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

CONTENTS

Annexes

SECTION A. General description of project activity

A.1 Title of the project activity:

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Comprehensive utilization of waste coal gas for electricity generation project in Shaanxi Xinglong Cogeneration Co. Ltd

Version: 09

Date:06, March, 2008

A.2. Description of the project activity:

The proposed projects includes two 130t/h gas-fired boilers and two sets of 25MW condensing steam turbine with bleeding. The fuel to be used in the proposed project will be the waste gas from blast furnace and converter which is surplus coal gas after balance and now open flaring in absence of the proposed project. The project participants intends to utilize these waste gases from Shaanxi Longmen Iron & Steel for power generation. The proposed project includes two phases: each phase consists of one 130t/h waste gas-fired boiler and one 25MW steam turbine generator. The proposed project utilizes 1271 million m^3 waste gas from blast furnace and 107.1 million m^3 waste gas from converter to generate electricity of 321 GWh per year in total. The generated electricity will be exported outside Xinglong Co-generation Co. The part of exported electricity will be supplied for the need of Shaanxi Longmen Iron & Steel for its daily production displacing the electricity which has been supplied by the Northwest China Power Grid. The proposed project will reduce the GHG emissions generated from the fossil-fuel power plant in NWPG. The expected emission reductions from this project are about 270,045 tCO_2e annually and 1,890,315 tCO_2e for the first crediting period of seven (7) years.

The project, which utilizes waste gas from blast furnace and converter for electricity generation, is a priority area in the “Measures for the operation and management of CDM project in China” issued by Chinese DNA and has significant environmental and social benefits. It will contribute to the sustainable development as followings.

The project will promote the integrated resource utilization and thus reduce the waste of energy resources.

- ✧ Electricity generated by this project will displace part of fossil fuel-fired power in the Northwest China Power Grid, reducing the environmental pollution generated from burning coal.
- ✧ The project will avoid dust pollution caused by the existing open flaring system.
- ✧ Meanwhile, the project will create employment opportunities for local community during the construction and operation of the project.
- ✧ As a user self-generation project, the proposed project will reduce the power loss during the transmission and distribution.

A.3. Project participants:

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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 Xinglong Cogeneration Co.Ltd	No
Japan	New Energy and Industrial Technology Development Organization (NEDO)	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.:

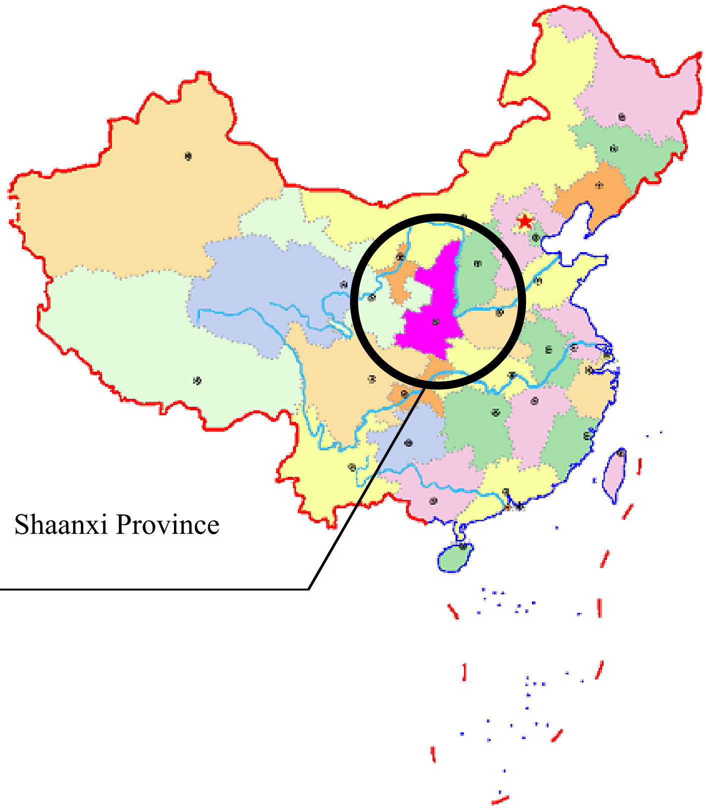
Shaanxi Province

A.4.1.3. City/Town/Community etc:

Longmen county, Hancheng city

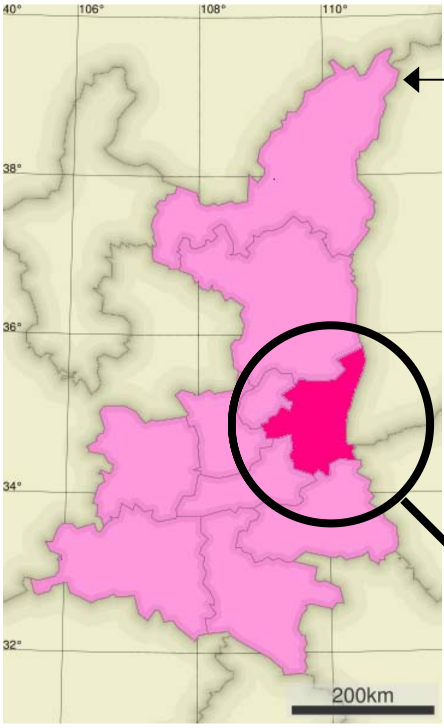
A.4.1.4. Detail of physical location, including information allowing the unique identification of this project activity (maximum one page):

The project is located in the Longmen Iron & Steel Group Co.,Ltd (LISGCO). LISGCO sits in the Longmen county, northeast of Hancheng city, adjacent Longmen bridge 5km to the north, Yellow river 1.2km to the east. The proposed project is located between north latitude of 35°36″ , east longitude of 110º34′.The geographical location of the project is detailed in the maps below.



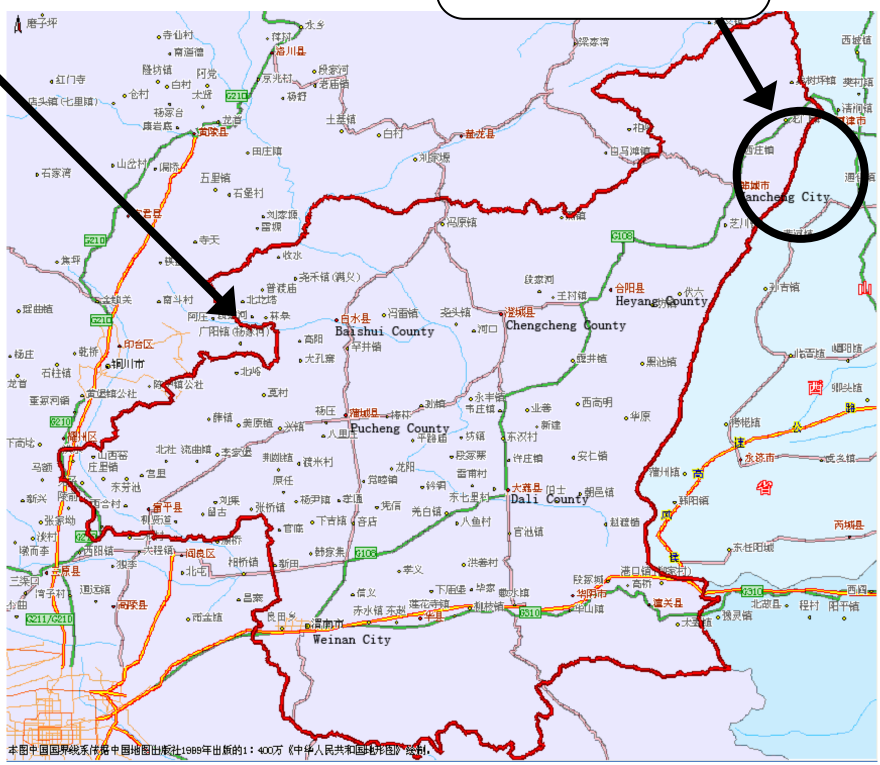
Shaanxi Province

Map of Shaanxi Province



Map of Weinan City

The Project Site
North latitude 35° 36'
East longitude 110° 34'



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

Scope 1: Energy Industry

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

The proposed project includes two phases with a 25 MW unit and one 130t/h gas-fired boiler for each phase. The surplus coal gas will be captured, purified and sent to gas tank. In gas tank, the stored gas is adjusted to proper pressure then fed into the gas-fired boiler through transmission system. The heat from gas boiler can be used to generate steam to power a steam turbine to produce electricity.

The major equipment employed in the proposed project includes:

Equipment No.	Type	Producer	Parameters	Life of Equipment
#1 Boiler	XD-130/3.82-QG	Tangshan Xinde Boiler Group Co. Ltd	Steam Temperature: 450 Pressure: 3.83MPa, Efficiency: 86.5%	20-35 years
#2 Boiler	XD-130/3.82-QG	Tangshan Xinde Boiler Group Co. Ltd	Steam Temperature: 450 Pressure: 3.83MPa, Efficiency: 86.5%	20-35 years
#1 Steam Turbine	C25-3.43/0.49	Wuhan Steam Turbine Factory	Steam Temperature: 435 Pressure:3.43MPa	>30 years
#2 Steam Turbine	C25-3.43/0.49	Wuhan Steam Turbine Factory	Steam Temperature: 435 Pressure:3.43MPa	>30 years
#1 Generator	QF-30-2	Wuhan Steam Turbine Factory	6.3kV 3437A	>30 years
#2 Generator	QF-30-2	Wuhan Steam Turbine Factory	6.3kV 2860A	>30 years

All the technologies employed in the proposed project are all domestic technologies, no technology transfer involved in the proposed project. All the technologies employed in this project has been designed and established according to the environmental regulation of local government.

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

A renewable crediting period will be used, the first crediting period is from 1 December 2007 to 30 November 2014.

The annual reduction from the proposed project is expected to be 270,045 tCO2e and 1,890,315 tCO_2e during the first crediting period of the project.

Years	Annual estimation of emission reductions in tonnes of CO_2e
2007(12)	22,504
2008(1~12)	270,045
2009(1~12)	270,045
2010(1~12)	270,045
2011(1~12)	270,045
2012(1~12)	270,045
2013(1~12)	270,045
2014(1~11)	247,541
Total estimated reductions in the first crediting period (tones of CO_2e)	1,890,315
Total number of crediting years (First crediting period)	7
Annual average over the first crediting period of estimated reductions (tonnes of CO_2e)	270,045

A.4.5. Public funding of the project activity:

No public funding is involved in this project activity.

SECTION B. Application of a baseline and monitoring methodology

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

Version 02 of ACM0004: “Consolidated baseline methodology for waste gas and/or heat and/or pressure for power generation” (referred as The Methodology) and

Version 02 of ACM0004: “Consolidated monitoring methodology for waste gas and/or heat and/or pressure for power generation” (referred as The Methodology)

According to ACM0004, in the calculation of project baseline emission factor of displaced grid generation by the proposed project, the version 06 of ACM0002: “Consolidated baseline methodology for grid-connected electricity generation from renewable source” will be adopted, meanwhile to demonstrate and assess the proposed project additionality, the version 03 of “Tool for the Demonstration and Assessment of Additionality” approved by CDM EB will be applied.

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 version 02 of ACM0004 is applicable to following conditions:

- generate electricity from waste heat or the combustion of waste gases in industrial facilities
- that displace electricity generation with fossil fuels in the electricity grid or displace captive electricity generation from fossil fuels;
- where no fuel switch is done in the process, where the waste heat or pressure or the waste gas is produced, after the implementation of the project activity

The proposed project activity meets all of the above conditions:

- The proposed project generates electricity from redundant blast furnace oven gas and converter oven gas of Longmen Iron Company (waste gases).
- The electricity generation of the proposed project activity will displace some generation from Northwest Power Grid(NWPG) which is dominated by fossil fuel.(over 75% are fossil power generation])
- That generation from waste gases will be emitted into the air in absence of the proposed project. Due to no captive power plant, all generation consumption is from Northwest power grid and thus no fuel switch is done in the process.

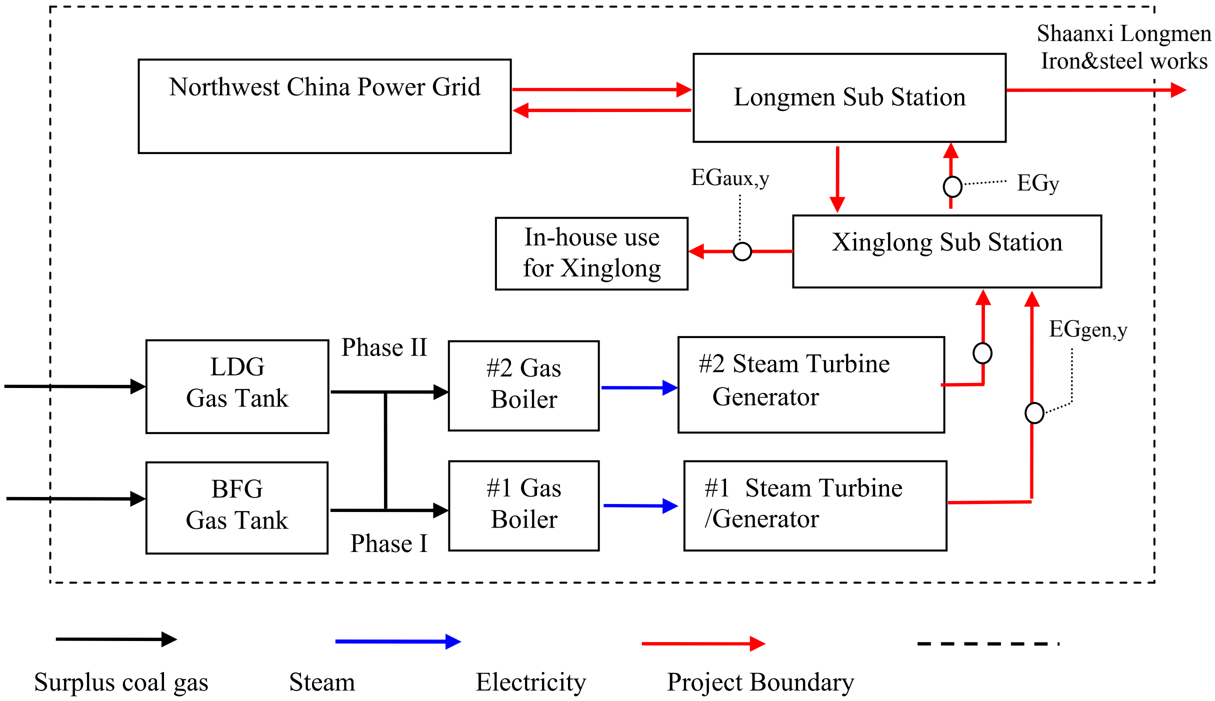
To conclude, the Methodology of ACM0004 is applicable to the proposed project.

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

Without captive power plant, all the electricity consumed by Shaanxi Longmen Iron & Steel works is supplied from Northwest power grid in the absence of the project activity. As fuels used in the proposed project are redundant blast furnace oven gas and converter oven gas and no auxiliary fossil fuels are needed. Therefore, according to ACM0004, the project boundary include: waste gas recovery system, power plant and the connected NWPG (Shaanxi,Gansu,Ningxia,Qinghai and Xinjiang).

According to ACM0004, All emission sources are included in the spatial project boundary and those in the project activity are excluded because of no difference between before and after the project activity for the determination of both baseline and project emissions. The change (reduction) of the emissions is caused by the reduced electricity generation by Northwest power grid.

	Source	Gas	Included?	Justification/Explanation
Baseline	Northwest power grid fossil fuel generation	CO_2	Included	Main emission source
		CH_4	Excluded	Excluded for simplification. This is conservative
		N_2O	Excluded	Excluded for simplification. This is conservative
Project Activity	On-site fossil fuel consumption due to the project activity	CO_2	Excluded	No auxiliary fossil fuels are needed
		CH_4	Excluded	Excluded for simplification.
		N_2O	Excluded	Excluded for simplification.
	Combustion of waste gas for electricity generation	CO_2	Excluded	It is assumed that this gas would have been burned in the baseline scenario.
		CH_4	Excluded	Excluded for simplification.
		N_2O	Excluded	Excluded for simplification.



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

According to ACM0004, the baseline scenario identification of the proposed project is demonstrated and assessed by "*Tool for the demonstration and assessment of additionality*"" approved by CDM EB. More details refer to B.5.

According to the version 2 of ACM0004, to provide the same amount of electricity, the possible alternative scenarios in absence of the CDM project activity would be as follows:

(a) The proposed project activity not undertaken as a CDM project activity;

(b) Continuation of the current situation (no project activity is required, the electricity to Shaanxi Longmen Iron & Steel is supplied from the NWPG);

(c) New captive power generation on-site, using other energy sources than waste gas, such as coal, diesel, natural gas, hydro, wind, etc;

(d) A mix of options (b) and (c), in which case the mix of grid and captive power should be specified;

(e) Other uses of the waste gas.

There is no existing captive power generation on-site. For new captive power generation on-site, according to sub-step 1a of B.5, due to the limitation of renewable resource at the project site, the generation from hydro and wind are excluded. Due to the high cost, the generation from diesel, natural gas are excluded. And according to sub-step 1b of B.5, similar scale generation from coal is not in compliance with the existing laws. Therefore, alternative (c) is excluded and alternative (d) is also excluded.

The main energy demand is from the process of Shaanxi Longmen Iron & Steel works. There is no other use of the redundant blast furnace gas and converter oven gas from the works except for the use as the fuels for the captive power generation (a). Therefore, alternative (e) is also excluded.

And according to step 2 of B.5, the FIRR of alternative (a) will be worse than that of the steel industrial benchmark, then financially unacceptable and no economic attractiveness to the project investor.

To conclude, the alternative (b) is the baseline scenario that is the NWPG as the provider for the same electricity output as the proposed project.

Key parameters for the determination of the baseline scenario:

Key Parameters	Explanations	Information Source
Current legal regulation on fossil fuel-fired power plant	the coal fired power plant with capacity below 135MW is not permitted	Station department on forbiddance construction of the fossil fuel-fired power plant with capacity below 135MW. National Development and Reform Commission (NDRC), 2005.
Benchmark FIRR of steel industrial	12%	Project economic assessment and key parameters (version 3). No.132 of p204.
FIRR of the project activity	Phase one:6.20% Phase two:8.36% Project (phase 1 and phase 2) :7.43%	Calculated as B.5 of investment analysis

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

According to the version 02 of ACM0004 and version 03 of "Tool for the demonstration and assessment of additionality", the following steps are used to demonstrate the addtionality of the proposed project activity:

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

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

According to the version 2 of ACM0004, to provide the same amount of electricity, the possible alternative scenarios in absence of the CDM project activity would be as follows:

(a) The proposed project activity not undertaken as a CDM project activity;

(b) Continuation of the current situation (no project activity is required, the electricity to Shaanxi Longmen Iron & Steel is supplied from the NWPG);

(c) New captive power generation on-site, using other energy sources than waste gas, such as coal, diesel, natural gas, hydro, wind, etc;

(d) A mix of options (b) and (c), in which case the mix of grid and captive power should be specified (e) other uses of the waste gas.

There is no existing captive power generation on-site. For new captive power generation on-site, due to the limitation of renewable resource at the project site and the local economic acceptance, the generation from biomass, hydro, and wind are excluded. As the high cost of diesel, oil and natural gas generation, and low cost of coal generation because of abundant coal resources in local area, there, the project owner will not build diesel, oil or nature gas plant.

The main energy demand is for the process heat in the steel enterprise, according to the project feasibility study, the available blast furnace gas is 2,173 million NM3/year, and only 872 million NM3/h (40%) is for heat generation, then 1301 million NM3/h of blast furnace gas is redundant. Therefore, as fuels used in the proposed project are redundant blast furnace oven gas and converter oven gas, no other use of the waste heat and waste gas exist, therefore, alternative (e) is also excluded.

There is no existing captive power generation on-site and all electricity consumption is from NWPG in the absence of the project activity. Therefore, alternative (b) is the current situation, so alternative (d) is not considered.

Therefore, the possible alternative scenarios in absence of the CDM project activity would be left as follows:

(a) The proposed project activity not undertaken as a CDM project activity;

(b) Import of electricity from the grid;

(c) New captive power generation on-site, using coal;

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

The proposed project is of 50MW install capacity, due to the similar annual operation time as the fossil generation in NWPG, the new captive coal power generation will be nearly 50MW. According to "*Station department on forbiddance construction of the fossil fuel-fired power plant with capacity below 135MW*", the alternative (c) is not in compliance with the existing laws and regulations, then, excluded.

The alternative (a) and (b) 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). http://www.serc.gov.cn/opencms/export/serc/laws/index.html and http://nyj.ndrc.gov.cn.

Step 2. Investment analysis.

Sub-step 2a. Determine appropriate analysis method.

In "Tool for the demonstration and assessment of additionality", 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 the project activity will produce economic benefit (from electricity sale) other than CERs income. According to step 0 and step 1, the possible alternative scenarios in absence of the CDM project activity would be left alternative (a) and (b). Due to alternative (b) is NWPG, which is not new-build project, the investment comparison analysis is also not applicable for the proposed project.

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

Sub-step 2b. Apply benchmark analysis.

According to the "*Project economic assessment and key parameters (version 3)*" , a project will be financially acceptable when the FIRR is better than the sectoral benchmark FIRR.

The sectoral benchmark FIRR on total investment for steel industrial projects is 12% ("*Project economic assessment and key parameters (version 3)*", page 204, item 142).

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

Table 1 Main parameters for calculation of financial indicators

Items	Unit	Phase one	Phase two	Phase one+ Phase Two	Source
Capacity	MW	25	25	50	FSR(feasibility study report)
Total Investment	Million Yuan	89.22	115.00	204.22	FSR and additional converter oven recovery system investment of 35 Million Yuan in phase two.
O&M	Million Yuan/yr	53.6	49	102.6	FSR
blast furnace gas price	Yuan/ NM^3	0.064	0.064	0.064	coal gas purchase agreement
converter coal gas price	Yuan/ NM^3	0.080	0.080	0.080	coal gas purchase agreement
blast furnace gas	Million NM^3	758.2	512.7	1270.9	FSR
converter coal gas	Million NM^3	0	107.1	107.1	FSR
Operation time	h	6985	7200	7092.5	FSR
Self use rate	%	9.44	9.44	9.44	FSR
Net output	GWh/yr	158.10	163.00	321.10	FSR
Electricity Tariff (Excluding VAT)	Yuan/kWh	0.42	0.42	0.42	FSR
Value Added Tax (VAT)	%	17/13	17/13	17/13	FSR oven gas is 13% and other is 17%.
Income tax	%	33	33	33	FSR
Other tax		8.0	8.0	8.0	FSR
Project life	years	22	22	22	FSR
Depreciation	years	20	20	20	FSR

time					
CERs price	$/tCO_2$	10	10	10	Assumed
Credit period	years	7×3	7×3	7×3	Only the first 7 years CERs revenue are taken account into.

The financial indicators (FIRR) without income from CERs sales are 6.20% of phase one and 8.36% of phase two (7.43% for phase one and phase two as a total), all of them are lower than that of the steel industrial benchmark then the proposed project is financially unacceptable because of its low profitability. With income from CERs sales, the financial acceptance will be dramatically improved; the FIRR of the proposed project is higher than the benchmark than financially acceptable 14.40% of phase one and 14.92% of phase two (14.70% for phase one and phase two as a total), only the first 7 years CERs revenue is taken account into).

Sub-step 2d. Sensitivity analysis.

Three factors are considered in the following sensitivity analysis:

1) Total investment.

2) Oven gas price.

3) Net electricity output.

The tariff is not considered in the sensitivity analysis because the tariff of electricity is regulated by the regulating entities and generally changed little. But the net electricity output will be changed due to the redundant oven gas varying time by time.

Assuming the above three factors vary in the range of -10%-+10%, the FIRR of the proposed project (without income from CERs sales) varies to different extent, as shown in Figure 1, Figure 2 and Figure 3 (sensitivity analysis of the Project: Phase I, Phase II and as a total).

The change of net electricity out is the most important factor affecting the financial attractiveness of the proposed project. The next important factor for financial attractiveness is oven gas price. The total investment is the slightest one. Within the reasonable range of total investment, oven gas price, net electricity output, the FIRR of proposed project is always lower than the investment benchmark, then lack of financial attractiveness.

Table 2 Calculation Results of FIRR

	Phase I	Phase II	Total (Phase I +II)
FIRR % without CER	6.20	8.36	7.43
FIRR % with CER	14.40	14.92	14.70

Table 3 FIRR (%) Sensitivity Analysis of Total (Phase I+II without CER

Item	10	Base Case	+10	Benchmark FIRR for Steel Making sector
Total investment	8.61	7.43	6.42	12
Oven gas price	10.30	7.43	4.38	
Net electricity output	6.16	7.43	8.66	

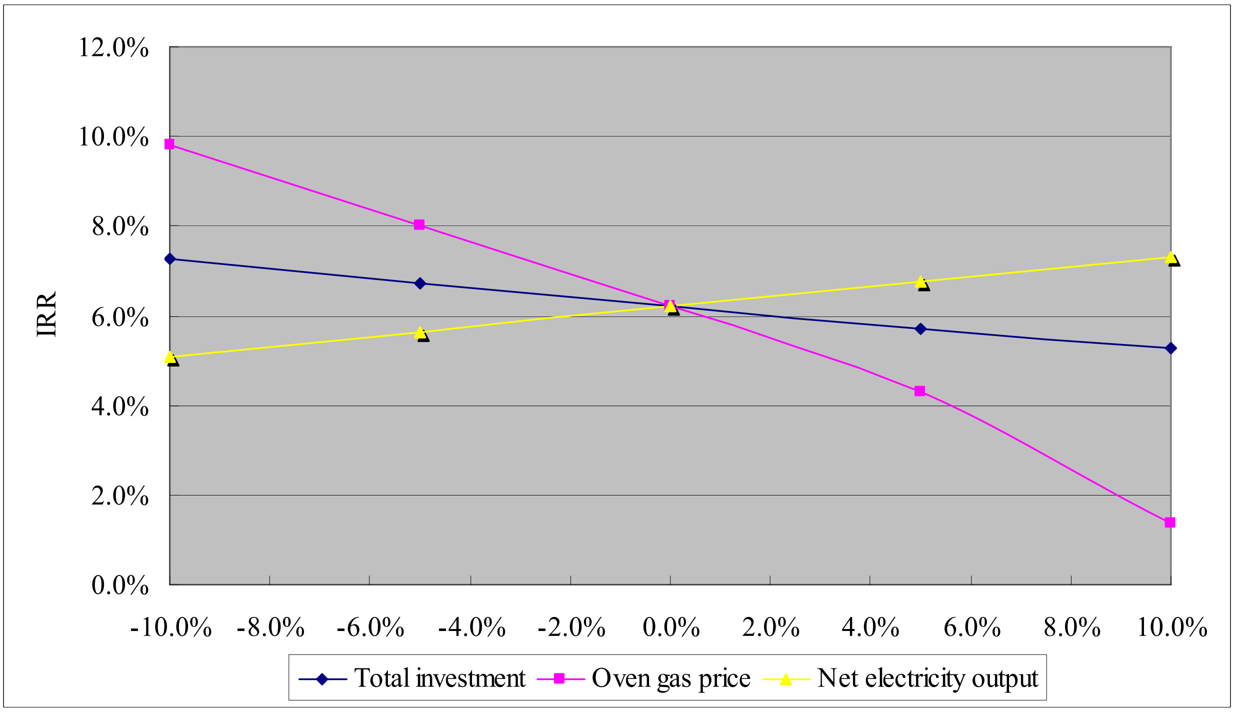


Figure 1 Sensitivity analysis of the Project of phase I

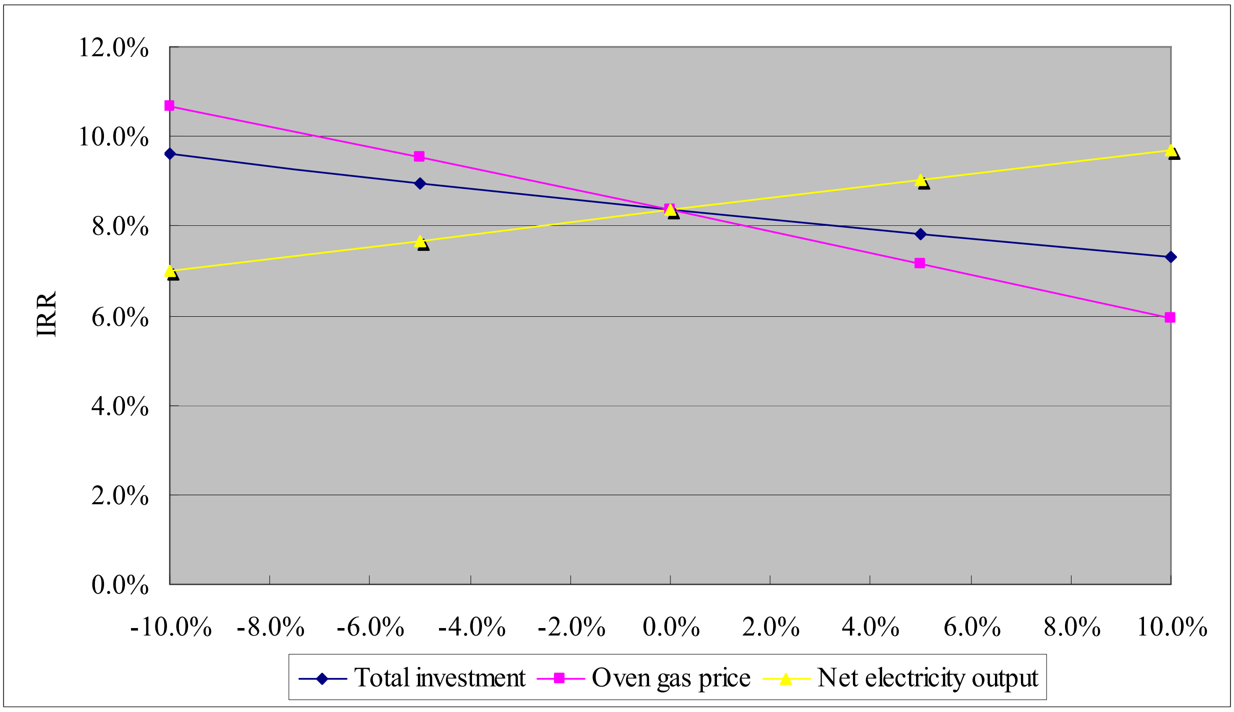


Figure 2 Sensitivity analysis of the Project of phase II

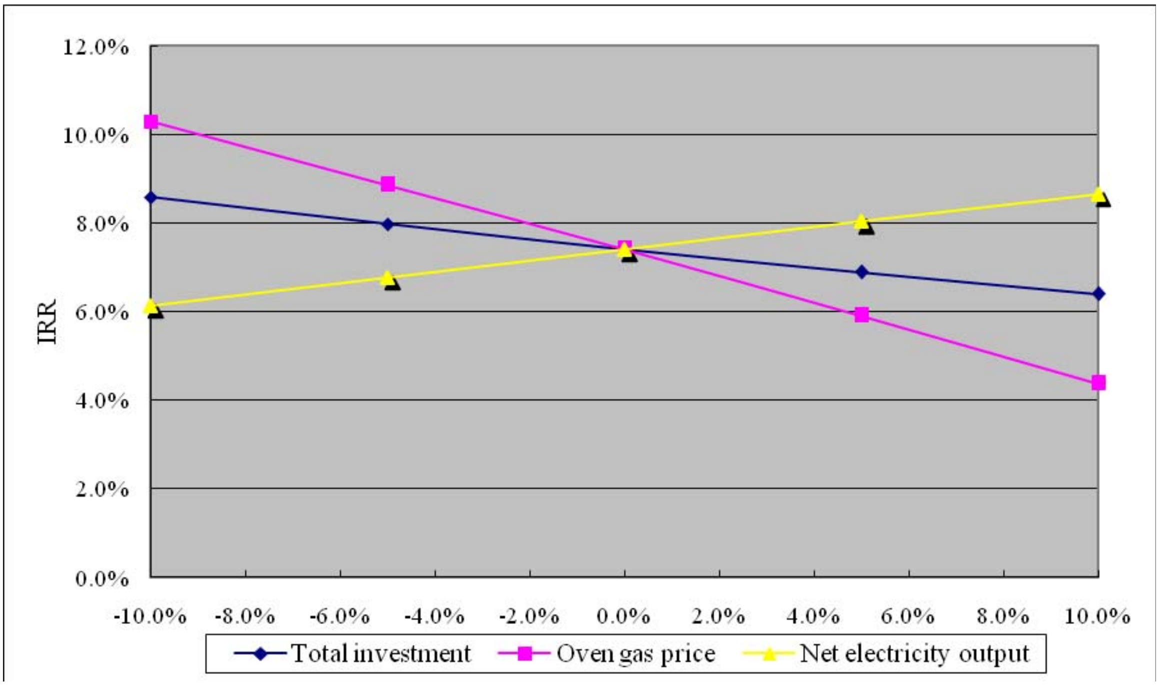


Figure 3 Sensitivity analysis of the Project of phase I and II

To conclude, without the income from CERs sales, the project has poor financial attractiveness.

Step 3. Barrier analysis

Besides the low financial attractiveness, the proposed project is the first one of recovering the redundant waste gases to generate electricity. Therefore, additional barriers are following:

1. Financial barrier

Due to the proposed project is waste gas recovery and energy conservation project, it is very difficult to get loan from commercial bank in china, which is shown as the reject letter of loan application on 2005. In fact, the funds shortage in phase one is covered by the staffs raise fund, which is very difficult persuade the staff to lend money to invest on the proposed project. The fund shortage in phase two depends on the introduction of another new shareholder to mitigate fund pressure and introducing the CDM, which can be demonstrated by the new shareholder cooperation document and the project owner make effort to contact varied CERs buyers and attend the CDM workshop, and then finally get the commercial loan.

2. Technological barrier

The proposed project is the first one of recovering the redundant waste gases to generate electricity in Shaanxi province, which is new to the project owner without management experience and technology staffs, therefore, the project activity has some risk implement. In fact, considering the possible revenues from CDM, the project owner will invest to carry out professional and system training on his staff, which can be demonstrated by the training plan document.

Step 4. Common practice analysis

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

In the version 03 of "Tool for the Demonstration and Assessment of Additionality", the similar activities is defined as "*activities (i.e. technologies or practices) that are of similar scale, take place in a comparable environment, inter alia, with respect to the regulatory framework and are undertaken in the relevant geographical area*". In China, the provincial government is the highest level of local government. The local regulatory framework is often set by local government (e.g. Price regulation, investment policy and so on). Then the activities in the same province could be regarded as sharing the same "comparable environment" and then the province is selected as the boundary of common practice analysis in this PDD.

The project owner is the largest steel company in Shaanxi province, the proposed project activity is the first one in Shaanxi province to recover the redundant blast furnace oven gas and converter oven gas to generate electricity, no other activities similar to the proposed project activity.

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

The proposed project activity is the first one in Shaanxi province to recover the redundant blast furnace oven gas and converter oven gas to generate electricity, and is not a common practice one.

In conclusion, the proposed project is additional.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

According to version 02 of ACM0004, The emission reduction by the project activity during a given year y is the difference between the baseline emissions though substitution of electricity generation with fossil fuels (BEy) and project emissions (PEy). No leakage is considered..

Step 1: the baseline scenario emission Calculation

According to B.4, the baseline scenario is that the NWPG supplies the same amount of electricity. According to version 2 of ACM0004, in the calculation of project baseline emission factor of displaced grid generation by the proposed project, the version 06 of ACM0002 of "Consolidated baseline methodology for grid-connected electricity generation from renewable source" will be adopted. Then the baseline scenario emissions equals to the baseline emission factor multiply displaced electricity from NWPG.

According to ACM0002, the ex-ante baseline emission factor will be adopted and fixed during the crediting period. According to the Chinese DNA guidance for the grid boundary, the NWPG is selected as the grid boundary.

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

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

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

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

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

The average emission rate method (d) can only be used where low-cost/must run resources constitute more than 50% of total grid generation and detailed data to apply option (b) is not available, and where detailed data to apply option (c) above is unavailable.
The Simple OM, simple-adjusted OM, and average OM emission factors can be calculated using either of the two following data vintages for years(s) y:

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

For The Project, the simple Operating Margin emission factor was chosen based on the following two reasons:

1. In China, the State Grid Corporation run the interregional dispatch system and each regional grid corporation run the intraregional dispatch system. The dispatch information is regarded as business secrets and not available to the public.
2. For the most recent 5 years (2000-2004) of NWPG, the low-cost/must run resources constitute less than 50% of total: 28.72%, 25.43%, 23.06%, 18.18% and 22.05% for 2000, 2001, 2002, 2003 and 2004.

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

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

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

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

Where,

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

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

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

$GEN_{j,y}$ is the electricity (MWh) delivered by source *j*. that is the net electricity output of the proposed project activity.

The CO_2 emission coefficient *COEFi* is obtained as

$$COEF_i = NCV_i \quad EFCO_{2,i} \quad OXID_i \qquad (2)$$

Where:

NCV_i is the net calorific value (energy content) per mass or volume unit of a fuel $_i$,

$OXID_i$ is the oxidation factor of the fuel (see page 1.29 in the 1996 Revised IPCC Guidelines for default values),

$EFCO_{2,i}$ is the CO_2 emission factor per unit of energy of the fuel *i*.

Where available, local values of NCV_i and $EFCO_{2,i}$ should be used. If no such values are available, country-specific values (see e.g. IPCC Good Practice Guidance) are preferable to IPCC world-wide default values.

The Chinese DNA published $EF_{OM,y}$ of NWPG, which will be adopted in this PDD and its value is 1.0329 (tCO_2/MWh).

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

According to ACM0002, the BM is calculated as the generation-weighted average emission factor of a sample of power plants *m*, as follows:

$$EF_{BM,y} = \frac{\sum_{i,m} F_{i,m,y} \times COEF_{i,m,y}}{\sum_{m} GEN_{m,y}} \quad (3)$$

Where $F_{i,m,y}$, $COEF_{i,m}$ and $GEN_{m,y}$ are analogous to the variables described for the simple OM method above for plants *m*.

The BM in this PDD is also calculated ex-ante and fixed during the credit period.

ACM0002 has provided two options to determinate the OM.

- Option 1. Calculate the Build Margin emission factor $EF_{BM,y}$ ex-ante based on the most recent information available on plants already built for sample group m at the time of PDD submission..
- Option 2. For the first crediting period, the Build Margin emission factor $EF_{BM,y}$ must be updated annually ex-post for the year in which actual project generation and associated emissions reductions occur.

The BM in this PDD is also calculated ex-ante and fixed during the credit period.

Because some data are not available, the BM calculation in this PDD adopts the deviation method agreed by the CDM EB in a response letter to clarification request by DNV (http://cdm.unfccc.int/UserManagement/FileStorage/AM_CLAR_QEJWJEF3CFBP1OZAK6V5YXPQKK7WYJ). Calculate first the new installed capacity and its power generation technology mix, then the weights of new capacity in each generation technology, and finally 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 CO2 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. Finally, 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.

$$\lambda_{Coal} = \frac{\sum_{i \in COAL, j} F_{i,j,y} \times COEF_{i,j}}{\sum_{i,j} F_{i,j,y} \times COEF_{i,j}} \tag{4}$$

$$\lambda_{Oil} = \frac{\sum_{i \in OIL, j} F_{i,j,y} \times COEF_{i,j}}{\sum_{i,j} F_{i,j,y} \times COEF_{i,j}} \tag{5}$$

$$\lambda_{Gas} = \frac{\sum_{i \in GAS, j} F_{i,j,y} \times COEF_{i,j}}{\sum_{i,j} F_{i,j,y} \times COEF_{i,j}} \tag{6}$$

Where:

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

$COEF_{i,j}$ is the CO_2 emission coefficient (tCO_2e / tce) of fuel i, taking into account the carbon content of the fuels used and the oxidation percent of the fuel in year y;

Coal, Oil and Gas is the foot-index for solid fuels, liquid fuels and gas fuels.

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

$$EF_{Thermal} = \lambda_{Coal} \times EF_{Coal,Adv} + \lambda_{Oil} \times EF_{Oil,Adv} + \lambda_{Gas} \times EF_{Gas,Adv} \tag{7}$$

$EF_{Coal,Adv}$ $EF_{Oil,Adv}$ $E_{FGas,Adv}$ 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.

$$EF_{BM,y} = \frac{CAP_{Thermal}}{CAP_{Total}} \times EF_{Thermal} \tag{8}$$

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 $EF_{BM,y}$ of NWPG, which will be adopted in this PDD and its value is 0.6491 (tCO_2/MWh).

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

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

$$EF_y = \omega_{OM} \times EF_{OM,y} + \omega_{BM} \times EF_{BM,y} \quad (9)$$

Where the weight w_{OM} and w_{BM} by default are 50%, then, the EF_y is 0.8410 tCO_2/MWh.

Sub-step 1d. Calculate the Baseline emission (BE_y)

The baseline emissions are the product of the baseline emissions factor (EF_y in tCO_2/MWh) times the electricity supplied by the project activity (EG_y in MWh), then

$$BE_y=EG_y \times EF_y \quad (10)$$

Step 2. Calculate Project Emission

The proposed project activity is to recover the redundant blast furnace oven gas and converter oven gas to generate electricity and no auxiliary fossil fuels are needed. Therefore, project emission annually

$$PE_y = 0 \quad (11)$$

Step 3. Leakage

According to ACM0004, project participants do not need to consider leakage in applying this methodology, then:

$$L_y = 0 \quad (12)$$

Step 4. Calculate Emission Reduction

The emission reduction ER_y by the proposed project activity during a given year y is the difference between baseline emissions (BE_y), project emissions (PE_y) and emissions due to leakage (L_y) as follows:

$$ER_y=BE_y \quad PE_y \quad L_y$$
$$=0.8410 \times EG_y \ tCO_2 e \quad (13)$$

Where EG_y is the net electricity output by the project activity (MWh/yr)

For EG_y is as follows:

$$EG_y = EG_{gen,y} \quad EG_{aux,y} \quad (14)$$

Where:

$EG_{gen,y}$ is the total electricity generated by the proposed project,
$EG_{aux,y}$ is the total electricity consumed by the project activity (power plant)

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

Data / Parameter:	**$EF_{OM,y}$**
Data unit:	tCO_2/MWh
Description:	Operation Margin Emission Factor of NWPG
Source of data used:	Chinese DNA
Value applied:	1.0329
Justification of the choice of data or description of measurement methods	This operation margin emission factor is calculated and recommended by Chinese DNA, see also http://cdm.ccchina.gov.cn/. Calculated ex-ante and fixed during the crediting period.

and procedures actually applied :	
Any comment:	

Data / Parameter:	$EF_{BM,y}$
Data unit:	tCO_2/MWh
Description:	Build Margin Emission Factor of NWPG
Source of data used:	Chinese DNA
Value applied:	0.6491
Justification of the choice of data or description of measurement methods and procedures actually applied :	This build margin emission factor is calculated and recommended by Chinese DNA, see also http://cdm.ccchina.gov.cn/. Calculated ex-ante and fixed during the crediting period.
Any comment:	

Data / Parameter:	the most recent 5 years (2000-2004) of NWPG, the low-cost/must run resources constitute share of total generation
Data unit:	%
Description:	the most recent 5 years (2000-2004) of NWPG, the low-cost/must run resources constitute share of total generation
Source of data used:	China electricity year book 2001~2005
Value applied:	Less than 50%. The most recent 5 years (2000-2004) of NWPG, the low-cost/must run resources constitute less than 50% of total: 28.72%, 25.43%, 23.06%, 18.18% and 22.05% for 2000, 2001, 2002, 2003 and 2004.
Justification of the choice of data or description of measurement methods and procedures actually applied :	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 formula (13), the project emission reduction is the product of the baseline emissions factor (EF_y in tCO_2/MWh) times the net electricity supplied by the project activity (EG_y in MWh). The baseline emission factor is ex-ante and fixed during the credit period, therefore, according to the FSR, the net electricity supplied are estimated as:

Phase one: 158,100 MWh/yr;

Phase two: 163,000 MWh/yr;

And the total net electricity supplied is:

158,100+163,000=321,100 MWh/yr

Then according to formula (13), the emission reduction is:

$ER_y = BE_y - PE_y - L_y$

$= 0.8410 \times 321{,}100 - 0 - 0$

$= 270{,}045$ tCO_2 e

And the project emission and project leakage are zero.

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

As the project starting date of the first crediting period is 1/12/2007 with the renewable crediting periods, the emission reductions during the first crediting period are estimated as:

Year(month)	Estimation of Project activity Emission (tonnes of CO2e)	Estimation of baseline emission (tonnes of CO2 e)	Estimation of leakage (tonnes of CO_2e)	Estimation of Emission reductions (tonnes of CO_2 e)
2007(12)	0	22,504	0	22,504
2008(1~12)	0	270,045	0	270,045
2009(1~12)	0	270,045	0	270,045
2010(1~12)	0	270,045	0	270,045
2011(1~12)	0	270,045	0	270,045
2012(1~12)	0	270,045	0	270,045
2013(1~12)	0	270,045	0	270,045
2014(1~11)	0	247,541	0	247,541
Total (t CO2e) (7 years)	0	1,890,315	0	1,890,315
The average emission reduction annually during the first credit period (tCO2e)	0	270,045	0	270,045

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

According to the monitoring methodology of version 2 of ACM0004, because no captive plant is existed and no auxiliary fossil fuels are needed, and the baseline emission factor is ex-ante and fixed during the credit period, only net electricity output is needed to be monitored. The net supply generation (EG_y) is the difference of the $EG_{gen,y}$ and $EG_{aux,y}$

B.7.1 Data and parameters monitored:

Data / Parameter:	$EG_{gen,y}$
Data unit:	MWh
Description:	Total electricity generated by the proposed project
Source of data to be used:	Electricity meter.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Phase one: 174,600 MWh/yr,from FSR. Phase two: 180,000 MWh/yr,from FSR. And the total is 354,600 MWh.
Description of measurement methods	This parameter will be continuously measured and monthly recorded and aggregately annually at the two electricity output points of phrase one and

and procedures to be applied:	phrase two. Two meters will be installed at each output point, 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. The electricity meter will be operated by the power distribution company and adjusted according to relevant national standard including "Technical administrative code of electric energy metering" DL/T 448-2000, "Verification regulation of electric energy metering appliance" SD 109-83, "Electricity Law", "Metrology law of the PR China". The accuracy of the metering equipment is 0.5s for generator 1 and 0.2s for generator 2.
QA/QC procedures to be applied:	please refer to B.7.2
Any comment:	Key parameter

Data / Parameter:	**$EG_{aux,y}$**
Data unit:	MWh
Description:	Self consumption of by the proposed project
Source of data to be used:	Electricity meter.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Self used rate is 9.44% from FSR. Phase one: 16,500 MWh/yr,from FSR. Phase two: 17,000 MWh/yr,from FSR. And the total is 33,500 MWh.
Description of measurement methods and procedures to be applied:	This parameter will be continuously measured and monthly recorded and aggregately annually at the two electricity output points of phrase one and phrase two. Two meters will be installed at each output point, 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. The electricity meter will be operated by the power distribution company and adjusted according to relevant national standard including "Technical administrative code of electric energy metering" DL/T 448-2000, "Verification regulation of electric energy metering appliance" SD 109-83, "Electricity Law", "Metrology law of the PR China". The accuracy of the metering equipment is 0.5s for generator 1 and 2.
QA/QC procedures to be applied:	please refer to B.7.2
Any comment:	The net supply generation(**EG_y**) is the difference of the **$EG_{gen,y}$** and **$EG_{aux,y}$**

Data / Parameter:	**EG_y**
Data unit:	MWh
Description:	Net electricity supplied by the proposed project
Source of data to be used:	Calculate
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Phase one: 158,100 MWh/yr,from FSR. Phase two: 163,000 MWh/yr,from FSR. And the total is 321,100 MWh.

Description of measurement methods and procedures to be applied:	The net supply generation (**EG**$_y$) is the difference of the **EG** $_{gen,y}$ and **EG** $_{aux,y}$. This parameter will be continuously measured and monthly recorded and aggregately annually. 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:	

B.7.2 Description of the monitoring plan:

According to the monitoring methodology of ACM0004 and the character of the proposed project, the monitoring plan is shown as follows:

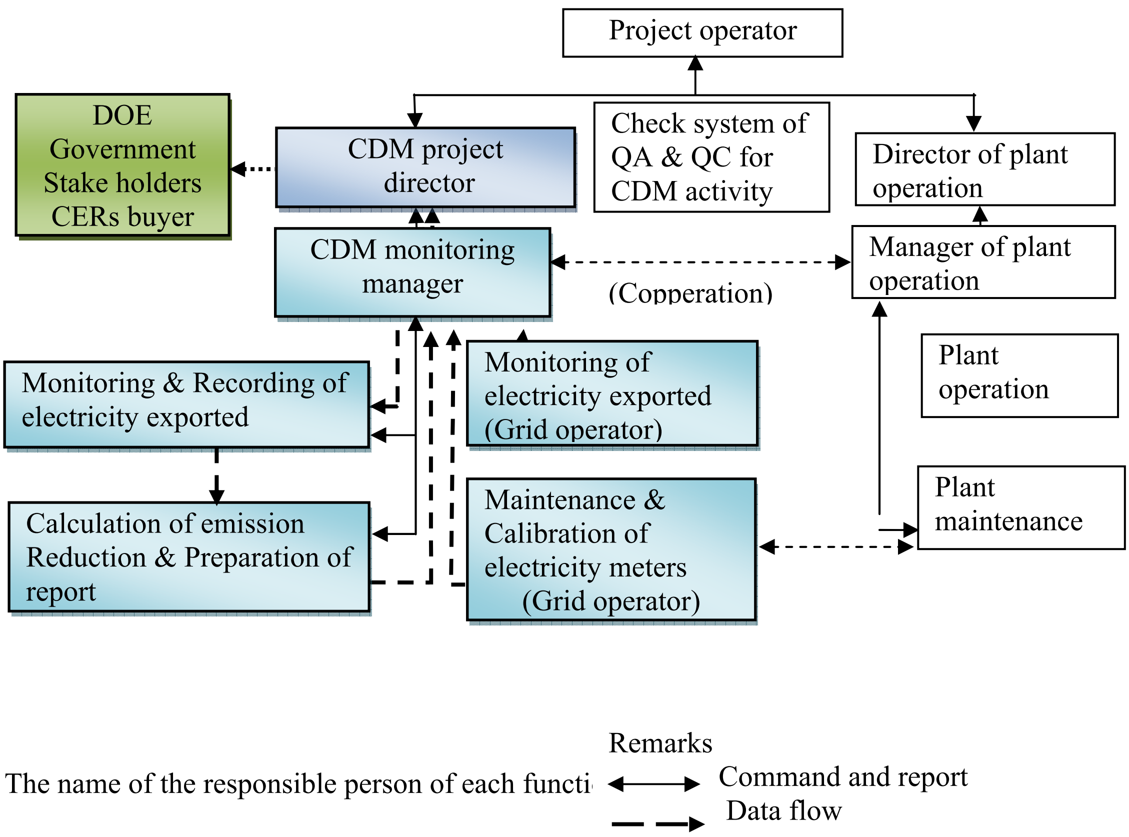
1. Monitor operational and management scheme

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

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

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

The management structure is illustrated as follows:



The name of the responsible person of each functi

Project operator: Ms Bo WU
CDM project director: Ms Beibei LUO
CDM monitoring manager: Mr Jianzhong WANG
Grid operator: Mr Bangyi CHEN
System for QA and QC of CDM activity:

As shown in the organization chart, all activities necessary for the CDM project activity are identified such as monitoring, recording, calculation of emission reduction, preparation of report, reporting, maintenance/ calibration of the measuring equipments, management and proper personnel are allocated to each function with authority and responsibility.

They are organized under the CDM project director and CDM monitoring manager for smooth reliable functioning.

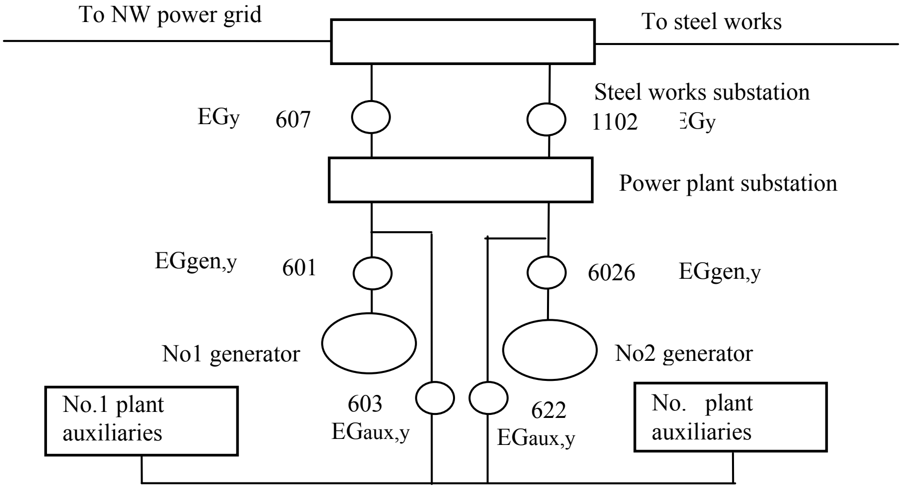
In addition to the organization for daily work for CDM activity, "Check system of QA & QC for CDM activity" which is composed of the responsible personnel of each function is organized to review and check the activity and advice improvement to the CDM project director for assuring quality control of CDM activity.

Measuring meters O&M and calibration

The electricity meter will be operated by the power distribution company and adjusted according to relevant national standard including "Technical administrative code of electric energy metering" DL/T 448-2000, "Verification regulation of electric energy metering appliance" SD 109-83, "Electricity Law", "Metrology law of the PR China". The calibration will be carried out once in every 6 months in collaboration with the plant operator."

The monitoring system (the system for the data acquisition, recording the measured data, calculation of emission reduction and preparation of the report and the maintenance/calibration of the electricity meters) will be incorporated into the power plant monitoring and maintenance system to ensure reliable, transparent and comprehensive monitoring.

The location of the electricity meters will be as illustrated below:



Electricity meters summary

unit	#1generator			#2 generator		
Meters name	601	603	607	6026	622	1102
function	Generator out	#1 self consumption	#1 delivery point	generator out	#2 self consumption	#2 delivery point
manufacture	Changsha Weisheng Electronics Co., Ltd.					
type	DSSD331	DSSD331	DSSD331	DSSD331	DSSD331	DTSD341
accuracy	0.2S	0.5S	0.5S	0.5S	0.5S	0.2S

2. deviations treatment

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

3. Monitoring report

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

4. monitoring data

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

5. monitoring points and record frequency

As B.7.1, the net electricity output will be continuously measured and monthly recorded and aggregately annually at the two electricity output points of phrase one and phrase two. Two meters will be installed at each output point, 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.

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 06 March, 2008 by:

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

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

(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:

1/1/2006

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

25 years

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

C.2.1. Renewable crediting period

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

01/12/2007[1]

C.2.1.2. Length of the first crediting period:

7 years

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

Not applicable

C.2.2.2. Length:

Not applicable

SECTION D. Environmental impacts

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

The environmental impact assessment (EIA) reports of the Phase 1 and Phase 2 have been prepared by Coal Science Research Institute (CSRI) and approved by Environmental Protection Bureau of Shaanxi Province in April and May of 2006 ([2005]106 and [2006]85).

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[1] The crediting period shall start after the registration of the project. When the registration date is late than the 01/12/2007, the starting date of the first crediting period should be revised to the registration date.

The main conclusions from the EIA are listed as follows:

The polluted and waste water will be recycled through a circulating system, thus has no impact on the water quality of Yellow River. In normal situation, the operation of proposed project has a very limited impact on the air quality around the project site. After the implementation of phase 1, the annual dust emission will decrease 13.42 tons per year; after the implementation of phase 2, the annual dust emission and SO_2 emission will decrease 21.065 tons and 0.232 tons per year. The noise of the proposed project can meet the third standard of GB3096-93, the national standard for industry noise. As a gas-fired project, the proposed project has no slag.

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

The proposed project is a project aiming at environment protection in the local area, then has no any negative impact on the environment.

SECTION E. Stakeholders' comments

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

The project participants distributed 100 questionnaire survey among stakeholders to find out the public attitudes in Oct, 25 2006. The questionnaire gives a brief introduction of the proposed project and its environment impact and fully considered comments from different occupations including residences, doctors, teachers, students and government staffs. Content of the questionnaire is shown in the following table:

Questionnaire for Stakeholder Comments:

<table>
<tr><td>Name</td><td></td><td>Gender</td><td>□male □female</td><td rowspan="3">Age</td><td rowspan="3">□18~30 years old
□31~55 years old
□above 56 years old</td></tr>
<tr><td>Occupation</td><td colspan="3">□Farmer □Worker □Business men □Teacher
□Official □Others</td></tr>
<tr><td>Educational level</td><td colspan="3">□ Primary school
□ Junior/high school
□ Bachelor or above</td></tr>
<tr><td colspan="6">Background information: The proposed projects include two 130t/h gas-fired boilers and two sets of 25MW condensing steam turbine with bleeding, invested by Xi'an Datang Pharmaceutical Co.Ltd in Shaanxi Longmen Iron & Steel Group. The fuel to be used in the proposed project will be the waste gas from blast furnace and converter which is surplus coal gas after balance and now open flaring in absence of the proposed project.</td></tr>
<tr><td colspan="6">Attention: For the purpose of environmental protection, the project should carry out public consultation in accordance with relevant national laws. Please mark the item which you agree with, and thank you for your opinion and advice.</td></tr>
<tr><td colspan="6">1 What do you think of the local environment</td></tr>
</table>

□Satisfying □Comparatively satisfying □Dissatisfying □Very dissatisfying
2 What do you think of the local air quality? □Satisfying □Comparatively satisfying □Dissatisfying □Very dissatisfying
3 By what mean have you heard about the proposed project? □Newspaper □TV/broadcast □Internet □Heard of
4 Which pollution do you think is the most heavy pollution from the current system?(multi-chosen) □Waste gas □Waste water □Noise □Solid waste □Ecology
5 What do you think of the pollution from the open flaring system? □Heavy □Commonly □Light □Tiny
6 How much do you think the proposed project will improve the local environment? □Greatly improve □Only improve □Can not improve □Even worse
7 How much do you think the proposed project will improve your living quality? □Greatly improve □Can not improve □Even worse
8 How much do you think the proposed project will improve the local development? □Greatly improve □Can not improve □Even worse
9 What's your attitude towards the proposed project? □Support □Partly support □Opposite □Don't care
Do you have any other advice or requirement on environment protection, please explain here: ____

Of all the investigated stakeholders, 10 person have bachelor degree, accounting for 10.5%; 78 person have junior school or high school degree, accounting for 82.1%, another 7 person have primary school degree. Regarding the age of investigated stakeholders, 30 of them are less than 29 years old, accounting for 31.6%; 42 of them are between 30 and 39 years old, accounting for 44.2%; 14 of them are between 40 and 49 years old, accounting for 14.7%; another 9 of them are more than 50 years old, accounting for 9.5%.

To further collect comments from local stakeholders to the proposed project, the project participants also held a stakeholder consultation with stakeholder representatives in 15 May of 2007.

E.2. Summary of the comments received:

Totally 100 copies of questionnaire are distributed and collected at a returning rate of 97%, 95 of them are effective questionnaires.

The results show that more than 83% of the investigated stakeholders support the proposed project and believe the proposed project will greatly promote the local sustainable development. Regarding to the local environment before the construction of the proposed project, the results show that about 70% of respondents are not satisfied with the local environmental situation. There are 48.4% of respondents think the air pollution is the heaviest local pollution, while 29.5% of them think the noise is the major local pollution. All of the respondents support the proposed project, there is no respondent opposite the proposed project.

In the stakeholder consultation, 12 representatives are invited to give comments for the proposed project. 5 of them acknowledged the proposed project from TV news, 3 from the newspaper, 2 from other person and 1 from the opening ceremony of the project. During the consultation, all the representatives expressed their support towards the proposed project. They believe that the collection of waste coal gas for generation will reduce the local air pollution and gain the environmental benefit. Some of them also suggest enlarging the proposed project to further improve the local air quality. Some villagers also expressed their concern about the noise made by the turbine and boilers.

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

All respondents in the survey support the proposed project, therefore no modification of the project is needed. The project participants will seriously consider the comments from stakeholders and strictly implement corresponding measures in the EIA to accomplish environmental, social and economical benefit of the proposed project.

Regarding to the noise problem, the project participants have installed 7 silencers in 25 June 2006 to reduce the noise. After the installation of these noise reducing facilities, the EPA of Hancheng city made a noise test in the proposed project and issued a test report to confirm the noise level meets the national criteria (65dB in daytime and 55dB in night).

In addition, the project company will keep regular communication with the stakeholders during the construction and operating periods.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Organization:	Shaanxi Xinglong Cogeneration Co.Ltd
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E-Mail:	luobeibei@hotmail.fr
URL:	
Represented by:	Beibei Luo
Title:	President Assistant
Salutation:	
Last Name:	Luo
Middle Name:	
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Country:	Japan
Telephone:	
FAX:	
E-Mail:	
URL:	http://www.nedo.go.jp/
Represented by:	
Title:	Director General
Salutation:	Mr.
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Middle Name:	
First Name:	Hidefumi
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Annex 2

INFORMATION REGARDING PUBLIC FUNDING

No public funding is involved in this project activity.

Annex 3

BASELINE INFORMATION

Table A3-1 NWPG 2000 2004 generation composition

year		Shaanxi	Gansu	Qinghai	Ningxia	Xinjiang	NWPG	Fossil share	Others
	unit	TWh	TWh	TWh	TWh	TWh	TWh	%	%
2000	Total	26.05	28.03	13.14	12.89	13.47	93.58		
	Fossil	22.72	16.59	2.49	11.98	12.91	66.70	71.28	28.72
2001	Total	30.88	29.53	14.17	14.34	19.90	108.83		
	Fossil	28.18	18.49	4.65	13.50	16.33	81.15	74.57	25.43
2002	Total	32.46	34.28	13.77	15.70	13.25	109.46		
	Fossil	29.87	23.50	4.65	14.83	11.36	84.21	76.94	23.06
2003	Total	42.71	39.34	13.58	20.00	23.61	139.24		
	Fossil	38.14	29.49	6.45	19.18	19.83	113.09	81.22	18.78
2004	Total	51.48	47.53	17.28	26.33	26.64	169.25		
	Fossil	44.44	33.24	6.21	25.30	22.75	131.94	77.95	22.05

Data Source: china electricity year book 2001 2005. Except that the data xinjiang 2000 and 2002 refers to the data of Wlumuqi grid.

Table A3-2 OM and BM

OM	tCO_2/MWh	1.0329
BM	tCO2/MWh	0.6491

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

The detail infomation are as follows:

Calculation of BM emission factor of the North West Power Grid(NWPG)

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

		Shaanxi	Gansu	Qinghai	Ningxia	Xinjiang	total	NCV	Emission factor(tC/TJ)	OXID (%)	Emission(tCO_2e)
Fuel type	Unit	A	B	C	D	E	G=A+…+E	H	I	J	K=G*H*I*J*44/12/100
Raw coal	10*kt	2428.70	1595.90	322.80	1270.10	1240.90	6858.4	20908 kJ/kg	25.80	0.98	132,939,033
Washed coal	10*kt	0	0	0	0	0	0	26344 kJ/kg	25.80	0.98	0
Other coal	10*kt	0	0	0	102.64	10.50	113.14	8363 kJ/kg	25.80	0.98	877,194
Coke	10*kt	0.78	0	0	0	0	0.78	28435 kJ/kg	29.50	0.98	23,511
Sub-total	10*kt										**133,839,737**
Crude oil	10*kt	0.01	0	0	0	0.06	0.07	41816 kJ/kg	20.00	0.99	2,125
Gasoline	10*kt	0.02	0	0	0	0	0.02	43070 kJ/kg	18.90	0.99	591
Kerosene	10*kt	0	0	0	0	0	0	43070 kJ/kg	19.60	0.99	0
diesel	10*kt	2.16	0.36	0	0.05	0.41	2.98	42652 kJ/kg	20.20	0.99	93,200
Fuel oil	10*kt	0.01	0.69	0	0	0.30	1	41816 kJ/kg	21.10	0.99	32,028.
Other oil	10*kt	0	0	0	0	0	0	38369 kJ/kg	20.00	0.99	0
Sub-total											**127,944**
Natual gas	10*M m^3	16.1	5.9	0	0	62.7	84.7	38931 kJ/m3	15.30	0.995	1,840,623
Coke oven gas	10*M m^3	0	3.0	0	0	0	3	16726 kJ/m3	13.00	0.995	23,799
Other oven gas	10*M m^3	7.4	12.6	0	0	0	20	5227 kJ/m3	13.00	0.995	49,582
LPG	10*kt	0	0	0	0	0	0	50179 kJ/kg	17.20	0.995	0
Refinery gas	10*kt	0	0	0	0	3.26	3.26	46055 kJ/kg	18.20	0.995	99,692
Sub-Total											**2,013,695**
total											**135,981,376**

Data source: China Energy Statistical Yearbook 2005.

Baseing on above table and formula (4),(5) and (6), then
λ_{Coal} =98.43% λ_{Oil} =0.09% λ_{Gas} =1.48% .

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

$$EF_{Thermal} = \lambda_{Coal} \times EF_{Coal,\ Adv} + \lambda_{Oil} \times EF_{Oil,\ Adv} + \lambda_{Gas} \times EF_{Gas,\ Adv} == 0.9062$$

	Vary	Efficiency	Emission factor(tC/TJ)	OXID (%)	Emission factor (tCO_2/MWh)
		A	B	C	D=3.6/A/1000*B*C*44/12
Coal generation(600MW sub critical)	$EF_{Coal,Adv}$	36.53%	25.8	0.98	0.9136
Gas generation (200MW, similar to GE, 9E)	$EF_{Gas,Adv}$	45.87%	15.3	0.995	0.4381
oil generation (200MW, similar to GE, 9E)	$EF_{Oil,Adv}$	45.87%	21.1	0.99	0.6011

Source: Chinese DNA, http://cdm.ccchina.gov.cn/

Step (3): Calculation BM in the grid.

NWPG Installed Capacity in 2004

Installed Capacity	unit	Shaanxi	Gansu	Qinghai	Ningxia	Xinjiang	total
thermal power	MW	7640.4	4975.6	889.8	3782	4959.7	22247.5
hydro	MW	1876.5	3566.1	4053.4	366.2	973	10835.2
nuclear	MW	0	0	0	0	0	0
wind farm and other	MW	0	138.2	0	42.5	95.3	276
total	MW	9516.9	8679.9	4943.2	4190.7	6028	33358.7

Data source: China Electric Power Yearbook 2005.

NWPG Installed Capacity in 2002

Installed Capacity	unit	Shaanxi	Gansu	Qinghai	Ningxia	Xinjiang	total
thermal power	MW	6735.4	3881.8	803.8	2386	3949.9	17756.9
hydro	MW	1462.3	3238.6	3206.3	307.9	984.8	9199.9
nuclear	MW	0	0	0	0	0	0
wind farm and other	MW	0	8.4	0	0	96.7	0

total	MW	8197.7	7128.8	4010	2693.9	5031.4	27061.8

Data source: China Electric Power Yearbook 2003.

NWPG Installed Capacity in 200

Installed Capacity	unit	Shaanxi	Gansu	Qinghai	Ningxia	Xinjiang	total
thermal power	MW	6302.4	3874.8	766.8	2046	3804.9	16794.9
hydro	MW	1450.7	3118.3	3127.4	307.9	868.1	8872.4
nuclear	MW	0	0	0	0	0	0
wind farm and other	MW	0	8.4	0	0	70.6	79
total	MW	7753.1	7001.5	3894.1	2353.9	4743.6	25746.2

Data source: China Electric Power Yearbook 2002.

NWPG BM calculation

	installed capacity of 2001	installed capacity of 2002	installed capacity of 2004	Newly installed capacity from 2001 to2004	Share of the Newly installed capacity
	A	B	C	D=C-A	
Thermal(MW	16794.9	17756.9	22247.5	5452.6	71.63%
Hydro(MW	8872.4	9199.9	10835.2	1962.8	25.78%
Nuclear(MW	0	0	0	0	0.00%
Windfarm(MW	79	105.1	276	197	2.59%
Total (MW)	**25746.3**	**27061.9**	**33358.7**	**7612.4**	**100.00%**
Percent of the installed capacity of 2004	77.18%	81.12%	100%		

$EF_{BM,y}$=0.9062×71.63%=0.6491 tCO_2/MWh

NWPG OM calculation

NWPG simple OM calculation in 2002

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	1607.5	1156.02	278.66		981.75	**4023.93**	25.8	98	20908	77997399.05
Washed coal	10*kt		0.91				**0.91**	25.8	98	26344	22224.92592
Other coal	10*kt						**0**	25.8	98	8363	0
Coke	10*kt						**0**	29.5	98	28435	0
Coke oven gas	100*Mm^3		0.04				**0.04**	13	99.5	16726	3173.145213
Other oven gas	100*Mm^3		0.08				**0.08**	13	99.5	5227	1983.263187
Crude oil	10*kt						**0**	20	99	41816	0
disel	10*kt	1.96				1.12	**3.08**	20.2	99	42652	96327.017
Fuel oil	10*kt		1.7			1.27	**2.97**	21.1	99	41816	95123.54277
LPG	10*kt						**0**	17.2	99.5	50179	0
Refinery gas	10*kt						**0**	18.2	99.5	46055	0
Natural gas	100*Mm^3		0.53			2.33	**2.86**	15.3	99.5	38931	621509.161
Other oil	10*kt						**0**	20	99	38369	0
Other coke	10*kt						**0**	25.8	98	28435	0
others	10*ktce		5.07			1.74	**6.81**	0	0	0	0
										sub-total	78837740.11

Data source: China Energy Statistical Yearbook 2003.

NWPG thermal generation in 2002							
province		**generation**	**Self consumption rate**	**Delivery generation**			
		(MWh)	**(%)**	**(MWh)**			
Shaanxi		31941000	7.87	29427243			
Gansu		23504000	6.83	21898677		Total emission tCO2	78837740.11
Qinghai		4980000	8.4	4561680		Total delivery MWh	86084777.9
Ningxia		15505000	6.54	14490973		**Emission factor**	**0.915815107**
Xinjiang		17498000	10.24	15706205			
total				86084778			

Data source: China Electric Power Yearbook 2003.

NWPG simple OM calculation in 2003

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	2002.26	1479.62	330.67	682	1065.75	**5560.3**	25.8	98	20908	107777455.9
Washed coal	10*kt						**0**	25.8	98	26344	0
Other coal	10*kt				27	3.64	**30.64**	25.8	98	8363	237557.13
Coke	10*kt						**0**	29.5	98	28435	0
Coke oven gas	100*Mm^3		1.54				**1.54**	13	99.5	16726	122166.0907
Other oven gas	100*Mm^3		0.12				**0.12**	13	99.5	5227	2974.89478
Crude oil	10*kt						**0**	20	99	41816	0
disel	10*kt		1.19			1.02	**2.21**	21.1	99	41816	70782.16482
Fuel oil	10*kt						**0**	17.2	99.5	50179	0
LPG	10*kt					3.48	**3.48**	18.2	99.5	46055	106419.6754
Refinery gas	10*kt	0.1	0.54			5.95	**6.59**	15.3	99.5	38931	1432078.801
Natural gas	100*Mm^3						**0**	20	99	38369	0
Other oil	10*kt						**0**	25.8	98	28435	0
Other coke	10*kt		5.86			2.3	**8.16**	0	0	0	0
others	10*ktce	2002.26	1479.62	330.67	682	1065.75	**5560.3**	25.8	98	20908	107777455.9
										Sub-total	109860773.6

Data source: China Energy Statistical Yearbook 2004.

NWPG thermal generation in 2003							
province		**generation**	**Self consumption rate**	**Delivery generation**			
		(MWh)	**(%)**	**(MWh)**			
Shaanxi		38144000	6.94	35496806			
Gansu		29494000	6.35	27621131		Total emission tCO2	**109860773.6**
Qinghai		6446000	4.5	6155930		Total delivery MWh	**105651775.3**
Ningxia		19175000	5.25	18168313		**Emission factor**	**1.039838406**
Xinjiang		19834000	8.19	18209595			
total				105651775			

Data source: China Electric Power Yearbook 2004.

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	2428.7	1595.9	322.8	1270.1	1240.9	**6858.4**	25.8	98	20908	132939032.6
Washed coal	10*kt						**0**	25.8	98	26344	0
Other coal	10*kt				102.64	10.5	**113.14**	25.8	98	8363	877193.6583
Coke	10*kt	0.78					**0.78**	29.5	98	28435	23510.79731
Coke oven gas	100*Mm^3		0.3				**0.3**	13	99.5	16726	23798.5891
Other oven gas	100*Mm^3	0.74	1.26				**2**	13	99.5	5227	49581.57967
Crude oil	10*kt	0.01				0.06	**0.07**	20	99	41816	2125.08912
disel	10*kt	0.02					**0.02**	18.9	99	43070	590.980698
gasline		2.16	0.36		0.05	0.41	**2.98**	20.2	99	42652	93199.51645
Fuel oil	10*kt	0.01	0.69			0.3	**1**	21.1	99	41816	32028.12888
LPG	10*kt						**0**	17.2	99.5	50179	0
Refinery gas	10*kt					3.26	**3.26**	18.2	99.5	46055	99691.99474
Natural gas	100*Mm^3	1.61	0.59			6.27	**8.47**	15.3	99.5	38931	1840623.284
Other oil	10*kt						**0**	20	99	38369	0
Other coke	10*kt						**0**	25.8	98	28435	0
others	10*ktce		6.17			3.46	**9.63**	0	0	0	0
										sub-total	135981376.3

Data source: China Energy Statistical Yearbook 2005.

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	**135981376.3**
Qinghai		6208000	7.96	5713843.2		Total delivery MWh	**122605242.6**
Ningxia		25298000	5.45	23919259		**Emission factor**	**1.109099198**
Xinjiang		22752000	9.07	20688394			
total				122605243			

Data source: China Electric Power Yearbook 2005.

Finally, the average emission factor of the three years is: 1.0329 tCO_2/MWh

Spread Sheet of IRR Calculation Longmen Project (I)

Total investment financial analysis of longmen project (I)					
cal result	without CERs	with CERs			
IRR(after tax)	6.20%	14.40%		benchmark IRR	12%
Payback period(excluing construction)	15.14	4.72			

input parameters				data source	
basic parameters					
delivered electricty(GWh)	158.10			FS	
tariff(Yuan/kWh)	0.42			FS	including VAT
Total investment(million Yuan)	89.22			FS	
active capital(million Yuan)	1.19			FS	
Depreciation period(year)	20			FS	
Construct period(year)	1			FS	
Operation period(year)	22			FS	
residue value(million Yuan)	54.44			FS	
O&M (million Yuan)	53.60				
Blast furnace gas	48.52			FS	
Converter gas	0.00			FS	
water fee	0.52			FS	
auxiliary material	0.50			FS	
Other cost	4.06			FS(3,4,5,6)	
Depreciation	5.46			FS	
Tax(%)					
VAX induction(%)	0.17			FS	basing on the sale revenue
VAX dedution (%)	0.13	0.17		FS(P78)	basing on the gas fuel cost plus water fee,but auxilary material is 17%
Other tax rate	0.08			FS	city tax plus education tax, basing on the VAX
Income tax rate	0.33			FS	
CDM					
CERprice $/tCO2e)	10			assumed	
exchange rate RMB/$)	7.7				

CAL model																							
IRR without CERs revenue																							
year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Cash flow in(million Yuan)		66.40	66.40	66.40	66.40	66.40	66.40	66.40	66.40	66.40	66.40	66.40	66.40	66.40	66.40	66.40	66.40	66.40	66.40	66.40	66.40	66.40	122.03
1. income of electricity sale		66.40	66.40	66.40	66.40	66.40	66.40	66.40	66.40	66.40	66.40	66.40	66.40	66.40	66.40	66.40	66.40	66.40	66.40	66.40	66.40	66.40	66.40
2. Residue recovery																							54.44
3. active capital recovery																							1.19
Cash flow out(million Yuan)																							
1. initial investment	89.22																						
2. active capital	1.19																						
3.O&M		53.60	53.60	53.60	53.60	53.60	53.60	53.60	53.60	53.60	53.60	53.60	53.60	53.60	53.60	53.60	53.60	53.60	53.60	53.60	53.60	53.60	53.60
4.VAX		4.83	4.83	4.83	4.83	4.83	4.83	4.83	4.83	4.83	4.83	4.83	4.83	4.83	4.83	4.83	4.83	4.83	4.83	4.83	4.83	4.83	4.83
5 .other tax		0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39
6.Depreciation		5.46	5.46	5.46	5.46	5.46	5.46	5.46	5.46	5.46	5.46	5.46	5.46	5.46	5.46	5.46	5.46	5.46	5.46	5.46	5.46	0.00	0.00
7. income tax		0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	2.50	20.86
Net Cash flow	-90.41	6.88	6.88	6.88	6.88	6.88	6.88	6.88	6.88	6.88	6.88	6.88	6.88	6.88	6.88	6.88	6.88	6.88	6.88	6.88	6.88	5.08	42.35
Accumulative total cash flow	-90.41	-83.53	-76.64	-69.76	-62.88	-56.00	-49.11	-42.23	-35.35	-28.47	-21.58	-14.70	-7.82	-0.93	5.95	12.83	19.71	26.60	33.48	40.36	47.24	52.33	94.68
Finacial indicator																							
IRR(after tax)			**6.20%**																				
Payback period (excluing construction)			15.14																				
CM (tCO2/MWh)	0.8410																						
IRR with CERs revenue																							
CER(tCO2/yr)		132,96	132,96	132,96	132,96	132,96	132,96	132,96															
CERs revenue(million Yuan)		10.24	10.24	10.24	10.24	10.24	10.24	10.24															
Net Cash flow	-90.41	17.12	17.12	17.12	17.12	17.12	17.12	17.12	6.88	6.88	6.88	6.88	6.88	6.88	6.88	6.88	6.88	6.88	6.88	6.88	6.88	5.08	42.35
Accumulative total cash flow	-90.41	-73.29	-56.17	-39.05	-21.93	-4.81	12.31	29.44	36.32	43.20	50.08	56.97	63.85	70.73	77.61	84.50	91.38	98.26	105.15	112.03	118.91	123.99	166.35
Finacial indicator																							
IRR(after tax)			**14.40%**																				
Payback period(excluing construction)			4.72																				

Spread Sheet of IRR Calculation Longmen Project (II)

Total investment financial analysis of longmen project (II)					
cal result	without CERs	with CERs			
IRR(after tax)	8.36%	14.92%		benchmark IRR	12%
Payback period(excluing construction)	12.60	5.85			

input parameters				data source	
basic parameters					
delivered electricty(GWh)	163.00			FS	
tariff(Yuan/kWh)	0.42			FS	including VAT
Total investment(million Yuan)	115.0025			FS	
active capital(million Yuan)	0.98			FS	
Depreciation period(year)	20			FS	
Construct period(year)	1			FS	
Operation period(year)	22			FS	
residue value(million Yuan)	71.36			FS	
O&M (million Yuan)	49.00				
Blast furnace gas	32.81			FS	
Converter gas	8.57			FS	
water fee	1.76			FS	
auxiliary material	0.50			FS	
Other cost	5.36			FS(3,4,5,6,7)	
Depreciation	6.68			FS	
Tax(%)					
VAX induction(%)	0.17			FS	basing on the sale revenue
VAX dedution (%)	0.13	0.17		FS(P78)	basing on the gas fuel cost plus water fee,but auxilary material is 17%
Other tax rate	0.08			FS	city tax plus education tax, basing on the VAX
Income tax rate	0.33			FS	
CDM					
CERprice $/tCO2e)	10			assumed	
exchange rate RMB/$)	7.7				

CAL model																							
IRR without CERs revenue																							
year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Cash flow in(million Yuan)		68.46	68.46	68.46	68.46	68.46	68.46	68.46	68.46	68.46	68.46	68.46	68.46	68.46	68.46	68.46	68.46	68.46	68.46	68.46	68.46	68.46	140.80
1. income of electricity sale		68.46	68.46	68.46	68.46	68.46	68.46	68.46	68.46	68.46	68.46	68.46	68.46	68.46	68.46	68.46	68.46	68.46	68.46	68.46	68.46	68.46	68.46
2. Residue recovery																							71.36
3. active capital recovery																							0.98
Cash flow out(million Yuan)																							
1. initial investment	115.00																						
2. active capital	0.98																						
3.O&M		49.00	49.00	49.00	49.00	49.00	49.00	49.00	49.00	49.00	49.00	49.00	49.00	49.00	49.00	49.00	49.00	49.00	49.00	49.00	49.00	49.00	49.00
4.VAX		5.94	5.94	5.94	5.94	5.94	5.94	5.94	5.94	5.94	5.94	5.94	5.94	5.94	5.94	5.94	5.94	5.94	5.94	5.94	5.94	5.94	5.94
5 .other tax		0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48
6.Depreciation		6.68	6.68	6.68	6.68	6.68	6.68	6.68	6.68	6.68	6.68	6.68	6.68	6.68	6.68	6.68	6.68	6.68	6.68	6.68	6.68	0.00	0.00
7. income tax		2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	4.30	28.17
Net Cash flow	-115.98	10.94	10.94	10.94	10.94	10.94	10.94	10.94	10.94	10.94	10.94	10.94	10.94	10.94	10.94	10.94	10.94	10.94	10.94	10.94	10.94	8.74	57.20
Accumulative total cash flow	-115.98	-105.04	-94.10	-83.16	-72.22	-61.28	-50.34	-39.40	-28.46	-17.52	-6.58	4.36	15.30	26.24	37.18	48.12	59.06	70.00	80.94	91.88	102.82	111.56	168.76
Finacial indicator																							
IRR(after tax)			**8.36%**																				
Payback period(excluing construction)			12.60																				
CM (tCO2/MWh)	0.8410																						
IRR with CERs revenue																							
CER(tCO2/yr)		137,08	137,08	137,08	137,08	137,08	137,08	137,08															
CERs revenue(million Yuan)		10.56	10.56	10.56	10.56	10.56	10.56	10.56															
Net Cash flow	-115.98	21.50	21.50	21.50	21.50	21.50	21.50	21.50	10.94	10.94	10.94	10.94	10.94	10.94	10.94	10.94	10.94	10.94	10.94	10.94	10.94	8.74	57.20
Accumulative total cash flow	-115.98	-94.49	-72.99	-51.50	-30.00	-8.50	12.99	34.49	45.43	56.37	67.31	78.25	89.19	100.13	111.07	122.01	132.95	143.89	154.83	165.77	176.71	185.45	242.65
Finacial indicator																							
IRR(after tax)			**14.92%**																				
Payback period(excluing construction)			5.85																				

Spread Sheet of IRR Calculation　Longmen Project (I+II)

Total investment financial analysis of longmen project (I)+(II)					
cal result	without CERs	with CERs			
IRR(after tax)	7.43%	14.70%		benchmark IRR	12%
Payback period(excluing construction)	13.58	5.41			

input parameters				data source
basic parameters		Phase II	Phase I	
delivered electricty(GWh)	321.10	163.00	158.10	
tariff(Yuan/kWh)	0.42	0.42	0.42	including VAT
Total investment(million Yuan)	204.22	115.00	89.22	
active capital(million Yuan)	2.17	0.98	1.19	
Depreciation period(year)	20	20	20	
Construct period(year)	1	1	1	
Operation period(year)	22	22	22	
residue value(million Yuan)	125.80	71.36	54.44	
O&M (million Yuan)	102.61	49.00	53.60	
Blast furnace gas	81.34	32.81	48.52	
Converter gas	8.57	8.57	-	
water fee	2.28	1.76	0.52	
auxiliary material	1.00	0.50	0.50	
Other cost	9.42	5.36	4.06	
Depreciation	12.14	6.68	5.46	
Tax(%)				
VAX induction(%)	0.17	0.17	0.17	basing on the sale revenue
VAX dedution (%)	0.13	0.13	0.13	basing on the gas fuel cost plus water fee,but auxilary material is 17%
Other tax rate	0.08	0.08	0.08	city tax plus education tax, basing on the VAX
Income tax rate	0.33	0.33	0.33	
CDM				
CERprice　$/tCO2e)	10			assumed
exchange rate　RMB/$)	7.7			

CAL model																							
IRR without CERs revenue																							
year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Cash flow in(million Yuan)		134.86	134.86	134.86	134.86	134.86	134.86	134.86	134.86	134.86	134.86	134.86	134.86	134.86	134.86	134.86	134.86	134.86	134.86	134.86	134.86	134.86	262.83
1. income of electricity sale		134.86	134.86	134.86	134.86	134.86	134.86	134.86	134.86	134.86	134.86	134.86	134.86	134.86	134.86	134.86	134.86	134.86	134.86	134.86	134.86	134.86	134.86
2. Residue recovery																							125.80
3. active capital recovery																							2.17
Cash flow out(million Yuan)																							
1. initial investment	204.22																						
2. active capital	2.17																						
3.O&M		102.61	102.61	102.61	102.61	102.61	102.61	102.61	102.61	102.61	102.61	102.61	102.61	102.61	102.61	102.61	102.61	102.61	102.61	102.61	102.61	102.61	102.61
4.VAX		10.81	10.81	10.81	10.81	10.81	10.81	10.81	10.81	10.81	10.81	10.81	10.81	10.81	10.81	10.81	10.81	10.81	10.81	10.81	10.81	10.81	10.81
5 .other tax		0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
6.Depreciation		12.14	12.14	12.14	12.14	12.14	12.14	12.14	12.14	12.14	12.14	12.14	12.14	12.14	12.14	12.14	12.14	12.14	12.14	12.14	12.14	0.00	0.00
7. income tax		2.78	2.78	2.78	2.78	2.78	2.78	2.78	2.78	2.78	2.78	2.78	2.78	2.78	2.78	2.78	2.78	2.78	2.78	2.78	2.78	6.79	49.02
Net Cash flow	-206.39	17.79	17.79	17.79	17.79	17.79	17.79	17.79	17.79	17.79	17.79	17.79	17.79	17.79	17.79	17.79	17.79	17.79	17.79	17.79	17.79	13.79	99.53
Accumulative total cash flow	-206.39	-188.60	-170.80	-153.01	-135.22	-117.42	-99.63	-81.83	-64.04	-46.25	-28.45	-10.66	7.14	24.93	42.73	60.52	78.31	96.11	113.90	131.70	149.49	163.28	262.81
Finacial indicator																							
IRR(after tax)			**7.43%**																				
Payback period (excluing construction)			13.58																				
CM (tCO2/MWh)	0.8410																						
IRR with CERs revenue																							
CER(tCO2/yr)		270,045	270,045	270,045	270,045	270,045	270,045	270,045															
CERs revenue(million Yuan)		20.79	20.79	20.79	20.79	20.79	20.79	20.79															
Net Cash flow	-206.39	38.59	38.59	38.59	38.59	38.59	38.59	38.59	17.79	17.79	17.79	17.79	17.79	17.79	17.79	17.79	17.79	17.79	17.79	17.79	17.79	13.79	99.53
Accumulative total cash flow	-206.39	-167.80	-129.22	-90.63	-52.04	-13.45	25.13	63.72	81.51	99.31	117.10	134.90	152.69	170.49	188.28	206.07	223.87	241.66	259.46	277.25	295.04	308.83	408.36
Finacial indicator																							
IRR(after tax)			**14.70%**																				
Payback period(excluing construction)			5.41																				

Annex 4

MONITORING INFORMATION

Please refer to section B.7.2 of this PDD.

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