ZIQIANG 18MW HYDROPOWER PROJECT IN GUIZHOU PROVINCE CHINA

Document Prepared By Guizhou Honor Carbon Asset Management Co., Ltd

Project Title	Ziqiang 18MW Hydropower Project in Guizhou Province China.
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ANNEX 1 CDM PDD

1 PROJECT DETAILS

1.1 Summary Description of the Project

Provide a summary description of the project.

1.2 Sectoral Scope and Project Type

The project falls into: Sectoral Scope 1: energy industries (renewable sources)
Subclass: hydro power

The Project is not a Grouped project.

1.3 Project Proponent

Organization:	Guizhou Zhijn Ouhua Developent Co.Ltd.
Street/P.O.Box:	No.16 Shuangyan Road,Chengguan Town
City:	Zhijin County
State/Region:	Guizhou Province
Country:	People's Republic of China
Represented by:	Nie Zhilin
Telephone:	+86-0858-8226778
FAX:	+86-0858-8226518
E-mail:	lpsgs@mail.gzzsgs.cn

1.4 Other Entities Involved in the Project

NO.

1.5 Project Start Date

The project started commissioning on 20/12/2010.

1.6 Project Crediting Period

The crediting period: 20/12/2010-22/10/2012.In total 673 days, covering 1 year and 308 days.

1.7 Project Scale and Estimated GHG Emission Reductions or Removals

The total installed capacity of the Project is 18MW.It is expected that the project activities will generate annual emission reductions for about 43,486 tCO_2e.

Project	YES
Large project	

Period	Estimated GHG emission reductions or removals (tCO_2e)
20/12/2010-31/12/2010	1,430
01/01/2011-31/21/2011	43,486
01/01/2012-22/10/2012	35,146
Total estimated ERs	80,181
Total number of crediting period	673 days

1.8 Description of the Project Activity

Describe the project activity or activities (including the technologies or measures employed) and how it/they will achieve net GHG emission reductions or removals. Indicate the lifetime of the project activity(s).

1.9 Project Location

The proposed project is located in Ziqiang town, Zhijin County, Bijie City, Guizhou Province, P.R.China, 74km away from Zhijin county and 94km away from Guiyang city. The geographical coordinates of the dam are east longitude +106.0839° and north Latitude +26.6778°, and the geographical coordinates of the powerhouse are east longitude +106.1219° and north Latitude +26.6661°.

1.10 Conditions Prior to Project Initiation

Prior to the project initiation, the equivalent electricity produced by the proposed project will be provided by China Southern Power grid, which is dominated by fossil fuel-fired power plants. As a hydro power project, the project will produce clean electricity using hydro power resources and will generate GHG emission reductions by avoiding CO_2 emission from electricity generation of fossil fuel fired power plants. Operation of the project does not lead to GHG emission. It is confirmed that the project was not implemented to create GHG emissions primarily for the purpose of its subsequent removal or destruction.

1.11 Compliance with Laws, Statutes and Other Regulatory Frameworks

Not applicable.

1.12 Ownership and Other Programs

1.12.1 Right of Use

The business license of Zhijin Ouhua Development Co.Ltd.

The approval letter of the Project

The EIA approval letter of the Project

The construction contract and purchase contract of main equipment.

1.12.2 Emissions Trading Programs and Other Binding Limits

The Project is not included in an emission trading program, and does not take place in a jurisdiction or sector in which binding limits are established on GHG emissions. The Project does not reduce GHG emissions from activities that participate in an emissions trading program, so this clause in not applicable.

The project has been registered as a CDM project on 23/10/2012, for which a renewable crediting period of 3×7 years will be used under the CDM GHG Program, the first 7-year from 01/11/2012 to 31/10/2019. Therefore, CO_2 emission reductions generated by the Project during the CDM crediting period will be verified as unique CERs but not VCUs to avoid double counting. As to the project under VCS only emission reductions achieved from 20/12/2010 to 22/10/2012 will be considered as VCUs, which will be sold only once to one particular buyer.

1.12.3 Participation under Other GHG Programs

The project has been registered as a CDM project on 23/10/2012 with registration reference number 6696.

1.12.4 Other Forms of Environmental Credit

The project proponent chose a clear VCS crediting period from 20/12/2010 to 22/10/2012 which has not created another form of environmental credit.

1.13 Additional Information Relevant to the Project

Eligibility Criteria

This project is not a grouped project.

Leakage Management

No fossil fuel will be consumed by the Project activity, so no leakage need to be considered in the Project.

Commercially Sensitive Information

No applicable.

Further Information

As a renewable hydro power project, the proposed project will produce positive environmental and economic benefits and contribute to the local sustainable development through following aspects:

- To be in accordance with Chinese national energy policy and the Western Development Strategy, the proposed project will alleviate power shortage in Zhijin County, will boost the social and economic development of local minority areas, will increase the income of local governments and people, will improve the local poor condition and will advance the standard of living of local people.
- To displace part of the electricity from coal-fired power plants in CSPG, and thus will avoid

environmental pollution caused by coal burning.

- To create new job opportunities for the local people: temporary job opportunities will be available during the construction period.
- After the operation of the proposed project, the local people can make good use of electricity

key documents approved before construction of the Project:

Completing date	Title of the documents needed to be approved before construction
12/05/2006	Approval Letter for EIA
26/06/2006	Approval of PDR

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

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Annex 1: Contact information on participants in the project activity

Annex 2: Information regarding public funding

Annex 3: Baseline information

Annex 4: Monitoring plan

SECTION A. General description of project activity

A.1. Title of the project activity:

>>
Ziqiang 18MW Hydropower Project in Guizhou Province China
Version 05
Date: 16 October 2012

A.2. Description of the project activity:

>>
The proposed Ziqiang 18MW Hydropower Project in Guizhou Province China (hereafter referred to as "the Project") is an 18MW hydropower project developed by Guizhou Zhijin Ouhua Development Co. Ltd. (owner)
(hereafter referred to as "the Project Owner") and is located in Ziqiang town, Zhijin County, Guizhou Province of People's Republic of China.

The project activity includes the gravity dam and the hydropower generating system which includes intake tower, pressure tunnel, steel penstock and powerhouse of hydropower station. The total installed capacity is 18MW (3×6MW). The estimated annual operation time of the proposed project is 3992h and the average electricity generated is 71,856MWh and the expected annual feed-in electricity to the grid is 60,955MWh. The surface area at the full reservoir level of the project will be 849,667 m^2, thus the power density of the project will be 21.2W/m^2. The electricity generated by the proposed project will meet the electricity demand of industrial and agricultural production and local people's life, and assume the task to adjust the peak in the local grid, finally connected to China Southern Power Grid (CSPG).

In the absence of the Project, the electricity delivered by the Project would have been provided by the CSPG, which is predominantly supplied by fossil fuel intensive power plants.

The baseline scenario of the Project is the same as the scenario existing prior to the start of implementation of the project activity.

By displacing electricity from the grid which would otherwise have been generated by the combustion of fossil fuel intensive fuels, the Project is expected to result in annual emissions reductions of 43,486t CO_2e.

The project contributes to the sustainable development of the locality in the following aspects：

a. The project will provide clean electricity to the local community and reduce the consumption of fossil fuel resulting in greenhouse gas (GHG) emission reductions as well as alleviating local power shortages.

b. The project activity will provide temporary employment opportunities during the construction period and permanent jobs during the operational period, which will increase the income of local residents.

c. The project will contribute towards the development of local infrastructure, thus improving the livelihoods of local residents through the payment of taxation to local Government bureaus during the operational phase of the project as well as the construction of new roads which will benefit local residents.

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)	Guizhou Zhijin Ouhua Development Co. Ltd. (owner)	No
Switzerland	Vitol S.A.	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. At 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.:

>>
Guizhou Province

A.4.1.3. City/Town/Community etc.:

>>
Zhijin County

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

>>
The proposed project is located in Ziqiang town ,Zhijin County, 74km away from Zhijin county and 94km away from Guiyang city. The geographical coordinates of the dam are east longitude +106.0839° and north Latitude +26.6778°, and the geographical coordinates of the powerhouse are east longitude +106.1219° and north Latitude +26.6661°. Figure A-1 below shows the location of the proposed project.

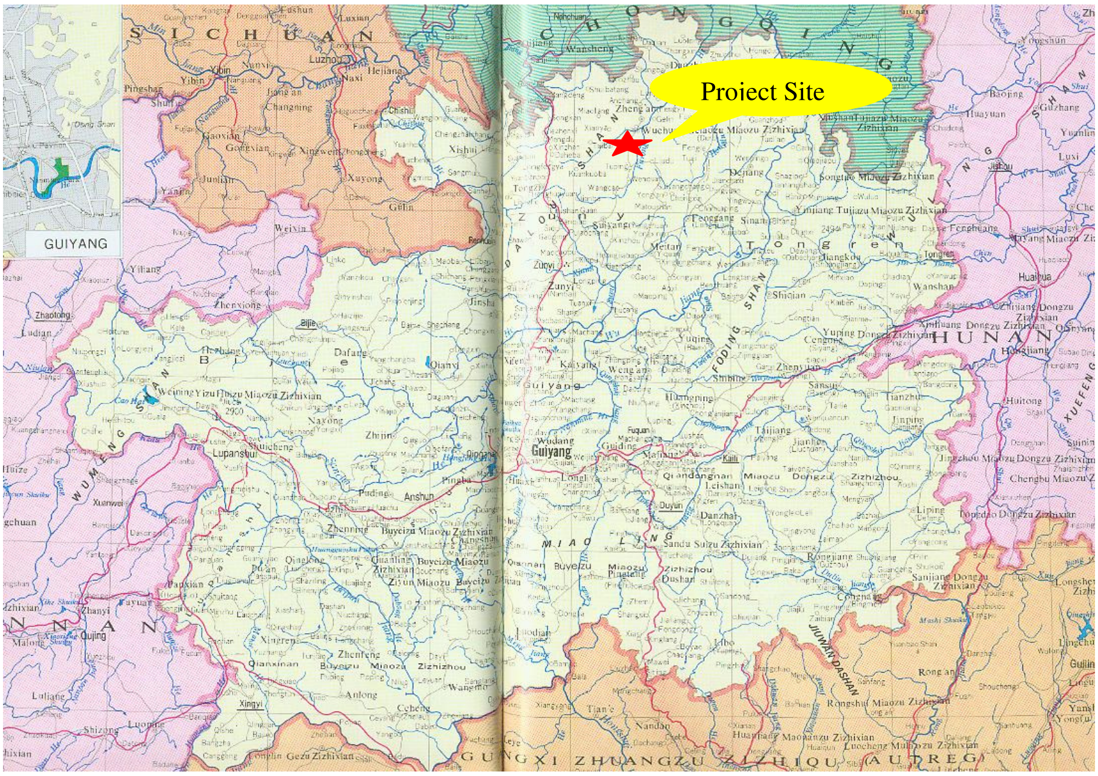

Fig. A-1 Location of the Ziqiang 18MW Hydropower Project in Guizhou Province China

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

>>
The project falls into:
Sectoral Scope 1: Energy industries (renewable sources).

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

>>
The scenario prior to the implementation of the project activity is that electricity delivered to the grid is generated by the operation of grid-connected power plants and by the addition of new generation sources. Coal fired power generation is currently the dominant power supply option within the South China Power Grid. Generation data within the Grid are published by Chinese authorities through the Electric Power Yearbook and the Energy Statistic Yearbook yearly.

The Project is newly built 18MW (3*6MW) hydropower project, which includes the construction of barrage, intake tower, pressure tunnel, steel penstock, the power plant, the step-up substation and power transmission sequence etc. The construction results in a new reservoir with a surface area of 849,667m^2 at full water level. The power density of the Project is calculated as 21.2 W/m^2. The height of the gravity dam is 49.5m. The length of the diversion tunnel is 3568.48m with a diameter of 3.6m. The end of the hydropower tunnel is diverged into the three sub-tunnels, each with the length of 405.457 m and the diameter of 1.8 m, that can lead the water to flow into the power plant and drive the turbines. It is disposed by "one tunnel, three machines". The water flow would drive three vertical shaft water turbines and the electrical energy will be delivered to CSPG. An annual amount of 60,955MWh net electricity is expected to be delivered via 110kV transmission lines to the CSPG.

It is clearly indicated that both the turbines and the generators are manufactured domestically. Thus, no international technology transfer is involved in the Project. The technology is a state of art technology and their operation would have no negative environmental impacts. The following table listed the type and parameter of turbines and generators of the project.

Table A-1 the type and parameter of turbines and generators of the Project

Parameter		Unit	Value
Turbine	Model	----	HLA351-WJ-93
	Quantity	unit	3
	Rated water head	m	207
	Rated flow rate	m^3/s	3.34
	Manufacturer	Fujian Nanping Nandian Hydropower Equipment Manufacturing Co., Ltd	
Generator	Model	----	SFW6000-6/1730
	Quantity	unit	3
	Rated Power	MW	6.0
	Rated voltage	V	6300
	Manufacturer	Fujian Nanping Nandian Hydropower Equipment Manufacturing Co., Ltd	

The baseline scenario is the same as the scenario existing prior to the start of the project activity mentioned above, as the project is the construction of a new power plant. In accordance with the applied methodology, the greenhouse gases accounted for are CO_2 emissions from electricity generation in fossil fuel fired power plants that is displaced due to the proposed project activity.

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

>>

The Project applies the renewable crediting period and it is expected that 304,402tCO_2e emission reduction will be generated per year during the first 7-year crediting period from November 2012 to October 2019.

Year	Annual Estimated Emissions Reductions (tonnes CO_2e)

01/11/2012-31/10/2013	43,486
01/11/2013-31/10/2014	43,486
01/11/2014-31/10/2015	43,486
01/11/2015-31/10/2016	43,486
01/11/2016-31/10/2017	43,486
01/11/2017-31/10/2018	43,486
01/11/2018-31/10/2019	43,486
Total estimated reductions (t CO_2e)	**304,402**
Total Number of Crediting Years	7
Annual average of emissions reductions over the crediting period (t CO_2e)	43,486

A.4.5. Public funding of the project activity:

>>

No Public funding has been made available for the Project from Annex I parties

SECTION B. Application of a baseline and monitoring methodology

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

>>

Approved baseline and monitoring methodology:

ACM0002: Consolidated methodology for grid-connected electricity generation from renewable resources

Version 12.3.0 (Valid from 17 Sep 10 to 10 May 12 Requests for registration can be submitted until 11 Jan 2013 23:59:59 GMT)

Refer to:

http://cdm.unfccc.int/methodologies/PAmethodologies/approved.html

Tools referenced in this methodology:

Tool to calculate the emission factor for an electricity system

Version 2.2.1 (EB 63 Annex 19)

Refer to:

http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v2.2.1.pdf/history_view

Tool for the demonstration and assessment of additionality

Version 6.1.0 (EB 69 Annex 20)

Refer to:

http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v6.1.0.pdf/history_view

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

>>

The Project is a Central China Power Grid-connected renewable power generation project activity that meets all the applicable criteria stated in the methodology ACM0002 (Version 12.3.0) as following:

- It is a newly constructed hydro power plant with an run-of-river reservoir;
- The project activity results in a new reservoir and the power density of the power plant is 21.2 W/m^2, greater than 4 W/m^2;
- The project activity doesn't involve switching from fossil fuels to renewable energy at the site of the project activity.
- The project activity is not the biomass fired power plant.

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

>>

The spatial extent of the Project boundary includes the Project power plant and all power plants connected physically to the electricity system that the Project power plant is connected to.

The boundary of the Project includes the dam, power houses, tunnel, reservoir, turbine, generators and auxiliary facilities.

The Project shall be connected to the CSPG via the Guizhou Provincial Power Grid. According to the *Notification on Determining Baseline Emission Factor of China's Grid*[1], Guizhou Provincial Power Grid is an integral part of the South China Power Grid. Therefore, the South China Power Grid is defined as the

[1] the *Notification on Determining Baseline Emission Factor of China's Grid* made publicly available on the website of China's DNA (http://cdm.ccchina.gov.cn/) on 20 December., 2010

electricity system boundary of the Project which is composed of Guangdong Power Grid, Guangxi Power Yunnan Power Grid and Guizhou Power Grid.

The project boundary can be demonstrated below:

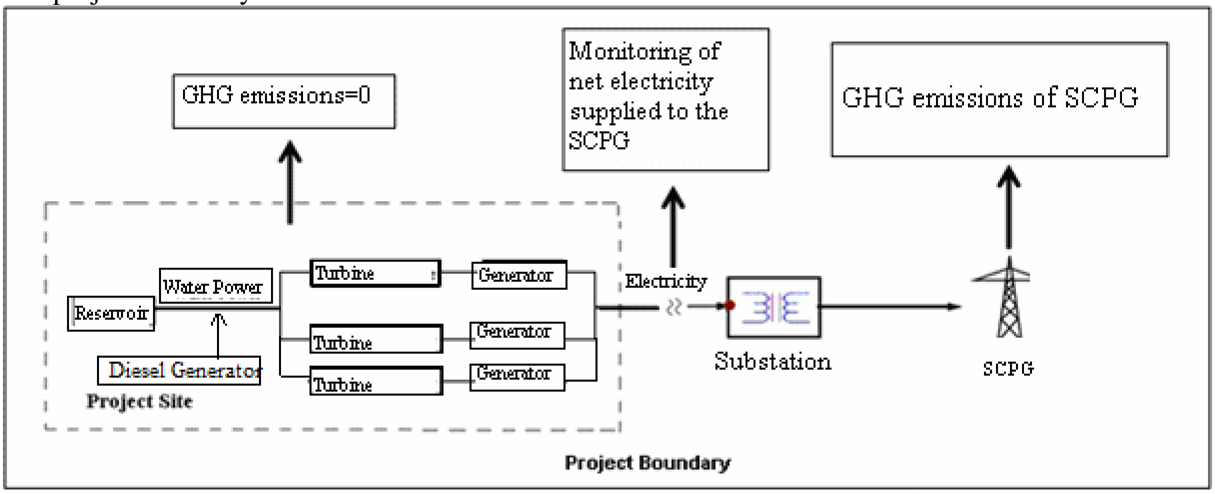

Fig. B-1 Project Boundary Diagram and Sources of emissions relevant to the Project

Gases and sources included in the project boundary is list in the Table B-1.

Table B-1 Emissions sources included in or excluded from the project boundary

	Source	Gas	Included?	Justification/Explanation
Baseline	Electricity supplied by CSPG	CO_2	Yes	Main emission source
		CH_4	No	Minor emission source
		N_2O	No	Minor emission source
Project Activity	Emission from the reservoir of the project	CO_2	Yes	The CO_2 emission due to the diesel consumption used by the diesel generatorwhich should be considered, if there is a diesel generator on-site in the future.
		CH_4	No	The project power density is greater than $10W/m^2$, CH_4 emissions is estimated as zero, the actual data will be monitored ex-post..
		N_2O	No	Minor emission source

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

>>

According to the methodology ACM0002 (version 12.3.0), if the project activity is the installation of a new grid-connected renewable power plant/unit, the baseline scenario is the following:

Electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources, as reflected in the combined margin (CM) calculations described in the “Tool to calculate the emission factor for an electricity system”.

The Project is the installation of a new grid-connected renewable power plant that connects to and delivers electricity to South China Power Grid. Therefore, the baseline scenario of the Project can be identified as the following:

Electricity delivered to the grid by the Project would have otherwise been generated by the operation of grid connected power plants and by the addition of new generation sources within the South China Power Grid, as reflected in the combined margin (CM) calculated described below.

The analysis and description in B.5 and B.6 will support the baseline scenario shown above.

Parameters used to determine the baseline emission are listed in the followed table:

Variable	Value / Unit	Original Data Source
Operating Margin Emission Factor	0.9762tCO_2/MWh	Calculated from the China Energy Statistic Yearbooks 2007-2009 and the China Electric Power Yearbooks 2007-2009
Build Margin Emission Factor	0.4506 tCO_2/MWh	Calculated from the China Energy Statistic Yearbook 2008 and the China Electric Power Yearbooks 2007-2009
Combined Margin Emission Factor	0.7134tCO_2/MWh	Calculated from the China Energy Statistic Yearbooks 2006-2008and the China Electric Power Yearbooks 2007-2009
Electricity supplied by the project to the grid in year y	60,955MWh	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 CDM project activity (assessment and demonstration of additionality):

>>

According to the “Tool for the demonstration and assessment of additionality” (Version 6.1.0) approved by EB, the additionality of the project is demonstrated and assessed through the following steps.

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

Sub-step 1a: Define alternatives to the project activity

According to the ACM0002 (Version 12.3.0), the baseline scenario of a new grid-connected renewable power plant is the following: “Electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources, as reflected in the combined margin (CM) calculations described in the .Tool to calculate the emission factor for an electricity system”.

According to relevant requirements of VVM, alternatives to the proposed project is not needed to be identified as the baseline scenario has been prescribed in the ACM0002 (Version 12.3.0) applied.

However, as per the additionality tool, the alternatives as follows should be included:

Alternative 1: The proposed project undertaken without being registered as a CDM project;
Alternative 2: CSPG provides equivalent electricity with that delivered to the grid by the proposed CDM project.

Sub-step 1b: Consistency with mandatory laws and regulations
Alternative 1, the Project activity undertaken without being registered as a CDM project activity comply with China's laws and regulations at present and does not belongs to project types to be implemented with mandatory requirements.

Alternative 2 CSPG provides equivalent electricity with that delivered to the grid by the proposed CDM project is prevailing practice which satisfies China's regulations.

Therefore, Alternative 1 and Alternative 2 are analyzed in Step 2.

Step 2. Investment analysis

The purpose of this step is to determine whether Alternative 1 (the project activity without CDM revenues) is financially less attractive than Alternative 2. The investment analysis is conducted in following steps.

Sub-step 2a. Determine appropriate analysis method
According to "Tool for the demonstration and assessment of additionality" (Version 6.1.0), there are three analysis methods for investment analysis, including simple cost analysis (Option I), investment comparison analysis (Option II) and benchmark analysis (Option III).

Because the project activity will generate economic benefits from the sale of electricity generation other than CDM related income, simple cost analysis method is not applicable; Alternative 4 (equivalent electricity supply by CSPG) isn't a concrete investment project, so investment comparison analysis method isn't applicable, too. Therefore, benchmark analysis method is chosen for the investment analysis.

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

The benchmark Internal Rate of Return (IRR) for total investment for a hydropower project with the installed capacity of less than 25MW is 10% (not including tax) which is quoted from the *Economic Evaluation Code for Small Scale Hydropower Projects* (SL16-95). This benchmark IRR is used extensively in China for investment analysis of hydropower projects.

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

All the input values come from the approved PDR completed by an independent organization, obtained grade "A" in water conservancy and electricity industry and engineering investigation, issued by Ministry of Construction of People's Republic of China. Based on the Economic Assessment Method and Parameters for Construction Projects, the fixed parameters should be used in the financial assessment. Therefore, the fixed parameters have been employed.

Based on Preliminary Design Report, the main assumptions for the investment analysis are shown in Table B-2.

Table B-2 Main parameters for investment analysis and evaluation

No.	Main Parameter	Unit	Value	Reference
1	Installed capacity	MW	18	PDR

2	Static investment	Million RMB	100.3715	PDR
3	Total electricity generation	MWh	71,856	PDR
4	Net electricity generation	MWh	60,955	PDR
5	Residual rate of fixed assets value	%	5	PDR
6	Electricity tariff (with VAT)	RMB/KWh	0.215	PDR
7	Value-added Tax	%	6	PDR
8	Education tax	%	3	PDR
	urban maintenance and construction tax	%	5	PDR
9	Income tax	%	33	PDR
10	Project lifetime	year	33	PDR

The IRR of the project is shown as Table B-3.

Table B-3 The project financial indicator without CERs revenue

Item	Unit	Without CERs revenue	Benchmark	With CERs revenue
IRR	%	6.81	10	10.14

Without CERs revenue, the project IRR of the project is 6.81%, which is lower than benchmark IRR. Thus, the project activity is not financially attractive. The post tax IRR of the project exceeds the benchmark with CDM revenue. Hence, the ability of repayment of loan and payment of interest has been increased, and the financial indexes have been improved. This shows that the CDM revenues make the project more attractive in finance.

Sub-step 2d. Sensitivity analysis
Four parameters, including fixed assets investment, annual operation & maintenance costs, electricity output and electricity tariff, are selected as sensitive factors to check the financial attractiveness. The results of the sensitivity analysis are presented in the following figure.

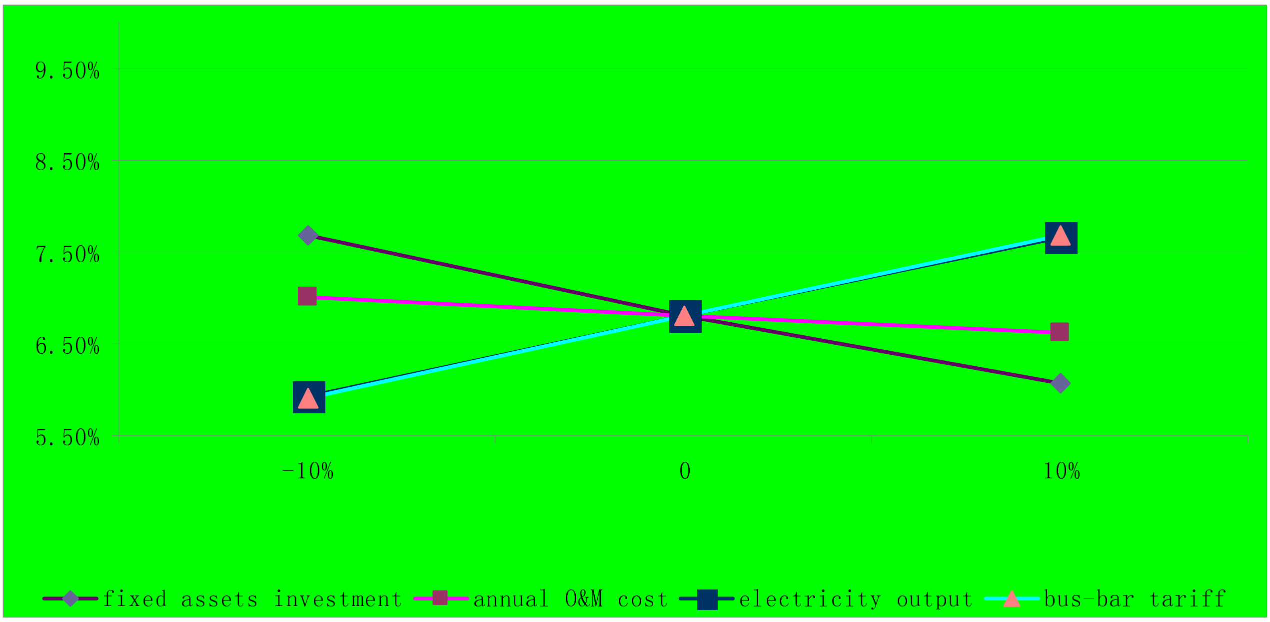

Fig. B-2 Sensitivity Analysis Chart

Table B-4 shows that the IRR of the project is always lower than the benchmark (10%) within the reasonable variation scope of the fixed assets investment, annual operation & maintenance costs, electricity output and electricity tariff, thus the project activity is unlikely to be financially attractive.

Table B-4 Critical Value Analysis

Sensitivity analysis Factor	Critical point of variation to reach benchmark	Practical assessment
Fixed assets investment	-30.3%	When fixed assets investment of project decrease, the IRR of the project goes up. The fixed assets investment of project is mainly subject to the industrial products' price. According to the data in "8-14 Producer Price Indices for Manufactured Goods by Category" in *China Statistical Yearbook 2009* published by the National Bureau of Statistics of China in Sep. 2009, the products price increased 24.64% from 2000 to 2008. Thus the products price has an increasing trend and will not decrease. Thus, as the recent published statistics, it is unlikely that the fixed assets investment of the project decreases 30.3%.
Annual O&M cost	/	Even the O&M costs are 0, the project IRR is still lower than the benchmark of 10%. Thus, the O&M costs have little impact on project IRR.
Electricity output	+39.5%	When the electricity generation increases, the IRR of project goes up. The variation of net electricity generation is mainly subject to the water resources of project site, and also is the outcome of the year's

		rainfall. It is impossible for the electricity generation of the project to increase 39.5%, because the PDR of the project calculated the power output on the basis of the hydrological data for 40 years, it will not change much. And thus, the 39.5% increase of project's electricity generation is unlikely to occur.
Electricity Tariff	+39.0%	When the tariff increases, the IRR of project goes up. When the electricity tariff increases 39.0%, the IRR of the project would reaches the benchmark of 10%. But it is impossible. According to the approved electricity tariff information from the Guizhou Province, the electricity tariff has not changed in the past years. Thus the electricity tariff in Guizhou Province could deem to be stable in recent years. Thus, the 39.0% increase of electricity tariff is unlikely to happen.

Step 4. Common practice analysis

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

In accordance with "Guidelines on Common Practice (version 02.0)" provided in Annex 8 of the 69th Meeting of the Executive Board, the common practice analysis for the proposed project activity is as follows:

Sub-step 1: Calculate applicable output range as +/- 50% of the design output or capacity of the proposed project activity.
The proposed project activity has an installed capacity of 18 MW.
Therefore the applicable output range for the common practice analysis is:
Installed Capacity: 9 MW ~ 27MW

Sub-step 2: identify similar projects (both CDM and none CDM) which fulfill all of the following conditions:
(a) The projects are located in the applicable geographical area;
(b) The projects apply the same measure as the proposed project activity;
(c) The projects use the same energy source/fuel and feedstock as the proposed project activity, if a technology switch measure is implemented by the proposed project activity;
(d) The plants in which the projects are implemented produce goods or services with comparable quality, properties and application areas (e.g. clinker) as the proposed project plant;
(e) The capacity or output of the projects is within the applicable capacity or output range calculated in Step 1;
(f) The projects started commercial operation before the project design document (CDM PDD) is published for global stakeholder consultation or before the start date of proposed project activity, whichever is earlier for the proposed project activity.

The project applies above points to analyze in this step, details are as following:

(a) Applicable geographical area should be covered the entire host country. But in China, the investment environment for each region is different. Specifically in terms of available resources, labour costs and average GDP, these can vary significantly in different parts of China, even different province of China. Please see the table below including some typical indicators in different province of China, which shows that there is significant difference among different regions in China. Therefore, it is not appropriate to consider activities in the whole of China and Guizhou Province is selected as the appropriate geographical area for the common practice analysis.

Table B-5 The typical indicators in different provinces of China

Province	Annual Average Salary(RMB)[2]	Average GDP/person (RMB)[3]
Beijing	61460	58204
Tianjin	65959	46122
Hebei	33196	19877
Shanxi	28001	16945
Inner Mongolia	36806	25393
Shandong	29843	27807
Shanghai	52698	66367
Jiangsu	46270	33928
Zhejiang	59791	37411
Anhui	26601	12045
Fujian	36546	25908
Liaoning	31381	34,193
Jilin	25661	25,906
Heilongjiang	25154	21,593
Henan	26453	16012
Hubei	26440	16206
Hunan	24708	14492
Jiangxi	24688	12633
Sichuan	25825	12893
Chongqing	18038	14660
Shaanxi	27606	14607
Gansu	27331	10346
Qinghai	28343	14257
Ningxia	40080	14649
Xinjiang	28897	16999
Guangdong	44353	33151
Guangxi	31,842	12555
Yunnan	30,177	10540
Guizhou	31,458	12109

[2] The annual average salary of provinces and whole China in 2007 Available at: http://www.stats.gov.cn/tjsj/ndsj/2008/indexch.htm

[3] The ranking of the provincial GDP in China Available at : http://www.stats.gov.cn/tjsj/ndsj/2008/indexch.htm

(f) The project starting date is 20/06/2007 and the 1st GSC date is 13/12/2007 and the 2nd GSC date is 02/09/2011, thus projects started commercial operation before 20/06/2007 shall be identified as per point (f).

(c) On the basis of the statistic on China Electric Power Yearbook 2008,which included all the power plants started commercial operation before the end of 2007, the electricity generation in Guizhou province are all from fuel fired power plants and hydropower plants. As fuel fired power plants have different energy source with hydro power plants, fuel fired power plants are not considered.

As analyzed above, hydro power plants located in Guizhou province with capacity range of 9MW to 27MW and operated before 20/06/2007 shall be identified as similar projects. According to Guizhou Power Yearbook 2008), which indicated all the hydropower plants operated before year 2008, China Water Resource Yearbook (2002~2008), which is a accumulative yearbook listed all the hydro power plants operated before year 2008, UNFCCC Website and public sources, we got that the list of plants with the same output as follows:

Table B-6 similar projects identified

Name of hydropower plant	Installed capacity MW	Operation time	Investment per kW(yuan/kW)	Remarks & references
Guanyinyan Hydropower Station	12.6	12/1990	N/A	http://23771060.blog.163.com/blog/static/1214357120108901416171/
Yangtou Hydropower Station	16	07/1991	2435.38	http://23771060.blog.163.com/blog/static/1214357120108901416171/
Tianbianzhai Hydropower Station	25	2001	N/A	http://www.chinarein.com/qkhc/detail.asp?id=3128
Hongqi Hydropower Station	12.8			http://mall.cnki.net/magazine/Article/GSLF2001S1010.htm
Taohua 9MW Hydro Power Project in Guizhou Province, China	9	03/02/2005	N/A	Registered as CDM Project No. 1569
Nahuihe Hydropower Project	19.5	30/10/2006	4102.56	1.CDM Validation stopped 2.http://www.gz.xinhuanet.com/zfpd/2006-11/05/content_8436274.htm
Huangyutang Hydro Power Project in Guizhou Province	12.6	06/11/2006	N/A	Registered as CDM Project No. 1809
Longwangtan 15MW Hydro	15	16/12/2006	N/A	Registered as CDM Project No. 2204

Power Project in Guizhou Province				
Wengyuan 20MW Hydro Power Project in Guizhou Province China	20	18/12/2006	N/A	Registered as CDM Project No. 2178
Luojiaohe 20MW Hydro Power Project in Guizhou Province China	20	12/2006	N/A	Registered as CDM Project No. 1486
Changwa 10 MW Small-scale Hydro Project	10	12/02/2007	N/A	Registered as CDM Project No. 1535
Guizhou Shuicheng Jinshizi Hydropower Station	20	12/04/2007	N/A	Registered as CDM Project no. 1517
Tongren Tianshengqiao Hydropower Project, Guizhou Province, China	22	19/06/2007	N/A	Registered as CDM Project No. 2136

Step 3: within the projects identified in Step 2, identify those that are neither registered CDM project activities, project activities submitted for registration, nor project activities undergoing validation. Note their number $N_{all.}$

According to the above link provided in Table B-7 and the references stated above, hydropower located in Guizhou province with capacity range of 9MW to 27MW and operated before 20/06/2007 that are neither registered CDM project activities, project activities submitted for registration, nor project activities undergoing validation are identified in the below Table B-7.

Table B-7

Hydropower located in Guizhou province with capacity range of 9MW to 27MW and operated before 20/06/2007 that are neither registered CDM project activities, project activities submitted for registration, nor project activities undergoing validation

Name of hydropower plant	Installed capacity（MW）	Operation year	Investment per kW(yuan/kW)	Remarks & references
Guanyinyan Hydropower Station	12.6	12/1990	N/A	http://23771060.blog.163.com/blog/static/1214357120108901416171/
Yangtou Hydropower Station	16	07/1991	2435.38	http://23771060.blog.163.com/blog/static/1214357120108901416171/
Tianbianzhai	25	2001	N/A	http://www.chinarein.com/qkhc/detail.a

Hydropower Station				sp?id=3128 http://mall.cnki.net/magazine/Article/GSLF2001S1010.htm
Nahuihe Hydropower Project	19.5	30/10/2006	4102.56	1.CDM Validation stopped 2.http://www.gz.xinhuanet.com/zfpd/2006-11/05/content_8436274.htm
Hongqi Hydropower Station	12.8	1981	N/A	http://d.wanfangdata.com.cn/LocalChronicleItem_4099997.aspx http://www.doc88.com/p-08332036059.html

Therefore, N_{all}=5.

Step 4: within similar projects identified in Step 3, identify those that apply technologies that are different to the technology applied in the proposed project activity. Note their number N_{diff}.

On February 10, 2002, the State Council of Peoples' Republic of China issued the Notice on Issuing Electric Power Sector Reform Programme (Guofa [2002] No 5). According to the notice, China began undertaking significant reform in electric power sector, including breaking up monopoly, introducing competition, increasing efficiency and decreasing costs in power system. In order to realize these objectives, the China State Power Corporation, which monopolized in electric power industry, was divided into two business section of electricity generation and power grid. The electricity generation was reorganized into five independent electricity generation companies (Huaneng, Guodian, Datang, Huadian, and China Power Investment). And the power grid was reorganized into State Grid Company and South China Grid Company. Before the reform, all the hydropower projects were constructed and operated by the national or provincial electric power companies, and the government provided loan guarantee for those companies. Therefore, the projects which started its operation before February 2002 had the essential difference and were excluded from the similar projects.

Of the projects listed in the table B-8, four identified projects were operated before 2002, which are not the similar projects compared with the project.

For the Nahuihe Hydropower Project, the unit investment is 4102.56 Yuan/kW. The unit investment of the project activity is calculated as 5576.19 Yuan/kW and the differences of the unit investment between the two projects is (5576.19-4102.56)/ 5576.19*100%=26.43%>20%.

Thus, Nahuihe Hydropower Project is not similar project compared with the project.

Therefore,.N_{diff}=5.

Step 5: calculate factor F=1-N_{diff}/N_{all} representing the share of similar projects (penetration rate of the measure/technology) using a measure/technology similar to the measure/technology used in the proposed project activity that deliver the same output or capacity as the proposed project activity.

F=1-N_{diff}/N_{all} =1-5/5=0
$N_{all}-N_{diff}$ =5-5=0

In conclusion, F<0.2, $N_{all}-N_{diff}$ <3, The proposed project activity is not a "common practice" within a sector in the applicable geographical area.

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

As analyzed above, there is an essential distinction between the proposed project and similar projects. It can therefore be concluded that similar hydropower projects implemented in Guizhou Province did not face the same barriers as the proposed project. Therefore, the proposed project can not be considered common practice and should be deemed additional.

CDM Consideration

The implementation timeline of the proposed CDM project activity is shown as follow:

Table B-8 key events in the development of the project

Events	Project Implementation Timeline	CDM Status Timeline
The PDR was finished.	06/2005	
Board Meeting minutes on seeking for financial support, i.e.CDM		25/08/2005
The EIA was finished.	11/2005	
The EIA was approved.	12/05/2006	
The PDR was approved.	26/06/2006	
Decision to consider CDM Support in Board Meeting was made.		08/10/2006
The project owner signed the contract on CDM Project Development Service with the consultancy company named Guizhou Hengyuan Project Management and consulting Co., Ltd		20/12/2006
The General Construction Contract for the project was signed which states that the contracted party shall be responsible for the power house construction, diversion Tunnel construction, equipment purchasing, equipment installation, mechanism installation etc.	20/06/2007	
The License of Construction Starting was issued by the supervision company	26/06/2007	
The ERPA was signed between the PO and Climatebridge Ltd.		19/09/2007
The main transformer contract has signed between the contracted party (i.e.Guizhou Qianshui Hydro Power Construction Co., Ltd) and the Guangxi Liuzhou Transformer Co., Ltd	08/10/2007	
The PDD was published for GSC and the validation company was TUV SUD.		13/12/2007
The Equipment Purchasing contract has signed between the contracted party (i.e.Guizhou Qianshui Hydro Power Construction Co., Ltd) and Fujian Nanping Nandian Hydropower Equipment Manufacturing Co., Ltd	15/12/2007	
The Communication letter between Validation entity TUV		26/03/2008

SUD and the PP regarding further evidences requirement.		
The Approval of China's LoA		25/06/2008
The Communication letter between Validation entity TUV SUD and the PP regarding the validation payment for further validating the project.		26/08/2008
The second Communication letter between Validation entity TUV SUD and the PP regarding the validation payment for further validating the project.		20/05/2009
Termination Agreement on CDM Project Development Service contract signed between PO and Guizhou Zhongshui Hengyuan project management consulting company		27/05/2010
Termination Agreement on CDM validation between PO and TUV SUD.		16/11/2010
Commissioning of the project activity.	20/12/2010	
The CER buyer of the project (i.e. Vitol S.A.) signed CDM Project and Development and Service Agreement with Libra CDM Investment & Management CO., Ltd		16/06/2011
Termination Agreement on ERPA signed between PO and Climatebridge Ltd.		28/06/2011
ERPA signed between PP and Vitol.S.A.		20/07/2011
The PDD was republished for GSC by TUV Rheinland (China) Ltd.		02/09/2011
The approval Note on Change of Project Participants of Ziqiang 18MW Hydropower Project in Guizhou Province China by the Department of Climate Change, National Development and Reform Commission of the People's Republic of China was issued by DNA of China		20/03/2012

Considering that the IRR of the project is less than the benchmark, and it is higher than the benchmark with CERs sale revenue, the project owner held a board meeting, the meeting decided to apply for the CDM support. The project owner signed the CDM Development Service Contract with Guizhou Hengyuan Project Management and consulting Co.Ltd before the project starting date. General Construction Contract of the project was signed on 20/06/2007 due to the CDM incentives, which is the earliest starting date of the project activity. The PDD of the project was published on the UNFCCC Website on 13/12/2007. The LoA was approved on 25 June 2008. The validation of the project was carried on by TUV SUD from 13/12/2007 to 16/11/2010, on which day the CDM validation was terminated. The PO has terminated the ERPA with Climatebridge Ltd. on 28/06/2011 and to continue seek for the support of CDM, the project owner signed ERPA with another CERs buyer Vitol S.A. on 20/07/2011. The newly signed Vitol S.A. has commissioned TUV Rheinland (China) Ltd to validate the project and the project has been republished for GSC on 02/09/2011. From the timeline and corresponding description above, it can be concluded that the continuing and real actions have been taken to secure CDM status for the project in parallel with its implementation.

In conclusion, the project activity is additional.

B.6. Emission reductions:

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B.6.1. Explanation of methodological choices:

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Emission reductions from the proposed project are calculated using the consolidated baseline methodology ACM0002 (version 12.3.0). In conjunction with ACM0002, the Methodological Tool "*Tool to calculate the emission factor for an electricity system" Version 2.2.1 shall* be followed in order to determine the emission factor of the relevant electricity system in order to determine the baseline emissions of the Project.

Project Emissions

ccording to the methodology, the project emissions shall be accounted for as project emissions by using the following equation:

$$PE = PE_{FF,y} + PE_{GP,y} + PE_{HP,y} \quad (1)$$

Where:

PE_y is the project emissions in year *y* (tCO_2e/yr)

$PE_{FF,y}$ is project emissions from fossil fuel consumption in year *y* (tCO_2/yr)

$PE_{GP,y}$ is project emissions from the operation of geothermal power plants due to the release of non-condensable gases in year *y* (tCO_2e/yr)

$PE_{HP,y}$ is project emissions from water reservoirs of hydro power plants in year *y* (tCO_2e/yr)

Fossil Fuel Combustion ($PE_{FF,y}$)

Diesel generator will be used to produce power in the case of emergency, hence the project emission from diesel consumption should be calculated. As per ACM0002(ver.11), $PE_{FF,y}$ shall be calculated as per the latest version of the "Tool to calculate project or leakage CO_2 emission from fossil fuel combustion". As per the latest version (ver.2) of the Tool mentioned above, CO_2 emission from fossil fuel combustion are calculated based on the quantity of fuels combusted and CO_2 emission coefficient of those fuels, as follows:

$$PE_{FF,y}=FC_{i,j,y}*COEF_{i,y} \quad (2)$$

Where:

$PE_{FF,y}$= are the CO_2 emission from fossil fuel combustion in process j during the year y(tCO_2/yr)

$FC_{i,j,y}$=Is the quantity of fuel type I combusted in process j during the year y (mass or volume unit/yr)

$COEF_{i,y}$=Is the CO_2 emission coefficient of fuel type i in year y

i=are the fuel types combusted in process j during the year y

$$COEF_{i,y}=NVC_{i,y}*EF_{co2,i,y} \quad (3)$$

$NCV_{i,y}$=is the weighted average net calorific value of the fuel type i in year y (GJ/mass or volume unit)

$EF_{co2,i,y}$= Is the weighted average CO_2 emission factor of fuel type i in year y (tCO_2/GJ)

i=Are the fuel types combusted in process j during the year y

The diesel motor employed in the project will only consume diesel oil. It is estimated to consume 0.0525t diesel oil per hour[4] and run about 60 hours annually. The weighted average net calorific value of diesel oil is 42.652GJ/ton, and the weighted average CO_2 emission factor of diesel oil is 0.0748 tCO_2/GJ[5].

Therefore, the annual CO_2 emission from diesel oil combustion can be calculated as follows:

$PE_{FF,y}$ =0.0525* 60*42.652*0.0748=10tCO_2.

Considering that the estimated annual project emissions from diesel oil combustion 10 $tCO_2$is far less than 1% of the expected average annual emission reduction[6], based on the 77th paragraph of VVM(ver.1.2), the annual CO2 emissions from diesel oil combustion is negligible, that is, $PE_{FF,y}$=0. The actual one will be monitored ex post. In case of the project emission over 1%, it will be considered.

Emissions of non-condensable gases from the operation of geothermal power plants ($PE_{GP,y}$)

As the Project is hydropower project activities, no emissions of non-condensable gases from the operation of geothermal power plant should be considered, i.e., the $PE_{GP,y}$ is zero.

Emissions from water reservoirs of hydro power plants ($PE_{HP,y}$)

According to the baseline methodology ACM0002 (Version 12.3.0), the power density of the project is calculated as follows:

$$PD = \frac{Cap_{PJ} - Cap_{BL}}{A_{PJ} - A_{BL}}$$

Where:

PD	=	Power density of the project activity (W/m^2)
Cap_{PJ}	=	Installed capacity of the hydro power plant after the implementation of the project activity (W)
Cap_{BL}	=	Installed capacity of the hydro power plant before the implementation of the project activity (W). For new hydro power plants, this value is zero
A_{PJ}	=	Area of the reservoir measured in the surface of the water, after the implementation of the project activity, when the reservoir is full (m^2)
A_{BL}	=	Area of the reservoir measured in the surface of the water, before the implementation of the project activity, when the reservoir is full (m^2). For new reservoirs, this value is zero

As the project will build a new reservoir, Cap_{BL} and A_{BL} are zero.

PD = (18,000,000 W-0) / (849,667 m^2-0) = 21.2 W/m^2

The power density of the project is more than 10 W/m2.

Thus, PE_y =0.

Baseline emissions

[4]According to http://www.docin.com/p-60902910.html, the diesel consumption for 250 kW diesel generator is about 52.5kg.

[5] According to page 283 of China Energy Statistical Yearbook 2008, the NCV of diesel oil is 42.652 GJ/ton. According to table 2.2, volume 2, chapter 2, the upper value of CO2 emission factor for diesel is 0.0748 tCO_2/GJ.

[6] The expected average annual emission reduction is 60440tCO_2, so the emission from diesel generator is only 0.0165% of the baseline emission.

According to the methodology ACM0002 (Version 12.3.0), baseline emissions are the CO_2 emissions from the electricity generation of the existed CSPG. The baseline emissions of the project activity are to be calculated as follows:

$$BE_y = EG_{PJ,y} \cdot EF_{grid,CM,y} \quad (1)$$

Where:
BE_y is baseline emissions in year y (tCO_2/yr).
$EG_{PJ,y}$ is quantity of net electricity generation that is produced and fed into the grid as the result of the implementation of the CDM project activity in year y (MWh/yr).
$EF_{grid,CM,y,}$ is combined margin CO_2 emission factor for grid connected power generation in year y calculated using “Tool to calculate the emission factor for an electricity system (version 02.2.1)”(tCO_2/MWh).

According to baseline methodology ACM0002, for Greenfield renewable energy power plants:

$$EG_{PJ,y} = EG_{facility,y} \quad (2)$$

Where:
$EG_{PJ,y}$ is quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year y (MWh/yr).
$EG_{facility,y}$ is quantity of net electricity generation supplied by the project plant to the grid in year y (MWh/yr).

$$EG_{facility,y} = EG_{delivery,y} - EG_{import,y} \quad (3)$$

Where:
$EG_{delivery,y}$ is electricity delivered by the Project to CSPG in year y (MWh/yr).
$EG_{import,y}$ is electricity imported by the Project from CSPG in year y (MWh/yr).

The emission coefficient (measured in kg CO_2e/kWh) should be calculated in a transparent and conservative manner as: a combined margin (CM), consisting of the combination of operating margin (OM) and build margin (BM) according to the procedures prescribed in the “Tool to calculate the emission factor for an electricity system (Version 2.2.1)”.The data used for calculation are from an official source (where available) and publicly available. The calculation processes are as follows:

STEP 1: Identify the relevant electricity system.
STEP 2: Choose whether to include off-grid power plants in the project electricity system (optional).
STEP 3: Select a method to determine the operating margin (OM).
STEP 4: Calculate the operating margin emission factor according to the selected method.
STEP 5: Calculate the build margin emission factor.
STEP 6: Calculate the combined margin (CM) emissions factor.

Step 1: Identify the relevant electricity system.

The power to be generated from the proposed Project will be delivered to the CSPG. The CSPG as defined by the NDRC has clearly identifiable geographic and system boundaries namely that it covers four provincial grids (Guangdong, Guangxi, Yunnan and Guizhou).

Step 2: Choose whether to include off-grid power plants in the project electricity system

According to ‘Tool to calculate the emission factor for an electricity system’ (Version 02.2.1), project participants may choose between the following two options to calculate the operating margin and build margin emission factor:

Option I : Only grid power plants are included in the calculation.
Option II : Both grid power plants and off-grid power plants are included in the calculation.

For the proposed project, Option I is chosen due to the unavailability of information of off-grid power plants.

<u>Step 3: Select a method to determine the Operating Margin (OM)</u>

According to "Tool to calculate the emission factor for an electricity system (Version 02.2.1)", there are four methods for calculating the $EF_{grid,OM,y}$:

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

Method (a) can be used if 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 averages data for hydroelectricity production. It can be found from Table 7 that the low-cost/must run resources including hydro, geothermal, wind, low-cost biomass constitute less than 50% of CSPG during year 2004 to 2008. Thus, method (a) is applicable to calculate $EF_{grid,OM,y}$.

Table B-9 Percentage of low-cost/must run resources in CSPG during year 2004～2008[7]

Year	2004	2005	2006	2007	2008
Percentage (%)	31.58	30.69	29.75	29.95	40.84

For the project, $EF_{grid,OMsimple,y}$ is calculated using ex ante option: A 3-year generation-weighted average, based on the most recent data available at the time of submission of the CDM-PDD to DOE for validation, without requirement to monitor and recalculate the emissions factor during the crediting period.

<u>Step 4: Calculate the Operating Margin emission factor according to the selected method</u>

According to "Tool to calculate the emission factor for an electricity system (Version 02.2.1)", there are two options based on different data for calculating $EF_{grid,OMsimple,y}$:

Option A: Based on the net electricity generation and a CO_2 emission factor of each power unit; or
Option B: Based on the total net electricity generation of all power plants serving the system and the fuel types and total fuel consumption of the project electricity system.
For the project, the necessary data for Option A is not available, so Option A can't be used, Option B can be used if only nuclear and renewable power generation are considered as low-cost/must-run power sources and the quantity of electricity supplied to the grid by these sources is known and off-grid power plants are not included in the calculation. There isn't any nuclear power in CSPG at present and renewable power generation are considered as low-cost / must-run power sources in CSPG, and the quantity of electricity supplied to CSPG by these sources is known and off-grid power plants are not included in the calculation, so Option B is used for calculating $EF_{grid,OMsimple,y}$, the formula is as follows:

[7] China Electric Power Yearbook 2005～2009

$$EF_{grid,OMsimple,y} = \frac{\sum_i (FC_{i,y} \times NCV_{i,y} \times EF_{CO_2,i,y})}{EG_y} \qquad (4)$$

Where:
$EF_{grid,OMsimple,y}$= Simple operating margin CO_2 emission factor in year *y* (tCO_2/MWh)
$FC_{i,y}$ = Amount of fossil fuel type *I* consumed in the project electricity system in year *y* (mass or volume unit)
$NCV_{i,y}$ = Net calorific value (energy content) of fossil fuel type *i* in year *y* (GJ / mass or volume unit)
$EF_{CO2,i,y}$ = CO_2 emission factor of fossil fuel type *i* in year *y* (tCO_2 / GJ)
EG_y = Net electricity generated and delivered to the grid by all power sources serving the system, not including low-cost / must-run power plants / units, in year *y* (MWh)
i = All fossil fuel types combusted in power sources in the project electricity system in year y
y= The three most recent years for which data is available at the time of submission of the CDM-PDD to the DOE for validation (ex ante option).

The calculation method of $EF_{grid,OMsimple,y}$ issued by National Development and Reform Commission is referred to for the project[8], to see A1～A7 in Annex 3 for details.

Step 5 Calculate the build margin emission factor

In terms of vintage of data, project participants can choose between one of the following two options: Option 1. For the first crediting period, calculate the build margin emission factor ex-ante based on the most recent information available on units already built for sample group m at the time of CDM-PDD submission to the DOE for validation. For the second crediting period, the build margin emission factor should be updated based on the most recent information available on units already built at the time of submission of the request for renewal of the crediting period to the DOE. For the third crediting period, the build margin emission factor calculated for the second crediting period should be used. This option does not require monitoring the emission factor during the crediting period.

Option 2. For the first crediting period, the build margin emission factor shall be updated annually, ex-post, including those units built up to the year of registration of the project activity or, if information up to the year of registration is not yet available, including those units built up to latest year for which information is available. For the second crediting period, the build margin emissions factor shall be calculated ex-ante, as described in option 1 above. For the third crediting period, the build margin emission factor calculated for the second crediting period should be used.

Option 1 is chosen to calculate the build margin emission factor.

Build Margin emission factor ($EF_{grid,\ BM,\ y}$) is calculated by utilizing an *ex-ante* 3 years data vintage for CSPG, the formulae as follow:

$$EF_{grid,BM,y} = \frac{\sum_{i,m} EG_{m,y} \times EF_{EL,m,y}}{\sum_m EG_{m,y}} \qquad (5)$$

Where：

[8] National Development and Reform Commission, China's Regional Grid Baseline Emission Factors 2010, 20 December 2010.

$EF_{grid,BM,y}$	=	Build margin CO_2 emission factor in year y (tCO_2/MWh)
$EG_{m,y}$	=	Net quantity of electricity generated and delivered to the grid by power unit m in year y (MWh)
$EF_{EL,m,y}$	=	CO_2 emission factor of power unit m in year y (tCO_2/MWh)
m	=	Power units included in the build margin
y	=	Most recent historical year for which power generation data is available

The CO_2 emission factor of each power unit m ($EF_{EL,m,y}$) should be determined as per the guidance in Step 4 (a) for the simple OM, using options A1, A2 or A3, using for y the most recent historical year for which power generation data is available, and using for m the power units included in the build margin.

Because of the data unavailability at the power plant level in China, the 22nd CDM EB meeting agreed the following deviation[9] approaches for $EF_{grid,BM,y}$ calculation:
1) Use the efficiency level of the most advanced commercialized technologies of provincial/regional or national grid of China, as a conservative proxy, for fuel i consumption estimation to estimate the $EF_{grid,BM,y}$;

2) Use of capacity additions during last several years for estimating the $EF_{grid,BM,y}$ i.e. the capacity addition over last several years, whichever results in a capacity addition that is closest to 20% of total installed capacity;

3) Use of installed capacity to replace annual power generation to estimate weights.

Due to the difficulty of separating the coal-fired, gas-fired or oil-fired installed capacity from the total thermal installed capacity, the $EF_{grid,BM,y}$ will be calculated as:

1) Based on the most recent years energy balance of the CSPG, calculating the proportions of CO_2 emissions from the coal-fired, oil-fired and gas-fired power plants in total CO_2 emissions of thermal power plants and taking them as weights of each type of plants in the following calculations;

2) Based on the most advanced commercialized technologies which applied by the coal-fired, oil-fired and gas-fired power plants, calculating the emission factor of thermal power plants in CSPG. This approach is more conservative as it assumes all recently built plants have the fuel efficiency as that of the most advanced commercialized technologies;

3) Calculating the $EF_{grid,BM,y}$ through multiplying the emission factor of thermal power plants by the percentage share of thermal power plants installed capacity addition within all recently built installed capacity. The proper year is selected so that it is the closest time when the last 20% of installed capacity was built.

The BM in this PDD is calculated as the following sub-steps.

SUB-STEP 5a: Calculating the percentages of CO_2 emissions from the coal-fired, gas-fired and oil-fired power plants in CO_2 emissions from total thermal power plants

$$\lambda_{Coal,y} = \frac{\sum_{i \in Coal, j} F_{i,j,y} \times NCV_{i,y} \times EF_{CO_2,i,j,y}}{\sum_{i,j} F_{i,j,y} \times NCV_{i,y} \times EF_{CO_2,i,j,y}} \qquad (6)$$

[9] http://cdm.unfccc.int/UserManagement/FileStorage/AM_CLAR_QEJWJEF3CFBP1OZAK6V5YXPQKK7WYJ

$$\lambda_{Oil,y} = \frac{\sum_{i \in Oil,j} F_{i,j,y} \times NCV_{i,y} \times EF_{CO_2,i,j,y}}{\sum_{i,j} F_{i,j,y} \times NCV_{i,y} \times EF_{CO_2,i,j,y}} \qquad (7)$$

$$\lambda_{Gas,y} = \frac{\sum_{i \in Gas,j} F_{i,j,y} \times NCV_{i,y} \times EF_{CO_2,i,j,y}}{\sum_{i,j} F_{i,j,y} \times NCV_{i,y} \times EF_{CO_2,i,j,y}} \qquad (8)$$

Where:

$\lambda_{Gas,y}$ = Percentage of CO_2 emissions from the gas-fired power plants in CO_2 emissions from total thermal power plants in year *y*;

$\lambda_{Oil,y}$ = Percentage of CO_2 emissions from the oil-fired power plants in CO_2 emissions from total thermal power plants in year *y*;

$\lambda_{Coal,y}$ = Percentage of CO_2 emissions from the coal-fired power plants in CO_2 emissions from total thermal power plants in year *y*;

$F_{i,j,y}$ = Amount of fuel i (mass or volume unit, t for solid and liquid fuel, m^3 for gas fuel) consumed by the power sources of province j in year y;

$NCV_{i,y}$ = Net calorific value (energy content) of fossil fuel type i in year y (GJ/t for solid and liquid fuel, GJ/ m^3 for gas fuel);

$EF_{CO_2,i,j,y}$ = CO_2 emission factor of fossil fuel type i in year *y* (tCO_2/MWh).

SUB-STEP 5b: Calculating the fuel-fired emission factor ($EF_{Thermal}$)

$$EF_{Thermal,y} = \lambda_{Coal,y} \times EF_{Coal,Adv,y} + \lambda_{Oil,y} \times EF_{Oil,Adv,y} + \lambda_{Gas,y} \times EF_{Gas,Adv,y} \qquad (9)$$

Where:

$EF_{Thermal,y}$ = Emission factor of thermal power plants;

$EF_{Coal,Adv,y}$ = Emission factor of coal-fired power plants applying the most advanced commercialized technologies;

$EF_{Oil,Adv,y}$ = Emission factor of oil-fired power plants applying the most advanced commercialized technologies;

$EF_{Gas,Adv,y}$ = Emission factor of gas-fired power plants applying the most advanced commercialized technologies.

SUB-STEP 5c: Calculating the Build Margin (BM) emission factor ($EF_{grid,BM,y}$)

$$EF_{grid,BM,y} = \frac{CAP_{Thermal,y}}{CAP_{Total,y}} \times EF_{Thermal,y} \qquad (10)$$

Where:

$EF_{grid,BM,y}$ = Build Margin (BM) emission factor with advanced commercialized technologies for year y of CSPG;

$CAP_{Total,y}$ = Incremental installed capacity of recently built power plants, which constitutes near and greater than 20% of the total installed capacity;

$CAP_{Thermal,y}$	=	Newly installed capacity of recently built thermal power plants;
$EF_{Thermal,y}$	=	Emission factor of thermal power plants.

$EF_{grid,BM,y}$ is calculated according to the latest available data at the submission time of this PDD, the detailed data for the calculations is shown in Table A8-Table A10 of Annex 3.

Step 6: Calculate the combined margin emissions factor (EFy)

According to 'Tool to calculate the emission factor for an electricity system' (Version 02.2.1), baseline emission factor EF_y is calculated as the weighted average of the Operating Margin emission factor ($EF_{grid,OM,y}$) and the Build Margin emission factor ($EF_{grid,BM,y}$):

$$EF_{grid,CM,y} = w_{OM} \times EF_{grid,OM,y} + w_{BM} \times EF_{grid,BM,y} \quad (11)$$

Where:

w_{OM}	=	Weighting of operating margin emission factor (%);
w_{BM}	=	Weighting of build margin emission factor (%).

The weighs w_{OM} and w_{BM}, by default, are 50% (i.e., w_{OM}= w_{BM}= 0.5) in the first crediting period , and w_{OM}= 0.25,w_{BM}= 0.75 in the second and third crediting period.

Leakage

According to baseline methodology ACM0002 (Version 12.3.0), no leakage emissions are considered.

Emission Reductions

The annual emission reduction (ER_y) of the project is the difference between baseline emission, project emissions and emissions due to leakage:

$$ER_y\ (tCO_2e/yr) = BE_y - PE_y \quad (12)$$

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

Data / Parameter:	$NCV_{i,y}$
Data unit:	kJ/kg or kJ/m^3
Description:	The net calorific value (energy content) per mass or volume unit of fuel i in year y
Source of data used:	*China Energy Statistical Yearbook 2009.*
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:	$EG_{Thermal,j,y}$
Data unit:	MWh
Description:	The electricity generated by fuel-fired power plants in province *j* in CSPG in year *y*
Source of data used:	*China Electric Power Yearbook 2007-2009*
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:	$IPCR_{j,y}$
Data unit:	%
Description:	The internal power consumption rate of power plants in province *j* in CSPG in year *y*.
Source of data used:	*China Electric Power Yearbook 2007-2009*
Value applied:	See Annex 3 for details.
Justification of the choice of data or description of measurement methods and procedures actually applied :	Data used are from Chinese authorities.
Any comment:	

Data / Parameter:	$EF_{CO2,\ i,y}$
Data unit:	tCO_2/TJ
Description:	The CO_2 emission factor per unit of fuel i in year y
Source of data used:	*Revised 2006 IPCC Guidelines for National Greenhouse Gas Inventories*
Value applied:	See Annex 3 for details.
Justification of the choice of data or description of measurement methods and procedures actually applied :	No specific Chinese value available, to adopt the IPCC default value.
Any comment:	

Data / Parameter:	$FC_{i,\ y}$
Data unit:	10^4 t, 10^8 m^3
Description:	The quantity of fuel *i* (in a mass or volume unit) consumed by CSPG in year *y*
Source of data used:	*China Energy Statistical Yearbook 2008-2009*
Value applied:	See Annex 3 for details.
Justification of the	Data used are from Chinese authorities.

choice of data or description of measurement methods and procedures actually applied :	
Any comment:	

Data / Parameter:	*CAP* $_{j,\ y}$
Data unit:	MW
Description:	Installed capacities of province *j* in CSPG in years *y*.
Source of data used:	*China Electric Power Yearbook 2007-2009*
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:	$F_{i,\ j,\ y}$
Data unit:	10^4 t, $10^7 m^3$
Description:	The quantity of fuel *i* (in a mass or volume unit) consumed by the relevant provinces *j* in year(s) *y*
Source of data used:	China Energy Statistical Yearbook 2009
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_{BL}
Data unit:	W
Description:	Installed capacity of the hydro power plant before the implementation of the project activity
Source of data used:	
Value applied:	0
Justification of the choice of data or description of measurement methods and procedures actually applied :	According to ACM0002 (version 12.3.0), for new hydro power plants, this value is zero.
Any comment:	

Data / Parameter:	A_{BL}

Data unit:	m^2
Description:	Area of the reservoir measured in the surface of the water, before the implementation of the project activity, when the reservoir is full.
Source of data used:	
Value applied:	0
Justification of the choice of data or description of measurement methods and procedures actually applied :	According to ACM0002 (version 12.3.0), for new reservoirs, this value is zero.
Any comment:	

Data / Parameter:	$GENE_{Coal,Adv}$
Data unit:	/
Description:	The power supply efficiency of coal-fired power plants with best technology commercially available
Source of data used:	China's Regional Grid Baseline Emission Factors 2010
Value applied:	39.08%
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:	$GENE_{Oil,Adv,y}$
Data unit:	/
Description:	The power supply efficiency of oil/gas-fired power plants with best technologies commercially available
Source of data used:	China's Regional Grid Baseline Emission Factors 2010
Value applied:	51.46%
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

According to section B.6.1, $PE_y = 0$

Baseline emission

According to the formula (3)-(10) in section B.6.1, the results of $EF_{grid,OM,y}$, $EF_{grid,BM,y}$ and $EF_{grid,CM,y}$ are listed in following Table B-10 , the detailed calculation is shown in Annex 3.

Table B-10 Calculating result of baseline emission factor of CSPG

$EF_{grid,OM,y}$ **(tCO_2e/MWh)**	$EF_{grid,BM,y}$ **(tCO_2e/MWh)**	$EF_{grid,CM,y}$ **(tCO_2e/MWh)**
0.9762	0.4506	0.7134

According to the formula (1) in Section B.6.1, the baseline emissions (BE_y) of the project in a typical year are calculated as follows:

$BE_y = EG_y \cdot EF_{grid,CM,y}$=60,955MWh×0.7134 tCO_2e /MWh = 43,486tCO_2e /yr

Leakage

According to Section B.6.1, no leakage emissions are considered.

Emission Reductions

According to the formula (12) in Section B.6.1, the emission reductions (ER_y) of the project in a typical year are calculated as follows:

ER_y (tCO_2e/yr) = $BE_y - PE_y$ = 43,486 tCO_2e — 0 tCO_2e = 43,486tCO_2e

In this PDD, the *Total electricity generation* for the calculation of emission reductions is estimated based on hydrological conditions, actually, as the impact of rainfall, runoff of the River and so on, the actual net electricity generation may be slightly different, so does the actual emission reductions.

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

>>

The estimated project emission reductions in the first crediting period are listed in Table B-11:

Table B-11 The ex-ante estimation of emission reductions

Year	**Estimation of project activity emissions (tonnes of CO_2e)**	**Estimation of baseline emissions (tones of CO_2e)**	**Estimation of leakage (tonnes of CO_2e)**	**Estimation of overall emission reductions (tonnes of CO_2e)**
01/11/2012-31/10/2013	0	43,486	0	43,486
01/11/2013-31/10/2014	0	43,486	0	43,486
01/11/2014-31/10/2015	0	43,486	0	43,486
01/11/2015-31/10/2016	0	43,486	0	43,486
01/11/2016-31/10/2017	0	43,486	0	43,486
01/11/2017-31/10/2018	0	43,486	0	43,486
01/11/2018-31/10/2019	0	43,486	0	43,486

Total (tCO_2e)	0	304,402	0	304,402

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

B.7.1 Data and parameters monitored:

Data Parameter:	$EG_{delivery,y}$
Data unit:	MWh
Description:	Electricity delivered by the Project to CSPG in year y.
Source of data to be used:	Project activity site
Value of data applied for the purpose of calculating expected emission reductions in section B.5	60,955
Description of measurement methods and procedures to be applied:	Continuous measurement by meters installed and at least monthly recording.
QA/QC procedures to be applied:	The meters will be calibrated once a year.
Any comment:	/

Data Parameter:	$EG_{import,y}$
Data unit:	MWh
Description:	Electricity imported by the Project from CSPG in year y
Source of data to be used:	Data used in the PDD is assumed as zero. Actual data will be read from ammeters.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	0
Description of measurement methods and procedures to be applied:	Continuous measurement by meters installed and at least monthly recording.
QA/QC procedures to be applied:	The meters will be calibrated once a year.
Any comment:	/

Data Parameter:	$EG_{facility,y}$
Data unit:	MWh
Description:	Quantity of net electricity generation supplied by the project plant/unit to the grid in year *y*
Source of data to be	Project activity site

used:	
Value of data applied for the purpose of calculating expected emission reductions in section B.5	60,955
Description of measurement methods and procedures to be applied:	Continuous measurement by meters installed and at least monthly recording. The data will be calculated by subtracting electricity imported by the Project from CSPG from electricity delivered by the Project to CSPG and settled by power grid company monthly.
QA/QC procedures to be applied:	Double checked by receipt of sales and settling accounts sheet.
Any comment:	/

Data / Parameter:	Cap_{PJ}
Data unit:	W
Description:	Installed capacity of the hydro power plant after the implementation of the project activity.
Source of data to be used:	Project site
Value of data applied for the purpose of calculating expected emission reductions in section B.5	18,000,000
Description of measurement methods and procedures to be applied:	Monitored annually through reading the Nameplate Capacity which states the maximum output of the hydro turbines.
QA/QC procedures to be applied:	/
Any comment:	/

Data / Parameter:	A_{PJ}
Data unit:	m^2
Description:	Area of the reservoir measured in the surface of the water, after the implementation of the project activity, when the reservoir is full.
Source of data to be used:	Project site
Value of data applied for the purpose of calculating expected emission reductions in section B.5	849,667
Description of measurement methods and procedures to be applied:	Yearly measured from topographical surveys and maps.
QA/QC procedures to be applied:	/

Any comment:	/

Data / Parameter:	$FC_{diesel,y}$
Data unit:	Mass or volume unit per year (e.g. ton/yr or m^3/yr)
Description:	Quantity of diesel combusted by diesel generator during the year y
Source of data to be used:	The data recorded by staff onsite
Value of data applied for the purpose of calculating expected emission reductions in section B.5:	/
Measurement procedures (if any)	The consume fuel will be monitored by the instrument and be recorded by the designated staff
Description of measurement methods and procedures to be applied:	Continuously
QA/QC procedures to be applied:	The consistency of metered fuel consumption quantities should be cross-checked by an annual energy balance that is based on purchased quantities and stock changes.
Any comment:	The data will only be monitored if there is a diesel generator installed at project site.

Data / Parameter:	$NCV_{diesel,y}$
Data unit:	GJ per mass or volume unit (e.g. GJ/m^3, GJ/ton)
Description:	Wighted average net calorific value of diesel in year y
Source of data to be used:	IPCC default values at the upper limit of the uncertainty at a 95% confidence interval as provided in Table 1.2 of Chapter 1 of Vol.2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories.
Value of data applied for the purpose of calculating expected emission reductions in section B.5:	/
Measurement procedures (if any)	/
QA/QC procedures to be applied:	Any future revision of the IPCC Guidelines should be taken into account
Any comment:	/

Data / Parameter:	$EF_{co2,diesel,y}$
Data unit:	tCO_2/GJ
Description:	Wighted average CO_2 emission factor of diesel in year y
Source of data to be used:	IPCC default values at the upper limit of the uncertainty at a 95% confidence interval as provided in Table 1.4 of Chapter 1 of Vol.2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories.

Value of data applied for the purpose of calculating expected emission reductions in section B.5:	/
Measurement procedures (if any)	/
QA/QC procedures to be applied:	Any future revision of the IPCC Guidelines should be taken into account
Any comment:	/

B.7.2. Description of the monitoring plan:

>>

Baseline emission factor of the Project is determined ex ante. Therefore, the electricity delivered by the Project to the South China Power Grid ($EG_{facility,y}$), the installed capacity of the hydro power plant after the implementation of the Project (Cap_{PJ}) and surface area of the reservoir after the implementation of the Project activity when the reservoir is full (A_{PJ}) are defined as the key data to be monitored. Meanwhile the electricity delivered to the grid by the Project in year y ($EG_{facility,y}$) is calculated as subtract the electricity import from the grid in year y ($EG_{import,y}$) from the electricity exported to the grid in year y ($EG_{delivery,,y}$), therefore the electricity import from the grid in year y ($EG_{import,y}$) and the electricity exported to the grid in year y ($EG_{delivery,,y}$) are also the key parameters to be monitored. Besides, the diesel consumed for electricity produces also needs to be monitored. The monitoring plan is drafted to focus on monitoring the parameters mentioned above.

1. Monitoring Structure

The Project owner assigns the person in charge of CDM operation with assistance of the technological departments and financial department. The structure shows as the following Figure B-3.

Personal in charge of CDM

In full charge of issues related to CDM projects, in particular:
(1) track the development of CDM;
(2) supervise the project operation status related to data monitoring and the monitoring process as well, ensure a smooth and orderly monitoring process;
(3) in charge of activities related to CER issuance, ensure the completeness and accuracy of related data.

Technical Department

In charge of calibrating and maintaining the meter, and checking, archiving and managing data

Financial Department

In charge of collecting data required by the checking activity, including meter readings records, electricity sales records and copies of electricity sales invoices.

Statistician

In charge of measuring and recording the meter readings;
In charge of measuring the installed capacity of the hydro power plant.

Figure B-3. Management Structure of Monitoring Plan

2. Monitoring apparatus and installation

The meters will be installed in accordance with "Technology & Management Regulations for Power Metering Devices" (DL/T448-2000). One main meter and one back-up meter will be installed at the connection point to the grid to measure net electricity delivered to CSPG, and further backup meters will be installed to measure on-site electricity consumption and gross electricity generation. The accuracy of the meters will be higher than 0.5S meeting the national standard, and should be calibrated at least once a year.

The Location of the metering system of the above mentioned two stages are shown in Figure B-4.

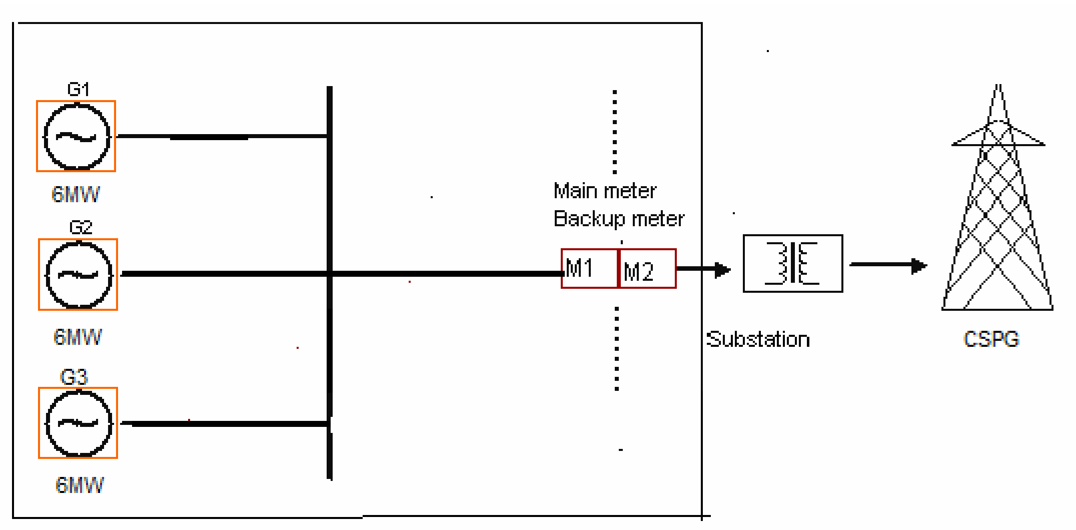

Figure B-4 Electricity system of the project activity

3. Data monitoring

Electricity supplied to the grid and electricity generated by the Project

To ensure the collection of reliable and accurate data, the project will adopt real-time continuous monitoring as well as manual recording. The electricity consumed by the project and the electricity delivered to and from CSPG will be read and recorded monthly.

The readings of the Gateway meter are used for calculating the emission reductions when the Gateway meter is in normal operation state. The monitoring processes are as follows:

(1) The designated persons from the grid company and the project company co-read and record the readings of the Gateway meter for the electricity delivered to and from CSPG on the same day every month;

(2) The power grid company provides the project owner with a settling accounts sheet to confirm the net electricity supplied to CSPG monthly;

(3) The power grid company pays for the power after the project owner provides the power grid company with a sale receipt.

Surface area of the reservoir

The Project owner assigned given statistician to monitor the surface area of the reservoir with GPS or maps according with the request of precision when the reservoir is full every year.

Installed capacity

CDM operators will read and record the nameplate data of each generator every year. This record will be checked by the CDM team leader and provided to DOE during the verification period.

Actual diesel consumption

When the generators operate in normal condition, the auxiliary power will be from the electricity generated by the generators directly. When the generators shut down, the auxiliary power will be imported from the grid, and the electricity will be monitored by the check meter as well as the main meter (bi-directional).If station is shut down and at the same time the electricity of the grid is unavailable, an independent diesel generator will be used to produce electricity at the emergency situation.

The actual diesel consumption will be record by the pointed staff once it is used for power generation at the emergency situation. The value will be accumulated per year.

4. Quality control

1) Calibration of meters

The main meter and back-up meter at the connection point to the grid will be calibrated at least once per year. Calibration will be carried out by staff of a qualified measurement and inspection organization.

When the main meter or back-up meter have a breakdown, the party finding the breakdown should tell another party and inform the qualified calibration organization to check, calibrate, test and treat the meter so as to recover the normal monitoring state.

2) Emergency treatment

When the main meter or back-up meter have a breakdown, the electricity generation difference will be treated as follows:

a. When Main Meter has a breakdown, the readings of Backup Meter will be adopted;

b. If both of the Main Meter and Backup Meter have breakdowns, the project owner should notice the power grid company immediately and solve the problem with a conservative calculation method.

After handling of the emergencies, the project owner must prepare a report regarding the emergency to explain to DOE that the handling method is reasonable.

In case of erroneous measurements, it will be reported to the Manager immediately and the Manager will initiate the corrective actions.

5. Data management

All monitoring data and records will be archived electronically and be kept in the designated storage room at least for 2 years after the end of the last crediting period. Receipts of electricity sales and settling accounts sheet will be used as a final double-check to ensure that measurements are correct. The project owner will ensure that all required documentation is made available to the verifier.

6. Training program

The project developer and the CDM Consulting Company will train all the related staffs before the registration of the project activity. The training contains CDM knowledge, operational regulations, quality control (QC), data monitoring requirements and data management regulations, etc.

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):

>>

The application of the baseline study and monitoring methodology of the Project was completed on 16/10/2012 by:

Entity: Libra CDM I&M Co., Ltd

Email: kevinz@libracdm.com

The person/entity is not project participant listed in Annex 1.

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:

>>
20/06/2007 (The General Construction Contract of the Project was signed and this is the earliest starting date of the project activity.)

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

>>
30 years 0 months

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

C.2.1. Renewable crediting period:

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

>>

01/11/2012 or the day of registration whichever is earlier.

C.2.1.2. Length of the first crediting period:

>>

7 years

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

>>

Not applicable.

C.2.2.2. Length:

>>

Not applicable.

SECTION D. Environmental impacts

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

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The proposed project is a representative canyon reservoir then there is no transmigrant. The area of the expropriable soil is 0.2123km^2. The Environmental Impact Assessment (EIA) for this project was carried out by Institute of Geochemistry, Chinese Academy of Science. The EIA report has already been approved by Guizhou Province Environmental Protection Bureau on 12th, May.2006 (Qinhuanhan [2006] No. 163). Combined with the EIA report, the influences of the proposed project on the environment are summarized as follows in the construction period and the operation period.

The contents of Ziqiang environmental impact assessment approval

Construction projects should focus on the following tasks:

1. The project owner should attach great importance to environmental protection, make efforts of the environmental protection and soil as well as water conservation during the construction and operation period.

The project owner should seriously implement environmental protection measures, special soil and water conservation plans and environmental protection requirements in EIA report and its approvals.

2. The soil and stone material area should be mining separately; the surface soil which strips should be piled up centralized. Timely reclamation of abandoned dumping sites and also prevents dumping abandons in the water environment. Prevent environmental problems triggered by soil erosion and geological disasters.

3. Strengthen the protection of the water environment. Sewage treatment programs, for the wastewater produced in the construction and operation period and daily life, should be chose as early as the project was set up. The processing scale must meet the largest need of production and increase the water reuse rates and the actually efflux part should be applied to agricultural irrigation. According to the assessment, after construction, the reservoir will hold the function of drinking water source, so it is possible to suggest that during the operation period the domestic sewage shouldn’t discharge into the reservoir even if it reaches the emission standard after biochemical treatment, the water can be used by afforestation or agricultural irrigation.

Before the reservoir storage, the environmental protection measures should be strictly enforced to strengthen the protection of water quality and reservoir management. In order to keep water function and guarantee the water resources demands for downstream. The project owner should prevent water pollution after the reservoir storage.

4. Make a good job of noise control and prevention, and strictly control the construction of time, also strictly forbid disturbing noise.

5. The project owner should implement the environmental protection, supervision and monitoring plan. The construction party should implement detailed measures of environmental protection in line with the related requirements, carry out the environmental protection measures, and also implement the environmental protection investment. At the same time, environmental engineering supervision costs should be listed in the environmental protection investment budget specifically.

6. The solid waste should be cleaned and transport timely and properly stacked. It is necessary to beautify and afforesting the ambient of power plant.

7. The proposed project has the draining hole with the diameter of 400mm to make sure the water flux reach 1.0m3/s.The operation of the proposed project won't have negative impact on river ecosystem and hydrophilic biology community.

8.The project owner should strictly abide by "three simultaneousness" regulation. The construction party should strengthen environmental management, establish environmental protection management agencies and implement job responsibility system. The construction party should also periodically report to environmental department and the local environmental protection bureau about the implementation of environmental protection measures during every steps of the project, and also accept the supervision and inspection from environmental protection department.

The project should not be put into operation until environmental department's on-site inspection and permission. The trial operation period will last three months, the construction parties are required to apply for environmental protection checks according to relevant procedures. The standard of total pollutants discharge should be approved and handed out by Zhijin Environment Protect Bureau; every construct party should abide by it and strictly implement the related regulations. Zhijin Environment Protect Bureau takes charge of the daily supervision.

9. The project implements national environmental quality standards and pollutant discharge standards as follows:

"Ambient Air Quality Standard" (GB3095-1996) Ⅱ;

"Surface Water Quality of the Environment" (GB3838-2002) Ⅲ;

"Standards for Noise in Urban Districts" (GB3096-1993) Ⅱ;

"Comprehensive Sewage Discharge Standards" (GB8978-1996) Ⅰ;

"Emission Standard of Air Pollutants" (GB16297-96)Ⅱ;

"The Standard of Noise Limits of Construction Site" (GB12523-90);

"Industrial enterprise Factory Boundary Noise Standard" (GB12348-90)Ⅱ.

As mentioned above, the environmental impact of the project during the construction period is short, and measures will also be taken to minimize the adverse environmental impacts. The environmental impact during the operation period is negligible.

The project as a clean renewable energy project can reduce greenhouse gas emissions and also reduce the environmental pollution caused by coal consumption. It has favorable influence on the local ecological environment; especially after the project is put into operation the ecological restoration measures can improve the local ecological environment.

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:

>>

Both of the host Party and the project owners regard that the proposed project will not bring significant impacts on the environment. After the completion of the project construction, the project will be put into operation only after the inspection and acceptance of local environmental protection department.

SECTION E. Stakeholders' comments

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

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In order to consult the public's opinions and suggestions about the proposed project, the project owner published the *Suggestion Consultation of Ziqiang Hydropower Plant CDM Project* on *Bijie Daily* on 10 May, 2007. Furthermore, the project owner distributed 35 copies of questionnaires through local government to consult the stakeholders' opinions about construction and operation of the proposed project in June, 2007. Detail content see E2.

E.2. Summary of the comments received:

>>

1. Content of the Public Participation Survey

The occupations, cultural degrees and age structures of the individual investigation are as follows:

Table 12 Summary of stakeholders

Item	Category	Quantity
Nationality	Miao	1
	Han	34
	Other	0
Education level	University	2
	Senior school	2
	Junior school	17
	Elementary school	14
Age	18~30	13
	31~50	17
	Above 50	5
Occupation	Farmer	31
	Worker	4
	Others	0

35questionnaires were distributed to the local people, and 35questionnaires had been returned. The response rate is 100%. Comments from these questionnaires for local people are summarized in the following table.

Summary of questionnaires

The number	Item	Choice	Numbers(persons)	share（%）

1	Whether to know the proposed project	Know	33	94
		Be aware of	1	3
		Don't know	1	3
2	The attitude to the construction of the proposed project	Build quickly	35	100
		Not care about	0	0
		Don't care about	0	0
3	Whether to join the building and operation of the proposed project	Expect	35	100
		Not care about	0	0
		Don't expect	0	0
4	The necessary need of the construction of the proposed project	Develop the economy	34	97
		Improve the quality of electricity generation	1	3
		Boost the tourism	0	0
5	The environment factors that may restrict the construction of the proposed project	The flood loss	27	77
		The immigrants allocation	13	37
		Destroy the ecology	0	0
6	Is there sewage drain near the proposed project	There is	16	45
		There is not	10	29
		Don't know	9	36
7	The acceptable ways of immigrants allocation in the local areas	Move	28	80
		Arrange the farmland nearly	10	29
		compensate	2	6
8	When the construction of the proposed project will affect your farmland and you must move, whether you would like to move	Willing	29	83
		Decide by the conditions of the allocation sites	6	17
		Unwilling	0	0
9	Do you accept to allocate immigrations to your village	Accept	31	89
		Not care about	4	11
		Not accept	0	0
10	The influence on the local wild	No influence	19	54

	animals and plants	Small influence	16	46
		Big influence	0	0
11	The main influence of the proposed project on environment you think	Environment	14	40
		Water environment	14	40
		Other aspects	7	20
12	The influence on the environment	Get better	33	94
		No change	2	6
		Get worse	0	0
13	The impact on the local economy	Boost	35	100
		No direct impact	0	0
		Negative impact	0	0
14	The greatest influence on local areas	Improving local economy	33	94
		Increase personal income	1	3
		Ensuring Electricity power	1	3
15	The environmental and economical benefits that the proposed project bring about, which you prefer	Environmental benefits	5	14
		Environmental and economical benefits	30	86
		Economical benefits	0	0
16	The advantages and disadvantages of the project	Advantages bigger than disadvantages, the project is feasible	35	100
		Advantages equal to disadvantages	0	0
		Advantages smaller than disadvantages, the project is not feasible	0	0

The result of this investigation shows that 100% of the public people supported the start of the proposed project, 100% thought that the advantages of operation of the power plant was bigger than the disadvantages, and 100% thought the proposed project would improve the environment. Therefore, the local people supported the construction of the proposed project, and they figured out that the power plant had positive meaning for local economy development. They had a positive and optimistic attitude for the environmental impacts because of the construction of the proposed project. The public generally hope that the project will start as soon as possible in order to spur local economic development, increase incomes and social benefits.

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

>>

The project owner will pay much attention to the comments and suggestions of the stakeholders, especially the environmental impacts problems in the construction period and the land compensation for the related farmers. During the construction period and operation period of the project, the project owner will do the work of ecological environmental protection and soil & water conservation, finish the design of environmental protection to make sure that all the measures and funds should be put into effect, and strengthen the environmental management during construction period, environmental monitoring and onsite supervision and law enforcement to make sure the environmental quality can reach the quality standard and the related requirement.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

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Annex 2

INFORMATION REGARDING PUBLIC FUNDING

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

Annex 3

B BASELINE INFORMATION

BASELINE INFORMATION

The installed capacity and the fuel consumption data used for OM and BM calculations are derived from <China Energy Statistical Yearbook>, <China Electric Power Yearbook>.

The low calorific value, CO_2 emission factor and oxidation factor of fuels are listed in Table A1 below.

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

Fuel	Low Calorific Value	Emission Factor ($kgCO_2/TJ$)	Oxidation Factor
Raw Coal	20908 kJ/kg	87,300	1
Cleaned Coal	26344 kJ/kg	87,300	1
Other Washed Coal	8363 kJ/kg	87,300	1
Moulded coal	20908 kJ/kg	87,300	1
Coke	28435 kJ/kg	95,700	1
Crude Oil	41816 kJ/kg	71,100	1
Gasoline	43070 kJ/kg	67,500	1
Diesel Oil	42652 kJ/kg	72,600	1
Fuel Oil	41816 kJ/kg	75,500	1
Other oil production	41816 kJ/kg	75,500	1
Natural Gas	38931 kJ/m^3	54,300	1
Coke Oven Gas	16726 kJ/m^3	37,300	1
Other Gas	5227 kJ/m^3	37,300	1
LPG	50179 kJ/kg	61,600	1
Refinery Dry Gas	46055 kJ/kg	48,200	1

Data Source: The net calorific values are quoted from <China Energy Statistical Yearbook 2009>, Page 507.

The emission factors are quoted from <2006 IPCC Guidelines for National Greenhouse Gas Inventories >, Table 1.3 and Table 1.4, Page 1.21-1.24, Chapter 1, Volume 2 Energy. 95% of lower limit value of emission factors confidence interval is adopted

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

Table A2 Simple OM Emission Factors Calculation of CSPG for Year 2006

Energy	Unit	Guangdong A	Guangxi B	Guizhou C	Yunnan D	Subtotal E=A+B+C+D	Carbon Content (tC/TJ) F	Oxidation rate (%) G	Emission factor (kg CO_2/TJ) H	Average Low Calorific Value (MJ/t or km^3) I	Emission (tCO_2e) J
Raw coal	10^4t	7303.19	1490.01	4001.54	2735.88	**15530.62**	25.8	100	87,300	20,908	283,475,499
Cleaned coal	10^4t					**0**	25.8	100	87,300	26,344	0
Other washed coal	10^4t			19.53	45.8	**65.33**	25.8	100	87,300	8,363	476,968
Briquette	10^4t	133.75				**133.75**	26.6	100	87,300	20,908	2,441,296
Coke	10^4t				1.31	**1.31**	29.2	100	95,700	28,435	35,648
Coke oven gas	10^8m^3		0.84		2.06	**2.9**	12.1	100	37,300	16,726	180,925
Other coal gas	10^8m^3	0.89			19.15	**20.04**	12.1	100	37,300	5,227	390,714
Crude oil	10^4t	0.87				**0.87**	20	100	71,100	41,816	25,866
Gasoline	10^4t					**0**	18.9	100	67,500	43,070	0
Diesel	10^4t	29.92	1.26		3	**34.18**	20.2	100	72,600	42,652	1,058,396
Fuel oil	10^4t	685.85	0.09			**685.94**	21.1	100	75,500	41,816	21,655,867
LPG	10^4t					**0**	17.2	100	61,600	50,179	0
Refinery gas	10^4t					**0**	15.7	100	48,200	46,055	0
Natural gas	10^8m^3	7.92				**7.92**	15.3	100	54,300	38,931	1,674,251
Other petroleum products	10^4t	0.67				**0.67**	20	100	75,500	41,816	21,153
Other coke products	10^4t					**0**	25.8	100	95,700	28,435	0
Other energy	10^4tCe	93.54	189.68		20.29	**303.51**	0	0	0	0	0
Emission of Centre China Power Grid (tCO_2e)						311,436,583					

Data source: China Energy Statistics Yearbook 2007

Table A3 Fuel-fired Electricity Generation of CSPG for Year 2006

	Electricity generation (MWh)	Auxiliary electricity consumption (%)	Electricity delivered to the grid (MWh)
Guangdong	188,429,000	5.27	178,498,792
Guangxi	27,967,000	4.45	26,722,469
Guizhou	76,039,000	6.06	71,431,037
Yunnan	39,791,000	4.12	38,151,611
Total			314,803,908

Data source: China Electric Power Yearbook 2007

The electricity import to the CSPG from CCPG was 21,730,840 MWh for year 2006. The Operating Margin emission factor of CCPG was 1.12157. According to Table A4, the total CO_2 emission of CSPG is 335,809,186 t CO_2e in year 2006. According to Table A5, the total supplied electricity of CSPG is 336,534,748 MWh. According to formula (2) in section B.6.1, the $EF_{grid,OM,2006}$ is 0.99784 tCO_2e/MWh.

Table A4 Simple OM Emission Factors Calculation of CSPG for Year 2007

Energy	**Unit**	**Guangdong** A	**Guangxi** B	**Guizhou** C	**Yunnan** D	**Subtotal** E=A+B+…+D	**Carbon Content (tC/TJ)** F	**Emission factor (tC/TJ)** G	**Oxidation rate (%)** H	**NCV (MJ/t or 1000m^3)** I	**Emission (tCO_2e)** J
Raw coal	10^4t	8214.78	1750.63	4298.8	3170.79	17435	25.8	100	87,300	20,908	318,235,546
Cleaned coal	10^4t	3.46				3.46	25.8	100	87,300	26,344	79,574
Other washed coal	10^4t		0.65	21.58	14.64	36.87	25.8	100	87,300	8,363	269,184
Briquette	10^4t	271.25				271.25	26.6	100	87,300	20,908	4,951,041
Coke	10^4t	0.04	1.69		2.15	3.88	29.2	100	95,700	28,435	105,584
Coke oven gas	10^8m^3		0.96	3.19	1.8	5.95	12.1	100	37,300	16,726	371,208
Other coal gas	10^8m^3		30.77		21.63	52.4	12.1	100	37,300	5,227	1,021,628
Crude oil	10^4t					0	20	100	71,100	41,816	0
Gasoline	10^4t					0	18.9	100	67,500	43,070	0
Diesel	10^4t	21.37	2.13		2.29	25.79	20.2	100	72,600	42,652	798,596
Fuel oil	10^4t	467.97	0.41			468.38	21.1	100	75,500	41,816	14,787,262
LPG	10^4t					0	17.2	100	61,600	50,179	0
Refinery gas	10^4t	0.37				0.37	15.7	100	48,200	46,055	8,213
Natural gas	10^8m^3	32.17				32.17	15.3	100	54,300	38,931	6,800,588
Other petroleum products	10^4t	8.47				8.47	20	100	75,500	41,816	267,407
Other coke products	10^4t					0	25.8	100	95,700	28,435	0
Other energy	10^4tCe	118.04	81.89	44.1	50.3	294.33	0	0	0	0	0
Emission of China Southern Power Grid (tCO_2e)											**347,695,831**

Data source: China Energy Statistics Yearbook 2008

Table A5 Fuel-fired Electricity Generation of NWPG for Year 2007

	Electricity generation (MWh)	Auxiliary electricity consumption (%)	Electricity delivered to the grid (MWh)
Guangdong	215,700,000	6.01	202,736,430
Guangxi	36,100,000	7.42	33,421,380
Guizhou	84,300,000	6.62	78,719,340
Yunnan	47,400,000	7.23	43,972,980
Total			358,850,130

Data source: China Electric Power Yearbook 2008

The electricity import to the CSPG from CCPG was 24,237,240 MWh for year 2007. The Operating Margin emission factor of CCPG was 1.10197 According to Table A6, the total CO_2 emission of CSPG is 374,404,628 t CO_2e in year 2007. According to Table A7, the total supplied electricity of CSPG is 383,087,370 MWh. According to formula in section B.6.1, the $EF_{grid,OM,2007}$ is 0.97733 tCO_2e/MWh.

Table A6 Simple OM Emission Factors Calculation of CSPG for Year 2008

Energy	Unit	Guangdong A	Guangxi B	Guizhou C	Yunnan D	Subtotal E=A+B+…+D	Carbon Content (tC/TJ) F	Emission factor (tC/TJ) G	Oxidation rate (%) H	NCV (MJ/t or $1000m^3$) I	Emission (tCO_2e) J
Raw coal	10^4t	8001.54	1513.1	4117.45	2766.85	16398.94	25.8	100	87,300	20,908	299,324,670
Cleaned coal	10^4t	2.31				2.31	25.8	100	87,300	26,344	53,126
Other washed coal	10^4t		0.08	13.38	57.11	70.57	25.8	100	87,300	8,363	515,224
Briquette	10^4t	297.43				297.43	26.6	100	87,300	20,908	5,428,896
Coke	10^4t	3.24	1.73		2.74	7.71	29.2	100	95,700	28,435	209,807
Coke oven gas	10^8m^3		1.55	3.92	2.17	7.64	12.1	100	37,300	16,726	476,644
Other coal gas	10^8m^3	1.09	29.6		35.71	66.4	12.1	100	37,300	5,227	1,294,582
Crude oil	10^4t					0	20	100	71,100	41,816	0
Gasoline	10^4t	0.01				0.01	18.9	100	67,500	43,070	291
Diesel	10^4t	10.46	0.97		2.28	13.71	20.2	100	72,600	42,652	424,535
Fuel oil	10^4t	344.59	0.24			344.83	21.1	100	75,500	41,816	10,886,656
LPG	10^4t					0	17.2	100	61,600	50,179	0
Refinery gas	10^4t	0.76				0.76	15.7	100	48,200	46,055	16,871
Natural gas	10^8m^3	35.6				35.6	15.3	100	54,300	38,931	7,525,674
Other petroleum products	10^4t	7.3				7.3	20	100	75,500	41,816	220,395
Other coke products	10^4t					0	25.8	100	95,700	28,435	0
Other energy	10^4tCe	120.17	103.26	89.44	42.63	355.5	0	0	0	0	0
Emission of China Southern Power Grid (tCO_2e)											**326,377,370**

Data source: China Energy Statistics Yearbook 2009

Table A7 Fuel-fired Electricity Generation of NWPG for Year 2008

	Electricity generation (MWh)	Auxiliary electricity consumption (%)	Electricity delivered to the grid (MWh)
Guangdong	210,700,000	6.18	197,678,740
Guangxi	34,200,000	7.14	31,758,120
Guizhou	81,300,000	7.04	75,576,480
Yunnan	41,800,000	7.29	38,752,780
Total			343,766,120

Data source: China Electric Power Yearbook 2008

The electricity import to the CSPG from CCPG was 22,342,090MWh for year 2008. The Operating Margin emission factor of CCPG was 1.04205 According to Table A6, the total CO_2 emission of CSPG is 326,377,370t CO_2e in year 2008. According to Table A7, the total supplied electricity of CSPG is 343,766,120MWh. According to formula (2) in section B.6.1, the $EF_{grid,OM,2007}$ is 0.95507tCO_2e/MWh.

The Operating Margin (OM) emission factor is the weighted average emission factors of year 2006-2008, and is expressed as follows:

$$EF_{grid,OM,y} = \mathbf{0.9762\ tCO_2e/MWh}.$$

:

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

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

Table A8 Percentages of CO2 emissions from the coal-fired, gas-fired and oil-fired power plants in total fuel-fired CO2 emissions

Fuels	Unit	Guangdong A	Guangxi B	Guizhou C	Yunnan D	Total E=A+…+D	Average low calorific rate F	Emission Factor G	Oxidation rate H	Total CO_2 Emission I=E×F×G×H/100,000
Raw coal	10^4t	8,001.54	1,513.10	4,117.45	2,766.85	16,398.94	20,908	87,300	1	299,324,670
Wash coal	10^4t	2.31	0	0	0	2.31	26,344	87,300	1	53,126
Other wash coal	10^4t	0	0.08	13.38	57.11	70.57	8,363	87,300	1	515,224
Briquette	10^4t	297.43	0	0	0	297.43	20,908	87,300	1	5,428,896
Coke	10^4t	3.24	1.73	0	2.74	7.71	28,435	95,700	1	209,807
Other coke products	10^4t	0	0	0	0	0.00	28,435	95,700	1	0
Sub-total										**305,531,723**
Crude oil	10^4t	0	0	0	0	0	41,816	71,100	1	0
Gasoline	10^4t	0.01	0	0	0	0.01	43,070	67,500	1	291
Diesel oil	10^4t	10.46	0.97	0	2.28	13.71	42,652	72,600	1	424,535
Fuel oil	10^4t	344.59	0.24	0	0	344.83	41,816	75,500	1	10,886,656
Other petroleum products	10^4t	7.3	0	0	0	7.3	41,816	72,200	1	220,395
Sub-total										**11,531,876**
Natural gas	10^8 m^3	356	0	0	0	356	38,931	54,300	1	7,525,674
Coke oven gas	10^8 m^3	0	15.5	39.2	21.7	76.4	16,726	37,300	1	476,644
Other coal gas	10^8 m^3	10.9	296	0	357.1	664	5,227	37,300	1	1,294,582
LPG	10^4t	0	0	0	0	0	50,179	61,600	1	0

Refinery gas	10^4t	0.76	0	0	0	0.76	46,055	48,200	1	16,871
Sub-total										**9,313,770**
Total										**326,377,369**

Data source: China Energy Statistics Yearbook 2009

$\lambda_{Coal,y}$ =92.61%, $\lambda_{Oil,y}$ =3.54%, $\lambda_{Gas,y}$ =2.85%

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

The most advanced commercialized technologies for coal-fired power plants in China are generators of 600 MW and above. The calculation uses the top 30 of the lowest coal consumption generators built in 2008. The estimated average standard coal consumption of them is 314.35 gce/kWh, corresponding to the power supply efficiency of 39.08%. For gas-fired and oil-fired power plants in China, the most advanced commercialized technologies are 200 MW combined cycle generators. The standard coal consumption (equivalent) for power supply of oil-fired and gas-fired power plants is 238.74gce/kWh, corresponding to the power supply efficiency of 51.46%.

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

Table A9 Emission factors of coal/gas/oil-fired power plants applying the most advanced commercialized technologies

	Variable	Efficiency of power supply (%)	Emission factor for the fuel ($kgCO_2/TJ$)	Oxidation	Emission factor (tCO_2/MWh)
		A	B	C	D=3.6/A/1,000,000×B×C
Coal-fired plants	$EF_{Coal,Adv,y}$	39.08	87,300	1	0.8042
Oil-fired plants	$EF_{Oil,Adv,y}$	51.46	75,500	1	0.5282
Gas-fired plants	$EF_{Gas,Adv,y}$	51.46	54,300	1	0.3799

$$EF_{Thermal,y} = \lambda_{Coal,y} \times EF_{Coal,Adv,y} + \lambda_{Oil,y} \times EF_{Oil,Adv,y} + \lambda_{Gas,y} \times EF_{Gas,Adv,y}$$

$$= 0.7823 \text{ tCO}_2\text{/MWh}$$

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

Table A10 Installed capacity of CSPG in 2008

Installed capacity	Unit	Guangdong	Guangxi	Guizhou	Yunnan	Total
Thermal power	MW	45,730	10,270	10,030	17,170	83,200
Hydropower	MW	10,280	13,970	15,740	9,470	49,460
Nuclear power	MW	3,780	0	0	0	3,780
Wind power	MW	290	0	80	0	370
Total	MW	60,080	24,240	25,850	26,640	136,810

Source: China Electric Yearbook 2008

Table A11 Installed capacity of CSPG in 2007

Installed capacity	Unit	Guangdong	Guangxi	Guizhou	Yunnan	Total
Thermal power	MW	44,710	9,310	10,630	15,960	80,610
Hydropower	MW	10,110	10,440	11,580	8,210	40,340
Nuclear power	MW	3,780	0	0	0	3,780
Wind power	MW	250	0	0	0	250
Total	MW	58,850	19,750	22,210	24,170	124,980

Source: China Electric Yearbook 2008

Table A12 Installed capacity of CSPG in 2006

Installed capacity	Unit	Guangdong	Guangxi	Guizhou	Yunnan	Total
Thermal power	MW	40,615	5,434	8,564	14,350	68,963
Hydropower	MW	9,320	7,624	9,698	7,534	34,176
Nuclear power	MW	3,780	0	0	0	3,780
Wind power and others	MW	183	0	0	0	183
Total	MW	53,898	13,058	18,262	21,884	107,102

Source: China Electric Yearbook 2007

A13Newly Added Installed Capacity from Year 2005-2007

	Installed Capacity in 2006	Installed Capacity in 2007	Installed Capacity in 2008	New Capacity Additions from 2006 to 2008	Percentage Relative to New C apacity Additions
	68,963	80,610	83,200	21,412	6,030
Thermal power	34,176	40,340	49,460	15,572	9,317
Hydro power	3,780	3,780	3,780	0	0
Nuclear power	183	250	370	187	120
Wind power	**107,102**	**124,980**	**136,810**	**37,171**	**15,467**
Total				27.17%	11.31%
Percentage relative to capacity installed in 2007	68,963	80,610	83,200	21,412	6,030

According to Table A10 and formula in section B.6.1, the $EF_{grid,BM,y}$ is calculated as:
$EF_{grid,BM,y}$ = 0.7823×57.60%=0.4506 tCO_2/MWh

Step 3: Calculating the baseline emission factor ($EF_{grid,CM,y}$)

According to formula (8) in section B.6.1, the baseline emission factor of CSPG is calculated as:

$$EF_{grid,CM,y} = 0.5 \times EF_{grid,OM,y} + 0.5 \times EF_{grid,BM,y} = 0.7134\ tCO_2e/MWh$$

Annex 4

MONITORING INFORMATION

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No more information.