CLEAN DEVELOPMENT MECHANISM
PROJECT DESIGN DOCUMENT FORM (CDM-SSC-PDD)
Version 03 - in effect as of: 22 December 2006

CONTENTS

Annexes

SECTION A. General description of small-scale project activity

A.1 Title of the small-scale project activity:

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Title of the project activity: China Changtanghe Rundle Small Hydropower Project
Document version: 04
The version 01 PDD is for GSP 20/07/2007;
The version 02 PDD is submitted for HCA application 05/11/2007;
The version 03 PDD is updated and submitted to DOE according to the draft validation report's comments 18/01/2008;
Completing Date: 05/08/2008(DD/MM/YYYY)

A.2. Description of the small-scale project activity:

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China Changtanghe Rundle Small Hydropower Project (here after referred as *the Project*) is located on the up and middle reaches of Changtanghe River, in Dongkou County, Shaoyang city, Hunan province. The project consists of three diversion type hydropower stations without reservoirs in the span of 20.6km, and they are named as Shuanglongqiao, Shuangjiangqiao, and Hebaotang stations, respectively as the second, third, and forth Rundle stations planed in *the project design report on Rundle hydraulic energy development of Changtanghe*. The installed capacity is 10.5MW in sum, the net power delivered to the grids is 41,024MWh [1]. When the project been built, the power generated will be delivered into Central China Power Grid (CCPG) through Dongkou transformation station, and CCPG is dominated by fossil-fuel power plants. Therefore, the project can indirectly cause Greenhouse Gas emission reductions through substituting the fossil-fuel fired power generation, and the annual emission reductions is estimated to be 39,980 tonnes of CO_2 equivalent.

The project will contribute to local sustainable development in following aspects:
a. The project utilize renewable energy to produce electric power, and it would take the place of parts of the power supplied from fuel fired power plants to CCPG, meanwhile, reduce the emissions of CO_2 、SO_2、NO_x and dust into the air.
b. Enlarge the ratio of clean/ renewable energy capacity over total installed capacity of CCPG to improve the energy structure.
c. Maintain the local traffic and communication infrastructure to benefit local residents.
d. The construction and operation of the project would directly and indirectly create more than 100 employment opportunities for local labours, and it would bring more revenues to both local inhabitants and government.

[1] The hydroelectric investigation institute of Nanping, Primary Design Report on Shuanglongqiao, Shuangjiangqiao, Hebaotang stations in Dongkou county, Hunan province, Dec 2004.

A.3. Project participants:

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Name of Party involved (*) ((host) indicates a host Party)	Private and/or public entity(ies) project participants (*) (as applicable)	Kindly indicate if the Party involved wishes to be considered as project participant (Yes/No)
P.R. CHINA (host)	Dongkou Zhexiang hydroelectric Co. Ltd.	No
UK	Wienerberger AG	No

The details information for both participants is available in Annex 1.

A.4. Technical description of the small-scale project activity:

A.4.1. Location of the small-scale project activity:

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A.4.1.1. Host Party(ies):

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People's Republic of China (Host)

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

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Hunan Province

A.4.1.3. City/Town/Community etc:

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Nuoxi Yao Minority Autonomous Town/ Dongkou County / Shaoyang city

A.4.1.4. Details of physical location, including information allowing the unique identification of this small-scale project activity :

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The Project is located in Dongkou County, Shaoyang City, Hunan Province, P.R.China. And the geographical coordinates of the individual powerhouse sites of the project are follows:

First cascade: N 27°12′17″ E 110°33′18″

Second cascade: N 27°09′21″ E 110°31′03″

Third cascade: N 27°08′25″ E 110°31′27″

Figure 1 shows the map locations of the project activity:

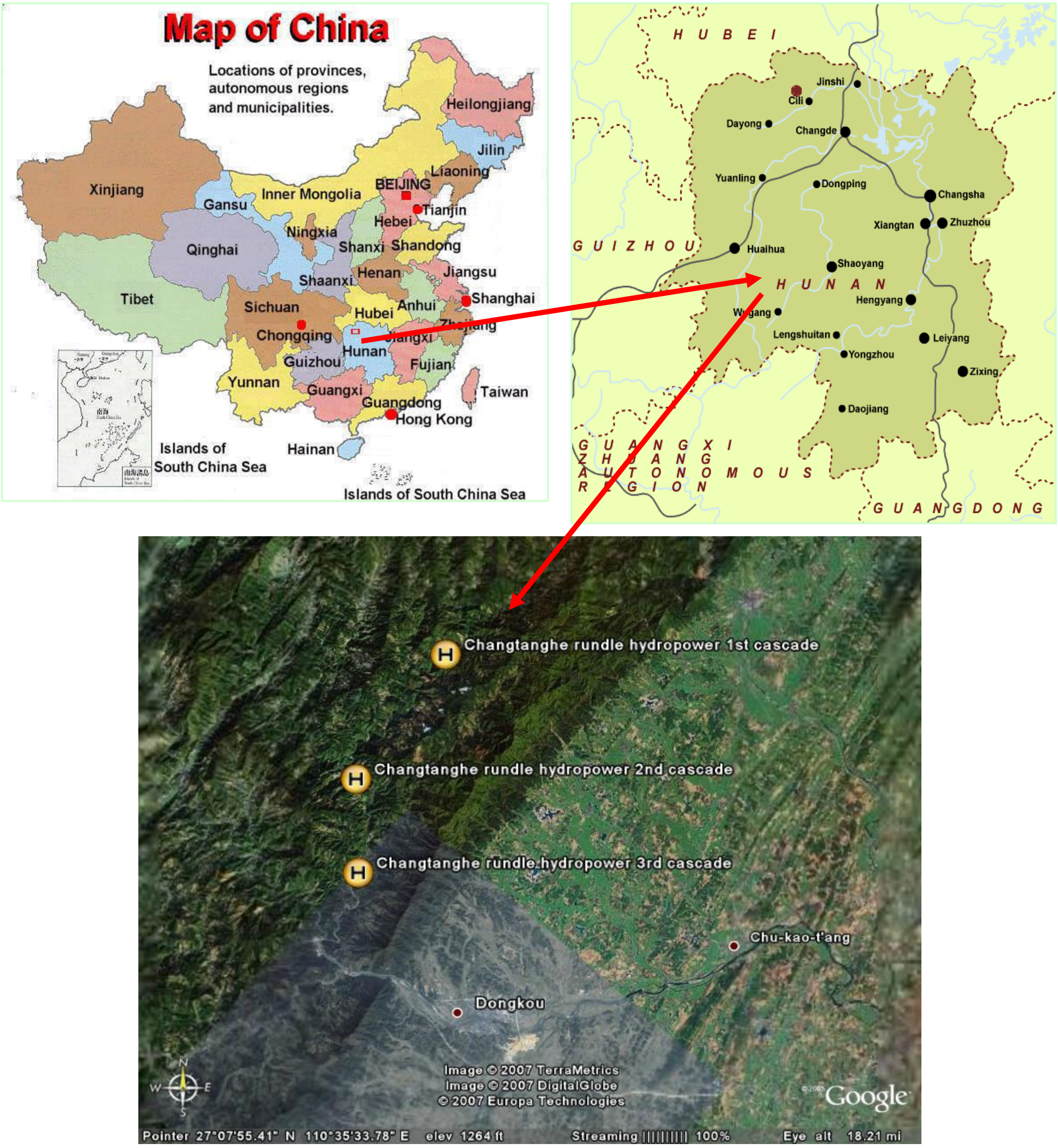

Figure 1 the locations map of the project

A.4.2. Type and category(ies) and technology/measure of the small-scale project activity:

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1. Type and category(ies) of the small-scale project activity

The project falls into:

Type Ⅰ——Renewable Energy Projects

Category I.D. ——Renewable Electricity Generation for a Grid.

2. Technologies applied on the small-scale project activity

The hydropower plants of the project are ascribed to the diversion type, there are three stages power plants in the project boundary, and in sum, the total installed capacity is 10.5MW. The three individual

stages of Changtanghe have the similar technical characteristics, and introduced as follows:

the first stage Shuangjiangqiao consists of barrages, pressure cavities, pressure pool, steel penstock and powerhouse; the second stage Shuanglongqiao consists of river barrages, pressure cavity, pressure pool, steel penstock, power and step-up transformation station; the third stage Hebaotang consists of river barrages, steel penstock, main and auxiliary powerhouse, step-up transformation station and tail water channel.

The Shuangjiangqiao power plant started in 13th July 2006, and plans to be completed in June 2008; the Shuanglongqiao power plant started in 29th July 2006, and plans to be completed in October 2008; while the Hebaotang power plant started in 28th June 2006, and plans to be completed in March 2008. Before the power plant is put into commencement, the staff will receive the monitoring, equipment maintenance and CDM training from experienced engineer and CDM experts.

The main technical parameters and features are summarized in the following table 2:

Table 1 The key technical parameters and features

Power plant		Shuangjiangqiao	Shuanglongqiao	Hebaotang
Installed capacity（KW）		2500	6400	1600
Turbine	Size	HK295/P0820-WJ-71	HLD54-WJ-84	HL295/P0820-WJ-62
	Amount	2	2	2
	Water head	48m	96m	31.6m
	Annual utilization hours	4930h	4368h	4949h
	Manufacturer	Hunan Xuefeng electric equipment manufacture Co. Ltd.		
Generator	Size	SFW1250-8	SFW3200-8	SFW800-8
	Amount	2	2	2
	Rated capacity	1250kW	3200kW	800 kW
	Manufacturer	Hunan Xuefeng electric equipment manufacture Co. Ltd.		
Step up transformation		S9-3125kW	S9-8000kW	S9-2000kW
Transmission lines		Voltage	35kV	
		Distance	17km	

3. Environmental safe technology:

The technologies employed in the proposed project are environmental friendly, and shall not be harmful to the ecosystem, which has been applied world widely.

4. Technology transfer:

All the main equipments, such as the turbines and electricity generators, are manufactured in domestic. There is no technology import from any UNFCCC Annex I party.

A.4.3 Estimated amount of emission reductions over the chosen crediting period:

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The renewable crediting period is chosen for the proposed project, and the first crediting period is 7 years. During the period the total emission reduction is estimated to be 279,860 tCO_2e. The amount of annual, total, and average emission reductions are explained in the following table 3:

Table 2 Estimation of emission reductions during first crediting period

Years	**Annual estimation of emission reductions in** (tCO_2e)
2008.10 — 2009.9	39,980
2009.10 — 2010.9	39,980
2010.10 — 2011.9	39,980
2011.10 — 2012.9	39,980
2012.10 — 2013.9	39,980
2013.10 — 2014.9	39,980
2014.10 — 2015.9	39,980
Total estimated reductions (tonnes of CO_2e)	279,860
Number of crediting years	7
Annual average emission reduction of crediting years (tonnes of CO_2e)	39,980

A.4.4. Public funding of the small-scale project activity:

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No public funding from UNFCCC Annex I parties is available to the project activity.

A.4.5. Confirmation that the small-scale project activity is not a debundled component of a large scale project activity:

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According to the Simplified Modalities and Procedures for small-scale CDM project activities, a small-scale project is considered a debundled component of a large project activity if there is a registered small-scale activity or an application to register another small-scale activity:

- With the same project participants; and
- In the same project category and technology/measure; and
- Registered within the previous two years; and
- Whose project boundary is within 1 km of the project boundary of the proposed small-scale activity at the closest point.

The project developer confirms that none of the above mentioned conditions is applicable to this project activity.

SECTION B. Application of a baseline and monitoring methodology

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

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Title of the approved baseline and monitoring methodology: AMS-I.D-Renewable electricity generation for a grid (Version 12, 10 August, 2007).

Title of the methodology to calculate the emission factor: ACM0002-Consolidated baseline methodology for grid-connected electricity generation from renewable sources (Version 06, 19 May 2006).

It can be found from the following website:

Reference: Appendix B of the simplified modalities and procedures for small scale CDM project activities, version 07, 28 November 2005

The above document can be found from the following website:
http://cdm.unfccc.int/methodologies/SSCmethodologies/approved.html

B.2 Justification of the choice of the project category:

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The project is of renewable electricity generation activity without Greenhouse Gas emission, and meets the applicable requirements in methodology AMS I.D. as:

1. The project is designed to make use of the renewable water resources to generate electricity, the total installed capacity is 10.5MW, lower than the threshold of 15MW for small scale hydropower projects;
2. The project is a newly built diversion type hydroelectric project without reservoir, and thus there is no project emissions according to the methodology;
3. The project activity doesn't involve in switching from fossil fuels to renewable energy at the site of the project activity;
4. The geographic and system boundaries of CCPG can be clearly identified and information on the characteristics of the grid is available in official published materials, such as *China Electric Yearbook* and *China Energy Statistical Yearbook*.

Therefore the methodology AMS I.D. is applicable to the project.

B.3. Description of the project boundary:

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According to methodology AMS I.D, the project boundaries contain the physical and geographical places that the renewable energy project is related to. The generated electricity of the project will be delivered to CCPG, which includes Henan Province, Hubei Province, Hunan Province, Jiangxi Province, Sichuan Province and Chongqing Municipality Power Grid [2]. The CCPG does not import electricity from other grids[3], and the main emission sources and types of GHG in the project boundaries are listed in table 4 below:

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[2] Chinese DNA's Guideline of emission factors of Chinese grids, published in 9th August, 2007 http://cdm.ccchina.gov.cn/web/index.asp

[3] China Electric Power Yearbook 2002-2006

Table 3 GHG emissions in project boundary

	Source	Gas	Included?	Justification/Explanation
Baseline	Emission from CCPG	CO_2	Yes	Main emission source
		CH_4	No	Neglected for simple, as conservative principle
		N_2O	No	Neglected for simple, as conservative principle
Project Activity	The project	CO_2	No	Neglected for simple, according to the methodology
		CH_4	No	no need to consider methane emission for the hydropower project without reservoir
		N_2O	No	Neglected for simple, according to the methodology

B.4. Description of baseline and its development:

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In order to provide the same service as the proposed project, there are 4 baseline scenarios for the project:
Scenario 1: The project activity not undertaken as CDM project activity;
Scenario 2: Construct a fossil fuel-fired power plant with equivalent annual power supply;
Scenario 3: Construct a power plant using other renewable energy with equivalent annual power supply;
Scenario 4: Equivalent annual electricity supplied by CCPG.

The analysis of above scenarios is as follow:

Scenario 1: The project activity not undertaken as CDM project activity;
In this scenario, the project will generate zero-emission power with renewable water resources and cause the emission reduction by displacing equivalent power supply from CCPG. However, the project can not be implemented due to the internal return rate (after tax) of total investment of the project is 7.48%, which is below of benchmark IRR (10%). Therefore, the scenario 1 is not a possible baseline scenario.

Scenario 2: Construct a fossil fuel-fired power plant with equivalent annual power supply;
This alternative is to construct a fossil fuel-fired power plant with equivalent annual power supply. For the annual utilization hours of the fossil fuel plant are 5,633 [4], which is larger than the annual utilization of hydropower plant. Thus, installed capacity of the fossil fuel plants with equivalent annual power supply as the project will be smaller than 10.5MW.

According to the current laws and regulations of China, to build such a small capacity (less than 135MW) coal based power plants in the district covered by large-scale power grids is forbidden[5]. Thus, it is not available to construct a fossil fuel-fired power plant as alternative. Therefore, the scenario 2 is not a possible baseline scenario.

Scenario 3: Construct a power plant using other renewable energy with equivalent annual power supply;
This scenario is to construct renewable power plants, which can supply equivalent electricity annually as the project. However, those kinds of renewable power plants, such as photovoltaics, tidal/wave, wind,

[4] *National Statistics Bulletin of Power Industry in 2006* China Electricity Council

[5] *Notice on Strictly Prohibiting the Installation of Fuel-fired Generators with the Capacity of 135 MW or below* issued by the General Office of the State Council, decree no. 2002-6. The State Electricity Regulatory Commission

geothermal and renewable biomass etc., are strongly depended on climate and natural resources. They can not provide equivalent power supply quality and services as hydropower plants. There is not enough such kind of renewable resources in local area. Furthermore, limited by technology development and high costs, constructing an alternative renewable power plant is not financially attractive compared to the proposed project. Therefore, the scenario 3 is not a possible baseline scenario.

Scenario 4: Equivalent annual electricity supplied by CCPG;
Under this scenario, the increasing demand of electricity would be met from CCPG by operation of grid-connected power plants and by the addition of new generation sources without the project according to the current Chinese laws and regulations. So the scenario 4 is realistic and credible choice.

Conclusion: From the analysis above, the only realistic and credible baseline scenario for the project is: Scenario 4 — Equivalent annual electricity supplied by CCPG.

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 small-scale CDM project activity:

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Assessment and demonstration of additionality
According to Appendix B of the simplified modalities and procedures for small scale CDM project activities, the simplified model is given. The project must face at least one identifiable barrier that itself can not overcome. See it as follows:

- Investment barrier;
- Technical barrier;
- Common practice barrier;
- Other barrier.

Investment Barrier
The barrier met by the project is mainly on investment. And there are three analysis methods recommended to conduct investment analysis, including simple cost analysis, investment comparison analysis and benchmark analysis.

The simple cost analysis is not applicable to the project because the project activity generates the revenue from the sales of generated electricity. And the investment comparison analysis is not applicable because the alternative to the proposed project is to purchase electricity from the grids, which is irrelevant for the project owner to make business decision. According to *the Economic Assessment Rules of Small Hydropower Project SL16-95*, the benchmark internal rate of return (after tax) for Chinese hydropower projects within threshold of 25MW installed capacity is 10% in total investment method [6]; therefore, the benchmark analysis is applicable for the proposed project.

The three stages hydropower plants of the project are developed by the single project owner. During the feasibility study process, Primary Design process and Environmental Impact Assessment process, the three are investigated by the institutes and approved by the authority at the same time and in the same report or approval letter. And the construction of the three falls in the same time span and the same construction budget. Therefore, there is an integrated financial report for the three stages Rundle hydropower project as follows.

The data related to calculating IRR are listed in Table 5 and the calculation results are listed in Table 6 as follows:

[6] Link to http://www.cws.net.cn/guifan/bz/SL16-95/

Table 4 Basic Parameters of the Financial Indicators Calculation

Project	Unite	Value	Resources
Installed capacity	MW	10.5	Preliminary project design report
Total asset investment (static)	Million RMB	47.20	Preliminary project design report
Annual electricity supply	MWh/yr	41,024	Preliminary project design report
Electricity tariff (including value-added tax)	RMB￥/kWh	0.230	Preliminary project design report
Value-added tax	%	17	Preliminary project design report
Construction surtax	%	5	Preliminary project design report (on basis of VAT)
Education surtax	%	3	Preliminary project design report (on basis of VAT)
Income tax	%	33	Preliminary project design report
Annual O & M cost	million RMB	2.37	As calculated in the IRR spreadsheet
CER price	Euro/tCO_2	9.0	Estimated
Project life cycle (including construction period)	year	22	Preliminary project design report

Table 5 Comparative table of the financial indicators with and without CERs incomes

Item	Without CERs	With CERs income	Benchmark IRR
Internal rate of return	7.48%	16.45%	10%
Net Present Value	-7.07 million RMB	20.78 million RMB	0

The IRR is below the benchmark without CERs sale revenue, so the project isn't attractive to investors; the IRR can be improved obviously and exceeds the benchmark with CERs revenue, so the registration of the project activity as a CDM project activity will improve the confidence of the project investors, CERs sales revenue will be very helpful to overcome the investment barrier.

A sensitivity analysis is used to show whether the conclusion regarding the financial attractiveness is robust to reasonable variations in the critical assumptions. Four parameters including total static investment, electricity tariff, electricity generation, and annual O&M cost are selected as key sensitive factors to check the financial attractiveness. The variation assumption of factors set in the analysis process is increase/decrease 10% from the original level of factors, and the set of variation assumptions is employed in the design report for the project, and applied for most small hydropower projects (less than 25MW) in China, as required in the SL16-95, *Economic Evaluation Code for Small Hydropower Projects*.

The result of the sensitivity analysis is shown in Table 6.

Table 6 Sensitivity Analysis

FIRR Variation rate / Factor	-10%	+10%
Total static investment	8.87%	6.28%
Electricity tariff	5.90%	8.97%
Electricity generation	5.90%	8.97%
Annual O&M cost	8.07%	6.86%

Table 6 shows that IRRs of the project are always lower than the benchmark (10%) within the reasonable variation scope of the total static investment, electricity generation, electricity tariff, and annual O&M cost, therefore, the project activity is unlikely to be financially attractive.

The procedure and impact of considering CDM

As early as 2004, the Dongkou county government signed agreement with Zhejiang investors on Changtanghe Rundle hydropower project, and granted the investors the rights to develop this project according to the general water energy utilization plan. And then the feasibility approved in May 2004, and the Primary Design Report (PDR) was completed at the end of 2004 either. However, as the results of financial evaluation in Primary Design report, it is revealed that the financial indicator (IRR) is much lower than the benchmark IRR.

The results of PDR made the project are unattractive, and the investment on project was deferred from then. During the deferring time, some shareholders began to know the Kyoto Protocol and CDM concepts through the CDM consultant and the local government. To overcome the financial barrier, some shareholders suggested the board meeting to consider the CDM in pipeline, and discuss the feasibility of applying for CDM support to generate additional revenues from CERs sales. And the revenues are estimated to improve the IRR evaluation result when accounting the CERs revenues into financial report.

When Hunan CDM project service center (HNCDM) is established, and organized potential projects investigation in provincial wide, the project owner contact the specialists of HNCDM, and reached CDM project development intent with HNCDM. With the expectation of improving the project's nature of financial return, the project owner reached the main equipments' purchase agreement in March 2006, and started the construction work in June 2006.

The key milestones of the project activity's whole history can be summarized as the following table:

Table 7 The brief history table of the project

Time(D/M/Y)	**Progress of project**	**Relevant document**
25/05/2004	The Feasibility Study Report is approved by local DRC	Dongjifa[2004]No.62
12/2004	The project PDR is completed	PDR
16/02/2005	Decide to apply for CDM support on board meeting	Minutes of board meeting
10/03/2005	Receive letter of intent from China Construction Bank (CCB)	Intention letter of CCB
04/2005	The EIA for project is completed	EIA report

30/04/2005	EIA approval for Changtanghe rundle hydropower project is obained	Donghuanpinghan[2005]No.06
21/08/2005	Training the project owner’s staff on CDM knowledge	CDM monitoring manual
10/01/2006	Sign CDM project development intention letter with HNCDM	LOI for CDM project development
19/01/2006	Obtain the PDR approval of proposed project	Shaoshuizi[2006]No.2
02/03/2006	Reach purchase agreement with manufacturer	The water turbines and generators trade agreement
28/06/2006	Starting project construction	Construction starting notice
08/09/2006	Collecting local stakeholders’ comments	part E of PDD
25/05/2007	The tariff is formally set by local DRC	Dongfagai [2007]No.44
15/09/2007	Global Stakeholders’ Process of proposed project	EB website
28/12/2007	The project is approved by host DNA	NDRC website
06/2008	The project is expected to be put into operation	*(expected)*

To sum up, the project owner considered the financial stimulation factors as CDM to improve the financial nature of proposed project before starting the project implementation, and thus the project is additional.

The explanation on CDM project development progress
From project owner’s side, developing CDM project and doing the cooperative works with consultant are very important to project owner. CDM is new to project owner, it took time to set up the basic knowledge of CDM, took time to find the experts in this field for consultant, and the project owner used to try to apply CDM by themselves but failed, and then contact the appropriate CDM consultant, while it also took time to negotiate the terms and conditions on the development agreement with consultant.

The step of project owner’s preparing works (Feb. 2005 to Jan. 2006) is summarized as:
Feb. 2005, decide to apply CDM in board meeting;
March to Sep 2005, further study on CDM and try to apply for CDM by project owner itself, during this time, the project owner met and talked with experts in Beijing;
Oct. to Nov. 2005, find hard to do CDM by self, have to find a professional institute for help, then do a basic investigate on CDM consultant market of China;
Nov. 2006 to Jan. 2006, negotiating and finally signing the CDM development with a consultant company.

During this time, project owner also have to do many works on project preparing, project financing and bank loans application etc., therefore, can not put their all time and effort on CDM development. At the end of this period, the CDM development intention agreement was signed before the PDR is finally approved, and prior to the date of starting project construction.

The consultant also spends a long time to develop the project, and the progress (up to validation process) is summarized as follows:
Jan. 2006, sign the CDM development agreement;
March 2006, do the paper investigation works on PDR and EIA, preparing the PIN to potential carbon buyer;

June 2006, the consultant hold a signature ceremony, invited 4 buyers and more than 60 project owners to sign the trade agreements in 23rd June, the project owner of Changtanghe signed trade agreement with Arreon Carbon UK;
Sep. 2006, the consultant assigned staff visit project site to write PDD;
Oct. 2006, the draft PDD is prepared, and submitted to NDRC for approval;
Nov. 2006, the first trial to apply for Host DNA approval is failed, due to the quality of PDD and other materials;
March 2007, a new staff, Mr. Li Feng was assigned to continue developing the project, revising the PDD;
April. 2007, Arreon Carbon negotiates with the consultant and project owner to abort the intention agreement, and the Atmoguard GmbH ask to do broker business for the project;
July 2007, Atmoguard sign a broker agreement with project owner, and introduce one of their alliance partners to project owner;
August 2007, TUV-SUD is appointed as DOE by Wienerberger or Atmoguard;
Sep. 2007, the project is under GSP and DOE visit the project site in the end of this month for validation;

To sum up, the factors that immature of Chinese carbon market and project developers' lacking of necessary experience lead to the delay of project progress.

B.6. Emission reductions:

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B.6.1. Explanation of methodological choices:

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Project Emissions

According to the baseline methodology, the project is of diversion type hydropower project, and designed without reservoirs. Meanwhile, the project doesn't involve in fossil fuel consumption in project site. Therefore, there is no need to consider project emission, that is:

$$PE_y = 0.$$

Baseline Emissions

According to the baseline methodology ACM0002, the baseline emissions are the CO_2 emissions from the equivalent electricity generation in CCPG that are displaced by the project activity. For it is a newly proposed project, the baseline emissions could be obtained by the following equation:

$$BE_y = EG_y \cdot EF_y \qquad (1)$$

Where:
BE_y is the baseline emissions quantity at a given year y, in tCO_2e/MWh;
EG_y is the electricity supplied by the project activity to the electricity grid at year y, in MWh;
EF_y is the baseline emissions factor at year y, in tCO_2e/MWh.

According to the baseline methodology ACM0002, the baseline emissions factor (EF_y) is calculated as a Combined Margin (CM), which consists of the weighted average of Operating Margin (OM) emission factor and Build Margin (BM) factor by utilizing an ex-ante 3 years' data vintage for the CCPG. The data used in calculation were provided by the official resources or public resources. The steps of calculation are as follows:
Step 1. Calculate the Operating Margin emission factor（$EF_{OM,y}$）;
Step 2. Calculate the Build Margin emission factor（$EF_{BM,y}$）;
Step 3. Calculate the baseline emission factor（EF_y）.

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

The baseline methodology ACM0002 introduced us that there are four methods to calculate the operating margin emission factor $EF_{OM,y}$. They are:

a) Simple OM, or
b) Simple Adjusted OM, or
c) Dispatched Data Analysis OM, or
d) Average OM.

Method (c) should be the first methodological choice. However, this method requires the detailed dispatch data of the CCPG, which is confidential information and is not available to be obtained by public. Thus, method (c) is not applicable. Due to the same reasons, the method (b) is not applicable.

Method (a) can be used where low-cost/must run resources constitute less than 50% of total grid generation in: 1) average of the five most recent years, or 2) based on long-term normal data for hydroelectricity production. The only low-cost/must run resource in CCPG is hydropower plants. It can be found from Table 8 that installed capacity of hydropower plants constitute less than 50% of CCPG during year 2001 to 2005. Thus, method (a) is applicable to calculate $EF_{OM,y}$. And method (d) can only be used where low-cost/must run resources constitute more than 50% of total grid generation, therefore, method (d) is not applicable to calculate $EF_{OM,y}$.

Table 8 Ratio of electricity generation of low cost/must-run power plants in CCPG during year 2001～2005[7]

Year	2001	2002	2003	2004	2005
Ratio of electricity generation of low cost/must-run plants in CCPG (%)	36.76	35.95	34.43	38.37	38.56

The Simple OM method is chosen for calculating the $EF_{OM,y}$, as the calculation methods described in details in the methodology ACM0002. And the $EF_{OM,y}$ could be calculated by utilizing an *ex-ante* 3 years' statistical data vintage for CCPG, the formula as follows:

$$EF_{OM,simple,y} = \frac{\sum_{i,j} F_{i,j,y} \cdot COEF_{i,j}}{\sum_{j} GEN_{j,y}} \qquad (2)$$

Where:

$F_{i,j,y}$ is the quantity of fuel *i* (in mass or volume unit) consumed by relevant power source *j* in year *y*; *j* refers to the power source generating electricity to the grid, which do not include the low-operating cost and must-run power plants, but the imports to the grid;

$COEF_{i,j,y}$ is the CO_2 emission coefficient of fuel *i* (tCO_2 / mass or volume unit of the fuel), taking into account the carbon content of the fuels used by the relevant power source *j* and the oxidation percentage of the fuel in year *y*;

$GEN_{j,y}$ is the electricity quantity (MWh) delivered to the grid by source *j*.

The CO_2 emission coefficient $COEF_i$ used above is obtained by:

$$COEF_i = NCV_i \cdot EF_{CO2,i} \cdot OXID_i \qquad (3)$$

Where:

NCV_i is the net calorific value (energy content) per mass or volume unit of fuel *i*;

$OXID_i$ is the oxidation factor of the fuel *i*, and the IPCC default value has been chosen;

[7] China Electric Power Yearbook 2002-2006

$EF_{CO2,i}$ is the CO_2 emission factor of the fuel *i*, in the unit of tonnes carbon dioxide per caloric, and the IPCC default value has been chosen.

There are net exports from the CCPG to other power grids, thus the imports are not taken into account.

$EF_{OM,y}$ is calculated according to the statistics information of recent 3 years (from 2003 to 2005), the data are the newest and available at the time of this PDD submission, the detailed calculation is shown in Annex 3.

Step 2: Calculate the Build Margin emission factor ($EF_{BM,y}$)
According to the baseline methodology ACM0002, the Build Margin emission factor ($EF_{BM,y}$) is calculated by utilizing an *ex-ante* 3 years data vintage for CCPG, the formula is as follows:

$$EF_{BM,y} = \frac{\sum_{i,m} F_{i,m,y} \cdot COEF_{i,m}}{\sum_{m} GEN_{m,y}} \qquad (4)$$

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

There are 2 method options provided in the methodology to calculate $EF_{BM,y}$:
Option 1, Calculate the Build Margin emission factor $EF_{BM,y}$ *ex-ante* based on the information available of recent 3 years at the time of the 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.

The method option 1 is used to calculate $EF_{BM,y}$ *ex-ante* in this project, the monitoring and updating ex-post isn't necessary. The calculation uses the alternative permitted by CDM EB due to the availability of the data. The first step of the calculation is to evaluate all the new-added installed capacity and the composition of the various power generation technologies in grids; and the next step is to calculate the weights of the new-added installed capacities with various technologies; the last step is to calculate the emission factor with the optimal efficiency of various commercialized technologies.

Due to the difficulty of separating the coal-fired, gas-fired or oil-fired installed capacity from the whole fossil fuel fired installed capacity, according to the approved deviation[8] by CDM Executive Board, the $EF_{BM,y}$ could be obtained by:
1) Based on the most recent years' data on the energy balance sheet of the CCPG, work out the weights of CO_2 emissions from the coal-fired, oil-fired and gas-fired power plants in the total fuel-fired CO_2 emissions;

2) Based on the optimized commercial technologies which applied by the coal-fired, oil-fired and gas-fired power plants, calculate the fuel-fired emission factor of the CCPG;

3) Work out the $EF_{BM,y}$ through the fuel-fired emission factor times the weight of the fuel-fired installed capacity over the 20 percent of the capacity additions in CCPG.

The specific steps and formulas are as follows:

[8] EB approved deviation for Methodologies AM0005 and AMS-I.D on 7 October 2005.

(1) Calculate the percentages of CO_2 emissions from the coal-fired, gas-fired and oil-fired power plants in the total fuel-fired CO_2 emissions:

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

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

$$\lambda_{Gas} = \frac{\sum_{i \in GAS,j} F_{i,j,y} \times COEF_{i,j}}{\sum_{i,j} F_{i,j,y} \times COEF_{i,j}} \qquad (5)$$

Where:

λ_{Gas}, λ_{Oil} and λ_{Coal} are respectively the percentages of CO_2 emissions from the gas-fired, oil-fired, coal-fired power plants in the total fuel-fired CO_2 emissions;

$F_{i,j,y}$ is the quantity of fuel *i* consumed by the power sources *j* in year *y*, by mass or volume unit;

$COEF_{i,y}$ is the CO_2 emission coefficient (tCO_2 per mass or volume unit) of fuel *i*, taking into account the carbon content of the fuels used by the grid and the oxidation coefficient of the fuel in year *y*.

(2) Calculate the fuel-fired emission factor of thermal plants ($EF_{Thermal}$):

$$EF_{Thermal} = \lambda_{coal} \times EF_{coal,adv} + \lambda_{oil} \times EF_{oil,adv} + \lambda_{gasl} \times EF_{gas,adv} \qquad (6)$$

Where:

$EF_{Thermal}$ is the fuel-fired emission factor;

$EF_{Coal,\ Adv}$, $EF_{Oil,\ Adv}$ and $EF_{Gas,\ Adv}$ are respectively corresponding to the emission factors of coal, oil and gas, which have been adopted in optimized commercial technologies.

(3) Calculate the Build Margin (BM) emission factor of the grid ($EF_{BM,y}$):

$$EF_{BM,y} = \frac{CAP_{Thermal}}{CAP_{Total}} \times EF_{Thermal} \qquad (7)$$

Where:

$EF_{BM,y}$ is the Build Margin (BM) emission factor with optimized commercial technologies for year *y*;

CAP_{Total} is the sum of all the power capacity additions;

$CAP_{Thermal}$ is the fuel-fired power capacity additions;

$EF_{Thermal}$ is the fuel-fired emission factor.

Step 3: Calculate the baseline emission factor (EF_y)

According to the baseline methodology, the factor EF_y is calculated as the weighted average of the Operating Margin emission factor ($EF_{OM,\ y}$) and the Build Margin emission factor ($EF_{BM,\ y}$):

$$EF_y = w_{OM} \cdot EF_{OM,y} + w_{BM} \cdot EF_{BM,y} \qquad (8)$$

Where:

The weights w_{OM} and w_{BM}, by default, are both 50% (i.e., $w_{OM}= w_{BM}= 0.5$), $EF_{OM,y}$ and $EF_{BM,y}$ are calculated as described in Steps 1 and 2 above and are expressed in tCO_2/MWh.

Leakage

There is neither energy generating equipment transfer from another activity nor existing equipment transfer to another activity exists in the project. Therefore, as the methodology set, it is not needed to consider leakage of the project. And thus L_y=0. (9)

Emission Reductions
The annual emission reduction ER_y by the project activity during a given year *y* is the difference between the baseline emission BE_y, the project emission PE_y, and the emissions due to leakage L_y, calculated as follows:

$$ER_y = BE_y - PE_y - L_y \qquad (10)$$

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

>>

Data / Parameter:	NCV_i
Data unit:	kJ/t or kJ/m^3
Description:	The net calorific value (energy content) per mass or volume unit of fuel *i*
Source of data used:	*The China Energy Statistical Yearbook 2005*, Page 365, *General Code Comprehensive Energy Consumption Calculation* (GB2589-81)
Value applied:	See Annex 3 for details.
Justification of the choice of data or description of measurement methods and procedures actually applied :	Data used are from Chinese authorities.
Any comment:	/

Data / Parameter:	$OXID_i$
Data unit:	%
Description:	Oxidation rate of the fuel *i*
Source of data used:	*Revised 2006 IPCC Guidelines for National Greenhouse Gas Inventories*
Value applied:	See Annex 3 for details.
Justification of the choice of data or description of measurement methods and procedures actually applied :	No specific local value available, adopt the IPCC default value.
Any comment:	/

Data / Parameter:	$F_{i,j,y}$
Data unit:	10^4 t, 10^8 m^3
Description:	The quantity of fuel *i* (in a mass or volume unit) consumed by the relevant power sources j in year(s) *y*
Source of data used:	*the China Energy Statistical Yearbook 2004-2006*
Value applied:	See Annex 3 for details.
Justification of the choice of data or	Data are collected from the published official statistics.

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

Data / Parameter:	*PR_y*
Data unit:	%
Description:	The internal power consumption of power plants in year(s) *y*
Source of data used:	*The China Electric Power Yearbook 2002-2006*
Value applied:	See Annex 3 for details.
Justification of the choice of data or description of measurement methods and procedures actually applied :	Data used are from Chinese authorities.
Any comment:	/

Data / Parameter:	*$EF_{CO2, i}$*
Data unit:	tC/TJ
Description:	The CO_2 emission factor per unit of fuel i
Source of data used:	*Revised 2006 IPCC Guidelines for National Greenhouse Gas Inventories*
Value applied:	See Annex 3 for details.
Justification of the choice of data or description of measurement methods and procedures actually applied :	No specific local value available, adopt the IPCC default value.
Any comment:	/

Data / Parameter:	*$GEN_{j, y}$*
Data unit:	MWh
Description:	The electricity quantity generated to the power grid
Source of data used:	"The China Electric Power Yearbook 2002-2006"
Value applied:	See Annex 3 for details.
Justification of the choice of data or description of measurement methods and procedures actually applied :	Data are collected from the published official statistics.
Any comment:	/

Data / Parameter:	*$GENE_{best,coal,}$*
Data unit:	/
Description:	the efficiency of generating electricity by the optimized

	commercial coal-fired plants
Source of data used:	*the bulletin on the baseline emission factor of China district power grids,* published by the office of National Coordination Committee on Climate Change, 9th August 2007
Value applied:	35.82%
Justification of the choice of data or description of measurement methods and procedures actually applied :	The Country-specific value.
Any comment:	/

Data / Parameter:	$GENE_{best,oil/gas}$
Data unit:	/
Description:	the efficiency of generating electricity by the optimized commercial oil-fired and gas-fired plants
Source of data used:	*the bulletin on the baseline emission factor of China district power grids,* published by the office of National Coordination Committee on Climate Change, 9th August 2007
Value applied:	47.67%
Justification of the choice of data or description of measurement methods and procedures actually applied :	The Country-specific value.
Any comment:	/

Data / Parameter:	$CAP_{j,y}$
Data unit:	MW
Description:	Installed capacities of hydropower and fuel-fired power of the CCPG during 2001-2005
Source of data used:	*the China Electric Power Yearbook 2002-2006*
Value applied:	See Annex 3 for details.
Justification of the choice of data or description of measurement methods and procedures actually applied :	The data has been applied in calculating the district grids' emission factors, as *the bulletin on the baseline emission factor of China district power grids,* published by the office of National Coordination Committee on Climate Change, 9th August 2007. Therefore, it is country-specific value.
Any comment:	Used in calculating BM.

B.6.3 Ex-ante calculation of emission reductions:

>>

Project emission

According to the baseline methodology ACM0002, the project is of diversion type hydropower project without building reservoir. Therefore, there is no need to consider project emissions, that is:

$$PE_y = 0.$$

Baseline emission

As the discussion in Section B 6.1, the baseline emission factor i.e. the Combined Margin emission factor will be calculated as the average of EF_{OM} and EF_{BM}. For CCPG, the Baseline Emission Factor is calculated in Annex 3 of PDD, and is given as follows:

Table 9 Calculating result of baseline emission factor of CCPG

EF_{OM} (tCO_2e/MWh)	EF_{BM} (tCO_2e/MWh)	EF_y (tCO_2e/MWh)
1.2899	0.6592	0.97455

According to the formula (1) in section B.6.1, the annual baseline emission (BE_y) of the project is calculated as follow:

$$BE_y = EG_y \cdot EF_y = 41{,}024 \text{ MWh} \times 0.97455 \text{ tCO}_2\text{e /MWh} = 39{,}980 \text{ tCO}_2 \text{ e /yr}$$

Leakage

As mentioned in Section B.6.1, $L_y = 0$

Emission Reductions

According to the formula (9) in section B.6.1, the annual emission reductions (ER_y) of the project is calculated as follow:

$$ER_y \text{ (tCO}_2\text{e/yr)} = 39{,}980 - 0 - 0 = 39{,}980 \text{ t CO}_2 \text{ e/yr}$$

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

>>

The estimated project emission reductions in the first crediting period are listed in Table 10:

Table 10 . The ex-ante estimation of emission reductions

Year	Estimation of project activity emissions (tonnes of CO_2e)	Estimation of baseline emissions (tonnes of CO_2e)	Estimation of leakage (tonnes of CO_2e)	Estimation of overall emission reductions (tonnes of CO_2e)
2008.10 — 2009.9	0	39,980	0	39,980
2009.10 — 2010.9	0	39,980	0	39,980
2010.10 — 2011.9	0	39,980	0	39,980
2011.10 — 2012.9	0	39,980	0	39,980
2012.10 — 2013.9	0	39,980	0	39,980
2013.10 — 2014.9	0	39,980	0	39,980
2014.10 — 2015.9	0	39,980	0	39,980
Total estimated reduction (tonnes of CO_2e)	0	279,860	0	279,860
Number of crediting years		7 years		
Annual average emission reduction (t CO_2e)		39,980		

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

>>

B.7.1 Data and parameters monitored:

>>

Data / Parameter:	EG_y
Data unit:	MWh
Description:	Net electricity supply to CCPG
Source of data to be used:	Measured on-site and checked with electricity sales receipts provided by local Grids Company.
Value of data applied for the purpose of calculating expected emission reductions in section B.6	41,024
Description of measurement methods and procedures to be applied:	1. Continuously monitor and record the data by ammeters, and the ammeters should be installed at the transformers' and generators' exit, powerhouse consumption entrances, and also monitored artificially once each day. 2. The net electricity supply to the CCPG will be measured continuously and automatically by ammeter and read once every month in the transformer substation by staff.
QA/QC procedures to be applied:	1. The power station's monitor records should be identical with the sales records; 2. The percentage of monitoring data is 100%; 3. The written and electric recorded data should be saved; 4. The saving period lasts two years after the vintage; 5. The ammeter should be examined by a qualified institution once every year; 6. The data should be recorded by ammeter with 0.5s precise degree.
Any comment:	This data would be important in evaluating the emission reductions.

B.7.2 Description of the monitoring plan:

>>

The aim of our monitoring plan is to make sure that the emission reductions be monitored and evaluated during vintage are completed, consistent, clear and precise. The details of plan are summarized as follows:

1. Monitoring subject

The primary data monitored is the net electricity supply to CCPG.

2. Processing and managing structure

In order to insure the monitor plan work effectively and efficiently, the project owner established the processing and managing structure as shown in Figure 2, which identified the relative staffs and institution for data collection and preservation.

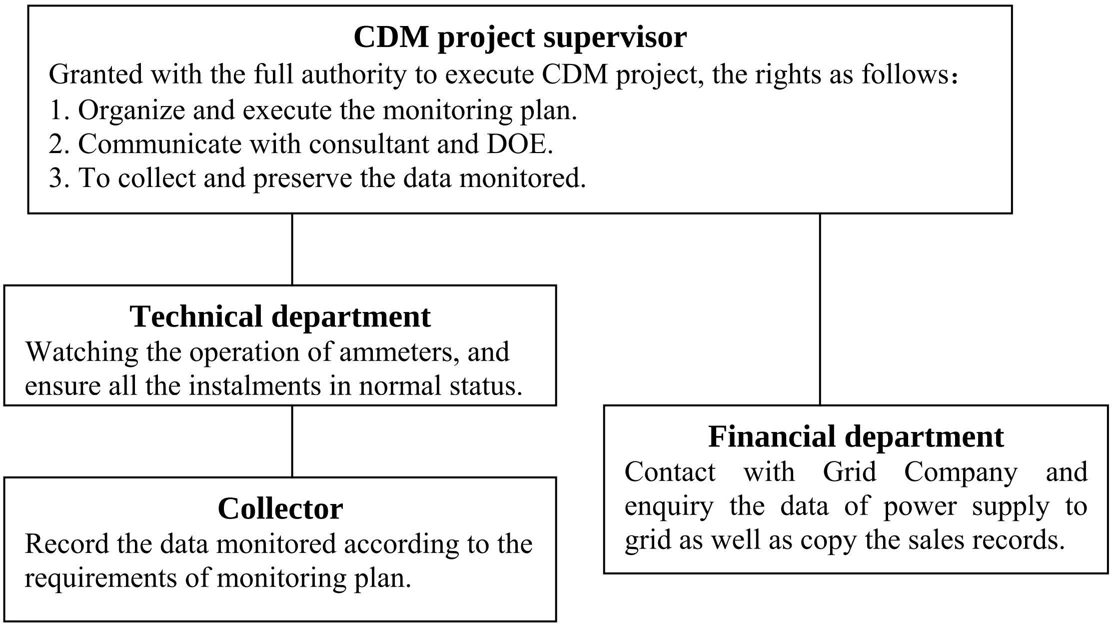

Fig 2 monitoring structure and positions' responsibilities

3. Monitoring apparatus and instalment

The ammeters will be configured as the technology requirements of "Management Regulations for Power Energy Metered Device Technology" (DL/T448-2000) or later version regulations or other national industrial standards. The ammeters should be examined and approved by a qualified institution.

The settlement ammeter is installed in the transformer substation, and measures the net power supply to grids when it operates in normal status. When the settlement ammeter is abnormal, project owner could estimate the net power supply by ammeters' records of generators' exits, powerhouse consumption entrances, and transformers' exits. All the data could be sampled, transmitted, and recorded by central computer system of power plant.

The monitoring apparatus are installed as the demonstration chart of monitoring apparatus and instalment system as following figure 3:

(Appendix:
A represents ammeter at the exit of generators，
B represents ammeter for captive electricity consumption，
C represents ammeter monitoring the net electricity supplied to grids, and is installed by the grid company)

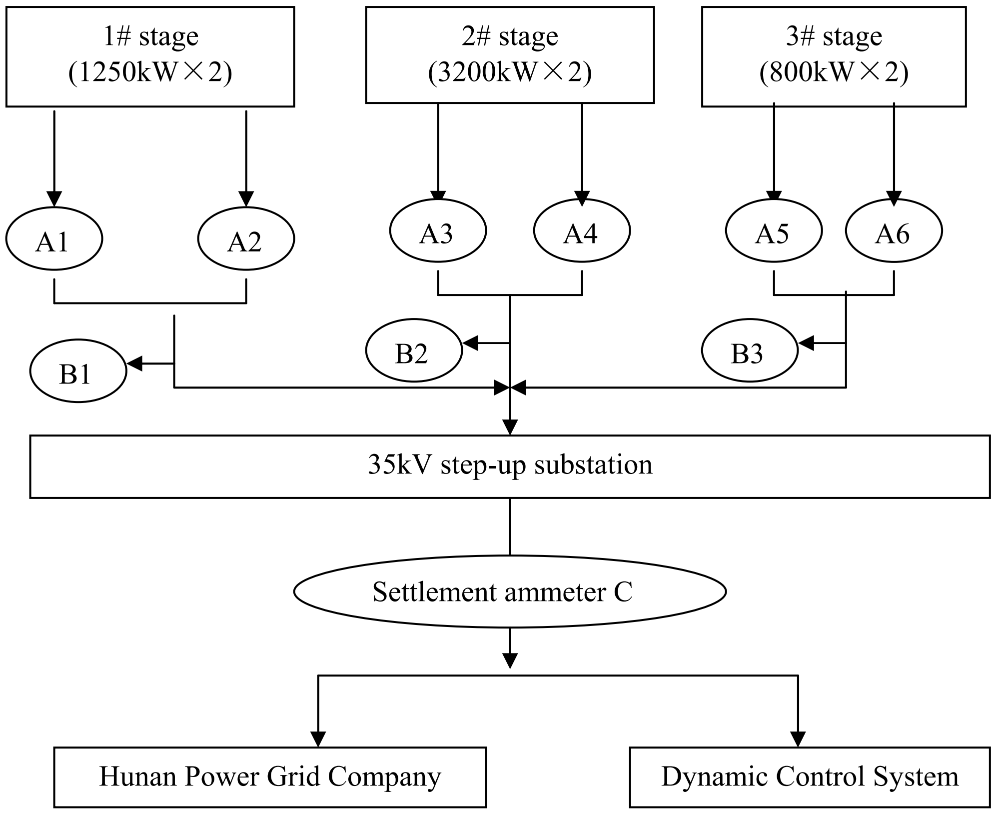

Fig 3 demonstration chart of monitoring system

4. Data monitoring

All apparatus should be kept in normal status, and the procedure of data monitoring follows the steps as:

(1) The operation teams record the readings of ammeters installed in power plant everyday;

(2) The designated persons from grids company and project owner record the readings of master ammeter installed in substation, which displays the net electricity supply to the grids.

(3) The project owner filling a settling accounts sheet according to the readings, and send it to the grids company; when the accounts sheet be approved by the grids company, project owner will bring the approved sheet to local Taxation Department to apply for power sales Value-add Tax (VAT) invoices.

(4) The project owner provides the grids company with the invoices and preserves the copies of the invoices.

(5) The project owner provides DOE verifiers with the readings record and copies of power sales invoices.

The principle of the serial processes is to guarantee the DOE officers could obtain the actual ammeter readings.

5. Quality control

1) Calibration of ammeters

The calibration of meters conducted by qualified institution at least once a year to ensure the accuracy, as must comply with national standards and industrial regulations. The ammeters must be pasted with seal after calibration. The calibration records must be archived together with other monitoring records.

When the following situations occurred, the corresponding ammeter should be tested by a qualified organization:
(1) The master ammeter readings beyond the allowable error.
(2) The ammeters have any malfunction or are replaced.

2) Emergency treatment
If any errors are detected, the party owns the meters shall repair, recalibrate or replace the ammeter; and give the other party sufficient notice to allow a representative to attend during any calibration activity. After handling of the emergency, the project owner must prepare a report regarding the emergency to explain to DOE that the handling method is reasonable.

6. Data management
All monitoring data and records will be archived in electronic document and paper document. The electronic documents will be backed up. The project owner shall both keep the sales records and prepare a monitoring report in each crediting year, which includes the net electricity supply to grids, the calibration records, the emission reductions calculation process and ammeters' corrective action records. All the electronic and paper documents will be archived through the crediting period and two years after.

7. Training program
The project owner will entrust the professional engineers and experts to train all the relative staffs before operation of generators. The training contains CDM knowledge, operational regulations, quality control (QC) standard flow, data monitoring requirements and data management regulations etc.

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

>>

Final Date of completion of the application of the baseline and monitoring methodology
30/07/2008

Name of person/entity of completion of the application of the baseline and monitoring methodology
Name: Feng LI
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Above individuals / entities determined the baseline are not as project participants.

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:

>>
02/03/2006 (reach the main equipments purchase agreement)

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

>>
20 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:

>>
01/10/2008 or the date of registration, which ever occurs later

C.2.1.2. Length of the first crediting period:

>>
7 years

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

>>
Not applicable

C.2.2.2. Length:

>>
Not applicable

SECTION D. Environmental impacts

>>

D.1. If required by the host Party, documentation on the analysis of the environmental impacts of the project activity:

>>

In April 2005, the project owner committed Shaoyang Environment Protection Institute to do the investigation and compile Environment Impact Assessment (EIA). The conclusion of the report is: The positive impacts will mainly take effects after the construction to be completed, and the effects would be significant, in long-term, and in depth; while the negative impacts will mainly occurred during the construction procedures, the impacts will be slight and in short-term. Most of the negative impacts could be minimized or remedied through the appropriate measures. Therefore, as the above conclusion, the project is feasible in environmental impacts aspects. The project's Environmental Impact Assessment report (EIA) has been approved by the Environmental Protection Bureau of Dongkou county at April 30th 2005 in the article of *Donghuanpinghan [2005] 06*.

Further more, the environmental impacts brought by the project and the remediation measures concluded in the EIA report are summarized as follows:
1. The natural environment around project site is well preserved, which owns high coverage rate of forest, and there is no phenomenon of soil washed out by water; there is no rare animals or plants list in the national protection name list exists near the reservoir area; and no historic memorable site in this area.

2. The EIA analysis in construction process shows that: The waste water caused by making concrete would be widely distributed, and uneasy to be collected. The main pollutant is inorganic dust, which is virulence and drained in low density, thus the impacts of the concrete dust to the water environment are limited. The project owner decided to remedy the impacts through environmental compensation mechanism, the waste water drained over the limitation will be paid with treatment fees for waste water.

3. The EIA analysis in operational process shows that: The construction of the project will change the former landform and physiognomy, as well as the terrene composition; some of the woods and grasses will be removed, and it is negative to preserve the water and soil. When the reservoir is completed, the water flow in the reservoir would be much more stable than nowadays; thus it is more likely to let the dust and nutrients to deposit on the river bed of the reservoir. When the project is finished, there would be a length of polluted river exists when the waterfall is washing out the sands deposited at the foot of the dam. At that moment, the nutrient and the organic deposited in the sands will come back into the water. The EIA compiler recognize the impacts won't be occurred as usual, and thus won't cause significant negative influences to the water environment, but ask the project owner to take sufficient measures to preserve water and soil resources.

4. The EIA recognizes that the project is of small scale hydropower project, won't cause any emissions, and the environment impacts are limited in the project site, no trans-boundary environmental impacts will be brought by the project.

In additional, the EIA report gave some suggestions as:
1. The soils and rocks waste produced in the construction work should be arranged appropriately, the places should be cleared after the construction, and recover, as well as compensate the damages after all the work.

2. The project should take engineering measures and planting measures to preserve the water and soil on the project site and the other sites to be directly impacted. Meanwhile the project owner decided to plant

trees and grasses in other places to release the impacts on environment.

3. Be ware of the importance of keep workers' health during project construction. And deal with the accidental emergencies properly and in time. The working time of each staff should be controlled in some extent, and workers must be kept in security.

4. There is no resettlement caused by the project, and the impact to agriculture activity is brought by land submerging. The project will compensate submerged land owners according to The Compensation Standards [9], and the local government will supervise each compensation measures. Meanwhile, the project owner should avoid the forest destruction through serial water and soil prevention measures.

5. Making plan for flooding prevention of reservoir, and ensure the security of power plants in flooding season. And the Shuanglongqiao dam should control and guarantee a certain amount of water flow to balance the ecological environment.

The project owner put great efforts on taking measures according to the impacts evaluation of project and suggestions given by Environmental Protection Administration (EPA) of Local government. When project construction works are all finished, the EPA will review the project, and issue permission to the project owner.

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

>>

The conclusion statement in EIA approval given by Environmental Protection Bureau of Dongkou County is translated as: On the basis of the analysis conclusion of EIA report, agree with the construction plan of Shuanglongqiao, Shuangjiangqiao, Hebaotang in Changtanghe River in principle.

Therefore, we conclude that the host party and the project participant consider that the project has no significant environmental impact.

[9] Specifications on Land requisition and resettlement design for construction of water resources and hydropower project, SL290-2003, 29th Sep. 2003

SECTION E. Stakeholders' comments

>>

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

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In order to collect the stakeholders' opinions from the local inhabitants, the project owner carried out a questionnaire interview at September 8th 2006. To inform the inhabitants living around the project site, the project owner paste notices on the walls of government buildings, country hospital, and country preliminary school in 2 weeks before the investigation activity date. The interviewed stakeholders include local peasants, representatives of social organizations, staffs in hydraulic system, government and administration officials etc., and 63.3% of them are male, 36.7% are female. The local peasants and local representatives of social organizations have taken up 67%, and the age of interviewees range from 30 to 65 years old.

To collect the stakeholders' comments, 30 copies of questionnaire were distributed, among them, 30 effective copies were recovered. The questions included in are listed as follow:

1. Do you believe the project will support the local economy development?
2. Do you support the project construction and why?
3. What about the impact brought by the noise and dust caused by the project to local people?
4. Do you think the project will cause negative impact to the hydrophily and terricolous lives?
5. Do you think the project will cause negative impact to the drinking water and ecology needs water of down reaches?
6. Do you think the project will cause any impact to the natural sight?
7. Do you think the project will cause any impact to the local people's health conditions?
8. What is the environmental impact caused by the project?
9. Any comments and suggestions on avoiding or reducing the negative impacts?

The comments and suggestions received are summarized in E.2 part.

E.2. Summary of the comments received:

>>

The summarized results of distributed questionnaire are:

100% of interviewees agree and support the Project;

100% of interviewees believe the project would have pushing effect on stimulating the local economical growth;

87% of interviewees think the noise and dust caused in the project construction will not bring serious negative impacts on the local residents' life, the rest have no tendency on this question;

90% of interviewees believe that there is no exiguous hydrophily and terricolous lives exist in the brook, the rest have no tendency on this question;

83% of interviewees believe the project won't cause obvious negative impacts on the drinking water and ecology environment in project surroundings, the rest don't have any comments;

77% of interviewees believe the project will not bring negative impact to the natural sight of local environment, and the rest think the effects brought by proposed project are neutral to the local sight;

97% of interviewees believe there is no negative impact to local people's health conditions, and the rest hold neutral opinions or have no idea;

60％of interviewees think the project would have serials of positive impact to local environment, no one think the project will cause negative impact.

27% of stakeholders expressed their comments and suggestions in words, these are summarized as follow:

1. Suggest that the soils and rocks waste produced in the construction work should be arranged in appropriate site, the places should be cleared after the construction,
2. Hope the project can supply clean and cheap electricity to local people.
3. Hope more work opportunities can be provided to local people.
4. Hope the project owner can finish the project construction and commence the operation earlier.

Generally speaking, most of interviewees thought that the project would have small impact on the environment and most of the stakeholders interviewed express their full support to the construction of the project and expected the project will be accomplished as soon as possible.

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

>>

The project owner visited many residents during investigation process, and collected the questionnaires to sum the results. The project owner highly respected the comments and suggestions from residents and government officers, and made a surely reply as:

1. The electricity generated should be supply to Dongkou county grids with price discounts, to mitigate the shortage situations of local electricity power consumption, and make local inhabitants' life be convenient, incentive the regional economic development and improve it to be more competitive.

2. The solid waste like rocks and soils should be put temporarily in certain places during construction process, and then utilized to build roads. At the same time of project construction, the project headquarter plan to build concrete roads to link with project site, local villages, and No.320 national highways. These above are surely about to make the local traffic situation be much more convenient for residents and project construction.

3. The project should take engineering measures and planting measures to preserve the water and soil on the project site and the other sites to be directly impacted. Meanwhile the project owner decided to plant trees and grasses in other places to release the impacts on environment.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Project Owner

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Annex 2

INFORMATION REGARDING PUBLIC FUNDING

No public funding from parties included in UNFCCC Annex I is available to the project activity

Annex 3

BASELINE INFORMATION[8]

The installed capacity, fuel consumption data used for OM and BM calculation is derived from <China Energy Statistical Yearbook>, <China Electric Power Yearbook>.
The low calorific value, CO_2 emission factor and oxidation factor of fuels are listed in Table A1 below.

Table A1 Low calorific values, CO_2 emission factors and oxidation factors of fuels

Fuel	Low Calorific Value	Emission Factor (tC/TJ)	Oxidation Factor
Raw Coal	20908 kJ/kg	25.8	100%
Cleaned Coal	26344 kJ/kg	25.8	100%
Other Washed Coal	8363 kJ/kg	25.8	100%
Coke	28435 kJ/kg	25.8	100%
Crude Oil	41816 kJ/kg	20.0	100%
Gasoline	43070 kJ/kg	18.9	100%
Diesel Oil	42652 kJ/kg	20.2	100%
Fuel Oil	41816 kJ/kg	21.1	100%
Natural Gas	38931 kJ/m^3	15.3	100%
Coke Oven Gas	16726 kJ/m^3	12.1	100%
Other Gas	5227 kJ/m^3	12.1	100%
LPG	50179 kJ/kg	17.2	100%
Refinery Dry Gas	46055 kJ/kg	18.2	100%

Data Source:
The net calorific values are quoted from <China Energy Statistical Yearbook 2006>, Page 287.

The emission factors and oxidation factors are quoted from <Revised 2006 IPCC Guidelines for National Greenhouse Gas Inventories >, Table 1.4, Page 1.24, Chapter 1, Volume 2.

[8] Chinese DNA's Guideline of emission factors of Chinese grid

Step 1: Calculating the Operating Margin emission factor ($EF_{OM,y}$)

Table A2 Simple OM Emission Factors Calculation of CCPG for Year 2003

Fuel	Unit	Jiangxi	Henan	Hubei	Hunan	Chongqing	Sichuan	Total	EF	Oxidation	Average Low Calorific Value	CO_2 Emission (tCO_2e)
									(tC/TJ)	(%)	(MJ/t,km^3)	K=G*H*I*J*44 /12/10000 (for mass unit)
		A	B	C	D	E	F	G=A+B+ C+D+E+F	H	I	J	K=G*H*I*J*44 /12 /1000 (for volume unit)
Raw Coal	10^4 t	1427.41	5504.94	2072.44	1646.47	769.47	2430.93	13851.66	25.8	100	20908	273971539.89
Cleaned Coal	10^4 t							0	25.8	100	26344	0
Other Washed Coal	10^4 t	2.03	39.63			106.12		147.78	25.8	100	8363	1169146.40
Coke	10^4 t				1.22			1.22	25.8	100	28435	32817.40
Coke Oven Gas	10^8 m^3			0.93				0.93	12.1	100	16726	69013.15
Other Gas	10^8 m^3							0	12.1	100	5227	0
Crude Oil	10^4 t		0.5	0.24			1.2	1.94	20	100	41816	59490.23
Diesel Oil	10^4 t	0.52	2.54	0.69	1.21	0.77		5.73	20.2	100	42652	181015.94
Fuel Oil	10^4 t	0.42	0.25	2.17	0.54	0.28	1.2	4.86	21.1	100	41816	157229.00
LPG	10^4 t							0	17.2	100	50179	0
Refinery Dry Gas	10^4 t	1.76	6.53		0.66			8.95	18.2	100	46055	275069.63
Natural Gas	10^8 m^3					0.04	2.2	2.24	15.3	100	38931	489222.52
											Total	**276404544.15**

Data Source: <China Energy Statistical Yearbook 2004>

Table A3 Fuel-fired Electricity Generation of CCPG for Year 2003

Province	Electricity Generation	Electricity Generation	Auxiliary Power Ratio	Supplied Electricity
	(10^8 kWh)	**(MWh)**	**(%)**	**(MWh)**
Jiangxi	271.65	27165000	6.43	25418291
Henan	955.18	95518000	7.68	88182218
Hubei	395.32	39532000	3.81	38025831
Hunan	295.01	29501000	4.58	28149854
Chongqing	163.41	16341000	8.97	14875212
Sichuan	327.82	32782000	4.41	31336314
Total				225987719

Data Source: <China Electric Power Yearbook 2004>

According to Table A2, the total CO_2 emissions of CCPG is **276404544.15** tCO_2e in year 2003. According to Table A3, the total supplied electricity of CCPG is 225987719.2 MWh. According to formula (2) in section B.6.1, the $EF_{OM, Simple, 2003}$ is 1.223095 tCO_2e/MWh.

Table A4 Simple OM Emission Factors Calculation of CCPG for Year 2004

Fuel	Unit	Jiangxi	Henan	Hubei	Hunan	Chongqing	Sichuan	Total	EF	Oxidation	Average Low Calorific Value	CO_2 Emission (tCO_2e)
									(tC/TJ)	(%)	(MJ/t,km^3)	K=G*H*I*J* 44/12/10000 (for mass unit)
		A	B	C	D	E	F	G=A+B+ C+D+E+F	H	I	J	K=G*H*I*J*4 4/12 /1000 (for volume unit)
Raw Coal	10^4 t	1863.8	6948.5	2510.5	2197.9	875.5	2747.9	17144.1	25.8	100	20908	339092605.29
Cleaned Coal	10^4 t		2.34					2.34	25.8	100	26344	58316.13
Other Washed Coal	10^4 t	48.93	104.22			89.72		242.87	25.8	100	8363	1921441.23
Coke	10^4 t		109.61					109.61	25.8	100	28435	2948455.29
Coke Oven Gas	10^8 m^3			1.68		0.34		2.02	12.1	100	16726	149899.53
Other Gas	10^8 m^3					2.61		2.61	12.1	100	5227	60527.09
Crude Oil	10^4 t		0.86	0.22				1.08	20	100	41816	33118.27
Gasoline	10^4 t		0.06			0.01		0.07	20.2	100	43070	2089.33
Diesel Oil	10^4 t	0.02	3.86	1.7	1.72	1.14		8.44	21.1	100	42652	266627.32
Fuel Oil	10^4 t	1.09	0.19	9.55	1.38	0.48	1.68	14.37	17.2	100	41816	464893.14
LPG	10^4 t							0	15.7	100	50179	0
Refinery Dry Gas	10^4 t	3.52	2.27					5.79	18.2	100	46055	177950.07
Natural Gas	10^8 m^3						2.27	2.27	25.8	100	38931	495774.61
											Total	**345671697.30**

Data Source: <China Energy Statistical Yearbook 2005>

Table A5 Fuel-fired Electricity Generation of CCPG for Year 2004

Province	Electricity Generation	Electricity Generation	Auxiliary Power Ratio	Supplied Electricity
	(10^8 kWh)	(MWh)	(%)	(MWh)
Jiangxi	301.27	30127000	7.04	28006059
Henan	1093.52	109352000	8.19	100396071
Hubei	430.34	43034000	6.58	40202363
Hunan	371.86	37186000	7.47	34408206
Chongqing	165.2	16520000	11.06	14692888
Sichuan	346.27	34627000	9.41	31368599
Total				249074186

Data Source: <China Electric Power Yearbook 2005>

According to Table A4, the total CO_2 emissions of CCPG is 346035809.73 tCO_2e in year 2004. According to Table A5, the total supplied electricity of CCPG is 249074186 MWh. According to formula (2) in section B.6.1, the $EF_{OM, Simple, 2004}$ is 1.3878 tCO_2e/MWh.

Table A6 Simple OM Emission Factors Calculation of CCPG for Year 2005

Fuel	Unit	Jiangxi	Henan	Hubei	Hunan	Chongqing	Sichuan	Total	EF	Oxidation	Average Low Calorific Value	CO_2 Emission (tCO_2e)
									(tC/TJ)	(%)	($MJ/t,km^3$)	K=G*H*I*J*44 /12/10000 (for mass unit)
		A	B	C	D	E	F	G=A+B+ C+D+E+F	H	I	J	K=G*H*I*J *44/12/1000 (for volume unit)
Raw Coal	10^4 t	1869.29	7638.87	2732.15	1712.27	875.4	2999.77	17827.75	25.8	100	20908	352614496.76
Cleaned Coal	10^4 t	0.02	0					0.02	25.8	100	26344	498.43
Other Washed Coal	10^4 t		138.12			89.99		228.11	25.8	100	8363	1804669.00
Coke	10^4 t		25.95		105			130.95	25.8	100	28435	3522490.83
Coke Oven Gas	10^8 m^3			1.15		0.36		1.51	12.1	100	16726	112053.61
Other Gas	10^8 m^3		10.2			3.12		13.32	12.1	100	5227	308896.88
Crude Oil	10^4 t		0.82	0.36				1.18	20	100	41816	36184.78
Gasoline			0.02			0.02		0.04	18.9	100	43070	1193.90
Diesel Oil	10^4 t	1.3	3.03	2.39	1.39	1.38		9.49	20.2	100	42652	299797.78
Fuel Oil	10^4 t	0.64	0.29	3.15	1.68	0.89	2.22	8.87	21.1	100	41816	286959.09
LPG	10^4 t							0	17.2	100	50179	0.00
Refinery Dry Gas	10^4 t	0.71	3.41	1.76	0.78			6.66	18.2	100	46055	204688.68
Natural Gas	10^8 m^3						3	3	15.3	100	38931	655208.73
											Total	**359887487.74**

Data Source: <China Energy Statistical Yearbook 2006>

Table A7 Fuel-fired Electricity Generation of CCPG for Year 2005

Province	Electricity Generation	Electricity Generation	Auxiliary Power Ratio	Supplied Electricity
	(10^8 kWh)	(MWh)	(%)	(MWh)
Jiangxi	300	30000000	6.48	28056000
Henan	1315.9	131590000	7.32	121957612
Hubei	477	47700000	2.51	46502730
Hunan	399	39900000	5.00	37905000
Chongqing	175.84	17584000	8.05	16168488
Sichuan	372.02	37202000	4.27	35613474.6
Total				286203304.6

Data Source: <China Electric Power Yearbook 2006>

According to Table A6, the total CO_2 emissions of CCPG is 359887487.74 tCO_2e in year 2005. According to Table A7, the total supplied electricity of CCPG is 286203304.6 MWh. According to formula (2) in section B.6.1, the $EF_{OM, Simple, 2005}$ is 1.257454 tCO_2e/MWh.

The Operating Margin (OM) emission factor is the weighted average emission factors of year 2003-2005, as follow:

$$EF_{OM} = 1.2899 \text{ tCO}_2\text{e/MWh}$$

Step 2: Calculating the Build Margin emission factor ($EF_{BM,y}$)

Sub-Step 2a: Calculating of percentages of CO_2 emissions from the coal-fired, gas-fired and oil-fired power plants in total fuel-fired CO_2 emissions

Table A8 Percentages of CO_2 emissions from the coal-fired, gas-fired and oil-fired power plants in total fuel-fired CO_2 emissions

		Jiangxi	**Henan**	**Hubei**	**Hunan**	**Chongqing**	**Sichuan**	**Total**	**Average Low Calorific Value**	**Emission Factor (tC/TJ)**	**Oxidation**	**CO_2 Emission (tCO_2e)**
Fuel	Unit	A	B	C	D	E	F	G=A+…+F	H	I	J	K=G*H*I*J*44 /12/100
Raw Coal	10^4 t	1869.29	7638.87	2732.15	1712.27	875.4	2999.77	17827.75	20908 kJ/kg	25.8	100%	352614496.76
Cleaned Coal	10^4 t	0.02	0					0.02	26344 kJ/kg	25.8	100%	498.43
Other Washed Coal	10^4 t		138.12			89.99		228.11	8363 kJ/kg	25.8	100%	1804669.00
Coke	10^4 t		25.95		105			130.95	28435 kJ/kg	29.2	100%	3986695.05
Subtotal												**358406359.24**
Crude Oil	10^4 t		0.82	0.36				1.18	41816 kJ/kg	20	100%	36184.78
Gasoline	10^4 t		0.02			0.02		0.04	43070 kJ/kg	18.9	100%	1193.90
Diesel Oil	10^4 t	1.3	3.03	2.39	1.39	1.38		9.49	42652 kJ/kg	20.2	100%	299797.78
Fuel Oil	10^4 t	0.64	0.29	3.15	1.68	0.89	2.22	8.87	41816 kJ/kg	21.1	100%	286959.09
Subtotal												**624135.55**
Natural Gas	10^7 m^3						30	30	38931 kJ/m^3	15.3	100%	655208.73
Coke Oven Gas	10^7 m^3			11.5		3.6		15.1	16726 kJ/m^3	12.1	100%	112053.61
Other Gas	10^7 m^3		102			31.2		133.2	5227 kJ/m^3	12.1	100%	308896.88
LPG	10^4 t							0	50179 kJ/kg	17.2	100%	0.00
Refinery Dry Gas	10^4 t	0.71	3.41	1.76	0.78			6.66	46055 kJ/kg	15.7	100%	176572.11
Subtotal												**1252731.33**
Total												**360283226.12**

Data Source: <China Energy Statistical Yearbook 2006>

According to Table A8 and formula (6) in section B.6.1, the percentages of CO_2 emissions from the coal-fired, oil-fired and gas-fired power plants in total fuel-fired CO_2 emissions are calculated as:

$$\lambda_{Coal} = 99.48\%,\ \lambda_{Oil} = 0.17\%,\ \lambda_{Gas} = 0.35\%$$

Sub-Step 2b: Calculating the fuel-fired emission factor ($EF_{Thermal}$)

The most advanced commercialized technologies for coal-fired power plants in China are domestic 600 MW sub-critical generators, with the standard coal consumption of power supply of 343.33 gce/kWh. For gas-fired and oil-fired power plants in China, the most advanced commercialized technologies are 200 MW combined cycle generators. The standard coal consumption (equivalent) for power supply of oil-fired and gas-fired power plants are 258 gce/kWh.

Parameters used for calculating fuel-fired emission factor are shown in Table A9 below:

Table A9 Parameters used for calculating fuel-fired emission factor

	Parameter	Efficiency of Power Suppy	Emission Factor of Fuel (tc/TJ)	Oxidation Factor	Emission Factor (tCO2/MWh)
		A	B	C	D=3.6/A/1000*B*C*44/12
Coar-fired Power Plant	$EF_{Coal,Adv}$	35.82%	25.8	100%	0.9508
Gas-fired Power Plant	$EF_{Gas,Adv}$	47.67%	15.3	100%	0.4237
Oil-fired Power Plant	$EF_{Oil,Adv}$	47.67%	21.1	100%	0.5843

According to Table A9 and formula (7) in section B.6.1, the $EF_{Thermal}$ is 0.9483 tCO_2e/MWh

Sub-Step 2c: Calculating the Build Margin (BM) emission factor ($EF_{BM,y}$)

Table A10 Installed Capacities of CCPG

Installed Capacity	**Unit**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**
Fuel-fired	MW	39864.6	42569.2	43303.2	46893.5	53744.7	60167.3
Hydro	MW	28637.8	30397	31034.7	36557	34642	38405.1
Nuclear	MW	0	0	0	0	0	0
Wind & Others	MW	0	0	0	0	0	24
Total	MW	**68502.4**	**72966.2**	**74337.9**	**83450.5**	**88386.7**	**98596.4**

Data Source: <China Electric Power Yearbook 2001-2006>

Table A11 Newly Added Installed Capacity from Year 2000-2005

	2000	**2001**	**2002**	**2003**	**2004**	**2005**	**F-C**
	A	**B**	**C**	**D**	**E**	**F**	
Fuel-fired (MW)	39864.6	42569.2	43303.2	46893.5	53744.7	60167.3	16864.1
Hydro (MW)	28637.8	30397	31034.7	36557	34642	38405.1	7370.4
Nuclear (MW)	0	0	0	0	0	0	0
Wind & Others(MW)	0	0	0	0	0	24	24
Total （MW）	68502.4	72966.2	74337.9	83450.5	88386.7	98596.4	24258.5
Percentage of newly installed capacity to 2005	30.51%	25.98%	24.59%	15.34%	10.33%	0.00%	
Percentage of newly added fuel-fired plants		69.52%					

It can be concluded from Table A11 that capacity additions from year 2002 to 2005 is closer to 20% of the total additions and it is obvious the capacity additions during year 2002 to 2005 are larger than the capacity of five plants, so year 2002 and 2005 are chosen to calculate the BM emission factor of CCPG.

According to Table A11 and formula (8) in section B.6.1, the EF_{BM} is calculated as:

$$EF_{BM} = 0.6592 \text{ tCO}_2\text{e/MWh}$$

Step 3: Calculating the baseline emission factor (EF_y)

According to formula (9) in section B.6.1, the baseline emission factor of CCPG is calculated as:

$$EF_y = 0.97455 \text{ tCO}_2\text{e/MWh}$$

The EF_y applied in this PDD is fixed for a crediting period and may be revised at the renewal of the crediting period.

Annex 4

MONITORING INFORMATION

The monitoring plan is described in Section B.7.2, and no additional information be given in this part.

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