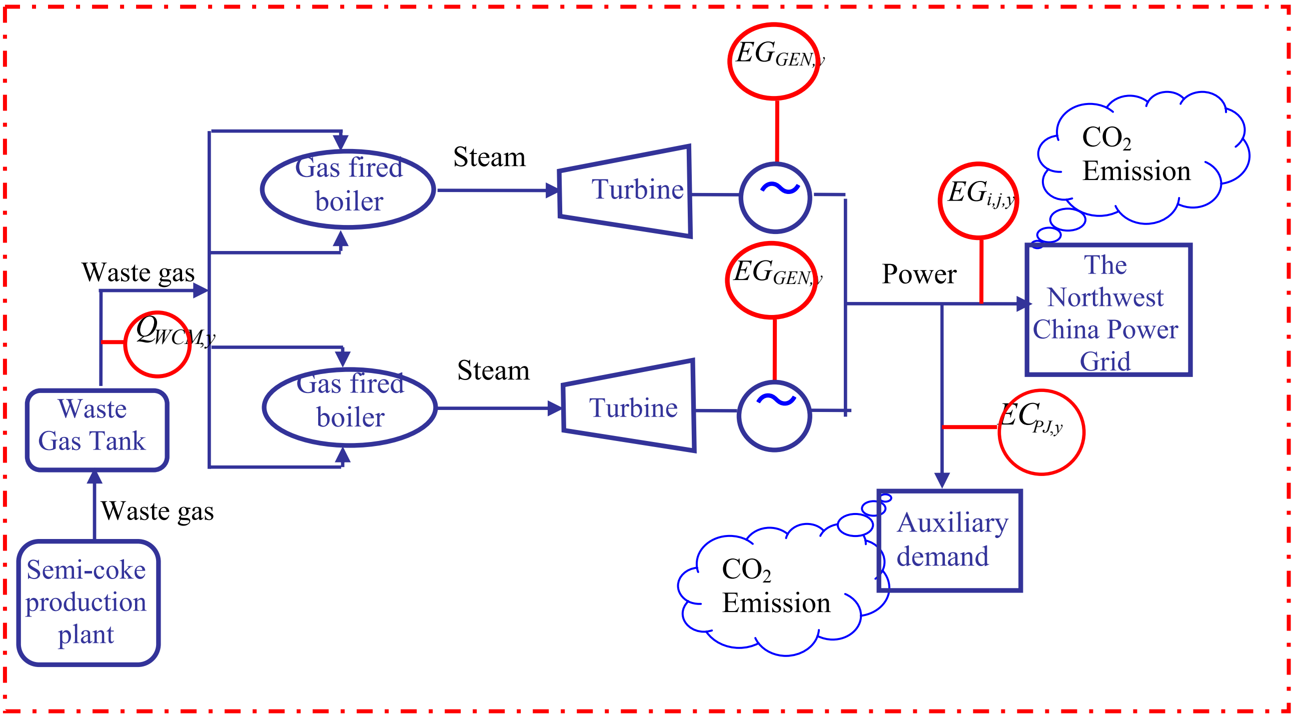


Figure 4 Project boundary

Table B.2 Summary of gases and sources included in the project boundary and justification explanation where gases and sources are not included.

Table B.2. Emission sources included in the project boundary

	Source	Gas	Included?	Justification / Explanation
Baseline	The Northwest China Power Grid electricity generation	CO_2	Included	Main emission source
		CH_4	Excluded	Excluded for simplification. This is conservative.
		N_2O	Excluded	Excluded for simplification. This is conservative.
	Fossil fuel consumption in boiler for thermal energy	CO_2	Excluded	Power generation only, Not applicable
		CH_4	Excluded	Power generation only, Not applicable

		N_2O	Excluded	Power generation only, Not applicable
	Fossil fuel consumption in Cogeneration plant	CO_2	Excluded	Power generation only, Not applicable
		CH_4	Excluded	Power generation only, Not applicable
		N_2O	Excluded	Power generation only, Not applicable
	Baseline emissions from generation of steam used in the flaring process, if any	CO_2	Excluded	No steam used in the flaring process, Not applicable
		CH_4	Excluded	No steam used in the flaring process, Not applicable
		N_2O	Excluded	No steam used in the flaring process, Not applicable
Project Activity	Supplemental fossil fuel consumption at the project plant	CO_2	Excluded	No supplemental fossil fuels consumption at the project plant site.
		CH_4	Excluded	No supplemental fossil fuels consumption at the project plant site.
		N_2O	Excluded	No supplemental fossil fuels consumption at the project plant site.
	Supplemental electricity consumption	CO_2	Included	Main emission source
		CH_4	Excluded	Excluded for simplification.
		N_2O	Excluded	Excluded for simplification.
	Electricity import to replace captive electricity, which was generated using waste gas in absence of project activity	CO_2	Excluded	No captive electricity in the baseline is Replaced by imported electricity.
		CH_4	Excluded	No captive electricity in the baseline is Replaced by imported electricity.
		N_2O	Excluded	No captive electricity in the baseline is Replaced by imported electricity.
	Project emissions from cleaning of gas	CO_2	Excluded	No cleaning of gas is required in the project.
		CH_4	Excluded	No cleaning of gas is required in the project.
		N_2O	Excluded	No cleaning of gas is required in the project.

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

>>According to ACM0012version 03.2, the baseline scenario is identified as the most plausible baseline scenario among all realistic and credible alternative(s).

Realistic and credible alternatives should be determined for:

·Waste energy use in the absence of the project activity; and

·Power generation in the absence of the project activity; and

·Steam/heat generation in the absence of the project activity
·Mechanical energy generation in the absence of the project activity

In determining the baseline scenario, project participants shall identify the realistic and credible alternatives to the project activity that would provide an output equivalent to the combined output of all the sub-systems in the project activity scenario. These alternatives may comprise one system or more than one sub-system(s). Therefore the alternative as, identified for the project activity should provide the same heat, power or mechanical energy output as in the project activity scenario and should include the alternate use of the waste energy utilized in the project activity. These alternatives shall be determined as realistic combinations of the following options available for meeting the 'heat requirement' and/or 'power requirement' and/or 'mechanical energy requirement' and for ensuring 'alternate use of waste energy'.

The proposed project activity will generate power only, so according to the methodology, the baseline should only take the options of power generation and waste energy use into consideration.

Step 1: Define the most plausible baseline scenario for the generation of heat and electricity using the following baseline options and combinations.

There are six waste gas baselines detailed in the methodology, namely:

Option	Description	Credibility	Conclusion
W1	WECM is directly vented to atmosphere without incineration or waste heat is released to the atmosphere or waste pressure energy is not utilized	According to Safety Code for Gas of Industrial Enterprises (GB6222-2005), the bleeding device for waste gas should install incineration equipment, and the waste gas must be incinerated.	Not a part of the baseline
W2	WECM is released to the atmosphere (for example after incineration) or waste heat is released to the atmosphere or waste pressure energy is not utilized	The baseline scenario option is in compliance with Chinese relevant laws and regulations, and it is a possible option in baseline scenario prior to the implementation of the proposed project.	May be a part of the baseline
W3	Waste energy is sold as an energy source	Waste Gas has a very low calorific value (7524 KJ/m^3) & it is 19.3% of the calorific value of the Natural Gas (38931KJ/Nm^3) [2]. So waste gas cannot be sold for residential use. Besides, presence of about 59.4% non-combustible components in the waste gas leaves no price for this gas. In addition, continuous supply of the waste gas cannot be ensured, as it is a by-product of the semi-coke manufacturing process.	Not a part of the baseline

[2] China Energy Statistical Yearbook 2006

		Furthermore, the project located on the edge of Chawusu desert and there is not any other big industrial energy (waste gas) consumer in the area, so the waste gas is impossible to be sold as an energy source. Therefore, this option is excluded.	
W4	Waste energy is used for meeting energy demand	As there is no potential use of waste gas for thermal energy around the project site, in addition there is no thermal energy demand either within the industrial facility (semi-coke plants)as it uses coal only as its fuel source, therefore this W4 is excluded.	Not a part of the baseline
W5	A portion of the waste gas produced at the facility is captured and used for captive electricity generation, while the rest of the waste gas produced at the facility is vented/flared	Considering the fact that there is no semi-coke oven gas to electricity generation project in the region due to low financial viability of utilizing semi-coke oven gas [3] and all the projects currently under planning are seeking for CDM revenue to overcome investment barrier[4], so W5 is not deemed to be a plausible baseline scenario to the project activity.	Not a part of the baseline
W6	All the waste gas produced at the industrial facility is captured and used for export electricity generation	This option is interpreted as the proposed project activity not undertaken as a CDM project activity.	May be a part of the baseline

From the above analysis we can conclude that the scenario W2, Waste gas is released directly to the atmosphere after incineration, and W6, All the waste gas produced at the industrial facility is captured and used for export electricity generation are available scenarios for the use of waste gas.

There are eleven Power baselines detailed in the methodology, namely:

Option	Description	Credibility	Conclusion

[3] Shaanxi Energy Conservation Association Document: Shaanxi semi-coke industry development and current status (reporting to Environment & Resource Department of Shaanxi Provincial Development & Reform Commission) (Document Number Shaan Jie Xie (2009)12)
[4] http://cdm.unfccc.int/Projects/Validation/DB/SVI2SVEX47K6230B5XJ2UAKP4BEXJ3/view.html
http://cdm.unfccc.int/Projects/Validation/DB/O2RD17OF3OV7V4KPHZO15GAS03RWEU/view.html
http://cdm.unfccc.int/Projects/Validation/DB/UIKFZOAMLCYMTUX77JZPTD0WUD5OEG/view.html
http://cdm.unfccc.int/Projects/Validation/DB/1UDFVTAJAPU5YJ18VLN0AH2674HH45/view.html
http://cdm.unfccc.int/Projects/Validation/DB/7FGDZ7WNO7S9F6C7MHD2U9SB779VNC/view.html

P1	Proposed project activity not undertaken as a CDM project activity;	This alternative is in compliance with all applicable legal and regulatory requirements.	May be a part of the baseline
P2	On-site or off-site existing/new fossil fuel based Cogeneration plant;	There is no on-site or off-site existing fossil fuel based cogeneration plant, and it could not be foreseen to build a new cogeneration plant with equivalent amount of electricity output as there is no thermal energy demand either around the project site or within the industrial facility (semi-coke plants), where is near to the Ordos desert. P2 is therefore excluded.	Not a part of the baseline
P3	On-site or off-site existing /new renewable energy based Cogeneration plant;	There is no on-site or off-site existing renewable energy based cogeneration plant, and it could not be foreseen to build a new cogeneration plant with equivalent amount of electricity output since there is no available renewable resource on-site or off-site. In addition, there is no thermal energy demand either around the project site or within the industrial facility (semi-coke plants), where is near to the Ordos desert. P3 is therefore excluded.	Not a part of the baseline
P4	On-site or off-site existing/new fossil fuel based existing captive or identified plant;	According to Chinese regulations issued in 2002, fossil-fired power plants of less than 135MW are prohibited for construction in the areas covered by the large grids such as provincial grids[5], and the fossil fuel power units with less than 100MW is strictly regulated for installation[6]. So the possible alternative baseline scenario of building a 30 MW coal-fired power plant conflicts with China's current regulations. Therefore, There is no on-site or off-site existing fossil fuel based captive plant. P4 is excluded.	Not a part of the baseline
P5	On-site or off-site existing/new renewable energy based or other waste energy based existing captive or identified plant;	There is no on-site or off-site existing renewable energy based existing captive plant which could provide the equivalent annual power supplied since the project region is in Ordos desert, where there are no significant hydropower resources[7] in	Not a part of the baseline

[5] http://www.gov.cn/gongbao/content/2002/content_61480.htm

[7]http://yl.hsw.cn/system/2009/08/10/050268757.shtml

		the project area. It also can be proved that, in China, solar PV[8], biomass[9] and geothermal [10] generation technology is still in the demonstration stage and it has little economic attraction to investor, Without policies& financial support, it would be difficult to operate such kinds of renewable energy. Also, there is no other semi-coke waste gas energy based power plant on site[11]. Thus, renewable energy based or other waste energy based power plant may not be a part of the baseline.	
P6	Sourced Grid-connected power plants;	This option is in compliance with Chinese relevant laws and regulations.	May be a part of the baseline
P7	Captive Electricity generation from waste gas (if project activity is captive generation with waste gas, this scenario represents captive generation with lower efficiency than the project activity.);	There is no captive plant using waste gas that already built in the plant site. Furthermore, the amount of the electricity consumed by the industrial facilities is very small [12], the captive electricity generation plant with the equivalent electricity output with the proposed project activity is not needed.. Hence the scenario P7 is not feasible as baseline scenario.	Not a part of the baseline
P8	Cogeneration from waste gas (if project activity is Cogeneration with waste gas, this scenario represents Cogeneration with lower efficiency than the project activity).	There is no cogeneration plant using waste gas with equivalent amount of electricity output as there is no thermal energy demand either around the project site or within the industrial facility (semi-coke plants), where is near to the Ordos desert. Thus P8 is excluded.	Not a part of the baseline
P9	Existing power generating equipment (used previous to implementation of project activity for captive electricity generation from a captured portion of waste gas) is either decommissioned to	There is no existing power generating equipment before the proposed project. Therefore, this option is not applicable to the proposed project activity.	Not a part of the baseline

[8] http://www.ceh.com.cn/ceh/cjxx/2009/6/27/49087.shtml
[9] http://www.gold9999.cn/chinese/share/shownews.asp?id=180201&classid=1&level=41
[10] http://www.wanye68.com/news/content/2009/5/195653.html
[11] Shaanxi Energy Conservation Association Document: Shaanxi semi-coke industry development and current status (reporting to Environment & Resource Department of Shaanxi Provincial Development & Reform Commission) (Document Number Shaan Jie Xie (2009)12)
[12] Clarification of the semi-coke plant, the rate of the annual electricity consumption of the semi-coke plant occupies the annual electricity generated of the power plant is less than 10%.

	build new more efficient and larger capacity plant or modified or expanded (by installing new equipment), and resulting in higher efficiency, to produce and only export electricity generated from waste gas. The electricity generated by existing equipment for captive consumption is now imported from the grid;		
P10	Existing power generating equipment (used previous to implementation of project activity for captive electricity generation from a captured portion of waste gas) is either decommissioned to build new more efficient and larger capacity plant or modified or expanded (by installing new equipment), and resulting in higher efficiency, to produce electricity from waste gas (already utilized portion plus the portion flared/vented) for own consumption and for export;	There is no existing power generating equipment before the proposed project. Therefore, this option is not applicable to the proposed project activity.	Not a part of the baseline
P11	Existing power generating equipment is maintained and additional electricity generated by grid connected power plants.	There is no existing power generating equipment before the proposed project. Therefore, this option is not applicable to the proposed project activity.	Not a part of the baseline

From the above analysis we can conclude that the scenario P6: the Northwest China Power Grid provides the equivalent electricity and the scenario P1: the proposed activity, not undertaken as a CDM project activity is the plausible scenarios to the project activity.

To sum up, the most plausible scenarios matrix obtained from the combinations of the alternatives are presented in the following table B.3.

Table B.3: Possible combinations of baseline scenarios matrix

Scenario	Baseline options		Description
	Waste gas use	Power generation	
1.	**W2**	**P6**	Waste gas is released directly to the atmosphere after

			incineration, and the Northwest China Power Grid provides the equivalent electricity
2.	**W6**	**P1**	All the waste gas produced at the industrial facility is captured and used for export electricity generation and the proposed activity not undertaken as a CDM project activity

STEP 2: Identify the fuel for the baseline choice of energy source taking into account the national and/or sectoral policies as applicable.

In this case, the identified baseline scenario is "sourced grid-connected power plants", which uses a combination of coal, gas and oil, which faces no compelling laws.

STEP 3: step 2 and/or step 3 of the latest approved version of the "Tool for the demonstration and assessment of additionality" shall be used

The PDD uses step 3 of the latest approved version of the "Tool for the demonstration and assessment of additionality" to identify the most credible baseline scenarios by eliminating non-feasible options.

For the scenario 2: All the waste gas produced at the industrial facility is captured and used for export electricity generation and the proposed activity not undertaken as a CDM project activity.
For the project activity, all the waste gas produced at the industrial facility is captured and used for export electricity generation as this is in compliance with laws and regulations, and as there is no compulsory construction under the national or local governmental laws. However, in order to confirm the additionality further, without the consideration the revenue of CERs, the total investment IRR is 5.34%, meaning lower than the 8% benchmark applicable to the power industry. Consequently, the project activity is not commercially attractive and scenario 2 cannot be considered the baseline scenario.

Conclusion:
Therefore, the baseline scenario of the proposed project is:

Scenario	Baseline options		Description
	Waste gas use	Power generation	
1.	**W2**	**P6**	Waste gas is released directly to the atmosphere after incineration, and the Northwest-China Power Grid provides the equivalent electricity

STEP 4: If more than one credible and plausible alternative scenario remain, the alternative with the lowest baseline emissions shall be considered as the most likely baseline scenario.
There is only one baseline scenario left, so this step is skipped.

Hence, in this case, the most credible and realistic baseline scenario is identified as:

Scenario	Baseline options		Description
	Waste gas use	Power generation	
1.	**W2**	**P6**	Waste gas is released directly to the atmosphere after incineration, and the Northwest China Power Grid provides the equivalent electricity

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

According to ACM0012, the "Tool for the demonstration and assessment of additionality (version 05.2)" is applied to demonstrate the additionality of the project activity versus the baseline scenario. The timeline of the proposed project activity is listed as follows:

Date	Events and Comments
08/ 2008	FSR
31/12/2008	Approval of FSR
05/01/2009	Seriously taking into account CDM support, Hengsheng company decided to implement the proposed project activity.
02/03/2009	Approval of EIA
30/04/2009	Contract for two gas-fuelled boilers. It is the starting date of the proposed project
09/08/2009	Notify NDRC
14/10/2009	Notify EB
December 2010	Expected to be full operated

From the events in the table above, we can conclude that CDM is seriously taken into account before the start of the proposed project activity.

Step1. Identification of alternatives to the project activity consistent with current laws and Regulations

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

Sub-step1a.Define alternatives to the project activity:

Alternatives to the use of waste energy:

W1 WECM is directly vented to atmosphere without incineration or waste heat is released to the atmosphere or waste pressure energy is not utilized;

W2 WECM is released to the atmosphere (for example after incineration) or waste heat is released to the atmosphere or waste pressure energy is not utilized;

W3 Waste energy is sold as an energy source;

W4 Waste energy is used for meeting energy demand;

W5 A portion of the waste gas produced at the facility is captured and used for captive electricity generation, while the rest of the waste gas produced at the facility is vented /flared;

W6 All the waste gas produced at the industrial facility is captured and used for export electricity generation.

According to section B.4, the possible alternatives are W2, Waste gas is released directly to the atmosphere after incineration, W4, Waste gas is used for meeting energy demand, and W6, All the waste gas produced at the industrial facility is captured and used for export electricity generation..

Alternatives to power generation:

P1 Proposed project activity not undertaken as a CDM project activity;

P2 On-site or off-site existing/new fossil fuel fired Cogeneration plant;

P3 On-site or off-site existing/new renewable energy based Cogeneration plant;

P4 On-site or off-site existing/new fossil fuel based existing captive or identified plant;

P5 On-site or off-site existing/new renewable energy based or other waste energy based existing captive or identified plant;
P6 Sourced Grid-connected power plants;
P7 Captive Electricity generation from waste gas (if project activity is captive generation with waste gas, this scenario represents captive generation with lower efficiency than the project activity.);
P8 Cogeneration from waste gas (if project activity is Cogeneration with waste gas, this scenario represents Cogeneration with lower efficiency than the project activity);
P9 Existing power generating equipment (used previous to implementation of project activity for captive electricity generation from **a captured portion** of waste gas) is either decommissioned to build new more efficient and larger capacity plant or modified or expanded (by installing new equipment), and resulting in higher efficiency, to produce and only export electricity generated from waste gas. The electricity generated by existing equipment for captive consumption is now imported from the grid;
P10 Existing power generating equipment (used previous to implementation of project activity for captive electricity generation from a captured portion of waste gas) is either decommissioned to build new more efficient and larger capacity plant or modified or expanded (by installing new equipment), and resulting in higher efficiency, to produce electricity from waste gas (already utilized portion plus the portion flared/vented) for own consumption and for export;
P11 Existing power generating equipment is maintained and additional electricity generated by grid connected power plants.

According to section B.4, the possible alternatives are P6: the Northwest China Power Grid provides the equivalent electricity and the scenario P1: the proposed activity, not undertaken as a CDM project.

Outcome of Step 1a:
As stated in B.4. The practical and feasible alternative to the project activity is a combined alternative, namely:

Scenario	Baseline options		Description
	Waste gas use	Power generation	
1.	**W2**	**P6**	Waste gas is released directly to the atmosphere after incineration, and the Northwest-China Power Grid provides the equivalent electricity

Sub-step1b.Enforcement of applicable laws and regulations:

According to section B.4, the alternatives W2 and P6 are in compliance with Chinese relevant laws and regulations, and not the compulsory project by national or local regulation and laws.

Step 2: investment analysis
The purpose of this step is to determine whether the Proposed Project activity is financially less attractive than other alternatives without the revenue from the sales of CERs. The investment analysis was done in the following steps:

Sub-step2a: Determine appropriate analysis method:
Three analysis methods suggested by *Tools for the demonstration and assessment of additionality* are simple cost analysis (option I), investment comparison analysis (option II) and benchmark analysis (option III).

Option I: Simple cost analysis, does not apply as the project generates economic returns through the sales of electricity to the local grid.
Option II: Investment comparison analysis is not appropriate as the only realistic alternative to the project:

Waste gas is released directly to the atmosphere after incineration, and the electricity is imported from the Northwest China Power Grid (the combined scenario of W2 and P6) is not the specific investment project. Option III: Benchmark analysis is appropriate.
The following analysis will be conducted through Option III of the additionality tool, i.e. Benchmark analysis.

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

In this case, as the proposed project is that waste gas is recovered from semi-coke production for power generation and the electricity generated is transmitted to the Northwest China Power Grid, the proposed project activity is regarded as a power plant. According to ***Interim Rules on Economic Assessment of Electrical Engineering Retrofit Projects,*** issued by former State Power Corporation of China, the financial internal rate of return of total investment after income tax (FIRR) 8% is regarded as benchmark in China's power industry[13]. Nowadays it is widely used in China. Therefore, 8% is selected as the benchmark for the proposed project activity.

Sub-step 2c. Calculation and comparison of financial indicators (only applicable to options II and III):

The basic financial parameters used for the project IRR calculation are provided in Table B.4:

Table B.4 Basic Finance Parameters of the project

Parameters		Value	Source
Installed capacity(MW)		30	Feasibility Study Report
Annual power supplied(MWh)		153,000	Feasibility Study Report
Total Static investment (10000 Yuan RMB)		18516.28	Feasibility Study Report
Annual running cost	raw material fee (10000 Yuan RMB)	407.22	Feasibility Study Report
	Water fee (10000 Yuan RMB)	335.28	
	Salary (10000 Yuan RMB)	430.92	
	Repair (10000 Yuan RMB)	645.60	
	Management (10000 Yuan RMB)	391.59	
	Total (10000 Yuan RMB)	2210.61	
Floating capital (10000Yuan RMB)		624.52	Feasibility Study Report
Grid price (with VAT, Yuan RMB/ kWh)		0.315	Feasibility Study Report
VAT		17%	Feasibility Study Report
Depreciation fee (10000 Yuan RMB)		976.98	Feasibility Study Report
Urban Maintenance and Construction Tax		5%	Feasibility Study Report
Education Supplementary Tax		3%	Feasibility Study Report
Income Tax		25%	Feasibility Study Report
Operating period (years)		15	Feasibility Study Report
CER price (EUR)		8.5	Expected

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

Calculating according to the above table, the FIRR of the proposed project activity is 5.34%[14], obviously lower than the benchmark 8%, therefore, the proposed project activity is less economically attractive. With the CDM revenue, the FIRR of the proposed project activity is 11.42%, which is higher than the benchmark. It shows that CDM is essential to the proposed project activity.

Sub-step 2d. Sensitivity analysis (only applicable to options II and III):

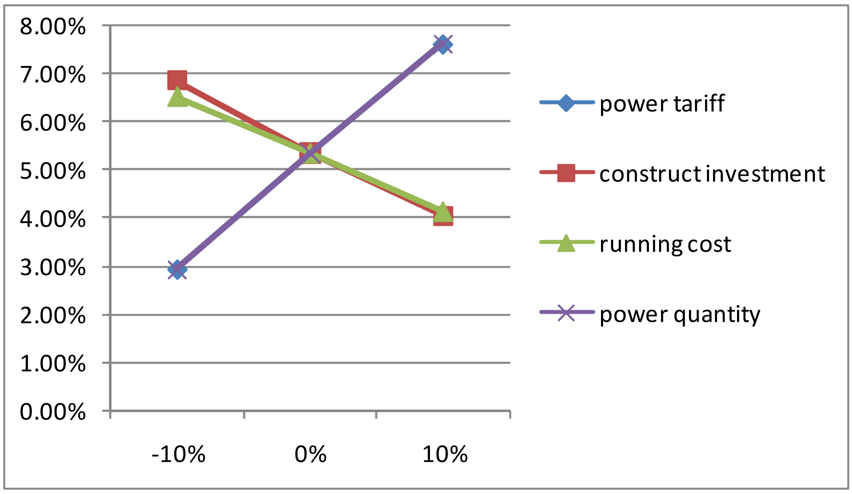
The purpose of the sensitivity analysis is to examine whether the conclusion regarding the financial viability of the project activity is sound and tenable with those reasonable variations in the assumptions.

Four factors are considered in the following sensitivity analysis:
1. Total Investment
2. Annual Running Cost
3. Electricity Price supplied
4. Electricity quantity supplied

Variations of ±10% (the sensitivity analysis in the Feasibility Study Report also uses ±10% as variation, in compliance with the Chinese requirements) have been considered for the critical assumptions. Table B.6 and Figure B.1 summarize the results of the sensitivity analysis.

Table B.5 sensitivity analysis of the proposed project activity

	-10%	0%	10%
Electricity Price Supplied	2.93%	5.34%	7.6%
Construction Investment	6.56%	5.34%	4.3%
Annual Running Cost	6.51%	5.34%	4.13%
Electricity quantity supplied	2.93%	5.34%	7.6%



FigureB.1 Sensitivity analysis

It can be found from Table B.5 and FigureB.1 that when total investment, Annual Operation & Maintenance Cost，Electricity Price Supplied and Electricity quantity supplied fluctuate within the range

[14] A post-tax benchmark is applied by the project activity, and the interest payment has been taken into account in calculation of income tax. As the project entity has had no loan since it was founded, which is evidenced by the clarification from accountant firms, the actual interest payment of this project is zero. Hence the project IRR calculation is consistent with the guideline (EB51).

of –10% to +10% (without CERs revenue), the project IRR varies to different extent. However, the project IRR is always lower than benchmark IRR of 8% whatever the critical assumptions vary.

In order to further demonstrate the additionality of the proposed project activity, the situation at which the benchmark would be reached will be taken into account as follows:

1. When the construction investment reduces 19.9%, the IRR of the project will reach 8%, the benchmark of the project. However, as the main part of construction investment, the cost of raw material is increasing continuously. The purchasing price index of industrial raw material, fuel and power in Shaanxi province has kept increasing from 2003 to 2008[15] according to the statistic data available on the website of Shaanxi Provincial Bureau of Statistics (SBS), which shows that, compared with the same period of last year, the purchasing price index has increased by 4.8%(2003), 10.4%(2004), 7.2%(2005), 6.7%(2006), 6.3%(2007) and 11.2%(2008). Furthermore, the actual contract investment is closely to the estimated investment of the FSR. So, price soaring will be a trend in the following years, it is impossible that the total Investment will reduce 19.9%.
2. In case the running cost reduces 23.2%, the FIRR of the project will reach 8%of the benchmark of the project. According to the approved FSR, the running cost consists of the material cost, repairing cost and wages for the workers etc. Based on the data mentioned above, the purchasing price index of industrial raw material, fuel and power in Shaanxi province has kept increasing from 2003 to 2008; Statistics data from the SBS also shows that, from 2003 to 2008, the total earning of workers in Shaanxi province has augmented[16]. So it is impossible that the running cost will reduce 23.2%.
3. When the power tariff and power quantity increase 11.8%, the FIRR of the project will reach 8% of the benchmark of the project. However, according to the power purchase agreements between Hengsheng Company and the grid company[17], the electricity tariff is fixed and won't be changed during the project life time. Furthermore, the proposed project activity is to utilize the waste gas from the semi-coke production line and the quantity of waste gas is estimated on the basis of gas balance of the semi-coke production plant, that is, as the operating time and load is rated, the amount of waste gas production and the electricity output, which are evaluated according to these data, are invariable. In the light of the theoretical parameters, the capacity and relative parameters of the turbine and generator are positively designed for electricity generation quantity and steam generation quantity calculation. Therefore it is impossible for the benchmark to be reached.

Therefore, based on the specific analysis of the sensitive factors and reasonable variation, the sensitivity analysis strengthens the conclusion that the proposed project is financially unattractive.

Outcome of Step 2:

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

Step 3. Barrier analysis

This step is not used.

Step 4. Common practice analysis

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

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[15] http://www.sn.stats.gov.cn/news/newmore.asp?typeid=31

[16] http://www.sn.stats.gov.cn/news/newmore.asp?typeid=31

[17] Electricity Purchase & Sale Contract and Supplemental Contract

According to the *tool for the demonstration and assessment of additionally*, the other activities should be operational and be similar to the proposed project activity. Projects are considered "similar" in case they are located in the "same county/region", are of "similar scale", and "take place in a comparable environment with respect to regulatory framework, investment climate, access to technology, access to financing, etc".

In China, the investment environment of each province is different due to policy framework, electricity tariff, investment ability and industry structure, for the common practice analysis, in considering of investment environment discrepancy by comparing Shaanxi Province with other provinces in China, we have analyzed the Shaanxi Province for the common practice analysis where the project activity is located in.

The semi-coke is the unique production of Shenmu County and Fugu County in Shaanxi Province, which shows obvious regional characteristic, therefore, similar projects with the Project applied in common practice analysis are defined as generation projects with waste gas from semi-coke production in Shaanxi Province. This section of common practice analysis is simply semi-coke plants involved and doesn't herein incorporate that of coke production plants as there actually exists significant difference between coke and semi-coke products, which are listed as follows:

Table B.6. Difference in specification

	Semi-coke (data source: http://sn.ifeng.com/zhuanti/show.php?itemid=7591)	Coke (data source: coke national standard GB8729-88)
Size (mm)	8-35	60-80
Ash (%)	<=8	8-12
Water content %	8-12	<=5
Strength %	>60	>84-92
Fixed C4 %	>80	>96 http://baike.steelhome.cn/doc-view-1802.html
Caloric value MJ/Kg	>21-24	>29 http://baike.steelhome.cn/doc-view-1802.html

Table B.7. Other difference (data source: http://sn.ifeng.com/zhuanti/show.php?itemid=7590)

	Semi-coke	coke
Raw material	Jurassic coal	bituminous coal
Processing	Low-temperature dry-distillation at about 600℃，the capacity at 30000 tonnes/year	High temperature dry-distillation at about 1000℃. The capacity can reach 500,000 t/y or even 1,000,000 t/y.
Usage	Can not used in steel industry, but can be used in Fe-alloy, calcium carbide and fertilizer production	Coke is used as a fuel and as a reducing agent in smelting iron ore in a blast furnace.
Market price	300RMB/tonnes	800RMB/tonnes

In light of the document from Shaanxi Energy Conservation Association[18]: the waste gas from the semi-coke plants is released to the atmosphere after incineration is a common practice. For accelerating the semi-coke industry structure adjustment and promoting energy conservation & emission reduction, a set of projects which recovery waste gas from semi-coke plant were implemented as the first kind of pilot projects by Shaanxi Energy Conservation Association, and the project activity is one of the first kind of pilot projects. Besides the proposed project activity, there are other seven corporations in Shaanxi province, who have considered the construction of semi-coke production and waste gas recovery for power generation project with the capacity of more than 600kt. All the projects are applying for CDM project (see details in the table below).

Project	Capacity (MW)	Construction state	Applying for CDM?
Shenmu Tongdeli	30	Commissioning	Yes
Shenmu Jiujiang	30	Under construction	Yes
Shenmu Hengdong	100	Under construction	Yes
Shenmu Jieneng	100	Under construction	Yes
Shenmu Hengsheng	30	Under construction	Yes
Fugu Yuchao	24	Under construction	Yes
Fugu Sanlian	21	Under construction	Yes
Fugu Taida	24	Under construction	Yes

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

Except Shenmu Tongdeli project, there are no other operated semi-coke waste gas power generation projects in Shaanxi Province before the DOE on-site validation of the project activity.

As the seven similar projects in Shaanxi province are all applied for CDM project, the proposed project is not a common practice.

Based on the analysis above, the proposed project activity is additional.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

>>The baseline emissions for the year *y* shall be determined as per the methodology ACM0012:

Baseline Emissions

$$BE_y = BE_{En,y} + BE_{flst,y}$$

Where:

BE_y	Total baseline emissions during the year *y* in tons of CO_2
$BE_{En,y}$	Baseline emissions from energy generated by project activity during the year *y* in tons of CO_2
$BE_{flst,y}$	Baseline emissions from generation of steam, if any, using fossil fuel, that would have been used for flaring the waste gas in absence of the project activity (tCO_2e per year), calculated as per equation (1c). This is relevant for those project activities where in the baseline steam is used to flare the waste gas.

[18] Shaanxi Energy Conservation Association Document: Shaanxi semi-coke industry development and current status (reporting to Environment & Resource Department of Shaanxi Provincial Development & Reform Commission) (Document Number Shaan Jie Xie (2009)12)

The baseline project activity will not use the steam for flaring the waste gas, hence $BE_{flst,y}$ is zero.

Therefore, $BE_y = BE_{En,y}$

According to the methodology, baseline emissions have two scenarios. In the proposed project activity, the baseline scenario represents the situation where the recipient plants obtain electricity from the power grid and the heat from a coal based boiler.

$$BE_{En,y} = BE_{Elec,y} + BE_{Ther,y}$$

Where:

$BE_{Elec,y}$	Are baseline emissions from electricity during the year *y* in tons of CO2
$BE_{Ther,y}$	Are baseline emissions from thermal energy (due to heat generation by element process) during the year *y* in tons of CO2

Since in the present project activity, waste gas is used for power generation only, therefore,

$$BE_{En,y} = BE_{Elec,y}$$

Where

$BE_{Elec,y}$ is baseline emissions due to displacement of electricity during the year *y* (tCO2e), and the calculation equation is as following:

Baseline emissions from electricity (BE $_{En,y}$) that is displaced by the project activity:

$$BE_y = BE_{En,y} = BE_{Elec,y} = f_{cap} * f_{wcm} * \sum_j \sum_i (EG_{i,j,y} * EF_{Elec,i,j,y})$$

Where:

$BE_{Elec,y}$	Are baseline emissions due to displacement of electricity during the year y in tons of CO_2.
$EG_{i,j,y}$	Is the quantity of electricity supplied to the recipient *j* by generator, which in the absence of the project activity would have been sourced from *i*th source (*i* can be either grid or identified source) during the year *y* in MWh,
$EF_{Elec,i,j,y}$	Is the CO2 emission factor for the electricity source i (i=gr (grid) or i=is (identified source)), displaced due to the project activity, during the year *y* in tons CO2/MWh
f_{wcm}	Fraction of total electricity generated by the project activity using waste gas. This fraction is 1 if the electricity generation is purely from use of waste gas. If the boiler providing steam for electricity generation uses both waste and fossil fuels, this factor is estimated using equation (1d). If the steam used for generation of the electricity is produced in dedicated boilers but supplied through common header, this factor is estimated using equation (1d/1e). NOTE: For project activity using waste pressure to generate electricity, electricity generated from waste pressure use should be measurable and this fraction is 1.
f_{cap}	Energy that would have been produced in project year y using waste gas/heat generated in base year expressed as a fraction of total energy produced using waste gas in year y. The ratio is 1 if the waste gas/heat/pressure generated in project year y is same or less then that generated in base year. The value is estimated using equation (1f) or (1g) and (1g-1).

The methodology points out that if the displaced electricity for recipient is supplied by a connected grid system, the CO_2 emission factor of the electricity $EF_{elec,i,j,y}$ shall be determined following the guidance provided in the "Tool to calculate the emission factor for an electricity system". As stated in the section B.4, the most reliable baseline alternative to the power generation is "Sourced from the grid-connected plants", the emission factor of the substituted electricity should be calculated according to the latest version of the "Tool to calculate the emission factor for an electricity system".

In accordance with the calculating steps and formulas provided in "Tool to calculate the emission factor for an electricity system", the emission reductions of the project activity are calculated as follows:

Calculation of $EF_{Elec, i, j, y}$ (abbreviated as $EF_{grid,y}$)

According to "Tool to calculate the emission factor for an electricity system", the baseline emission factor ($EF_{grid,y}$) is calculated as a combined margin (CM) of $EF_{grid,OM,y}$ and $EF_{grid,BM,y}$, based on the following six steps:

Step 1. Identify the relevant electric power system

According to the announcement of Grid Boundary by DNA of China, *Northwest China Power Grid covers five provinces (Shaanxi, Gansu, Ningxia, Qinghai, and Xinjiang)*[19], the project activity is located in Shaanxi province and it is appropriate to select the Northwest China Power Grid as project system boundary.

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

Project participants may choose between the following two options to calculate the operating margin and build margin emission factor:
Option I: Only grid power plants are included in the calculation.
Option II: Both grid power plants and off-grid power plants are included in the calculation.
In this case, Option I is chosen.

Step 3 Select an operating margin (OM) method

Calculation of OM emission factor should be based on one of the following four methods:
(a) Simple OM, or
(b) Simple adjusted OM, or
(c) Dispatch Data Analysis OM, or
(d) Average OM.

The simple OM method can only be used where low-cost/must run resources constitute less than 50% of total grid generation in: (1) average of the five most recent years, or (2) based on long-term normal for hydroelectricity production. Low operating cost and must run resources typically include hydro, geothermal, wind, low-cost biomass, nuclear and solar generation. If coal is obviously used as must-run, it should also be included in this list, i.e. excluded from the set of plants. From 2003to 2007, the low cost must run resources constitute less than 50% of total amount grid generation output. (See Table B.7). Therefore, method (a) is applicable for the project.

Table B.7. Basic Information of Northwest China Grid as Baseline Scenario

[19] http://cdm.ccchina.gov.cn/web/index.asp

Year	Installed capacity (MW)				Electricity generation(MWh)			
	Total	Thermal	low cost/ must run	% low cost/ must run	Total	Thermal	low cost/ must run	% low cost/ must run
2003	29998	20492.7	9505.3	31.69	139235000	113093000	26142000	18.78
2004	33358.7	22247.5	11111.2	33.31	169253000	131939000	37314000	22.05
2005	37981.9	25362.6	12619.3	33.22	184562000	133909000	50653000	27.44
2006	44100	29627	14473	32.82	198492000	149438000	49054000	24.71
2007	51008.5	35620	15388.5	30.16	229939000	176705000	53234000	23.15

Source: China Electric Power Yearbook 2004-2008

In conclusion, method (a) is the only reasonable and feasible method among the four methods for calculating the Operating Margin emission factor ($EF_{grid,OMsimple,y}$) of the Northwest China Power Grid.

Step 4. Calculate the operating margin emission factor according to the selected method (Simple OM)

According to the "Tool to calculate the emission factor for an electricity system", the Simple OM emission factor ($EF_{grid,OMsimple,y}$) is calculated as the generation-weighted average CO_2 emissions per unit net electricity generation (tCO_2/MWh) of all generating power plants serving the system, not including low-operating cost and must-run power plants/units, It may be calculated:

-Option A: Based on the net electricity generation and a CO_2 emission factor of each power unit;3 or
-Option B: Based on the total net electricity generation of all power plants serving the system and the fuel types and total fuel consumption of the project electricity system.

Option B can only be used if:
(a) The necessary data for Option A is not available; and
(b) 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; and
(c) Off-grid power plants are not included in the calculation (i.e., if Option I has been chosen in Step 2).

In the proposed project activity, for the applicable grid, detailed data on the individual power plants connected to the grid is not available, and that only nuclear and renewable power generation are considered as low cost/must run sources, Option B is used and the simple OM emission factor is calculated based on the net electricity supplied to the grid by all power plants serving the system, not including low-cost/must-run power plants/units, and based on the fuel types and total fuel consumption of the project electricity system, as follows:

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

Where:

- $FC_{i,y}$ is the amount of fossil fuel type i consumed in the project electricity system in year y (mass or volume unit),
- $NCV_{i,y}$ is net calorific value (energy content) of fossil fuel type I in year y (GJ/mass or volume unit)

- $EF_{CO2,i,y}$ is the CO2 emission factor of fossil fuel type i in year y (tCO2/GJ)
- EG_y is the 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 is all fossil fuel types combusted in power sources in the project electricity system in year y,
- y is either the three most recent years for which data is available at the time of submission of the CDM-PDD to the DOE for validation (ex-ante option) or the applicable year during monitoring (ex post option), following the guidance on data vintage in step 2. As for the proposed project, data of the three most recent years is available and then will be used.

For this approach (simple OM) to calculate the operating margin, the subscript m refers to the power plants/units delivering electricity to the grid, not including low-cost/must-run power plants/units, and including electricity imports to the grid. Electricity imports should be treated as one power plant m.

In the project activity, the data of net calorific values of the fuels is from the China Energy Statistical Yearbook and the data of emission factors of the fuels are from IPCC 2006 default.

The simple OM emission factor of the proposed project is calculated based on the electricity generation mix of the Northwest China Power Grid, excluding low operating cost/must run power plant, such as wind power, hydropower etc. The data on installed capacity and electricity output of different power generation technology options are from the *China Electric Power Yearbook* (2004~2008, published annually). The data on different fuel consumptions for power generation in the Northwest China Grid are from the Energy Balance Table of Gansu, Qinghai, Xinjiang, Ningxia and Shaanxi in year 2003- 2007 from the China Energy Statistical Yearbook (2004-2008 Edition). Therefore, the Simple OM Emission Factor of proposed project is an ex-ante emission factor, based on 3-year average of the most recent statistics available at the time that the PDD was developed.

Besides, there is no adding electricity power into Northwest China Grid from the other grid of China. Hence this part of electricity needn't to be taken into account.

Based on these data, (see annex 3) the Simple OM Emission Factor ($EF_{grid,OMsimple,y}$) is:

$$EF_{grid,OMsimple,y} = 1.0246 \text{ tCO}_2\text{/MWh}$$

The value of $EF_{grid,OMsimple,y}$ calculated ex-ante will be used and won't be updated during the fixed crediting period.

Step 5: Identify the cohort of power units to be included in the build margin

The sample group m consists of either the five power plants that have been built most recently or the power plants capacity additions in the electricity system that comprise 20% of the system generation (in MWh) and that have been built most recently, and if 20% falls on part capacity of a plant, that plant is fully included in the calculation. The latter method will be used in the proposed project.

"Tool to calculate the emission factor for an electricity system" allows project participants to choose between two given options for calculating the Build Margin for the project, one is ex-ante calculation, and the other is annual ex-post updating in the first crediting period. For this project the first option is chosen. The Build Margin Emission Factor therefore is based ex-ante on the most recent information available on plants already built at the time of PDD submission.

Step6: Calculation the Build Margin emission factor ($EF_{grid,BM,y}$)

According to "Tool to calculate the emission factor for an electricity system", $EF_{grid,BM,y}$ is determined by the formula as follow:

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

Where:

$EF_{grid,BM,y}$	is Build margin CO2 emission factor in year y (tCO2/MWh)
$EG_{m,y}$	is Net quantity of electricity generated and delivered to the grid by power unit m in year y (MWh)
$EF_{EL,m,y}$	is CO2 emission factor of power unit m in year y (tCO2/MWh)
m	is Power units included in the build margin
y	is Most recent historical year for which power generation data is available

As plant specific fuel consumption and electricity generation data is not publicly available in China, EB guidance[20] is used to calculate $EF_{grid,BM,y}$. While the request for deviation was submitted relating to AM0005, the guidance has also widely been used for "Tool to calculate the emission factor for an electricity system"as this replaces reference to ACM0002 which directly replaces AM0005 and all OM and BM calculations in these two methodologies are the same:

- Use capacity additions for estimating the build margin emission factor for grid electricity.
- Use weighting estimated using installed capacity in place of annual electricity generation.
- Use the efficiency level of the best technology commercially available in the provincial/regional or national grid, as a conservative proxy, for each fuel type in estimating the fuel consumption to estimate the build margin (BM).

The calculation of the Build Margin for the proposed project makes use of aggregated data to identify the 20% most recent capacity additions (sample group). This is identified by direct comparison of the total installed capacity on Northwest China Power Grid in the most recent year for which data is available, in this case 2007, with historical data from preceding years until the 20% addition is reached. BM is determined by selecting the year since which the new capacity additions are equal to or greater than 20%.

Based on the method and data issued by China's DNA on 02/07/2009, which is the latest and available data published before validation, the $EF_{Thermal,y}$ is calculated as following:

Firstly, use the following equations to calculate weights of CO_2 emissions by coal-fired, oil-fired and gas-fired plants in total CO_2 emissions of Northwest China Power Grid.

[20] The EB guidance was given in a response letter entitled "Several projects in China (application of approved methodology AM0005), see http://cdm.unfccc.int/UserManagement/FileStorage/AM_CLAR_QEJWJEF3CFBP1OZAK6V5YXPQKK7WYJ. The guidance can be used for "Tool to calculate the emission factor for an electricity system" (EB 35)

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

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

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

Where:

$F_{i,j,y}$	is the total amount of fuel I (in a mass or volume unit) consumed by Province j in Northwest China Power Grid for power generation in year y;
$NCV_{i,y}$	is the net calorific value of fuel i during year *y*(in GJ/t unit for solid and liquid or GJ/m^3 for gas);
$EF_{CO2,i,j,y}$	is the emission factor of fuel i (tCO_2/GJ).

Secondly, the $EF_{thermal\ power}$ is calculated as a weighted emission factor as the following formula:

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

Where:

$EF_{Coal, Adv,y}$ $EF_{Oil,Adv,y}$ and $EF_{Gas, Aad,y}$ are the emission factors of the best technology for coal, oil, gas fired power plants commercially available in China, which are calculated based on the efficiency level of the best technology for each fuel type commercially available in China (see details in Annex 3).

In conclusion, the procedure to be used for calculating the build margin using the most recent additional capacity follows steps below:

- Using the latest statistical data available (from the China Electric Power Yearbook 2008) determine the year from which the added generation capacity is equal to or just exceeds 20% of the capacity of the latest statistic year 2007. The year selected is 2005, since which about 21.26% capacities has been added.
- Of the added capacity since 2005 78.74% is thermal capacity.
- The CO_2 emission weights by coal-fired, oil-fired and gas-fired plants of total CO_2 emission of Northwest China Power Grid in 2007, namely $\lambda_{coal,y}$,$\lambda_{oil,y,}$ $\lambda_{gas,y}$ is calculated as 98.14%, 0.08%, 1.77%.
- According to the data issued by China DNA, the efficiency levels of domestic sub-critical 600MW coal power unit and the efficiency level of 200MW combined cycle power unit are taken as the efficiency level of the best technology for coal-fired power plants, oil and gas fired power plants commercially available in China, which are at 38.1%,49.99%, 49.99%, respectively.

The emission factor is calculated as follows:

$EF_{thermal\ power}$ =98.14%* 0.8249+0.08%* 0.5437+1.77%* 0.3910 =0.8170 tCO_2e/MWh

The Build Margin emissions factor is now calculated as the percentage of thermal plant additions and thermal plant emissions factor.

Third, BM of the grid is calculated as follows:

$$EF_{grid,BM,y} = \frac{CAP_{Thermal,y}}{CAP_{Total,y}} * EF_{Thermal,y}$$

Where:

$CAP_{Total,y}$ is the additional capacity which is close to but not more than 20% of the existing capacity,

$CAP_{Thermal,y}$ is the additional capacity of thermal plants

Based on the formula above, the BM emission factor of Northwest China Power Grid for the proposed project in the crediting period is calculated as:

$$EF_{grid,BM,y} = 0.6433 \text{ tCO2/MWh.}$$

The value of $EF_{grid,BM,y}$ calculated ex-ante will be used and won't be updated during the fixed crediting period.

The details of $EF_{grid,BM,y}$ calculation are given in Annex 3.

Step 7. Calculate the combined margin emission factor EFelec,i,j,y

Based on "Tool to calculate the emission factor for an electricity system", the baseline emission factor EF_y should be calculated as the weighted average of the Operating Margin emission factor ($EF_{grid,OM,y}$) and the Build Margin emission factor ($EF_{grid,BM,y}$), where the weights W_{OM} and W_{BM} , are 50%(i.e. $W_{OM} = W_{BM} = 0.5$) by default, and ($EF_{grid,OM,y}$) and ($EF_{grid,BM,y}$) are calculated as described in Step 3 and 5.

$$EF_{elec,i,j,y} = 0.5*1.0246+0.5*0.6433=0.83395 \text{ (tCO}_2\text{e/MWh)}$$

The value of $EF_{elec,i,j,y}$ calculated ex-ante will be used and won't be updated during the fixed crediting period.

The method and data used in this section to calculate the $EF_{grid,OM,y}$ and $EF_{grid,BM,y}$ are based on the data issued by China's DNA on 02/07/2009, which is the latest and available data version published before validation.

Calculating capping of baseline emissions

As an introduction of element of conservativeness, this methodology requires that baseline emissions should be capped irrespective of planned/unplanned or actual increase in output of plant, change in operational parameters and practices, change in fuels type and quantity resulting into increase in generation of waste energy. In case of planned expansion a separate CDM project should be registered for additional capacity. The cap can be estimated using the three Methods described below. Project proponents shall use Method-1 to estimate the cap if data is available. In case of project activities

implemented in a new facility, or in facilities where three year data on production is unavailable, Method-2 shall be used. In case the project proponents demonstrate technical limitations in direct monitoring of waste heat/ pressure of waste energy carrying medium (WECM), then Method-3 is used.

Method-1: Where the historical data on energy released by the waste energy carrying medium is available, the baseline emissions are capped at the maximum quantity of waste energy released into the atmosphere under normal operation conditions in the three years previous to the project activity.

Method-2: The manufacturer's data for the industrial facility shall be used to estimate the amount of waste energy the industrial facility generates per unit of product generated by the process that generates waste energy (either product of departmental process or product of entire plant, whichever is more justifiable and accurate). In case any modification is carried out by project proponent or in case the manufacturer's data is not available for an assessment should be carried out by independent qualified/certified external process experts such as a chartered engineer on a conservative quantity of waste gas generated by plant per unit of product manufactured by the process generating waste gas/heat/pressure. The value arrived based on above sources of data, shall be used to estimate the baseline cap (f_{cap}). The documentation of such assessment shall be verified by the validating DOE. The basis for using the capped value, (including manufacturer's design document/letter and the expert's analysis) should be provided to DOE during validation.

Method-3: In some cases, it may not be possible to measure the waste energy (heat, sensible heat, heat of reaction, heat of combustion etc.), enthalpy or pressure content of WECM. Therefore there is no historic data available for these cases. The cases may be of following two types.

Case-1: The energy is recovered from WECM and converted into final output energy through waste heat recovery equipment. For such cases *fcap* should be the ratio of maximum theoretical energy recoverable using the project activity waste heat recovery equipment and actual recovered under the project activity (direct measurement). For estimating the theoretical recoverable energy, manufacturer's specifications can be used. Alternatively, technical assessment can be conducted by independent qualified/certified external process experts such as chartered engineers.

Case-2: The energy is recovered from WECM in intermediate energy recovery equipment using an intermediate source. For example, an intermediate source to carry energy from primary WECM may include the sources such as water, oil or air to extract waste energy entrapped in chemicals (heat of reaction) or solids (sensible heat). This intermediate energy source is finally used to generate the output energy in the final waste heat recovery equipment. For these cases *fcap* is the ratio of maximum theoretical intermediate energy recoverable from intermediate waste heat recovery equipment and actual intermediate energy recovered under the project activity (using direct measurement). For estimating the theoretical energy, manufacturer's specifications can be used. Alternatively, technical assessment can be carried out by independent qualified/certified external process experts such as chartered engineers.

For this project, there were no monitoring equipments installed previous to the proposed project, so there is no three years historical data available. Meanwhile, the waste gas generated can be directly monitored and the manufacturer's data for the industrial facility is available, so Method-2 is applied and under this method, following equations should be used to estimate f_{cap} .

$$f_{cap} = \frac{Q_{WCM,BL}}{Q_{WCM,y}} \quad (1g) \qquad Q_{WCM,BL} = Q_{BL,product} \times q_{wcm,product} \quad (1g\text{-}1)$$

Where:

$Q_{WCM,BL}$	Quantity of waste energy generated prior to the start of the project activity estimated using equation 1g-1. (kg of WECM or other relevant unit)
$Q_{BL,product}$	Production associated with the relevant waste energy generation as it occurs in the baseline scenario. The minimum of the following two figures should be used: (1) average annual historical production data from start-up, if plant operational history is less than three years, of the plant or (2) the most relevant manufacture's data for normal operating conditions. In case of new facilities or where data is not available the manufacture's data for normal operating conditions shall be used.
$q_{wcm,product}$	Amount of waste energy per unit of product generated by the process (that generates waste energy) in the industrial facility
$Q_{WCM,y}$	Quantity of WECM used for energy generation during year *y* (mass unit (kg))

Accoring to the methodology, the minimum of the following two figures should be used: (1) average annual historical production data from start-up, if plant operational history is less than three years, of the plant or (2) the most relevant manufacture's data for normal operating conditions. In case of new facilities or where data is not available the manufacture's data for normal operating conditions shall be used.
In this case, the semi-coke facilities came to operation in the end of 2008, and average annual production of semi-coke from January 1st to December 31st in 2009 amounts to 909,219 ton[21]; from the design institute of semi-coke facilities, the annual production capacity for normal operating conditions is 900,000 ton, hence the minimum one 900,000 ton is used in the calculation as $Q_{BL,product}$.

According to the equation above, the quantity of waste gas in the baseline scenario is estimated to be $4.35\times10^8 Nm^3/a$, the quantity of waste gas used in the proposed project activity will be equal to or smaller than the one in the baseline scenario, so the f_{cap} is calculated to be 1.

Over the 10 years' crediting period, the value of f_{cap} will be updated ex post when the $Q_{WCM,y}$ is monitored and its value is available for calculating f_{cap} as per the equation (1g) above.

Calculation of the energy generated (electricity and/or steam) in units supplied by WECM and other fuels

Situation-1: The procedure specified below, should be applied when the direct measurement of the energy generated using the WECM is not possible as other fossil fuel(s) along with WECM are used for energy generation. The relative share of the total generation from WECM is calculated by considering the total electricity produced, the amount and calorific values of the other fuels and of the WECM used, and the average efficiency of the plants where the energy is produced. It is not applicable here.

Situation-2: An alternative method that could be used when it is not possible to measure the net calorific value of the waste gas/heat, and steam generated with different fuels in dedicated boilers are fed to turbine/s through common steam header takes into account that the relative share of the total generation from WECM is calculated by considering the total steam produced and the amount of steam generated from each boiler. The fraction of energy produced by the WECM in project activity is calculated as

[21] The production statistics from the project owner

follows:

$$f_{WCM} = \frac{ST_{whr,y}}{ST_{whr,y} + ST_{other,y}}$$

Where:

$ST_{whr,y}$	Energy content of the steam generated in waste heat recovery boiler fed to turbine via common steam header
$ST_{other,y}$	Energy content of steam generated in other boilers fed to turbine via common steam header

As the proposed project activity generates electricity purely from the waste gas, not mixing with fossil fuels, hence the f_{WECM} =1.

Project Emissions

According to the methodology ACM0012 version 03.2, project Emissions include emissions due to (1) combustion of auxiliary fuel to supplement waste gas/heat and (2) electricity emissions due to consumption of electricity for cleaning of gas before being used for generation of energy or other supplementary electricity consumption; and (3) emissions due to consumption of imported electricity that in the absence of project activity would have been supplied by captive electricity generated (only for Type-2 project activities).

As the proposed project activity belongs to Type-1 project activities and there is no combustion of auxiliary fuel to supplement waste gas, in this case, project emissions include electricity emissions due to consumption of electricity as a result of the proposed project activity.

Project emissions due to electricity consumption as a result of the project activity have been considered and subtracted in the calculation of baseline emissions, thus the project emissions due to electricity consumption as a result of the project activity needn't to be taken into account in this step. Over the ten years' crediting period, the project emissions as a result of the project activity will be monitored and considered in the calculation of net electricity supply by the project activity, the parameters are listed in the section B6.2.

Leakage

In accordance with ACM0012, no leakage is considered.

Calculation of Emission Reductions

Emission reductions due to the project activity during the year *y* are calculated as follows:

$$ER_y = BE_y - PE_y$$

Where:

ERy	Total emissions reductions during the year y in tons of CO_2
BEy	Emissions from the project activity during the year y in tons of CO_2

PEy	Baseline emissions for the project activity during the year y in tons of CO_2 applicable for scenario 2.

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

Data / Parameter:	$Q_{WCM,BL}$
Data unit:	Nm^3 (It is an appropriate unit for gas.)
Description:	Quantity of waste gas generated prior to the start of the project activity.
Source of data used:	Manufacturer's specifications
Value applied:	$4.35*10^8$
Justification of the choice of data or description of measurement methods and procedures actually applied :	As three years historical data is not available, the method of estimated based on information provided by the technology supplier on the waste gas generation per unit of product and volume or quantity of production is used.
Any comment:	Given that this value is monitored only for the purpose of capping the emission reduction, its unit can be in Nm^3 rather than kg, provided that it is compared with values in the similar unit. Given that the flow meters provide measure in Nm^3, this unit is considered more appropriate, rather than kg, which would require the intermediate estimate/measurement of the gas density. Furthermore, It is noticed that this value is used in the proportion calculation equation of fcap, $f_{cap} = \frac{Q_{WCM,BL}}{Q_{WCM,y}} = \frac{Mass_{BL}}{Mass_y} = \frac{Volume_{BL} \times density(at\ NTP)}{Volume_y \times density(at\ NTP)} = \frac{Volume_{BL}}{Volume_y}$ the unit of the numerator and denominator should be kept the same and it can reduce a fraction to the lowest terms if the same parts exist. In this case, mass unit of gas equals to volume multiplies with density at NTP. If the temperature and pressure are the same, the density of the gas is the same. Then reduction of a fraction upon the density can be done. In the proposed project activity, the data showed in the flow meters are the value under the normal temperature and pressure condition, which is the same as the situation where the quantity of waste gas estimated in the baseline scenario. Hence in this case, monitoring mass unit is equivalent to monitoring volume at normal temperature and pressure. And the volume at NTP will be monitored and Nm^3 is appropriate unit.[22]

Data / Parameter:	$Q_{BL,product}$
Data unit:	Tons/yr
Description:	Production associated with the relevant waste energy generation as it occurs in the baseline scenario. The minimum of the following two figures should be used: (1) historical production data from start-up, if plant operational history is less than three years, of the plant or (2) the most relevant manufacture's data for

[22] http://www.chinaflow.com.cn/basic/jiliang_11.HTM

	normal operating conditions. In case of new facilities or where data is not available the manufacture's data for normal operating conditions shall be used.
Source of data used:	Manufacture's data
Value applied:	900,000
Justification of the choice of data or description of measurement methods and procedures actually applied :	In this case, the semi-coke facilities came to operation in the end of 2008, and average annual production of semi-coke from January 1st to December 31st in 2009 amounts to 909,219 ton[23]; from the design institute of semi-coke facilities, the annual production capacity for normal operating conditions is 900,000 ton, hence the minimum one 900,000 ton is used in the calculation as $Q_{BL,product}$.
Any comment:	For this project activity, the manufacture's data for normal operating conditions is used.

Data / Parameter:	$q_{wcm,product}$
Data unit:	Nm^3/Ton
Description:	Specific waste gas production per unit of product (departmental or plant product which most logically relates to waste gas generation) generated as per manufacturer's or external expert's data. This parameter should be analyzed for each modification in process which can potentially impact the waste gas quantity.
Source of data used:	Manufacture's data
Value applied:	483.3
Justification of the choice of data or description of measurement methods and procedures actually applied :	As the method 2 is used in this case, the source of data and calculation are in line with the method 2 in the methodology.
Any comment:	For this project activity, the manufacturer's data is used.

Data / Parameter:	$FC_{i,j,y}$
Data unit:	t/m^3
Description:	Total amount of fuel *i* (in a mass or volume unit) consumed by all the relevant power sources *j* in the Northwest China Power Grid during year y.
Source of data used:	China Energy Statistic Yearbook 2008
Value applied:	Please refer to annex 3.
Justification of the choice of data or description of measurement methods and procedures actually applied :	The detailed data of fuels consumed by power plants are not available publicly, so the aggregated data by fuel types are used instead.
Any comment:	-

Data / Parameter:	$NCV_{i,y}$

[23] The production statistics from the project owner

Data unit:	TJ/t(ce), TJ/m^3(ce)
Description:	Net calorific value per mass or volume unit of a fuel *i* in year y.
Source of data used:	China Energy Statistical Yearbook 2008
Value applied:	Please refer to annex 3.
Justification of the choice of data or description of measurement methods and procedures actually applied :	-
Any comment:	-

Data / Parameter:	$EF_{CO2,i,j,y}$
Data unit:	tCO_2/GJ
Description:	CO_2 emission factor per unit of energy of the fuel *i* in year y.
Source of data used:	2006 IPCC Guideline for National Greenhouse Gas Inventories.
Value applied:	Please refer to annex 3.
Justification of the choice of data or description of measurement methods and procedures actually applied :	This data is based on IPCC default value because the national specific value is unavailable.
Any comment:	-

Data / Parameter:	$EG_{m,y}$
Data unit:	MWh
Description:	Electricity imported to the grid by power source *m* of the Northwest China Power Grid in year of *y.*
Source of data used:	China Electric Power Yearbook 2006-2008
Value applied:	Please refer to annex 3.
Justification of the choice of data or description of measurement methods and procedures actually applied :	The detailed data of fuels consumed by power plants are not available publicly, so the aggregated data by fuel types are used instead.
Any comment:	-

Data / Parameter:	$OXID_{i,y}$
Data unit:	
Description:	oxidation factor of the fuel *i* by power source *m* of the Northwest China Power Grid in year of *y.*
Source of data used:	IPCC default value in revised 2006 IPCC Guideline for National Greenhouse Gas Inventories.
Value applied:	Please refer to annex 3.
Justification of the choice of data or	This data is based on IPCC default value because the national specific value is unavailable.

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

Data / Parameter:	$EF_{EL,m,y}$
Data unit:	tCO_2/MWh
Description:	CO_2 emission coefficient of fuel *i* by power source *m* of the Northwest China Power Grid in year of *y*.
Source of data used:	China Energy Statistic Yearbook 2008.
Value applied:	Please refer to annex 3.
Justification of the choice of data or description of measurement methods and procedures actually applied :	The detailed data of fuels consumed by power plants are not available publicly, so the aggregated data by fuel types are used instead.
Any comment:	-

Data / Parameter:	$EF_{ELec,i,j,y}$
Data unit:	tCO_2/MWh
Description:	CO_2 emission factor of the Northwest China Power Grid, displaced due to the project activity, during the year *y*.
Source of data used:	Data issued by China's DNA on 02/07/2009
Value applied:	0.83395
Justification of the choice of data or description of measurement methods and procedures actually applied :	Official Data
Any comment:	-

B.6.3 Ex-ante calculation of emission reductions:

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Step 1: Baseline Emission

Calculation o f f_{WCM}

Since the fuel used in the project activity is purely waste gas and there is no fossil fuels involved except for some for ignition, f_{WCM} equals to 1.

Calculation of f_{cap}

Quantity of waste gas generated prior to the start of the project activity $Q_{WCM,BL}$ is estimated to be larger than the quantity of waste gas used in the proposed project activity $Q_{WCM,y}$ is estimated to be

4.16×10^8 Nm^3.

So $f_{cap} = \frac{Q_{WCM,BL}}{Q_{WCM,y}}$ =1.

According to the feasibility study report, annual power generation is 180,000 MWh, annual electricity consumption is 27,000 MWh, and the net electricity supply is 153,000 MWh. Application of the formula presented in Section B6.1 to the baseline data presented in Annex 3 yields the following results:

$EF_{OM,y}$ of the Northwest China Grid is 1.0246 tCO_2e/MWh;

$EF_{BM,y}$ of the Northwest China Grid is calculated as 0.6433 tCO_2e/MWh;

$EF_{elec,i,j,y}$ of the Northwest China Grid is 0. 0.83395 tCO_2e/MWh;

$$BE_y = BE_{Elec,y} = f_{cap} * f_{wcm} * \sum_j \sum_i ((EG_{i,j,y} * EF_{Elec,i,j,y}))$$

= 1*1*153,000*0.83395

=127,594 tCO_2e.

The annual baseline emissions BE_y are thus calculated to be 127,594 tCO_2e. (Details referred to Annex3)

Step 2: Project Emission

There is no project emission for the electricity consumed by project activity has been subtracted during the calculation of baseline emissions.

Step 3: Leakage

According to ACM0012, there is no leakage for the proposed project activity.

Step 4: Emission Reductions

In a given year, the emission reductions realized by the project activity (ER_y) is equal to baseline GHG emissions (BE_y) minus project direct emissions and leakages during the same year:

ER_y =127,594-0 =127,594 tCO_2e

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

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Table B. 8 the estimation of the emission reductions in crediting period

Year	**Estimation of project activity emissions (tonnes of CO_2e)**	**Estimation of baseline emissions (tonnes of CO_2e)**	**Estimation of leakage (tonnes of CO_2e)**	**Estimation of overall emission reductions (tonnes of CO_2e)**
2011	0	127,594	0	127,594
2012	0	127,594	0	127,594
2013	0	127,594	0	127,594
2014	0	127,594	0	127,594
2015	0	127,594	0	127,594
2016	0	127,594	0	127,594
2017	0	127,594	0	127,594

2018	0	127,594	0	127,594
2019	0	127,594	0	127,594
2020	0	127,594	0	127,594
Total (tonnes of CO_2e)	0	1,275,940	0	1,275,940

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

B.7.1 Data and parameters monitored:

Data / Parameter:	$Q_{WCM,y}$
Data unit:	Mass unit (kg) (or Nm^3)
Description:	Quantity of WECM/waste gas used for energy generation during year y
Source of data to be used:	Actual measurements, plant operational records
Value of data applied for the purpose of calculating expected emission reductions in section B.5	4.16×10^8
Description of measurement methods and procedures to be applied:	Gas flow meters will be installed at the entrance of the Gas fired boilers separately to measure the waste gas used for power generation. Monitoring frequency: continuously The data will be electronically recorded monthly and in paper. The data will be archived electronically and kept for two years after the end of the last crediting period. Accuracy degree: 1 or above
QA/QC procedures to be applied:	The flow meters should be calibrated by the qualified institution or entity every year. During the time of calibration and maintenance, alternative flow meters should be used for monitoring
Any comment:	Given that this value is monitored only for the purpose of capping the emission reduction, its unit can be in Nm3 rather than kg, provided that it is compared with values in the similar unit. Given that the flow meters provide measure in Nm3, this unit is considered more appropriate, rather then kg, which would require the intermediate estimate/measurement of the gas density. Furthermore, It is noticed that this value is used in the proportion calculation equation of fcap, $f_{cap}=\frac{Q_{WCM,BL}}{Q_{WCM,y}}=\frac{Mass_{BL}}{Mass_y}=\frac{Volume_{BL}\times density(at\ NTP)}{Volume_y\times density(at\ NTP)}=\frac{Volume_{BL}}{Volume_y}$ the unit of the numerator and denominator should be kept the same and it can reduce a fraction to the lowest terms if the same parts exist. In this case, mass unit of gas equals to volume multiplies with density at NTP. If the temperature and pressure are the same, the density of the gas is the same. Then reduction of a fraction upon the density can be done. In the proposed project activity, the data showed in the flow meters are the value under the normal temperature and pressure condition, which is the same as the situation

	where the quantity of waste gas estimated in the baseline scenario. Hence in this case, monitoring mass unit is equivalent to monitoring volume at normal temperature and pressure. And the volume at NTP will be monitored and Nm^3 is appropriate unit[24])

Data / Parameter:	$EG_{GEN,y}$
Data unit:	MWh
Description:	Quantity of electricity generation by the project activity during the year y in MWh
Source of data to be used:	generation plant measurement records
Value of data applied for the purpose of calculating expected emission reductions in section B.5	According to Feasibility Study Report , value of the data is: 180,000
Description of measurement methods and procedures to be applied:	Accuracy degree: 0.5 or above. Monitoring frequency: continuously, aggregated monthly The meter(s) are installed at the outlet of the power generator. The electricity data is recorded every month and archived electronically. All the data will be kept at least for two years after the end of the last crediting period.
QA/QC procedures to be applied:	The electricity meters will undergo maintenance/calibration to the national relative power industry standards. Electricity meters will be calibrated by Qualified institution or entity once two years and calibration documents will be kept by Hengsheng company.
Any comment:	In case the meter for monitoring parameter $EG_{i,j,y}$ is out of work, the difference between the data of EG_{GEN} and $EC_{PJ,y}$ will be used for verification.

Data / Parameter:	$EG_{i,j,y}$
Data unit:	MWh
Description:	Quantity of net electricity (which is the difference of the quantity of the electricity upload and the electricity download) supplied by the project activity during the year y in MWh
Source of data to be used:	Actual measurements
Value of data applied for the purpose of calculating expected emission reductions in section B.5	According to Feasibility Study Report , value of the data is:153,000
Description of measurement methods	Accuracy degree: 0.5 or above. Monitoring frequency: continuously, aggregated monthly

[24] http://www.chinaflow.com.cn/basic/jiliang_11.HTM

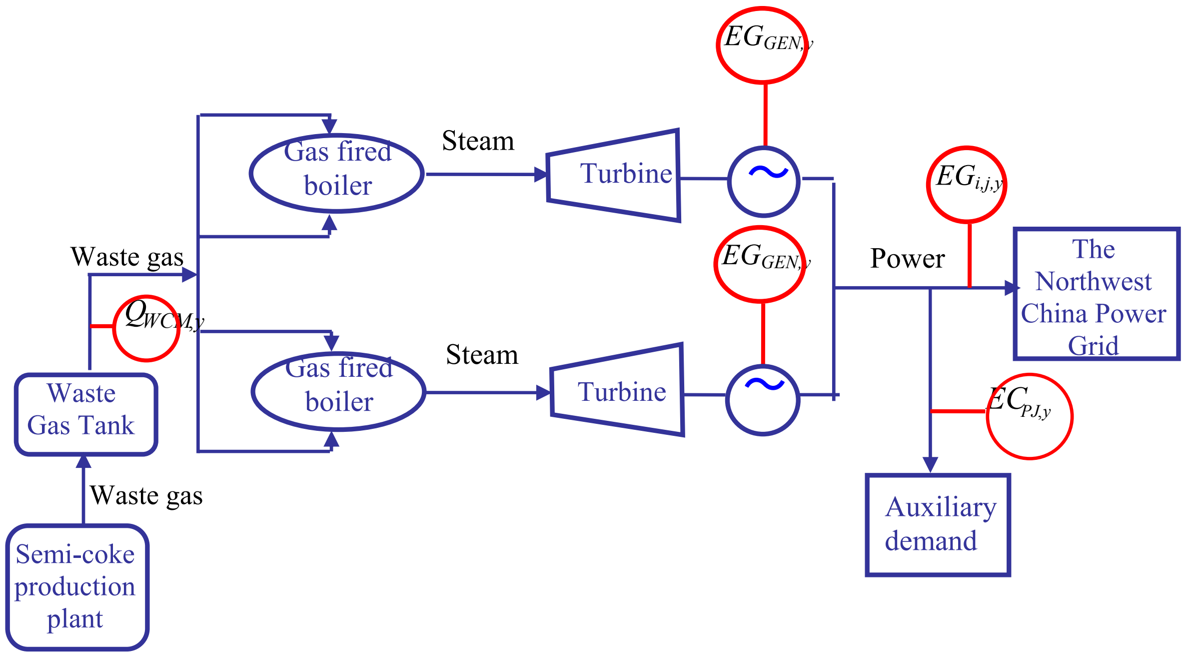
and procedures to be applied:	Measurement methods: Online continuous measurement, the value of electricity supplied can be accumulated and saved by the electricity meter and shown on DCS. Recording frequency: Monthly. The recorded data will be archived in electronic way, and will be kept in Credit period + 2 yrs. Emergency measures: Data can not be measured because of calibration or the electricity meter is out of order in the crediting period, then emergency measures should be taken. Please refer to section B.7.2 for detail information.
QA/QC procedures to be applied:	QA/QC for Monitoring Equipment: Calibration procedure: all the electricity meters are calibrated by qualified institution or entity once a year. A calibration report will be provided by the qualified institution or entity and kept by the project owner. CDM manager is responsible for regular calibration of the meter. QA/QC for Data: (1) The project owner cannot unseal electricity meters in the absence of the qualified institution or entity(or its authorized delegates) (2) The project owner will arrange operators recording the data monthly. (3) Sales records or purchase receipts are used to ensure the consistency.
Any comment:	If bi-directional meter will be used to monitor the net electricity supply, the electricity upload and electricity download will be monitored and recorded separately, the net electricity supply will be the difference of the quantity of the electricity upload and the electricity download. The main electricity meter will be installed at the 110KV substation, where is the recipient end of the grid, and it is the main meter for purchase receipts. Data shall be measured at the recipient plant(s) and at the generation plant for cross check. Sales records or purchase receipts shall be used for verification. DOEs shall verify that total energy supplied by the generator is equal to total electricity received by recipient plant(s).

Data / Parameter:	$EC_{PJ,y}$
Data unit:	MWh
Description:	Additional electricity consumed in year *y,* for other equipment in the system consumption, as a result of the implementation of the project activity.
Source of data to be used:	Actual measurements, plant operational records
Value of data applied for the purpose of calculating expected emission reductions in section B.5	According to Feasibility Study Report , value of the data is:27,000
Description of measurement methods and procedures to be applied:	Monitoring frequency: Continuously, aggregated monthly Accuracy degree: 0.5 or above. Measurement methods: Online continuous measurement, the value of electricity consumption can be accumulated and saved by the electricity meter and shown on DCS.

	Recording frequency: Monthly. The recorded data will be archived in electronic way, and will be kept in Credit period + 2 yrs. Emergency measures: Data can not be measured because of calibration or the electricity meter is out of order in the crediting period, then emergency measures should be taken. Please refer to section B.7.2 for detail information.
QA/QC procedures to be applied:	QA/QC for Monitoring Equipment: Calibration procedure: Meters are calibrated by qualified institution or entity once a year. A calibration report will be provided by the qualified institution or entity and kept by Hengsheng Company. CDM manager is responsible for regular calibration of the meter. QA/QC for Data: (1) Hengsheng Company cannot unseal electricity meters in the absence of the qualified institution or entity(or its authorized delegates) (2) Hengsheng Company will arrange operators recording the data monthly.
Any comment:	In case the meter for monitoring parameter $EG_{i,j,y}$ is out of work, the difference between the data of EG_{GEN} and $EC_{PJ,y}$ will be used for verification.

B.7.2 Description of the monitoring plan:

>>



This Monitoring plan will set out a number of monitoring tasks in order to ensure that all aspects of projected greenhouse gas (GHG) emission reductions for the project activity are controlled and reported. This requires an on going monitoring of the project to ensure performance according to its design and that

claimed Certified Emission Reductions (CERs) are actually archived.

The monitoring plan of the project activity is a guidance document that provides the set of procedures for preparing key project indicators, tracking and monitoring the impacts of the project activity. The monitoring plan will be used throughout the defined crediting period for the project to determine and provide documentation of GHG emission impacts from the project activity. This monitoring plan fulfils the requirement set out by the Kyoto Protocol that emission reductions projects under the CDM have real, measurable and long-term benefits and that the reductions in emissions are additional to any that would occur in the absence of the certified project activity.

1. Monitoring Targets

(1) Monitoring of Electricity supply to the Northwest China Power Grid

Electricity meters are installed to measure the quantity of electricity generation by the proposed project activity and the net quantity of electricity supplied to Northwest China Power Grid. Meter for monitoring parameter EG_{GEN} is installed at the exit of the power generator for monitoring the electricity generation, and meter for monitoring parameter $EC_{PJ,y}$ is installed in the power generation plant for monitoring the electricity consumption by the proposed project activity, meter for monitoring parameter $EG_{i,j,y}$ (which is the difference of the quantity of the electricity upload and the electricity download, the electricity upload and electricity download will be monitored and recorded separately) is installed at the 110KV substation (where is the recipient end of the grid) to measure the net quantity of power supplied to the grid by the project activity, which is the main electricity meter for emission reduction calculation.
The sales records or purchase receipts will be used for cross-checking the net quantity of electricity supplied to the grid by the proposed project activity. In case the meter for monitoring parameter $EG_{i,j,y}$ is out of work, the difference between the data of EG_{GEN} and $EC_{PJ,y}$ will be used for verification. The data measured by meters will be archived in the electronic way and kept for two years after the end of the last crediting period. And the data will be recorded monthly.

(2) Monitoring of Electricity consumption as a result of the project activity ($EC_{PJ,y}$)

Electricity meters are installed to measure the auxiliary consumption of electricity caused by the proposed project activity. The data measured by meters will be archived in the electronic way and kept for two years after the end of the last crediting period. And the data will be recorded monthly.

(3) Monitoring of waste gas for power generation

Flow meters are installed at the entrance to the gas fired boilers to measure the quantity of waste gas that supplies for power generation. All of the metering equipments will be properly calibrated and checked annually for accuracy according to the latest relevant national standards available. The data will be recorded monthly. And the data will be archived electronically and kept for two years after the end of the last crediting period.

2. Monitoring Procedures
(1) Measurement
All the meters used in the proposed project activity are calibrated according to the latest relevant national standards available. The accumulated data on electricity meters and gas flow meters will be recorded according to monitoring Methodology. All the data will be archived electronically and kept at least two years after the last crediting period.

(2) Identification

The trained operators will identify the data whether it is reasonable in 24 hours. And they will go on a tour of inspection focusing on all meters. If the operator finds out the data isn't credible, emergency plan will be used. The method of data identification and the detailed procedure are defined on CDM Operational Manual.

(3) Calculation
The Emission Reduction Calculation will be executed by computer in the designed Excel sheet with the data archived, based on the defined formula of ACM0012version03.2. The calculation will be executed every month by CDM manager.

(4) Archiving
The operators will archiving the identified data and save them into computer. The records will be kept for two years after the end of the crediting period or the last issuance of CERs.

3. Quality Assurance and Quality Control
(1) For measurement equipments——Calibration of Meters

All of electricity meters will be calibrated according to the latest relevant national standards available once a year by qualified institution or entity. After calibration, calibration reports will be provided by qualified institution or entity and kept by Hengsheng Company. This would be in the charge of CDM manager. Backup electricity meters and flow meters which have been calibrated will be prepared for replacement of each meter in case any of them doesn't work.

(2) For Monitoring Process——Computer Execution with Human Supervision

The Monitoring Process will be arranged and supervised by persons, meanwhile executed by computer, which will avoid artificial errors. The operation report forms should be archived. If the abnormal situation happens, the emergency plan will be started up.

(3) For Emergency Situation——Backup Meters and Conservative Method
When main meters are on calibration or out of work, backup meters are to be used and the data in the calibration or malfunction period measured by backup meters are used to calculate the emission reduction. The starting time and the ending time should be recorded carefully; and the report needs to be archived and provided to DOE.

For monitoring the net electricity supply to the grid:

When monitoring data of the meters in the power generation plant are not available, the data of the meters installed for monitoring the electricity supply to the grid will be cross checked and used in the emission reductions calculation and the starting time and the ending time should be identified and recorded carefully. The report needs to be archived and provided to DOE.

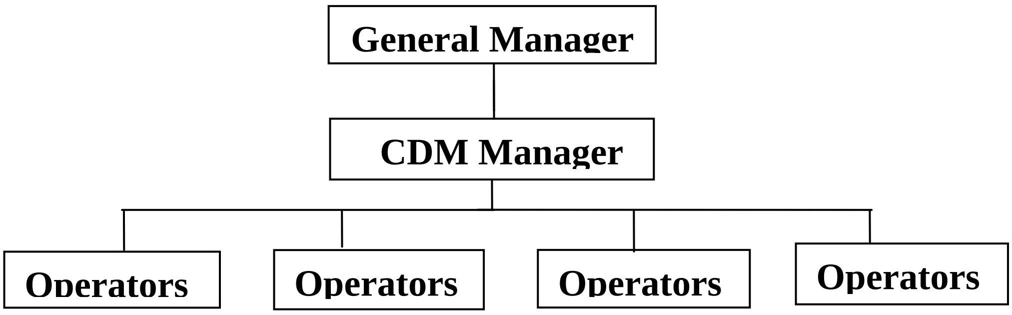
When the data from recipients (grid) are not available, the difference from the power generation and the electricity for consumption in the plant will be used for cross check and used in the emission reductions calculation. The starting time and ending time should be identified and recorded carefully and the report needs to be archived and provided to DOE.

When the waste gas provision is paused and the starting and ending time should be recorded carefully and the emission reductions during this period will not be included.

(4)For Human Resource Management——Training Plan

The training course should be performed according to the methodology ACM0012, *"Monitoring Plan", "CDM Operational Manual"* and conducted appropriately by CDM consultants. Relative documentation or other materials such as: the training plan, training materials, training report or test paper should be archived and provided to DOE at the time of verification.

4. Operational and Management Structure



(1) Responsibility of General Manager:

All the affairs related to CDM project monitoring is managed by general manager.

(2) Responsibility of CDM Manager:

In charge of Meters calibration and training affairs; Check the daily operation report forms; Archive emergency situation disposal report.

(3) Responsibility of operators:

In charge of data supervision, identification, and archivingment; Executive emergency plan; Draft operation report forms and emergency situation disposal report.

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

>>

Date of completing draft of the baseline and monitoring section:

The current version of baseline and monitoring study was completed on 12th , December, 2009.

The name of the responsible person/ entity:

Shenmu Jingyuan Clean Development Co., Ltd., which is not the project participant.

Address: No. 501, Flat 2, Power Bureau, South Area, Dongxing Street, Shenmu County, Shanxi Province, China

The entity above is not project participant.

SECTION C. Duration of the project activity / crediting period

C.1 Duration of the project activity:

C.1.1. Starting date of the project activity:

>>30/04/2009 (the date of the gas-fuelled boiler purchasing was signed, which is earliest date in line with CDM Glossary Term)

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

>>15 years 0 month

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

C.2.1. Renewable crediting period

Not applicable

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

>> Not applicable

C.2.1.2. Length of the first crediting period:

>> Not applicable

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

>>01/01/2011

C.2.2.2. Length:

>>10years 0 month

SECTION D. Environmental impacts

>>

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

>>

The EIA Table was finished in February, 2009 by Yulin City Environmental Scientific & Technological Consulting Service Department and approved by Shaanxi Provincial Environmental Protection Bureau on 2nd March, 2009 for the environmental impacts of this project during the construction phase and operational phase reach relevant national standards for the environmental quality. All the documents related to EIA of the project activity will be detailed in the final version of this PDD for validation. No adverse impacts including trans-boundary impacts are arising due to the project activity.

Environmental impact and treatments of the project is as follows:

- **During Construction Phase：**

1. Impact to the air: the influence to the air mainly caused by the dust raised by earthwork and building material transportation. The tail gas of automobile and waste gas of constructing equipments also

contributes a lot to the air pollution. However, this influence will be disappear when the construction is finished.

2. Water pollution: waste water from construction and daily life of the workers will be used to wash the floor, water the trees or recovered after sedimentation process. Thus, it will not pollute the surface water and underground water.
3. Noise pollution: the noise pollution mainly comes from the construction equipments and vehicles. With the soundproof wall, the level of noise will reduced by 10-20 dB (A) and reaches the requirement of II level of Standard of Environmental Noise of Urban Area (GB 3096-93). The noise from construction equipment will also do some harm to the workers. Then, noise mitigation measure will be adopted to guarantee the health of the workers.
4. Solid waste pollution: the solid waste in construction period is cement, tile, lime and sands. These waste will pollute the water body by rain washing. Thus, the waste material and domestic garbage will be collected and treated centralized.

- **<u>During Operational and Maintenance Phase</u>**

1. **Air pollution**: the pollutants contained in the waste gas combusted are NOx and SO2, which is discharged through a chimney with 80m high. The emission concentration of the waste gas is in line with the III Emission Standard of Air Pollutants for Thermal Power Plant (GB13223-2003).

2. **Noise pollution**: noises from the proposed project activity will be mostly from the turbines, generator and relief valves in the boiler, estimated to be 80-110 dB (A). Turbines, pumps and other equipments will be designed and specified with a view to minimize noise pollution. Adequate measures have been adopted in the project activity to ensure noise levels are maintained well within permissible industrial norms.

3. **Water pollution**: waste water of the power plant include boiler sewage, condensing water, sewage from chemical treatment workshop and domestic sewage. The industrial sewage will be collected by the waste water treatment system in Hengsheng Company and recovered. And the pollution to underground water will be controlled as following:

- The solid waste should be stacked and removed properly, and keep dry from rainy water
- The equipment should be maintained regularly to avoid underground water pollution from running, water leakage and dropping and raw material throwing.

4. **Solid waste pollution**: No solid waste will be produced from production. The domestic garbage will be used for composting or land-filled.

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

>>

The EIA study on the project has revealed that though there some unavoidable influence to the air, sound and water, etc. during the construction phase and operating phase, pollution treatments adopted by the project help reduce the pollutants below the established guideline level. Thus, considered in terms of environment protection, implementation of the project is feasible.

SECTION E. Stakeholders' comments

>>

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

>>

On 9th January 2009, public notices for collecting the comments by local stakeholders were put up at the project site and the downtown of Shenmu county by Hengsheng Company. From 10th January to 11th January of 2009, the project owner Hengsheng Coal Chemicals Co., Ltd. conducted interviews and received comments from local stakeholders around. As a common method of stakeholder consultation used mainly, questionnaire is convenience and efficiency, and relative to consulting meeting, it is easily to be filled and to be collected. Thus, it is used by most CDM PP in China. The opinions of soliciting government are also collected in form of questionnaire. The main content of one-page questionnaire designed is listed as follow:

1. Project introduction
2. Basic information and education level
3. The stakeholders identified with the project are as follows:

    - Inhabitants of Ningtiaota industry zone(20 questionaires);
    - Staff of the project owner Hengsheng Coal Chemicals Co., Ltd. (20 questionaires);
    - Government opinion
    - Male: 87.5%, female:12.5%;
    - Educational level: middle school:87.5%, high school level: 2.5%, the other: 10%
4. Key questions:

    - Did you get to know about the project activity?
    - What positive impacts will the project activity have upon the local economy development?
    - What negative impacts will the construction of project activity have upon the eco-environment?
    - Whether does the project increase the noise in the local?
    - Whether does the project affect to the air nearby?
    - What negative impacts will the project activity have upon the residents' living?
    - Whether does the project make more employment opportunities?
    - Whether does the project increase the income of inhabitants?
    - Do you support the project activity?

The survey had a 100% response rate (40 questionnaires returned out of 40).

E.2. Summary of the comments received:

>>

After collecting the questionnaires, the following are the key findings:

1. Official delegates of Government think that the project is in line with national policy of sustainable development and help to improve local environment by recover the waste semi-coke tail gas.
2. When asked for the information of the project activity, all of them knew it.
3. When asked for the comments on the positive impact on local development, all of them think it will promote the local economy development.
4. When asked for the comments on the negative impacts on the eco-environment, 97.5% think that it will be positive for the natural environment; 2.5% does not care for this.
5. When asked for increasing the noise in the local, 92.5% think it will not increase the noise; 2.5% think it does; 5% does not care for this.
6. When asked for affecting to the air nearby, 97.5% think it will reduce air pollution; 2.5% does not care for this.

7. When asked for the comments on the project activity's negative impacts on the local residents, 95% think it will be not harm to their living condition; 5% does not care for this.
8. When asked for the comments on employment opportunities, 92.5% think it will create employment opportunities; 7.5% does not care for this.
9. When asked for the comments on the income of inhabitants, 90% think it will increase their incomes; 7.5% think it will not increase their incomes; 2.5% does not care for this.
10. 100% residents support the construction of the project and nobody opposes it.

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

>>

According to the comments received from the stakeholders of the project activity, some local villagers show worries in a certain extent about possible noise. Corresponding to these comments, Hengsheng Company will take the measures as follows:

The noise caused by the activity will be restricted to be within the range of the permission of industry standard. Turbines, pumps and other equipments will be designed and specified with a view to minimize noise pollution; while the nearest local inhabitants live away from the power plant 3,000 meters. So the operational sound would not influence the local Inhabitants.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Organization:	Shenmu County Hengsheng Coal Chemical Co., Ltd.
Street/P.O.Box:	Ningtiaota Industry Zone, Shenmu County
Building:	
City:	Yulin
State/Region:	Shaanxi
Postfix/ZIP:	719300
Country:	People's Republic of China
Telephone:	0912-8322320
FAX:	0912-8321318
E-Mail:	Ljcdm016@163.com
URL:	
Represented by:	Wang Jihu
Title:	
Salutation:	Mr.
Last Name:	Wang
Middle Name:	
First Name:	Jihu
Department:	
Mobile:	
Direct FAX:	0912-8322320
Direct tel:	0912-8321318
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Postfix/ZIP:	28042
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E-Mail:	jesus.abadia@endesa.es
URL:	
Represented by:	Jesús Abadía Ibañez
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Salutation:	
Last Name:	Abadía Ibañez
Middle Name:	
First Name:	Jesús
Department:	
Mobile:	
Direct FAX:	+34 912131052
Direct tel:	+34 912131414
Personal E-Mail:	jesus.abadia@endesa.es

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

There is no public funding from Annex I countries

Annex 3

BASELINE INFORMATION

Table 1 Low calorific values, CO_2 emission factors and oxidation factors of fuels

Fuel	Low Calorific Value (KJ/Kg)	Emission Factor (tC/TJ)	Oxidation Factor
Raw coal	20908	25.8	100%
Clean coal	26344	25.8	100%
Other washed coal	8363	25.8	100%
Moulded coal	20908	26.60	100%
Coke	28435	29.2	100%
Crude oil	41816	20	100%
gasoline	43070	18.9	100%
kerosene	43070	19.6	100%
Diesel oil	42652	20.2	100%
Fuel oil	41816	21.1	100%
Other fossil fuel products	38369	20.00	100%
Other coke products	28435	25.80	100%
Natural gas	38931	15.3	100%
Coke oven gas	16726	12.1	100%
Other coal gas	5227	12.1	100%
LPG	50179	17.2	100%
Refinery dry gas	46055	15.7	100%

Data Source:
The net calorific values are quoted from <China Energy Statistical Yearbook 2008>, Page 283.

The following tables summarize the numerical results from the equations listed in the “Tool to calculate the emission factor for an electricity system”. The information listed in the tables includes data, data sources and the underlying computations.

Table 2 Fuel consumption and emission of Northwest China Power Grid in 2005

Fuel type	unit	Shaanxi A	Gansu B	Qinghai C	Ningxia D	Xinjiang E	Fuel Consumption F=A+B+C+D+E	Carbon Possession (tc/TJ) G	Fuel emission factor (KgCO2/TJ) I	average low Caloric value (MJ/t,km^3,tce) I	CO_2 emission (tCO_2e) K=F×I×J/100000 (Mass Unit) K=F×I×J/10000 (Volumn Unit)
Raw coal	10^4tonne	2461.28	1597	345.1	1467.7	1358.09	**7229.17**	25.8	87,300	20,908	131,951,756
Clean coal	10^4tonne	16.22					**16.22**	25.8	87,300	26,344	373,033
Other washed coal	10^4tonne	35.56			101.95	10.2	**147.71**	25.8	87,300	8,363	1,078,416
Coke	10^4tonne	3.23					**3.23**	29.2	95,700	28,435	87,896
Coke oven gas	10^8m^3						**0**	12.1	37,300	16,726	0
Other coal gas	10^8m^3						**0**	12.1	37,300	5,227	0
Crude oil	10^4tonne					0.18	**0.18**	20	71,100	41,816	5,352
gasoline	10^4tonne	0.02				0.01	**0.03**	18.9	67,500	43,070	872
Diesel oil	10^4tonne	2.24	0.46	0.06		0.5	**3.26**	20.2	72,600	42,652	100,947
Fuel oil	10^4tonne	0.01	0.57			0.25	**0.83**	21.1	75,500	41,816	26,204
LPG	10^4tonne						**0**	17.2	61,600	50,179	0
Refinery gas	10^8m^3					7.71	**7.71**	15.7	48,200	46,055	171,151
Natural gas	10^4tonne	1.46	0.52	1.33		7.81	**11.12**	15.3	54,300	38,931	2,350,716
Other petroleum product	10^4tonne						**0**	20	75,500	41,816	0
Other coke product	10^4tonne						**0**	25.8	95,700	28,435	0
Other energy	10^4tonne	8.24	1.3				**9.54**	0	0	0	0
total											136,146,341

Data source: China Energy Statistic Yearbook2006

Table3 The fossil-fired electricity generation of Northwest China Grid in 2005

Province	Electricity Generation	Auxiliary Power Ratio	Supplied Electricity
	(10^8KWh)	(%)	(MWh)
Shaanxi	411	7.16	38,157,240
Gansu	331.06	4.23	31,705,616
Qinghai	55	2.69	5,352,050
Ningxia	276.43	5.73	26,059,056
Xinjiang	265.6	8.8	24,222,720
Sum			125,496,682

Data source: China Electric Power Yearbook 2006

Total emission (tCO2e): 136,146,341
Total electricity supply (MWh): 125,496,682
$EF_{(2005)}$: 1.08486 tCO2e/ MWh

Table 4 Fuel consumption and emission of Northwest China Power Grid in 2006

Fuel type	unit	Shaanxi	Gansu	Qinghai	Ningxia	Xinjiang	Fuel Consumption	Carbon Possession (tc/TJ)	Fuel emission factor (KgCO2/TJ)	average low Caloric value (MJ/t,km^3,tce)	CO_2 emission (tCO_2e) K=F×I×J/100000 (Mass Unit) K=F×I×J/10000 (Volumn Unit)
		A	B	C	D	E	F=A+B+C+D+E	G	I	I	
Raw coal	10^4tonne	2834.44	1660.92	421.86	1833.72	1547.69	**8298.63**	25.8	87,300	20,908	151,472,271
Clean coal	10^4tonne						**0**	25.8	87,300	26,344	0
Other washed coal	10^4tonne				112.7	8.45	**121.15**	25.8	87,300	8,363	884,504
Coke	10^4tonne				0.01		**0.01**	29.2	95,700	28,435	272
Coke oven gas	10^8m^3	0.2				0.08	**0.28**	12.1	37,300	16,726	17,469
Other coal gas	10^8m^3	0.1					**0.1**	12.1	37,300	5,227	1,950
Crude oil	10^4tonne					0.02	**0.02**	20	71,100	41,816	595
gasoline	10^4tonne	0.01					**0.01**	18.9	67,500	43,070	291
Diesel oil	10^4tonne	1.14	0.24	0.61		1.25	**3.24**	20.2	72,600	42,652	100,328
Fuel oil	10^4tonne		0.6			0.11	**0.71**	21.1	75,500	41,816	22,415
LPG	10^4tonne						**0**	17.2	61,600	50,179	0
Refinery gas	10^8m^3						**0**	15.7	48,200	46,055	0
Natural gas	10^4tonne	1.59	0.56	1.06		7.49	**10.7**	15.3	54,300	38,931	2,261,930
Other petroleum product	10^4tonne						**0**	20	75,500	41,816	0
Other coke product	10^4tonne	1.86					**1.86**	25.8	95,700	28,435	50,615
Other energy	10^4tonne	33.57	8.81			2.2	**44.58**	0	0	0	0
total											154,812,639

Data source: China Energy Statistic Yearbook2007

Table5 The fossil-fired electricity generation of Northwest China Grid in 2006

Province	Electricity Generation	Auxiliary Power Ratio	Supplied Electricity
	(10^8KWh)	(%)	(MWh)
Shaanxi	544.82	6.97	50,684,605
Gansu	357.38	4.29	34,204,840
Qinghai	72.04	2.57	7,018,857
Ningxia	367.31		36,731,000
Xinjiang	299.01	8.02	27,502,940
Sum			156,142,241

Data source: China Electric Power Yearbook 2007

Total emission (tCO2e): 154,812,639
Total electricity supply (MWh): 156,142,241
$EF_{(2006)}$: 0.99148 tCO2e/ MWh

Table 6 Fuel consumption and emission of Northwest China Power Grid in 2007

Fuel type	unit	Shaanxi A	Gansu B	Qinghai C	Ningxia D	Xinjiang E	Fuel Consumption F=A+B+C+D+E	Carbon Possession (tc/TJ) G	Fuel emission factor (KgCO2/TJ) I	average low Caloric value (MJ/t,km^3,tce) I	CO_2 emission (tCO_2e) K=F×I×J/100000 (Mass Unit) K=F×I×J/10000 (Volumn Unit)
Raw coal	10^4tonne	3303.44	1969.03	470.85	2165.8	1762.11	**9671.23**	25.8	87,300	20,908	176,525,905
Clean coal	10^4tonne						**0**	25.8	87,300	26,344	0
Other washed coal	10^4tonne	3.73			124.31	7.73	**135.77**	25.8	87,300	8,363	991,243
moulded coal	10^4tonne	3.53					**3.53**	26.6	87,300	20,908	64,432
Coke	10^4tonne						**0**	29.2	95,700	28,435	0
Coke oven gas	10^8m^3	0.52	0.65			0.26	**1.43**	12.1	37,300	16,726	89,215
Other coal gas	10^8m^3	14.14	0.71				**14.85**	12.1	37,300	5,227	289,526
Crude oil	10^4tonne					0.09	**0.09**	20	71,100	41,816	2,676
gasoline	10^4tonne	0.02					**0.02**	18.9	67,500	43,070	581
Diesel oil	10^4tonne	1.12	0.26	0.42		1.77	**3.57**	20.2	72,600	42,652	110,546
Fuel oil	10^4tonne	0.01	1.05	0.04		0.05	**1.15**	21.1	75,500	41,816	36,307
LPG	10^4tonne						**0**	17.2	61,600	50,179	0
Refinery gas	10^8m^3					5.99	**5.99**	15.7	48,200	46,055	132,969
Natural gas	10^4tonne	1.68	0.49	1.93		8.66	**12.76**	15.3	54,300	38,931	2,697,404
Other petroleum product	10^4tonne						**0**	20	75,500	41,816	0
Other coke product	10^4tonne						**0**	25.8	95,700	28,435	0
Other energy	10^4tonne	94.36	9.73				**104.09**	0	0	0	0
total											180,940,805

Data source: China Energy Statistic Yearbook2008

Table7 The fossil-fired electricity generation of Northwest China Grid in 2007

Province	Electricity Generation	Auxiliary Power Ratio	Supplied Electricity
	(10^8KWh)	**(%)**	**(MWh)**
Shaanxi	591	6.77	55,098,930
Gansu	424	5.89	39,902,640
Qinghai	97	7.19	9,002,570
Ningxia	435		43,500,000
Xinjiang	346	9.2	31,416,800
Sum			178,920,940

Data source: China Electric Power Yearbook 2008

Total emission (tCO2e): 180,940,805
Total electricity supply (MWh): 178,920,940
EF $_{(2004)}$: 1.01129 tCO2e/ MWh

The Simple OM emission factor ($EF_{grid,OM,y}$): 1.0246 tCO2e/ MWh

The conservative calculation of the build margin emission factor of the Northwest China Grid has been explained in Section B in the PDD. The data, sources and calculation process of the build margin emission factor and combined emission factor of the Northwest China Grid are shown in Table 8, Table 9 and Table 10.

Table 8 Percentages of CO2 emissions from the coal-fired, gas-fired and oil-fired power plants in total fuel-fired CO2 emissions

Fuel type	unit	Shaanxi	Gansu	Qinghai	Ningxia	Xinjiang	Fuel Consumption	average low Caloric value (MJ/t,km^3,tce)	Carbon Possession (KgCO2/TJ)	Oxidation Factor	CO_2 emission (tCO_2e)
		A	B	C	D	E	F=A+……+E	G	H	I	J=F*G*H*I*44/12/100
Raw coal	10^4tonne	3,303.44	1,969.03	470.85	2,165.80	1,762.11	9,671.23	20,908	87,300	100%	176,525,905
Clean coal	10^4tonne	0	0	0	0	0	0	26,344	87,300	100%	0
Other washed coal	10^4tonne	3.73	0	0	124.31	7.73	135.77	8,363	87,300	100%	991,243
Moulded coal	10^4tonne	3.53	0	0	0	0	3.53	20,908	87,300	100%	64,432
Coke	10^4tonne	0	0	0	0	0	0	28,435	95,700	100%	0
Other coke products	10^4tonne	0	0	0	0	0	0	28,435	95,700	100%	0
Total											**177,581,580**
Crude oil	10^4tonne	0	0	0	0	0.09	0.09	41,816	71,100	100%	2,676
gasoline	10^4tonne	0.02	0	0	0	0	0.02	43,070	67,500	100%	581
Diesel oil	10^4tonne	1.12	0.26	0.42	0	1.77	3.57	42,652	72,600	100%	110,546
Fuel oil	10^4tonne	0.01	1.05	0.04	0	0.05	1.15	41,816	75,500	100%	36,307
Other Oil products	10^4tonne	0	0	0	0	0	0	41,816	75,500	100%	0
Total											**150,110**
Natural gas	10^7m^3	16.8	4.9	19.3	0	86.6	127.6	38,931	54,300	100%	2,697,404
Coke oven gas	10^7m^3	5.2	6.5	0	0	2.6	14.3	16,726	37,300	100%	89,215
Other coal gas	10^7m^3	141.4	7.1	0	0	0	148.5	5,227	37,300	100%	289,526
LPG	10^4tonne	0	0	0	0	0	0	50,179	61,600	100%	0
Refinery dry gas	10^4tonne	0	0	0	0	5.99	5.99	46,055	48,200	100%	132,969
Total											**3,209,114**
Total											**180,940,805**

Data source: China Energy Statistic Yearbook2008

According to the data in the table above, $\lambda_{Coal,y}$ =98.14%， $\lambda_{Oil,y}$ =0.08%， $\lambda_{Gas,y}$ =1.77% (λ is the ratio of CO_2 emission by burning coal, oil, gas to the total emission).

Table 9 Calculating of Emission Factor for Various Power Plant

	variable	Power generation efficiency	Emission factor	Oxidation	Emission factor
		A	B	C	D=3.6/A/1000*B*C*44/12
Coal-fire power plant	$EF_{coal,adv,y}$	38.10	87,300	1	0.8249
Gas-fired power plant	$EF_{gas,\ adv,y}$	49.99	75,500	1	0.5437
Oil-fired power plant	$EF_{oil,adv,y}$	49.99	54,300	1	0.3910

According to Table 8 and Table 9, $EF_{Thermal,y} = \lambda_{coal,y} \times EF_{coal,adv,y} + \lambda_{oil,y} \times EF_{oil,adv,y} + \lambda_{gas,y} \times EF_{gas,adv,y}$ = 0.8170 tCO_2e/MWh

Table 10 Capacity additions used to determine the Build Margin of Northwest China Grid from 2005 to 2007

	installed capacity 2005 (MW)	installed capacity 2006 (MW)	installed capacity 2007 (MW)	New installed capacity (MW)	New install capacity proportion(%)
	A	B	C	D=C-A	
Fuel fired power	25,362.6	29,627	35,620	10,257.4	78.74%
Hydro power	12,219.8	14,074	14,590	2,370.2	18.20%
Nuclear power	0	0	0	0	0.00%
Wind power and other	399.5	399	798.5	399	3.06%
total	**37,981.9**	**44,100**	**51,008.5**	**13,026.6**	**100.00%**
Proportion to capacity of 2007(%)	74.46%	86.46%	100%		

Data: China Electricity Yearbook 2006－2008

$$EF_{grid,BM,y} = 0.8170 \times 78.74\% = 0.6433 \text{ tCO2e/MWh}$$

$$EF_{grid,y} = 0.5 \times EF_{grid,OM,y} + 0.5 \times EF_{grid,BM,y} = 0.5 \times 1.0246 + 0.5 \times 0.6433$$
$$= 0.83395 \text{ tCO}_2\text{e/MWh}$$

Annex 4

MONITORING INFORMATION

There is no further more information.