Summary of CDM/JI Feasibility Study Report, FY2010

03/2011
Tepia Corporation Japan Co., Ltd.

Title of the Study

Feasibility Study on the Shaanxi Dongling Smelting Waste Heat Recovery Project

Name of the Company

Tepia Corporation Japan Co., Ltd.

Operating Structure of the Study

Tepia Corporation Japan Co., Ltd.
- Main coordinator and responsible for the study;
- PDD author;
- Contract with DOE and so on

Shaanxi Industrial Technology Research Institute CDM Program Center
- Subcontractor;
- Provide information;
- Coordinate with the project owner and so on

Shaanxi Dongling Smelting Co., Ltd
- Project owner

1. Outline of the Project

(1). General information of the project:

The project is implemented at Shaanxi Dongling Smelting Co., Ltd. of lead and zinc production in Shaanxi province, China. It aims to recover 4 kinds of waste energy: Coke Oven Gas (COG), Blast Furnace Gas (BFG), Fuming Furnace Gas (FFG) and Cooling Lead and Zinc (CLZ). The project owner supposed to newly install 90t/h of waste gas boiler, waste heat recovering equipment from smelted lead and zinc, 20MW of turbine and 25MW of generator. Before implementation of the project, those 4 kinds of waste energy are treated as follows:

COG

Part of COG is recovered for coking process but most of gas is flared with no use. The the project is to recover that rest of gas for electricity generation (about 11,000Nm^3/h) flared before implementation of the project.

BFG

Part of BFG is utilized but most of gas is flared with no use. The project is to recover that rest of gas for electricity generation (about 23,000Nm^3/h) flared before implementation of the project.

FFG

Following to the environmental regulation in China, FFG is collected for sending to existing waste heat boiler and then about 6.5t/h of steam is produced but the steam is released to atmosphere with no use. The proposed project utilizes the steam for electricity generation with connecting to turbine and generator.

CLZ

On the process of producing lead and zinc, the smelted lead and zinc (about 4,000t/h, 520 ℃) is cooled down to 430 ℃, and the removed heat of smelted lead and zinc is released through the

cooling water. The project is to utilize the removed heat for electricity generation with producing steam and then sending it to turbine and generator.

The generated electricity from the project is sold to Shaanxi Grid (one of the component of NWPG). The electricity generating system is operated about 7,500 hours per annual; as a result, approximately 147,160MWh of electricity is generated and 135,390MWh of them (without the amount of consumption by the system itself) is sold, in consequence. It is supposed to choose 10-year crediting period from 2012 and estimated to reduce 112,910tCO2e annually.

(2). The applied methodology:

ACM0012, Version 03.2
"Consolidated baseline methodology for GHG emission reduction from waste gas or waste energy recovery projects"

2. Contents of the Study

(1). Study Subjects:

① Feasibility of the project

Regulatory movements in China

In recent years, realignment policy over the industrial sector called, "*Eliminate backward production capacity*" is taken into practice in China, then the equipments or facilities with small capacity or backward technique have been eliminating. Then it should be disclose whether the project owner is imposed the sanction or not; therefore it is conducted to investigate into the policy especially over lead and zinc smelting and coking industries.

Technology transfer

There is no case to install the waste heat recovering equipment from smelted lead and zinc in China. For implementing the project, it is investigated the feasibility to install from other country which have the technology.

Lead-poisoning Accident

In August, 2009, lead-poisoning accident was happened around the project site; the lead concentration in the blood of the residents around the area exceeded the ordinal level; therefore the possible polluter, the project owner, have been shutdown temporally by the local government until the cause of the accident identified. Then it is investigated into its occurrence to resolution, and its influence on the project.

② Feasibility as CDM project

Choice of Methodology

The project recovers waste gas (with calorific value) and waste heat (without calorific value but high temperature) for electricity generation; therefore it is possible to apply ACM0012. More detailed discussions are developed in this survey.

Identification of Baseline

Based on ACM0012, it is conducted to identify the baseline scenario referring to the situation how the 4 kinds of waste energy are treated before implementation of the project. At the same time the emission factor of local grid is investigated.

Demonstration of Additionality

According to ACM0012, the additionality of the project is demonstrated based on "Investment Analysis", "Barrier Analysis" and "Common Practice Analysis."

Confirmation of Monitoring Plan

It is needed to meet the monitoring plan considered by the project owner and the requirements in ACM0012. In case the monitoring plan and the requirements is not match, the plan should be modified to meet the methodology.

③ Consideration Co-benefit of the project

According to the feature of the project, it can be supposed the emission reduction of air pollutants for reducing the amount of coal incinerated at the grid-connected electricity generating facilities. The effect can be quantitatively analyzed comparing the current status of emission of air pollutants from 4 kinds of energy and its treatment to the project status of emission and treatment.

(2). Study Contents:

① Feasibility of the project

Regulatory movements in China

For achieving the aim of energy saving and pollutants reduction in Chinese "*11th five-year plan*", the Chinese government tries to eliminate those facilities with small capacity or backward technique following to "*Eliminate backward production capacity*"; then those facilities or companies are listed and disclosed on the HP of Ministry of Industry and Information Technology. According to the list, 192 of coking, 53 of zinc smelting and 17 of lead smelting facilities or companies in whole country are listed; among those 16 are located in Shaanxi province, on the other hand, the project owner is not included in the list moreover it is turned out to be obvious that there is no possibility for the project owner to be eliminated according to the project owner and the local government.

Technology transfer

The project is to install the waste gas boiler for recovering COG and BFG, waste heat recovering equipment from smelted lead and zinc, turbine and generator however, as to the waste heat recovering equipment from smelted lead and zinc is not in China; therefore it supposed to importing the equipment from Japan.

It is still under negotiation about the transfer of the technique between the project owner and Japanese company.

Lead-poisoning Accident

In Aug, 2009, it was disclosed that the levels of lead detected in the children around Changqing industrial park were above the average: the levels in 851 of 1,016 children were exceeded the average. Considering it seriously, the local government put a halt on the factory and announced not to make it restart unless they find where the responsibility lies; as a result the project owner halted the operation from Aug, 2009 to Mar, 2010.

After the careful examination by the local governmental bureau of environmental protection, it became clear that all the levels of lead emission to atmosphere water and land meet the Chinese national standard and confirmed that the project owner had illegal operation.

On the other hand,

The project owner held presentations to the local residents for explaining that no illegal operations were conducted in the project site; and then the local government agreed the project owner to restart the operation after April, 2010. It has been already recovered the normal operation at present.

② Feasibility as CDM project

Choice of Methodology

ACM0012, "Consolidated baseline methodology for GHG emission reduction from waste gas or waste energy recovery projects", has been applied to the project (referred to the detailed

discussion below).

Identification of Baseline

The baseline scenario is determined as the case where the 4 kinds of waste energy are flared or released to the atmosphere and the comparable amount of electricity is supplied from the grid connected electricity generating facilities.

Demonstration of Additionality

The additionality of the project is proven in any analysis (referred to the detailed discussion below).

Confirmation of Monitoring Plan

The project owner assumed full responsibility for operation, monitoring, management and so on. According to the hearing from the project owner, any part of the monitoring plan considered by the project owner meets the requirements in ACM0012, the meters will be installed to both the project site and grid, and moreover the backup data will be collected.

③ Consideration Co-benefit of the project

According to the "*Quantitative Evaluation Manual for Co-benefit*" published by Ministry of environment, it is calculated the SO2 emission reduction from the grid; as a result the annual emission reduction is estimated 327.49 tons of SO2.

3. Study results of CDM project implementation

(1). Identification of baseline scenario and project boundary:

① Baseline scenario

Under the current situation, COG and BFG are flared and FFG and CLZ are released to atmosphere through steam or cooling water.
The project recovers waste gas and waste heat for generating electricity; therefore ACM0012 is applicable for the project. According to the methodology, the baseline scenarios are supposed to the scenario where: the waste gas and waste heat would be flared or released to atmosphere continuously and the comparable amount of electricity would be supplied from the grid connected electricity generating facilities; the waste gas and waste heat would be recovered for generating electricity without CDM scheme, that is implement the project without CDM benefits.
On the other hand, as discussed in "Investment Analysis", the project would not be implemented without CDM benefits since it has less economical attractive, moreover the technique is not available under current situation for recovering heat from smelted lead and zinc in China since there is no comparable technology there; therefore the latter alternative scenario is not appropriate for the baseline scenario. Then the former alternative scenario indicates the continuation of current situation and it is very realistic; therefore the scenario where the waste gas and waste heat would be flared or released to atmosphere continuously and the comparable amount of electricity would be supplied from the grid connected electricity generating facilities is chosen as the baseline scenario of the project.

② Project boundary

According to ACM0012, the geographical boundary is determined as the facilities or equipments where: the industrial facility where waste energy is generated; the facility where process heat in the element process/steam/electricity is generated and the equipment providing auxiliary heat to the waste energy recovery process; the facility/s where the process heat in the element process/steam/electricity is used including the local grid connected.
Referring to the above consideration, geographical boundary of the project is determined as those

facilities: coke oven, blast furnace, fuming furnace, smelted lead and zinc sink, waste heat boiler and waste gas boiler, waste heat recovering equipment from smelted lead and zinc, turbine, generator and NWPG.

(2). GHG emission:

① Baseline emission

The project aims to generate electricity only; therefore the baseline emission can be calculated as follows:

$$BE_y = BE_{elec,y}$$

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

$$= 1 * 1 * 135{,}390 [MWh/a] * 0.83396 [tCO_2e/MWh]$$

$$= 112{,}910 [tCO_2e/a]$$

$BE_{elec,y}$: Baseline emission from electricity during the year *y* in tons of CO2

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 than generated in base year.

f_{wcm} : Fraction of total electricity generated by the project activity using waste energy.
This fraction is 1 if the electricity generation is purely from use of waste energy.

$EG_{i,j,y}$: The quantity of electricity supplied to the recipient j by generator, which in the absence of the project activity would have been sourced from ith source (i can be either grid or identified source) during the year y in MWh
The value 135,390MWh/a is applied in this calculation.

$EF_{elec,i,j,y}$: 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
The value is calculated from the grid emission factor (OM: 1.0246 and BM: 0.6433); both are considered at the rate of 50% and it equals to 0.83396 tCO_2e/MWh.

② Project emission

According to ACM0012, the project emission can be determined as the emissions for: combusting auxiliary fuel to supplement waste gas; generating the electricity consumed for cleaning gas before used. The project activity is to use only waste gas and heat to generate electricity, and there is no gas cleaning equipment in the project boundary; therefore the project emission is zero.

③ Leakage emission

No leakage is applicable under this methodology.

According to above all consideration, the annual emission reduction can be estimated 112,910 tCO2e.

(3). Monitoring plan:

① Monitoring items

Based on the monitoring method of ACM0012, the main monitoring items can be determined as follows:

i. The amount of electricity sent (sold) to the grid

ii. The amount of waste energy recovered

The monitoring meters for above items are applied those meeting the Chinese national standard, calibrated annually. Those meters especially for monitoring *i* (the amount of electricity sent (sold) to the grid) are installed on both sides of NWPG and the project owner: the former is the main meter collecting the data applied; the latter is for back-up in an emergency.

② Data management and its procedure

The project owner assumes the full responsibility for operation, monitoring and their management. Following to the monitoring plan designed by the project owner, the project owner places CDM project manager and operators for monitoring: the former is responsible for supervising and checking the whole measure and date recorded and the calibrating meters, and the latter (the engineers in the project site) carrying out collecting and storing data and calibration and maintenance the meters regularly.

(4). Estimated GHG emission reduction:

	Project emission (tCO_2e)	Baseline emission (tCO_2e)	Leakage emission (tCO_2e)	Emission reduction (tCO_2e)
2012	0	112,910	0	112,910
2013	0	112,910	0	112,910
2014	0	112,910	0	112,910
2015	0	112,910	0	112,910
2016	0	112,910	0	112,910
2017	0	112,910	0	112,910
2018	0	112,910	0	112,910
2019	0	112,910	0	112,910
2020	0	112,910	0	112,910
2021	0	112,910	0	112,910
Total (tCO_2e)	**0**	**1,129,100**	**0**	**1,129,100**

(5). Duration of project and its crediting period:

The duration of the project is 15 years since its lifetime of equipments and it is chosen 10-year crediting period.

Timelines in Project Implementation and CDM application activities are as follows:

Apr, 2009	Designation of the project
May, 2009	Make EIA report
May 31st, 2009	Ratification of EIA by environmental protection bureau of Baoji city
Jul 1st, 2009	Approval of the project by Shaanxi government
Jul 15th, 2009	Board decision in developing the project as CDM project
Sep, 2009	Consultation contract between the project owner and Shaanxi Industrial Technology Research Institute CDM Program Center as a CDM developer
Jan, 2010	Purchasing contract of main equipments (*Project Start*)
Mar, 2010	Questionnaire survey on the stakeholders
Jun, 2010	Submission of notification
Dec, 2010	Test operation from COG, BFG and FFG
Jan, 2011	Onsite assessment conducted by DOE
Aug, 2011	Conclusion of validation and Application for registration

late 2011 (schedule) Electricity selling contract with grid company
Jan, 2012 (schedule) Official start of the project and Project registration by EB

The implementation of the project has already approved by the local government in advance in 2009 however, the occurrence of the lead-poisoning accident has deeply affected to develop the project. After that in 2010, it is expected to be able to restart the production; the project owner concluded the purchasing contract of main equipments in January, 2010, and then the project was officially started. From December in 2010, the test operation has been started recovering part of the waste energy. The project is prospected to be officially started from January 1st in 2012 and be registered by UNFCCC around the period.

(6). Environmental impacts and other influence:

The *Environmental Impact Assessment* (EIA) of the proposed project has been ratified by Baoji City Environmental Protection Bureau on 31 May 2009; according to the EIA, the environmental impact on atmosphere, water environment, solid waste and noise are as follows:

① Impact on atmosphere
There will be little negative impact on atmosphere since no additional fossil fuel is charged.

② Impact of water
The impact of water environment can be considered very small since there will be a very little amount of waste water for implementing the project; the waste water is treated to meet the Chinese national standard.

③ Impact of solid wastes
The impact of solid wastes (dust and daily waste) can be considered very small since those wastes are treated to meet the Chinese national standard.

④ Impact of noise
There will be little negative impact of noise since the project owner installs low-level-noise equipments and silencers; therefore the noise level from the project site will meet the Chinese national standard.

(7). Stakeholders' comments:

The project owner conducted the questionnaire survey on the stakeholders cooperating with CDM developer from March 12th to 21st in 2010. 35 residents around the project site participated in the questionnaire survey as the stakeholders. The following table represents the questions conducted to them and its result. All of the stakeholders answered that the project will contribute to improving the local environment and they can stand to accept the environmental impacts from implementing the project as they meet the Chinese national emission standard.

Table 1 Questionnaire and its Result

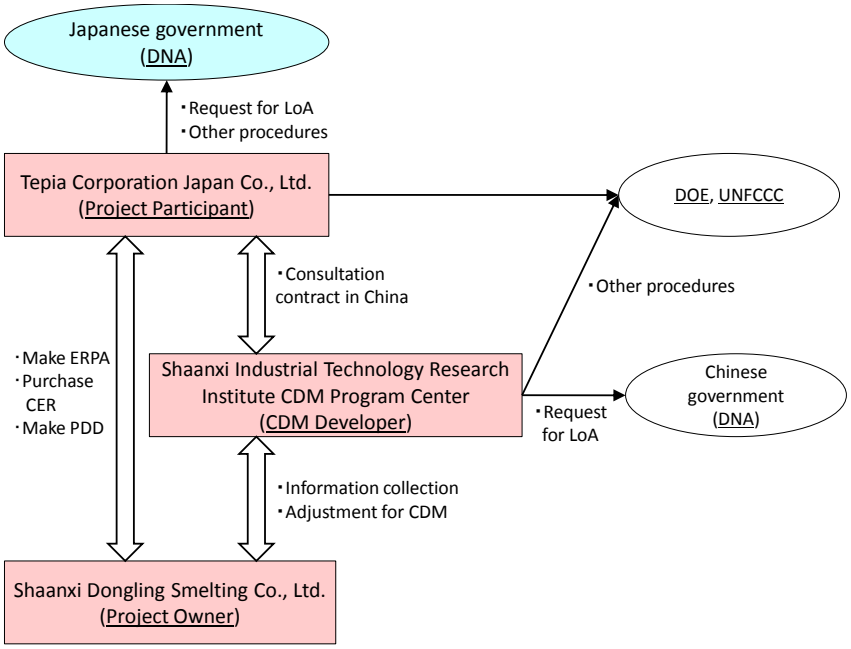
No.	Question		Reply	Rate (%)
1	Do you know the project?	Yes	35	100
		No	0	0
2	Do you think the project will help to improve the local quality of the environment?	Yes	32	91.4
		No	0	0
		Not sure	3	8.6
3	Is it acceptable if any unfavorable impact on the environments? (if the project meets national standard demand)	Yes	35	100
		No	0	0

No.	Question		Reply	Rate (%)
4	Do you think the project will be helpful to improve the local economy?	Yes	33	94.3
		No	0	0
		Not sure	2	5.7
5	Do you think the project will increase employment opportunities?	Yes	34	97.1
		No	0	0
		Not sure	1	2.9
6	Do you think the project will feasible?	Yes	35	100
		No	0	0
7	Other suggestions or comments.		Nothing	

According to the survey, there is no negative comment against the project, moreover the project obtain their agreements.

(8). Project implementation structure:

Shaanxi Dongling Smelting Co., Ltd (the project owner) assumes the responsibility to financing, operation, management, monitoring and so on.
Shaanxi Industrial Technology Research Institute CDM Program Center (CDM developer), assumes the CDM-related procedures, for example request for LoA from Chinese government, deal with DOE and UNFCCC in place of the project owner in China.
Tepia Corporation Japan Co., Ltd., as CDM project participants in Japan, assumes the responsibility, for example deal with Japanese government, DOE and UNFCCC, purchaser of CERs, author of PDD and so on. The following figure represents the project structure:



(9). Financial plan:

The total investment of the project is 206,456,600 RMB (more detailed are described on the below table): 66,387,800 RMB are internal funds of the project owner and 140,068,800 RMB are borrowed from bank.

Financial plan of the project

Unit: 10,000 RMB

	Item	Total	1st year	2nd year	3rd year
1	Total investment	20,645.66	20,425.84	219.83	0
1.1	Fixed asset investment	20,009.83	20,009.83		
1.2	Interest during construction	416.00	416.00		
1.3	Current capital	219.83		219.83	0
2	Financing	20,645.66	20,425.84	219.83	0
2.1	Project capital	6,638.78	6,418.95	219.83	0
2.1.1	For construction	6,002.95	6,002.95		
2.1.2	For current capital	219.83		219.83	0
2.1.3	For interest during construction	416.00	416.00		
2.2	Obligation	14,006.88	14,006.88		
2.2.1	For construction	14,006.88	14,006.88		
2.2.2	For current capital	0	0		
2.2.3	For interest during construction	0	0		

(10). Economic Analysis:

① Project capacity and electricity supply

The required capacity for utilizing 4 kinds of energy is calculated 20MW by the industrial designating company. The annual operating hour is supposed to 7,500 hours, then the estimated electricity supply is 135,390MWh without the consumption by the electricity generating system itself (8% is applied).

② Basic investment parameters

According to the reliable background materials, the input values of parameters used in this analysis is determined as follows:

Basic parameters of investment analysis of the project

Item	Value
Fixed asset investment	200.0983 million RMB
Current capital	2.1983 million RMB
Annual depreciation fee	11.0254 million RMB
Average O&M cost	15.8414 million RMB
Electricity tariff (including tax)	0.315 RMB/kWh
Income tax	25%
Value added tax	17%
The additional tax for city development	7%
The additional tax for education	3%
Unit price of CER	10 EURO/tCO_2e
Exchange rate	9 RMB/EURO
Project lifetime	15 years

③ Conclusion of the investment analysis

According to the parameters, the project IRR without CER revenue is 5.28%, on the other hand the project IRR with CER revenue is 11.23% (both are after tax).

(11). Demonstration of additionality:

① Investment analysis

Determination of benchmark

Although the project owner belongs to nonferrous smelting industry, the 92% of gross electricity generated are supplied to the local grid; therefore the project should be considered electricity generating project not smelting. For this reason it is appropriate to apply 8% of the electricity

generating industry to the project.

IRR
The project IRR without CER revenue is 5.28%; on the other hand the project IRR with CER revenue is 11.23% following to the above discussion. That is to say, the project would not be implemented without the CER revenue since its less economic attractive; on the other hand, it is possible to make the investment decision since the IRR exceeds the benchmark 8% with CER revenue.

Sensitive analysis
Sensitive analysis is conducted following to "Guidance on the Assessment of Investment Analysis", fluctuate the IRR without CER revenue in the range of 10% against 4 main parameters: total fixed asset investment, O&M cost, electricity tariff and electricity supply. The IRR would never reach the benchmark 8% whenever any of those parameters fluctuated in the range; therefore it can be concluded that the project is economically additional.

② Common practice analysis
The project owner owns not only lead and zinc smelting plant but also cokes plant.
According to the "Tool for the Demonstration and Assessment of Additionally", those projects are considered "similar" in case which locate in the same province, belong to the same industries (lead and zinc smelting, and coking industry), and recovering waste gas and/or heat for electricity generation. It is observed 9 "similar" plants applicable for all the requirements.
3 of those plants (2 are coking and another is zinc smelting) plan to/already apply for CDM; therefore those 3 plants should not be considered. The other 3 plants (all of them are coking) are flaring the waste gas with no use; therefore those 3 plants are also excluded from them. Although the another coking plant is recovering the waste gas for generating electricity, the company is run by Chinese government with special support or economical benefits; therefore the case should not be considered as the "similar" case. The last plant belongs to the smelting industry which generates electricity recovering waste energy, however, the capacity is quite small (3MW) compared to the project (20MW); therefore this case is not appropriate as the "similar" activity to the project.
As described above, it can be concluded that it has some barriers to implement the project without CDM; therefore the implementation of the project is additional activity.

(12). Prospect for realization of the project:

As implementing the project, the board of the project owner made decision to implement the project as CDM, and then purchasing contract of main equipments is concluded and started the project in 2010. It has already requested Chinese DNA for LoA on May 5th and reported to UNFCCC on June 10th in 2010. Regarding to the installation of waste heat recovering equipment from smelted lead and zinc is still under negotiation however; COG, BFG and FFG have been already recovered for test operation of the system.
The project is supposed to start from January, 2012.

4. Validation

(1). Validation outline:

The goal of the project is to be registered and issued CER.
It is planned to finish:

- Offer "public comment" on UNFCCC website;
- Submit "initial findings" by DOE;
- Correct the requirements in "initial findings";
- Conduct "Onsite assessment" by DOE and
- Submit "onsite assessment report" by DOE

(2). Process of validation:

Validation of the project is offered to DOE (Japan Consulting Institute; JCI) in September, 2010, and then started the validation.

① Offer "public comment" on UNFCCC website

The PDD of the project is published on the UNFCCC website after checking by DOE in November, 2010. The period offering the "public comment" is one month from 17th November to 16th December, in 2010; then there is no comment is offered to the project.

② Submit "initial findings" by DOE

DOE submitted the "initial findings" on 13th December, 2010, for requesting for adding or revising some parts in PDD.

③ Conduct "onsite assessment" by DOE

The "onsite assessment" was conducted from 11th to 15th January in 2011; during the period, DOE visited and checked following institutions and items:

- Governmental institutions
  Baoji Municipal Development & Reform Commission, Baoji Environmental Protection Bureau, Baoji Electricity Bureau)
- Project owner
  for confirming the system of the project
- Residents around the site (as stakeholders)
  for confirming the stakeholders opinions
- Project site tour
  for a visual inspection of the project system

Throughout the whole "onsite assessment", there is no issue pointed out.

5. Cobenefit evaluation

(1). Evaluation item:

According to the feature of the project, it can be supposed the emission reduction of air pollutants like SO2 for reducing the amount of coal incinerated at the grid-connected electricity generating facilities. Especially in China, SO2 emission is seriously aimed to reduce, and then the project supposed to reduce SO2 from local grid; therefore it is conducted to evaluate the emission reduction of SO2 quantitatively.

(2). Baseline scenario:

The baseline scenario is determined according to the result discussed above. The scenario is where the comparable amount of electricity is generated at the grid connected facilities (almost occupied with coal-fired), and at the process of incinerating coal, considerable amount of SO2 are emitted to the atmosphere.

For evaluating the effect, it is determined as the boundary for Shaanxi grid (one of the components of NWPG); and secondly emission reduction are evaluated.

(3). Project scenario:

There would be no emission increase since the auxiliary fuel is not used but waste gas and heat.

(4). Evaluation of baseline emission:

The baseline emission is calculated using the published value from Chinese government.

Coal includes more sulfur than other fuels; then SO2 emission is included in the calculation from grid connected electricity generating facilities almost occupied with coal fired.

(5). Calculation and result:

According to "*Quantitative Evaluation Manual for Co-benefit* (1st edition)", SO2 emission reduction is calculated 327.5 tones per annual. The process of calculation is as follows:

	Item	Value	Source
Baseline emission			
①	Electricity supply from the project	135,390MWh	Monitoring data (applies predictive value this time)
②	Gross electricity generation in Shaanxi province	80,910,000 MWh	Value in 2008 published by Shaanxi government
③	Coal consumption for electricity generation in Shaanxi province	28,060,000 t	Value in 2008 published by Chinese national government
④	Coal consumption reduction	46,953.94 t	③×①/②
⑤	Sulfur contents in coal	0.93%	Predictive data published by Shaanxi government in 2005 before "*11th five-year plan*"
⑥	Desulfurization rate among the electricity generation industry in Shaanxi province	62.5%	Value in 2008 published by Shaanxi government
⑦	Baseline SO2 emission	327.5 t/a	④×⑤×64/32×(1-⑥)
Project emission			
⑧	Project SO2 emission	0	
Emission reduction of SO2			
	SO2 emission reduction	**327.5 t/a**	⑦-⑧

7. Contribution to sustainable development

① Energy issues in China

In China, the great part of energy supply/consumption is provided by coal and the rate is extremely higher than other countries; both supply and consumption of coal occupy more than 40% among those of whole world.

The extreme dependency on coal is a kind of serious issues in China in any views of energy security, environmental pollution, global warming and so on; it is a big barrier for achieving the sustainable development in China.

On the other hand, the project would contribute to reducing coal consumption recovering waste gas and heat, in other words the project make it comes true the distribution of energy source.

As stated above, the project would contribute to the sustainable development for solving the energy issues in China.

② Job creation

As implementing the project, it creates job opportunities under construction and after implementation of the project for operating the system. The project owner supposed to employ 100 workers for implementing the project; the project would contribute to the sustainable development for vitalizing the local economy around the project site.