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

CONTENTS

SECTION A. General description of small-scale project activity

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

Yunnan Jinping Dapo Hydropower Station
Ver. 5~~4~~.0
Date: 08~~2~~/09~~2~~/2008

Revision History of the PDD

Version	Date	Comments
Version 1.0	20 April 2007	Complete PDD version, prepared for the host country approval process
Version 2.0	07 June 2007	Revised draft PDD; prepared for validation
Version 3.0	05 December 2007	Revised draft PDD, prepared on the basis of corrective action requests in the Validation protocol of TUV SUD.
Version 4.0	02 February 2008	Revised draft PDD, prepared on the basis of the first response of corrective action requests in the Validation protocol of TUV SUD.
Version 5.0	08 September 2008	Revised PDD, prepared on the basis of a review request by UNFCCC

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

Summary:

Yunnan Jinping Dapo Hydropower Station (hereafter referred to as “the proposed project” or “the project”) is located in the downstream of the Laobeiye River in Jinping Miao-Yao-Dai Autonomous County, Honghe Hani-Yi Autonomous Prefecture, Yunnan Province, China.

The project is a run-of-river diversion type hydropower station. The total installed capacity is 8.2MW and the surface area at full reservoir level is 0.0064km^2 thus the power density is 1,281.25W/m^2. On the average, the project activity is expected to operate 5,135hours per year, which corresponds to an average annual generation of 42,107MWh and a net electricity supplied to the grid of 37,890MWh. The power generated by the project will be connected to the Yunnan Grid, and finally to the Southern China Grid.

Contribution to sustainable development:

The project activity contributes significantly to the region’s sustainable development in the following ways:

- In recent years, China has witnessed a huge increase in power consumption. Both public and private parties are struggling to meet the demand for electricity. The proposed hydropower project will contribute in a sustainable manner to bridging the gap between supply and demand of power on a regional and national level.

- In China, more than 80% of total electricity production is derived from coal based power plants. Being so heavily dependant on coal mine for its energy consumption, this project contributes environmental benefits to the country’s air, soil and water sources. The project activity will displace the generation of fossil fuel power plants, reducing CO_2, SO_x and NO_x emissions significantly, thus mitigating the air pollution and its adverse impacts on human health.

- The project activity promotes the growth of sustainable and renewable capacity in China and makes it less dependent on exhaustible and polluting fossil fuels.

- The project will definitely contribute to the economic development in this province by improving the local energy generation infra-structure and generating employment opportunities during both the construction and the operation period of the power plant.

The proposed hydropower project is grid-connected electricity generation from renewable sources, which will be supplied to the Southern China Grid and will replace electricity generated by thermal power plants, which are predominant in the Southern China Grid.

A.3. 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)
People's Republic of China (host)	Jinping Dazhai Power Generation Co. Ltd. (as the project owner)	No
Germany	RWE Power AG (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 small-scale project activity:

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

A.4.1.1. Host Party(ies):

The People's Republic of China

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

Yunnan Province

A.4.1.3. City/Town/Community etc:

Jinping Miao-Yao-Dai Autonomous County, Honghe Hani-Yi Autonomous Prefecture

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

The proposed project is located in the downstream of the Laobeiye River in Jinping Miao-Yao-Dai Autonomous County, Honghe Hani-Yi Autonomous Prefecture, Yunnan Province, China. It is 110km from Jinping County. The dam site is located in the middle reaches of the Laobeiye River and 3km from the powerhouse site. The exact location of the powerhouse is at the longitude of 103°23′06″～46″E and latitude of 22°52′29″～55″N. The exact location of the dam is at the longitude of 103°23′06″E and latitude of 22°52′29″N.

The Location of the project is shown in Fig. A.1:

Fig A.1 the Location of Yunnan Jinping Dapo Hydropower Station

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

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

The project activity utilizes hydropower for electricity generation, which falls into the category of renewable energy. Since the total installed capacity of the proposed project is 8.2MW, not exceeding the threshold capacity of 15MW, the project activity can be regarded as a small-scale CDM project activity. Therefore, according to small-scale CDM modalities, the project activity falls under:
Type - I Renewable Energy Projects, and
Category I-D - Renewable Electricity Generation for a Grid

Technology of the small-scale project activity

The construction of the specific project consists of barrage, diversion tunnel, pressure forebay, pressure pipe, power house and switch station. The project is a run-of-river diversion type hydropower station without regulating capacity and the total installed capacity is 8.2MW. The diversion system consists of the diversion tunnel, pressure forebay and pressure pipe. The length of the diversion tunnel is 2,701m and the length of the pressure pipe is 485.82m. The maximum height of the overflow dam is 3m and the length of the overflow dam is 20m. The project will be equipped with two generator unit with a capacity of 3.2MW and 5MW respectively, providing a total installed capacity of 8.2 MW. One unit of HLD54-WJ-82 turbine and one unit of HLA520-WJ-88 will be employed and matched with one unit of SFWE-K3200-6/1730 generator and one unit of SFW5000-6/1730 generator respectively.

The key technology parameters of the power station are showed in TableA.1

Table A.1 Technical data of the turbine/generator units

<table>
<tr><th colspan="4">The Main Technical Data</th></tr>
<tr><td rowspan="7">Turbines</td><td>Manufacture</td><td colspan="2">Sichuan Deyang Dongneng Equipment Engineering Technology Co.,ltd.</td></tr>
<tr><td>Type</td><td>HLD54-WJ-82</td><td>HLA520-WJ-88</td></tr>
<tr><td>Units</td><td>1</td><td>1</td></tr>
<tr><td>Rated power</td><td>3.2MW</td><td>5MW</td></tr>
<tr><td>Rated Rotation Speed</td><td>1000r/min</td><td>1000r/min</td></tr>
<tr><td>Rated water head</td><td>215m</td><td>215m</td></tr>
<tr><td>Rated flow rate</td><td>1.82m^3/s</td><td>2.78m^3/s</td></tr>
<tr><td rowspan="7">Generators</td><td>Manufacture</td><td colspan="2">Sichuan Deyang Dongneng Equipment Engineering Technology Co.,ltd.</td></tr>
<tr><td>Type</td><td>SFWE-K3200-6/1730</td><td>SFW5000-6/1730</td></tr>
<tr><td>Units</td><td>1</td><td>1</td></tr>
<tr><td>Rated power</td><td>3.2MW</td><td>5MW</td></tr>
<tr><td>Rated voltage</td><td>6.3kV</td><td>6.3kV</td></tr>
<tr><td>Rated rotate speed</td><td>1000r/min</td><td>1000r/min</td></tr>
<tr><td>Rated current</td><td>366.6A</td><td>572.8A</td></tr>
</table>

The power generated by the project will be connected to the Yunnan Grid, and finally to the Southern China Grid.

There is no technology transfer because all the technology employed is domestically available.

Before the project commissioning, the project owner has established a detailed training plan for the all the employees. Firstly, all the employees were trained from August 10 to September 20, 2006 in Jingfeng Hydropower Station which has been operated already. Secondly, all employees were trained five days from November 15 to 30, 2007 in Yunnan Power School and all employees have passed the training and examination. Thirdly, all the employees were trained by Sichuan Deyang Dongneng Equipment Engineering Technology Co.,Ltd from October 15, 2006 to May 17, 2007. The project owner also set a series of regulations for guaranteeing normal operating and maintenance on hydropower station. Referring to CDM monitoring, a monitoring officer will receive training on monitoring methodologies, procedures and archiving by Beijing Tianqing Power International CDM Consulting Co. Ltd. (hereinafter referred to as Tianqing). Then, the monitoring officer will train the project staff who in charge for CDM monitoring.

Table A.2 The time schedule

Date	Main event
16-7-2004	The project owner has acquired the approval of Dapo Hydropower Station 3.2MW Feasibility Study Report and the Checking and Examining Opinion on Feasible Study Report of Dapo Hdyropower Station issued by the expert group of Honghe Prefecture Development and Reform Committee. The expert group suggested that the project owners should invite the experts from Yunnan Nongdian Design Institute to carry out the consulting and investigation on the installed capacity scale targeting at using water resources efficiently and optimize investment efficiency.
21-7-2004	The project owner has acquired the approval for Dapo Hydropower Station 3.2MW Environment Impact Assessment Report by Honghe Prefecture Environment Protection Bureau.
27-7-2004	The project owner has acquired the Letter about Recommending Dapo Hydropower Station to Apply CDM Project by Jinping County Government.
3-8-2004	Finance Indexes Evaluation Report for Dapo Hydropower Station Expansion Project (8.2MW) has been finished by Yunnan Nongdian Design Institute.
10-8-2004	Due to poor IRR index and increased investment for expansion project for using water resources efficiently, the investors decided to apply for CDM to overcome barriers.
25-8-2004	The project owner asked the Development and Plan Bureau of Jinping County to support CDM application about Dapo 8.2MW project.
3-9-2004	The project owner received the support letter from Development and Plan Bureau of Jinping County about Dapo 8.2MW project.
12-10-2004	The project owner signed the cooperation agreement of Clean Development Mechanism with the Power Enterprises Association of Dehong Prefecture.
20-12-2004	The project start construction [1].
17-12-2004	The project owner has signed the purchase agreement of 3.2MW turbine and generator.
7-4-2005	The Power Enterprises Association of Dehong Prefecture consigned the Beijing Tianqing Power International CDM Consulting, Co., Ltd to complete application work of Dapo project.

[1] After acquiring the approval for 3.2MW FSR and EIA of the project, the construction has been started on December 20, 2004, and it is allowable. In addition, the approval for expansion projects have to take a long time in China, it is complying with common situation in China. Therefore, it is reasonable that the construction start date is earlier than the approval for expansion project.

18-12-2005	The project owner has signed purchase agreement of 5MW turbine and generator.
25-5-2006	Environment Impact Assessment Report (for 8.2MW) has been finished.
13-6-2006	The project owner has acquired the approval for Dapo Hydropower Station 8.2MW (3.2+5.0) Environment Impact Assessment Report by Honghe Prefecture Environment Protection Bureau.
9-2006	The Feasibility Report Study for Dapo Hydropower Station 8.2MW(3.2+5.0) has been finished by Yunnan Nongdian Design Institute.
18-12-2006	The project owner has acquired the approval of Feasibility Report Study on Dapo Hydropower Station 8.2MW (3.2+5.0) issued by Honghe Prefecture Development and Reform Committee.
12-5-2007	The first generator began to commissioning.
26-7-2007	The second generator began to commissioning.
20-7-2007	The project owner has received LOA of Chinese DNA.

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

The project activity uses the renewable crediting period (7years, renewable twice), and the estimation of the emission reductions in the first crediting period (from June 2008 to May 2015) is provided in Table A.3. Estimated Emission Reductions in the first crediting period are 223,678tCO_2e.

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

Years	Estimation of Annual emission reductions in tones of CO_2e
2008(the last 7months)	18,640
2009	31,954
2010	31,954
2011	31,954
2012	31,954
2013	31,954
2014	31,954
2015(the first 5months)	13,314
Total estimated reductions (tones of CO_2e)	223,678
Total number of crediting years	7
Annual average of the estimated reductions over the crediting period (tCO_2e)	31,954

Note: Above figures are *ex-ante* expectations of reductions, and should be changed based on *ex-post* monitoring.

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

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

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

According to Appendix C of the Simplified Modalities and Procedures for Small-Scale CDM project activities, a proposed small-scale project activity shall be deemed to be a debundled component of a large scale project activity if there is a registered small-scale CDM project activity or an application to register another small-scale CDM project activity:

- With the same project participants;
- In the same project category and technology/measure;
- Registered within the previous 2 years; And
- Whose project boundary is within 1km of the project boundary of the proposed small-scale activity at the closest point.

Besides this specific project, the project owner has not developed other similar projects. Therefore, the specific project is not a debundled component of a large scale project activity
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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:

The methodology "Simplified Modalities and Procedures for Small-Scale CDM project activities" AMS-I.D Grid connected renewable electricity generation (Version 11) will be used. The methodology can be found from:
http://cdm.unfccc.int/methodologies/SSCmethodologies/approved.html
http://cdm.unfccc.int/UserManagement/FileStorage/CDMWF_AM_UYF1PQNDY5FZ4VH4HZ28FYAP13SI9W

In conjunction with AMS-I.D, approved methodology ACM0002/Version 06, "Consolidated methodology for grid-connected electricity generation from renewable sources," will be employed.
The ACM0002 methodology can be found at:
http://cdm.unfccc.int/UserManagement/FileStorage/CDMWF_AM_BW759ID58ST5YEEV6WUCN5744MN763

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

The project activity utilizes the hydropower for electricity generation, which falls into the category of renewable energy. Since the capacity of the project is 8.2MW, not exceeding the threshold qualifying capacity of 15MW, the project activity can be regarded as a small-scale CDM project activity. The power generated is exported to the grid. Therefore, according to small-scale CDM modalities, the project activity falls under Type - I Renewable Energy Projects, and category I-D - Renewable Electricity Generation for a Grid.
The project satisfies the applicable conditions of AMS-I.D:
1. It is the hydropower station connected the Southern China Grid;
2. The capacity is 8.2MW, lower than 15MW. The installed capacity of the proposed project will remain under the limits of small-scale project activity types during every year of the crediting period.

According to small-scale CDM modalities, the project chooses the approved monitoring methodology AMS-I.D.

B.3. Description of the project boundary

According to AMS-I.D (Version 11) methodology, the project boundary encompasses the physical, geographical site of the renewable generation source.

The system boundary of the specific project is defined as the Southern China Grid, because the project power plant is connected to the Yunnan Grid via the local grid network, and finally to the Southern China Grid. The Southern China Grid is a large regional grid, which consists of four sub-grids: the Yunnan, Guangdong, Guangxi, Guizhou grids. According to the guidance for small-scale CDM projects, the Southern China Grid is the right project boundary for the proposed project activity, considering substantial inter-grid power exchange among the Southern China Grid and its sub-regional components.

In accordance with AMS-I.D (Version 11) methodology, emissions related to production, transportation and distribution of the fuel used for the power plants in the baseline are not included in the project boundary, as they do not occur at the physical and geographical site of the project.

B.4. Description of the baseline and its development:

The project power plant is connected to the Yunnan Grid via the local grid network, and thus finally to the Southern China Grid. The Southern China Grid consists of four sub-grids: the Yunnan, Guangdong, Guangxi and Guizhou grids.

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

1. The specific hydropower activity undertaken without being registered as a CDM project activity;
2. A thermal power generation plant with equivalent annual power generation;
3. Other renewable sources power generation plant with comparable annual power generation;
4. Equivalent power supplied by the Southern China Grid.

These baseline scenario options are discussed individually below, considering relevant laws and regulations, as well as investment analysis:

First scenario: The proposed hydro power activity, without being registered as a CDM project activity;

The first scenario is in compliance with Chinese relevant laws and regulations. Whether or not this scenario is a feasible alternative, it can be further judged through an investment analysis (see the Investment Barrier Analysis in B.5 below): The proposed project, with an installed capacity of 8.2MW, is located in a rural area. According to the *Chinese Economic Evaluation Code for Small Hydropower Projects*, the IRR of an electric power project in this region should not be lower than a threshold value of 10%[2]. By contrast, without CDM revenue, the IRR of the project is 8.67%. Therefore, these results and a sensitivity analysis (see B.5) show that the project faces significant economic and financial barriers without CDM revenue, and demonstrate that the first scenario is not feasible.

Second scenario: Thermal power plant with equivalent annual power generation

There is a large difference between thermal power and hydropower in their annual utilizing hours and the stability of their operation. However, an alternative fossil fuel power plant that can provide the equivalent generation capacity with an annual utilization rate of 5,988 hours[3], which was the average utilization hours of the thermal units in China in 2004, would be one with installed capacity of around 7MW. However, according to Chinese regulations, coal-fired power plants of capacity less than 135 MW are prohibited for construction in areas covered by large regional grids[4]. In addition, construction of thermal units under 100MW capacity is strictly limited by the authority[5]. Therefore, the second scenario does not comply with Chinese relevant laws and regulations, and it cannot be considered a feasible alternative.

[2]The hydropower No [1995]186 documents, The Revision of Economic Evaluation Code for Small Hydropower Project(SL16-95), by the Ministry of Water Resources of the People's Republic of China. A small hydropower project is defined as a station with installed capacity lower than 25MW and related building, revising, expansion, rebuilding of the relevant Grid. Middle scale hydropower stations with installed capacity of 50MW or lower should follow these regulations.

[3] *China Electric Power Yearbook 2005.p.18*

[4] 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.

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

Third scenario: Other renewable energy power plant with equivalent annual power generation

Other renewable energy plants have not been built in the area because of lack of relevant energy source (solar, geothermal, etc.). The cost of other renewable energy power plant with equivalent installed capacity or power generation is very high. The economic return of other renewable power plants with similar amount of capacity should be little attractiveness. The third scenario is therefore not feasible nor is it a baseline scenario.

Fourth scenario: Equivalent power supplied by the Southern China Grid.

The fourth scenario is in compliance with Chinese relevant laws and regulations, and without financial barriers. Therefore, it is a feasible baseline scenario.

Conclusion:

From the analysis above, we can conclude that the fourth scenario is the only feasible alternative scenario. As a result, the baseline scenario of the project is as follows: without the specific hydropower station, power generation will be supplied by the Southern China Grid.

The basic parameters used for calculating baseline emissions of the proposed project are provided in table B.1:

Table B.1 Basic parameters used for calculating baseline emissions

Parameters	Value	Data sources
the operating margin emission factor ($EF_{OM,y}$) of the Southern Grid （tCO_2e/MWh）	1.0119	Chinese DNA: Bulletin on Baseline Emission Factor of China's Regional Grid
the build margin emission factor($EF_{BM,y}$) of the Southern Grid（tCO_2e/MWh）	0.6748	Chinese DNA: Bulletin on Baseline Emission Factor of China's Regional Grid
Electricity supplied to grid（ EG_y , MWh）	37,890	Finance Indexes Evaluation Report on Dapo Hydropower Station Expansion Project/ Feasible Study Report

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:

According to Attachment A to Appendix B of the simplified modalities and procedures for CDM small-scale project activities, evidence to why the project is additional is offered under the following categories of barriers:

Investment Barrier Analysis

The Yunnan Nongdian Design Institute has finished the Finance Indexes Evaluation Report of Dapo Hydropower Station Expansion Project in August 2004 and has implemented a general economic analysis on the proposed project in the Finance Indexes Evaluation Report, indicating that the project was not economic attractive with low IRR. In September 2006, the Yunnan Nongdian Design Institute completed the final Feasibility Study Report of Dapo Hydropower Station Expansion Project. Since the Yunnan Nongdian Design Institute finished the two reports as Finance Indexes Evaluation Report and the final Feasibility Study Report both and the data between the two reports is the same. So we use all data in Finance Indexes Evaluation Report on Dapo Hydropower Station Expansion Project and Feasible Study

Report. In the Finance Indexes Evaluate Report of Expansion Project of Dapo Station and the final Feasibility Study Report, the IRR is 7.63%. Based on the original data in Finance Indexes Evaluate Report of Expansion Project and the final Feasibility Study Report, we calculate the IRR is 8.67%. We employ the higher IRR of 8.67% for conservative purpose.

The basic parameters used for calculating the project key financial indexes are provided in TableB.2:

Table B.2 The basic financial parameter

Parameters	Value	Source
Installed Capacity	8.2MW	Finance Indexes Evaluation Report on Dapo Hydropower Station Expansion Project/ Feasible Study Report
Annual Net Power Supplied to Grid	37,890MWh	Finance Indexes Evaluation Report on Dapo Hydropower Station Expansion Project/ Feasible Study Report
Static Total Investment (RMB)	4078.13×10^4yuan	Finance Indexes Evaluation Report on Dapo Hydropower Station Expansion Project/ Feasible Study Report
Grid Price (without VAT) (RMB)	0.18yuan/ kWh	Finance Indexes Evaluation Report on Dapo Hydropower Station Expansion Project/ Feasible Study Report
Operation Period	20 years	Finance Indexes Evaluation Report on Dapo Hydropower Station Expansion Project/ Feasible Study Report
VAT	17%	Finance Indexes Evaluation Report on Dapo Hydropower Station Expansion Project/ Feasible Study Report
Income Tax Rate	33%	Finance Indexes Evaluation Report on Dapo Hydropower Station Expansion Project/ Feasible Study Report
Annual Operating Cost (RMB)	81.46×10^4yuan	Finance Indexes Evaluation Report on Dapo Hydropower Station Expansion Project/ Feasible Study Report

The annual operating cost is calculated as table B.3. The method used for calculating annual operating cost is based on the Feasible Study Report.

Table B.3 Calculation method of Annual operating cost

	Items	Unit	Value	Data Source
A	Payroll and Welfare	Yuan RMB	21×10^4	Finance Indexes Evaluation Report on Dapo Hydropower Station Expansion Project/ Feasible Study Report
B	Cost of Overhaul	Yuan RMB	40.78×10^4	Finance Indexes Evaluation Report on Dapo Hydropower Station Expansion Project/

				Feasible Study Report
C	Other Expenses	Yuan RMB	19.68×10^4	Finance Indexes Evaluation Report on Dapo Hydropower Station Expansion Project/ Feasible Study Report
D	Annual Operating Cost	Yuan RMB	81.46×10^4	D= A+B+C

Table B.4 IRR of total investment of the project

	IRR of total investment
Without CDM revenue	8.67%
With CDM revenue	11.81%

Results summarized in Table B.4 show that the IRR of the project is 8.67% without CDM revenue. However, according to the Chinese *Economic evaluation code for small hydropower projects* (see footnote 1 above), the IRR of an electric power project's total investment in this region should not be lower than the benchmark threshold of 10%. Therefore, the project faces obvious financial barriers without CDM revenue. The same calculations indicate that CDM revenue can improve the economical attraction of the project, raising its IRR to 11.81% (8EUR/tCO_2), above the minimum investment threshold.

The tool for the demonstration and assessment of additionality further requires that a sensitivity analysis be conducted to check whether, under reasonable variations in the critical inputs, the results of the IRR analysis remain unaltered. We have used as critical assumptions:

- Static total investment
- Annual operational cost
- Grid price

Variations of ±10% have been considered for the sensitivity analysis. Table B.5 summarizes the results, while Figure B.1 provides a graphic depiction.

Table B.5 Impact of variations in critical assumptions on IRR of the project

	-10%	-5%	0%	5%	10%
Grid price	7.41%	8.05%	8.67%	9.28%	9.87%
Static total investment	9.92%	9.27%	8.67%	8.11%	7.60%
Annual operational cost	8.82%	8.74%	8.67%	8.59%	8.52%

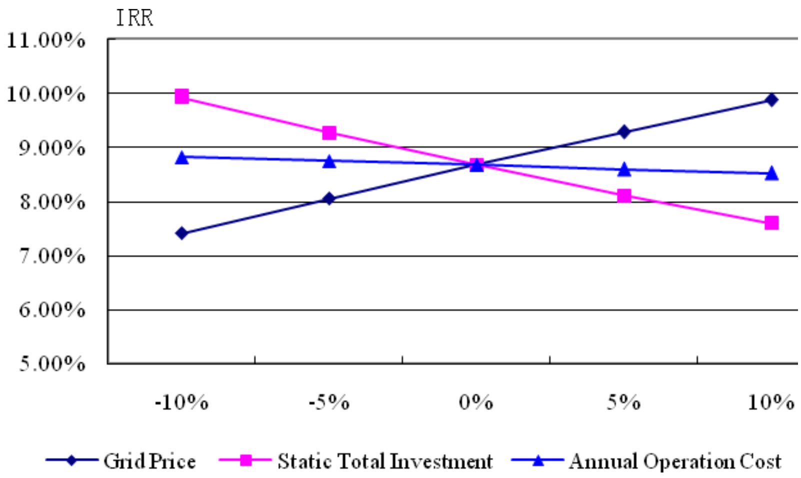


Fig B.1 the IRR Sensitivity Analysis when Static Total Investment, Annual Operation Cost or Grid Price changed

The results of the sensitivity analysis, as shown in both table and figure above, clearly indicate that even under reasonable variations in the critical assumptions the project IRR is well below the acceptable 10% threshold. Specifically, with a decrease in the static total investment by up to 10%, the IRR is 9.92%; with an increase in the grid price by up to 10%, the IRR of the project is 9.87%; and finally, with a decrease in the annual operational cost by up to 10%, the IRR only rises by 0.15%, remaining well below the 10% threshold.

Therefore, the results of the sensitivity analysis confirm that the project faces significant economic and financial barriers without CDM revenue.

Conclusion:
Without the CDM, the proposed project faces significant barrier, which would prevent its implementation without CDM incentives. If the specific project is not implemented, an equivalent amount of power would be supplied by the Southern China Grid. Hence, the proposed project activity is not the baseline scenario, and it is additional.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

The electricity generated by the project is connected to the Yunnan Grid and then to the Southern China Grid. The Southern China Grid includes the Yunnan, Guangdong, Guangxi, Guizhou grids. Therefore, the project selects for the Southern China Grid for the calculation of baseline emission factor.

According to methodology AMS-I.D., the following choices for preparing the baseline calculation can be employed:

(a) A combined margin (CM), consisting of the combination of operating margin (OM) and build margin (BM) according to the procedures prescribed in the approved methodology ACM0002. Any of the four procedures to calculate the operating margin can be chosen, but the restrictions to use the Simple OM and the Average OM calculations must be considered;

OR

(b) The weighted average emissions (in kg CO_2equ/kWh) of the current generation mix. The data of the year in which project generation occurs must be used.

The project has chosen method (a) for the baseline calculations, because the data of the year in which project generation occurs are not public available.

According to methodology AMS-I.D, the baseline emission factors will be calculated according to the procedures prescribed in the approved methodology ACM0002.

Baseline emissions

According to methodology ACM0002, baseline emissions are equal to the power delivered to the grid, multiplied by the baseline emission factor EF_y. The baseline emission factor is defined as the Combined Margin (CM): the equally weighted average of the Operating Margin (OM) emission factor ($EF_{OM,y}$) and the Build Margin (BM) emission factor ($EF_{BM,y}$).

The data used to calculate the grid emissions factor comes from reliable and publicly accessible statistics e.g. China Energy Statistic Yearbook and China Electric Power Yearbook, as well as Chinese DNA.
For more information on the published OM and BM emission factors, please refer to:
http://cdm.ccchina.gov.cn:80/english/NewsInfo.asp?NewsId=1891

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

ACM0002 (Version 06) outlines 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 per ACM0002, "Dispatch Data Analysis" should be the first methodological choice. However, the method is not selected herein, 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.

The Simple OM method has been chosen instead. This is possible because low cost/ must run resources account for less than 50% of the power generation in the grid in most recent years. From 2001 to 2005, according to gross annual power generation statistics for the Southern Grid, the ratio of power generated by hydropower and other low cost/compulsory resources was: 36.86% in 2001, 35.99% in 2002, 33.53% in 2003, 29.95% in 2004, 30.42% in 2005 respectively, significantly lower than 50%.

The simple Operating Margin (OM) emission factor ($EF_{OM,simple,y}$) is calculated as the generation-weighted average emissions per electricity unit (tCO_2/MWh) of all generating sources serving the system, not including low-operating cost and must-run power plants. A three-year average, based on the most recent fuel consumption statistics available at the time of PDD submission, is used ("ex-ante" approach).

The calculation equation of the Simple OM is as follows:

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

Where:

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

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

$COEF_{i,j}$ 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 relevant 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 relevant 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, using country specific values;

$OXID_i$ is the oxidation factor of the fuel *i*, according to default values from 2006 IPCC Guidelines for default values;

$EF_{CO_2,i}$ is the CO_2 emission factor per unit of energy of the fuel i, as per 2006 IPCC Guidelines for default values.

In addition, there is net imported power to the Southern Grid from the Central China Grid. Since it is not possible to identify the specific power plants exporting electricity from the Central China Grid to the Southern Grid, the average emission factor of the Central China Grid will be taken into account.

The Operating Margin emission factors for 2003, 2004 and 2005 are calculated separately and then the three-year average is calculated as a full-generation-weighted average of the emission factors. For details please refer to Annex 3.

The result of the Operating Margin emission factor (EF_{OM}) for the Southern Grid is **1.0119tCO_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. $EF_{OM,y}$ calculations adopt the most recent data announced by China's DNA in the *Notification on Determining the Regional Grid Emission Factors of China*, renewed on August 9, 2007

(available at http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File1358.xls)

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:

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

Where

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

$COEF_{i,m}$ 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 (coal, oil and gas) used by relevant power plants m and the percent oxidation of the fuel in year(s) y; and

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

The methodology provides the following two options:

Option 1: Calculate the Build Margin emission factor $EF_{BM,y}$ ex-ante based on the most recent information available on plants already built for sample group m at the time of PDD submission.

Option 2: For the first crediting period, the Build Margin emission factor $EF_{BM,y}$ must be updated annually ex-post for the year in which actual project generation and associated emissions reductions occur. 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 most recently. From these two options, project participants should use the 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[6] 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 - 3 years, whichever results in a capacity addition that is closest to 20% of total installed capacity.

2) Proportional weights that correlate to the distribution of installed capacity in place during the selected period above are applied, using plant efficiencies and emission factors of commercially available best

[6] 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.

practice technology in terms of efficiency. It is suggested to use the efficiency levels of the best technology commercially available in the provincial/regional or national grid of China, as a conservative proxy.

Since there is no way to separate the different generation technology capacities based on coal, oil or gas fuel etc from the generic term "thermal power" in the present energy statistics, the following calculation measures will be taken:

First, according to the energy statistics of the selected period in which approximately 20% capacity has been added to the grid, determine the ratio of CO_2 emissions produced by solid, liquid, and gas fuel consumption for power generation; than multiply this ratio by the respective emission factors based on commercially available best practice technology in terms of efficiency. Finally, this emission factor for thermal power is multiplied with the ratio of thermal power identified within the approximation for the latest 20% installed capacity addition to the grid. The result is the BM emission factor of the grid.

Sub-step 1
Calculate the proportion of CO_2 emissions related to consumption of coal, oil and gas fuel used for power generation as compared to total CO_2 emissions from the total fossil fuelled electricity generation (sum of CO_2 emissions from coal, oil and gas).

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

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

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

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 in year(s) y,
Coal, Oil and *Gas* stands for solid, liquid and gas fuels respectively.

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

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

Where,
$EF_{Thermal}$ is the weighted emissions factor of thermal power generation with the efficiency level of the best commercially available technology in China in the previous three years.

$EF_{Coal,Adv}, EF_{Oil,Adv}, EF_{Gas,Adv}$ are the emission factors of coal, oil and gas-fired power generation with efficiency levels of the best commercially available technology in China in the previous three years.

A coal-fired power plant with a total installed capacity of 600MW 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 60 MW is 343.33gce/kWh, which corresponds to an efficiency of 35.82% for electricity generation.

For gas and oil power plants a 200 MW power plant with a specific fuel consumption of 258gce/kWh, which corresponds to an efficiency of 47.67% 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 Annex3.

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 of the selected period in which approximately 20% capacity has been added to the grid,

$CAP_{Thermal}$ is the total thermal power capacity addition of the selected period in which approximately 20% capacity has been added to the grid.

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. $EF_{BM,y}$ calculations adopt the most recent data announced by China's DNA in the *Notification on Determining the Regional Grid Emission Factors of China*, renewed on August 9, 2007 (available at http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File1365.pdf).

The result of the Build Margin emission factor calculation is 0.6748tCO_2e/MWh

The data sources for calculating OM and BM are:
1. Installed capacity, power generation and the rate of internal electricity consumption of thermal power plants for the years 2003 to 2005

Source: *China Electric Power Yearbook* (2004-2006)

2. Fuel consumption and the net caloric value of thermal power plants the years 2003 to 2005

Source: *China Energy Statistics Yearbook* (2004-2006)

3. Carbon emission factor and carbon oxidation factor of each fuel

Source: *2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2 Energy*, Table 1.3 and Table 1.4 of Page 1.21-1.24 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.

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

The **Operating Margin** emission factor (EF_{OM}) of Southern Grid is **1.0119tCO_2e/MWh** and the **Build Margin** emission factor (EF_{BM}) is **0.6748tCO_2e/MWh**. The defaults weights for hydropower projects are used as specified in ACM0002 (Version 06).

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

The result of the **Combined Margin** Baseline Emission Factor calculation is **0.84335tCO_2e/MWh**.

Emission Reductions ER_y

The emission reductions ER_y by the project activity during a given year y calculation is as follows:

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

Of which:

BE_y is baseline emissions during a given year y, the baseline emissions is calculated by:

$$BE_y = EG_y \times EF_y$$ Equation (B.11)

Where,

EG_y is the net electricity supplied by the project activity to the grid, in MWh.

EF_y is baseline emissions factor, in tCO_2e/MWh.

$$EG_y = EG_{s,y} - PR_{g,y}$$ Equation (B.12)

Of which: $EG_{s,y}$ is the power supplied to the grid.

$PR_{g,y}$ is the electricity use of power plant supplied by the grid.

PE_y is project emissions during a given year y. Since the power density of the project is 1,281.25W/m^2, greater than 10 W/m^2, greenhouse gas emissions from the project activity are zero. Hence $PE_y = 0$.

L_y is leakage, according to AMS- Ⅰ.D, there is no leakage calculation is required. Hence $L_y = 0$.

Therefore, the emission reductions are equal to the baseline emissions, namely,

$$ER_y = BE_y - PE_y = (EG_{s,y} - PR_{g,y}) \times EF_y - PE_y$$ Equation (B.13)

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

Data / Parameter:	$EGP_{y,j}$
Data unit:	MWh
Description:	The Power Generation of Sources j in the years y

	(2003-2005, including Yunnan, Guangdong, Guangxi and Guizhou)
Source of data used:	*China Electric Power Yearbook 2004-2006*
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

Data / Parameter:	$GEN_{import,y}$
Data unit:	MWh
Description:	The Power Transmitted from the Central China Grid to the Southern Grid in the years y (2003-2005)
Source of data used:	*State Power Information Network: http://www.sp.com.cn/zgdl/dltj/default.htm*
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

Data / Parameter:	$PR_{m,y}$
Data unit:	%
Description:	The rate of electricity consumption of thermal power plants of Province m in the years y (2003-2005 including Yunnan, Guangdong, Guangxi and Guizhou)
Source of data used:	*China Electric Power Yearbook 2004-2006*
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

Data / Parameter:	$F_{i,j,y}$
Data unit:	$10^4t/10^8m^3$
Description:	The Fuel i Consumption of Power Sources j in the years y (2002-2005, including Yunnan, Guangdong, Guangxi and Guizhou)
Source of data used:	*China Energy Statistical Yearbook 2000-2006*
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

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 2006*
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

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:	*2006 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

Data / Parameter:	$OXID_i$
Data unit:	**%**
Description:	The Oxidation Rate of Fuel i
Source of data used:	*2006 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

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:	*Chinese 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:	35.82%
Justification of the choice of data or description of	National Fixed Value

measurement methods and procedures actually applied :	
Any comment:	To calculate BM

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:	*Chinese 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:	47.67%
Justification of the choice of data or description of measurement methods and procedures actually applied :	National Fixed Value
Any comment:	To calculate BM

Data / Parameter:	$CAP_{y,j}$
Data unit:	MW
Description:	The Installed Capacity of Power Sources j in the years y (2002-2005, including Yunnan, Guangdong, Guangxi and Guizhou)
Source of data used:	*China Electricity Power Yearbook 2003-2006*
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

Data / Parameter:	$SA_{reservoir}$
Data unit:	km^2
Description:	Surface area at full reservoir level
Source of data used:	Measured value of Gejiu City Water and Power Institute
Value applied:	$0.0064km^2$
Justification of the choice of data or description of measurement methods and procedures actually applied :	The surface area will be calculated using the design schematics and area maps. Photographs of the reservoir at several key locations will be taken when the project is operational to check whether the actual reservoir does not deviate substantially for the design.
Any comment:	To calculate project emission

Data / Parameter:	$EF_{OM,y}$
Data unit:	tCO_2e/MWh
Description:	The Operating Margin Emission Factor of the Southern Grid (which is

	calculated ex-ante and will not be renewed in the first crediting period of the project activity)
Source of data used:	*Chinese DNA: Bulletin on Baseline Emission Factor of China Grid-the calculation of baseline* Operating Margin Emission Factor *for China Grid*
Value applied:	1.0119
Justification of the choice of data or description of measurement methods and procedures actually applied :	Calculated and published by Chinese DNA
Any comment:	To calculate CM

Data / Parameter:	$EF_{BM,y}$
Data unit:	tCO_2e/MWh
Description:	The Build Margin Emission Factor of the Southern Grid (which is calculated ex-ante and will not be renewed in the first crediting period of the project activity)
Source of data used:	*Chinese DNA: Bulletin on Baseline Emission Factor of China Grid-the calculation of baseline* Build Margin Emission Factor *for China Grid*
Value applied:	0.6748
Justification of the choice of data or description of measurement methods and procedures actually applied :	Calculated and published by Chinese DNA
Any comment:	To calculate CM

Data / Parameter:	w_{OM} ; w_{BM}
Data unit:	
Description:	The defaults weights of $EF_{OM,y}$ and $EF_{BM,y}$ for hydropower projects
Source of data used:	ACM0002 (version 06)
Value applied:	$w_{OM} = 0.5$; $w_{BM} = 0.5$
Justification of the choice of data or description of measurement methods and procedures actually applied :	The defaults weights of $EF_{OM,y}$ and $EF_{BM,y}$ for hydropower projects are used as 0.5 respectively which are specified in the ACM0002 (version 06).
Any comment:	To calculate CM

Data / Parameter:	EF_y
Data unit:	tCO_2e/MWh
Description:	The Combined Margin Emission Factor of the baseline
Source of data used:	*Calculate* EF_y *according to the* $EF_{OM,y}$ and $EF_{BM,y}$ data *from Chinese DNA: Bulletin on Baseline Emission Factor of China Grid*
Value applied:	0.84335

Justification of the choice of data or description of measurement methods and procedures actually applied :	The defaults weights of $EF_{OM,y}$ and $EF_{BM,y}$ for hydropower projects are used as 0.5 respectively which are specified in the ACM0002 (version 06) namely, $EF_y = 0.5 \times EF_{OM,y} + 0.5 \times EF_{BM,y}$
Any comment:	To calculate baseline emissions

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

According to B.6.1, the baseline emission factor of the Southern China Grid is 0.84335tCO_2e/MWh in the first crediting period, and he net annual electric power supplied to the grid ($EG_y = EG_{s,y} - PR_{g,y}$) by the project is 37,890MWh.
Therefore, BE_y in the first crediting period is to be calculated as follows:

$BE_y = EG_y \times EF_y$ = 31,954 tCO_2e

Hence the emission reductions due to the project are equal to the baseline emissions, and annual emission reductions are 31,954tCO_2e during the first crediting period.

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

The total emission reductions of the project are 223,678tCO_2e during the first crediting period.

Table B.6 Estimate of emission reductions of the project during the first crediting period

Year	Estimation of project activity emissions (tCO_2e)	Estimation of baseline Emissions (tCO_2e)	Estimation of leakage (tCO_2e)	Estimation of overall emission reductions (tCO_2e)
2008(the last 7months)	0	18,640	0	18,640
2009	0	31,954	0	31,954
2010	0	31,954	0	31,954
2011	0	31,954	0	31,954
2012	0	31,954	0	31,954
2013	0	31,954	0	31,954
2014	0	31,954	0	31,954
2015(the first 5motns)	0	13,314	0	13,314
Total(tCO_2e)	0	223,678	0	223,678

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

B.7.1. Data and parameters monitored:

We need to monitor the power supplied to the grid ($EG_{s,y}$) and the electricity use of power plant supplied by the grid $PR_{g,y}$, and according to the two data, the net power supplied to the grid (EG_y) will be calculated ($EG_y = EG_{s,y} - PR_{g,y}$).

Table B.7 The Data of The Electricity Supplied to The Grid by The Project Monitored ($EG_{s,y}$)

Data / Parameter:	$EG_{s,y}$ **Electricity supplied to the grid by the project activity**
Data unit:	MWh
Description:	Gross electricity supplied to the grid by the project
Source of data to be used:	Directly measured, by meter
Value of data applied for the purpose of calculating expected emission reductions in section B.5	The electricity supplied annually to the grid by the project is estimated to be 37,928MWh
Description of measurement methods and procedures to be applied:	Measured continuously and recorded on a monthly basis. The supply of power to the grid by project is measured through national standard electricity metering instruments. Accuracy degree of the main meter is 0.2S, bi-directional.
QA/QC procedures to be applied:	The metering instruments will be calibrated annually in accordance with the *"Technical administrative code of electric energy metering (DL/T448 —2000)"*.Sales record to the grid and other records are used to ensure consistency.
Any comment:	Refer to B.7.2. Description of the monitoring plan

Table B.8 the Data of the electricity use of the proposed project power plant supplied by the grid Monitored ($PG_{g,y}$)

Data / Parameter:	$PE_{g,y}$ **Electricity used by the project activity**
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 38MWh
Description of measurement methods and procedures to be applied:	Measured continuously and recorded on a monthly basis. The consumption of power by the project is measured through national standard electricity metering instruments. Accuracy degree of the main meter is 0.2S, bi-directional.
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. Jinping Dazhai Power Generation Co. Ltd is in charge of project construction. After the project has been finished, the Jinping Zhongtai Investment Development&Management Co. Ltd which is the parent company of Jinping Dazhai Power Generation Co. Ltd will be in charge of the operation and management of project and implementation of the monitoring plan. The project owner is mainly responsible for the implementation of the monitoring plan, and Grid Company will cooperate with the project owner.

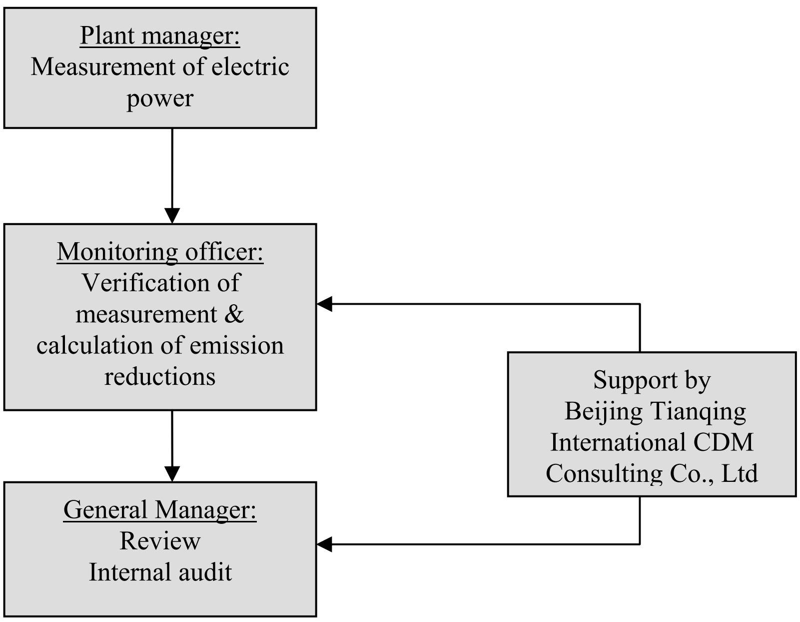
1. Monitoring Objective

The main monitoring data are electricity supplied to the grid and the electricity use of power plant supplied by the grid company because the baseline emission factor is fixed by ex-ante calculation.

2. Monitoring Organization

The project owner will appoint a monitoring officer, who will supervise and verify metering and recording, collection of data (e.g. sales / billing receipts), calculation of emission reductions and development of monitoring report. The plant manager will be in charge of direct electricity measurement.
The monitoring officer will receive support from Beijing Tianqing Power International CDM Consulting, Co., Ltd., Ltd in his/her responsibilities through the following actions:

- Initial training on CDM, monitoring methodology, monitoring procedures and requirements and archiving;
- Provide the monitoring officer with a calculation template in electronic form for calculation of annual emission reductions;
- Continuous advice to the monitoring officer on a need basis;
- Review of monitoring reports.



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 is in operation.

Four meters will be required. There are two meters at the exit of the booster station of the proposed activity, one is the main meter M1, and the another one is the back-up meter M2. As the back-up meter, the back-up meter M2 will measure the same data as the main meter M1simultaneity. And the measurement meter M3 is located at the exit of the first generator and the measuring meter M4 is located at the exit of the second generator, both measuring power generation. When the main meter M1 is in trouble, the project owner and Grid Company should employ the data monitored by the backup meter M2. When the main meter M1 and the backup meter M2 are in trouble, the project owner should employ the data monitored by the measuring meter M3 and M4.

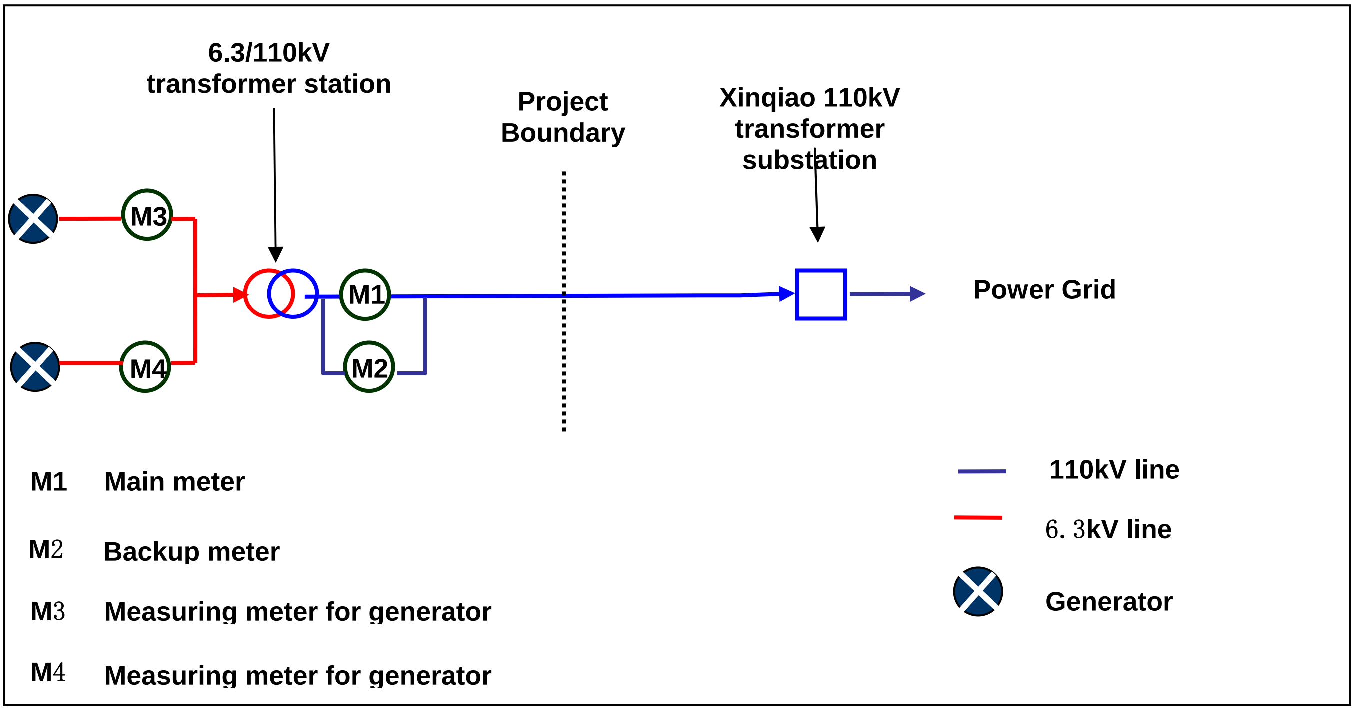
Through the main meter M1 (accuracy degree is 0.2S, bi-directional), the amount of electricity supplied to the grid $M1_A$ (excluded the line losses) and power supplied to the project from the grid company $M1_B$ (excluded the line losses). The transmission line loss (1%) is shouldered by the project owner. So the net power supplied to the grid by the proposed project activity is to be calculated as follows:

The amount of electricity supplied to the grid= $M1_A \times$(1-loss line)= $M1_A \times$(1-0.1%)

The amount of power supplied to the project from the grid company= $M1_B \times$(1+loss line)= $M1_B \times$ (1+0.1%)

The net power supplied by the proposed project activity = $M1_A \times$(1-0.1%)- $M1_B \times$(1+0.1%)

In order to measure electricity when the main meter is out of order, a backup meter M2 (accuracy degree is 0.2S, bi-directional), M3 (accuracy degree is 0.5S, bi-directional), and M4 (accuracy degree is 0.5S, bi-directional) is installed.



4. Data Collection:

The project owner are responsible for operation monitoring of the backup meter and the main meter, and guarantee the measuring equipments are in good operation and completely sealed.

The electricity recorded by the main meter alone will suffice for the purpose of billing and emission reduction verification as long as any main meter errors are within the allowable tolerance. The main monitoring process is as follows:

- i The project owner and Grid Company read and check the backup meters and the main meter and record the data at on the last day of every month;
- ii The project owner sells the electricity to the Grid Company;
- iii The Grid Company provides an electricity bill to the project owner and the project owner confirmation the sale electricity data.
- iv 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.
- v The Grid company sells the electricity to the project owner;
- vi The Grid Company provides an electricity sales invoice to the project owner, and the invoice will be stored by the project owner.
- vii The project owner records the net electricity supplied to the grid electronically;
- viii The project owner keeps the records of the main meter's data readings for verification by the DOE.

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

- i Reading the backup meter (after taking the line losses into consideration) to ensure electricity is supplied to the grid, unless a test by either party reveals it is inaccurate;
- ii If the backup system is not within acceptable limits of accuracy or performed improperly, the proposed project owner and the Grid Company shall jointly prepare an new agreement of the correct readings; and
- iii If the proposed project owner and the Grid Company fail to reach an agreement concerning the correct reading, then the matter will be submitted for 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 the Grid Company within 10 days after:

- i The detection of a difference larger than the allowable tolerance in the readings of the main meter and the backup meter;
- ii Repair to the faulty meter caused by improper operation.

6. Data Management

Data will be archived at the end of each month using electronic spreadsheets. The electronic files will be stored on hard disk and cd-rom. In addition, a hard copy printout will be archived. In addition, the project owner will collect sales receipts for the power delivered to the grid as a cross-check. At the end of each

crediting year, a monitoring report will be compiled detailing the metering results and evidence (i.e. sales receipts).
Physical documentation such as, paper-based maps, diagrams and environmental assessment, will be collected in a central place, together with the monitoring plan. In order to facilitate the auditor's reference, monitoring results will be indexed. All paper-based information will be stored by the project owner.

All data records will be kept for a period of 2 years following 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: 08~~2~~/09~~2~~/2008
Name of persons determining the monitoring methodology:

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Beijing Tianqing Power International CDM Consulting, Co., Ltd. is not 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:

~~20~~17/12/2004 (the date of the equipment purchase contract (3.2MW) which is the earliest starting date of the project~~The date of project start construction~~)

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

The expected operational lifetime of the project activity is 20 years.

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

C.2.1. Renewable crediting period:

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

01/06/2008(or earliest date after registration)

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

According to the relevant environmental law and regulations, an environmental impact assessment had been carried out, and has been approved by Environment Protection Bureau of Honghe Hani-Yi Autonomous Prefecture on 13 June, 2006. The main assessment conclusions are be provided below:

1. Impact on Ambient Environment

During construction period, some project activities as digging, exploding, transportation, sandstone washing and processing, concrete mixing etc, will produce dust and pollute the air. The project owner can minimize the negative influence of dust by a serious of measure as sprinkling, wet working, loading and unloading cement carefully, equipping dust catcher to concrete mixing floor and etc.

2. Impact on Acoustic Environment

The noise of construction is mainly from digging, exploding, concrete mixing, crusher operating and vehicle running. According to the recourses of the noises, the project owner will take some measures such as equipping noise prevention earplug or ear protector to builder to diminish the harm of noise.

3. Impact on Aquatic Environment

The construction wastewater includes industrial wastewater and domestic wastewater, and the main components are suspension, BOD, COD, nitrogen or phosphor nutriment. The industrial waste water from sandstone processing only needs the simple treatment before discharging. The project produces a little domestic wastewater which should be treated by a integrated sewage disposal equipment. The medical sewage should be disinfected before discharging.

4. Impact on the Solid Waste

The digging slag will be transported to slag disposal pits to pile up. To avoid collapse, the slope reinforce treatment should be carried out and wall to prevent the slide of the slag should be built. After the construction, the project owner will cover a layer of fresh soil to the slag disposal pits, and make virescence in time.

5. Impact on Soil and Water Conservation

In order to maintain the loss of soil and water in control, the main steps of the project is making slope reinforce treatment to the slag disposal pits, building wall to prevent the slide of the slag and making virescence. The soil and water loss produced by the project will be minimized by measures of combining engineering measure with plant measure.

6. Impact on the Ecosystem

There are no species protected rare animals and plants in the construction region, the impact will be small. The construction will impose negative influence on some plants, but these plants will be recovered after carrying out the water and soil conservation measures. So the construction will not cause evidenced influence on eco-environment.

7. Impact on Land Utilization and Immigration

The total occupied land is 2.8hm^2, of which permanent occupied land is 1.47hm^2; and temporary occupied land is 1.33hm^2. The project uses a diversion tunnel and reduces the occupied land correspondingly. The proportion of farmland in occupied land is small. The proposed project doesn't involve any immigration.

8. Impact on the environmental flow

The annual natural runoff is 1.29m^3/s at the station site where the guarantee rate P is 90%, and taking water as 4.6m^3/s based on the designed water intake quantity. The natural runoff from Xinzhai River could not satisfy the requirements for power station, which will cause the water quantity in the water way of 3.5 km in length from station dam site to tail water exit of power house be reduced or cut off. If during the period for water reduction or river cut off, the water consumption for ecological environment and agricultural irrigation could not be guaranteed, the living and breeding for aquatic creature and the daily life for peasants will be affected.

The main irrigating way for the farm land in Xinzhai River Basin is the gravity irrigation, only small part for the farm land is drawing water from the river. The area of farmland is less than 100 unit of area along the two borders of the river way between the Dapo Station Dam site and the tail water exit. For this farmland, the irrigating water for each unit of area is 600m^3, thus the water consumption for irrigation is only 60,000m^3 in every year, and there is no human nor cattle for drinking water, and nor requirements for industry. Based on investigation, there is a big branch river from the right border flow into the Xinzhai River which is located on 2.4km downstream of Dapo Dam. The water flowing is 0.12m^3/s in the drought season, which could ensure there will not appear the cut off on the 1.1km river way between the branch river flowing place to the tail water exit of power house, and could satisfy the requirements for agriculture and ecological purpose. In order to guarantee water consumption for irrigation and ecological purpose for the 2.4 km river way below the station dam, there is left discharge flow of 0.08m^3/s, and this measure could reduce the influence on environment. Since the specialty for the way of taking water, using water and subsiding water, the tailed water after power generation will be discharged directly to Xinzhai River, the distribution of water resources in the downstream of power house has been recovered. Therefore, the taking water by station will not impose big influence on the water consumption for agricultural and industry along the tow borders of the riverway below the tail water exit, also impose small influence on the ecological purpose water consumption.

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 project participants and the host Party do not consider any environmental impacts to be significant and consider negative impact on environment to be very marginal.

SECTION E. Stakeholders' comments:

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

Aiming at collecting advices on the influence imposed on the local society, economy, daily life etc for the project broadly. Project owner had distributed questionnaires for local residents to investigate the suggestion of them on the construction of Dapo Hydropower Station, including the impact on social, economical and life.

Furthermore, a special stakeholder consultation meeting for the parties interested in the project was organized from 9:00-11:00 on Mar. 27, 2007 at Jinping Miao-Yao-Dai Autonomous County to collect opinions from all the potential stakeholders.

In order to make the potential stakeholders to receive information of the meeting, Jinping Dazhai Generation Co. Ltd. had published a bulletin for the meeting of stakeholders on the newspaper "*Shennan morning paper"* on Mar. 27, 2007 and also publicized the meeting bulletin via the website of www.tqcdmchina.com on Mar, 28. 2007. The project owner has informed all villages impacted by the stations before the meeting and they selected 5 village representatives who attend the stakeholder consultation meeting and express their comments. In the bulletin, the companies advised that all the potential stakeholders could learn the detailed information on the project. At the meeting, the project owner and the consultant invited the participants to express their comments and concerns about the project and CDM.

The following questions are from the questionnaires and stakeholders' meeting:

1. Whether the noise during construction will affects people's life?
2. Is there the submergence in this project? Is there any impact on the local people because of the submergence?
3. Is there any immigration? If yes, are they voluntary? Whether the immigration satisfied with the life after the migration?
4. How about the local people's life? What do the local people live on? How about the economic condition?
5. What is the impact of the project on the local environment?
6. What is the impact of construction on the local industry?
7. Whether the project has the impact on people's income?
8. Whether the cost will increase due to the implementation of the CDM project?
9. Have you known CDM before? What is the attitude for local people and government for CDM project? Whether people support this CDM project?
10. Whether all the stakeholders agree with the construction of the hydropower stations?

E.2. Summary of the comments received:

The project owner distributed 33 questionnaires for local residents impacted by the stations in total 30 filled in questionnaires have been returned, the interviewees are all villagers impacted by the stations, 20% of those are women, 20% are graduated from senior high school or upwards, 20% are elder than twenty years old, and the investigation results are following:

100% think the communication conditions is better after construction

100% of the investigated residents think that local area face power shortage.

100% of the investigated residents think the hydropower station will bring benefit to their lives and think their income increases after construction

100% of the investigated residents think the hydropower station will not bring negative impact on their lives.

100% of the investigated residents think the hydropower station bring little negative impact on environment.

100% of the investigated residents agree with the construction of the project.

From the questionnaires and stakeholders' meeting, we find that all the local government and residents agree with the construction of the project. The opinions are following:

The occupied land for the construction is small, and will provide corresponding compensation for the affected residents. Also, the implementation of the proposed project will provide the electricity power for life and manufacture, accelerate the development of village enterprise to largest extent, also will increase the employment opportunities for local residents, and increase the revenues of local residents, thus improve the level for local residents. Therefore almost all of the stakeholders support the construction of the 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 corrective action is necessary in response.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

The Project Owner

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Annex 2

INFORMATION REGARDING PUBLIC FUNDING

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

Annex 3
BASELINE INFORMATION

Table 1–Power Supply data for the Southern Grid, 2001-2005

	2001	2002	2003	2004	2005
Electricity Generation of Thermal power plant (MWh)	162,910,000	185,168,000	222,780,000	263,574,000	287,187,000
Electricity Generation of Hydro power plant (MWh)	79,971,000	83,093,000	83,271,000	84,072,000	94,919,000
Other Power (MWh)	15,135,000	21,012,000	29,089,000	28,530,000	30,632,000
Total Electricity Generation of the Southern Grid (MWh)	258,016,000	289,273,000	335,140,000	376,277,000	412,738,000
the ratio of power generated by hydropower and other low cost/compulsory resources (%)	36.86%	35.99%	33.53%	29.95%	30.42%

Data Source: China Electric Power Yearbook 2002-2006.

Table 2–Power Supply data for the Southern Grid, 2003 (not including low operating cost and must-run power plants)

	Guangdong	Guangxi	Guizhou	Yunnan
Thermal Power Generation (MWh)	143,351,000	17,079,000	43,295,000	19,055,000
Rate of Electricity Consumption of the Power Plant (%)	5.50	8.43	7.40	8.01
Power Supplied to the Grid(MWh)	135,466,695	15,639,240	40,091,170	17,528,695
Total Supplied to Grid of the Thermal Power (MWh)		208,725,800		
Net import Power from the Central China Grid (MWh)		11,100		
The total Power for the Southern Grid (MWh)		208,736,900		

Data Source: China Electric Power Yearbook 2004; State Power Information Network: http://www.sp.com.cn/zgdl/spw/04_12y/04_12_dljh.htm.

Table 3–Power Supply data for the Southern Grid, 2004 (not including low operating cost and must-run power plants)

	Guangdong	Guangxi	Guizhou	Yunnan
Thermal Power Generation (MWh)	169,389,000	20,143,000	49,720,000	24,322,000
Rate of Electricity Consumption of the Power Plant (%)	5.42	8.33	7.06	7.56
Power Supplied to the Grid(MWh)	160,208,116	18,465,088	46,209,768	22,483,257
Total Supplied to Grid of the Thermal Power (MWh)		247,366,229		
Net import Power from the Central China Grid (MWh)		10,951,240		
The total Power for the Southern Grid (MWh)		258,317,469		

Data Source: China Electric Power Yearbook 2005; State Power Information Network: http://www.sp.com.cn/zgdl/spw/04_12y/04_12_dljh.htm.

Table 4–Power Supply data for the Southern Grid, 2005 (not including low operating cost and must-run power plants)

	Guangdong	Guangxi	Guizhou	Yunnan
Thermal Power Generation (MWh)	176,453,000	25,023,000	58,430,000	27,281,000
Rate of Electricity Consumption of the Power Plant (%)	5.58	7.95	7.34	6.94
Power Supplied to the Grid(MWh)	166,606,923	23,033,672	54,141,238	25,387,699
Total Supplied to Grid of the Thermal Power (MWh)		269,169,531		
Net import Power from the Central China Grid (MWh)		96,363,000		
The total Power for the Southern Grid (MWh)		365,532,531		

Data Source: China Electric Power Yearbook 2006; State Power Information Network: http://www.sp.com.cn/zgdl/spw/05_01y/05_01_dljh.htm *etc.*

Table 5– Calculation of average emission factor for the Central China Grid in 2003-2005

	2003	2004	2005
Total CO_2 emission of the Central China Grid (tCO_2e)	276,404,544	345,671,697	359,887,488
The total power supplied to the Central China Grid (MWh)	346,613,868	418,261,666	466,644,030
Average emission factor (tCO_2e/ MWh)	0.7974423	0.8264484	0.7712249

Table 6–Energy Consumption Statistics of Power Generation of the Southern Grid in 2003

Fuel	Unit	Guangdong A	Guangxi B	Guizhou C	Yunnan D	Subtotal =A+B+C+D
Raw coal	Ten thousand Tons	4,491.79	831.84	2,169.11	1,405.27	8,898.01
Clean coal	Ten thousand Tons	0.05	0.00	0.00	0.00	0.05
Other washed coal	Ten thousand Tons	0.00	0.00	36.38	20.37	56.75
Coke	Ten thousand Tons	0.00	0.00	0.00	0.50	0.50
Coke oven gas	Ten thousand Tons	0.00	0.00	0.00	0.04	0.04
Other gas	10^8 Cubic meter	3.21	0.00	0.00	11.27	14.48
Crude oil	10^8 Cubic meter	6.85	0.00	0.00	0.00	6.85
Gasoline	Ten thousand Tons	0.02	0.00	0.00	0.00	0.02
Diesel oil	Ten thousand Tons	31.90	0.00	0.00	0.76	32.66
Fuel oil	Ten thousand Tons	627.22	0.30	0.00	0.00	627.52
LPG	Ten thousand Tons	0.00	0.00	0.00	0.00	0.00
Refinery gas	10^8Cubic meter	2.85	0.00	0.00	0.00	2.85
Natural gas	10^8Cubic meter	0.00	0.00	0.00	0.00	0.00
Other petroleum products	10^8Cubic meter	11.35	0.00	0.00	0.00	11.35
Other coking products	Ten thousand Tons	0.00	0.00	0.00	0.00	0.00
Other E (standard coal)	Ten thousand Tons	93.21	0.00	0.00	22.35	115.56

Data Source: China Energy Statistical Yearbook 2004.

Table 7- The Operation Margin Emission Factor Calculation of the Southern Grid in 2003

Fuel	Unit	Fuel Consumption in the SCPG (E)	Emission Factor （tC/TJ） (F)	Oxidation Rate (%) G	Average NCV (MJ/t,km^3) H	CO_2Emission (tCO_2e) I=G*H*F*E*44/12/10000（in mass） I=G*H*F*E*44/12/1000 (in volume)
Raw coal	Ten thousand Tons	8,898.01	25.80	100	20,908	175,993,455.05
Clean coal	Ten thousand Tons	0.05	25.80	100	26,344	1,246.07
Other washed coal	Ten thousand Tons	56.75	25.80	100	8,363	448,971.84
Coke	Ten thousand Tons	0.50	25.80	100	28,435	13,449.76
Coke oven gas	10^8 Cubic meter	0.04	12.10	100	16,726	2,968.31
Other gas	10^8 Cubic meter	14.48	12.10	100	5,227	335,797.81
Crude oil	Ten thousand Tons	6.85	20.00	100	41,816	210,055.71
Gasoline	Ten thousand Tons	0.02	18.90	100	43,070	596.95
Diesel oil	Ten thousand Tons	32.66	20.20	100	42,652	1,031,759.27
Fuel oil	Ten thousand Tons	627.52	21.10	100	41,816	20,301,304.48
LPG	10^8Cubic meter	0.00	17.20	100	50,179	0.00
Refinery gas	10^8Cubic meter	2.85	18.20	100	46,055	87,592.00
Natural gas	10^8Cubic meter	0.00	15.30	100	38,931	0.00
Other petroleum products	Ten thousand Tons	11.35	20.00	100	38,369	319,357.98
Other coking products	Ten thousand Tons	0.00	25.80	100	28,435	0.00
Other E (standard coal)	Ten thousand Tce	115.56	0.00	100	0	0.00
CO_2 emission of power import from the Central China Grid		$0.7974423 \times 11,100 = 8,851.61tCO_2e$				
Total emission (Q)		$198,755,406.84tCO_2e$				
Supply to the Southern Grid (P)		208,736,900MWh				
OM Emission Factor (=Q/P)		$0.952181tCO_2e/MWh$				

Data sources: China Energy Statistical Yearbook 2006 ；2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2 Energy, p.1.21-p.1.24

Table 8–Energy Consumption Statistics of Power Generation of the Southern Grid in 2004

Fuel	Unit	Guangdong A	Guangxi B	Guizhou C	Yunnan D	Subtotal =A+B+C+D
Raw coal	Ten thousand Tons	6,017.70	1,305.00	2,643.90	1,751.28	11,717.88
Clean coal	Ten thousand Tons	0.21	0.00	0.00	0.00	0.21
Other washed coal	Ten thousand Tons	0.00	0.00	0.00	0.00	0.00
Coke	Ten thousand Tons	0.00	0.00	0.00	0.00	0.00
Coke oven gas	Ten thousand Tons	0.00	0.00	0.00	0.00	0.00
Other gas	10^8 Cubic meter	2.58	0.00	0.00	0.00	2.58
Crude oil	10^8 Cubic meter	16.89	0.00	0.00	0.00	16.89
Gasoline	Ten thousand Tons	0.00	0.00	0.00	0.00	0.00
Diesel oil	Ten thousand Tons	48.88	0.00	0.00	1.83	50.71
Fuel oil	Ten thousand Tons	957.71	0.00	0.00	0.00	957.71
LPG	Ten thousand Tons	0.00	0.00	0.00	0.00	0.00
Refinery gas	10^8Cubic meter	2.86	0.00	0.00	0.00	2.86
Natural gas	10^8Cubic meter	0.48	0.00	0.00	0.00	0.48
Other petroleum products	10^8Cubic meter	1.66	0.00	0.00	0.00	1.66
Other coking products	Ten thousand Tons	0.00	0.00	0.00	0.00	0.00
Other E (standard coal)	Ten thousand Tons	79.42	0.00	0.00	0.00	79.42

Data Source: China Energy Statistical Yearbook 2005.

Table 9- The Operation Margin Emission Factor Calculation of the Southern Grid in 2004

Fuel	Unit	Fuel Consumption in the SCPG (E)	Emission Factor （tC/TJ） (F)	Oxidation Rate (%) G	Average NCV (MJ/t,km^3) H	CO_2Emission (tCO_2e) I=G*H*F*E*44/12/10000（in mass） I=G*H*F*E*44/12/1000 (in volume)
Raw coal	Ten thousand Tons	11,717.88	25.80	100	20,908	231,767,573.55
Clean coal	Ten thousand Tons	0.21	25.80	100	26,344	5,233.50
Other washed coal	Ten thousand Tons	0.00	25.80	100	8,363	0.00
Coke	Ten thousand Tons	0.00	25.80	100	28,435	0.00
Coke oven gas	10^8 Cubic meter	0.00	12.10	100	16,726	0.00
Other gas	10^8 Cubic meter	2.58	12.10	100	5,227	59,831.38
Crude oil	Ten thousand Tons	16.89	20.00	100	41,816	517,932.98
Gasoline	Ten thousand Tons	0.00	18.90	100	43,070	0.00
Diesel oil	Ten thousand Tons	50.71	20.20	100	42,652	1,601,975.28
Fuel oil	Ten thousand Tons	957.71	21.10	100	41,816	30,983,494.25
LPG	10^8Cubic meter	0.00	17.20	100	50,179	0.00
Refinery gas	10^8Cubic meter	2.86	18.20	100	46,055	87,899.34
Natural gas	10^8Cubic meter	0.48	15.30	100	38,931	104,833.40
Other petroleum products	Ten thousand Tons	1.66	20.00	100	38,369	46,707.86
Other coking products	Ten thousand Tons	0.00	25.80	100	28,435	0.00
Other E (standard coal)	Ten thousand Tce	79.42	0.00	100	0	0.00
CO_2 emission of power import from the Central China Grid		0.8264484×10,951,240=9,050,630.40tCO_2e				
Total emission (Q)		274,226,116.64tCO_2e				
Supply to the Southern Grid (P)		258,317,469MWh				
OM Emission Factor (=Q/P)		1.061586tCO_2e/MWh				

Data sources: China Energy Statistical Yearbook 2006 ；2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2 Energy, p.1.21-p.1.24

Table 10– Energy Consumption Statistics of Power Generation of the Southern Grid in 2005

Fuel	Unit	Guangdong A	Guangxi B	Guizhou C	Yunnan D	Total E=A+B+C+D
Raw coal	Ten thousand Tons	6,696.47	1,435	3,212.31	1,975.55	13,319.33
Clean coal	Ten thousand Tons	0.00	0.00	0.00	0.15	0.15
Other washed coal	Ten thousand Tons	0.00	0.00	10.39	33.88	44.27
Coke	Ten thousand Tons	4.79	0.00	0.00	8.05	12.84
Coke oven gas	10^8 Cubic meter	0.00	0.00	0.00	0.79	0.79
Other gas	10^8 Cubic meter	1.87	0.00	0.00	15.96	17.83
Crude oil	Ten thousand Tons	10.91	0.00	0.00	0.00	10.91
Gasline	Ten thousand Tons	0.68	0.00	0.00	0.00	0.68
Diesel oil	Ten thousand Tons	31.96	2.02	0.00	1.81	35.79
Fuel oil	Ten thousand Tons	887.21	0.00	0.00	0.00	887.21
LPG	Ten thousand Tons	0.00	0.00	0.00	0.00	0.00
Refinery gas	Ten thousand Tons	4.92	0.00	0.00	0.00	4.92
Natural gas	10^8 Cubic meter	0.93	0.00	0.00	0.00	0.93
Other petroleum products	Ten thousand Tons	1.70	0.00	0.00	0.00	1.7
Other coking products	Ten thousand Tons	0.00	0.00	0.00	0.00	0.00
Other Energy	Ten thousand Tce	104.66	133.15	0.00	59.72	297.53

Data Source: China Energy Statistical Yearbook 2006

Table 11– The Operation Margin Emission Factor Calculation of the Southern Grid in 2005

Fuel	Unit	Fuel Consumption in the SCPG (E)	Emission Factor （tC/TJ） (F)	Oxidation Rate (%) G	Average NCV (MJ/t,km^3) H	CO_2Emission (tCO_2e) I=G*H*F*E*44/12/10000（in mass） I=G*H*F*E*44/12/1000 (in volume)
Raw coal	Ten thousand Tons	13,319.33	25.80	100	20,908	263,442,601.85
Clean coal	Ten thousand Tons	0.15	25.80	100	26,344	3,738.21
Other washed coal	Ten thousand Tons	44.27	25.80	100	8,363	350,237.59
Coke	Ten thousand Tons	12.84	25.80	100	28,435	345,389.71
Coke oven gas	10^8 Cubic meter	0.79	12.10	100	16,726	58,624.07
Other gas	10^8 Cubic meter	17.83	12.10	100	5,227	413,485.84
Crude oil	Ten thousand Tons	10.91	20.00	100	41,816	334,555.88
Gasline	Ten thousand Tons	0.68	18.90	100	43,070	20,296.31
Diesel oil	Ten thousand Tons	35.79	20.20	100	42,652	1,130,638.84
Fuel oil	Ten thousand Tons	887.21	21.10	100	41,816	28,702,703.26
LPG	Ten thousand Tons	0.00	17.20	100	50,179	0.00
Refinery gas	Ten thousand Tons	4.92	18.20	100	46,055	151,211.46
Natural gas	10^8 Cubic meter	0.93	15.30	100	38,931	203,114.71
Other petroleum products	Ten thousand Tons	1.70	20.00	100	38,369	47,833.35
Other coking products	Ten thousand Tons	0.00	25.80	100	28,435	0.00
Other Energy	Ten thousand Tce	297.53	0.00	100	0	0.00
Emission of electricity from the Central China Grid		0.7712249×96,363,000=74,317,554.67tCO_2e				
Total Emission（Q）		369,521,974.54tCO_2e				
Thermal Power supplied to the Southern Grid（P）		365,532,531MWh				
OM Emission Factor [＝Q/P]		1.010914tCO_2e/MWh				

Data sources: China Energy Statistical Yearbook 2006 ；2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2 Energy, p.1.21-p.1.24

Table 12- Calculation of average emission factor for the Southern Grid in recent 3 years

Years	2003	2004	2005
Total CO_2 Emission (tCO_2e)	198,755,407	274,226,117	369,521,975
Total supply （MWh）	208,736,900	258,317,469	365,532,531
Full-weighted average OM	= (198,755,407+274,226,117+369,521,975) / (208,736,900 +258,317,469 +365,532,531) = 1.011911tCO_2e/MWh		

Table 13–Calculation of Ratio of Solid, Liquid and Gas fuel in total CO_2 Emission

Fuel		Unit	Guangdong	Guangxi	Guizhou	Yunnan	Total	NCV kJ/kg kJ/m^3 H	Emission Factor I	Oxidation Rate J(%)	CO_2 emission (tCO_2e)	λ_{Coal}, λ_{Oil} λ_{Gas}
Solid	Raw coal	10^4 Tons	6,696.47	1,435.00	3,212.31	1,975.55	13,319.33	20,908	25.80	100	263,442,602	-
	Clean coal	10^4 Tons	0.00	0.00	0.00	0.15	0.15	26,344	25.80	100	3,738	-
	Other washed coal	10^4 Tons	0.00	0.00	10.39	33.88	44.27	8,363	25.80	100	350,238	-
	Coke	10^4 Tons	4.79	0.00	0.00	8.05	12.84	28,435	25.80	100	345,390	-
	Subtotal	-	-	-	-	-	-	-	-	-	264,141,967	89.48 %
Liquid	Crude oil	10^4 Tons	10.91	0.00	0.00	0.00	10.91	41,816	20.00	100	334,556	-
	Gasoline	10^4 Tons	0.68	0.00	0.00	0.00	0.68	43,070	18.90	100	20,296	-
	Coal oil	10^4 Tons	0.00	0.00	0.00	0.00	0.00	43,070	19.60	100	0.00	-
	Diesel oil	10^4 Tons	31.96	2.02	0.00	1.81	35.79	42,652	20.20	100	1,130,639	-
	Fuel oil	10^4 Tons	887.21	0.00	0.00	0.00	887.21	41,816	21.10	100	28,702,703	-
	Other petroleum products	10^4 Tons	1.70	0.00	0.00	0.00	1.70	38,369	20.00	100	47,833	-
	Subtotal	-	-	-	-	-	-	-	-	-	30,236,028	10.24 %
Gas	Natural gas	10^7 m^3	9.30	0.00	0.00	0.00	9.30	38,931	15.30	100	203,115	-
	Coke oven gas	10^7 m^3	0.00	0.00	0.00	7.90	7.90	16,726	12.10	100	58,624	-
	Other gas	10^7 m^3	18.70	0.00	0.00	159.60	178.30	5,227	12.10	100	413,486	-
	LPG	10^4 Tons	0.00	0.00	0.00	0.00	0.00	50,179	17.20	100	0	-
	Refinery gas	10^4 Tons	4.92	0.00	0.00	0.00	4.92	46,055	18.20	100	151,211	-
	Subtotal	-	-	-	-	-	-	-	-	-	826,436	0.28%
Total		-	-	-	-	-	-	-	-	-	295,204,431	100%

Table 14–Calculation of the Emission Factor for Coal-fired, oil-fired and Gas-fired Power

	Variable	Supply Efficiency J	Emission Factor of fuel F (tc/TJ)	Oxidation Rate G (%)	Emission Factor (tCO_2e/MWh) =3.6/J/1000*F*G*44/12
Coal-fired	$EF_{Coal,Adv}$	35.82%	25.80	100	0.9508
Gas-fired	$EF_{Gas,Adv}$	47.67%	15.30	100	0.4237
Oil-fired	$EF_{Oil,Adv}$	47.67%	21.10	100	0.5843

The emission factor of thermal power is:

$$EF_{Thermal} = \lambda_{Coal} \times EF_{Coal,Adv} + \lambda_{Oil} \times EF_{Oil,Adv} + \lambda_{Gas} \times EF_{Gas,Adv} = 0.9117 tCO_2e/MWh.$$

Table 15–The Installed Capacity of the Southern Grid 2003

Installed Capacity	Guangdong	Guangxi	Guizhou	Yunnan	Tianshengqiao	Subtotal
Thermal power(MW)	27,231.40	3,190.10	3,556.80	6,465.80	0.00	40,444.10
Hydro power(MW)	8,107.20	4,525.20	6,543.20	3,713.70	2,520.00	25,409.30
Nuclear power(MW)	3,780.00	0.00	0.00	0.00	0.00	3,780.00
Wind power and other(MW)	83.40	0.00	0.00	0.00	0.00	83.40
Total (MW)	39,202.00	7,715.30	10,100.00	10,179.50	2,520.00	69,716.80

Data Source: China Energy Statistical Yearbook 2004.

Table 16–The Installed Capacity of the Southern Grid 2004

Installed Capacity	Guangdong	Guangxi	Guizhou	Yunnan	Subtotal
Thermal power(MW)	30,172.90	4,378.10	4,306.90	7,801.80	46,659.70
Hydro power(MW)	8,584.60	5,040.40	7,058.60	6,896.50	27,580.10

Nuclear power(MW)	3,780.00	0.00	0.00	0.00	3,780.00
Wind power and other(MW)	83.40	0.00	0.00	0.00	83.40
Total (MW)	42,620.90	9,418.50	11,365.50	14,698.30	78,103.30

Data Source: China Energy Statistical Yearbook 2005, Tianshenqiao power station is included in Guizhou.

Table17–The Installed Capacity of the Southern Grid 2005

Installed Capacity	Guangdong	Guangxi	Guizhou	Yunnan	Subtotal
Thermal power(MW)	35,182.60	4,931.20	4,758.40	9,634.80	54,507.00
Hydro power(MW)	9,035.70	6,085.30	7,993.10	7,233.00	30,347.10
Nuclear power(MW)	3,780.00	0.00	0.00	0.00	3,780.00
Wind power and other(MW)	83.40	0.00	0.00	0.00	83.40
Total (MW)	48,081.70	11,016.50	12,751.50	16,867.80	88,717.50

Data Source: China Energy Statistical Yearbook 2006, Tianshenqiao power station is included in Guizhou.

Table18–The Calculation of BM Emission Factor for the Southern Grid

	2003	2004	2005	New addition 2003-2005	The Ratio in new addition
Thermal power(MW)	40,444.10	46,659.70	54,507.00	14,062.90	74.01%
Hydro power(MW)	25,409.30	27,580.10	30,347.10	4,937.80	25.99%
Nuclear power(MW)	3,780.00	3,780.00	3,780.00	0.00	0.00%
Wind power (MW)	83.40	83.40	83.40	0.00	0.00%
Total(MW)	69,716.80	78,103.30	88,717.50	19,000.70	100.00%
Ratio of installed capacity in 2005	78.58%	88.04%	100.00%	-	-

$EF_{BM,y}$ = 0.9117×74.01% = 0.6748 tCO_2e/MWh.

The OM is calculated as 1.0119tCO_2e/MWh, the BM is calculated as 0.6748tCO_2e/MWh. And the baseline emission factor equal to the combined margin with equally weighted average of the operating margin emission factor and the build margin emission factor.

According to ACM0002 (version 6), the default weight of hydropower is:

$$w_{OM} = 0.5 \qquad w_{BM} = 0.5$$

So the Baseline Emissions Factor (EF_y in tCO_2e/MWh) is $0.84335tCO_2e/MWh$.

Annex 4

MONITORING INFORMATION

Selection procedure:
Jinping Dazhai Power Generation Co. Ltd is in charge of project construction. After the project has been finished, the Jinping Zhongtai Investment Development&Management Co. Ltd which is the parent company of Jinping Dazhai Power Generation Co. Ltd will be in charge of the operation and management of project and implementation of the monitoring plan.The monitoring officer will be appointed who will be selected among the senior technical or managerial staff. Before he/she commences monitoring duties, he/she will receive training on monitoring requirements and procedures by Beijing Tianqing Power International CDM Consulting, Co., Ltd.

The selection of the initial monitoring officer has taken place and the following person was appointed:
Name:
Position:

Tasks and responsibilities:
The monitoring officer will be responsible for carrying out the following tasks

- **Supervise and verify metering and recording:** The monitoring officer will coordinate with the plant manager to ensure and verify adequate metering and recording of data, including power delivered to the grid.
- Collection of additional data, sales / billing receipts: The monitoring officer will collect sales receipts for power delivered to the grid, billing receipts for power delivered by the grid to the hydropower station and additional data such as the daily operational reports of the hydropower station.
- Calibration: The monitoring officer will coordinate with staff of the project entity to ensure that calibration of the metering instruments is carried out periodically in accordance with regulations of the grid company.
- Calculation of emission reductions: The monitoring officer will calculate the annual emission reductions on the basis of net power supply to the grid. The monitoring officer will be provided with a calculation template in electronic form by the project's CDM advisors.
- Preparation of monitoring report: The monitoring officer will annually prepare a monitoring report which will include among others a summary of daily monthly operations, metering values of power supplied to and received from the grid, copies of sales/billing receipts, a report on calibration and a calculation of emission reductions.

Support:
The monitoring officer will receive support from Beijing Tianqing Power International CDM Consulting, Co., Ltd., Ltd in his/her responsibilities through the following actions:

- Initial training on CDM, monitoring methodology, monitoring procedures and requirements and archiving
- Provide the monitoring officer with a calculation template in electronic form for calculation of annual emission reductions
- Continuous advice to the monitoring officer on a need basis
- Review of monitoring reports