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

CONTENTS

A. General description of project activity

B. Application of a baseline and monitoring methodology

C. Duration of the project activity / Crediting period

D. Environmental impacts

E. Stakeholders' comments

Annexes

Annex 1: Contact information on participants in the project activity

Annex 2: Information regarding public funding

Annex 3: Baseline information

Annex 4: Monitoring plan

SECTION A. General description of project activity

A.1. Title of the project activity:

Sichuan Pingshan Pingbian&Guanyintuo Hydropower Station
Ver. 02
Mar. 05, 2007

Revision History of the PDD

Version	Date	Comments
Version 1.0	08 October 2006	Complete version of the PDD, prepared for the host country approval process
Version 2.0	05 March 2007	Revised draft PDD; prepared for validation, incorporating the latest NDRC emission factors information

A.2. Description of the project activity:

Summary:

The proposed project activity involves the construction and operation of two hydropower stations with installed capacity of 20MW respectively. Both the Pingbian (mixed type with daily regulating capacity) and Guanyintuo (run-of-river diversion type) Stations are located in the Xining River Basin in Pingshan County, Yibin City, Sichuan Province of China. The total installed capacity of the two hydropower stations is 40MW, with an average annual generation of 203,460MWh and electricity supplied to the grid of 161,850.5MWh. The generated electricity will be supplied to the local grid, then connected to the Sichuan Grid and, finally, to the Central China Grid.

Contribution to sustainable development:

The project activity’s contributions to sustainable development are:

- Reducing the dependence on exhaustible fossil fuels for power generation;
- Reducing air pollution by replacing coal-fired power plants with clean, renewable power;
- Bridging the gap between power supply and demand and reducing the deficiency of the local grid;
- Reducing the adverse health impacts from air pollution;
- Reducing the emissions of greenhouse gases, to combat global climate change;
- Contributing to local economic development through employment creation and improving the local energy generation infrastructure.

This project fits with the Chinese government objective to reduce the dependence on exhaustible fossil fuels for power generation, make the energy sector in general and the power sector in particular more sustainable.

A.3. Project participants:

The parties involved in the project are shown in Table A.1:

Table A.1 Project participants

Name of Party involved (*) ((host) indicates a host Party)	Private and/or public entity(ies) project participants (*) (as applicable)	Kindly indicate if the Party involved wishes to be considered as project participant（Yes/No）
China (host）	Pingshan Zhongxing Electrometallurgy Co., Ltd. (as the project owner)	No
Italy	ENEL Trade SpA (as the CER buyer)	No

For more detailed contact information on participants in the project activities, 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):

The People's Republic of China

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

Sichuan Province

A.4.1.3. City/Town/Community etc:

Pingshan County, Yibin City

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

This project is located in the Xining River Basin, Pingshan County, Yibin City, Sichuan Province of China.

The Pingbian Hydropower Station is located in Pingbian Yi National Autonomous County, which is 63km from the Pingshan County Seat. The plant site is located at the confluence of the Yangsiba and Xining Rivers. The exact location is at longitude of 103°42'11" East and latitude of 28°34'29" North.

The Guanyintuo Hydropower Station is located in the Village of Xiaxi, which is 60km from the Pingshan County seat. The plant site is located on the right bank of the Manaohe which is a branch of the Xining River. The exact location of the plant site is at longitude of 103°41'15" East and latitude of 28°39'40" North.

The exact location of the proposed project is shown in Fig.A.1.

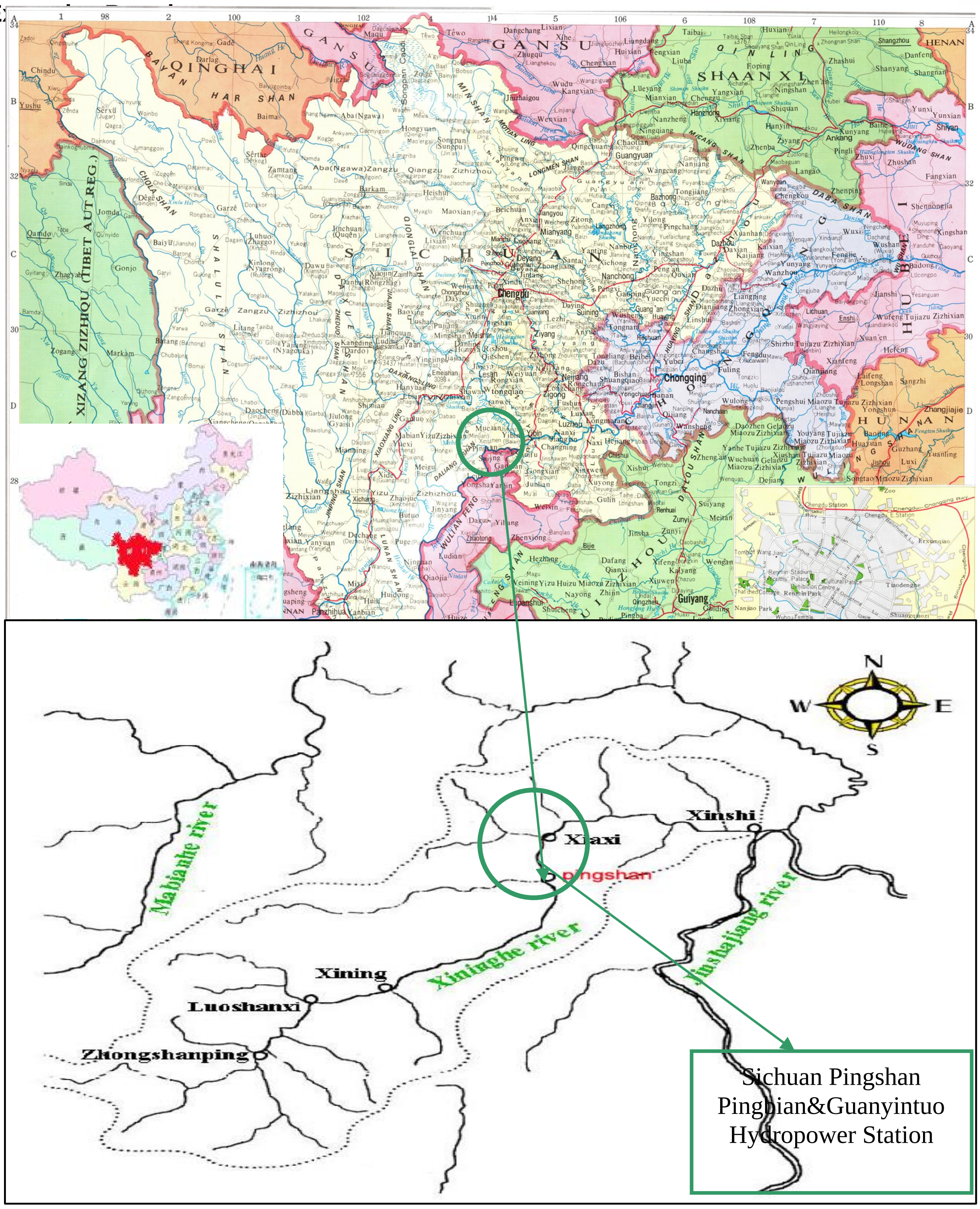

Fig A.1 the Location of Sichuan Pingshan Pingbian&Guanyintuo Hydropower Station

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

Sectoral Scope: Scope Number 1; Energy industries (renewable -/ non-renewable sources)

The project activity falls under the category of grid-connected renewable power generation project activities by

Pingbian	New hydropower project with reservoirs having power densities greater than 4 W/m^2.
Guanyintuo	Run-of-river hydropower station.

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

The project involves the construction of two hydro power stations. The Pingbian station is a mixed type with daily regulating capability and the Guanyintuo station is a run-of-river diversion type.

The Pingbian power station utilizes water from Baixiankan dam in the Xining River where the normal water sea level is 634m. The diversion tunnel with pressure hole is located on the left bank of the Xining River. The length of the diversion tunnel is 4,636m with a 2.5×4.3m horseshoe-shaped section and a designed flow rate of 41.7m^3/s.

The Guanyintuo power station utilizes water from the Pingshan power station at the Yangsi dam located in the Xining River where the normal water sea level is 587m. The length of the water tunnel is 5,058m with a 4.65×4.7m section gate tunnel structure. The designed reduced water flow is 47.8m^3/s.

The Guanyintuo and Pingbian power station will be jointly operated, and start to be built simultaneously.

Two power stations have the following features:

Table A.2 the features of two stations

	Pingbian	Guanyintuo
Hydraulic turbines	HLA551-LJ-160 (power output 10.417MW)	HLA551-LJ-180 (power output 10.417MW)
Generators	SF10-16/3250 (Power output 10MW)	SF10-16/3250 (Power output 10MW)
Designed water head	54m	47m
Annual operation hours	5,098	5,075
Average annual electricity generation	101,960MWh	101,500MWh
Electricity supplied to grid	85,688.8MWh	76,161.7MWh

The electricity generated by the Pingbian station will first be transmitted to the Guanyintuo hydropower station via an 110kV transmission line of 5km length. Subsequently, the combined power will be sent in turn to the Oujia Village hydropower station via an 110kV transmission line of 9km length, the Yibin Boxi transformer substation via an 110kV transmission line of 81km length, Yibin Tianchi transformer substation via an 110kV transmission line of 11km length, the Sichuan grid and, finally, to the Central China Grid.

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

The project activity uses the renewable crediting period, and the estimated emission reductions in the first crediting period are presented in Table A.3. Estimated emission reductions in the first crediting period are 1,070,020tCO_2e.

Table A.3 the Estimation of the Emission Reductions in the Crediting Period

Years	Annual estimation of emission reductions (tCO_2e)
2008(the last six months)	76,430

2009	152,860
2010	152,860
2011	152,860
2012	152,860
2013	152,860
2014	152,860
2015(the first six months)	76,430
The estimated CO_2 reductions for the 1st crediting period（tCO_2e）	1,070,020
Total number of the 1st crediting years	7 years
Annual Average Reductions over Crediting Period	152,860

A.4.5. Public funding of the project activity:

There is no public funding from Annex I countries available to the project.

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:

Baseline methodology:

Approved consolidated baseline and monitoring methodology ACM0002 (Version 6): Consolidated baseline and monitoring methodology for grid-connected electricity generation from renewable sources (approved on 24th CDM EB conference on 19th of May, 2006)

The methodology draws upon the "Tool for the demonstration and assessment of additionality" (version 03, approved at EB29).

Monitoring methodology

Approved consolidated monitoring methodology ACM0002 (Version 6): Consolidated monitoring methodology for grid-connected electricity generation from renewable sources

For more information on the baseline and monitoring methodology we refer to the UNFCCC 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 baseline and monitoring methodology ACM0002 is applicable to the proposed project, because the project meets all the applicability criteria stated in the methodology:

The proposed project is a grid-connected renewable power generation project.

- The proposed project activities are electricity capacity additions from new hydro power projects, in which, the installed capacity of the Pingbian station is 20MW, with the surface area at full reservoir level 0.776km^2 and power density of 25.8W/m^2 which is greater than 4W/m^2, and the Guanyintuo station is a run-of-river hydro power plant;
- The project does not involve an on-site switch from fossil fuels to a renewable source.
- The geographic and system boundaries for the relevant electricity grid, the Central China Grid, can be clearly identified and information on the characteristics of the grid is available.
- The methodology will be used in conjunction with the approved consolidated monitoring methodology ACM0002 (Consolidated monitoring methodology for grid-connected electricity generation from renewable sources).

The latest version of ACM0002 (version 6) has been applied.

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

According to the ACM0002 definition of project boundary, the project boundary includes the project site (the physical site of the project plant as well as the reservoir area) and the electricity system where Pingbian and Guanyintuo hydropower stations are connected.

In this specific case, both stations are connected to the Sichuan Grid and, finally to the Central China Grid. The Central China Grid is a larger regional grid, which consists of six sub-grids: Chongqing, Sichuan, Henan, Jiangxi, Hubei and Hunan. According to the above definition, it is justifiable to determine the Central China Grid as the right project boundary for this specific project, considering substantial intergrid power exchange among the Central China Grid.

Table B.1 Description of How the Sources and Gases Included in the Project Boundary

	Source	Gas	Included?	Justification / Explanation
Baseline	Thermal power plants in Central China Grid	CO_2	Included	Based on ACM0002, project participants shall only take into account the CO_2 emissions
		CH_4	Excluded	Based on ACM0002, project participants shall only take into account the CO_2 emissions
		N_2O	Excluded	Based on ACM0002, project participants shall only take into account the CO_2 emissions
Project Activity	Sichuan Pingshan Pingbian&Guanyintuo Hydropower Station	CO_2	Excluded	The project is electricity generation from renewable sources, without CO_2 emission.
		CH_4	Excluded	The power density of the Pingbian station is 25.8W/m^2 and Guanyintuo station is a run-of-river station, so based on ACM0002, there is no need to take into account CH_4 emissions.
		N_2O	Excluded	The project is electricity generation from renewable sources, without N_2O emission.

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

Following baseline scenario options have been identified as realistic and credible alternatives to the project activity:

1. The specific hydropower activity, without the support of CDM;
2. Thermal power plant with equivalent annual power generation;
3. Other renewable energy power plant with equivalent annual power generation;
4. The equivalent annual electricity is supplied by the Central China Grid.

The baseline scenario options described above are discussed individually considering relevant laws and regulations, as well as investment analysis:

First scenario, the specific hydropower activity, without the support of CDM,

The first scenario is in compliance with the Chinese relevant laws and regulations and will furthermore review the project's economic feasibility in order to provide a more in depth analysis of the first scenario (provided in section B.5). The results show that The IRR of this project is only 7.76% and 7.51% for Pingbian and Guanyintuo stations respectively without CDM revenue which are all lower than the benchmark rate of 10%[1]; therefore, the project faces significant economic and financial barriers without CDM revenue, so the first scenario is not feasible.

1 The hydropower NO. [1995]186 documents of Ministry of Water Resources of the People's Republic of China which is The Revision of Economic Evaluation Code for Small Hydropower Project(SL16-95). A small hydropower

Second scenario, thermal power plant with equivalent annual power generation,

There is a wide difference between thermal power and hydropower in annual utilization hours because of water resource quality instability. However, an alternative fossil fuel power plant that can provide the equivalent annual generation capacity of this specific hydropower plant and with an annual utilization hour of 5,988h, which was the average utilization hours of the thermal units in China in 2004[2], would be one with an installed capacity of 40MW. However, according to the Chinese Electricity Power Regulations, construction of coal-fired power plants of less than 135MW is prohibited in areas covered by large grids such as the provincial grids[3]. At the same time, the construction of a thermal unit under 100MW is strictly controlled by the government[4]. Therefore, the second scenario is not in accordance with Chinese relevant laws and regulations and thus is not a feasible scenario.

Third scenario, other renewable energy power plant with equivalent annual power generation,

There is not enough other renewable energy, such as wind sources, biomass, solar sources, wave and tidal sources or geothermal sources, to provide equivalent power generation in local area. So the scenario is not a feasible alternative.

Fourth scenario, the equivalent annual electricity is supplied by the Central China Grid

The fourth scenario option is in compliance with Chinese relevant laws and regulations, and without financial or other barriers.

Conclusion:

From the above analysis we can conclude that the fourth scenario is the only feasible scenario. Therefore, the baseline scenario of this project is:

Electricity delivered to the grid by the project would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources without the proposed project activity.

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

The additionality of the project activity is demonstrated by using the Tool for the Demonstration and Assessment of Additionality as specified in the baseline methodology ACM0002/Version 06 as follows:

Step 0: Preliminary screening based on the starting date of the project activity

project is: a station with installed capacity not exceeding 25MW and the building, revising, expansion, rebuilding of corresponding Grid of it.

2 2005 China Electric Power Yearbook.p.18

3 Notice on Strictly Prohibiting the Installation of Fuel fired Generators with the Capacity of 135MW or below issued by the General Office of the State Council, Decree No. [2002]6.

4 The Management Provisional Regulation on the Construction of Small Fuel fired Generators (in Aug. 1997)

The submission for registration of the proposed project activity will occur after the 31 st of December, 2005. Therefore, the project participants will not claim emission reductions from power generation that date from before the registration date of the CDM activity.

Step 1: Identification of Alternatives to the Project Activity Consistent with Current Laws and Regulations

Sub-Step1a. Define alternatives to the project activity

This methodological step requires a number of sub-steps, the first of which is the identification of realistic and credible alternatives to the project activity. There are only a few alternatives that are available and credible in the Central China Grid:

1. The specific hydropower activity, without the support of CDM;
2. Thermal power plant with equivalent annual power generation;
3. Other renewable energy power plant with equivalent annual power generation;
4. The equivalent annual electricity is supplied by the Central China Grid.

The third alternative is not feasible since there is not enough other renewable energy, such as wind sources, biomass, solar sources, wave and tidal sources or geothermal sources, to provide equivalent power generation in local area.

Sub-Step1b. Enforcement of applicable Laws and Regulations

As discussed in section B.4, the first and fourth alternatives are in compliance with Chinese relevant laws and regulations while the second one is not and hence is not a feasible alternative.

Therefore, the proposed project activity is not the only alternative consistent with Chinese current laws and regulations, it has additionality.

Step 2: Investment Analysis

Sub-step 2a. Determine appropriate analysis method

There are three options to carry out investment analysis provided in the additionality tool, they are: simple cost analysis (Option I), investment comparison analysis (Option II) and benchmark analysis (Option III). We choose option Ⅲ, i.e. benchmark analysis to this specific project since it has the revenue of electricity sales whilst the fourth alternative is not a specific project.

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

The proposed project, with two 20MW installed capacity, is located in a rural area. Based on the benchmark revenue rate in the financial evaluation of the Chinese *Economic Evaluation Code for Small Hydropower Projects,* the IRR of small hydropower projects total investment should not be lower than 10%.

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

The basic parameters for calculating key financial indexes are provided in TableB.2 and Table B.3 for Pingbian and Guanyintuo stations respectively.

Table B.2 the Basic Financial Parameter of the Pingbian

Installed capacity (MW)	Annual grid generation (MWh)	Static Investment (€)	Estimated grid price (€/kWh) (without VAT)	VAT	Corporate Income Tax	Operation period (years)	Annual operation cost (€)
20	85,688.8	13,020,920	0.022	17%	15%	25	274,200

Table B.3 the Basic Financial Parameter of the Guanyintuo

Installed capacity (MW)	Annual grid generation (MWh)	Static Investment (€)	Estimated grid price (€/kWh) (without VAT)	VAT	Corporate Income Tax	Operation period (years)	Annual operation cost (€)
20	76,161.7	11,733,880	0.022	17%	15%	25	253,420

The IRR of this project is only 7.76% and 7.51% for Pingbian and Guanyintuo stations respectively without CDM revenue. Based on the regulations of the Economic Evaluation Code for Small Hydropower Projects, the IRR of small hydropower projects' total investment should not be lower than the threshold of 10%. It is therefore obvious that, without CDM revenue, the project faces financial barriers.

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

The sensitivity analysis is conducted to check whether, under reasonable variations in the critical assumptions, the results of the analysis remain unaltered. We have used as critical assumptions:

1. Static total investment
2. Annual operational cost
3. Grid price

Variations of ±10% have been considered in the critical assumptions. Tables B.4 and B.5 summarizes the results of the sensitivity analysis for Pingbian and Guanyintuo respectively, while Figures B.1 and B.2 provide a graphic depiction.

Table B.4 Impact of Variations in Critical Assumptions on IRR of Pingbian Station

	-10%	-5%	0%	5%	10%
Grid price	6.40%	7.09%	7.76%	8.42%	9.07%
Static total investment	9.05%	8.38%	7.76%	7.19%	6.67%
Annual operational cost	8.04%	7.90%	7.76%	7.62%	7.49%

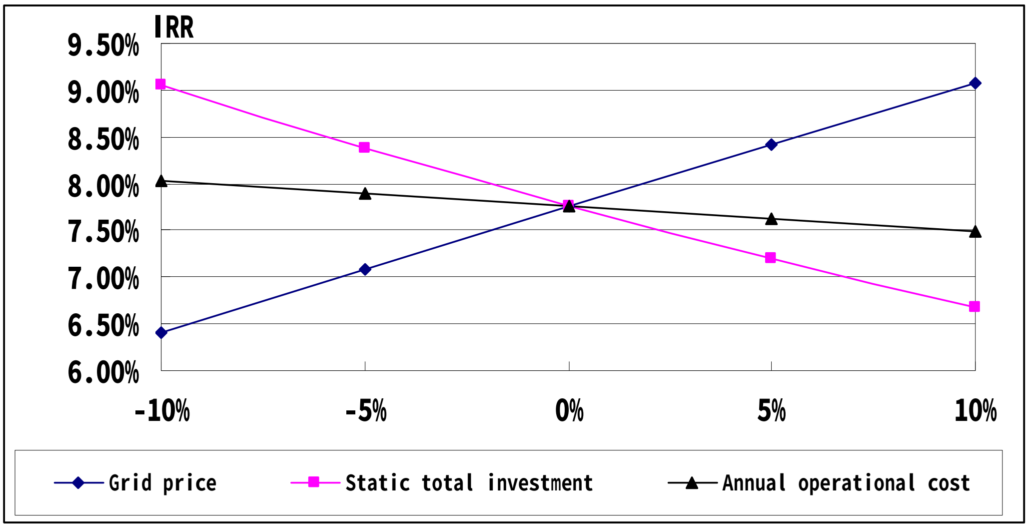

Fig B.1 the IRR Sensitivity Analysis of Pingbian Station when Static Total Investment, Annual Operation Cost or Grid price changed

Fig.B.1 shows that none of variations can raise the IRR of Pingbian higher than the threshold of 10% and the sensitivity of the annual operational cost is very low.
Wider variations in the remaining critical assumptions are impossible due to the following reasons:

- The static investment can not be lowered because the price of equipment and material, etc., has been increasing.

Table B.5 Impact of Variations in Critical Assumptions on IRR of Guanyintuo Station

	-10%	-5%	0%	5%	10%
Grid price	6.16%	6.84%	7.51%	8.17%	8.81%
Static total investment	8.78%	8.12%	7.51%	6.95%	6.43%
Annual operational cost	7.80%	7.65%	7.51%	7.37%	7.23%

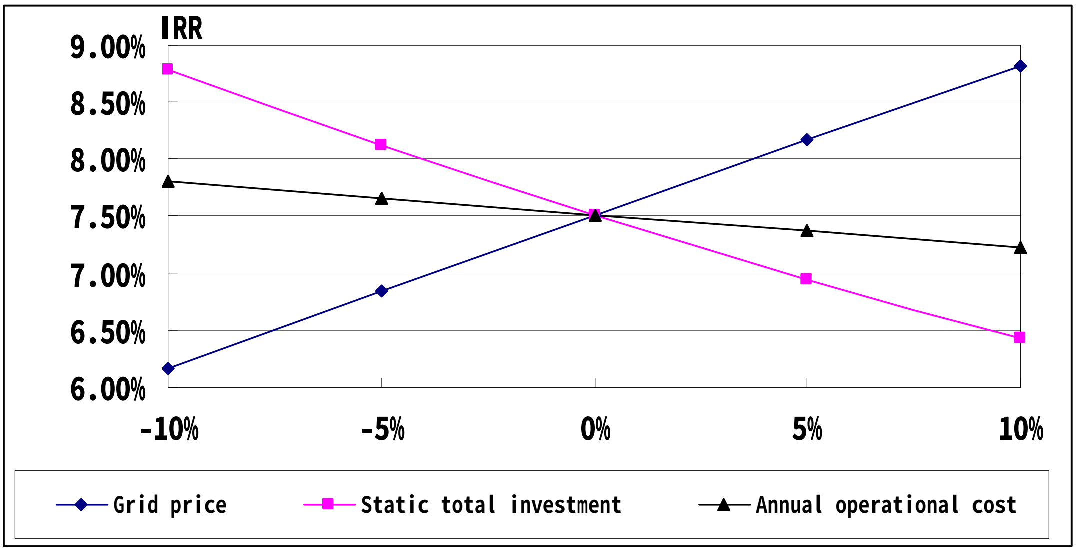

Fig B.2 the IRR Sensitivity Analysis of Guanyintuo Station when Static Total Investment, Annual Operation Cost or Electricity tariff changed

Fig.B.2 shows that the results obtained for Pingbian are applicable to Guanyintuo.

The above analysis indicates that the project faces significant economic and financial barriers without CDM revenue. Consequently the first scenario is not feasible nor is the baseline scenario.

Step 3: Barrier Analysis

Sub-step 3a. Identify barriers that would prevent the implementation of type of the proposed project activity

Without CDM revenues, some barriers will interfere with the implantation of the project. They are:

Financial and Investment Environment

The installed capacity of this specific project is 40MW, and the project owner is private company in central and western China, however, The national credit extension loan policy regulates that the bank should invest carefully in small scale projects, especially those under 50MW[5], and pay attention to choosing the best in excellence and be especially cautious with regard to investments in central and western China due to the low anti risk ability of the local private companies. In addition, as Pingshan is one of the poor counties in China, the project can not get the financing from local residents. As a result, without CER revenues, the project faces significant economic and financial barriers

Increased Investment Costs

The project activity includes the constructions of a tunnel for water intake and discharge. This is one of the major portions of the project investment.
As of now, the unexpected cost impacts are as follows:

- It is necessary to develop a flood control programme for the tunnel under the riverbed of the Xining River. The instability of the tunnel will increase the investment.
- There is nearly 10m silty clay under the sand and 5m thick cobble stone riverbed is needed for leakage prevention.

Due to technology limits, there might be other factors which increase the tunnel construction costs. This will raise the unit kilowatt price, reduce the commercial attractiveness and bring more investment risk for the project owner.

Uncertainty of Electricity Sale

Hydropower could be affected to a large extent by water condition causing power generation to be unstable. This will make it difficult to achieve the estimated annual operating hours. In addition, the power generation will increase in the flood season, so the electricity supply of the grid operating company will exceed demand and the station will adjust the electricity generated according to arrangements taken with the grid operating company. Therefore, the station can not be operated under full burden. The uncertainty of electricity sale reduces the commercial attraction once more.

.

Uncertainty of Grid Price

The price of electricity is differs greatly between peak and valley periods. The Grid Company will adjust the grid price according to the actual demand. At the same time, the power generation will be greater

5 The Guideline for Credit Policy of Bank in 2005

during the flood season, so the Grid Company will adjust the grid price according to the demand. The uncertainty of the grid price further increases the financial risk.

Sub-step 3b. Show that the identified barriers would not prevent the implementation of at least one of the alternatives (except the proposed project activity):

From the above mentioned steps 1 and 2, the barriers can not have an impact on the fourth alternative, so the fourth alternative is feasible.

Step 4 Common Practice Analysis

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

Basic information concerning existing, or under construction, hydropower plants similar to the proposed activity is shown in Table B.6.

Table B.6 some existing or constructing hydropower stations similar to the proposed activity

Name of Hydropower Station	Installed Capacity (MW)	Location	Operation date	Annual operating hours	Investor
Baishuihe Hydropower Station	26	Shimian County, Sichuan Province	1999	5,900	Shimian Kaiyuan Electric power Co., Ltd
The 2nd Level of Niujiaowan Hydropower Station	18	Butuo County, Liangshan State, Sichuan Province	1999	6,153	Sichuan Xichang Electric power Co., Ltd
Shaping Hydropower Station	20	Ebian County, Leshan City, Sichuan Province	2001	5,024	Sichuan Daduhe Electric power Co., Ltd
Dabao Hydropower Station	17.5	Pengzhou City, Chengdu, Sichuan Province	2001	5,100	Dabao Hydropower Co., Ltd.
Wahei Hydropower Station	44	Yi Autonomous County of Mabian	Sep. 2006	4,500	Sichuan Mabian Xianjia Puhe Hydro-electric Co., Ltd.
Baiyangxi Hydropower Station	32	Linhe Village, Wanyuan Town, Dazhou City	Oct. 2008	4,200	Wanyuan Baiyangxi Hydropower Development Co., Ltd.

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

Compared to the proposed project, the investment costs of the existing stations above, for the above mentioned power stations, were low due to the geographically good location near to local county seat. Furthermore, all the stations obtained policy and capital support from national government during the construction period, e.g. they could use the project itself as a guarantee, and all investments were financed by banks, therefore, it was easy for project owners to realize the projects. In addition, all of the land used during the construction period was transferred land and the investments for the land were much lower than the current one, consequently the investment risk was lower.

Wahei hydropower station and Baiyangxi hydropower station which are under construction are applying to the CDM project in order to overcome some of the barriers which they are facing.

Therefore, these projects don't have to face the barriers that the proposed project has to face, and they have more commercial attraction, on the contrary, the proposed project lacks these advantages.

Step 5 Impact of CDM Registration

From the barrier analysis above, it can be concluded that this specific project is an ambitious challenge and could not be operated as usual. On the contrary, the use of the CDM in this project to overcome the barriers above was decided at an early stage and, as such, the CDM has been critical to its realisation.

Without the qualification of CDM, the project would not provide shareholders with the returns that they require, reduce risk, generate cash and ultimately yield a positive value.

In summary the CDM has the following positive impacts on the project:

1. The CERs revenue has been taken into account by project owner as a means of improving project financial performance. The whole investment IRR will increase greatly when the project gets the CERs benefit, which would reach 10.83% and 10.56% respectively for Pingbian and Guanyintuo (above the 10% benchmark), assuming the CERs price of €8/tCO_2e.
2. The CERs will enable the project developer to increase the revenues from the project, which on a yearly basis may be used to ensure the operation and maintenance of the power plant.
3. The CERs revenue will ensure the ultimate success of the project that is currently, at best, marginal in terms of the return that can be expected by the project.

Conclusion:
The project faces several barriers which would prevent the implementation of the proposed project activity without CDM. CDM helps to overcome these barriers. If the project is not implemented, the power will be supplied by the Central China Grid. Hence, the proposed project activity isn't baseline scenario, but is additional.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

According to methodology ACM0002, Baseline emissions are equal to the power supplied to the grid multiplied by the baseline emission factor EF_y. The baseline emission factor is equal to the combined margins: the equally weighted average of the operating margin emission factor ($EF_{OM,y}$) and the build margin emission factor ($EF_{BM,y}$).

Baseline

According to the *Bulletin on Baseline Emission Factor of China Region Grid* which was renewed by the Office of National Coordination Committee on Climate Change on Dec. 15, 2006[6], the operating margin emission factor (EF_{OM}) and the build margin emission factor (EF_{BM}) calculation for the Central China

6 Bulletin on confirming of the baseline emission factor for China Grid was renewed by Office of National Coordination Committee on Climate Change, Dec. 15, 2006.

Grid is as follows:

STEP 1 Calculate the Operating Margin emission factor ($EF_{OM,y}$)

ACM0002 (version 06) offer four options for the calculation of the Operating Margin emission factor(s) ($EF_{OM,y}$):

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

As the methodology "Dispatch Data Analysis" should be the first methodological choice. However, the method is not selected for OM emission factor calculation, because dispatch data, let alone detailed dispatch data, are not available to the public or to the project participants. For the same reason, the simple adjusted OM methodology cannot be used.
From 2000 to 2004, in the composition of gross annual generation power for Central China Grid, the ratio of power generated by hydro-power and other low cost/compulsory resources is as following: 38.00% in 2000, 36.76% in 2001, 35.95% in 2002, 34.43% in 2003, 38.37% in 2004, obviously far lower than 50%. Based on these considerations, the OM has been calculated according to the Simple OM. Simple OM is appropriate, because low cost/ must run resources account for far less than 50% of the power generation in the Central China Grid in most recent years.The "ex-ante vintage" will be employed for OM calculation of the project.

The calculation equation is as follows:

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

Where
$F_{i,j,y}$ is the amount of fuel i (in a mass or volume unit) consumed by power sources j in year(s) y;
$COEF_{i,j,y}$ is the CO_2 emission coefficient of fuel i (tCO_2e/mass or volume unit of the fuel), taking into account the carbon content of the fuels used by power sources j and the percent oxidation of the fuel(coal, oil and gas) in year(s) y; and
$GEN_{j,y}$ is the electricity (MWh) delivered to the grid by power sources j.
The CO_2 emission coefficient $COEF_i$ is obtained as

$$COEF_i = NCV_i \times EF_{CO_2,i} \times OXID_i \qquad \text{Equation (B.2)}$$

Where:
NCV_i is the net calorific value (energy content) per mass or volume unit of a fuel i, National fixed value;
$OXID_i$ is the oxidation factor of the fuel ,1996 Revised IPCC Guidelines for default values;
$EF_{CO_2,i}$ is the CO_2 emission factor per unit of energy of the fuel i ,1996 Revised IPCC Guidelines for default values.

In addition, there is no net imported power to the Central China Grid.

The Operating Margin emission factors for 2002, 2003 and 2004 are calculated. The three-year average is calculated as a full-generation-weighted average of the emission factors. For details we can find in the bulletin mentioned above. The published Operation Margin Emission Factor as 1.2526tCO_2e/MWh.

The operating margin emission factor of the baseline is calculated ex-ante and will not be renewed in the first crediting period of the project activity.

STEP 2 Calculate the Build Margin emission factor ($EF_{BM,y}$)

According to ACM0002, the Build Margin Emission Factor is calculated as the generation weighted average emission factor (measured in tCO_2e/MWh) of a sample of ***m*** power plants. The calculation equation is as follows:

$$EF_{BM,y} = \frac{\sum_{i,m} F_{i,m,y} \times COEF_{i,m,y}}{\sum_{m} GEN_{m,y}} \qquad \text{Equation (B.3)}$$

Where

$F_{i,m,y}$, is the amount of fuel i (in a mass or volume unit) consumed by power plants m in year(s) y,

$COEF_{i,j,m}$ is the CO_2 emission coefficient of fuel ***i*** (tCO_2e/mass or volume unit of the fuel), taking into account the carbon content of the fuels used by power plants m and the percent oxidation of the fuel(coal, oil and gas) in year(s) y; and

$GEN_{m,y}$ is the electricity (MWh) delivered to the grid by power plants m.

The methodology supplied the following two options:

Option 1: Calculate the Build Margin emission factor $EF_{BM,y}$ *ex-ante based on the most recent four years 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. For subsequent crediting periods,* $EF_{BM,y}$ *should be calculated ex-ante, as described in option 1 above.*

Project participants have chosen Option 1.

The sample group ***m*** consists of either the five power plants that have been built most recently or the power plant capacity additions in the electricity system that comprise 20% of the system generation (in MWh) and that have been built recently. Project participants should use from these two options that sample group that comprises the larger annual generation.

However, in China it is very difficult to obtain the data of the five existing power plants built most recently or the power plants capacity additions in the electricity system that comprise 20% of the system generation (in MWh) and that were built most recently. Taking notice of this situation, EB accepts[7] the following deviation in methodology application:

1) Capacity addition from one year to another is used as basis for determining the build margin, i.e. the capacity addition over 1 - 4 years, whichever results in a capacity addition that is closest to 20% of total installed capacity.

---

[7]This is in accordance with the „Request for guidance: Application of AM0005 and AMS-I.D in China", a letter from DNV to the Executive Board, dated 07/10/2005, available online at:
http://cdm.unfccc.int/UserManagement/FileStorage/6POIAMGYOEDOTKW25TA20EHEKPR4DM.
This approach has been applied by several registered CDM projects using methodology ACM0002 so far.

2) Use proportional weights that correlate to the distribution of installed capacity in place during the selected period above, using plant efficiencies and emission factors of commercially available best practice technology in terms of efficiency. It is suggested to use the efficiency level of the best technology commercially available in the provincial/regional or national grid of China, as a conservative proxy.

The build margin calculations featured below is derived from the "Bulletin on the baseline emission factor of the Chinese Electricity Grid", which has been renewed by the China DNA (Office of National Coordination Committee on Climate Change) on Dec. 15, 2006.

Since there is no way to separate the different generation technology capacities as coal, oil or gas fuel etc from thermal power based on the present statistical data, the following calculation measures will be taken: First, according to the energy balance sheet of the most recent year, we should calculate the ratio of different emissions of CO_2 produced by solid, liquid, and gas fuels for power generation which is part of the total CO_2 emissions; then take this ratio as the weight, take the emission factor based on the commercial optimal efficiency technology level as the base and calculate the emission factor of the thermal power for the grids; finally, multiply this emission factor for thermal power with the ratio of thermal power which is part of the 20% installed capacity addition for the grid, the result is the BM emission factor for the grid.

Sub-step 1

Calculate the proportion of CO_2 emissions of the solid, liquid and gas fuels used to generate power in the total CO_2 emissions of three fuels.

$$l_{Coal} = \frac{\sum_{i \in COAL, j} F_{i,j,y} \times COEF_{i,j}}{\sum_{i,j} F_{i,j,y} \times COEF_{i,j}}$$ Equation (B.4)

$$l_{Oil} = \frac{\sum_{i \in OIL, j} F_{i,j,y} \times COEF_{i,j}}{\sum_{i,j} F_{i,j,y} \times COEF_{i,j}}$$ Equation (B.5)

$$l_{Gas} = \frac{\sum_{i \in GAS, j} F_{i,j,y} \times COEF_{i,j}}{\sum_{i,j} F_{i,j,y} \times COEF_{i,j}}$$ Equation (B.6)

Where,

$F_{i,m,y}$, is the amount of fuel i (in a mass or volume unit) consumed by power sources j in year(s) y,

$COEF_{i,j,m}$ is the CO_2 emission coefficient of fuel i (tCO_2e/mass or volume unit of the fuel), taking into account the carbon content of the fuels used by power plants m and the oxidation percentage of the fuel(coal, oil and gas) in year(s) y,

Coal, Oil and *Gas* is solid, liquid and gas fuels respectively.

Sub-step 2: Calculate the operating margin emission factor of fuel-based generation:

$$EF_{Thermal} = l_{Coal} \times EF_{Coal,Adv} + l_{Oil} \times EF_{Oil,Adv} + l_{Gas} \times EF_{Gas,Adv}$$ Equation (B.7)

Where,

$EF_{Coal,Adv}, EF_{Oil,Adv}, EF_{Gas,Adv}$ are the operating margin emission factors respectively consumed by coal-fired, oil-fired and gas-fired generation technology in the commercial optimization efficiency.

A coal-fired power plant with a total installed capacity of 600MW distributed over 11 turbines is assumed to be the commercially available best practice technology in terms of efficiency, the estimated coal consumption of such a National Sub-critical Power Station with a capacity of 600MW is 336.66gce/kWh, which corresponds to an efficiency of 36.53% for electricity generation.

For gas and oil power plants a 200MW power plant with a specific fuel consumption of 268.13gce/kWh, which corresponds to an efficiency of 45.87% for electricity generation, is selected as commercially available best practice technology in terms of efficiency.

The main parameters used for calculation of the thermal power plant emission factors $EF_{Coal,Adv}$, $EF_{Oil,Adv}$, $EF_{Gas,Adv}$ are provided in Annex 3.

Sub-step 3: Calculate the Build Margin emission factor

$$EF_{BM,y} = \frac{CAP_{Thermal}}{CAP_{Total}} \times EF_{Thermal} \qquad \text{Equation (B.8)}$$

Where,

CAP_{Total} is the total capacity addition, $CAP_{Thermal}$ is the total thermal power capacity addition.

For details we can find in the bulletin mentioned above. The published Build Margin emission factor is 0.6363tCO_2e/MWh.

As mentioned above, the build margin emission factor of the baseline is calculated ex-ante and will not be renewed in the first crediting period.

The data resources for calculating OM and BM are:

1. Installed capacity, power generation and the rate of internal electricity consumption of thermal power plants
   Source: *China Electric Power Yearbook* (2001-2005)
2. Fuel consumption and the net caloric value of thermal power plants
   Source: *China Energy Statistical Yearbook* (figures are for 2000-2005)
3. Carbon emission factor and carbon oxidation factor of each fuel
   Source: *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories: Workbook*, Table 1-2 of Page 1.6 and Table 1-4 of Page 1.8 in Chapter one.

STEP 3 Calculate the Electricity Baseline Emission Factor (EF_y)

The Baseline Emission Factor is calculated as a Combined Margin, using the weighted average of the Operating Margin and Build Margin.

$$EF_y = w_{OM} \times EF_{OM,y} + w_{BM} \times EF_{BM,y} \qquad \text{Equation (B.9)}$$

According to the *Bulletin on Baseline Emission Factor of China Region Grid* which was renewed by the Office of National Coordination Committee on Climate Change on Dec. 15, 2006, the operating margin emission factor (EF_{OM}) of the Central China Grid is 1.2526tCO_2e/MWh and the build margin emission factor (EF_{BM}) is 0.6363tCO_2e/MWh,. The defaults weights for hydro power projects are used as specified in the ACM0002 (version 06).

$$w_{OM} = 0.5; w_{BM} = 0.5$$

We calculate a Baseline Emission Factor of 0.94445tCO_2e/MWh.

Emission Reductions (ER_y)

The project activity mainly reduces carbon dioxide through substitution of grid electricity generation with fossil fuel fired power plants by renewable electricity. The emission reduction ER_y by the 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:

$$ER_y = BE_y - PE_y - L_y$$ Equation (B.10)

where the baseline emissions (BE_y in tCO_2) are the product of the baseline emissions factor (EF_y in tCO_2/MWh) calculated in Step 3, times the electricity supplied by the project activity to the grid (EG_y in MWh) minus the baseline electricity supplied to the grid in the case of modified or retrofit facilities ($EG_{baseline}$ in MWh), as follows:

$$BE_y = (EG_y - EG_{baseline}) \times EF_y$$ Equation (B.11)

There is no modified or retrofit facilities, so $EG_{baseline}$ =0.

The power density of Pingbian is 25.8W/m^2 which is larger than 10W/m^2 and the Guanyintuo is a run-of-river project, According to ACM0002, greenhouse gas emissions from the project activity are zero. Hence $PE_y = 0$;

Based on ACM0002, project participant does not need to consider leakage in applying ACM0002 methodology, i.e. Ly=0.

Therefore, the emission reductions of this specific project are equal to the baseline emissions, i.e.

$$ER_y = BE_y = EG_y \times EF_y$$ Equation (B.12)

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

Table B.7 Data and Parameters that are Available at Validation ($EGP_{m,y,j}$)

Data / Parameter:	$EGP_{m,y,j}$
Data unit:	MWh
Description:	The Power Generation of Sources j of Province m in the years y (2002-2004, including Chongqing, Sichuan, Henan, Jiangxi, Hubei and Hunan)
Source of data used:	*China Electric Power Yearbook 2003-2005*
Value applied:	Provided in Annex 3
Justification of the choice of data or description of measurement methods and procedures actually	Official Statistical Data

applied :	
Any comment:	To calculate the power delivered to the grid

Table B.8 Data and Parameters that are Available at Validation ($PR_{m,y}$)

Data / Parameter:	$PR_{m,y}$
Data unit:	%
Description:	The rate of electricity consumption of thermal power plants of Province m in the years y (2002-2004 including Chongqing, Sichuan, Henan, Jiangxi, Hubei and Hunan)
Source of data used:	*China Electric Power Yearbook 2003-2005*
Value applied:	Provided in Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	Official Statistical Data
Any comment:	To calculate the power delivered to the grid

Table B.9 Data and Parameters that are Available at Validation ($F_{i,,j,y,m}$)

Data / Parameter:	$F_{i,,j,y,m}$
Data unit:	10^4t/10^8m^3
Description:	The Fuel i Consumption of Power Sources j of Province m in the years y (2002-2004, including Chongqing, Sichuan, Henan, Jiangxi, Hubei and Hunan)
Source of data used:	*China Energy Statistical Yearbook 2000-2005*
Value applied:	Provided in Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	Official Statistical Data
Any comment:	To calculate OM and BM

Table B.10 Data and Parameters that are Available at Validation (NCV_i)

Data / Parameter:	NCV_i
Data unit:	TJ/ fuel in a mass or volume unit
Description:	The NCV_i *of* Fuel i in a mass or volume unit
Source of data used:	*China Energy Statistical Yearbook 2005*
Value applied:	Provided in Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	Official Statistical Data

Any comment:	To calculate OM and BM

Table B.11 Data and Parameters that are Available at Validation ($EF_{CO_2,i}$)

Data / Parameter:	$EF_{CO_2,i}$
Data unit:	tC/TJ
Description:	The *Emission Factor of* Fuel i in a mass or volume unit
Source of data used:	*Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories, Workbook*
Value applied:	Provided in Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	IPCC Default Value
Any comment:	To calculate OM and BM

Table B.12 Data and Parameters that are Available at Validation ($OXID_i$)

Data / Parameter:	$OXID_i$
Data unit:	%
Description:	The Oxidation Rate of Fuel i
Source of data used:	*Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories, Workbook*
Value applied:	Provided in Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	IPCC Default Value
Any comment:	To calculate OM and BM

Table B.13 Data and Parameters that are Available at Validation ($GENE_{best,coal}$)

Data / Parameter:	$GENE_{best,coal}$
Data unit:	%
Description:	Commercially available coal-fired power plant corresponding to the best practice in terms of efficiency
Source of data used:	*China DNA: Bulletin on Baseline Emission Factors of the China's Regional Grids-the calculation of baseline Build Margin emission factor for the China's Regional Grids*
Value applied:	36.53%
Justification of the choice of data or description of measurement methods and procedures actually applied :	National Fixed Value
Any comment:	To calculate BM

Table B.14 Data and Parameters that are Available at Validation ($GENE_{best,oil/gas}$)

Data / Parameter:	$GENE_{best,oil/gas}$
Data unit:	%
Description:	Commercially available oil and gas power plant corresponding to the best practice in terms of efficiency
Source of data used:	*China DNA: Bulletin on Baseline Emission Factors of the China's Regional Grids -the calculation of baseline Build Margin emission factor for the China's Regional Grids*
Value applied:	45.87%
Justification of the choice of data or description of measurement methods and procedures actually applied :	National Fixed Value
Any comment:	To calculate BM

Table B.15 Data and Parameters that are Available at Validation ($CAP_{m,y,i}$)

Data / Parameter:	$CAP_{m,y,i}$
Data unit:	MW
Description:	The Installed Capacity of Power Sources j of Province m in the years y (2000-2004, including Chongqing, Sichuan, Henan, Jiangxi, Hubei and Hunan)
Source of data used:	*China Electricity Power Yearbook 2001-2005*
Value applied:	Provided in Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	Official Statistical Data
Any comment:	To calculate BM

B.6.3. Ex-ante calculation of emission reductions:

According to Anex3, the baseline emission factor of the project is 0.94445tCO_2e/MWh in the first crediting period. The annual electrical power supplied to the grid by the project is 161,850.5MWh.

Therefore, BE_y in the first crediting period is to be calculated as follows:

$$BE_y = EG_y \times EF_y = 152{,}860 \text{tCO}_2\text{e}$$

Therefore, in the first crediting period, the annual emission reductions are 152,860tCO_2e.

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

The total emission reductions of the project are 1,070,020tCO_2e during the first crediting period.

Table B.16 Estimate of Emission Reductions Due to the Project

years	Project Emissions (tCO_2e)	Baseline Emissions (tCO_2e)	Leakage (tCO_2e)	Emission Reductions

				(tCO_2e)
2008(the last six mouths)	0	76,430	0	76,430
2009	0	152,860	0	152,860
2010	0	152,860	0	152,860
2011	0	152,860	0	152,860
2012	0	152,860	0	152,860
2013	0	152,860	0	152,860
2014	0	152,860	0	152,860
2015(the first six mouths)	0	76,430	0	76,430
Total(tCO_2e)	0	1,070,020	0	1,070,020

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

B.7.1. Data and parameters monitored:

In order to calculate emission of baseline, we need to monitor the electricity supplied to grid

Table B.17 Data and parameters monitored ($EG_{s,y}$)

Data / Parameter:	$EG_{s,y}$
Data unit:	MWh
Description:	Power supplied to the grid in year y
Source of data to be used:	Measured by meter
Value of data applied for the purpose of calculating expected emission reductions in section B.5	The electricity supplied to the grid by the project is 162,011.5MWh
Description of measurement methods and procedures to be applied:	Measured continuously and recorded on a monthly basis
QA/QC procedures to be applied:	The meters will be periodically checked according to the relevant national electric industry standards and regulations; Power supplied to the grid and double checked according to electricity sales receipt.
Any comment:	Refer to B.7.2. Description of the monitoring plan

Table B.18 Data and parameters monitored ($PE_{g,y}$)

Data / Parameter:	$PE_{g,y}$
Data unit:	MWh
Description:	The electricity use of power plant supplied by the grid in year y
Source of data to be used:	Measured by meter
Value of data applied for the purpose of calculating expected emission reductions in section B.5	The electricity use of power plant supplied by the grid is estimated to be 161MWh
Description of measurement methods and procedures to be applied:	Measured continuously and recorded on a monthly basis

QA/QC procedures to be applied:	The meters will be periodically checked according to the relevant national electric industry standards and regulations; Power supplied to the grid and double checked according to electricity sales receipt.
Any comment:	Refer to B.7.2. Description of the monitoring plan

B.7.2. Description of the monitoring plan:

The objective of the monitoring plan is to insure the complete, consistent, clear, and accurate monitoring and calculation of the emissions reductions during the whole crediting period. The project owner is responsible for the implementation of the monitoring plan, and the Grid Company cooperates with the project entity.

1. Monitoring Objective

The main monitoring data are electricity supplied to the grid because the baseline emission factor is fixed by Ex-ante calculation.

2. Monitoring Organization

A chief monitoring officer will be appointed by the project owner, who will supervise and verify metering and recording, collect data (meter's data reading, sales / billing receipts), calculate emission reductions and prepare monitoring reports.
The monitoring officer will receive support from Beijing Tianqing Power International CDM Consulting Co., Ltd.

3. Monitoring Equipment and Program

According to the *Technical Administrative Code of Electric Energy Metering (DL/T448 - 2000)*, the electric energy metering equipment will be properly configured, and the metering equipment will be checked by both the project owner and the grid company before the project starts operation.

Two meters (bio-direction) will be required, of which, the first meter (backup meter) at the exit of this specific project station is employed to measure output electricity and the electricity use of power plant supplied by the grid (without line loss), and the second meter (main meter) measures the net power supplied to the grid and the electricity use of power plant supplied by the grid (with line loss) at the input of the Tianchi transformer substation of the Grid Company. According to the main meter, achieving the net power supplied to the grid, and in case the main meter meets some malfunctioning, the project owner should employ the data monitored by the backup meter.

4. Data Collection:

The project owner and the Grid Company are responsible for monitoring of the backup meter and the main meter, and guarantee the measuring equipments are in good operation and with complete seal.

The electricity recorded by the main meter alone will suffice for the purpose of billing and emission reduction verification as long as the accuracy of the Main Meter is within the permissible tolerance. The main monitoring process is as follows:

- i The project owner and Grid Company read and check the backup meter and the main meter on the auxiliary lines, and records the data at 24:00 on the last day of every month;
- ii The Grid Company supplies the electricity supplied to the grid by the project owner;
- iii The project owner provides an electricity sales invoice to the Grid Company. A copy of the invoice is stored by the project owner, together with a record of the payment by the grid company.
- iv The Grid Company provides an electricity sales invoice to the project owner, and the invoice is

stored by the project owner.

v The project owner records the net electricity supplied to the grid;

vi The project owner keeps and safeguards the records of the main meter's data readings for verification by the DOE.

If inaccuracy of the reading data from the main meter has exceeded the allowable tolerance or otherwise the meter functioned will operate in one certain month, or any other unexpected problems, the grid-connected electricity generated by this specific project shall be followed by:

i Reading the backup meter(after taking into account line losses) to obtain electricity supplied to the grid, unless a test by either party reveals it is inaccurate;

ii If the backup system is not within the acceptable tolerance limit or otherwise performed improperly, this specific project owner and the Grid Company shall jointly prepare a new agreement for the correct reading; and

iii If this specific project owner and the Grid Company fail to agree on the correct reading, the matter will be referred to arbitration according to agreed procedures.

The meter reading will be readily accessible for the DOE. Calibration test records will be maintained for verification.

5. Calibration

The verification of electric energy meter should be periodically carried out according to relevant national electric industry standards or regulations. After verification, meters should be sealed. Both meters shall be jointly inspected and sealed on behalf of the project owner and Grid Company and shall not be accessible by either party except in the presence of the other party or its accredited representatives,
All the meters installed shall be tested by the qualified metrical organization co-authorized by the project owner and Grid Company within 10 days after:

i The detection of a difference larger than the allowable error in the readings of the main meter and the backup meter;

ii Repair the meter caused by the failure of operation.

6. Data Management

The project owner will provide an electricity sales invoice to the Grid Company based on the agreed figure which is obtained from the transaction meter.

Data is archived at the beginning of each month based on the readings taken at the end of the previous month using an electronic spreadsheet which is to be included in the Monitoring Plan. The electronic files will be stored on hard disk and cd-rom. In addition, the project owner compiles a hard copy printout of the spreadsheets and copies of sales invoices and sales receipts for the net power delivered to the grid.

At the end of each crediting year, a monitoring report will be prepared by compiling the monthly data.

The project owner compiles and keeps the monitoring reports together with other necessary information such as maps, electrical one-line diagrams and environmental assessment for verification by the DOE.

All data records will be kept for a period of 2 years after the end of the crediting period.

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

Date of completion: 05/03/2007
Name of persons determining the baseline:

Dr. Naoki Matsuo
Climate Experts Ltd.
Ratio 1002, Tsukiji 1-10-11, Chuo-ku, Tokyo 104-0045, Japan
Phone : +81-70-55982236
Fax : +81-46-8771734
n_matsuo@climate-experts.info
(Not Project Participant)

Asako Yamamoto
Climate Experts Ltd.
Ratio 1002, Tsukiji 1-10-11, Chuo-ku, Tokyo 104-0045, Japan
Phone : +81-90-35219167
Fax : +81-46-8771734
asako_yamamoto@climate-experts.info
(Not Project Participant)

Yoshiji Kubo
Climate Experts Ltd.
RATIO 1002,Tsukiji 1-10-11,Chuo-ku,Tokyo 104-0045, Japan
Phone: 046-875-4138
Yoshi_kubo@climate-experts.info
(Not Project Participant)

Aimin Yang, General Manager, Beijing Tianqing Power International CDM Consulting, Co., Ltd.
Tel: +86-10-68298491/68298496
Fax: +86-10-68173622/68221621
Email: aiminyang820@yahoo.com.cn
(Not Project Participant)

Jingqiu Yang, Beijing Tianqing Power International CDM Consulting, Co., Ltd.
Tel: +86-10-68298491/ 68298496
Fax: +86-10-68173622/68221621
Email: jingqiuyang@sina.com
(Not Project Participant)

Xuemei Tang, Beijing Tianqing Power International CDM Consulting, Co., Ltd.
Tel: +86-10-68298491/68298496
Fax: +86-10-68173622/68221621
Email: jasmine1982616@yahoo.com.cn

(Not Project Participant)

Xiujuan Yuan, Beijing Tianqing Power International CDM Consulting, Co., Ltd.
Tel: +86-10-68298491/68298496
Fax: +86-10-68173622/68221621
Email: abeautytracy@yahoo.com.cn
(Not Project Participant)

SECTION C. Duration of the project activity / Crediting period

C.1. Duration of the project activity:

C.1.1. Starting date of the project activity:

30/06/2008

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

The expected operational lifetime of the project activity is 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:

01/07/2008

C.2.1.2. Length of the first crediting period:

7 years

C.2.2. Fixed crediting period:

Not applicable

C.2.2.1. Starting date:

C.2.2.2. Length:

SECTION D. Environmental impacts

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

According to the relevant environmental law and regulations, an environmental impact assessment had been carried out, and has been approved on Nov. 7, 2005 by the Environmental Protection Bureau of Yinbin City. The main assessment conclusions are be provided below:

I. Environmental Impact Analysis during the Construction Period

1. Wastewater

The wastewater produced during the construction period will consist of industrial wastewater and domestic wastewater. The construction wastewater has a high content of suspended solids from washing the gravel aggregate. It is basically alkaline, but does not contain toxic substances. Therefore, industrial waste water will be collected in simple rectangular tanks for sedimentation, re-used as much as possible and finally discharged in the Xining River. As for domestic wastewater, a sufficient number of rest rooms will be provided along with their centralized fecal treatment facilities.

2. Impact on Ambient Air

The main concern about air pollution from the construction activity is exhaust from the construction equipment and dust from excavation and blasting of earth-rock, stone sieving and concrete mixing. However, as the concrete mixing plants and stone sieving facilities are set up at the construction sites of the power plants and dam which located far from residential areas, there will be little impact on local residents.

3. Noise

The noise from the construction period is mainly due to blasting, digging, drilling, stone sieving, concrete pouring, transportation vehicles and construction machines. This might have some impact on nearby residents.

In order to lower the noise level, low noise machines will be used. And working hours will be reasonably planed in order to reduce night time work including limit blasting activities during night time.

4. Solid waste

The solid waste consists of slag waste and domestic waste.
The Pingbian project will prepare 7 waste dumping fields with a total capacity of 322,000 m^3. The Guanyintuo project will prepare 5 waste slag fields with a total capacity of 359,300 m^3.
According to soil and water conservation requirements, side slope disposal and vegetation replacement will be undertaken for all the dumping fields. The domestic waste produced during the construction period will be treated and disposed of sanitary fill.

5. Impact on Soil and Water Loss

The requisitioned land, exploitation of the slag material, waster slag piling, etc. which will occur during construction period will destroy and change the original landform and the surface vegetation in the working area. Engineering measures such as various slurry building to protect the slope, combined with small regional vegetation replacement measures, will be employed in order to soil and water loss.

6 Impact of Land Requisition on Land Utilization

The project is located in a remote mountain and gorge and there are no local residents around the project, thus, there are neither migrants nor any pollution that will affect local residents, and little negative impact on the environment.

The requisitioned land in the project can be divided into two parts: permanently requisitioned land and temporarily requisitioned land. The permanently requisitioned land for the Pingbian station is 5.2 hectares, and the temporarily requisitioned land 3.53hectares. The permanently requisitioned land for the Guanyintuo station is 5.92hectares and temporarily requisitioned land 4.15 hectares.

The tilled land requisitioned during the construction period is minimal. The requisitioned land is mostly woodland and wasteland which is otherwise difficult to utilize. Project participant will take necessary measures in order to minimize the negative impacts on temporarily requisitioned land, such as offer compensation for seedlings and other vegetation losses. Therefore, the negative impact on the life of local residents is very small.

7 Impact on ecosystem

The construction of this proposed project may have some impacts on the terrestrial and hydrophytic biology. However, there are no rare, precious or migrating fish. Therefore, the impact on fish resources in Xining is limited and will not affect biological diversity.

II. Environmental Impact Analysis during the Operation Period

The following permanent environmental impacts are foreseen:

1. Decrease of water flow

Decrease of water flow between water intake and water discharge to the Xining River has been taken into account. However, water for irrigation, daily life and industries is still available from other branches.

2. Effects on aquatic life

The project activity may have an effect on terrestrial and aquatic life, especially fish. However, in the case of fish, the impact is quite limited because, as we can see in the existing power station dams, Oujiacun and Xuetuo in the lower reaches, fish in those sections are already scarce and there are no fishermen.

After protective measure are taken, it is possible for the waste discharged to reach acceptable standards thus, reducing to a minimum the influence on the ecosystem and contributing to controlling the quality of the environment. From the above analysis, the negative impact is negligible.

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:

All of project participants and host party involved considered that there is little negative environmental impact of this specific project.

SECTION E. Stakeholders' comments

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

A special stakeholder consultation meeting on the project was organized at 8:00-12:00 on May 17, 2006 in the City of Yibin, Sichuan Province, to collect opinions from all of the potential stakeholders such as local residents.
Before the meeting, questionnaires were then given out to local residents in order to investigate their opinions on the construction of the Sichuan Pingshan Pingbian&Guanyintuo Hydropower Station. Furthermore, in order to ensure the potential stakeholders obtain the information on the meeting, the project owner published a bulletin in the *Yibin Daily newspaper* on May 12, 2006 concerning the stakeholders' meeting, and also publicized the meeting bulletin via the following website, www.tqcdmchina.com on May 10, 2006. In the bulletin, the companies noted that all the potential stakeholders had access to the detailed information concerning the project. At the meeting, the project owner and the consultant invited the participants to express their concerns and comment concerning the project and the CDM. The representatives asked the following questions focusing on the CDM and the project and received satisfactory answers from experts.

Questions from the stakeholders to the project participants:
1. What impact will this project have on the local government, will we benefit from it?
2. What is the revenue policy of China concerning the CDM project?
3. Are there migrants and flooded areas as a result of this project?
4. Will the construction have some impacts on local residents such as noise and pollution of the drinking water?

Questions from the project participants to the stakeholders:
1. Were you familiar with the CDM before this meeting?
2. After the construction of the hydropower station is complete, will there be any impact on the income of local residents? Will there be any negative impact on income?
3. Is there any evidence proving that income will be increased?
4. Was it convenient to use electricity before? What major fuel is used by local residents in their daily activities?
5. If the electricity power supply is abundant, will local residents use electricity instead of burning fuel wood?
6. Do you support the Pinshan Zhongxing Electrometallurgy Co., Ltd. in their application for the CDM project?

E.2. Summary of the comments received:

We have reclaimed 20 questionnaires, the interviewees are all villagers of Pingbian, 40% are women, 95% are junior high school graduates or inferior. 100%think that there is a shortage of electricity in the local area, of which 60% think the situation is serious; 100% think the construction of the hydropower station will bring benefits to their lives and all of them agree with the construction of the project.

From the questionnaires and stakeholders' meeting, we find that all, local government and residents, agree with the construction of the project. All stakeholders think that the hydropower station is located in remote mountains and canyon, so there is no impact due to flooding and no migration. There are no residents near the project, therefore, the local residents will not suffer from pollution, and the negative environmental impacts are limited. The construction of the Pingbian&Guanyintuo hydropower station will not only increase the local residents' incomes, but also improve the transportation condition. The project will provide electricity power to residents for daily life and for manufacturing, improve the quality of life of local residents, such as, bring about an increase in their income and promote service industries, such as food, beverage, accommodation and retail. The impacts of the proposed project are positive, so all support the construction of this project.

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

Given the generally positive (or neutral) nature of the comments received, no action has been taken to address the comments received.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

The Project Entity:

Organization:	Pinshan Zhongxing Electrometallurgy Co., Ltd.
Street/P.O.Box:	Huilong Village, Pingshan Town
Building:	The fourth floor of the Jinjiang Passenger Station
City:	Pingshan County, Yibin City
State/Region:	Sichuan Province
Postfix/ZIP:	645350
Country:	China
Telephone:	+86-831-5725301
FAX:	+86-831-5725301
E-Mail:	sczhongxing@126.com
URL:	/
Represented by:	Huang zhijun
Title:	assistant general manager
Salutation:	Mr.
Last Name:	Huang
Middle Name:	/
First Name:	Zhijun
Department:	/
Mobile:	+86-13700930992
Direct FAX:	+86-831-5627849
Direct Tel:	+86-831-5627746
Personal E-Mail:	hzjhxhmy@126.com

The Buyer

Organization:	ENEL Trade SpA
Street/P.O.Box:	Viale Regina Margherita, 125
Building:	/
City:	Rome
State/Region:	/
Postfix/ZIP:	00198
Country:	Italy
Telephone:	+44-20-79848709
FAX:	+44-20-79848661
E-Mail:	/
URL:	http://www.enel.it
Represented by:	Eliano Russo
Title:	/
Salutation:	Mr.
Last Name:	Russo
Middle Name:	/
First Name:	Eliano
Department:	/
Mobile:	/
Direct FAX:	+39-06-83054394
Direct tel:	+39-06-83058506
Personal E-Mail:	Eliano.russo@enel.it

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

There is no public funding from Annex I countries used in the project activity.

Annex 3

BASELINE INFORMATION

Table1. Calculation of the Thermal Power supplied to the Central China Grid in 2002

Province	Jiangxi	Henan	Hubei	Hunan	Chongqing	Sichuan
Thermal power Generation (MWh)	18,648,000	84,734,000	34,301,000	20,058,000	14,727,000	27,879,000
Rate of Electricity Consumption of Power Plant (%)	7.67	8.03	7.73	7.73	10.21	9.59
Thermal power Supplied to the Grid (MWh)	17,217,698.4	77,929,859.8	31,649,532.7	18,507,516.6	13,223,373.3	25,205,403.9
Total Thermal Power Supplied to the Central China Grid (MWh)	183,733,384.7					

Data source: 2003 China Electric Power Yearbook.

Table2. Calculation of the Thermal Power supplied to the Central China Grid in 2003

Province	Jiangxi	Henan	Hubei	Hunan	Chongqing	Sichuan
Thermal Power Generation (MWh)	27,165,000	95,518,000	39,532,000	29,501,000	16,341,000	32,782,000
Rate of Electricity Consumption of Power Plant (%)	6.43	7.68	3.81	4.58	8.97	4.41
Thermal Power Supplied to the Grid (MWh)	25,418,290.5	88,182,217.6	38,025,830.8	28,149,854.2	14,875,212.3	31,336,313.8
Total Thermal Power Supplied to the Central China Grid (MWh)	225,987,719.2					

Data source: 2004 China Electric Power Yearbook.

Table3. Calculation of the Thermal Power supplied to the Central China Grid in 2004

Province	Jiangxi	Henan	Hubei	Hunan	Chongqing	Sichuan
Thermal power Generation (MWh)	30,127,000	109,352,000	43,034,000	37,186,000	16,520,000	34,627,000
Rate of Electricity Consumption of Power Plant (%)	7.04	8.19	6.58	7.47	11.06	9.41
Thermal Power Supplied to the Grid (MWh)	28,006,059.2	100,396,071.2	40,202,362.8	34,408,205.8	14,692,888.0	31,368,599.3
Total Thermal Power Supplied to the Central China Grid (MWh)	249,074,186.3					

Data Source: 2005 China Electric Power Yearbook.

Table 4. Energy Consumption Statistics of Power Generation of the Central China Grid in 2002

Fuel	Unit	Jiangxi A	Henan B	Hubei C	Hunan D	Chongqing E	Sichuan F	The Central China Grid G=A+B+C+D+E+F
Raw coal	Ten thousand Tons	1,062.63	4,679.02	1,710.00	1,113.78	398.57	1,964.32	10,928.32
Clean coal	Ten thousand Tons	2.72	0.00	0.00	0.00	0.00	0.00	2.72
Other washed coal	Ten thousand Tons	3.66	26.49	0.00	0.00	249.99	0.00	280.14
Coke	Ten thousand Tons	0.00	1.15	0.00	0.00	0.00	0.00	1.15
Coke oven gas	10^8 Cubic meter	0.00	0.00	1.11	0.00	0.00	0.00	1.11
Other gas	10^8 Cubic meter	0.00	2.16	0.00	0.00	0.00	0.00	2.16
Crude oil	Ten thousand Tons	0.00	0.67	1.17	0.00	0.00	0.81	2.65
Diesel oil	Ten thousand Tons	1.00	1.34	1.08	2.19	0.51	0.51	6.63
Fuel oil	Ten thousand Tons	0.33	0.16	0.34	0.69	0.00	1.51	3.03
LPG	Ten thousand Tons	0.00	0.02	0.00	0.00	0.00	0.00	0.02
Refinery gas	Ten thousand Tons	0.49	0.00	0.00	1.90	0.00	0.00	2.39
Natural gas	10^8 Cubic meter	0.00	0.00	0.00	0.00	0.00	1.75	1.75
Other petroleum products	Ten thousand Tons	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other coking products	Ten thousand Tons	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other Energy	Ten thousand Tce	0.00	3.38	0.00	0.00	0.00	0.00	3.38

Data Source: China Energy Statistical Yearbook 2000-2002.

Table 5. Energy Consumption Statistics of Power Generation of the Central China Grid in 2003

Fuel	Unit	Jiangxi A	Henan B	Hubei C	Hunan D	Chongqing E	Sichuan F	The Central China Grid G=A+B+C+D+E+F
Raw coal	Ten thousand Tons	1,427.41	5,504.94	2,072.44	1,646.47	769.47	2,430.93	13,851.66
Clean coal	Ten thousand Tons	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other washed coal	Ten thousand Tons	2.03	39.63	0.00	0.00	106.12	0.00	147.78
Coke	Ten thousand Tons	0.00	0.00	0.00	1.22	0.00	0.00	1.22
Coke oven gas	10^8 Cubic meter	0.00	0.00	0.93	0.00	0.00	0.00	0.93
Other gas	10^8 Cubic meter	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crude oil	Ten thousand Tons	0.00	0.5	0.24	0.00	0.00	1.20	1.94
Diesel oil	Ten thousand Tons	0.52	2.54	0.69	1.21	0.77	0.00	5.73
Fuel oil	Ten thousand Tons	0.42	0.25	2.17	0.54	0.28	1.20	4.86
LPG	Ten thousand Tons	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Refinery gas	Ten thousand Tons	1.76	6.53	0.00	0.66	0.00	0.00	8.95
Natural gas	10^8 Cubic meter	0.00	0.00	0.00	0.00	0.04	2.2	2.24
Other petroleum products	Ten thousand Tons	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other coking products	Ten thousand Tons	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other Energy	Ten thousand Tce	0.00	11.04	0.00	0.00	16.2	0.00	27.24

Data Source: China Energy Statistical Yearbook 2004.

Table 6. Energy Consumption Statistics of Power Generation of the Central China Grid in 2004

Fuel	Unit	Jiangxi A	Henan B	Hubei C	Hunan D	Chongqing E	Sichuan F	The Central China Grid G=A+B+C+D+E+F
Raw coal	Ten thousand Tons	1,863.80	6,948.50	2,510.50	2,197.90	875.50	2,747.90	17,144.10
Clean coal	Ten thousand Tons	0.00	2.34	0.00	0.00	0.00	0.00	2.34
Other washed coal	Ten thousand Tons	48.93	104.22	0.00	0.00	89.72	0.00	242.87
Coke	Ten thousand Tons	0.00	109.61	0.00	0.00	0.00	0.00	109.61
Coke oven gas	10^8 Cubic meter	0.00	0.00	1.68	0.00	0.34	0.00	2.02
Other gas	10^8 Cubic meter	0.00	0.00	0.00	0.00	2.61	0.00	2.61
Crude oil	Ten thousand Tons	0.00	0.86	0.22	0.00	0.00	0.00	1.08
Gasoline	Ten thousand Tons	0.00	0.06	0.00	0.00	0.01	0.00	0.07
Diesel oil	Ten thousand Tons	0.02	3.86	1.7	1.72	1.14	0.00	8.44
Fuel oil	Ten thousand Tons	1.09	0.19	9.55	1.38	0.48	1.68	14.37
LPG	Ten thousand Tons	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Refinery gas	Ten thousand Tons	3.52	2.27	0.00	0.00	0.00	0.00	5.79
Natural gas	10^8 Cubic meter	0.00	0.00	0.00	0.00	0.00	2.27	2.27
Other petroleum products	Ten thousand Tons	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other coking products	Ten thousand Tons	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other Energy	Ten thousand Tce	0.00	16.92	0.00	15.2	20.95	0.00	53.07

Data Source: China Energy Statistical Yearbook 2005.

Table 7. The Operation Margin Emission Factor Calculation of the Central China Grid in 2002

Fuel	Unit	Fuel Consumption of the Central China Grid in 2002 G	Emission Factor H （tc/TJ）	Oxidation Rate I (%)	Average NCV J (MJ/t,km^3)	CO_2 Emission(tCO_2e) K=G*H*I*J*44/12/10000 (for quality unit) K=G*H*I*J*44/12/1000 (for volume unit)
Raw coal	Ten thousand Tons	10,928.32	25.8	98.0	20,908	211,827,873.70
Clean coal	Ten thousand Tons	2.72	25.8	98.0	26,344	66,430.55
Other washed coal	Ten thousand Tons	280.14	25.8	98.0	8,363	2,171,973.06
Coke	Ten thousand Tons	1.15	29.5	98.0	28,435	34,663.36
Coke oven gas	10^8 Cubic meter	1.11	13.0	99.5	16,726	88,054.786
Other gas	10^8 Cubic meter	2.16	13.0	99.5	5,227	53,548.11
Crude oil	Ten thousand Tons	2.65	20.0	99.0	41,816	80,449.80
Diesel oil	Ten thousand Tons	6.63	20.2	99.0	42,652	207,353.29
Fuel oil	Ten thousand Tons	3.03	21.1	99.0	41,816	97,045.23
LPG	Ten thousand Tons	0.02	17.2	99.5	50,179	629.76
Refinery gas	Ten thousand Tons	2.39	18.2	99.5	46,055	73087.08
Natural gas	10^8 Cubic meter	1.75	15.3	99.5	38,931	380294.07
Other petroleum products	Ten thousand Tons	0.00	20.0	99.0	38,369	0.00
Other coking products	Ten thousand Tons	0.00	25.8	98.0	28,435	0.00
Other Energy	Ten thousand Tce	3.38	0.0	0.0	0.0	0.00
Total Emission (Q)		215,081,402.80tCO_2e				
Thermal Power supplied to the Central China Grid (P)		183,733,384.70MWh				
OM Emission Factor in 2002 [＝Q/P]		1.17062tCO_2e/MWh				

Data sources: China Energy Statistical Yearbook 2000-2001; Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories, Workbook: p. 1.8;,p. 1.6.

Table 8. The Operation Margin Emission Factor Calculation of the Central China Grid in 2003

Fuel	Unit	Fuel Consumption of The Central China Grid in 2003 G	Emission Factor H （tc/TJ）	Oxidation Rate I (%)	Average NCV J (MJ/t,km^3)	CO_2 Emission(tCO_2e) K=G*H*I*J*44/12/10000 (for quality unit) K=G*H*I*J*44/12/1000 (for volume unit)
Raw coal	Ten thousand Tons	13,851.66	25.8	98.0	20,908	268,492,109.10
Clean coal	Ten thousand Tons	0.00	25.8	98.0	263,44	0.00
Other washed coal	Ten thousand Tons	147.78	25.8	98.0	8,363	1,145,763.47
Coke	Ten thousand Tons	1.22	29.5	98.0	28,435	36,773.30
Coke oven gas	10^8 Cubic meter	0.93	13.0	99.5	16,726	73,775.63
Other gas	10^8 Cubic meter	0.00	13.0	99.5	5,227	0.00
Crude oil	Ten thousand Tons	1.94	20.0	99.0	41,816	58,895.33
Diesel oil	Ten thousand Tons	5.73	20.2	99.0	42,652	179,205.78
Fuel oil	Ten thousand Tons	4.86	21.1	99.0	41,816	155,656.71
LPG	Ten thousand Tons	0.00	17.2	99.5	50,179	0.00
Refinery gas	Ten thousand Tons	8.95	18.2	99.5	46,055	273,694.28
Natural gas	10^8 Cubic meter	2.24	15.3	99.5	38,931	486,776.41
Other petroleum products	Ten thousand Tons	0.00	20.0	99.0	38,369	0.00
Other coking products	Ten thousand Tons	0.00	25.8	98.0	28,435	0.00
Other Energy	Ten thousand Tce	27.24	0.0	0.0	0	0.00
Total Emission (Q)		270,902,650.00tCO_2e				
Thermal Power supplied to the Central China Grid (P)		225,987,719.20MWh				
OM Emission Factor in 2003 [＝Q/P]		1.19875tCO_2e/MWh				

Data sources: China Energy Statistical Yearbook 2004; Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories, Workbook: p. 1.8;,p. 1.6.

Table 9. The Operation Margin Emission Factor Calculation of the Central China Grid in 2004

Fuel	Unit	Fuel Consumption of the Central China Grid in 2003 G	Emission Factor H （tc/TJ）	Oxidation Rate I (%)	Average NCV J (MJ/t,km^3)	CO_2 Emission(tCO_2e) K=G*H*I*J*44/12/10000 (for quality unit) K=G*H*I*J*44/12/1000 (for volume unit)
Raw coal	Ten thousand Tons	17,144.10	25.8	98.0	20,908	332,310,753.20
Clean coal	Ten thousand Tons	2.34	25.8	98.0	26,344	57,149.81
Other washed coal	Ten thousand Tons	242.87	25.8	98.0	8,363	1,883,012.41
Coke	Ten thousand Tons	109.61	29.5	98.0	28,435	3,303,869.86
Coke oven gas	10^8 Cubic meter	2.02	13.0	99.5	16,726	160,243.83
Other gas	10^8 Cubic meter	2.61	13.0	99.5	5,227	64,703.96
Crude oil	Ten thousand Tons	1.08	20.0	99.0	41,816	32,787.09
Gasoline	Ten thousand Tons	0.07	18.9	99.0	43,070	2,068.43
Diesel oil	Ten thousand Tons	8.44	20.2	99.0	42,652	263,961.05
Fuel oil	Ten thousand Tons	14.37	21.1	99.0	41,816	460,244.21
LPG	Ten thousand Tons	0.00	17.2	99.5	50,179	0.00
Refinery gas	Ten thousand Tons	5.79	18.2	99.5	46,055	177,060.32
Natural gas	10^8 Cubic meter	2.27	15.3	99.5	38,931	493,295.73
Other petroleum products	Ten thousand Tons	0.00	20.0	99.0	38,369	0.00
Other coking products	Ten thousand Tons	0.00	25.8	98.0	28,435	0.00
Other Energy	Ten thousand Tce	53.07	0.0	0.0	0	0.00
Total Emission (Q)		339,209,149.90tCO_2e				
Thermal Power supplied to the Central China Grid (P)		249,074,186.30MWh				
OM Emission Factor in 2004 [＝Q/P]		1.36188tCO_2e/MWh				

Data sources: China Energy Statistical Yearbook 2005; Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories, Workbook: p. 1.8;,p. 1.6.

According to electricity supplied to the grid of fire power, the OM of latest three years should be weighted average, so the weighted average OM is:

$$EF_{OM,y} = \frac{(1.170266 \times 183{,}733{,}384.70 + 1.19875 \times 225{,}987{,}719.20 + 1.36188 \times 249{,}074{,}186.30)}{(183{,}733{,}384.70 + 225{,}987{,}719.20 + 249{,}074{,}186.30)} = 1.2526 tCO_2e / MWh$$

Table10. Calculation of CO_2 Emission of Solid, Liquid and Gas Fuel for Power Generation in 2004

Fuel	Unit	Jiangxi A	Henan B	Hubei C	Hunan D	Chongqing E	Sichuan F	Total G=A+B+C +D+E+F	NCV kJ/kg kJ/m^3 H	Emission Factor I	Oxidation Rate J	CO_2 emission (tCO_2e)	l_{Coal}, l_{Oil} l_{Gas}
Raw coal	10^4 Tons	1,863.80	6,948.50	2,510.50	2,197.9	875.50	2,747.90	17,144.10	20,908	25.80	0.980	332,310,753	-
Clean coal	10^4 Tons	0.00	2.34	0.00	0.00	0.00	0.00	2.34	26,344	25.80	0.980	57,150	-
Other washed coal	10^4 Tons	48.93	104.22	0.00	0.00	89.72	0.00	242.87	8,363	25.80	0.980	1,883,012	-
Coke	10^4 Tons	0	109.61	0.00	0.00	0.00	0.00	109.61	28,435	29.50	0.980	3,303,870	
Subtotal	-	-	-	-	-	-	-	-	-	-	-	337,554,785	99.51%
Crude oil	10^4 Tons	0.00	0.86	0.22	0.00	0.00	0.00	1.08	41,816	20.00	0.990	32,787	-
Gasoline	10^4 Tons	0.00	0.06	0	0.00	0.01	0	0.07	43,070	18.90	0.990	2,068	-
Coal oil	10^4 Tons	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43,070	19.60	0.990	0	-
Diesel oil	10^4 Tons	0.02	3.86	1.70	1.72	1.14	0	8.44	42,652	20.20	0.990	263,961	-
Fuel oil	10^4 Tons	1.09	0.19	9.55	1.38	0.48	1.68	14.37	41,816	21.10	0.990	460,244	-
Other petroleum products	10^4 Tons	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38,369	20.00	0.990	0	-
Subtotal	-	-	-	-	-	-	-	-	-	-	-	759,060	0.22%
Natural gas	10^7 m^3	0.00	0.00	0.00	0.00	0.00	22.7	22.70	38,931	15.30	0.995	493,296	-
Coke oven gas	10^7 m^3	0.00	0.00	16.8	0.00	3.40	0.00	20.20	16,726	13.00	0.995	160,244	-
Other gas	10^7 m^3	0.00	0.00	0.00	0.00	26.10	0.00	26.10	5,227	13.00	0.995	64,704	-
LPG	10^4 Tons	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50,179	17.20	0.995	0	-
Refinery gas	10^4 Tons	3.52	2.27	0.00	0.00	0.00	0.00	5.79	46,055	18.20	0.995	177,060	-
Subtotal	-	-	-	-	-	-	-	-	-	-	-	895,304	0.27%
Total	-	-	-	-	-	-	-	-	-	-	-	339,209,149	100%

Table11. Calculating of Emission Factor for Various Power Plant

	Variable	Power Supply Efficiency L	Emission Factor for Fuels (tc/TJ) I	Oxidation Rate J	Emission Factor (tCO_2e/MWh) O=3.6/L/1000*I *J*44/12
Coal-fired Power Plant	$EF_{Coal,Adv}$	36.53%	25.8	0.980	0.9136
Gas-fired Power Plant	$EF_{Oil,Adv}$	45.87%	15.3	0.995	0.4381
Oil-fired Power Plant	$EF_{Gas,Adv}$	45.87%	21.1	0.990	0.6011

Therefore, the emission factor of thermal power is：

$$EF_{Thermal} = l_{Coal} \times EF_{Coal,Adv} + l_{Oil} \times EF_{Oil,Adv} + l_{Gas} \times EF_{Gas,Adv} = 0.9116 \text{tCO}_2\text{e/MWh}$$

Table12. Installed Capacity of the Central China Grid in 2004

Installed Capacity	Unit	Jiangxi	Henan	Hubei	Hunan	Chongqing	Sichuan	Total
Thermal Power	MW	5,496.0	21,788.5	9,509.3	6,779.5	3,271.1	6,900.3	53,744.7
Hydro Power	MW	2,549.9	2,438.0	7,415.1	7,448.2	1,407.9	13,382.9	34,642.0
Nuclear Power	MW	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Wind Power and others	MW	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	MW	8,045.9	24,226.5	16,924.4	14,227.8	4,679	20,283.2	88,386.8

Data Source: 2005 China Electric Power Yearbook. The data of Hubei grid take no account of power generation by Three Gorge Engineering.

Table13. Installed Capacity of the Central China Grid in 2001

Installed Capacity	Unit	Jiangxi	Henan	Hubei	Hunan	Chongqing	Sichuan	Total
Thermal Power	MW	4,869.8	15,349.0	8,077.3	4,997.8	2,898.3	6,377.0	42,569.2
Hydro Power	MW	2,067.8	2,438.0	7,125.6	5,966.1	1,268.0	11,531.5	30,397.0
Nuclear Power	MW	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Wind Power and others	MW	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	MW	6,937.6	17,787.0	15,202.9	10,963.8	4,166.3	17,908.5	72,966.1

Data Source: 2002 China Electric Power Yearbook.

Table14. Installed Capacity of the Central China Grid in 2000

Installed Capacity	Unit	Jiangxi	Henan	Hubei	Hunan	Chongqing	Sichuan	Total
Thermal Power	MW	4,474.3	13,789.0	8,038.8	4,477.4	2,995.0	6,090.1	39,864.6
Hydro Power	MW	1,846.0	1,528.0	7,070.5	5,858.0	1,327.0	11,008.3	28,637.8
Nuclear Power	MW	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Wind Power and others	MW	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	MW	6,320.3	15,317.0	15,109.3	10,335.4	4,322	17,098.4	68,502.4

Data Source: 2001China Electric Power Yearbook.

Table15. The BM Calculation of the Central China Grid

	Installed Capacit y in 2000	Installed Capacit y in 2001	Installed Capacity in 2004	Capacity Addition Of 2000-2004	Ratio of Capacity Addition
Thermal Power（MW）	39,864.6	42,569.2	53,744.7	13,880.1	69.80%
Hydro Power（MW）	28,637.8	30,397.0	34,642.0	6,004.2	30.20%
Nuclear Power（MW）	0.0	0.0	0.0	0.0	0.00%
Wind Power（MW）	0.0	0.0	0.0	0.0	0.00%
Total（MW）	68,502.4	72,966.2	88,386.7	19,884.3	100.00%
Percent of Installed Capacity in2004	77.50%	82.55%	100.00%	-	-

Therefore, the BM was calculated as $EF_{BM,y} = 0.9116 \times 69.80\% = 0.6363 tCO_2e/MWh$.

The baseline emission factor was calculated as the weighted average of the OM Emission Factor (1.2526tCO_2e/MWh) and the BM Emission Factor（0.6363tCO_2e/MWh）. The defaults weights for hydropower projects are used as 0.5 respectively. We obtain a baseline emission factor of 0.94445tCO_2e/MWh.

Annex 4

MONITORING INFORMATION

The monitoring plan will monitor power generation and electricity supplied to the Central China Grid, provided the relative information in section B7.2.