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:

Shaanxi Haiyan Coke Making Group 24MW Waste Coke Oven Gas (COG) Based Electricity Generation Plant
Version: 1.0
Date: 08/12/2008

A.2. Description of the project activity:

The proposed project is located in Longmen town, Hancheng city, Shaanxi province and the owner of the proposed project is Shaanxi Haiyan Coke Making (Group) Co., Ltd. (Hereinafter referred to the project owner), who has coke production lines with total annual production capacity of one million tons. During the coke production process, Coke Oven Gas (COG) gas will be produced every year (H_2, CH_4, N_2 and other combustible gas with heating 16853～16375KJ/Nm^3 and pressure 4000-6000Pa)) . Total amount of the WECM (waste energy carrying medium) is about 27400 Nm^3/hr, which is directly emitted to the atmosphere through the chimney after ignition; therefore, a lot of energy (WECM) is wasted. The proposed project is to recover the waste Coke Oven Gas, which is realized by setting up power generator using waste Coke Oven Gas, as energy source for grid-connected electricity generation. The baseline scenario of the proposed project is the continuation of the existing situation.

The proposed project will install 2×75t/h waste gas recovery boilers and two sets of 12MW steam turbine generator in order to recover and utilize the waste Coke Oven Gas. The increase of net annual delivered electricity supply is 163,800 MWh. In the absence of the proposed project, the same amount of electricity (163,800 MWh) is from grid system (NWPG), which is mainly from fossil fuel fired power plants. According to the China DNA, the regional grid (NWPG) has CO_2 emission factor 0.877[1], therefore, the annual emission from gird for the same amount of electricity is 143,653 tCO_2. As the proposed project uses waste gas to produce electricity, there will be no emission of greenhouse gas involved. Hence, the emission reduction of the proposed project is 143,653 ton/year.

The project, which utilizes waste Coke Oven Gas from coke production for electricity generation, has significant environmental and social benefits. It will contribute to the local sustainable development as followings.

- Promote the integrated utilization of waste gas resource and reduce the waste of energy resources and heat pollution.
- Increase the supply of power and relieve the local shortage of power partly.
- Displace part of electricity of NWPG and reducing the local environmental pollution (SO_2, TSP) resulted from burning coal.
- Reduce the heat pollution caused by direct emission to the open air of high temperature flue gas.
- Create 115 employment opportunities when operation.

A.3. Project participants:

[1] http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/2008/200887164119674.pdf

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)	Shaanxi Haiyan Coke Making (Group) Co., Ltd.	No
Japan	Tepia Corporation Japan Co., Ltd. CER Buyer	No

For detailed contact information of the project participants, please refer to Annex 1

A.4. Technical description of the project activity:

A.4.1. Location of the project activity:

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.:

Longmen town, Hancheng city

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

The project is located in Longmen town, Hancheng city, Shaanxi province; its west is adjacent No.108 Highway, 30km away from Hancheng Railway station. It enjoys the convenient traffic as showed in Figure 1.

The proposed project is situated within the coke-making factory. Its geographical coordinates is N 35° 34′ 0.92″, E110° 28′ 34.31″.

Shaanxi province in China

Hancheng city in Shaanxi Provimnce

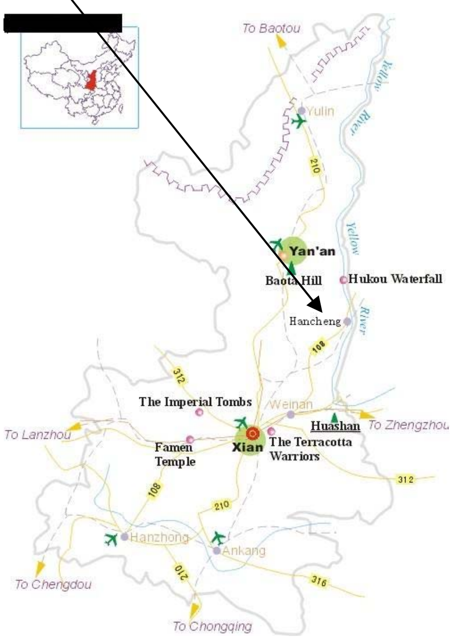

Figure 1: Project Location (Hancheng City, Shaanxi Province)

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

Sectoral scope 1: Energy Industries
Sectoral scope 4: Manufacturing Industries

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

The coke making production line annually produce 1,000,000 ton coke. During the coke production process, there will produce 40,000 Nm^3/hr Coke Oven Gas (COG) as by-product. The Coke Oven Gas (COG) is mainly containing CH_4(22.9%), CO(6.9%), H_2(53.6%), CO_2(3.2%), N_2(9.4%) with heat 16853-16375KJ/Nm^3 and pressure 4000-6000Pa., 12,600Nm^3/hr COG will be re-used in the coke-making production, the remaining 27,400Nm^3/hr will be directly released to the atmosphere through chimney after ignition. In the absence of the proposed project, the main equipment disposing the remaining COG is the COG cooler, desulfuration facilities, fans, chimney and ignition installation.

The project will recover the waste Coke Oven Gas (COG) of 22,000Nm^3/hr. Therefore; the proposed project is waste gas recovery activity from coke production through waste gas boiler, which will produce 118Ton/hr steam with pressure 3.82Mpa and temperature 450℃.

The steam will supply to two set of 12MW steam turbine generator to generate electricity of 24MW/hour, 2.16MW/hour electricity will be consumed by itself and finally 21.84MW/hour or 163,800MW per year will be supply to local grid then the regional grid (NWPG).

Waste gas balance after the proposed project

Total amount of waste gas (Nm^3/hr)	Purpose of the waste gas	Amount of waste gas (Nm^3/hr)	Remarks
40,000	Power generation	22,000	Emitted to open air after ignition before this project
	Re-use in the coke making process	12,600	It is re-used also before the proposed project
	Directly released to the atmosphere after ignition	5,400	

This project will use most of waste gas (22,000 Nm^3/hr waste gas) and remaining gas still not be used.

The boilers will produce about 118 ton steam with pressure 3.82Mpa and temperature 450℃, of which 112 ton (2*56ton) will be put into steam turbines and generators to generate 24MW (2*12MW) electricity, the remaining 6 ton is a leakage.

Here give the reason why the boiler produce 118 ton instead of 150ton (2*75).

The enthalpy of waste gas is16,614(KJ/Nm^3); the temperature of smoke is 150℃。

The enthalpy of COG burning per hour:

$I_{coke\ gas}=16,614\times 22,000=365.508\times 10^6$（KJ/h）

The enthalpies of smoke with 150℃:

$I_{150℃}=22.344\times 10^6$（KJ/h）

The burning enthalpies per hour:

$I = I_{coke\ gas} - I_{150℃} = 343.164 \times 10^6$（KJ/h）
The enthalpies loss of boiler draining per hour:
$I_s = 150 \times 2\% \times (1075 - 632.2) = 1{,}328.4 \times 10^3$(KJ/h)
The temperature of the boiler feed water is 150℃，the enthalpies is 632.2(KJ/Kg)
The temperature of overheating steam is 450℃，the enthalpy is 3331.7(KJ/Kg)
The boilers' efficiency≥93%，the steam amount of the boilers producing per hour:
$M = (I \times 93\% - Is)/(3331.7-632.2)=118$(t/h)

Electricity generated will be connected into existing Hancheng power substation nearby through 35KV line, which is connected into Shaanxi grid, then NWPG grid.

The baseline scenario is same as the scenario before the proposed project activity implemented. As the baseline scenario, the electric power produced by the proposed project is from NWPG, which includes Shaanxi,Gansu,Qinghai, Ningxia and Xinjiang according to the Chinese DNA[2].

Based on feasibility study report of the proposed project, the proposed project includes the following key equipments: two sets of waste gas boilers (75t/h), two sets of steam turbine and two sets of generator (12MW). Followings are technical parameters of major equipments,

1) Waste gas boilers（**2***75t/h）

Type: 75/38.2-Q

Rated evaporation: 75t/h

Rated steam temperature: 450 ℃

Rated steam pressure: 3.82Mpa
Designed boiler efficiency ≥ 93%

Waste gas pressure input: 4000 Pa

Designed lifespan of the equipment: 16 years

Producer: TAIYUAN BOILER MAKER

2) Steam turbine（**2***12MW）

Type: N12-3.43

Capacity: 12MW

Rated Inlet steam pressure: 3.43MPa

Rated Inlet steam temperature: 435 ℃

Rated inlet steam: 56t/h

Designed lifespan of the equipment: 16 years

Producer: QINGDAO JIENENENG STEAM TORBINE MANUFACTURER

3) Generator (2*12MW**)**

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2 http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/2008/200887164119674.pdf.

Type: QF-12-2

Capacity: 12MW

Efficiency: 97.8%
Outlet voltage: 6300V
Rated speed: 3000r/min
Frequency: 50HZ
Designed lifespan of the equipment: 16 years
Producer: JINAN GENERATOR MANUFACTURER

In addition, the proposed project utilizes the waste Coke Oven Gas (COG) for electricity generation, which will not affect coke production system operation. The process flow and heat balance as showed in Figure 2.

All the technologies in the proposed project are all domestic technologies, no international technology transfer involved in the proposed project. The technologies of similar gas boiler, steam turbine and generator are widely used in China commercially and the project design engineer reports there are of good operation currently.

Following flow meters are attached to the above mentioned equipment and respective date are recorded.

1. Flow meter attached to the Boilers to monitor the quantity of COG (in Nm^3 and Pa)

2. Flow meter attached to the Steam Turbines to monitor the quantity of steam (in ton/hour and temperature)

3. Flow meter attached to the Generators to monitor the quantity of electricity (in MWh)

4. Flow meter before the Grid to monitor the quantity of electricity (in MWh)

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

The project will chose a fixed crediting period of 10 years (01/07/2009－30/06/2019) and the total reduction is estimated to 1,436,526 tCO_2e during the crediting period. Emission reduction is estimated as following:

Years	Annual estimation of emission reductions in tones of CO_2e
2009.7	71,826
2010	143,653
2011	143,653
2012	143,653
2013	143,653
2014	143,653
2015	143,653
2016	143,653
2017	143,653
2018	143,653

2019.6	71,826
Total estimated reductions (tCO_2e) (10 years)	1,436,526
Total number of crediting years	10
Annual average over the crediting period of estimated reductions (t CO_2e)	143,653

A.4.5. Public funding of the project activity:

No public funding from parties in Annex 1 is involved in this project activity

SECTION B. Application of a baseline and monitoring methodology

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

ACM0012 (Version 03.1): "Consolidated baseline methodology for GHG emission reductions from waste energy recovery projects";

"Tool to calculate the emission factor for an electricity system" (Version 01.1), and;

"Tool for the demonstration and assessment of additionality" (Version 05.2).

More information about the Methodology can be found on the website:

http://cdm.unfccc.int/methodologies/PAmethodologies/approved.html

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

The consolidated methodology 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 ~~as~~ 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);
  - → For generation of mechanical energy.

The proposed project is applicable to the methodology ACM0012 (Ver 03.1) as it is to use the waste gas from coke oven to generate electricity, according to Type-1 condition. The following table is to show how the proposed project meets all the conditions listed in the methodology.

Items listed in the methodology	The relevant situation of the proposed project corresponds to the methodology items.	Remarks
If the project activity is based on the use of waste pressure to generate electricity, electricity generated using waste pressure should be measurable.	The proposed project will not use waste pressure to generate electricity.	Applicable
Energy generated in the project activity may be used within the industrial facility or exported from industrial facility;	All generated electricity will be connected to the Northwest China Power Grid (NWPG), which is dominated by fossil fuel.	Applicable
The electricity generated in the project	All generated electricity will be exported	Applicable

activity may be exported to the grid or used for captive purpose;	to the NWPG.	
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.	The owner of the coke-making company owns the generated electricity by the proposed project.	Applicable
Regulations do not constrain the industrial facility that generates waste energy from using the fossil fuels prior to the implementation of the project activity.	There is no regulation constrains the coke company using fossil fuels before the implementation of the project activity.	Applicable
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.	The proposed project is an existing facility. The Coke production facility started operation in Jan. 2008.	Applicable
The emission reductions are claimed by the generator of energy using waste energy;	The credits are claimed by the generator, Shaanxi Haiyan Coke Making (Group) Co., Ltd.	Applicable
In case the energy is exported to other facilities an official agreement exists between the owner's 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 waste energy used in the proposed project activity will not be exported to another facility other than the owner.	Applicable
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.	The lifespan of Coke production facility is about 15 years from Jan.2008, and lifespan of NWPG is surely more than 15 years.so, the credit period will be claimed, i.e.,10 years.	Applicable
Waste energy that is released under abnormal operation (for example, emergencies, shut down) of the plant shall	Under abnormal operation of the plant (emergencies, shut down), waste energy that is released will not be accounted for credits.	Applicable

not be accounted for.		
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. However, the projects recovering waste energy from such power plants for the purpose of generation of heat only can apply this methodology.	The proposed project is to recover waste gas from coke making plant.	Applicable

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

As listed in the Methodology ACM0012 (Ver. 03.1), there're a few ways to demonstrate the use of waste energy in the absence of CDM project activity under different situation.

<u>For Type-1 project activities</u>: 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 ~~the~~ 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.

<u>For Type-1 project activities</u>, in cases where waste energy recovery activities were already implemented in other streams of WECM prior to the implementation of the CDM project activity, the following should be demonstrated:

- That there is no decrease in energy generated from the waste energy recovered previous to the implementation of the CDM project activity; or
- In the case where there is a decrease in energy generation from previously recovered waste energy, it can be demonstrated that the decrease is due to a decrease in generation of waste energy on account of the factors not related to the project activity;

- The conditions shall be confirmed by the verifying DOE for each issuance period.

Type-1 project activities situation is considered for this project. Therefore, the option of **On site checks conducted by the DOE** is selected for the demonstration of using waste energy in the absence of CDM project activity.
To conclude, the methodology ACM0012 (Ver. 03.1) is applicable to the proposed project.

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

The proposed project activity is to recover and utilize the waste gas from coke production, which results in the increase of net annual electricity supply to the grid. The project owner has no captive power plant and all electricity consumption is from NWPG in the absence of the project activity. As the proposed project employs waste Coke Oven Gas generation, no auxiliary fossil fuels are needed.

Therefore, according to ACM0012 (Ver. 03.1), the project boundary includes:

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. Therefore, the coke production line is the industrial facility, and there is no utilization of the waste energy before the proposed project is implemented.

2. The facility where process heat in 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. Hence, the project boundary includes two waste heat recovery boilers, two sets of steam turbine and two sets of generator;

3. The facility/s where the process heat in element process/steam/electricity/mechanical energy is used (the recipient plant(s)) and/or grid where electricity is exported, if applicable. Hence, all the power plants connected to NWPG (according to the delineation of grid boundaries provided by the Chinese DNA, Shaanxi,Gansu,Qinghai, Ningxia and Xinjiang are counted as NWPG.), are included in the project boundary.

According to ACM0012 (Ver. 03.1), an overview of emissions sources included and excluded from the project boundary for determination of both baseline and project emissions are as follows:

	Source	Gas	Included?	Justification/Explanation
Baseline	Electricity generation, grid or captive source	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	There is no heat supply for the proposed project.
		CH_4	Excluded	N.A.
		N_2O	Excluded	N.A.
	Fossil fuel consumption in cogeneration plant	CO_2	Ecluded	No fossil fuel is used.
		CH_4	Excluded	N.A.
		N_2O	Excluded	N.A.
	Baseline emissions from generation of steam used in the flaring process, if any	CO_2	Excluded	There is no flaring occurred.
		CH_4	Excluded	N.A.
		N_2O	Excluded	N.A.
Project Activity	Supplemental fossil fuel consumption at the project plant	CO_2	Excluded	There is no supplemental fossil fuel needed in the proposed project.
		CH_4	Excluded	N.A.
		N_2O	Excluded	N.A.
	Supplemental electricity consumption.	CO_2	Excluded	No supplemental electricity consumption.
		CH_4	Excluded	N.A.
		N_2O	Excluded	N.A.
	Electricity import to replace captive electricity, which was generated using waste gas in absence of project activity.	CO_2	Excluded	No captive electricity is generated by using waste gas in the absence of the project activity.
		CH_4	Excluded	N.A.
		N_2O	Excluded	N.A.

	Project emissions from cleaning of gas	CO_2	Excluded	No waste gas cleaning is required and leads to emissions related to the energy requirement of the cleaning.
		CH_4	Excluded	N.A.
		N_2O	Excluded	N.A.

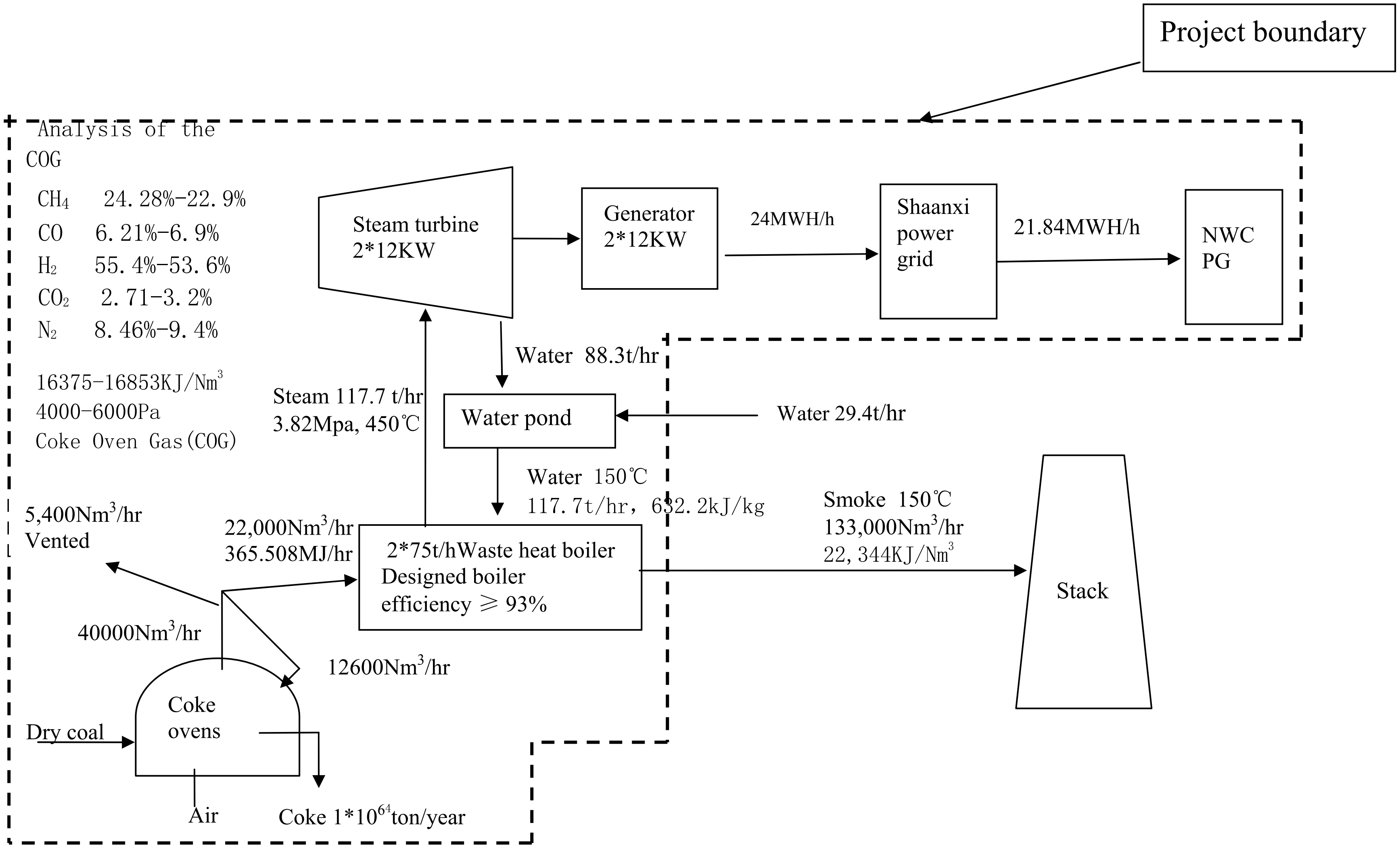


Figure 2. Process flow and heat balance chart of the proposed project

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

According to the methodology ACM0012 (Ver. 03.1), the most plausible baseline scenario among all realistic and credible alternatives should be determined for:

- Waste energy use in the absence of the project activity;
- Power generation in the absence of the project activity;
- Steam/heat generation in the absence of the project activity;
- Mechanical energy generation in the absence of the project activity.

Determine the heat, power or mechanical energy requirement of the system(s) in the project boundary that can be met from one or more than one sub-system(s) in the project activity scenario. While determining the baseline scenario, project participants shall identify the realistic and credible alternatives to the project activity, which would provide output equivalent to the combined output of the all the sub-systems in the project activity scenario. These alternatives may comprise one system or more than one sub-system(s). Therefore the alternatives, 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' as described below:

The project participant shall exclude baseline options that:

- Do not comply with legal and regulatory requirements; or
- Depend on fuels (used for generation of heat, power or mechanical energy) that are not available at the project site.

The project participant shall provide evidence and supporting documents to exclude baseline options that meet the above-mentioned criteria.

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

The baseline candidates should be considered for following facilities:

- For the industrial facility where the waste energy is generated; and
- For the facility where the energy is produced; and
- For the facility where the energy is consumed.

For the use of waste energy, the realistic and credible alternative(s) may include, inter alia:

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.

Option	Description of plausibility	Conclusion
W1	"Emission standard of Air Pollutants for Coke Oven (GB16171-1996)" stipulates that the excess COG must be flared to the atmosphere and no direct discharge is allowed. Hence, option W1 is not a baseline scenario.	This is not recommended as part of the baseline scenario for the project.
W2	The common method to deal with waste COG in Shaanxi Province is to release the waste COG and flare into atmosphere.	It is a plausible alternative baseline scenario.
W3	The project locates at Longmen Industry Park which possess 21 coke-making plants and produce 2.0 billion NM^3 per year COG. At present, there are only 500 million NM^3 per year being/to be reused to produce methanol or generate power, and the surplus 1.5 billion NM^3 per year is directly vented to atmosphere after incineration. Currently, only one coke-making plants reuses COG which is Black-Cat Coke-making Co.. Black-Cat Coke-making Co., Ltd with 1,200,000 t-coke per year capacity reuses the by-product (COG) of coke-making to produce methanol and has a line with 100,000 ton annual methanol. So Black-Cat Coke-making Co. has enough COG to satisfy the demand of methanol production. So, we can conclude that it is impossible to be sold as an energy source.	This is not recommended as part of the baseline scenario for the project.
W4	It is possible to use waste gas as energy source to generate power.	It is a plausible alternative baseline scenario.
W5	There is no waste gas to be captured and used for captive electricity generation.	This is not recommended as part of the baseline scenario for the project.
W6	A portion of waste gas have been recovered by coke oven, so this option is not applicable.	This is not recommended as part of the baseline scenario for the project.

For power generation, the realistic and credible alternative(s) may include, inter alias:

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 or other waste energy based existing captive or identified plant;
P6: Sourced Grid-connected power plants;

P7: Captive Electricity generation waste energy (if project activity is captive generation using waste energy, this scenario represents captive generation with lower efficiency than the project activity.);

P8: Cogeneration using waste energy (if project activity is cogeneration with waste energy, 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 euipment), and resulting in higher efficiency, to produce electricity from waste gas (already utilized portion plus the portion flared/vented) for won consumption and for export;

P11: Existing power generating equipment is maintained and additional electricity generated by grid connected power plants.

Option	Description	Conclusion
P1	It is possible for proposed project not undertaken as a CDM project activity.	It is a plausible alternative baseline scenario.
P2	The proposed project activity don't involve heat supply.	This is not recommended as part of the baseline scenario for the project.
P3	The proposed project activity don't involve heat supply.	This is not recommended as part of the baseline scenario for the project.
P4	There is no existing fossil fuel fired cogeneration plant on site. According to the regulations covering "small thermal power plant construction management (Ministry of electricity, 1997)" [3], construction of fossil (coal, oil, natural gas) power plants (including captive plant) with a unit capacity of less than 100 MW is restricted construction and a unit capacity of less than 25MW is forbidden. As the proposed project will have only 24 MW installed capacity, fossil power plants of the same capacity would not be in compliance with existing laws and regulations. Therefore, it is not complied with the regulations on building a	This is not recommended as part of the baseline scenario for the project.

[3] http://info.westpower.com.cn/cgi-bin/Ginfo.dll?DispLaw&w=westpower&ac=&gr=6851&pr=0&lid=15812

	24MW fossil fuel fired cogeneration plant.	
P5	For renewable energy generation, due to the technology development status and the high cost for power generation, solar PV, geothermal wind farm and biomass of the similar installed capacity as the proposed project are alternatives far from being attractive investment in the grid in China. Furthermore there is no hydropower resource in this area to provide a comparable output or the same services as the proposed project. Therefore, due to the limitation of renewable resource or high cost at the project site, the generation from the small hydro, biomass, wind and other renewable energy generation methods are not considered.	This is not recommended as part of the baseline scenario for the project.
P6	Under this scenario, same amount of electricity will be generated by the proposed project can be purchased from grid (NWPG). It is also a continuation of current practice without CDM. Therefore, it is included in the plausible alternatives.	It is a plausible alternative baseline scenario.
P7	The proposed project activity doesn't involve captive electricity generation as the coke production uses very little electricity. Therefore, this option is omitted.	This is not recommended as part of the baseline scenario for the project.
P8	The proposed project activity doesn't involve heat supply.	This is not recommended as part of the baseline scenario for the project.
P9	There is no existing power generating equipment.	This is not recommended as part of the baseline scenario for the project.
P10	Same reason as P9	This is not recommended as part of the baseline scenario for the project.
P11	There is no existing power generating equipment for the proposed project.	This is not recommended as part of the baseline scenario for the project.

As the outcome of step1, alternatives W2, W4, P1 and P6 are remained as baseline options. A scenario matrix can be developed based on various combinations of baseline options.

	P1	P6
W2	W2/P1 does not match. Due to in P1 the energy content of the waste gases and	W2/P6 does match. It is considered as a plausible baseline

	heat is used for power generation, it conflict with W2 where the waste gases is vented after flaring and waste heat released in to atmosphere directly.	scenario combination.
W4	W4/P1 does match. It is the proposed project activity not undertaken as a CDM project activity	W4/P6 does not match. Due to in W4 the energy content of waste gases/heat is used for power generation that displaces equal electricity purchase from grid, it conflict with P6where this amount of power is purchased from local grid.

The outcome of the step1: The plausible baseline scenarios may include, inter alias:

W2/P6: The waste gases generated from the coke oven would have been flared and the equivalent electric power generated by the proposed project activity would have been sourced from NWPG.

W4/P1: The project proponent could have utilized the waste gases/heat for generation of power displacing equivalent purchased grid power. In other words, the project activity will be implemented without CMD.

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

As discussed above, the option P6 is plausible baseline alternative. Therefore, the fuel of the connected gird, NWPG, is dominated by fossil fuel. The option P1 is also an alternative; the fuel then is the COG.

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 to identify the most plausible baseline scenarios by eliminating non-feasible options (e.g. alternatives where barriers are prohibitive or which are clearly economically unattractive).

Combination of Options W4 and P1 is consistent with host country's current laws and regulations; however, it is not the most plausible baseline scenario when financial indicator is taken into account. The financial internal return rate (IRR) of the combination W6/P1 is 5.0%, and is lower than the power industrial benchmark 8% (after tax). Therefore, W6/P1 combination is not acceptable from commercial point of view, and is financially unattractive for the project owner. Detailed discussion will be provided at section B5.

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

From the above discussion, the most plausible combination baseline scenario of the proposed project is,

Baseline Scenario: Generation of Electricity only			
Scenario	Baseline options		Description of situation
	Waste energy	Power	

1	W2	P6	The electricity is obtained from the grid NWPG.

In addition, a full discussion on step 4 will be in section B5.

Conclusion: W2/P6 does match. It is considered as a most plausible baseline scenario combination.

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

The owner made investment decision of the proposed project activity in Oct, 2007 and signed the CDM consulting contract with Shanghai Tepia Environmental Protection Co., Ltd in Nov, 2007. On April 30, 2008, the proposed project has been approved to by the local government, which is Shaanxi Development and Reform Commission (SDRC). Sebsequently, the owner has signed a purchase contract with Taiyuan Boiler Co, ltd. for the waste heat boiler in the proposed project on May 8, 2007. Among all the dates, the earliest is the investment decision making date of the proposed project activity, however, it does not creat a bond for the project to be put into reality. The next earlier date is the date when the owner had the commercial action, which is to purchase the main equipment for the proposed project. This date is chosen for the starting date of the project activity as the owner had contract and is legally bound to pay the penalty if the owner decides not to develop the proposed project. Therefore, the project activity start date is May 8, 2008.

Timeline of the important dates of the proposed CDM project activities

Items	Date	Description
Investment decision making date	2007.10	Resolution of the board of Shaanxi Haiyan Coke Making (Group) Co., Ltd.
CDM consulting start	2007.11	Signed the CDM consulting contract with Shanghai Tepia Environmental Protection Co., Ltd
Government approval date	2008.4.30	Provincial government approved date
Project start date	2008.5.8	Major equipment purchasing contract signed
Project operation date	2009.7	FSR

According to ACM0012 (Ver03.1), the latest version (ver05.2) of ‘Tool for the demonstration and assessment of additionality” is employed in this section to assess the additionality of proposed project.

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

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

As stated in the section B6 Step1, there are only two combinations of plausible baseline alternatives are left, which are W2/P6 and W6/P1, as shown below:

(a) W2/P6 Waste heat/gas is directly vented to the atmosphere, and demand electricity is obtained from the grid.

(b) W4/P1 Waste heat/gas used to generate energy, and project is not a CDM project.

Sub-step 1b: Consistency with mandatory laws and regulations:

The alternative W2/P6 and W4/P1 are compliance with all applicable legal and regulations. The related laws and regulations can be found and downloaded from the website of State Electricity Regulatory commission (SERC), and National Development and Reform Commission (NDRC)[4].

Step 2: Investment analysis

Sub-step 2a: Determine appropriate analysis method

In "Tool for the demonstration and assessment of additionally", three options can be applied for the investment analysis: the simple cost analysis, the investment comparison analysis and the benchmark analysis.

The simple cost analysis is not applicable for the proposed project because it will produce economic benefit (from electricity sale) other than CERs' income.

Then the benchmark analysis will be used to identify whether the financial indicators, i.e., Financial Internal Return Rate (IRR) in this project is better than relevant benchmark value.

Sub-step 2b: Apply benchmark analysis (Option III).

All the electricity generated by the project will be transmitted to the Grid according to the electricity supply contract with the power supply CO., Ltd, then this project's benchmark will use electricity generation section benchmark, rather than the owner's present sect oral benchmark.

"The Interim Measures for Economical Assessment of Electrical Technological Transformation Project," is the most important reference for project assessment in China. According to mentioned above, a project would be financially acceptable if the IRR (after income tax) is higher than the IRR (after income tax).

The sectoral benchmark IRR (after income tax) on total investment for power industry is 8% (after income tax).

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

According to the feasibility study report (FSR), which was prepared by Changsha Shente Environment Technology Co., Ltd (qualification A) on 05/12/2007 and got approved by the Shaanxi Development and Reform Committee on 30/04/2008, the main parameters for financial analysis are shown as following:

Table 1. Main parameters for calculation of financial calculation

Items	Unit	Value	Source
Installed Capacity	MW	24	FSR (feasibility study report)
Total Investment	Million Yuan	98.4	FSR
Current capital	Million Yuan	7.65	FSR
O&M	Million Yuan/yr	29.89	FSR
Delivered Electricity	GWh/yr	163.8	FSR
Electricity Tariff (including tax)	Yuan/MWh	300	As per FSR, it is 285, including VAT. It is adjusted as per current situation by Chinese Government[5]

[4] http://www.serc.gov.cn/opencms/export/serc/laws/index.html and http://nyj.ndrc.gov.cn.

Value added tax	%	17%	FSR and set by Chinese Government[6]
Additional tax for city development	%	7%	FSR and set by Chinese Government[7]
Additional tax for education		3%	FSR and set by Chinese Government[8]
Income tax	%	25%	FSR and set by Chinese Government[9]
Project life	Years	16	FSR, excluding one year for construction.
Time span for IRR calculation	Years	17	FSR, including one year for construction.
CERs price	€ /tCO_2	9	Purchase Contract
Exchange rate(predicted)	￥/€	9.5	Predicted
Credit period	Years	10	

Here give some explanation about why the electricity tariff is fixed during credit period (10 years),

1. In China, as per local regulation, the feasibility study uses current price as basis for calculation of IRR, and it is fixed during whole period. It is normal practice in China.
2. In China, the electricity tariff is fully controlled by the government[10]. In order to control the inflation, the local government will consider the overall economic situation and refer to central government for final approval for tariff change. It is not controlled or predictable for the project owner.
3. From the electricity sale contract, the tariff is also fixed for a long period. The Grid is fully government owned and has full power to negotiate the tariff.
4. If the electricity tariff is not fixed and increase annually, then the cost, including labour cost, spare parts cost, maintenance cost will also increase annually. The historical electricity tariff and price indexes are shown as following:

Table 2. The historical electricity tariff and price indexes

Year	Electricity tariff Yuan/KWh	Electricity tariff increase rate %	the average price indexes derived for water, materials etc increase rate %[11]
2004	0.26	---	11.4%
2005	0.27	3.85%	8.3%
2006	0.285	5.56%	6.0%
2007	0.285	0%	4.8%[12]
2008	0.3	5.26%	---
Average annual increase rate		3.85%	7.63%

5http://www.ndrc.gov.cn/zcfb/zcfbtz/2008tongzhi/t20080702_222225.htm
6 http://www.gov.cn/banshi/2005-08/19/content_24733.htm
7 http://www.gov.cn/banshi/2005-08/19/content_24817.htm
8 http://www.chinacourt.org/flwk/show1.php?file_id=104821
9 http://www.gov.cn/flfg/2007-03/19/content_554243.htm
10 http://www.chinacourt.org/flwk/show1.php?file_id=100966
11 http://www.stats.gov.cn/tjsj/ndsj/2007/indexch.htm
12 http://www.88gu.cn/news/caijing/2008012651.html

As shown above, from 2004 to 2008, the average price indexes increase rate is much higher than the tariff increase rate. From this point of view, fixed tariff is a conservative method.

5. As per current situation, the eclectricity price already adjusted to 300Yuan/MWh from 285Yuan/MWh stated in the FSR by Chinese Government.

As shown in table below, the IRR (after income tax) without revenues from CERs is 5.0%, lower than that of the electricity generation section benchmark then the proposed project is financially unacceptable because of its low profitability. Taking account into the CERs revenue, the IRR (after income tax) of the proposed project is increased to 16.8%, higher than the benchmark and the financial attraction will be dramatically improved. Therefore, alternative W4/P1 is not the most plausible baseline scenario.

Comparison of financial indicators with and without CER revenues

Item	IRR(after income tax)	Benchmark
Without income from CERs	5.0%	8%
With income from CERs	16.8%	8%

Sub-step 2d: Sensitivity analysis

Three impact factors are considered in the following sensitivity analysis:

1) Total investment.

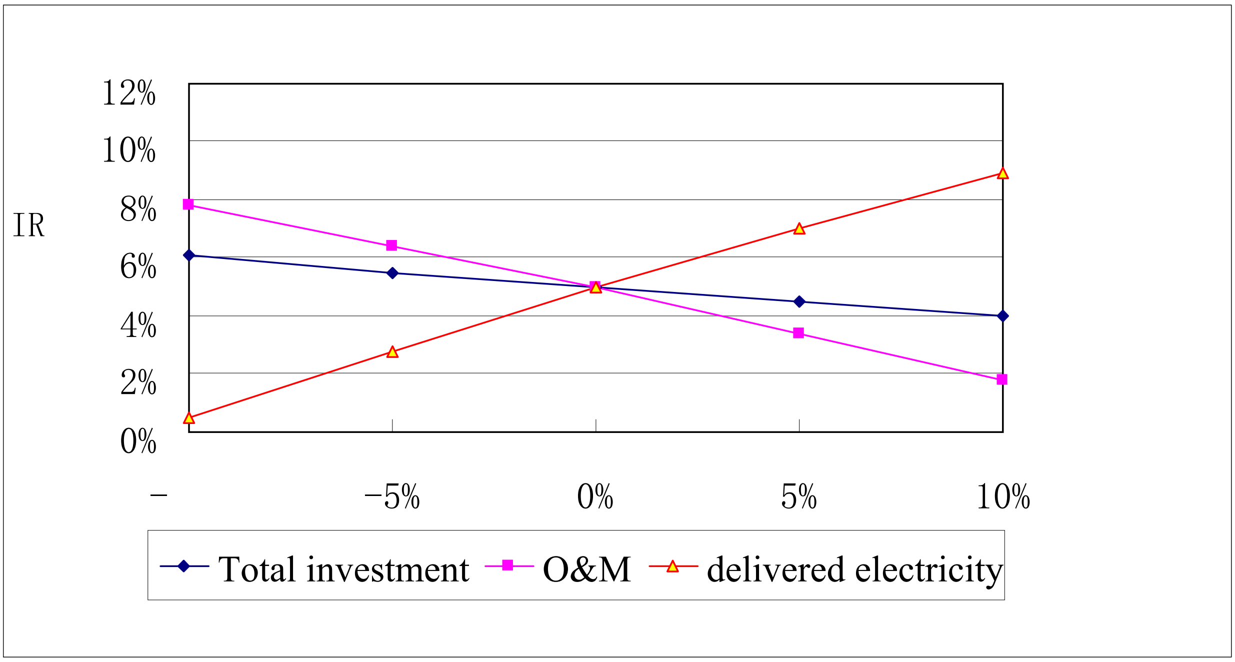
2) Operation and Maintenance Cost.

3) Delivered electricity.

The tariff is not considered in the sensitivity analysis because the tariff of electricity is regulated by the regulating entities and generally changed little. Assuming the above three factors vary in the range of -10%-+10%, the IRR of the proposed project (without income from CERs sales) varies to different extent, as shown in the following:

Sensitivity analysis of the project total investment IRR(after income tax)

Varying range	-10.00%	0%	10.00%
Total investment	6.1%	5.0%	4.0%
Annual electricity output	0.5%	5.0%	8.9%
Operational cost	7.8%	5.0%	1.8%



The change of delivered electricity is the most important factor affecting the financial attractiveness of the proposed project. When the output of the annual electricity is 10% increase, the IRR will be 8.9%, greater than 8%. But the proposed project activity' operation time couldn't exceed the operation time of the coke oven (the annual operation time of the coke oven: 22hr/day*365day/year=8030hr/year). Even if the project operate at its max operating time, i.e., 8030 hours, the IRR will be 7.8%, which is still less then the benchmark (8%). In this case, the IRR will not be over 8% at normal condition.

The next most important factors are total investment and operation and maintenance cost. In these two cases, the IRR is lower than the benchmark, 8%. That is to say, even consider the tolerance, the project is still not financially attractive, if without CERs income.

In conclusion, without the income from CER sales, the proposed CDM project activity is unlikely to be financially attractive.

Step 3: Barrier analysis

Basing on step 2, without the income from CERs revenues, the project has poor financial attractiveness and the proposed project is additional, therefore, the barrier analysis step is omitted.

Step 4: Common practice analysis

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

Up to now, similar project (coke making with waste gas) in Shaanxi province are listed below.

Table 4 Coke making Project with waste gas in Shaanxi province

	Project Name	Coke production Capacity ton/year	Waste gas usage
1	Black-Cat Coke-making Co.	1200000	Producing methanol
2	Baoji Dongling Coke-making Co.	700000	Generating electricity apply CMD
3	Hancheng Rongchang Coke-making Co.	150000	Emission into atmosphere after ignition
4	Hancheng Zhongtian Coke-making Co.	150000	Generating electricity apply CMD
5	Hancheng Heli Coke-making Co.	100000	Generating electricity apply CMD
6	Shaanxi Coke-making Co.	700000	Generating electricity without CDM, Glass-making

Sub-step 4b: Discuss any similar options that accruing.
As above table shown, the projects 2, 4 and 5 recover COG for power generation and apply CDM, which are same as the proposed project. Project 3 is same as the baseline Scenario of the proposed project.

Black-Cat Coke-making Co., Ltd uses the by-product (COG) of coke-making to produce methanol and has a line with 100,000 ton annual methanol . This project of producing methanol was implemented in 2004 and has started operation since 2007, the total investment reached ￥300 million yuan, which is two times higher than that of the proposed project. Black-Cat Coke-making Co., Ltd is a public company, so it could finance easily. But for the owner of the proposed project, it's not easy to finance from the market. Moreover, the technology using COG to produce methanol is not mature

Project 6 is a quite special case and here give it more detailed discussion. It's a capative power plant with an installed capacity of 3MW. The main task is providing service for the prime business and ensure its operation smoothly. So it is only an auxiliary project, the purpose of construction and opreation is not from financial and economic angle. The owner is expanding its capacity to 2 million tone of coke per year, at the same time planning to produce methanol. The total investment of methanol production line reaches ￥550 million yuan[13], which is 5.5 times as that of the proposed project. Shaanxi Coke-making Co. is a state-owned enterprise which can get the favourable policies and financial support from government[14].

Therefore, similar activities are observed, but essential distinctions between the project activity and similar activities can be reasonably explained, then the proposed project activity is additional.

As above four steps shown, the proposed project activity is additional.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

[13] http://www.sxcoking.com/Column-eyes/Newsset/showpicnews.jsp%7Eid=170.html

[14] http://www.sxcoking.com/Column-eyes/windows/infomationlist.jsp0003subcate_id=5584.html

According to ACM0012 (Ver 03.1), the emission reduction calculation is carried out as following:

- Baseline emission calculation
- Project emission calculation
- Leakage
- Emission reduction

1. Baseline Emission (BE_y)

The baseline emissions for the year y shall be determined as follows:

$$BE_y = BE_{En,y} \quad \textbf{(1)}$$

Where:

BEy are total baseline emissions during the year y in tons of CO_2

$BE_{En,y}$ are baseline emissions from energy generated by project activity during the year y in tons of CO_2

The calculation of baseline emissions ($BE_{En,y}$) depends on the identified baseline scenario.

<u>Baseline emissions for Scenario 1</u>

Scenario 1 represents the situation where the electricity is obtained from a specific existing power plant or from the grid, mechanical energy (displaced waste energy based mechanical turbines in project) is obtained by electric motors and heat from a fossil fuel based element process (e.g. steam boiler, hot water generator, hot air generator, hot oil generator).

<u>Note</u>: If the project activity is either generation of electricity only, or mechanical energy only or generation of heat only, then one of the two sub-sections below shall be used for estimating baseline, depending on the type of energy generated by the project activity. Further, in case project activity is use of waste pressure to generate electricity then only, then section a.i) below is used.

$$BE_{En,y} = BE_{Elec,y} \quad \textbf{1(a)}$$

$BE_{Elec,y}$ are baseline emissions from electricity during the year y in tons of CO_2

As discussed on B4 and B5, the baseline scenario for the proposed project only take into account of electricity generation, hence, there is no $BE_{Ther,y}$ involved in the calculation.

(a.i) Baseline emissions from electricity ($BE_{electricity,y}$) Type-1 activities:

<u>Case-1: Waste energy is used to generate electricity</u>

$$BE_{Elec,\,y} = f_{cap} * f_{wcm} * \sum\sum((EG_{i,\,j,\,y} * EF_{Elec,i,\,j,\,y}) \quad \textbf{1(b)}$$

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, and

$EF_{elec,i,j,y}$ is the CO_2 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 CO_2/MWh

f_{wcm} Fraction of total electricity generated by the project activity using waste energy.

f_{cap} Energy that would have been produced in project year y using waste energy generated in base year expressed as a fraction of total energy produced using waste source in year y. The ratio is 1 if the waste energy generated in project year y is same or less then that generated in base year.

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-2 is adapted to the calculation as the three-year data on production is unavailable.

Method-2: The manufacturer's data for the industrial facility shall be used to estimate the amount of waste gas/heat/pressure the industrial facility generates per unit of product generated by the process that generates waste gas/heat/pressure (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.

Under this method, following equations should be used to estimate f_{cap}.

$$f_{cap} = \frac{Q_{WCM,BL}}{Q_{WCM,y}} \quad (1d)$$

$$Q_{WCM,BL} = Q_{BL,product} \times q_{wcm,product} \quad (1d\text{-}1)$$

Where:

$Q_{WCM,BL}$	Quantity of waste gas generated prior to the start of the project activity estimated using equation 1d-1. (Nm^3)
$Q_{BL, product}$	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.(t-coke)
$q_{wcm, product}$	Amount of waste energy per unit of product generated by the process (that generates waste energy) in the industrial facility. (Nm^3/ t-coke)

The ratio in this project is 1 as the waste energy generated in project year y is same as that generated in base year.

CALCULATION OF CO_2 EMISSION FACTOR FOR NWPG $EF_{Elec,gr,j,y}$,

According to the methodology ACM0012(Version 03.1), the 'Tool to calculate the emission factor for an electricity system' (Version 01.1) (hereafter, referred as the Tool) is used to calculate project baseline emission factor of displaced grid generation by the proposed project. Based on this tool, the calculation is followed as described below:

Step 1. Identify the relevant electric power system

According to the China DNA the delineation, Shaanxi,Gansu,Qinghai, Ningxia and Xinjiang are counted as NWPG. This project is in Shaanxi province, the relevant electric power system of the proposed project activity is NWPG.

Step 2. Select an operating margin (OM) method.

According to the Tool, four alternatives could be used to calculate the OM:

(a) Simple OM

(b) Simple adjusted OM, or

(c) Dispatch Data Analysis OM, or

(d) Average OM.

For the simple OM, the simple adjusted OM and the average OM, the emissions factor can be calculated using either of the two following data vintages:

• Ex ante option: A 3-year generation-weighted average, based on the most recent data available at the time of submission of the CDM-PDD to the DOE for validation, without requirement to monitor and recalculate the emissions factor during the crediting period, or

• Ex post option: The year in which the project activity displaces grid electricity, requiring the emissions factor to be updated annually during monitoring. If the data required calculating the emission factor for year y is usually only available later than six months after the end of year y, alternatively the emission factor of the previous year (y-1) may be used. If the data is usually only available 18 months after the end of year y, the emission factor of the year proceeding the previous year (y-2) may be used. The same data vintage (y, y-1 or y-2) should be used throughout all crediting periods.

For the most recent 5 years (2002-2006) of NWPG, the low-cost/must run resources acount for 22.82%, 18.78%, 22.05% , 27.44% and 23.42% respectively, which are less than 50%. So, the simple OM method can be used. And Ex ante option is used for this CDM-PDD, therefore it is not required to monitor and recalculate during the crediting period.

Step 3. Calculate the operating margin emission factor ($EF_{grid,OM,y}$)

<u>(a) Simple OM</u>

The simple OM emission factor 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-cost / must-run power plants / units. It may be calculated:

• Based on data on fuel consumption and net electricity generation of each power plant / unit (Option A), or

• Based on data on net electricity generation, the average efficiency of each power unit and the fuel type(s) used in each power unit (Option B), or

• Based on data on the total net electricity generation of all power plants serving the system and the fuel types and total fuel consumption of the project electricity system (option C)

As stated in the Tool, Option A should be preferred and must be used if fuel consumption data is available for each power plant/unit. However, Option C is adapted in this PDD as all the relevant data necessary for Option A are not currently available in China. Accordingly, only nuclear and renewable power generation are considered as low-cost/must run power sources and data of the quantity of electricity supplied to the grid by these sources are available.

Where Option C is used, 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 type(s) and total fuel consumption of the project electricity system, as follows:

$$EF_{grid,OMsimple,y} = \frac{\sum_i FC_{i,y} \times NCV_{i,y} \times EF_{CO2i,y}}{EG_y} \qquad (2a)$$

Where:

$EF_{grid,OMsimple,y}$ = Simple operating margin CO_2 emission factor in year y (tCO_2/MWh)

$FC_{i,m,y}$ = Amount of fossil fuel type i consumed by power plant / unit m in year y (mass or volume unit)

$NCV_{i,y}$ = Net calorific value (energy content) of fossil fuel type i in year y (GJ / mass or volume unit)

$EF_{CO2,i,y}$ = CO_2 emission factor of fossil fuel type i in year y (tCO_2/GJ)

EG_y = Net electricity generated and delivered to the grid by power plant / unit m in year y (MWh)

i = All fossil fuel types combusted in power plant / unit m in year y

y = 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

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.

The Chinese DNA published the latest $EF_{OM,y}$ of NWPG will of be adopted in this PDD and its value is 1.1225 (tCO2/MWh) and the detail calculation is shown as Annex 3.

Step 4. Identify the cohort of power units to be included in the build margin

The sample group of power units m used to calculate the build margin consists of either:

(a) The set of five power units that have been built most recently, or

(b) The set of power capacity additions in the electricity system that comprise 20% of the system generation (in MWh) and that have been built most recently

The PDD identifies option (b) for sample group of power units m, as the information for five power units that have been built most recently is not available in China.

As for vintage of data, Option 1 is selected.

Option 1. For the first crediting period, calculate the build margin emission factor ex-ante based on the most recent information available on units already built for sample group m at the time of CDM-PDD submission to the DOE for validation. For the second crediting period, the build margin emission factor should be updated based on the most recent information available on units already built at the time of submission of the request for renewal of the crediting period to the DOE. For the third crediting period, the build margin emission factor calculated for the second crediting period should be used. This option does not require monitoring the emission factor during the crediting period.

As the crediting period for the proposed project is fixed 10 years, the build margin emission factor ex-ante will the only BM emission factor calculated for the proposed project.

Step 5. Calculate the build margin emission factor

The build margin emissions factor is the generation-weighted average emission factor (tCO_2/MWh) of all power units m during the most recent year y for which power generation data is available, calculated as follows:

$$EF_{grid\ BM,y} = \frac{\sum_m F_{i,m,y} * EF_{EL,i,m}}{\sum_m EG_{m,y}} \qquad \textbf{(2b)}$$

Where:

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

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

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

m = Power units included in the build margin

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

Because some data are not available, the BM calculation in this PDD adopts the deviation method (*Application of AM0005 and AMS-I.D in China* requested by DNV) agreed by the CDM EB[15].

Firstly, calculate the new installed capacity and its power generation technology mix. Secondly, calculate the weights of new capacity in each generation technology. and finally, calculate the BM emission factor at the commercialized best efficiency performance of each generation technology.

Because the installed capacity of the coal-fired, oil-fired and gas-fired technology can not be extracted directly from the existing statistical data, the BM calculation in this PDD adopts the following method: First, use the available data in the energy balance sheets on the most recent year to calculate the share of CO_2 emissions from solid, liquid and gaseous fuels corresponding to the total emissions of CO_2 emissions. Second, use the proportions as the weights, based on the emission factors at the commercialized best efficiency performance of each generation technology, calculate the emission factor of the thermal power in grid. Thirdly, this thermal emission factor is multiplied by the proportion of thermal power in the new 20% capacity. Finally the BM emission factor is got.

The detail calculation steps are as follows:

Step (1): Calculation of the share of CO_2 emissions from solid, liquid and gaseous fuels.

$$\lambda_{COAL,y} = \frac{\sum_{i \in COAL,j} F_{i,j,y} \times NCV_{i,j} \times EF_{CO2,i,j,y}}{\sum_{i,j} F_{i,j,y} \times NCV_{i,j} \times EF_{CO2,i,j,y}} \qquad \textbf{(2c)}$$

[15] http://cdm.unfccc.int/Projects/Deviations/index.html

$$\lambda_{Oil,y} = \frac{\sum_{i \in OIL,j} F_{i,j,y} \times NCV_{i,j} \times EF_{CO2,i,j,y}}{\sum_{i,j} F_{i,j,y} \times NCV_{i,j} \times EF_{CO2,i,j,y}} \quad \textbf{(2d)}$$

$$\lambda_{Gas,y} = \frac{\sum_{i \in GAS,j} F_{i,j,y} \times NCV_{i,j} \times EF_{CO2,i,j,y}}{\sum_{i,j} F_{i,j,y} \times NCV_{i,j} \times EF_{CO2,i,j,y}} \quad \textbf{(2e)}$$

Where:

$F_{i,j,y}$ is the amount of fuel *i* consumed by province *j* in year(s) *y;*

$NCV_{i,y}$ is net calorific value (energy content) of fossil fuel type i in year y (GJ / mass or volume unit)

$EF_{CO2,i,y}$ is CO_2 emission factor of fossil fuel type i in year y (tCO_2/GJ)

Coal, Oil and *Gas* refer to the solid, liquid and gaseous fuel.

Step (2): Calculation the emission factor of thermal power.

$$EF_{Thermal} = \lambda_{Coal} \times EF_{Coal,Adv} + \lambda_{Oil} \times EF_{Oil,Adv} + \lambda_{Gas} \times EF_{Gas,Adv} \quad \textbf{(2f)}$$

$EF_{Coal,Adv}$、$EF_{Oil,Adv}$、$E_{FGas,Adv}$ represent the emission factors of the best efficient and commercial coal-fired, oil-fuel and gas-fuel generation technologies.

Step (3): Calculation BM in the grid.

$$EF_{grid,BM,y} = \frac{EF_{Thermal,y} \times CAP_{Thermal,y}}{CAP_{Total,y}} \quad \textbf{(2g)}$$

Where:

CAP_{Total} is the total added installed capacity;

$CAP_{Thermal}$ is the total added installed capacity for thermal power.

Same as the OM, The Chinese DNA published the lastest $EF_{BM,y}$ of NWPG will be adopted in this PDD and its value is 0.6315 (tCO_2/MWh) and the detail calculation is shown as Annex 3.

Step 6. Calculate the combined margin emissions factor

The combined margin emissions factor is calculated as follows:

$$EF_y = w_{OM} \cdot EF_{OM,y} + w_{BM} \cdot EF_{BM,y} \quad \textbf{(2h)}$$

Where:

$EF_{grid,BM,y}$ = Build margin CO_2 emission factor in year y (tCO_2/MWh)
$EF_{grid,OM,y}$ = Operating margin CO_2 emission factor in year y (tCO_2/MWh)
w_{OM} = Weighting of operating margin emissions factor (%)
w_{BM} = Weighting of build margin emissions factor (%)

The following default values should be used for w_{OM} and w_{BM}:

- Wind and solar power generation project activities: w_{OM} = 0.75 and w_{BM} = 0.25 (owing to their intermittent and non-dispatch able nature) for the first crediting period and for subsequent crediting periods.

- All other projects: w_{OM} = 0.5 and w_{BM} = 0.5 for the first crediting period, and w_{OM} = 0.25 and w_{BM} = 0.75 for the second and third crediting period, unless otherwise specified in the approved methodology which refers to this tool.

Therefore, for the proposed project w_{OM} = 0.5 and w_{BM} = 0.5 is chosen. Then CO_2 emission factor for NWPG $EF_{Elec,gr,j,y}$ is 0.877(tCO_2/MWh). (0.5*1.1225+0.5*0.6315=0.877)

Calculation of Baseline Emission(BE_y)

$BE_y=EG_y\times EF_y$

Where:

EG_y Net electricity delivered by the proposed project in y year

$EG_y=EG_{grid,y}-EG_{import,y}$

Where:

$EG_{grid,y}$ Electricity delivered by the proposed project in y year(MWh)

$EG_{import,y}$ Electricity imported from the grid by the proposed project in y year(MWh)

2. PROJECT EMISSION (PE_y)

The proposed project activity is to recover the waste COG of to generate electricity and no auxiliary fossil fuels are needed. Therefore, project emission annually PE_y is 0.

3. LEAKAGE

According to the methodology ACM0012 (Ver 03.1), leakage is counted as 0.

4. EMISSION REDUCTION

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

$ER_y = BE_y - PE_y = 0.877 \times EG_y$ tCO_2e

Where:

ER_y are the total emissions reductions during the year y in tons of CO_2

PE_y are the emissions from the project activity during the year y in tons of CO_2

BE_y are the baseline emissions for the project activity during the year y in tons of CO_2.

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

Data / Parameter:	**f_{WCM}**
Data unit:	Fraction
Description:	Fraction of total energy generated by the project activity using waste gas.
Source of data used:	Feasibility study report of the proposed project.
Value applied:	1
Justification of the choice of data or description of measurement methods and procedures actually applied :	This fraction is 1 if the energy generation is purely from use of waste gas in the project generation unit.
Any comment:	

Data / Parameter:	**f_{cap}**
Data unit:	Fraction
Description:	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.
Source of data used:	Feasibility study report of the proposed project.
Value applied:	1
Justification of the choice of data or description of measurement methods and procedures actually applied :	The ratio is 1 if the waste gas generated in project year y is same or less then that generated in base year. The value is estimated using equation (1d) and (1d-1).
Any comment:	

Data / Parameter:	**$Q_{BL,product}$**
Data unit:	Tons/year
Description:	Production by process that most logically relates to waste gas generation in baseline.
Source of data used:	Feasibility study report of the proposed project.

Value applied:	1,000,000
Justification of the choice of data or description of measurement methods and procedures actually applied :	Based on the manufacturing data for the plant, and production records.
Any comment:	

Data / Parameter:	$q_{wcm,product}$
Data unit:	(kg, tons or m^3/(at NTP) kJ, Pa, or other relevant units per unit of product)
Description:	Specific waste energy production per unit of product (departmentalor plant product which most logically relates to waste energy generation) generated as per manufacturer's or external expert's data. This parameter should be analysed for each modification in the process which can potentially impact the waste energy quantity.
Source of data used:	Plant owner and manufacturer.
Value applied:	220Nm^3/ton
Justification of the choice of data or description of measurement methods and procedures actually applied:	Based on the designer of the coke production line.
Any comment:	Of which 165 Nm^3/ton to be used for this project.

Data / Parameter:	$FC_{i,y}$
Data unit:	mass or volume unit of fuel i
Description:	the amount of fuel i consumed (in a mass or volume unit) by project electricity system in year(s) y
Source of data used:	China Energy Statistical Yearbook 2005-2007
Value applied:	Please refer to annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	All the data are published officially. Detail information, refer to annex 3.
Any comment:	

Data / Parameter:	$GEN_{j,\ y}$
Data unit:	MWh
Description:	Net electricity generated and delivered to the grid by all power sources serving the system, not including low-cost/must-run power plant/units, in year y.
Source of data used:	China electricity Statistical Yearbook 2005~2007
Value applied:	Please refer to annex 3
Justification of the	All the data are published officially.

choice of data or description of measurement methods and procedures actually applied :	Detail information, refer to annex 3.
Any comment:	

Data / Parameter:	$NCV_{i,y}$
Data unit:	GJ / mass or volume unit
Description:	the net calorific value (energy content) of fossil fuel type I in year y.
Source of data used:	China Energy Statistical Yearbook 2006
Value applied:	Please refer to annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	All the data are published officially. Detail information, refer to annex 3.
Any comment:	

Data / Parameter:	$EF_{CO2,i,y}$
Data unit:	tCO_2/GJ
Description:	the CO_2 emission factor of fossil fuel type I in year y
Source of data used:	2006 IPCC Guidelines for National Greenhouse Gas Inventories: Volume 2: Energy.
Value applied:	Please refer to annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	IPCC default value
Any comment:	

Data / Parameter:	The best efficient of commercial coal-fired, oil-fuel and gas-fuel generation.
Data unit:	%
Description:	The best efficient and commercial coal-fired, oil-fuel and gas-fuel generation.
Source of data used:	China DNA: Bulletin on Baseline Emission Factor of China Region Grid-the calculation of baseline Build Margin emission factor for China Grid. Please refer to annex 3
Value applied:	Please refer to annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	All the data are published officially. The figures of OM and BM are identical to those provided in China DNA publication of 18th July 2008. (http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File1880.pdf) Detail information, refer to annex 3

Any comment:	

Data / Parameter:	share of CO_2 emissions from solid, liquid and gaseous fuels
Data unit:	%
Description:	share of CO_2 emissions from solid, liquid and gaseous fuels
Source of data used:	Please refer to annex 3
Value applied:	Please refer to annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	All the data are published officially. The figures of OM and BM are identical to those provided in China DNA publication of 18th July 2008. (http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File1880.pdf) Detail information, refer to annex 3
Any comment:	

Data / Parameter:	$CAP_{fossil,y}$
Data unit:	MW
Description:	the total capacity additions of fossil fuel fired power of NWPG in year y.
Source of data used:	Please refer to annex 3
Value applied	Please refer to annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	All the data are published officially. The figures of OM and BM are identical to those provided in China DNA publication of 18th July 2008. (http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File1880.pdf) Detail information, refer to annex 3
Any comment:	

B.6.3 Ex-ante calculation of emission reductions:

According to the analysis in section B.6.1, the baseline emission is calculated as following equations.

$BE_y = BE_{En,y}$

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

$BE_{Elec,\,y} = f_{cap} * f_{wg} * \sum\sum((EG_{i,\,j,\,y} * EF_{Elec,i,\,j,\,y})$

Since there is no flaring activity or heat supply involved in the proposed project, BE_y equals to $BE_{Elec,y}$. f_{cap} is 1 according to above mentioned analysis, and f_{wg} is 1 as the generated electricity are purely from waste gas.

The emission factor $EF_{Elec,i,\,j,\,y}$ for Northwest China Power Grid (NWPG) is calculated as in B.6.1, which is 0.877 tCO_2e/MWh. As estimated in Feasible Study Report, $EG_{i,j,y}$ is 163,800 MWh/yr, BE_y=163800*0.877=143653, therefore, BE_y is 143,653 tCO_2e per year.

As discussed in section B.6, the project emission PE_y is 0, hence, emission reduction for the proposed project ER_y is followed as this equation $ER_y = BE_y - PE_y$ and is 143,653 tCO_2e per year.

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

As the project starting date of the crediting period is expected to 01/07/2009 with the fixed crediting period (10 years), the emission reductions during the crediting period are estimated as:

Years	Estimation of Project activity Emissions (Tonnes of CO_2e)	Estimation of baseline emissions (Tonnes of CO_2 e)	Estimation of Leakage (Tonnes of CO_2e)	Estimation of overall emission reductions (Tonnes of CO_2e)
2009	0	71,826	0	71,826
2010	0	143,653	0	143,653
2011	0	143,653	0	143,653
2012	0	143,653	0	143,653
2013	0	143,653	0	143,653
2014	0	143,653	0	143,653
2015	0	143,653	0	143,653
2016	0	143,653	0	143,653
2017	0	143,653	0	143,653
2018	0	143,653	0	143,653
2019	0	71,826	0	71,826
Total (tCO_2e) (10 years)	0	1,436,526	0	1,436,526

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

B.7.1 Data and parameters monitored:

Data / Parameter:	$EG_{grid,y}$
Data unit:	MWh
Description:	Annual electricity delivered by the proposed project
Source of data to be used:	Electricity meter.
Value of data applied for the purpose of calculating expected	163,800MWh, from FSR

emission reductions in section B.5	
Description of measurement methods and procedures to be applied:	This parameter will be continually measured and monthly recorded and aggregately annually. Two meters will be installed, one is the main meter for normally data record, and the other is auxiliary meter for backup under the condition of the main meter do not work normally. The relevant data will be kept during the crediting period and two years after. Calibrated once in 6 months according to relevant regulations of electricity industry.
QA/QC procedures to be applied:	please refer to B.7.2
Any comment:	

Data / Parameter:	$EG_{import,y}$
Data unit:	MWh
Description:	Electricity consumption due to the proposed project (waste gas recovery generation system) During the period when power generation is not operational some amount of electricity may be supplied by the grid to operate the equipment implemented for the project.
Source of data to be used:	Electricity meter.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	
Description of measurement methods and procedures to be applied:	This parameter will be continually measured and monthly recorded and aggregately annually. Two meters will be installed, one is the main meter for regular data record, and the other is auxiliary meter for backup under the condition of the main meter do not work properly. The relevant data will be kept during the crediting period and two years after. Calibrated once in 6 months according to relevant regulations of electricity industry.
QA/QC procedures to be applied:	Please refer to B.7.2
Any comment:	

Data / Parameter:	$\mathbf{Q_{WCM,y}}$
Data unit:	Nm^3
Description:	Quantity of WECM/Waste Gas used for energy generation during year y
Source of data to be used:	Direct measured by project owner at the point before the gas boiler.
Value of data applied for the purpose of calculating expected emission reductions in	

section B.5	
Description of measurement methods and procedures to be applied:	Two induced fan flow meters will be installed to measure the waste gas quantity enters to the boilers. One is the main meter for regular data record, and the other is auxiliary meter for backup under the condition of the maintenance and calibration.. The relevant data will be kept during the crediting period and two years after.
QA/QC procedures to be applied:	Please refer to B.7.2
Any comment:	It will be verified by DoE that it is proper to measure flow rate before boiler generator.

B.7.2. Description of the monitoring plan:

Monitoring Methodology

All data collected as part of monitoring plan should be archived electronically and be kept at least for 2 years after the end of the last crediting period. 100% of the data should be monitored if not indicated otherwise in the comments in the tables below. The following data shall be monitored.

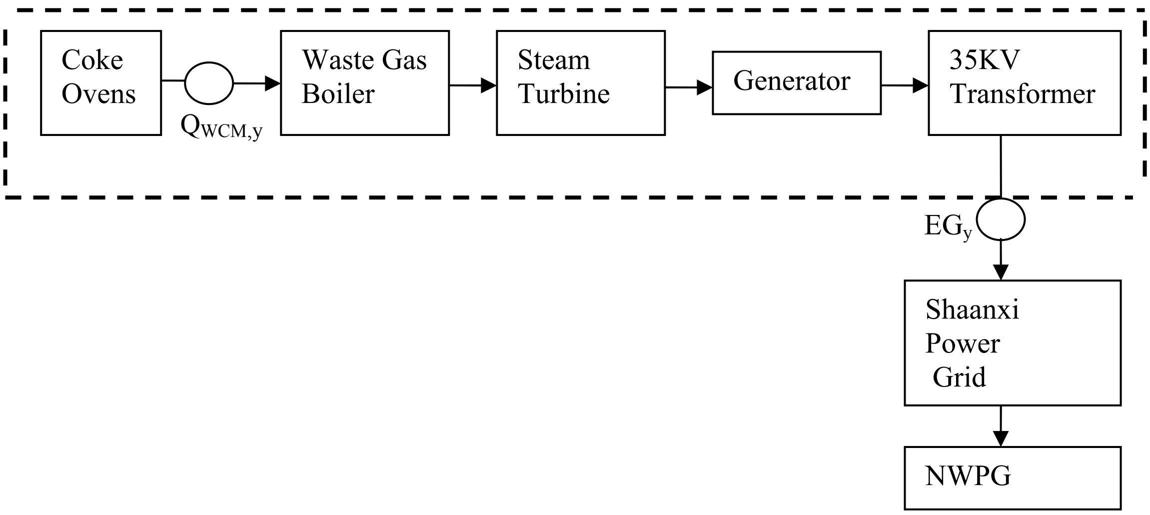
1. Monitor Data

1.1 $EG_{grid,y}$ and $EG_{import,y}$

According to the methodology ACM0012 (Ver 03.1), because no captive plant is existed and no auxiliary fossil fuels are needed, and the baseline emission factor (gird emission factor) is ex-ante and fixed during the credit period. Therefore, only net delivered electricity (**EG_y**) is needed for the emission reduction calculation. The net delivered electricity generation (**EG_y**) is the difference of the **$EG_{grid,y}$** and **$EG_{import,y}$**. Therefore, **$EG_{grid,y}$** and **$EG_{import,y}$**. need to be monitored.

1.2 $Q_{WCM,y}$

According to the methodology ACM0012 (Ver 03.1), $Q_{WCM,y}$need to be monitored.



2. Monitor operational and management scheme

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

CDM Project Director： Receive reports from the monitoring manager; manage the CDM project jointly with the CER buyer; coordinate with the Chinese Government and stakeholders; submit the monitoring report to the DOE and deliver the CERs.

Monitoring Manager: Based on the monitoring plan in the PDD, he records the net electricity supplied monthly and the annual totals, prepares the monitoring reports, etc. The Monitoring manager reports to the CDM project director.

Monitoring engineers, responsible for the daily operation and maintenance of the plant, and the recording of the daily electricity generation.

The team members named in the above may be revised in the future.

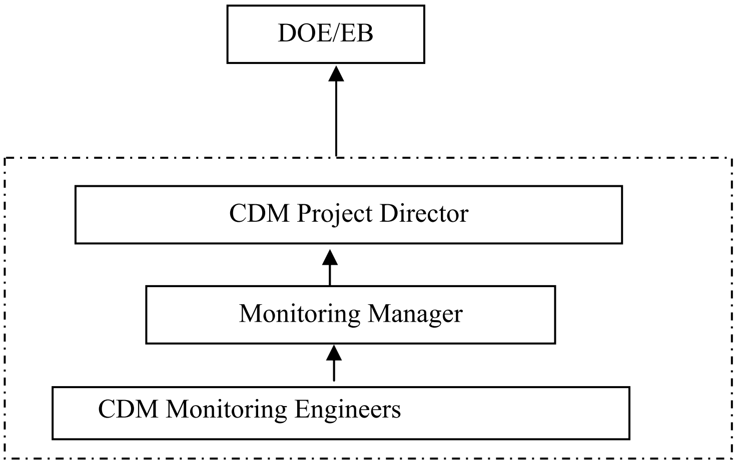


Figure 3 Operational and Management Scheme

3. Installation and Calibration of Measuring Meters, and O&M

For the electricity generation ($EG_{grid,y}$) , Two electricity meters with accuracy 0.2S will be installed. One electricity meter (main meter) will be installed at existing Hancheng power substation, which is connected to the grid (gateway). The other (auxiliary meter) will be installed at the generator output line on the side of the power plant, for backup.

For the Electricity consumption due to the proposed project (**$EG_{import,y}$**) , two electricity meters (main meter and auxiliary meter) with accuracy 0.5S(which means that the uncertainty is less than 0.5%), will be installed to directly measure the electricity consumption of waste gas recovery generation system.

The above four meters can provide accurate measure and monitoring of both the electricity generation (**$EG_{grid,y}$**) and the self consumption by the proposed project (waste gas recovery generation system) (**$EG_{import,y}$**). The net supply generation (**EG_y**) is the difference between **$EG_{grid,y}$** and **$EG_{import,y}$**.

The meters are consistent with the "electricity measurement management rules (DL/T448-2000)".

During electricity meters installation, the Hancheng city electricity grid company will check the electricity meters, and verify them by issuance of licenses, guaranteeing their reliability.

During operation, the meters will be maintained and calibrated once every 6 months in accordance with the relevant regulations of the electricity industry, whose accuracy and reliability are in accordance with relevant national standards.

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

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

4. Treatment of Deviations

In the event that deviation(s) in the monitoring data are found, the Monitoring Engineer will study the operating parameters to identify the reason for such deviation(s) and take remedial measures. The main meter is for regular data recording, and the auxiliary meter is for backup. If the main meter is not functioning properly, the data of the auxiliary meter is recorded and calibrated based on the average disparity of the preceding month between the main meter and the auxiliary meter. If the auxiliary meter is also not function properly, the lowest value of the recent months (at least three months) will be adopted.

5. Monitoring Reports

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

6. Monitoring Data Management

All monitoring data of the meters will be continually recorded and automatically stored in electronic archives, and in parallel a paper (hard copy) record will be created for the archives. The relevant data will be kept during the crediting period and for two years after.

7. Monitoring Points and Recording Frequency

The monitoring points include the electricity meters of the generation and the self consumption by the proposed project (waste heat recovery generation system). For the monitoring points, please refer to" Installation and Calibration of Measuring Meters, and O&M".

Recording frequency: continually measured, recorded monthly, and aggregated annually.

8. QA/QC (Quality Assurance) Management

The QA/QC management of the Data Monitoring will be consistent with the project QA management.

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

The baseline study and monitoring methodology was completed on 2 Nov. 2008 by:

Mr. Tomohiko Ike, E&E Solutions Inc., not the project participant

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Email: a-ogura@eesol.co.jp

(Not the project participants listed in Annex 1)

SECTION C. Duration of the project activity / crediting period

C.1. Duration of the project activity:

C.1.1. Starting date of the project activity:

08/05/2008 (Date of purchase contract of the major equipment)

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

16 years

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

C.2.1. Renewable crediting period:

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

N.A.

C.2.1.2. Length of the first crediting period:

N.A.

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

01/07/2009 or date of registration, whichever comes later.

C.2.2.2. Length:

10 years

SECTION D. Environmental impacts

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

Shaanxi Environmental Protection Bureau, Weinan in March.2008, has approved the proposed project[16]. It can not only enhance local economic strength, but also result in prominent environmental and social benefit; therefore, the proposed project is feasible. Refer to Environmental Impact Assess Report of Coke Oven Waste gas Recovery Power Plant of Shaanxi Haiyan Coke Making (Group) Co., Ltd.

The main conclusions on environmental impact assess of the proposed project are following:

1. Waste energy

During the project construction period, no waste energy generated.

During the project operation period, the proposed project is to recover the waste gas during the coke production; no additional waste gas will be generated in the proposed project.

2. Waste water

During the project construction period, no waste water generated.

During the project operation period, the sewage in this project includes residential drainage and production drainage. Production wastewater will be reused for Coke Quenching. Residential wastewater will be used for sprinkling and water grass after treated by existing sewage treatment equipment. Therefore, due to the reuse of the production wastewater and the utilization of the residential wastewater, it will not cause water pollution.

3. Solid wastes

During the project construction period, only little construction wastes generated and will be treated accordingly.

During the project operation period, the proposed project is to recover the waste gas during the coke production; no additional solid waste will be generated in this project.

4. Noise

During the project construction period, lower noise will be generated, but it is far from residential areas.

During the project operation period, the noise sources of the proposed project are from boiler fan, boiler exhaust gas valve, electricity motor, water pumps, etc., its sound level generally is 95~110dB (A). The noise will meet the criteria of the environmental requirements of the "Standards for noise for industrial plant" (GB12348-90), through the following measures: install the noise equipment far from the residential areas, use of less noise-polluted equipment, install a noise reduction device for shock absorption, and strengthen worker protection measures, etc.

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[16] It will be submitted to DOE for desk review.

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:

In conclusion, implement of the proposed project will perform little impact on surroundings and comply with Chinese environmental rules and laws.

SECTION E. Stakeholders' comments

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

The stakeholder's comments will be collected by following means:

- Questionnaire survey

The questionnaire survey activity was carried out by Shaanxi Industrial Technology Research Institute in May 2008. No meeting is held on this subject.

- Purpose of public questionnaire survey

To know the attitude about this project of the public and the local officials near the proposed site, extensively collecting opinions and suggestions of related stakeholders, to receive more reasonable advice for the project implementation.

- Questionnaire scope

The participants in this survey include residents around the project site. In the public questionnaire survey, 45 questionnaires were delivered, and 42 were returned. The questionnaire scope includes different ages、educational degree, occupations and living areas. The ages are between 18～45, accounting for 88% of the total. More than 62% are graduated from high school. The participants are peasants, students and others. Therefore, the survey can fully represent the opinion of local people on this project.

- Questionnaire Content

Questionnaire content are shown as following:

1. Will the project help to improve the local quality of the environment (air, water, noise)?
2. Will the project facilitate to the local economic development?
3. Will the project increase employment opportunities?
4. The construction of the project is feasible?
5. Other suggestions or comments?

E.2. Summary of the comments received:

The **Questionnaire results are shown as following:**

- 98% of the participants think it would the project help to improve the local quality of the environment (air, water, noise). 2% give no comments on this subject.
- 100% of the participants think it would the project facilitate to the local economic development.
- 98% of the participants think it would the project increase employment opportunities. 2% give no comments on this subject.
- 79% of the participants think that the construction of the project is feasible. 21% have no ideas about the feasibility of this project.
- No other suggestions or comments.

In conclusion, the public will support the proposed project .

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

As the proposed project is located within the present coke production factory, it is helpful to improve air quality by generating electricity from waste heat of high temperature smoke gas produced in coke production line, which is basically a beneficial project for energy saving and environmental protection. If the project owner operates the project according to the related laws and regulation, the proposed project will get the largest support from the local public of the proposed project.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Organization:	Shaanxi Haiyan Coke Making (Group) Co., Ltd.
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E-Mail:	
URL:	
Represented by:	Board chairman
Title:	Mr.
Salutation:	
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FAX:	-
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Represented by:	
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<u>Annex 2</u>

INFORMATION REGARDING PUBLIC FUNDING

No public funding from parties in Annex 1 is involved in this project activity.

Annex 3

BASELINE INFORMATION

Table A3-1 Northwest China Power Grid(NWPG) 2003～2006 generation composition

Year	Thermal Electricity Generation (MWh)	Total Electricity Generation (MWh)	Thermal Electricity Share％	Others Electricity Share％
2002	93428000	121052000	77.18	22.82
2003	113093000	139235000	81.22	18.78
2004	131939000	169253000	77.95	22.05
2005	133909000	184562000	72.56	27.44
2006	156,142,241	203,899,330	76.58	23.42

Data Source: China electricity year book 2003～2007.

Table A.3-2 OM and BM of Northwest China Power Grid

OM	tCO_2/MWh	1.1225
BM	tCO_2/MWh	0.6315

Data Source: China DNA, http://cdm.ccchina.gov.cn/

NWPG simple OM calculation in 2004

Fuel type	Unit	Shaanxi	Gansu	Qinghai	Ningxia	Xinjiang	Sub-total	Emission factor	OXID	**NCV**	**emission(tCO_2e)**
								(tc/TJ)	（%）	（**MJ/t,km^3**）	**K=G*H*I*J*44/12/10000mass unit**
		A	B	C	D	E	G=A+B+C+D+E	H	I	J	**K=G*H*I*J*44/12/1000 volume unit**
Raw coal	10*kt	2428	1595	322	1270	1240	**6858**	25.8	100	20908	135652074
Washed coal	10*kt						**0**	25.8	100	26344	0
Other coal	10*kt				102	10	**113**	25.8	100	8363	895096
Coke	10*kt	0.78					**0.78**	29.2	100	28435	23747
Coke oven gas	100*Mm^3		0.3				**0.3**	12.1	100	16726	22262
Other oven gas	100*Mm^3	1.74	1.26				**3**	12.1	100	5227	46381
Crude oil	10*kt	0.01				0.06	**0.07**	20	100	41816	2147
Gasoline	10*kt	0.02					0.02	18.9	100	43070	597
disel	10*kt	2.16	0.36		0.05	0.41	**2.98**	20.2	100	42652	94141
Fuel oil	10*kt	0.01	0.69			0.3	**1**	21.1	100	41816	32352
LPG	10*kt						**0**	17.2	100	50179	0
Refinery gas	10*kt					3.26	**3.26**	15.7	100	46055	86430
Natural gas	100*Mm^3	1.61	0.59			6.27	**8.47**	15.3	100	38931	1849873
Other oil	10*kt						**0**	20	100	38369	0
Other coke	10*kt						**0**	25.8	100	28435	0
others	10*ktce		6.17			3.46	**9.63**	0	100	0	0
										sub-total	138705098

Data source: China Energy Statistical Yearbook 2005.

NWPG simple OM calculation in 2005

Fuel type	Unit	Shaanxi	Gansu	Qinghai	Ningxia	Xinjiang	Sub-total	Emission factor	OXID	**NCV**	**emission(tCO_2e)**
								(tc/TJ)	（%）	（**MJ/t,km^3**）	**K=G*H*I*J*44/12/10000mass unit**
		A	B	C	D	E	G=A+B+C+D+E	H	I	J	**K=G*H*I*J*44/12/1000 volume unit**
Raw coal	10*kt	2461	1597	345	1467	1358	**7229**	25.8	100	20908	142985522
Washed coal	10*kt	16.22					**16**	25.8	100	26344	404225
Other coal	10*kt	35.56			101.95	10.2	**147**	25.8	100	8363	1168593
Coke	10*kt	3.23					**3.23**	29.2	100	28435	98335
Coke oven gas	100*Mm^3						**0**	12.1	100	16726	0
Other oven gas	100*Mm^3						**0**	12.1	100	5227	0
Crude oil	10*kt					0.18	**0.18**	20	100	41816	5520
Gasoline	10*kt	0.02				0.01	0.03	18.9	100	43070	895
disel	10*kt	2.24	0.46	0.06		0.5	**3.26**	20.2	100	42652	102986
Fuel oil	10*kt	0.01	0.57			0.25	**0.83**	21.1	100	41816	26852
LPG	10*kt						**0**	17.2	100	50179	0
Refinery gas	10*kt					7.71	**7.71**	15.7	100	46055	204410
Natural gas	100*Mm^3	1.46	0.52	1.33		7.81	**11.12**	15.3	100	38931	2428640
Other oil	10*kt						**0**	20	100	38369	0
Other coke	10*kt						**0**	25.8	100	28435	0
others	10*ktce	8.24	1.3				**9.54**	0	100	0	0
										sub-total	147425979

Data source: China Energy Statistical Yearbook 2006.

NWPG simple OM calculation in 2006

Fuel type	Unit	**Shaanxi**	**Gansu**	**Qinghai**	**Ningxia**	**Xinjiang**	Sub-total	Emission factor	OXID	**NCV**	**emission(tCO_2e)**
								(tc/TJ)	（%）	（**MJ/t,km^3**）	**K=G*H*I*J*44/12/10000mass unit**
		A	B	C	D	E	G=A+B+C+D+E	H	I	J	**K=G*H*I*J*44/12/1000 volume unit**
Raw coal	10*kt	2834	1660	421	1833	1547	**8298**	25.8	100	20908	164138337
Washed coal	10*kt						**0**	25.8	100	26344	0
Other coal	10*kt				112.7	8.45	**121**	25.8	100	8363	958466
Coke	10*kt				0.01		**0.01**	29.2	100	28435	304
Coke oven gas	100*Mm^3	0.2					**0.28**	12.1	100	16726	20778
Other oven gas	100*Mm^3	0.1					**0.1**	12.1	100	5227	2319
Crude oil	10*kt					0.02	**0.02**	20	100	41816	613
Gasoline	10*kt	0.01					0.01	18.9	100	43070	298
disel	10*kt	1.14	0.24	0.61		1.25	**3.24**	20.2	100	42652	102355
Fuel oil	10*kt		0.6			0.11	**0.71**	21.1	100	41816	22970
LPG	10*kt						**0**	17.2	100	50179	0
Refinery gas	10*kt						**0**	15.7	100	46055	0
Natural gas	100*Mm^3	1.59	0.56	1.06		7.49	**10.7**	15.3	100	38931	2336911
Other oil	10*kt						**0**	20	100	38369	0
Other coke	10*kt	1.86					**1.86**	25.8	100	28435	50033
others	10*ktce	33.57				2.2	**44.58**	0	100	0	0
										Sub-total	167633385

Data source: China Energy Statistical Yearbook 2007.

NWPG thermal generation in 2004					
Province	**Generation**	**Self consumption rate**	**Delivery generation**		
	(MWh)	**(%)**	**(MWh)**		
Shaanxi	44439000	7.5	41106075		
Gansu	33242000	6.21	31177672	Total emission tCO2	**138705098**
Qinghai	6208000	7.96	5713843	Total delivery MWh	**122605243**
Ningxia	25298000	5.45	23919259	**Emission factor**	**1.13131**
Xinjiang	22752000	9.07	20688394		
Total			122605243		

Data source: China Electric Power Yearbook 2005.

NWPG thermal generation in 2005					
Province	**Generation**	**Self consumption rate**	**Delivery generation**		
	(MWh)	**(%)**	**(MWh)**		
Shaanxi	41100000	7.16	38157240		
Gansu	33106000	4.23	31705616	Total delivered electricity	**147425979**
Qinghai	5500000	2.69	5352050	Total emission tCO_2	**125496682**
Ningxia	27643000	5.73	26059056	**Emission factor**	**1.17474**
Xinjiang	26560000	8.8	24222720		
total			125496682		

Data source: China Electric Power Yearbook 2006.

NWPG thermal generation in 2006					
Province	**Generation**	**Self consumption rate**	**Delivery generation**		
	(MWh)	**(%)**	**(MWh)**		
Shaanxi	54482000	6.97	50684605		
Gansu	35738000	4.29	34204840	Total delivered electricity	**156142241**
Qinghai	7204000	2.57	7018857	Total emission tCO_2	**167633385**
Ningxia	36731000	0	36731000	**Emission factor**	**1.07359**
Xinjiang	29901000	8.02	27502940		
Total			156142241		

Data source: China Electric Power Yearbook 2007.

Finally, the average emission factor of the three years is: 1.12250 tCO2/MWh.

BM calculation

Step (1): Calculation of the share of CO_2 emissions from solid, liquid and gaseous fuels.

Energy	Unit	Shaanxi	Gansu	Qinghai	Ningxia	Xinjiang	Total fuel	Emission factor （tc/TJ）	Oxidation rate （%）	NCV （MJ/t,km3）	Emission (tCO_2e) K=G*H*I*J*44/12/10000(Mass unit)
		A	B	C	D	E	G=A+B+C+D+E	H	I	J	K=G*H*I*J *44/12/1000 (Vol unit)
Coal	10^4t	2834	1660	421	1833	1547	**8298**	25.8	100	20908	164138337
Cleaned coal	10^4t	0	0	0	0	0	**0**	25.8	100	26344	0
Other washed coal	10^4t	0	0	0	112	8.45	**121**	25.8	100	8363	958466
mould coal	10^4t	0	0	0	0	0	**0**	26.6	100	20908	0
Coke	10^4t	0	0	0	0.01	0	**0.01**	29.2	100	28435	304
Total											**165097108**
Crude oil	10^4t	0	0	0	0	0.02	**0.02**	20	100	41816	613
Gasoline	10^4t	0.01	0	0	0	0	**0.01**	18.9	100	43070	298
Diesel	10^4t	1.14	0.24	0.61	0	1.25	**3.24**	20.2	100	42652	102355
Fuel oil	10^4t	0	.06	0	0	0.11	**0.71**	21.1	100	41816	22970
Other Coke Product	10^4t	1.86	0	0	0	0	**1.86**	25.8	100	28435	50033
Total											**176269**
Natural gas	10^8Nm^3	15.9	5.6	10.6	0	74.9	**107**	15.3	100	38931	2336911
Coke gas	10^8Nm^3	2	0	0	0	0.8	**2.8**	12.1	100	16726	20778
Other gas	10^8Nm^3	1	0	0	0	0	**1**	12.1	100	5227	2319
Total											**2360008**
Grand total											**167633385**

Data source: China Energy Statistical Yearbook 2007.

Based on above table and formula (4),(5) and (6), then

λ_{Coal}=98.49%， λ_{Oil}=0.11%， λ_{Gas}=1.40% .

Step (2): Calculation the emission factor of thermal power.

According to China DNA[17], the optimum commercial, coal-fired power supply generation efficiency 37.28%, oil and gas generation efficiency is 48.81% the relative emission factor as following table

The emission factors of the best efficient and commercial coal-fired, oil-fuel and gas-fuel generation technologies

type	vary	efficiency	Emission Factor (tc/TJ)	Oxidation Rate (%)	Emission Factor (tCO2/MWh)
		A	B	C	D=3.6/A/1000*B*C*44/12
Coal-fired	$EF_{coal,Adv}$	37.28	25.8	1	0.9135
Gas-fuel	$EF_{gas,Adv}$	48.81	15.3	1	0.4138
Oil-fuel	$EF_{oil,Adv}$	48.81	21.1	1	0.5706

$EF_{Thermal} = \lambda_{Coal} \times EF_{Coal,\ Adv} + \lambda_{Oil} \times EF_{Oil,\ Adv} + \lambda_{Gas} \times EF_{Gas,\ Adv} = 0.9061\ tCO_2/MWh$

Step (3): Calculation BM in the grid.

NWPG Installed Capacity in 2006

Installed Capacity	unit	Shaanxi	Gansu	Qinghai	Ningxia	Xinjiang	Total
Thermal power	MW	9723	6448	1517	6002	5937	29627
Hydro	MW	2165	4291	5423	429	1766	14074
Nuclear	MW	0	0	0	0	0	0
Wind farm and other	MW	0	199	0	11	189	399
Total	MW	11888	10938	6940	6442	7892	44100

Data source: China Electric Power Yearbook 2007.

[17] http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File1364.pdf

NWPG Installed Capacity in 2005

Installed Capacity	Unit	Shaanxi	Gansu	Qinghai	Ningxia	Xinjiang		Total
Thermal power	MW	9132	5715	886	4577	5051		25362
Hydro	MW	1578	4036	4825	428	1352		12219
Nuclear	MW	0	0	0	0	0		0
Wind farm and other	MW	46	109	0	112	132		399
Total		10756	9860	5711	5117	6536		37981

Data source: China Electric Power Yearbook 2006.

NWPG Installed Capacity in 2004

Installed Capacity	Unit	Shaanxi	Gansu	Qinghai	Ningxia	Xinjiang		Total
Thermal power	MW	7640	4975	889	3782	4959		22247
Hydro	MW	1876	3566	4053	366	973		10835
Nuclear	MW	0	0	0	0	0		0
Wind farm and other	MW	0	138	0	42	95		276
Total	MW	9516	8679	4943	4190	6028		33358

Data source: China Electric Power Yearbook 2005.

NWPG BM Calculation

	Installed capacity of 2004	Installed capacity of 2005	Installed capacity of 2006	Newly installed capacity from 2004 to2006	Share of the Newly installed capacity
	A	B	C	D=C-A	
Thermal(MW)	22247	25362	29627	4264	69.70%
Hydro(MW)	10835	12219	14074	1854	30.30%
Nuclear(MW)	0	0	0	0	0.00%
Wind farm(MW)	276	399	399	0	0.00%
Total (MW)	33358	37981	44100	6118	100.00%
Percent of the installed capacity of 2005	75.64%	86.13%	100.00%		

$$EF_{BM,y}=0.9061\times69.70\%=0.6315\ tCO_2/MWh$$

Annex 4

MONITORING INFORMATION

Please refer to section B.7.2 of this PDD

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