CLEAN DEVELOPMENT MECHANISM
PROJECT DESIGN DOCUMENT FORM (CDM-PDD)
VERSION 03 - IN EFFECT AS OF: 28 JULY 2006

CONTENTS

Annexes

SECTION A. General description of project activity

A.1 Title of the project activity:

Qi'nan Hydro Power Project
Version of Document: version 04
Date of Document: 07/08/2008

A.2 Description of the project activity:

The Qi'nan Hydro Power Project (hereinafter as "the proposed project") is located in Nandong Town, Rucheng County, Chenzhou, Hunan Province, People's Republic of China. The project owner is Yuzaikou Hydropower Co., Ltd. It is a hydropower station with the main objective of generating electricity, of which the total installed capacity is 18 MW. The annual average output of the proposed project is 58,680 MWh and the effective electricity supply to the grid will be 56,640 MWh/year.

The proposed project is a newly built project to fully utilize the water resources of Qijiang river. But another small hydropower project named as Mazitan which is 4km in the downstream of Qi'nan will be influenced, as the water flow will be smaller during dry season after the construction of Qi'nan. The installed capacity of Mazitan is 4.8MW, which was commissioned in 1999 and expected to continue operating till 2034. The average annual electricity generation of Mazitan(from 2003-2007) was 18,000Mwh. After the commission of Qi'nan, the effective average annual output of Mazitan is expected to 10,000Mwh, which will connect to Qi'nan to deliver electricity to grid.

The project will be connected to Guangzhou grid and finally supply electricity for China Southern Power Grid(CSPG) as it is very close to Guangzhou. The CSPG is dominated by fossil fuel-fired generation, covering Guangdong, Guangxi Zhuang Autonomous Region, Yunnan and Guizhou Province[1]. The project will generate certified emission reductions(CERs) by displacing electricity generation from grid connected fossil fuel-fired power plants. Annual emissions reductions for the entire project are expected to be 41,020 tonnes CO2.

The benefits to the sustainable development brought by the construction and development of the proposed project are summarized as follows:

—reduce the GHG emission to mitigate the trend of global warming by providing clean energy;
—replacing fossil fuel-fired generation to alleviate the environmental pollution problem;

[1] Chinese DNA's Guideline of emission factors of Chinese grids

—create job opportunities for local people during the construction period;

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 participants (Yes/No)
People's Republic of China (host)	Yuzaikou Hydropower Co., Ltd	No
Sweden	Carbon Asset management Sweden AB	No
(*)In accordance with the CDM modalities and procedures, at the time of making the CDM-PDD public at the stage of validation, a Party involved may or may not have provided its approval. A the time of requesting registration, the approval by the Party(ies) involved is required.		

A.4. Technical description of the project activity:

A.4.1. Location of the project activity:

A.4.1.1. Host Party(ies):

People's Republic of China

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

Hunan Province

A.4.1.3. City/Town/Community etc:

Chenzhou City/ Rucheng County/Nandong Town

A.4.1.4. Detail of physical location, including information allowing the unique identification of this project activity:

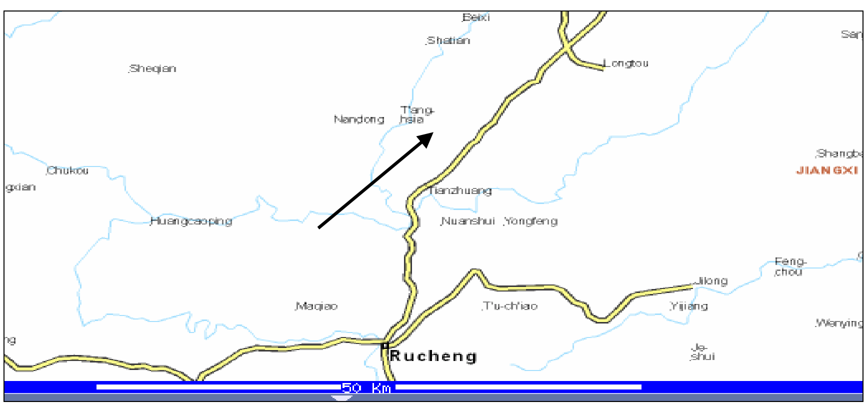
The proposed project is located on the lower reaches of Qijiang River, two kilometers northeast of the town of Nandong, in Rucheng County, Chenzhou City, Hunan Province.

Coordinates: Longitude 133°25′12″; Latitude 25°27′36″

Map 1: Location of Qi'nan Project in Hunan Province

Location of Qi'nan Project

Map 2: Location of Qi'nan Project in the County



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

The proposed project falls into:
Sectoral Scope 1: Energy Industries
Project Activity: Grid-connected renewable Power generation.

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

The proposed project will install two (2) 9 MW Francis turbines with design water level of 55m, average annual discharge of 14.5m^3/s. Main construction structures include a dam, division tunnel, penstock, power house, booster station. The overflow dam will be designed to have three gates size 10x9m. The length and the diameter of the power diversion tunnel are 7005m and 6m respectively and the cross section takes the shape as rectangular with arch crown. The design flood level is 420m. The dam height is 15m and has a crest elevation of 423m, and a crest length of 70m.

The construction period will be about 30 months, the design flood control standard is 30 years and check flood standard is 200 years.

Main Technical Specifications see Table 1:

Table 1 main Technical Parameters

Item	parameter	Source
Installed Capacity	18MW(Mazitan 4.8MW)	FSR
Annual Operation hour	3260h	FSR
Water head	55m	FSR
Rated unit discharge	18.78m^3/s	FSR
Turbine Style	HLA551-LJ-145	FSR
Generator Style	SF9000-14/3250	FSR

The equipments installed are domestic manufactured, no technical transfer concerned.

The project started construction on April 1st 2006, after signed CDM development contract with the consulter in Dec 2005. The first generator is expected to put into commission in October 2008, and the second is expected to generate in Dec. 2008.

Table 2. Timeline for the development of the proposed project

Time	**Status**
March 2003	Established the company
May 2005	Completed the Feasibility Study Report *Note*: CDM considered in FSR as it is not financially attractive. The board meeting held on April 2004 considered CDM financing.
Aug.29th 2005	Environment Impact Assessment Report was approved
Dec 28th 2005	Signed CDM development contract with IC-SHP after buyer found. *Note:* submitted CDM application in Jan. 2005
Jan15th, 2006	Signed term sheet (Letter of Intent)with buyer
Mar. 10th 2006	FSR was approved
Apr.1st 2006	Construction Start Permit
Jul.19th, 2007	PDD published on Web.

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

The proposed project chooses the renewable crediting period of 7 years. The estimated annual emission reduction over the first crediting period is 287,140 tonnes of CO_2e.

Years	Annual estimation of emission reductions in tonnes of CO_2e
2008 (11-12)	6,837
2009	41,020
2010	41,020
2011	41,020
2012	41,020
2013	41,020
2014	41,020
2015(1-10)	34,183
Total estimated reductions (tonnes of CO_2e)	287,140
Total number of crediting years	7 years
Annual average over the crediting period of estimated reductions (tonnes of CO_2e)	41,020

A.4.5. Public funding of the project activity:

This project has not received any public funding from Annex 1 Countries.

SECTION B. Application of a baseline and monitoring methodology:

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

1. Baseline Methodology: "Consolidated baseline methodology for grid-connected electricity generation from renewable sources", ACM0002 version 06 19 May 2006;
2. Monitoring methodology: "Consolidated monitoring methodology for zero-emission grid-connected electricity generation from renewable sources", ACM0002 version 06 19 May 2006;
3. Tool for the demonstration and assessment of additionality. Version 04 30 Nov. 2007

More information for the methodologies and tool listed above is available at the following website:
http://cdm.unfccc.int/methodologies/PAmethodologies/approved.html

B.2 Justification of the choice of the methodology and why it is applicable to the project activity:

The project is a grid-connected renewable power generation activity which meets all the applicable criteria stated in the methodology ACM0002:

1. the project is a new hydropower plant, its surface area at full reservoir level is $49000m^2$, the installed capacity is 18MW, so the power density of the project is $367.3w/m^2$ which is greater than 10 w/m^2
2. the project activity doesn't involve switching from fossil to renewable energy at the site of the project activity;
3. the geographic and system boundaries for CSPG which the project is connected to can be clearly identified and information on the characteristics of the grid is available.

Therefore, the methodology ACM0002 is applicable to the project activity.

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

According to ACM0002, the project boundary includes the proposed project site and all the power plants connected to the grid which the proposed project is also connected to. The proposed project is connected to China Southern Power Grid, which consists of Guangdong, Guangxi Zhuang Autonomous Region, Yunnan and Guizhou Provincial Grid.

The GHG emission sources included in or excluded from the project boundary are as follows:

	Source	Gas	Included?	Justification / Explanation
Baseline	The fuel-fired power plant connected to CSPG	CO2	Yes	It is the major emission sources
		CH4	No	It is excluded for simplification. This is conservative.
		N2O	No	It is excluded for simplification. This is conservative.
Project Activity	Hydro power generation	CO2	No	The project activity is hydropower generation, belongs to grid-connected renewable power generation activity, of which there is no CO2 emission;
		CH4	No	The power density of the project is larger than 10 w/m^2, so the CH4 emission is not considered;
		N2O	No	The project activity is hydropower generation, belongs to grid-connected renewable power generation activity, of which there is no CH4 emission.

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

According to the methodology, in the absence of the CDM project activity, the existing facility would continue to provide electricity to the grid ($EG_{baseline}$, in MWh/year) at historical average levels ($EG_{historical}$, in MWh/year), until the time at which the generation facility would be likely be replaced or retrofitted in the absence of the CDM project ($DATE_{BaslineRrtrofit}$). From that point of time onwards, the baseline scenario is assumed to correspond to the project activity, and baseline electricity production ($EG_{Baseline}$) is assumed to equal project electricity production (EG_y, in MWh/year), and no emission reductions are assumed to occur. All project electricity generation above baseline levels ($EG_{baseline}$) would have otherwise been generated by other power plants currently operating in the grid (see the OM calculation) and by the addition of new generation sources, as reflected in the combined margin (CM) calculations.

In the absence of the proposed project, the original project Mazitan will continue to provide electricity to grid at historical average levels till 2034, as it was commissioned in 1999 and expected to continue operating till 2034. From that point of time onwards, the baseline scenario is assumed to correspond to the project activity, and baseline electricity production ($EG_{Baseline}$) is assumed to equal project electricity production (EG_y, in MWh/year), and no emission reductions are assumed to occur.

The possible baseline scenarios that can provide equivalent services as the proposed activity are as the follows:

1- The proposed project activity does not undertaken as a CDM project activity.

2-Construction of a thermal power plant with equivalent annual electricity generation.

3-Construction of a power plant using other sources of renewable resources with equivalent annual power generation.

4-Equivalent annual electricity supplied by SCPG.

The proposed project is not enforced by the current laws and regulations in China. However, this alternative is not feasible due to the weak financial indicators of the project. According to the financial analysis in section B.5, it is obvious that without the CDM revenues, the project is not financially attractive as its IRR without CDM revenue is only 7.10% which is lower than the national benchmark of 10%. Therefore, 1 is not a realistic and credible scenario.

The average annual operation hour of thermal plant is 5633h[2] which is larger than that of hydropower. Therefore the thermal plant can provide equivalent annual electricity will be less than 18MW. According to the current laws and regulations in China, the coal-fired power plants with the installed capacity less than 135 MW are generally prohibited for construction in the areas covered by large power grids[3]. Therefore, 2 is not a realistic and credible scenario.

Hunan is rich in water resources, but lack of other renewable energy resources, such as wind energy[4]. Furthermore, the unit cost from other renewable sources such as wind energy and solar energy is much higher than hydropower[5]. The economic return of other renewable power plant with similar amount of capacity should be little attractiveness. So scenario 3 is not feasible as a realistic and credible baseline scenario.

Equivalent annual electricity supplied by CSPG is in line with the current lays and regulations in China. CSPG is a fuel-fired dominant power grid, and the installed capacity of the CSPG has been increasing. Moreover, thermal plant technology is matured and it is economically feasible. So scenario 4 is the only realistic and credible baseline scenario.

It can be concluded from above analysis, the only realistic and credible baseline scenario of the project is:

Scenario 4- Equivalent annual electricity supplied by CSPG.

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

"Tools for the demonstration and assessment of additionality" – Version 04 – published by the Executive Board is adopted to demonstrate the additionality of the proposed project.

Hunan Hydro & Electrical Survey and Design Institute were trusted to carry out the feasibility study report of the project and which was completed in May 2005. It was found that the IRR was only 7.10% which is lower than the national benchmark of 10%, so CMD support was considered to increase the financial indicator of the project in the FSR. Therefore, owner started seeking CDM consultation and finally contracted with IC-

[2] http://www.ndrc.gov.cn/zjgx/t20070307_120213.htm

[3] General Office of the State Council, Notice on Strictly Prohibiting the Construction of Fuel-fired power plants with installed capacity of 135MW or below

[4] http://www.china5e.com/www/dev/newsinfo/newsview/viewnews-200712110107.html

[5] http://search.ce.cn/ced/detail.jsp?channelid=79132&record=170

http://news.xinhuanet.com/fortune/2007-12/22/content_7296075.htm

SHP for CDM development in Dec. 2005 when Sweden Carbon Asset was confirmed as a buyer. The project owner has signed a term sheet with the buyer in Jan 2006 and signed the final ERPA in Nov. 2006.The FSR approval was obtained on March 10th 2006. Considering the positive feedback on CDM revenue support, the construction permit was obtained on April 1st 2006. Subsequently, the consultant fully developed the PDD and started to obtain the LoA from the host government. Then they contracted DOE for validation in Jun. 2007. Therefore, the CDM financing was considered before the starting date of construction.

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

Sub-step 1a. Define alternatives to the project activity:
The possible alternatives that can provide equivalent services as the pRoposed activity are as the follows:

Alternative1-The proposed project activity does not undertaken as a CDM project activity.

Alternative2- Construction of a thermal power plant with equivalent annual electricity generation.

Alternative3- Construction of a power plant using other sources of renewable resources with equivalent annual power generation.

Alternative 4- Equivalent annual electricity supplied by CSPG.

Alternative 3- Construction of a power plant using other sources of renewable resources with equivalent annual power generation. As Hunan is rich in water resources, but lack of other renewable energy resources, such as wind energy.[6] Furthermore, the unit cost from other renewable sources such as wind energy(unit cost above 8000yuan/kw) and solar energy(per kwh cost 4 yuan/kwh) is much higher than hydropower.[7] The economic return of other renewable power plant with similar amount of capacity should be little attractiveness. So scenario 3 is not feasible as a realistic and credible baseline alternative.

Sub-step 1b. Consistency with mandatory laws and regulations

Alternative 1 and Alternative 4 are in line with the current laws and regulations in China, but not enforced by laws.
Alternative 2: the average annual operation hour of thermal plant is 5633h which is larger than that of hydropower. Therefore the thermal plant can provide equivalent annual

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[6] http://www.china5e.com/www/dev/newsinfo/newsview/viewnews-200712110107.html

[7] http://search.ce.cn/ced/detail.jsp?channelid=79132&record=170

http://news.xinhuanet.com/fortune/2007-12/22/content_7296075.htm

electricity will be less than 18MW. According to the current laws and regulations in China, the coal-fired power plants with the installed capacity less than 135 MW are generally prohibited for construction in the areas covered by large power grids. Therefore, alternative 2 is not a realistic and credible alternative for the proposed project.

Step 2: Investment analysis

Sub-step 2a. Determine appropriate analysis method

According to "Tool for the demonstration and assessment of additionality (version 04)", three options can be applied to conduct the investment analysis. They are: the simple cost analysis (Option I), the investment comparison analysis (Option II) and the benchmark analysis (Option III).

Since this project will generate electricity and bring financial benefits other than CDM-related income, through the sale of generated electricity, Option I (Simple Cost Analysis) is not applicable.

As alternative 4 is not a concrete investment choice, Option II is not applicable.

Given that the project parameters are available, Option III is adopted to analyze the financial attractiveness of the project activity.

Sub-step 2b. Apply benchmark analysis

According to "Economic Evaluation Code for Small Hydropower Projects"(SL 16-95) Issued by the Ministry of Water Resources, the benchmark FIRR on total investment for hydropower projects is 10%.

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

Table 2. (without CDM revenue)

Items	Unit	Value	Source
Installed capacity	MW	18	FSR
Total investment	Million yuan	128.68	FSR
Annual grid-connected electricity generation	Mwh/year	56，640	FSR
Electricity Tariff(including VAT)	Yuan/kwh	0.35	FSR
Value added tax (VAT)	%	17	FSR
Town building maintenance tax	%	5	FSR
Surcharge for education	%	3	FSR
Income tax	%	33	FSR
Annual O&M cost	Million yuan	5.91	FSR

Project life	year	30	FSR
Expected CER price	USD	9.8	Expected

The FIRR with and without CDM revenue are listed in Table 3. Without the income from CERs, the FIRR of the proposed project is 7.10% too much lower than the benchmark FIRR set in China, so the proposed project is financially unacceptable. With the income from CERs, the FIRR is increased to 9.66%, which increased the financial attractiveness for the project owner.

The National Economic Evaluation of the project is 15%(FSR) which is higher than the Social Discount Rate of 12%, as the benchmark of the National Economic analysis is 12%, so the project is viable though not financially attractive.

Table 3. Comparison of financial indicators with and without CDM revenue

Item	Unit	Without CDM revenue	benchmark	With the CDM revenue
FIRR of total investment	%	7.10	10	9.66

Sub-step 2d: Sensitivity analysis

A sensitivity analysis was conducted by altering the following parameters:

—Total investment

—Operation and maintenance cost

—Operation hours

—Tariff

The above four factors were considered to alternate in order to meet the benchmark FIRR of 10% (without the CDM revenue). Table 4 summarized the results of the sensitivity analysis.

Table 4 Sensitivity analysis of the proposed project

IRR	7.10%	10%	Variation of the parameter to reach the benchmark (%)
Total investment(mil.yuan)	128.68	97.79	- 24%
Annual O&M cost (mil. Yuan)	5.91	3.5	-40.8%
Operation hour (h)	3260	4107	+ 26%
Tariff(yuan)	0.35	0.44	+26%

Significant variations in the key parameters in favour of the project would be required to meet the benchmark IRR, however, which are not considered as a realistic range of assumptions for the project.

-**Total investment**: the total investment should reduce 24% to satisfy the benchmark, however, this is impossible for hydropower project the total investment will exceed the design budget other than reduce. Moreover, the design report was carried out by the Hydraulic and Hydroelectric Project Budget Assessment Standard of Hunan Province which was published in 1998,[8] considering the price of materials has been growing up continuously in the recent years[9] and the interests has been increased several times as well, it is impossible to reduce 24% of the investment.

-**O&M cost**: the annual O&M cost required to reduce 40.8%, however, only the compensation to the Mazitan project amounts to 3.2 million yuan annually[10]. The final O&M cost is impossible to be reduced to 3.5 million yuan. So, it is impossible to reach the benchmark by reduce the O&M cost to 40.8%.

-**Operation hour**: the expected operation hour of the proposed project indicated in the FSR is scientific and reliable, as it was calculated based on 43years'historical statistics of the drainage area of the river[11]. The FSR was carried out by the Hunan Hydraulic & Hydroelectric Survey and Design Institute, which was certified as the first-class Survey and Design Institute in the filed of hydropower in the country. The operation hour is likely to fluctuate only within very small range. 26% of increase in annual operation hour is absolutely impossible. Therefore, it is not likely to reach the benchmark by the increase of operation.

-**Tariff:** the electricity tariff contracted with the grid company is 0.35yuan/kwh (including VAT), which is fixed. As China adopts the policy of "Price Competition for Electricity Supply to Grid", the grid company always offer lower tariff for rural hydropower projects. So, it is unlikely to be increased by 26% for the project.

Therefore we can conclude that the project (without carbon) is not financially attractive and would not be implemented without CDM revenue.

Step 3: Barrier analysis

The proposed project does not adopt this step analysis.

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[8] See the feasibility study report page 14-1

[9] http://www.xg360.com.cn/hall/sector_archives/sector_news_detail.aspx?id=33830

[10] See the historical generation explanation.

[11] FSR page2-5

Step 4. Common practice analysis

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

A list of some existing hydro power plants with installed capacity between15-25 MW commissioned after 2002 in Hunan province is given in the following table:

Table 5: Hydropower projects (between 15-25MW) in Hunan Province[12]

No.	Project	Capacity (MW)	Commission year	IRR	Unit cost (yuan/kw)	Project owner
1	Wannianqiao	15	2004	/	/Public fund	Rucheng country power company
2	Yangmingshan Second Stage	22	2004	IRR 12.4%	4800	Xiangneng Group
3	Yongxing Second Stage	20	2005	IRR 10.8%	/Public fund	Yongxing Hydropower Corp.
4	Jiexikou	20	2005	/	5700	Hunan Xulin Hydropower Co.
5	Chengjiangkou	25	2006	IRR 10.2%	/	Chenjiangkou Group
6	Mulongtan	15	2003	IRR 11.1%	/	Gezhouba Group
7	Ruoshui	15	2006	IRR10.35%	/	Zhejiang SanyiCo.ltd

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

The projects listed in Table 5 are in the same region(Hunan Province), rely on a broadly similar technology, are of a similar scale(small scale rural hydropower station with the capacity below 25MW[13], but >15MW belongs to large scale CDM project), and take place in a comparable environment with respect to regulatory framework, investment climate, access to technology, access to financing, which are built after the separate of plant and grid in 2002. As most of the hydropower plants completed before 2002 were all developed by stated-owned enterprises, or constructed with national or local governmental funds, or the government provided the loan guarantee, the developers didn't have any financing difficulties. So we do not consider these projects as common practice activity.

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[12] China Water Resource Yearbook(2006);

http://www.netinform.net/KE/files/pdf/China%20Shaibeitan%20Hydropower%20project-Version%2003.1-2007.07.25.pdf

[13] Economic Evaluation Code for Small Hydropower Projects"(SL 16-95)

There are essential distinctions between the proposed project and the hydropower projects with installed capacity of 15-25MW constructed since 2002 in Hunan Province (listed in Table 5): First, Hunan Province started to carry out demonstration projects of "SHP Replacing Firewood Program" since 2001 and established related favorable policies. The Wannianqiao project and Yongxing Second Stage were enrolled as demonstration project and gained the national special fund of the "SHP Replacing Firewood Program"[14]; while the proposed project does not have any governmental fund support. Second, investors will develop the hydropower projects with good technical and economic indicators, the Yangmingshan Second Stage and Jiexikou project were developed earlier with excellent natural conditions and low construction cost. The total investment of Yangmingshan Second Stage is 120 million yuan[15], installed capacity is 22MW, so the unit cost of which is only 4800 yuan/kw; the total investment og Jiexikou project is 114 million yuan, in stalled capacity is 20MW[16], of which the unit cost is 5700yuan/kw. It is clear that the unit cost of the two projects is much lower than the proposed project that is 7148yuan/kw. Third, the Chengjiangkou project is invested by Zixing Chengjiangkou power company, of which the FIRR is 10.2% higher than the national benchmark. As a key project of Zixing, it has enjoyed favorable policies in terms of tax, land usage etc[17].And the IRR of Mulongtan and Ruishui project is 11.1% and 10.35% higher than the benchmark as well[18]. However, the FIRR of the proposed project is only 7.10%, lower than the national benchmark. Moreover, the project owner is a private company, the local bank has strict requirements for its loan release. It has indicated without the CDM support, it will limit the rest loan release[19].

So the proposed project faces severe investment barrier and is not a common practice.

To sum up, the proposed project has strong additionality.

B.6 Emission reductions;

B.6.1. Explanation of methodological choices:

Project Emission:
According to the baseline methodology ACM0002, for new hydroelectric power projects with reservoirs, if the power density of the project is greater than 10 w/m^2, then the project emission PE_y=0. For the proposed project, the power density is 367.3w/m^2, larger

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[14] http://hlj.rednet.com.cn/Articles/2003/07/442454.HTM

[15] http://www.86ne.com/Ocean/200411/Ocean_31554.htm

[16] http://www.shaoyang.gov.cn/other/syagri/market/detail.asp?n_id=604

[17] http://news.rednet.cn/c/2003/04/23/411745.htm

[18] http://www.netinform.net/KE/files/pdf/China%20Shaibeitan%20Hydropower%20project-Version%2003.1-2007.07.25.pdf

[19] See the letter from bank provided by the project owner.

than10w/m^2. According to the baseline methodology ACM0002, the project emission PE_y=0.

Baseline Emission

The proposed project connected to CSPG, and CSPG was identified as the baseline Grid. According to baseline methodology ACM0002, the baseline emissions are the CO2 emissions from the equivalent electricity generation in CSPG that are displaced by the project activity. The proposed project is a newly-built hydropower project; however, one original hydro project Mazitan in downstream will be influenced during dry season. Its annual output will be reduced in some degree. The recent 5 years' historical generation of the original project is available, and its lifetime is 35 years (1999-2034) which will cover the whole crediting period of the proposed project[20]. According to ACM0002, the project boundary includes the proposed project site and all the power plants connected to the grid which the proposed project is also connected to. As the Mazitan is in the project boundary and it need to deduct the influenced amount of generation during the calculation of baseline emission. The historical generation of the original project is shown below(unit:Mwh):

Month / Year	Jan	Feb	Mar	Apri	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Subtotal
2003	500	610	1250	2050	2080	2540	2100	2480	1760	680	780	760	17590
2004	660	690	1300	1980	2350	2100	2080	2340	1800	780	880	890	17850
2005	480	550	1160	2110	2160	2440	2090	2380	1750	660	770	850	17400
2006	720	760	1450	2100	2250	2600	2260	2550	1860	650	1080	920	19200
2007	450	560	1340	2060	2100	2520	2200	2450	1820	600	980	880	17960
Average	562	634	1300	2060	2188	2440	2146	2440	1798	674	898	860	18000

So for the proposed project, the baseline emissions can be obtained by the following equation:

$$BEy = EG_y * EF_y$$
$$= (EGy - EG_{historicale}) \times EF \text{(unitl } \mathbf{DATE}_{\text{baseline Retrofit)}} \qquad (1)$$

Where:

BEy is the baseline emissions in a given year *y*. in tCO_2e;

EGy is the electricity supplied by the project activity to the power grid in year *y*, in Mwh;
$EG_{historical}$ is the historical Electricity Production;

[20] See the historical generation statement.

EFy is the baseline emissions factor in year y, in tCO_2e/Mwh.

According to the baseline methodologyACM0002, the baseline emission factor (EF_y) is calculated as a Combined Margin (CM), which consists of the weighted average of the Operating Margin emission factor ($EF_{OM,y}$) and the Build Margin emission factor ($EF_{BM,y}$) by utilizing an ex-ante 3 years' data vintage for the CSPG. The data used in calculation are from official source and made publicly available.

The baseline emission factor can be calculated with the following steps described below.
Step1. Calculate the Operating Margin emission factor($EF_{OM,y}$);
Step 2. Calculate the Build Margin emission factor($EF_{BM,y}$);
Step 3. Calculate the Baseline emission factor (EF_y)

Step 1 Calculate the Operating Margin emission factor ($EF_{OM,y}$)
Baseline methodology ACM0002 gives the four following methods to calculate the operating margin emission factor ($EF_{OM,y}$):
(a) Simple OM , or
(b) Simple adjusted OM, or
(c) Dispatch data analysis OM, or
(d) Average OM.

Method(c) should be the first methodological choice. However, this method requires the detailed dispatch data of CSPG, which are confidential information and are not available publicly. Thus, method(c) is not applicable. Due to the same reasons, the method (b) is not applicable, neither.

Method (a) can only be used where low-cost/must run resources constitute less than 50% of total grid generation in :1) average of the five most recent years, or 2) based on long-term normal data calculation. The low-cost/must runs resources in CSPG including hydropower, wind, geothermal, low-cost biomass, nuclear and solar energy generation. In the five most recent years from 2001 to 2005, the low-cost/must run resources constituted less than 50% of total power generation of the China Southern Power Grid and the relevant ratios are respectively 33.76%, 32.98%, 31.06%, 29.95% and 30.41%[21]. As a result, the simple OM method can be used to calculate the operating margin emission factor ($EF_{OM,y}$).

Method (d) is applicable where low-cost/must run resources constitute more than 50% of total grid generation. So it is not applicable for the proposed project as the low-cost/must run resources constituted less than 50% of total power generation of CSPG.

[21] China Electric Power Yearbook 2002-2006

Therefore, the proposed project adopts method (a) to calculate the Operating Margin emission factor.

The Simple OM emission factor ($EF_{OM,simple,y}$) is calculated as the generation-weighted average emissions per electricity unit (tCO2e/MWh) of all generating sources serving the system, not including low operating cost and must-run power plants. The ex-ante 3 years' statistical data vintages of CSPG is publicly available, the formula of $EF_{OM,simple,y}$ calculation is:

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

Where:
$F_{i,j,y}$ is the amount of fuel *i* (in a mass or volume unit) consumed by relevant power sources *j* in year(s) *y*;
$COEF_{i,j}$ 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 province *j* and the percent oxidation of the fuel in year(s) *y*;
$GEN_{j,y}$ is the electricity (MWh) delivered to the grid by province *j*.
The CO_2 emission coefficient $COEF_i$ *is* obtained as

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

Where:
NCV_i is the net calorific value (energy content) per mass or volume unit of a fuel *I*, the country specific value has been chosen;
$OXID_i$ is the oxidation factor of the fuel *i*, the IPCC default value has been chosen;
$EF_{CO2,i}$ is the CO_2 emission factor per unit of energy of the fuel *i*, the IPCC default value has been chosen;
There are imports from other grid to CSPG (but not exceed 20% of its total generation), as it's impossible to identify the specific power plants which export the amount of electricity, the average emission factor of their Grid has been adopted.

$EF_{OM,y}$ is calculated according to the statistics information of recent 3 years (from 2003 to 2005), the data are the latest and available at the time of this PDD submission, the detailed calculation is shown in Annes3.

Step 2 Calculate the Build Margin emission factor ($EF_{BM,y}$)
According to ACM0002, the BM is calculated as the generation-weighted average emission factor of a sample of power plants *m*, as follows:

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

Where:
$F_{i,m,y}$ is the amount of fuel *i* (in a mass or volume unit) consumed by plant *m* in year *y*;
$COEF_{i,m}$ is the CO_2 emission coefficient (tCO_2e / a mass or volume unit) of fuel *i*, taking into account the carbon content of the fuels used by plant *m* and the percent oxidation of the fuel in year *y*;
$GEN_{m,y}$ is the electricity (MWh) delivered to the grid by plant *m in year y*.

The methodology provides two options for the BM calculation :1) Ex-ante calculation based on the available data in the recent three years when the PDD submission; 2) Ex-post update BM according to the actual generated electricity and emission reductions in the first crediting period, and in other crediting period the ex-ante calculation like the first choice can be adopted.

The result of BM emission factor in this project is based on the first choice: ex-ante calculation and the update for the emission factor are not needed.

Because some data can't be available, the BM calculation in this PDD adopts the modifications methods agreed by the CDM EB. First, calculate the newly added installed capacity and the various component technologies, then calculation of the weight of newly added installed capacity of each power generation technology. Finally the commercial and efficient level of each power generation technology is adopted to calculate BM emission factor.
Because the generating capacity of the coal-fired, oil-fired and gas-fired technology can not be separated from the existing statistical data, the BM calculation in this PDD adopts the following method: First, use the available data in the energy balance tables on the most recent year, then calculate the proportion of CO_2 emissions from solid, liquid and gaseous fuels corresponding to the total emissions of CO_2 emissions; Second, the proportion used as the weight, based on the emission factors of the optimal efficient and commercial technologies, calculate the emission factor of the thermal power in each grid. Finally, this thermal emission factor is multiplied by the proportion of thermal power added capacity in the additional 20% capacity. The result is BM emission factor.

Concrete steps and the formula for BM are as follows:

Sub-step1: Calculation of the proportion of CO_2 emissions from solid, liquid and gaseous fuels corresponding to the total emissions of CO_2 emissions.

$$\lambda_{Coal}=\frac{\sum_{i\in COAL,j}F_{i,j,y}\times COEF_{i,j}}{\sum_{i,j}F_{i,j,y}\times COEF_{i,j}}\quad \lambda_{Oil}=\frac{\sum_{i\in OIL,j}F_{i,j,y}\times COEF_{i,j}}{\sum_{i,j}F_{i,j,y}\times COEF_{i,j}}\quad \lambda_{Gas}=\frac{\sum_{i\in GAS,j}F_{i,j,y}\times COEF_{i,j}}{\sum_{i,j}F_{i,j,y}\times COEF_{i,j}}\quad (5)$$

Where:
$F_{i,j,y}$ is the amount of fuel *i* (in a mass or volume unit) consumed by province *j* in year *y*;
$COEF_{i,j,}$ is the CO_2 emission coefficient (tCO_2e / a mass or volume unit) of fuel *i*, taking into account the carbon content of the fuels used by province *j* and the percent oxidation of the fuel in year *y*;
Coal, Oil and Gas is the footmarks of solid fuels, liquid fuels and gas fuels.

Sub-step2: Calculation the emission factor of thermal power.

$$EF_{Thermal}=\lambda_{Coal}*EF_{Coal,Adv}+\lambda_{Oil}*EF_{Oil,Adv}+\lambda_{Gas}*EF_{Gas,Adv} \qquad (6)$$

$EF_{Coal,Adv}$、$EF_{Oil,Adv}$、$EFGas_{,Adv}$ represent the emission factors of coal-fired, oil-fueled and gas-fueled generation technologies with the best efficiency level commercially available.

Sub-step 3: Calculation of BM in the grid.

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

Where:
CAP_{Total} is the total added installed capacity;
$CAP_{Thermal}$ is the total added installed capacity for thermal power.
$EF_{thermal}$ is the fuel-fired emission factor.

Detailed calculation is shown in Annex 3.

Step 3 Calculate the baseline emission factor EFy
The baseline emission factor is the weighted average of the Operating Margin emission factor ($EF_{OM,}y$) and the Build Margin emission factor (EF_{BM},y):

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

Where the weight w_{OM} and w_{BM} by default, are 50%. $EF_{OM,y}$ and EF_{BM},y can be obtained from the calculation of the above steps.

Step 4 Calculate the baseline emissions (BEy) and emission reductions (ERy)

Leakage

According to the baseline methodology ACM0002, the proposed project has no leakage *Ly*=0.

Emission Reductions
The annual emission reductions *ERy* by the project activity during a given year y are the difference between baseline emissions (*BEy*), project emissions (*PEy*) and emissions due to leakage (*Ly*), as follows:

$$ERy=BEy-PEy-Ly \quad (9)$$

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

(Copy this table for each data and parameter)

Data / Parameter:	**NCV_i**
Data unit:	MJ/t or MJ/Km^3.
Description:	The Net calorific value per mass or volume unit of a fuel *i*
Source of data used:	China Energy Statistical Yearbook 2006
Value applied:	See Annex 3 for details.
Justification of the choice of data or description of measurement methods and procedures actually applied :	Data used are from Chinese Authorities
Any comment:	

Data / Parameter:	**$OXID_i$**
Data unit:	%
Description:	The oxidation factor of the fuel *i*
Source of data used:	Revised 2006 IPCC Guidelines for National Greenhouse Gas Inventories
Value applied:	See Annex 3 for details.
Justification of the choice of data or description of measurement methods and procedures actually applied :	Adopt the IPCC default value
Any comment:	

Data / Parameter:	$EF_{CO2,i}$
Data unit:	tC/TJ
Description:	the CO2 emission factor per unit of energy of the fuel *i*
Source of data used:	Revised 2006 IPCC Guidelines for National Greenhouse Gas Inventories
Value applied:	See Annex 3 for details.
Justification of the choice of data or	Adopt the IPCC default value

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

Data / Parameter:	$F_{i,j,y}$
Data unit:	10^4t,10^7m^3
Description:	the amount of fuel *i* (in a mass or volume unit) consumed by province *j* in year(s) *y*
Source of data used:	China Energy Statistical Yearbook 2004-2006
Value applied:	See Annex 3 for details.
Justification of the choice of data or description of measurement methods and procedures actually applied :	Data used are from Chinese Authorities
Any comment:	Accurate

Data / Parameter:	**$GEN_{j,y}$**
Data unit:	MWh.
Description:	The electricity (MWh) connected to the grid by source *j* of each province connected to CSPG.
Source of data used:	China Energy Statistical Yearbook
Value applied:	See Annex 3 for details.
Justification of the choice of data or description of measurement methods and procedures actually applied :	Data used are from Chinese Authorities
Any comment:	

Data / Parameter:	$CAP_{j,y}$
Data unit:	MW
Description:	The installed capacity of power source j in year y
Source of data used:	China Electric Power Yearbook 2001-2006
Value applied:	See Annex 3 for details.
Justification of the choice of data or description of measurement methods and procedures actually applied :	Data used are from Chinese Authorities
Any comment:	

Data / Parameter:	Internal Power consumption rate of power plant
Data unit:	%
Description:	The internal power consumption rate of power plant in each province connected to CSPG in year y
Source of data used:	China Electric Power Yearbook 2004-2006
Value applied:	See Annex 3 for details.
Justification of the choice of data or description of measurement methods and procedures actually applied :	Data used are from Chinese Authorities
Any comment:	Reasonable

Data / Parameter:	$EF_{Coal,Adv}$ $EF_{Gas,Adv}$ $EF_{Oil,Adv}$
Data unit:	tCO2e/MWh
Description:	The emission factor of the most efficient commercial coal-fueled, oil-fueled and gas-fueled power plant
Source of data used:	Official data
Value applied:	See Annex 3 for details.
Justification of the choice of data or description of measurement methods and procedures actually applied :	Data used are from Chinese Authorities
Any comment:	

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

Project Emission:
The proposed project belongs to grid-connected renewable energy power generation, and the power density is 367.3w/m^2, larger than10w/m^2. According to the baseline methodology ACM0002, the project emission PE_y=0.

Baseline Emission

The Qi'nan project is proposed to fully utilize the water resources of the river section. While,the original built Mazitan hydro power plant will be influenced during dry season, but operate normally during wet season. The effective electricity supplied to grid by Qi'nan will be 56,640Mwh.The historical average annual output of mazitan is 18,000Mwh($EG_{historical}$), and its expected average annual output after the commission of Qi'nan will amount to 10,000Mwh, which will be connected to Qi'nan project after its commission. The lifetime of Mazitan is 35 years and it was commissioned in 1999. It will be likely be replaced in 2034 in the absence of the proposed project. Thus the total annual electricity supplied to CSPG by both projects will be 66,640Mwh(EG_y).

According to the formula (2)-(8) in section B.6.1, the results of EF_{OM} , EF_{BM} , 和 EF_Y are listed in following Table 6, the detailed calculation is shown in Annex 3.

Table 6 Calculating result of baseline emission factor of CSPG

EF_{OM} (tCO_{2e}/Mwh)	EF_{BM} (tCO_{2e}/Mwh)	EF_Y (tCO_{2e}/Mwh)
1.0119	0.6748	0.84335

According to the formula(1) in section B.6.1, the baseline emission (BE_y) of the project in a typical year are calculated as follow:

BEy = **EG *EF**$_y$
= (*EGy-EG*$_{historicale}$*)*EF*(unitl **DATE**$_{baseline\ Retrofit}$)
= **(EG**y ,pa + **EG**y,m -***EG***$_{historicale}$***)*EF***(unitl **DATE**$_{baseline\ Retrofit}$)
= (66640 Mwh -18000 Mwh)*0.84335 tCO_{2e}/Mwh
=41,020 tCO_{2e}

Where:

***EGy,pa* :**Net electricity to the grid by Project Activity
***EGy,m* :**Net electricity to the grid by Mazitan

BE_y: Baseline emissions (tCO_2)

EG_y: Total electricity supplied by the project to the grid (MWh)

$EG_{historical}$: Historical electricity production

EF_y: baseline emission factor (tCO_2/MWh)

y: refers to a given year

Leakage:
According to the baseline methodology ACM0002, L_y=0

Emission Reductions:
According to the formula (9) in section B.6.1, the emission reductions (ER_Y) of the project in a typical year are calculated as follow:

ER_Y(tCO_{2e}/yr)= *BEy-PEy-Ly=41,020-0-0*=41,020 tCO_{2e}/yr

Therefore, the annual emission reduction of the proposed project is 41,020tCO_{2e},.

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

Years	Estimation of project activity emission (tCO_2e)	Estimation of baseline emission (tCO_2e)	Estimation of Leakage emission (tCO_2e)	Estimation of emission reductions (tCO_2e)
2008(Nov.-Dec)	0	6,837	0	6,837
2009	0	41,020	0	41,020
2010	0	41,020	0	41,020
2011	0	41,020	0	41,020
2012	0	41,020	0	41,020
2013	0	41,020	0	41,020
2014	0	41,020	0	41,020
2015 (Jan-Oct.)	0	34,183		34,183
Total (tCO_2e)	0	287,140	0	287,140

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

B.7.1. Data and parameters monitored

Data / Parameter:	$EG_{y,m}$
Data unit:	MWh.
Description:	Electricity delivered to CSPG by the Qi'nan project
Source of data used:	Automatically measured by meter
Value of data applied for the purpose of calculating expected emission reduction in section B5:	56,640
Description of measurement methods and procedures to be applied :	The M1&M2 will record the electricity supplied to grid by Qi'nan. The data will be measured hourly and recorded monthly. For detailed description of measurement, see B.7.2
QA/QC procedures to be applied:	details see B.7.2
Any comment:	

Data / Parameter:	$EG_{y,pa}$
Data unit:	MWh.
Description:	Energy delivered to CSPG by Mazitan
Source of data used:	Automatically measured by meter
Value of data applied for the purpose of calculating expected emission reduction in section B5:	10,000

Description of measurement methods and procedures to be applied :	The M3 meter will record the electricity supplied to grid by Mazitan. The data will be measured hourly and recorded monthly. For detailed description of measurement, see B.7.2
QA/QC procedures to be applied:	details see B.7.2
Any comment:	

Data / Parameter:	**$EG_{historical}$**
Data unit:	MWh.
Description:	Historical generation of the original project
Source of data used:	Project site
Value of data applied for the purpose of calculating expected emission reduction in section B5:	18,000
Description of measurement methods and procedures to be applied :	5 recent years' generation calculation
QA/QC procedures to be applied:	Kept two years' after the credit period
Any comment:	

Data / Parameter:	**A_{BL}**
Data unit:	m^2
Description:	Surface area at full reservoir level before the implementation of the project.
Source of data used:	Project site
Value of data applied for the purpose of calculating expected emission reduction in section B5:	49,000 m^2
Description of measurement methods and procedures to be applied :	Measured from topographical surveys
QA/QC procedures to be applied:	Kept during the crediting period
Any comment:	

B.7.2. Description of the monitoring plan

The proposed project owner is the entity who carries out this monitoring plan. The aim of this monitoring plan is to make sure that the emission reduction quantity monitored and evaluated during the project activity's vintage is completed, consistent, clear and precise. All the data and related documents should be available for the contracted DOE validation and verification. The details are summarized as follows:

1. Monitoring Subject

The electricity delivered to CSPG by the original project Mazitan and Qi'nan project will be monitored.

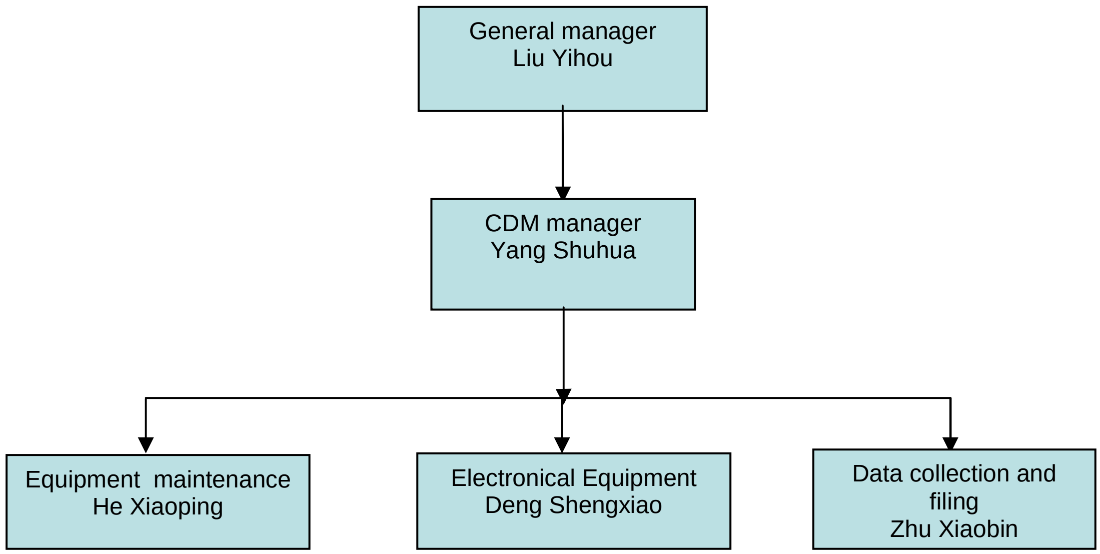
Meanwhile, the annual historical generation of Mazitan project prior to the commission of Qi'nan will be documented and preserved two years after the crediting period, the OM&BM calculation as well.

2. Monitoring Organization

In order to ensure the monitoring plan work effectively and efficiently, the project owner has established the processing and managing structure as shown in chart 1, which identified the relative staff and institution for the implementation of this monitoring plan.

The general manager of the proposed project Mr. Liu Yihou will responsible for the whole monitoring plan and checkup the data filed and the monitoring report. Mr. Yang Shuhua is designated as CDM manager to take charge of supervising and demonstrating all the measuring and recording tasks, such as collecting data(ammeter reading, sale receipts), calculating emission reduction and preparing monitoring report etc; he will also be responsible for training the relative staffs, such as CDM knowledge, the operational regulations, the data recording requirements and the management rules etc. Engineer He Xiaoping will responsible for the hydraulic equipment(including turbine, generator etc) maintenance; Deng Shengxiao will be responsible for the electronic equipment (including meters, control room etc). Zhu Xiaobin will be responsible for data reading and recording.

Chart 1. Monitoring organization



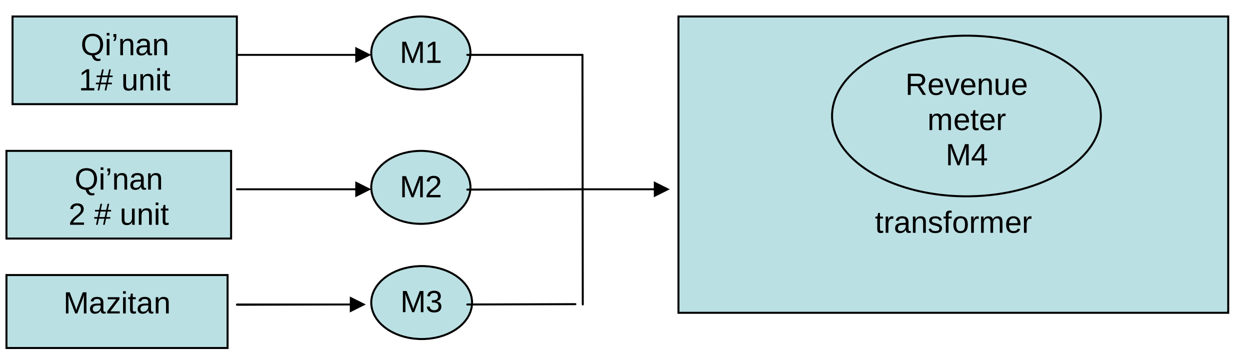
3. Meter Installation

Electricity meters should meet the relevant standards at the time of installation. Before installation, it should be factory calibrated by the manufacturer. The meters will be installed by the project owner and the grid company according to relevant national standard (JJG596-99). Records of the meters (type, model and calibration documentation) will be retained in the quality control system.

M1&M2 will be installed to measure the electricity generated by Qi'nan. M3 will be installed to measure the electricity generated by the original project-Mazitan.

M4 is the revenue meter of the project and will be installed at the transformer site to measure the total electricity supplied to SCPG. See Chart 2

Chart 2. Meter Installation



4. Data Recording

Metering of electricity delivered to grid:

M1&M2 records the electricity generated by Qi'nan and M3 records the electricity generated by Mazitan. The accuracy of meter is 0.5S. The meters will be measured hourly and recorded monthly.

The revenue meter M4 is used for cross-check, which records the total electricity delivered to grid. It is a 2-way recording meter and its accuracy is 0.5S. The meters will be measured hourly and recorded monthly. There will be slight transmission loss between M4 and subtotal of (M1+M2+M3).

The grid company will send separate invoices to the project owner with the amount of net electricity that each project supplied to grid every month. For the purpose of conservation (allowing the deduction of transmission loss), the figure on the invoice will be adopted for emission calculation.

5. Quality Control

Meter adjustment
All the meters should be in good status and meet the national electricity industry standards in order to insure the precision of meter. Periodic tests should be carried out by qualified institutions or companies. After the test, the meter should be sealed by the project owner and the power grid company. Any party mustn't dismantle or change independently.

When the following circumstances occurred, all the ammeters should be tested in 10 days:
—the error of revenue meter or the other meters exceeds the allowable range specified by the national standards(JJG596-99);
— the meter is repaired or replaced.

When the revenue meter is failed, the project should read and record the back-up meter data in stead.

In case of failure of both revenue meter and back-up meter, the data of the cross-check meters can be used, the electricity delivered to grid should be calculated as the follows:
a) the data from cross-check meters will be used for the period, with a minor adjustment to allow for transmission losses;
b) according to the historical transmission loss rate to calculate the electricity delivered.

6. Data Collection & Management

At the end of each month, the monitoring data needs to be filed. All monitoring data should be saved in electrical recording form and the electrical documents should be stored in hard disc, and print out hard copies. The project owner should also keep the sale invoices and receipts. The project owner should provide related documents such as maps, forms, design report to DOE to prove the authenticity of all the information.

The project owner should prepare a monitoring report at the end of each year, which includes the on-grid electricity quantity monitoring files, the verification files, the emission reduction evaluation files and the records on monitoring apparatus' repairs and tests. The report should be distributed to DOE, buyer and the consultancy.

All the data should be preserved two years after the vintage.

7. Monitoring Principle

This monitoring plan is compiled according to the monitoring methodology ACM0002. The project owner should carry out all the tasks strictly in order to guarantee the truth and reliability of the information monitored and ensure the effectiveness of GHG emission reduction of the project. The project should provide all the related documents and information for DOE validation and verification. The buyer and consultancy have the right to know the monitoring results.

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

The baseline study and monitoring methodology were completed on 15/02/2007 by:

Ms. Hu Xiaobo & Ms. Wang Xianlai
IC-SHP, No. 136 Nanshan Rd., Hangzhou, P.R. China
Tel: +86-571-87132792
Fax +86-571-87023353
Email hic@mail.hz.zj.cn
(Non of the people or entity referred above is the project participant)

SECTION C. Duration of the project activity / Crediting period:

C.1. Duration of the project activity:

C.1.1. Starting date of the project activity:

01/04/2006 (construction starting permit date)

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

30y-0m

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

C.2.1. Renewable crediting period:

7 × 3 years=21 years

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

01/11/ 2008 or the date of registration, whichever is later.

C.2.1.2. Length of the first crediting period:

7y-0m

C.2.2. Fixed crediting period:

>>
Not applicable

C.2.2.1. Starting date:

>>
Not applicable

C.2.2.2. Length:

>>
Not applicable

SECTION D.: Environmental impacts:

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

The Environment Impact Assessment (EIA) report was carried out by Hunan Provincial Environment Protection Institute and approved by Hunan Provincial Environment Protection Bureau on 29th August 2005. The impact was summarized as the follows:

Impacts on water:
The construction of the proposed project almost has no negative influence to the water. The waste water produced during the construction period by earth excavation, concrete molding, washing of trucks and machines will be deposited and separated by water & oil, which will discharged after meeting all the requirements of environment projection.

Impacts on air:
The construction of project will cause powdery dust and floating dust. The trucks will be covered to avoid earth drops, the road will be sprinkled, and mixing machines will be

installed dust catcher to reduce the floating dust. Necessary measures will be taken to ensure the air pollution controlled within the environment protection standard.

Noise impacts:
The noise mostly comes from mechanical tools, vehicles and blasts during construction. However, the very far distance between construction area and nearby residences will affect local residents little. Furthermore, noise proof measures will be taken to protect the construction workers.

Solid waste:
The selected 3 spoil sites for solid waste are reasonable. Through the construction of stone pitched water-retaining structure and drainage ditch, the soil and water lose will be controlled within the environment projection requirements. The living waste will be delivered to the nearest refuse dump which will not cause environment pollution.

Ecology impact:
There is no rare wild animal or plant found within the project area, no spawning migration fishery within the project river section neither. So it will not cause large ecology impact.

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 host party and the project owner both regard that the proposed project will not bring significant impacts on the environment.

SECTION E. Stakeholders' comments:

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

On April 10th, 2005, the project owner has taken public questionnaire approach and visited 50 residents to collect the individual opinions, attitude, suggestion and reviews on the proposed project from extensive groups and person affected in the project area. The universality and typicality was seriously taken into account when executing the public sample investigation, thus this process involved the mass of various gender, age, vocation and education level. The residents in Tuoshuihe river section were emphasized when carrying out the investigation.

The questions listed in the questionnaires are as the follows:

- Do you know it is planed to construct Qinan project?
- Do you think the project will impact the environment around
- What do you think the project should most concern?
- What is your view about the local environment ?
- What are you concering about the prjoect construction?
- What do you think the most significant impact the project will bring?
- What is the largest impact of Tuoshuihe river section to your life?
- Which pollution is the most serious to your life?
- Do you support the project construction?

E.2. Summary of the comments received:

The investigation had distributed 50 questionnaires, and collected 50 effective questionnaires back, the percentage is 100%.

Table 7. public questionnaire results form

Question	Opinion & Ratio			
Do you know it is planed to construct Qinan project?	yes (88%)	No (2%)	Heard of (10%)	
Do you think the project will impact the environment around	greatly (14%)	Neutral (82%)	No realted (4%)	
What do you think the project should most concern?	generation (14%)	scene (0%)	ecologypro tection (86%)	
What is your view about the local environment ?	Good (30%)	Common (68%)	Not good (2%)	
What are you concering about the prjoect construction?	economic benefit (12%)	Ecology benefit (56%)	Social benefit (32%)	
What do you think the most significant impact the project will bring?	Nature (4%)	ecology (58%)	economy (40%)	Don't know (2%)
What is the largest impact of Tuoshuihe river section to your life?	irrigation (54%)	drinking (18%)	other (6%)	Not related (22%)
Which pollution is the most serious to your life?	noise (32%)	ecology (70%)	Water pollution	airpollut ion

			(4%)	(0%)
Do you support the project construction?	support (90%)	disagree (0%)	Neutral (10%)	

The results indicates that most of interviewees support the proposed project, and believe the project will promote the economy development and improve the living standard of local people. They hope it can complete as early as possible. The public realized and concerned the impacts to the environment, they agree the impact will be controlled after taking measures. Most of them support the construction of the project and require the project owner should solve the pollution problem and ecology recovery after the construction. They call for the harmonized development of economic and environment protection.

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

Some villagers from Gaoyue Village required the project owner to solve the irrigation problem. The project owner signed land use agreement with Gaoyue Village and provide fund for the construction of a division channel and made compensation for the villages. At present, the division channel was completed which can guarantee the irrigation of the whole village.

For the concerned environmental problem, the project owner will carry out the protection and dealing measures according to the feasibility design and environmental protection requirements, to reduce the negative impact to an acceptable level.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

(Please repeat table as needed)

Organization:	Yuzaikou Hydropower Co. ltd
Street/P.O.Box:	Wenhua Road 3
Building:	
City:	Nandong Town, Rucheng
State/Region:	Hunan
Postcode/ZIP:	423000
Country:	P. R. China
Telephone:	+86 (0) 735 842 0318
FAX:	+86 (0) 735 822 2828
E-Mail:	-
URL:	-
Represented by: Liu Yihou	
Title:	Mr.
Salutation:	Mr.
Last Name:	Liu
Middle Name:	
First Name:	Yihou
Department:	Administration
Mobile:	+86 139 735 185 69
Direct FAX:	+86 (0) 735 822 8172
Direct tel:	+86 (0) 735 823 0909
Personal E-Mail:	

Organization:	Carbon Asset management Sweden AB
Street/P. O. Box:	Drottninggatan 92-94,
Building:	
City:	Stockholm
State/Region:	
Postcode/ZIP:	SE-111 36
Country:	Sweden
Telephone:	+46 (0)8 506 885 00
FAX:	+46 (0)8 34 60 80
E-Mail:	marco@tricorona.se
URL:	http://www.camsweden.se/

Represented by:	
Title:	
Salutation:	Mr.
Last Name:	Berggren
Middle Name:	
First Name:	Marco
Department:	Technical Department
Mobile:	+46 (0) 70 72 67 455
Direct FAX:	+46 (0) 8 34 60 80
Direct tel:	+46 (0) 8 50 62 63 94
Personal E-Mail:	marco@tricorona.se

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

The project has no public funding from Annex 1 countries.

Annex 3

BASELINE INFORMATION

The baseline information for calculation of OM, BM and CM emission factor of China Southern Power Grid is shown in the Report on Dertermination of Baseline Grid Emission Factor by China DNA NDRC at http://cdm.ccchina.gov.cn.

The concrete process is shown in the following:

Table A1 OM Emission Factor Calculation of CSPG for Year 2003

Fuel	Unit	Guang dong	Guangxi	Guizhou	Yunnan	total	EF	Oxidation	Average low calorific value	CO_2 emission (tCO_2e)
							(tc/TJ)	(%)	(MJ/t,km3)	I=G*H*F*E*44/12/10000 (mass unit)
		A	B	C	D	E=A+B+C+D	F	G	H	I=G*H*F*E*44/12/1000 (volume unit)
Raw coal	10^4 ton	4491.79	831.84	2169.11	1405.27	**8898.01**	25.8	100	20908	175993455.05
Cleaned coal	10^4 ton	0.05				**0.05**	25.8	100	26344	1246.07
Other washed coal	10^4 ton			36.38	20.37	**56.75**	25.8	100	8363	448971.84
coke	10^4 ton				0.5	**0.5**	25.8	100	28435	13449.76
Coke oven gas	10^8m^3				0.04	**0.04**	12.1	100	16726	2968.31
Other gas	10^8m^3	3.21			11.27	**14.48**	12.1	100	5227	335797.81
Crude oil	10^4 ton	6.85				**6.85**	20	100	41816	210055.71
gasoline	10^4 ton	0.02				**0.02**	18.9	100	43070	596.95
Diesel oil	10^4 ton	31.9			0.76	**32.66**	20.2	100	42652	1031759.27
Fuel oil	10^4 ton	627.22	0.3			**627.52**	21.1	100	41816	20301304.48
LPG	10^4 ton					**0**	17.2	100	50179	0.00
Refinery gas	10^4 ton	2.85				**2.85**	18.2	100	46055	87592.00
Natural gas	10^8m^3					**0**	15.3	100	38931	0.00
Other petroleum products	10^4 ton	11.35				**11.35**	20	100	38369	319357.98

Other coking products	10^4 ton					**0**	25.8	100	28435	0.00
Other energy	10^4 ton ce	93.21			22.35	**115.56**	0	100	0	0.00
									total	**198746555.23**
China Energy Statistical Yearbook 2004										

Fuel-fired Electricity Generation of CSPG for Year 2003

Province	Generation	Generation	Plant consumption ratio	Electricity supplied		
	(10^8kWh)	(MWh)	(%)	(MWh)		
Guangdong	1433.51	143351000	5.5	135,466,695	Import from CCPG MWh	**11,100**
Guangxi	170.79	17079000	8.43	15,639,240	Average EF of CCPG	**0.797442**
Guizhou	432.95	43295000	7.4	40,091,170	Total emission tCO2	**198,755,407**
Yunnan	190.55	19055000	8.01	17,528,695	Total electricity supplied MWh	**208,736,900**
Total				208,725,800	OM for year 2003	**0.952181**
China Electric Power Yearbook 2004						

Table A2 OM Emission Factor Calculation of CSPG for Year 2004

Fuel	Unit	Guang dong	Guangxi	Guizhou	Yunnan	total	EF	Oxidation	Average low calorific value	CO_2 emission (tCO_2e)
							(tc/TJ)	(%)	(MJ/t,km3)	I=G*H*F*E*44/12/10000 (mass unit)

		A	B	C	D	E=A+B+C+D	F	G	H	I=G*H*F*E*44/12/1000 (Volume unit)
Raw coal	10^4 ton	6017.7	1305	2643.9	1751.28	**11717.88**	25.8	100	20908	231767573.55
Cleaned coal	10^4 ton	0.21				**0.21**	25.8	100	26344	5233.50
Other washed coal	10^4 ton					**0**	25.8	100	8363	0.00
coke	10^4 ton					**0**	25.8	100	28435	0.00
Coke oven gas	10^8m^3					**0**	12.1	100	16726	0.00
Other gas	10^8m^3	2.58				**2.58**	12.1	100	5227	59831.38
Crude oil	10^4 ton	16.89				**16.89**	20	100	41816	517932.98
gasoline	10^4 ton					**0**	18.9	100	43070	0.00
Diesel oil	10^4 ton	48.88			1.83	**50.71**	20.2	100	42652	1601975.28
Fuel oil	10^4 ton	957.71				**957.71**	21.1	100	41816	30983494.25
LPG	10^4 ton					**0**	17.2	100	50179	0.00
Refinery gas	10^4 ton	2.86				**2.86**	18.2	100	46055	87899.34
Natural gas	10^8m^3	0.48				**0.48**	15.3	100	38931	104833.40
Other petroleum products	10^4 ton	1.66				**1.66**	20	100	38369	46707.86

Other coking products	10^4 ton						**0**	25.8	100	28435	0.00
Other energy	10^4 ton ce	79.42					**79.42**	0	100	0	0.00
										Total	**265175481.54**
China Energy Statistical Yearbook 2005											

Fuel-fired Electricity Generation of CSPG for Year 2004

Province	Generation	Generation	Plant consumption ratio	Electricity supplied		
	(10^8kWh)	(MWh)	(%)	(MWh)		
Guangdong	1693.89	169389000	5.42	160,208,116	Import from CCPG MWh	**10,951,240**
Guangxi	201.43	20143000	8.33	18,465,088	Average EF of CCPG	**0.826448**
Guizhou	497.2	49720000	7.06	46,209,768	Total emission tCO2	**274,226,117**
Yunnan	243.22	24322000	7.56	22,483,257	Total electricity supplied MWh	**258,317,469**
Total				247,366,229	OM for year 2004	**1.061586**
China Electricity Yearbook 2005						

Table A3 OM Emission Factor Calculation of CSPG for Year 2005

Fuel	Unit	Guang dong	Guangxi	Guizhou	Yunnan	total	EF	Oxidation	Average low calorific value	CO_2 emission (tCO_2e)
							(tc/TJ)	(%)	(MJ/t,km3)	I=G*H*F*E*44/12/10000 (mass unit)
		A	B	C	D	E=A+B+C+D	F	G	H	I=G*H*F*E*44/12/1000 (volume unit)
Raw coal	10^4	6696.47	1435	3212.31	1975.55	**13319.33**	25.8	100	20908	263442601.85

	ton									
Cleaned coal	10^4 ton				0.15	**0.15**	25.8	100	26344	3738.21
Other washed coal	10^4 ton			10.39	33.88	**44.27**	25.8	100	8363	350237.59
coke	10^4 ton	4.79			8.05	**12.84**	25.8	100	28435	345389.71
Coke oven gas	10^8m^3				0.79	**0.79**	12.1	100	16726	58624.07
Other gas	10^8m^3	1.87			15.96	**17.83**	12.1	100	5227	413485.84
Crude oil	10^4 ton	10.91				**10.91**	20	100	41816	334555.88
gasoline	10^4 ton	0.68				**0.68**	18.9	100	43070	20296.31
Diesel oil	10^4 ton	31.96	2.02		1.81	**35.79**	20.2	100	42652	1130638.84
Fuel oil	10^4 ton	887.21				**887.21**	21.1	100	41816	28702703.26
LPG	10^4 ton					**0**	17.2	100	50179	0.00
Refinery gas	10^4 ton	4.92				**4.92**	18.2	100	46055	151211.46
Natural gas	10^8m^3	0.93				**0.93**	15.3	100	38931	203114.71
Other petroleum products	10^4 ton	1.7				**1.7**	20	100	38369	47833.35
Other coking products	10^4 ton					**0**	25.8	100	28435	0.00
Other energy	10^4 ton ce	104.66	133.15		59.72	**297.53**	0	100	0	0.00

									小计	295204431.07
China Energy Statistical Yearbook 2006										

Fuel-fired Electricity Generation of CSPG for Year 2005						
Province	**Generation**	**Generation**	**Plant consumption ratio**	**Electricity supplied**		
	(10^8kWh)	**(MWh)**	**(%)**	**(MWh)**		
Guangdong	1764.53	176453000	5.58	166,606,923	Import from CCPG MWh	96,363,000
Guangxi	250.23	25023000	7.95	23,033,672	Average EF of CCPG	0.771225
Guizhou	584.3	58430000	7.34	54,141,238	Total emission tCO2	369,521,975
Yunnan	272.81	27281000	6.94	25,387,699	Total electricity supplied MWh	365,532,531
Total				269,169,531	OM for year 2005	1.010914
China Electricity Yearbook 2006						

Table A4 OM Emission Factor Calculation of CSPG for Year 2005

	Total co2 emission (tCO_2)	Total electricity supplied (MWh)
2003	**198,755,407**	**208,736,900**
2004	**274,226,117**	**258,317,469**
2005	**369,521,975**	**365,532,531**
总计	**842,503,499**	**832,586,900**

Source：**Table A1-A3**

OM= Total Co2 emission (tCO_{2e})/ Total Electricity Supplied (MWh)

OM=1.0119
tCO_2e/MWh

Table A5: Percentage of Co2 emission from the coal-fueled, gas-fueled and oil-fueled power plant in total fuel-fired emissions

		Guangdong	Guangxi	Guizhou	Yunan	Total	Calorific value	EF (tc/TJ)	Oxidation	Co2 Emission (tco2e)
fuel	**unit**	A	B	C	D	E=A+…+D	F	G	H	I=E*F*G*H*44/12/100
Raw coal	10^4 ton	6696.47	1435	3212.31	1975.55	13319.3	20908 kJ/kg	25.8	1	263,442,602
Cleaned coal	10^4 ton	0	0	0	0.15	0.15	26344 kJ/kg	25.8	1	3,738
Other washed coal	10^4 ton	0	0	10.39	33.88	44.27	8363 kJ/kg	25.8	1	350,238
coke	10^4 ton	4.79	0	0	8.05	12.84	28435 kJ/kg	29.2	1	345,390
subtotal										**264,141,967**
Crude oil	10^4 ton	10.91	0	0	0	10.91	41816 kJ/kg	20	1	334,556
gasoline	10^4 ton	0.68	0	0	0	0.68	43070 kJ/kg	18.9	1	20,296
Coal oil	10^4 ton	0	0	0	0	0	43070 kJ/kg	19.6	1	0

Diesel oil	10^4 ton	31.96	2.02	0	1.81	35.79	42652 kJ/kg	20.2	1	1,130,639
Fuel oil	10^4 ton	887.21	0	0	0	887.21	41816 kJ/kg	21.1	1	28,702,703
Other gasoline products	10^4 ton	1.7	0	0	0	1.7	38369 kJ/kg	20	1	47,833
Subtotal										**30,236,028**
Natural gas	10^7m^3	9.3	0	0	0	9.3	38931 kJ/m3	15.3	1	203,115
Coke oven gas	10^7m^3	0	0	0	7.9	7.9	16726 kJ/m3	12.1	1	58,624
Other gas	10^7m^3	18.7	0	0	159.6	178.3	5227 kJ/m3	12.1	1	413,486
LPG	10^4 ton	0	0	0	0	0	50179 kJ/kg	17.2	1	0
REFINERY GAS	10^4 ton	4.92	0	0	0	4.92	46055 kJ/kg	18.2	1	151,211
Subtotal										**826,436**
Total										**295,204,431**

source：China Energy Statistical Yearbook 2006

Table A6: the emission factor of the most efficient commercial coal-fueled, oil-fueled and gas-fueled power plant

	Variable	Efficiency of electricity supply (%)	Emission factor of the fuels (tC/Tj)	Oxid	Emission factor (tCO_2e/MWh)
		A	B	C	D=3.6/A/1000*B*C*44/12
Coal-fueled power plant	$EF_{Coal, Adv}$	35.82%	25.8	1	0.9508
Oil-fueled power plant	$EF_{Oil, Adv}$	47.67%	15.3	1	0.4237

Gas-fueled power plant	$EF_{Gas, Adv}$	47.67%	21.1	1	0.5843

Table A7: the weight of CO2emission from solid, liquid and gas fueled among the total emissions and the thermal emission factor

λCoal	λOil	λGas	EFthermal(tCO2e/Mwh) (λCoal* $EF_{Coal, Adv}$ + λOil* $EF_{Oil, Adv}$ + λGas* $EF_{Gas, Adv}$)	EFthermal(tCO_2e/MWh)
89.48%	10.24%	0.28%	89.48% * 0.9508 + 10.24 %* 0.4237 + 0.28% * 0.5843	**0.9117**

Table A8: Calculation of BM emission factor of CSPG in 2005

	2003 installed capacity	2004installed capacity	2005installed capacity	Newly added installed capacity between 2003 to 2005	Weight in newly added installed capacity
	A	B	C	D=C-A	
Fossil fueled（MW）	40444.1	46659.7	54507	14062.9	74.01%
Hydro power（MW）	25409.3	27580.1	30347.1	4937.8	25.99%
Nuclear Power （MW）	3780	3780	3780	0	0.00%
Wind power（MW）	83.4	83.4	83.4	0	0.00%
Total（MW）	69716.8	78103.3	88717.5	**19000.7**	**100.00%**
Share in 2005 installed capacity	78.58%	88.04%	100%		

Calculation of BM emission factor of CSPG in 2005

$EF_{BM,y}$=0.9117*74.01%= 0.6748

Data source："China electricity Yearbook 2004", "China electricity Yearbook 2005", "China electricity Yearbook 2006"

BM=0.6748
tCO_2e/MWh

Table A9:Calculation of CM emission factor of CSPG

OM tCO_2e/MWh A	**BM** tCO_2e/MWh B	**CM** tCO_2e/MWh C=OM*0.5+BM*0.5
1.0119	**0.6748**	**0.84335**

CM=0.84335tCO_2e/MWh

Annex 4

Monitoring Information

Detailed information please see B.7.2