CLEAN DEVELOPMENT MECHANISM

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

CONTENTS

Annexes

SECTION A. General description of project activity

A.1 Title of the project activity:

Title of the project activity: Yunnan Youfanggou Hydropower Project

Version of the document: 04

Date of the document completed: 09/03/2010

Version 01	07/2008	Chinese draft PDD, submitted for China's LoA
Version 02	09/02/2009	PDD submitted for GSP
Version 02.1	25/05/2009	PDD corrected according to DOE requests
Version 03	07/09/2009	PDD corrected according to DOE requests
Version 04	09/03/2010	PDD revised according to methodology ACM0002 (Version 10)

A.2. Description of the project activity:

The Yunnan Youfanggou Hydropower Project (hereafter referred to as the "Project Activity") lies at the lower reaches of the Sayu River, in Daguan Town northeast of Yunnan Province. This area is characterised by its mountainous surroundings and subsistence farming. The Project Activity is developed and operated by Yunnan Zhaotong Gaoqiao Power Generation Ltd. (the "Project Entity").

The Project Activity is a diversion type hydropower project utilizing an underground water tunnel. The total installed capacity is 68 MW with a gross annual electricity output of 303.65 GWh and actual electricity delivered to the grid of 272 GWh. Expected operation time per year is 4465 hrs. At nominal water level the surface area of the reservoir is 0.1096 km^2 and related power density is 620W/m^2.

The electricity generated by the Project Activity will directly connect to the China Southern Power Grid (CSPG) through the local Yunnan Power Grid. When the Project Activity begins operation, electricity generated will effectively displace an equal amount of the electricity generated by the CSPG which is dominated by fossil fuel power plants. By displacing electricity from the CSPG the estimated annual GHG emission reductions will be 236,966 tCO_2e. As this is a new built project there is no project scenario and related measures/activities existing before the Project Activity. The baseline scenario is therefore the same as the situation before implementation of the Project Activity (i.e. the same amount of electricity supplied by the CSPG). The Project Activity will exclusively generate electricity from renewable sources.

Developing the Project Activity is in compliance with China energy policy, and it will contribute to the sustainable development of the host party and the local area through the following aspects:

- Alleviating the shortage of electricity supply locally and regionally (the CSPG is a net importer of electricity).
- Creating additional access roads and ancillary infrastructure in a remote area where local communities have traditionally faced difficulties accessing these.
- Reducing GHG emission and other pollutants generated from the power industry by increasing the proportion of electricity generated from renewable resources.
- Creating 90 employment opportunities.

A.3. Project participants:

The participants of the Project Activity include:

Table 1. Project participants information

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)	Yunnan Zhaotong Gaoqiao Power Generation Limited	No
United Kingdom of Great Britain and Northern Ireland	Trading Emissions PLC (CER Buyer)	No

Detailed contact information of the project participants are provided in Annex 1.

A.4. Technical description of the project activity:

A.4.1. Location of the project activity:

A.4.1.1. Host Party (ies):

The People's Republic of China

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

Yunnan Province

A.4.1.3. City/Town/Community etc:

Zhaotong City

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

The Project Activity is located in Yuele Town, Daguan County, Zhaotong City Prefecture, Yunnan Province. The hydropower plant is located on the lower reaches of the Sayu River which is a branch of the Heng River. The Heng River is a branch of the Jinsha River. The project site is off the G040/G213 highway about 26 km away from Daguan Town, 78 km from Zhaotong City and 514km from Kunming. The dam of the Project Activity is located at N 27°49'17", E 103°44'51". The powerhouse is located at N 27°49'19"N, E 103°50'36".

The geographic location of the Project Activity is shown in Figure 1.

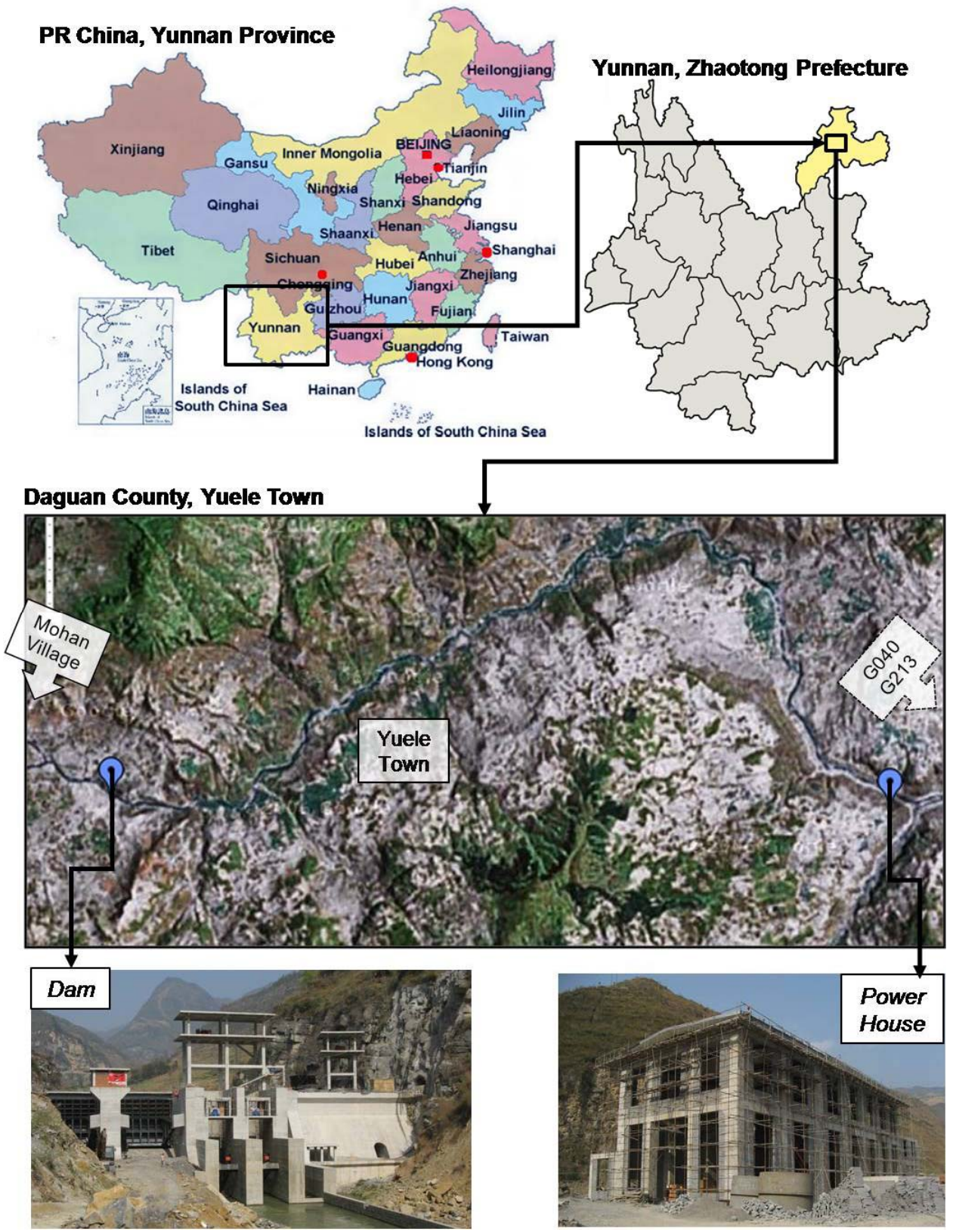


Figure 1. Location of Youfanggou Hydropower Station

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

The Project Activity falls into the sector scope 1: Energy industries (renewable sources) -- Hydropower Project.

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

The installed capacity of the Project Activity is 68MW (2 × 34MW). The structures of the Project Activity include a Concrete Gravity Dam, Water Diversion System and power plant buildings. The Water Diversion System consists of a shaft intake, water tunnel, surge shaft and penstock. The plant building is 41.09m in length, 17.2m in width and 28.4m in maximum height. The power station will deliver electricity by one outlet with 110kV voltage to Daguan substation and is connected to the Yunnan Power Grid, part of the China Southern Power Grid. Technical specifications of the turbines and generators are shown below:

Table 2. Technical specifications of the turbines and generators

Turbines	**Generators**
Quantity: 2	Quantity:2
Model: HLA575C-LJ-177	Model: SF34-12/3650
Rated Output: 35.06MW	Rated Capacity: 34MW
Rated Revolution: 500r/min	Rated Revolution: 500r/min
Rated Head: 170.0m	Rated Voltage: 10.5kV
Rated Flow: 22.51m^3/s	Power Factor: 0.85

The Project Activity uses domestic equipment. There will be no international technology transfer involved in this project. Training for operation and maintenance for the project will be provided by the Project Entity's internal training programmes and by the equipment supplier.

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

The Project Activity will adopt a renewable crediting period (7 years × 3). The total greenhouse gas emission reductions will amount to 1,658,762 tCO_2e over the first crediting period.

Years	**Annual estimation of emission reductions in tonnes of CO_2e**
Year 1	236,966
Year 2	236,966
Year 3	236,966
Year 4	236,966
Year 5	236,966
Year 6	236,966
Year 7	236,966
Total estimated reductions (tonnes of CO_2e)	**1,658,762**

Number of years in the first crediting period	**7**
Annual average over the crediting period of estimated reductions (tonnes of CO_2e)	**236,966**

A.4.5. Public funding of the project activity:

No public funding from Annex I countries is provided for the Project Activity.

SECTION B. Application of a baseline and monitoring methodology

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

Baseline and monitoring methodology ACM0002: "Consolidated baseline and monitoring methodology for grid-connected electricity generation from renewable sources" (ACM0002/Version 10, Sectoral Scope: 01, 27 February 2009).

Tool for the demonstration and assessment of additionality (Version 05.2, 26 August 2008)

Tool to calculate the emission factor for an electricity system (Version 02, 16 October 2009)

For detailed information please refer to http://cdm.unfccc.int/ methodologies/approved.

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

The Project Activity fully meets all the applicability requirements of ACM0002, which is shown below:

- It is a newly-built 68MW hydropower station with a reservoir and belongs to new grid-connected generation project from renewable source;
- The project is a hydropower plant with reservoir, which power density is greater than $4W/m^2$ (the Project Activity power density is $620W/m^2$, see details in B.6.1);
- It does not involve switching from fossil fuels to renewable energy at the site of the project activity.

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

The spatial extent of the project boundary includes the reservoir, dam, tunnel and power plant connected physically to the CSPG which is the electricity system that the project activity's power plant will be connected to. The CSPG is a regional power grid in China and includes the provincial grids of: Guangdong, Guangxi, Yunnan and Guizhou .

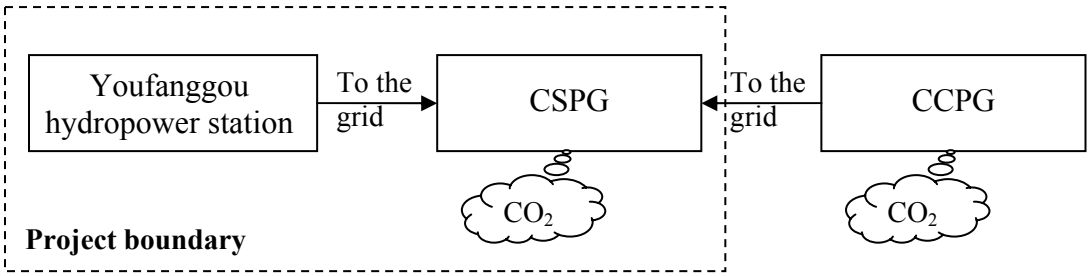


Figure 2. Project boundary and emissions sources relevant to the project activity

The CSPG is a net importer of electricity sourced from the Central China Power Grid (CCPG)[1,2] (see Figure 2). The Project Activity does not provide electricity to the CCPG, however the amount of electricity imported must be taken into account when determining the baseline emission factor (see Annex 3 for further details).

Table 4. Emissions sources included in or excluded from the project boundary

	Source	***Gas***	*Included*	***Justification / Explanation***
Baseline	*CO2 emission from electricity generation in fossil fuel fired power plants that is displaced due to the project activity*	*CO_2*	*Yes*	*Main emission source*
		CH_4	*No*	*Minor emission source*
		N_2O	*No*	*Minor emission source*
Project Activities	*Reservoir Emission*	*CO_2*	*No*	*The Project Activity is a grid-connected generation project from renewable source. There is no CO_2 emission.*
		CH_4	*No*	*The power density of the project is greater than 10W/m^2 (the Project Activity power density is 620W/m^2, see details in B.6.1), so the emission is omitted.*
		N_2O	*No*	*The Project Activity is a grid-connected generation project from renewable source. There is no N_2O emission.*

[1] "Bulletin about confirming 2008 baseline emission factor of regional power grid in China" announced by Office of National Coordination Committee on Climate Change , National Development and Reform Commission (NDRC) of China (DNA of China) on Jul. 18th, 2008. http://cdm.ccchina.gov.cn/web/NewsInfo.asp?NewsId=3239

[2] CCPG is a regional power grid in China and includes the provincial grids of Henan, Hubei, Hunan, Jiangxi, Sichuan and Chongqing city.

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

According to ACM0002 (Version 10), if the project activity is the installation of a new grid-connected renewable power plant/unit, the baseline scenario is that the connected grid provides the same electricity generation which would otherwise be provided by the Project Activity.

Baseline emission is reflected by the product of electricity generation by the project activity and combined emission factor (CM) of the CSPG. Imported electricity from CCPG is considered as well. The baseline for the first crediting period will employ the latest data at the time the PDD is submitted for validation. The baseline will be updated with the latest baseline data for the second and third crediting periods. Baseline data will be validated for each crediting period. For details, see section B.6.

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):

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

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

Plausible and credible alternatives available to the Project Activity that provide outputs or services comparable with the proposed CDM Project Activity include:

(1) The proposed hydropower plant development not undertaken as a CDM project activity;

(2) Construction of a fossil fuel power plant with the same amount of annual electricity generation;

(3) Construction of a power plant using other renewable energy sources with the same annual electricity generation;

(4) China Southern Power Grid as the provider for the same electricity generation as the Project Activity.

From a technical feasibility perspective, there is no usable wind resource in the site of the Project Activity[3]; biomass generation that can generate the same amount of annual electricity generation needs plenty of biomass material, there is lack of the biomass material in the area which the Project Activity is located at mountain area, and the expense of transportation is very high[4]. So alternative (3) is not feasible.

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

In point of applicable rules and regulations, "*Notice from General Office of the PRC State Council on Strictly Prohibiting Constructing Fossil Fuel Power Units with the Capacity of 135MW or below*" (state council public notice [2002] No.6) publicly proclaims to prohibit constructing fossil fuel power plants with the capacity of 135MW or below in the area which can be covered by large power grid. Constructing a fossil fuel power plant with the capacity below 68MW[5] as a baseline scenario alternative of the Project Activity is not in line with the national rule. Alternative (2) is not feasible.

Alternative (1) and alternative (4) is in compliance with current laws and regulations.

[3] http://www.zsyzw.cn/news/25/390/1375/list/294832.htm
[4] http://www.sxcoal.com/91378/Print.html
[5] The annual utilization hours of fossil fuel power plant is greater than ones of hydropower station, so the fossil fuel power plant with the installed capacity below 68MW can generate equivalent electricity to that generated by the hydropower station with the installed capacity of 68 MW.

Step 2. Investment Analysis

Comparing with other alternatives, the Project Activity has no advantages in terms of economy and finance if the sales revenue of CERs is not considered. The investment analysis is as follows.

Sub step 2a. Determine appropriate analysis method

The Tools for the demonstration and assessment of additionality suggest three analysis methods, i.e. simple cost analysis (option I), investment comparison analysis (option II) and benchmark analysis (option III). The simple cost analysis is not applicable because the project activity will produce economic benefits (from electricity sale in the future) other than CERs income. Investment comparison analysis method (option II) is applicable to projects whose alternatives are also investment projects. Only on such basis, comparison analysis can be adopted. The alternative baseline scenario of the Project Activity is China Southern Power Grid rather than the specific replaceable investment projects, thus option II is not an appropriate method for the decision-making context. The Project Activity will therefore use benchmark analysis (option III) method based on the consideration that benchmark IRR of the power industry is available.

Sub step 2b. Benchmark Analysis Method (Option III)

Referring to *Interim Rules on Economic Assessment of Electrical Engineering Retrofit Projects*[6], the financial benchmark internal rate of return (after tax) for Chinese power industries is listed as 8% (Project IRR). This financial benchmark is applicable to electric power projects. On the basis of this benchmark, the calculation and analysis of financial indicators are carried out in sub-step 2c

Sub step 2c. Calculation and comparison of financial indicators

(1) Basic parameters for calculation of financial indicators

Based on the feasibility study report of the Project Activity, basic parameters for calculation of financial indicators are as follows:

Table 5. Parameter used in investment analysis

Name	Value	Source
Installed capacity	68MW	FSR
Estimated annual electricity delivered to the grid	272GWh	FSR
Load Factor	50.97%	Derived from official approval[7]
Project lifetime	25 years	FSR
Total investment	RMB 339.68 million Yuan	FSR
Static investment	RMB 304.58 million Yuan	FSR
Annual O&M cost (excluding depreciation)	RMB 12.77 million Yuan	FSR
Liquid Capital	RMB 0.68 million Yuan	FSR
Tax	The rate of value-added tax is 17%.	FSR

[6] National State Power, 10/09/2002

[7] The load factor for the Project Activity can be derived from the official approval by the Yunnan Development and Reform Commission and is therefore consistent with EB 48 Annex 11 §3(a).

	The rate of tax and extra charges on sales is 8% (based on amount of value-added tax).	FSR
	The rate of income tax is 33%.	FSR
Prospective electricity tariff	0.201 RMB Yuan/kWh (including VAT)	Power Purchase Intent Letter, Adjusted Financial Report (AFR)
Depreciation years	25 years	FSR
Crediting period	7 years *3 (renewable)	
Expected CERs price	8 EUR /tCO_2e	

(2) Comparison of IRR for the Project Activity and the financial benchmark

In accordance with benchmark analysis method (Option III), if the financial indicator (Project IRR) of the Project Activity without CDM revenue is lower than the benchmark, the project is considered financially unattractive. The IRR of the Project Activity, with and without CDM revenues, are shown in Table 6.

Table 6. Financial indicators of Youfanggou Hydropower Project

	IRR (benchmark=8%)
Without CDM	7.11%
With CDM	11.86%

Without CDM revenue, the IRR on total project investment is 7.11%, which is lower than 8% (the benchmark IRR) making the Project Activity financially unattractive. With CDM revenue, the IRR of the Project Activity increases to 11.86%, which is higher than the benchmark IRR, therefore, the Project Activity with CDM revenue can be considered as financially attractive to investors, and the financial feasibility of the project is significantly improved.

Sub step 2d. Sensitivity analysis

According to *Guidance on the Assessment of Investment Analysis*, only variables, including the initial investment cost, that constitute more than 20% of either total project costs or total project revenues should be subjected to sensitivity analysis with reasonable variation.[8] The four key parameters that can have a substantial impact on the financial attractiveness of the project are therefore identified as follows:

1) Fixed Assets investment
2) Annual O&M cost
3) Annual electricity output
4) Electricity tariff

Assuming the above four factors fluctuate within the range of -10% ~ +10%, the corresponding IRR (without CDM revenue) of the Project Activity will change. The corresponding impacts on IRR of the Project Activity are shown in Table 7 and Figure 3 for details.

Table 7. IRR sensitivity to different financial parameters of Youfanggou Hydropower Project (without CDM revenue)

[8] As per EB 41, Annex 45 (para 17) As a general point of departure for variations in the sensitivity analysis should at least cover a range of +10% and –10%

	-10%	-5%	0	+5%	+10%
Fixed assets investment	7.97%	7.52%	7.11%	6.72%	6.37%
Annual O&M cost	7.36%	7.23%	7.11%	6.98%	6.85%
Annual electricity output	6.19%	6.65%	7.11%	7.54%	7.97%
Electricity tariff	6.14%	6.64%	7.11%	7.57%	8.02%

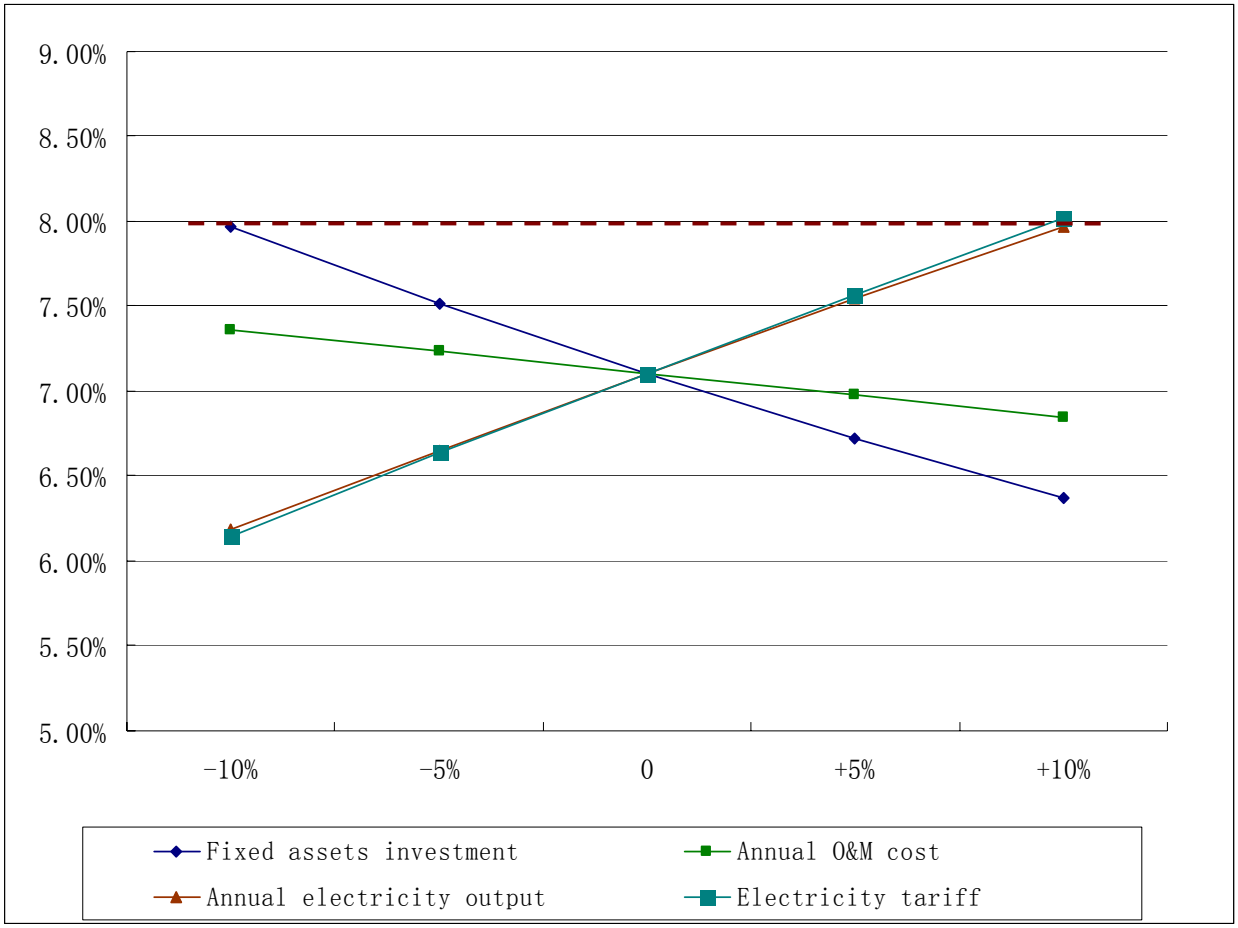


Figure 3. IRR sensitivity to different financial parameters of Youfanggou Hydropower Project (without CDM revenue)

Fixed assets investment

Because of the long construction period, the equipment and relevant materials price are rising sharply, the on-site geological and construction condition are very complicated, all the above reasons led to increasing in the fixed assets investment. From statistics, in the last few years, the *Price of Industry Products*[9],

[9] http://www.stats.gov.cn/tjsj/ndsj/2008/html/I0814e.htm; Explanatory notes of statistical indicators refers to web address: http://www.stats.gov.cn/tjsj/ndsj/2008/html/z08e.htm

Purchasing Price Indices for Raw Materials, Fuels and Power[10] and *Price Indices for Investment in Fixed Assets*[11] all indicate an increasing trend. So the fixed assets investment is unlikely to decrease.

Annual O&M cost

According to the FSR of this project, the annual O&M cost was comprised of Materials fee, Salary and Premium, Facilities maintenance fee, Reservior maintenance fee, Water resource fee, Insurance premium and "Other fees". According to the relevant state regulations, all the parameters were selected according to strict criteria[12]. Furthermore, the salary and relevant marital etc. has been rising. Therefore, the annual O&M cost would never exceed -10% and the IRR of Project Activity will never reach 8%.

Annual electricity output

The annual electricity output was estimated based on 47 years of hydrological data which comes from adjacent hydrological measuring stations mentioned in the FSR, and its value will be relatively stable in conventional conditions, being unlikely to change more than 10%.

Electricity tariff

The tariff applied is according to the official notification on the tariff issued by Yunnan Development and Reform Commission, Furthermore, the government is in charge of the tariff, and its floating range is very small. In addition the tariff for the Project Activity was mentioned in the Power Purchase Intent Letter[13] between the Yunnan Grid Company and the Project Entity which will form the basis for a Power Purchase Agreement once the project becomes operational and passes its trial period.

In conclusion, when the key parameters fluctuate within a reasonable range, the Project Activity without CDM revenue will never be economically attractive.

Step 3. Barriers analyses

This step is not used to confirm the additionality of this project.

Step 4. Common practice analyses

Sub step 4a. Analyze other activities similar to the Project Activity:

According to the requirements of common practice analysis, the projects with similar conditions, such as investment conditions and natural conditions (including geographical conditions, climate conditions, development conditions and so on), should be analyzed. Projects located in different provinces of the Southern Grid have different investment conditions[14] and natural conditions[15 16 17 18 19]. Therefore Yunnan province can be further confirmed as the boundary for the common practice analysis.

[10] http://www.stats.gov.cn/tjsj/ndsj/2008/html/I0815e.htm; Explanatory notes of statistical indicators refers to web address: http://www.stats.gov.cn/tjsj/ndsj/2008/html/z08e.htm
[11] http://www.stats.gov.cn/tjsj/ndsj/2008/html/I0816e.htm
[12] Economic Evaluation Methods and Parameter About Construction Projects, China planning press
[13] Power Purchase Intent Letter (20/01/2006) signed by Yunnan Grid and Project Entity (submitted to DOE)
[14] Yearbook of China Water Resources 2006
[15] http://www.hydrochina.com.cn/zgsd/zgsd_zy.jsp
[16] http://www.hydrochina.com.cn/shuigis/province/provincedetail.jsp?provinceID=17
[17] http://www.hydrochina.com.cn/shuigis/province/provincedetail.jsp?provinceID=22
[18] http://www.hydrochina.com.cn/shuigis/province/provincedetail.jsp?provinceID=21
[19] http://www.hydrochina.com.cn/shuigis/province/provincedetail.jsp?provinceID=16

The first "Electricity Reform Program" was implemented by the State Council in April 2002[20]. These reforms substantially changed the regulatory framework and investment environment for hydro power development. The major changes included reforming ownership of power plants and power grids, initiating a competitive bidding mechanism for new entities wishing to supply power to the grid and building a competitive and open power market. The electricity generation side of the business gave birth to newly independent and non-state electricity generation companies. Therefore, independent grid companies such as the project entity existed only after 2002 and the electric supply business changed dramatically ever since.

According to *Classification & design safety standard of hydropower projects* (DL5180-2003) issued by State Economic and Trade Commission of People's Republic of China in 2003, hydropower plant, with capacity less than 50MW, is defined as small scale hydropower projects; hydropower plant, with capacity less than 300MW and more than 50MW, is defined as middle scale hydropower project; hydropower plant, with capacity more than 300MW, is defined as large scale hydropower projects.

The Project Activity is a middle scale hydropower station with a total installed capacity of 68MW (with capacity less than 300MW and more than 50MW). So the selected power plants for common practice will be limited to with capacity less than 300MW and more than 50MW (the projects with the installed capacity larger than 300MW and lower than 50MW were excluded).

Based on the above, activities that are similar to the Project Activity are the hydropower stations:

- Located in Yunnan Province;
- Built after 2002;
- With installed capacity of 50-300 MW.

Based on information available to public, the similar hydro power plants are identified as follows:

Name	Capacity (MW)	Construction	Operation	Annual operation time	Investment / Ele. RMB/kwh
Youfanggou Hydropower (project activity)	68	2007	-	4,465	1.12
Dayingjiang II (2nd level hydropower station)[21,22]	70	2005	2007	5,557	1.03
Gaoqiao Hydropower[23,24]	90	2002	2004	5,000	0.99
Dayingjiang III[25]	98	2003	2006	7,153	0.69
Malutang Hydropower[26,27]	100	2002	2004	6,970	0.58

[20] http://www.ndrc.gov.cn/xwfb/t20050708_28096.htm
[21] Almanac of China's water power (volume 10) p300 2005 China Electric Power Publish House
[22] http://www.7c.gov.cn/color/DisplayPages/ContentDisplay_497.aspx?contentid=12450
[23] http://www.chinapower.com.cn/newsarticle/1007/new1007103.asp
[24] http://www.kmha.cn/Html/yj/sh/34094560.html
[25] http://www.yjzs.gov.cn/yjzs/Article/xxdt/chxw/200612/150.html
[26] http://www.ynws.gov.cn/docdetail.asp?id1=20030618092840
[27] http://www.cnki.com.cn/Article/CJFDTotal-YNSD200505002.htm

Supahe Ajiutian Hydropower[28]	105	2002	2005	5,670	0.82

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

As can be seen from the prior section Dayingjiang II, Gaoqiao, Dayingjiang, Malutang and Ajiutian hydropower projects are all endowed with better hydrological resources than the Project Activity. Their annual operation time, respectively 5557, 5000, 7153, 6970 and 5,670 hrs are substantially greater than the 4,465 hrs of the Project Activity. The construction of these projects was also much earlier when prices for materials were still much lower than the project start-date. The investment/yield ratios of these projects (between 0.69 and 1.03 RMB/kwh) are very favourable compared to that of the Project Activity (1.12 RMB/kwh). In addition, Dayingjiang II was listed in the "double hundred important project of state level in 2007" and Dayingjiang III was listed in the "double hundred important project of provincial level in 2004"[29]; Gaoqiao and Malutang were taken as the provincial important project[30], so the investment environment for these projects were better than for the Project Activity because they can get support from government, besides Gaoqiao has a big reservoir to adjust its hydrological condition[31], so it can fully utilize the water resource compared to the Project Activity. Ajiutian Hydropower Station was sited on the Supahe River in Baoshan City, and it got the support from Baoshan City Committee and the People's Government of Baoshan City, and it was invested by Yunnan Domestic Electric Power Investment Co.Ltd (which was consistent of Yunnan Province Development and Investment Co.Ltd, Kunming Design Institute of National Power Company, Yunnan Hongta Group Co.Ltd, Yuntianhua Group Co.Ltd and Yunnan Dianneng (Group) Co.Ltd), Baoshan Electric Power Co.Ltd, Baoshan State-owned Assets Operation Co.Ltd. All the above investors have strong capital capacity and have relation to the state capital[32].

In conclusion, the hydraulic condition, and the investment benefit of similar projects are all far better than the Project Activity. The project activity is therefore additional and in line with the additionality assessment criteria.

The timeline for the Project validated by the DOE is as follows:

Table 8 Timeline for the development of the Project Activity

Stage	Date
Completion of Feasibility Study Report (FSR)	May, 2005
Completion of Environmental Impact Assessment (EIA)	Oct, 2005
Approval of EIA by Environmental Protect Bureau of Yunnan Province	14/11/2005
Power Purchase Intent Letter	20/01/2006
Board Decision to implement CDM	09/03/2006
Adjusted Financial Report (AFR)[33]	Apr, 2006
Approval of FSR by the Yunnan DRC	27/06/2006
CDM consulting contract was signed[34]	09/08/2006
Bank issue the notification agree to give the loan for the project	13/09/2006

[28] http://xxgk.yn.gov.cn/canton_model45/newsview.aspx?id=732636
[29] http://www.lxqda.yn.gov.cn/dhdpc/361413870096482304/20080205/7322.html
[30] http://www.cbminfo.com/tabid/63/InfoID/217181/Default.aspx
[31] http://www.yn.gov.cn/yunnan,china/73469366967992320/20050307/21873.html
[32] http://www.chinapower.com.cn/newsarticle/1020/new1020835.asp
[33] The Project Entity commissioned Design Institute to compile the AFR to reflect the financial situation at the time of CDM application decision making.
[34] Annex 8_CDM consulting service contract of Youfanggou

Loan contract with ICBC was signed	08/10/2006
Construction contract of powerhouse was signed (**project start-date**)	08/01/2007
Construction of powerhouse was started[35]	27/03/2007
Termsheet signed[36]	25/04/2007
Emission Reductions Purchase Agreement (ERPA) was completed[37]	12/08/2007
ERPA signed by Project Entity	02/10/2007
ERPA signed by CER Buyer	08/01/2008
PDD submitted to China DNA for LoA	28/07/2008
DOE search correspondence	09/10/2008
Attend China DNA (NDRC) meeting for LoA application	30/10/2008
LoA from China DNA received	10/12/2008
GSP started	17/02/2009
The expected commissioning date of the Project Activity	29/03/2010
The expected commercial operation date of the Project Activity	01/04/2010

The Feasibility Study Report (FSR) was completed in May 2005. During loan negotiations with the ICBC, it had initially indicated that it was unwilling to provide a loan for the Project Activity as it doubted that this project could provide adequate repayment ability. The official bank refusal caused the Project Entity to rethink the development of the Project Activity and it decided to delay the implementation of the project[38]. In this case, the Project Entity had to find other financial support to overcome its financing barrier. The Power Purchase Intent Letter made it clear that the Project Entity would not be able to obtain a higher electricity tariff. Finally, CDM application was discussed and approved in its board meeting on 9 March 2006. Meanwhile, the Project Entity commissioned the third party design institute to assess the financial situation at the time of CDM application decision making, the Adjusted Financial Report was finished in April 2007 subsequently, and it indicates the tariff change and investment increment which makes the Project Entity to start CDM application as soon as possible. After negotiating terms with a CDM consulting firm and having finally received government approval for the FSR, the CDM consulting contract was signed on 9 August 2006. The Project Entity contacted the bank again to ask it to reconsider providing a loan to the project. Acknowledging that the Project Activity will be eligible to receive financial support from the CDM, the bank issued a notice on 13 September 2006[39], agreeing to give the loan to the project. The final loan contract was signed on 8 October 2006. On 8 January 2007, the Project Entity signed the construction contract for the powerhouse, representing the first concrete action that was taken to develop the Project Activity (project start-date). With the help of the CDM consultant the Project Entity searched for CER buyers, and on 25 April 2007, the Project Entity and the CER Buyer signed a Termsheet. This Termsheet was to provide the basis for the final ERPA which was signed by both parties on 8 January 2008. As part of the LoA application the project participants submitted the PDD for the Project Activity to the China NDRC. In the meantime the project participants proceeded with searching for a DOE to validate the Project Activity. After the Project Entity's meeting with the China DNA on 30 October 2008 the Project Activity received an LoA from the China DNA on 10 December 2008 The PDD was updated and finalized for GSP by 17 February 2009.

B.6. Emission reductions:

[35] Construction permission of the powerhouse issued by supervisor company
[36] Annex 9_Termsheet of Youfanggou
[37] Annex 10_ERPA of Youfanggou
[38] Bank rejection letter provided to DOE
[39] Annex 11_Notice issued by Industrial and Commercial Bank of China (ICBC) on 13th Sep 2006

B.6.1. Explanation of methodological choices:

According to the approved methodology ACM0002: The emission reduction ER_y during a given year *y* is calculated as follows:

$$ER_y = BE_y - PE_y \quad (1)$$

Where,

ER_y refers to emission reductions in year y (t CO_2e/yr);

BE_y refers to the baseline emissions in year y (t CO_2e/yr);

PE_y refers to the project emissions in year y (t CO_2e/yr);

The steps to calculate PE_y and BE_y to confirm ER_y are detailed in the following:

Project Emission (PE_y):

As the methodology defined, PE_y are calculated as follows:

$$PE_y = PE_{FF,y} + PE_{GP,y} + PE_{HP,y} \quad (2)$$

Where,

$PE_{FF,y}$ = *Project emissions from fossil fuel consumption in year y (tCO_2e/yr). It is omitted due to the Project Activity does not involve any fossil fuel consumption.*

$PE_{GP,y}$ = *Project emissions from the operation of geothermal power plants due to the release of non-condensable gases in year y (tCO_2e/yr). It is not applicable for the Project Activity.*

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

According to the feasibility study report of the Project Activity, the surface area at normal reservoir level is 0.1096 km^2, the power density is 620W/m^2 which is greater than 10W/m^2. Based on ACM0002, the CH_4 emission by the Project Activity could be omitted, i.e. $PE_{HP,y} = 0$, *therefore* $PE_y = 0$.

Baseline emissions (BE_y):

The baseline emissions of the Project Activity (BE_y) could be calculated by the following formula:

$$BE_y = EG_{PJ,y} \times EF_{grid,CM,y} \quad (3)$$

Where,

BE_y = *Baseline emissions in year y (tCO2/yr).*

$EG_{PJ,y}$ = *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)*

$EF_{grid,CM,y}$ = *Combined margin CO_2 emission factor for grid connected power generation in year y, which is calculated by the latest version of the "Tool to calculate the emission factor for an electricity system". (tCO_2/MWh)*

The Project Activity is the installation of a new grid-connected hydropower plant at a site where no renewable power plant was operated prior to the implementation of the project activity, then:

$$EG_{PJ,y} = EG_{facility,y} \quad (4)$$

Where,

$EG_{facility,y}$ = *Quantity of net electricity generation supplied by the project plant/unit to the grid in year y (MWh/yr)*

The Project Activity is likely to import the electricity from CCPG in case of equipment shutdown or overhaul, so the net quantity of electricity supplied to the grid will be calculated as follows:

$$EG_{PJ,y} = EG_{facility,y} = EG_{facility\ to\ grid,y} - EG_{grid\ to\ facility,y} \quad (5)$$

Where,

$EG_{facility\ to\ grid,y}$ = *Quantity of electricity supplied by the project plant/unit to the grid in year y (MWh/yr)*

$EG_{grid\ to\ facility,y}$ = *Quantity of electricity supplied by the grid to the project plant/unit in year y (MWh/yr)*

Leakage:

No leakage emissions are considered. The main emissions potentially giving rise to leakage in the context of electric sector projects are emissions arising due to activities such as power plant construction and upstream emissions from fossil fuel use (e.g. extraction, processing, transport). These emissions sources are neglected.

Calculation of $EF_{grid,CM,y}$

The "*Tool to calculate the emission factor for an electricity system"* provides for a step-wise approach to calculate the $EF_{grid,CM,y}$. These steps include:

Step 1. Identify the relevant electric power system

As described in section B.3, the spatial extent of the project boundary includes the Project Activity and all power plants connected physically into CSPG which includes four Provincial Power Grids: Guangdong, Guangxi, Yunnan and Guizhou (Figure 2). Furthermore, the project boundary also includes China Central Power Gird (shortening as "CCPG" hereafter) because it delivers some of its power generation to CSPG. CCPG is a regional power grid in China, including Henan province, Hubei province, Hunan province, Jiangxi province, Sichuan province and Chongqing city.

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

Option I: only grid power plants are included in the calculation was chosen for the emission factor calculation.

Step 3. Select a method to determine the operating margin (OM)

The calculation of the operating margin emission factor ($EF_{grid,OM,y}$) is based on one of the following methods:

(a) Simple OM;

(b) Simple adjusted OM;

(c) Dispatch Data Analysis OM;

(d) Average OM.

We use method (a) to calculate the OM emission factor of CSPG and the *ex-ante* option is adopted with using the data vintage as a 3-year generation-weighted average based on the most recent data.

Simple OM can only be used where low operating cost/ must-run resources constitute less than 50% of

total grid generation. In recent 5 years, electricity generated by the hydropower of CSPG and other renewable energy is less than 50% of the total power generation (please see to annex 3), which meets the requirement that a low operating cost/must-run plant's electricity generation constitute less than 50% of total grid electricity generation.

Step 4. Calculate the operating margin emission factor according to the selected method

The simple OM emission factor is calculated as the generation-weighted average CO_2 emissions per unit net electricity generation (tCO_2/MWh) of all generating power plants serving the system, not including low-cost / must-run power plants / units. It may be calculated:

- Option A: Based on the net electricity generation and a CO2 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.

In China, all power grids and power plants keep their specific net electricity generation and the fuel consumption data as business secrets, so they would not publicly release these data, thus only option (c) is feasible.

$$EF_{grid,OMsimple,y} = \frac{\sum_i FC_{i,y} \times NCV_{i,y} \times EF_{CO_2,i,y}}{EG_y} \quad (6)$$

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.*

According to the calculation of DNA of China, adopting *ex-ante* calculation, **the operating margin emission factor of CSPG is 1.0608 tCO_2e /MWh** (please see annex 3)..

Step 5. Identify the group of power units to be included in the build margin

The sample group of power units *m* used to calculate the build margin consists of either:

(a) The set of five power units that have been built most recently, or

(b) The set of power capacity additions in the electricity system that comprise 20% of the system generation (in MWh) and that have been built most recently.

In the current circumstance in China the data of sampling power units group *m* are not available.

Therefore, CDM EB approves the following methodology deviation[40]:

(1) Use of capacity additions during last 1 - 3 years for estimating the build margin emission factor for grid electricity.

(2) Use of weights estimated using installed capacity in place of annual electricity generation and use of the efficiency level of the best technology commercially available in the provincial/regional or national grid of China, as a conservative proxy.

Methodology AM0005 has been replaced by the consolidated methodology ACM0002, thus the deviation above is also applicable to the consolidated methodology ACM0002.

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.

Step 6. Calculate the build margin emission factor

Because the generation capacities of coal, oil and gas fueled power cannot be separated from the current statistic data, the following steps are adopted in the calculation: firstly the PDD make use of the latest energy balance data to calculate all sorts of emission scale in total emission from coal, oil and gas fueled power; then based on the emission factor under the level of best commercialized technical efficiency, calculate the fuelled power emission factor of the grid; last multiply the fuelled power emission factor and fuelled power proportion of the total power, then comes the resulting BM of the grid.

The detailed procedure and formula are as follows:

1. Calculate the specific proportions of CO_2 emission induced by solid, liquid and gaseous fuels in local grid with the following formulas:

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

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

$$\lambda_{Gas,y} = \frac{\sum_{i \in GAS, j} F_{i,j,y} \times NCV_{i,y} \times EF_{CO_2,i,j,y}}{\sum_{i,j} F_{i,j,y} \times NCV_{i,y} \times EF_{CO_2,i,j,y}} \quad (9)$$

[40] EB guidance for "Request for guidance: Application of AM0005 and AMS-ID in China，2005.10.7": Request for clarification on use of approved methodology AM0005 for several projects in China. http://cdm.unfccc.int/Projects/Deviations

Where,

$F_{i,j,y}$ = *The amount of fuel i consumed by province j in year(s) y;*

$NCV_{i,y}$ = *Net calorific value (energy content) of fossil fuel type i in year y (GJ / mass or volume unit)*

$EF_{CO2,i,j,y}$ = *CO2 emission factor of fossil fuel type i in j province in year y (tCO2/GJ)*

Coal, Oil and Gas refer to the solid, liquid and gaseous fuel.

2. Calculated the emission factor of fossil fuel plants

$$EF_{Thermal,y} = \lambda_{Coal,y} \times EF_{Coal,Adv,y} + \lambda_{Oil,y} \times EF_{Oil,Adv,y} + \lambda_{Gas,y} \times EF_{Gas,Adv,y} \quad (10)$$

Where,

$EF_{Coal,Adv,y}$、$EF_{Oil,Adv,y}$ and $EF_{Gas,Adv,y}$ refers to the emission factor of the efficiency level of the best technology commercially by utilizing coal, oil and gas to generate electricity.

3. Calculate the $EF_{grid,BM,y}$ of the grid

$$EF_{grid,BM,y} = \frac{CAP_{Thermal,y}}{CAP_{Total,y}} \times EF_{Thermal,y} \quad (11)$$

Where:

$EF_{grid,BM,y}$ = *Build margin CO2 emission factor in year y (tCO2/MWh)*

CAP_{Total} = *The total installed capacity addition (MW)*

$CAP_{Thermal}$ = *The installed capacity addition of fossil fuel (MW)*

According to the calculation of DNA of China, adopting *ex-ante* calculation, **the build margin emission factor of CSPG is 0.6816 tCO_2e /MWh.**

Step 7. Calculate the combined emissions factor

The combined margin emissions factor is calculated as follows:

$$EF_{grid,CM,y} = EF_{grid,OM,y} \times w_{OM} + EF_{grid,BM,y} \times w_{BM} \quad (12)$$

Where:

$EF_{grid,OM,y}$ = *Operating margin CO_2 emission factor in year y (tCO_2/MWh).*

$EF_{grid,BM,y}$ = *Build margin CO_2 emission factor in year y (tCO_2/MWh).*

w_{OM} = *Weighting of operating margin emissions factor (%).*

w_{BM} = *Weighting of build margin emissions factor (%).*

The weighting w_{OM} and the weighting w_{BM} are both taken 0.5 as default for the first crediting period.

For the second and third crediting period, $_{OM}w$ = 0.25 and $_{BM}w$ = 0.75.

For first crediting period, the weights w_{OM} and w_{BM} are 50% (i.e., $w_{OM} = w_{BM} = 0.5$).

According to the formula, the baseline emission factor of CSPG is obtained as:

EF_y= 0.5×1.0608＋0.5×0.6816＝0.8712 tCO2/MWh

For the results of the emission reduction calculation kindly refer to Section B.6.3.

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

The data and parameters used in the baseline calculation are as follows, the detailed data are listed in Annex 3.

Data / Parameter:	$EF_{CO2,i,y}$
Data unit:	tCO_2/TJ
Description:	The CO_2 emission factor per unit of energy of the fuel type *i in year y*
Source of data used:	2006 IPCC Guidelines for National Greenhouse Gas Inventories: Volume 2 Energy
Value applied:	As in Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	Data is based on IPCC default.
Any comment:	

Data / Parameter:	$NCV_{i,y}$
Data unit:	MJ/t or MJ/km^3
Description:	The net calorific value (energy content) per mass or volume unit of a fuel type i in year2006
Source of data used:	China Energy Statistics Yearbook (2007)
Value applied:	As in Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	Data is from official statistics.
Any comment:	

Data / Parameter:	*EGy*
Data unit:	MWh

Description:	The electricity delivered to the grid by all power source serving the system in year(s) *y*.
Source of data used:	China Electric Power Yearbook (2005,2006,2007)
Value applied:	As in Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	Data is from official statistics.
Any comment:	

Data / Parameter:	$FC_{i,y}$
Data unit:	t, km^3
Description:	The amount of fuel *i* consumed in the project electricity in year(s) *y*
Source of data used:	China Energy Statistics Yearbook (2005,2006,2007)
Value applied:	As in Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	Due to fuel consumption data of single power plant could not be obtained in public, PDD will adopt the total fuel consumption data as proxy. Relevant data is from official statistics.
Any comment:	

Data / Parameter:	$CAP_{Total,y}$ $CAP_{Thermal,y}$
Data unit:	MW
Description:	CAP_{Total} is the total installed capacity addition (MW); $CAP_{Thermal}$ is the installed capacity addition of fossil fuel (MW)
Source of data used:	China Electric Power Yearbook (2005,2006,2007)
Value applied:	As in Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	Data is from official statistics.
Any comment:	

Data / Parameter:	$EF_{Coal,Adv,y}$、$EF_{Oil,Adv,y}$、$EF_{Gas,Adv,y}$
Data unit:	%
Description:	Best efficiency of power supply by coal, gas and oil.
Source of data used:	Official data
Value applied:	As in Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	Data is from official statistics. Please refer to "2008 Bulletin about confirming baseline emission factor of regional power grid in China" announced by Office of National Coordination Committee on Climate Change , National Development and Reform Commission (NDRC) of China (DNA of China) on Jul. 18th, 2008 for detailed information.
Any comment:	

Data / Parameter:	Cap_{BL}
Data unit:	%
Description:	Installed capacity of the hydro power plant before the implementation of the project activity. For new hydro power plants, this value is zero.
Source of data used:	Project site
Value applied:	0
Justification of the choice of data or description of measurement methods and procedures actually applied :	
Any comment:	

Data / Parameter:	A_{BL}
Data unit:	km^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 (m2). For new reservoirs, this value is zero.
Source of data used:	Project site
Value applied:	0
Justification of the choice of data or description of measurement methods and procedures actually applied :	

Any comment:	

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

According to B.6.1, the emission reduction by the Project Activity during a given year y is the difference between baseline emissions and project emissions, the emissions by the project activity (PE_y) is considered as ZERO, the calculation as follows:

$ER_y = BE_y$

$= EG_{PJ,y} \times EF_{grid,CM,y}$

$= (EG_{facility\ to\ grid,y} - EG_{grid\ to\ facility,y}) \times EF_{grid,CM,y}$

BE_y, which is numerically equal to the annual emission reduction of the Project Activity, is the emission induced by the baseline of China Southern Power Grid when it generates electricity with the same amount of the Project Activity EG_y if the Project Activity is not implemented as a CDM project.

According to the calculation of the combined margin baseline emission factor of the power grid in section B.6.1, the baseline emission factor is 0.8712 tCO_2e/MWh.

According to the feasibility report of the Project Activity, the annual amount of electricity generation delivered to the Grid is 272GWh (i.e. $EG_{PJ,y} = EG_{facility,y} = 272GWh$). Therefore, the ex-ante annual emission reduction (ER_y) of the Project Activity is estimated to be

ER_y=272,000 MWh×0.8712 tCO_2e/MWh=236,966 tCO_2e

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

The overall emission reduction induced by the Project Activity in the first crediting period is estimated to be 1,658,762 tCO_2e.

Year	Estimation of baseline emissions (tonnes of CO_2e)	Estimation of the project activity emissions (tonnes of CO_2e)	Estimation of leakage (tonnes of CO_2e)	Estimation of overall emission reductions (tonnes of CO_2e)
Year 1	236,966	0	0	236,966
Year 2	236,966	0	0	236,966
Year 3	236,966	0	0	236,966
Year 4	236,966	0	0	236,966
Year 5	236,966	0	0	236,966
Year 6	236,966	0	0	236,966
Year 7	236,966	0	0	236,966
Total (tonnes of CO_2e)	**1,658,762**	**0**	**0**	**1,658,762**

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

B.7.1. Data and parameters monitored:

Data / Parameter:	$EG_{facility\ to\ grid,y}$
Data unit:	MWh/yr
Description:	Quantity of electricity supplied by the project plant/unit to the grid 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	272,000
Description of measurement methods and procedures to be applied:	Electricity delivered to the Grid by the Project Activity will be measured by electricity meter(s) according to the relevant national electric industry standard and regulations. For a detailed description of the measurement methods see B.7.2
Monitoring frequency:	Continuous measurement and monthly recording
QA/QC procedures to be applied:	Readings on ammeter. Check whether the reading is the same as that is shown on power sales invoice provided by the grid company to which the Project Activity is connected. Please refer to Monitoring Plan for detailed information.
Any comment:	Copies in electronic format and paper documents. Keep 2 years after the Project Activity is completed.

Data / Parameter:	$EG_{grid\ to\ facility,y}$
Data unit:	MWh/yr
Description:	Quantity of electricity supplied by the grid to the project plant/unit 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	0
Description of measurement methods and procedures to be applied:	Electricity delivered to the Grid by the Project Activity will be measured by electricity meter(s) according to the relevant national electric industry standard and regulations. For a detailed description of the measurement methods see B.7.2
Monitoring frequency:	Continuous measurement and monthly recording
QA/QC procedures to be applied:	Readings on ammeter. Check whether the reading is the same as that is shown on power sales invoice provided by the grid company to which the Project Activity is connected. Please refer to Monitoring Plan for detailed information.
Any comment:	Copies in electronic format and paper documents. Keep 2 years after the

	Project Activity is completed.

Data / Parameter:	Cap_{PJ}
Data unit:	MW
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	68
Description of measurement methods and procedures to be applied:	Verified on site
Monitoring frequency:	Yearly
QA/QC procedures to be applied:	
Any comment:	

Data / Parameter:	A_{PJ}
Data unit:	km^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. For new reservoirs, this value is zero.
Source of data to be used:	FSR.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	0.1096
Description of measurement methods and procedures to be applied:	The data will be measured by professional design institute base on topographical map.
Monitoring frequency:	Yearly
QA/QC procedures to	

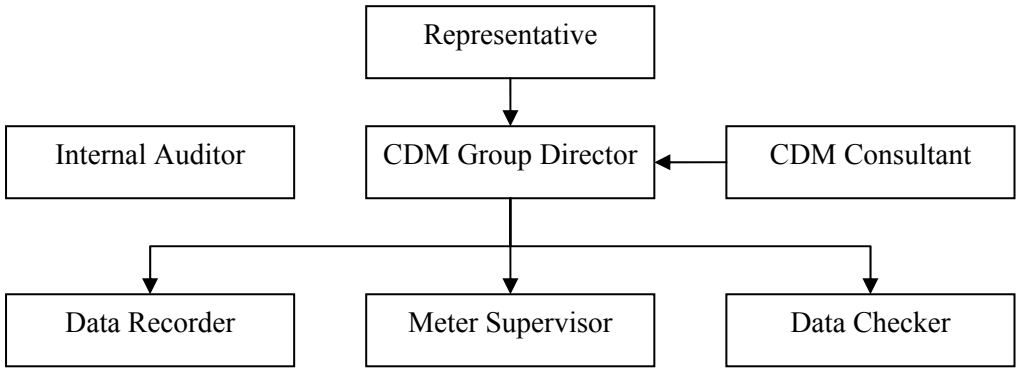
be applied:	
Any comment:	

B.7.2. Description of the monitoring plan:

The monitoring plan will be implemented by the Project Entity and will help to ensure that the Project Activity is implemented according to CDM guidelines.

1. Monitoring organization

The Project Entity will set up a special CDM group to take charge of data collection, supervision, verification and archiving. The structure of the monitoring group is as follows:



Group members and their responsibilities:

Function	Responsibility
Representative	Legal representative of the project entity
CDM Group Director	• Managing the overall CDM-related issues of the proposed hydropower project; • Guiding and supervising the Data Recorder, Meter Supervisor and Data Checker to meet the requirement of relevant regulations and monitoring manual; • Approve and issue the monitoring manual and report;
CDM Consultant	• Providing CDM group with training and technical support about CDM monitoring plan; • Compile and update the monitoring manual promptly, and prepare the monitoring report at the end of the credit period; • Pre-review on monitoring data and material; • Cooperate with project entity to facilitate verification and certification
Data Recorder	• Collecting and recording ammeter data every month and at the beginning and end of every credit period according to monitoring manual and corresponding regulations; • Report to CDM group director promptly if there is any abnormal situation.
Meter Supervisor	• Checking of the ammeter periodically according to relevant regulations, and report to CDM group director promptly if there is any abnormal situation;

	• Correct the improper use of ammeter and provide corrective suggestions; • Cooperate with the qualified institution to facilitate calibration and maintenance of the ammeter, and keep the relevant records for archiving;
Data Checker	• Double checking the collected data measured by ammeter to insure consistency, report the checked results to the CDM group director; • Find and report any abnormal data to CDM group director.
Internal Auditor	• Carry out Internal Audit on monitoring procedure, to propose suggestion for improvement; • Report the results to CDM group director.

2. Monitoring data

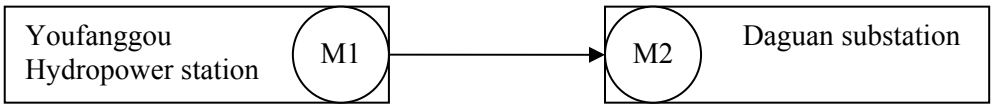
Because the baseline emission factor is ex-ante calculated, the data to be monitored only refers to electricity delivered to the grid by the Project Activity and electricity consumed by the Project Activity.

Installed capacity of the hydro power plant after the implementation of the Project Activity and area of the reservoir measured in the surface of the water after the implementation of the Project Activity will be monitored yearly.

3. The installation and maintenance of monitoring equipment

Electric energy metering equipment of the Project Activity should be collocated and installed according to "*Technical Administrative Code of Electric Energy Metering*" (DL/T448-2000, issued by State Economic and Trade Commission of the People's Republic of China on Nov.3rd, 2000 and implemented on Jan.1st, 2001).

Two metering ammeters should be installed for the Project Activity. One ammeter will be installed at the outlet of the substation in hydropower station (check ammeter, M1) to measure electricity output of the Project Activity; the other one will be installed at the inlet of the substation of power grid company (gateway ammeter, M2) to measure electricity delivered to the grid by the hydropower station. The two ammeters will be measured hourly and recorded monthly, and on-site checked periodically according to regulation DL/T448-2000. The ammeters locations refer to the following diagram:



Note: As the Project Activity is still undergoing construction the finalized location of the meters will be confirmed as this information becomes available.

4. Data collection

The steps of monitoring the electricity delivered to the grid and the electricity consumed by the Project Activity are as follows:

①. The Project Entity and power grid company should read and collect data from check ammeter and gateway ammeter every month, and the reading record will be recognized by Project Entity and power grid company.

②. The power grid company offers the Project Entity the actual amount of the electricity delivered to the grid by the power station and Project Entity offers the electricity purchase/sales invoice;

③. The Project Entity shows the record of gateway ammeter reading and copy of invoice to the verifier of DOE;

Installed capacity of the hydro power plant after the implementation of the project activity and area of the reservoir measured in the surface of the water after the implementation of the project activity were monitored yearly in line with the appropriate regulation.

5. Equipment failure

If the imprecision of readings from the gateway ammeter falls outside the range of allowed error in some month, or the ammeters' function is abnormal, the amount of the electricity delivered to the grid should be confirmed according to the following measures:

①. Conduct calibration on gateway ammeter and check ammeter by qualified party to judge which one is in trouble.

②. If the other cases happen and Project Entity and power grid company can not reach agreement on the conservative method to estimate reading, arbitration should be conducted according to Power Purchase Agreement to confirm the consistency of estimating method.

6. Data management

The monitored data will be kept in electronic archives at the end of every month. Electronic documents should be archived both in soft copy and hard copy. Paper documents, such as maps, forms, EIA reports, the copy of electricity sales invoice etc., should be used with monitoring plan, to verify the authenticity of data. All the data and information in the form of paper documents will be kept in archives. All of the data should be kept for 2 years after the crediting period.

7. Personnel Training

All persons working within CDM group should be trained. Through the training, persons will know the necessary knowledge on the basic knowledge about CDM and monitoring requirement, familiar with the equipment operating principle and basic structure; master the cause and solution of common problem.

During the operating period, project entity will hold irregularly scheduled training to improve staff's professional level.

The new staff can't operate or maintain the equipment until they pass the exams and master the knowledge and skills after training mentioned above.

8. Monitoring report

The management organization will collect monitoring documents and compile the annual monitoring report before verification.

9. Internal Audit

The aim to conduct an internal audit is to improve the monitoring process to make it more efficient. It will ensure the monitoring of the Project Activity shall be processed as scheduled plan.

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 study of the baseline and the monitoring methodology was completed on 02/03/2010:

The key organizations involved in the baseline study include:

Coway International TechTrans Co., Ltd. Room 2206, Huaye Building, Tsinghua University, Beijing, China Tel: (8610) 62795171

The above organization and individual is not the project participants.

SECTION C. Duration of the project activity / crediting period

C.1 Duration of the project activity:

C.1.1. Starting date of the project activity:

08/01/2007 (contract date of head work).

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

25 years

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

C.2.1. Renewable crediting period

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

01/04/2010(or the date of registration)

C.2.1.2. Length of the first crediting period:

7 years

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

Not applicable

C.2.2.2. Length:

Not applicable

SECTION D. Environmental impacts

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

According to the requirement of the national environmental protection rules and regulations, the Project Activity has completed the environmental assessment report on environmental impact and water and soil maintenance, and Yunnan Environment Protection Bureau has ratified the environmental assessment report and agreed to implement the Project Activity.

The impacts on environment made by the Project Activity are as follows:

- **Ecological impact**

According to the investigation, the damage of vegetation due to the proposed power plant construction and reservoir water storage have not involved national or provincial rare and endangered plant species, but 5 Bird species (*Milvus migrans*, *Accipiter nisus*, *Falco tinnunculus*, *Glaucidium brodiei*, *Glaucidium Cuculoides*), 1 Mammal species (*Felis bengalensis*), 1 Amphibian (*Paa boulengeri*) species and 4 Reptile species (*Elaphe carinata*, *Elaphe mandarinus*, *Elaphe taeniura*, *Zaocys dhumnades*) were involved, of which only a small amount of *Felis bengalensis* were involved, and its main habitats are forest, brushwood, grave and stone cavern which are more than 100m away from reservoir area; the 5 bird species are all raptor which have strong flying ability, can flee the spot easily; the 4 reptile species and *Paa boulengeri* are widely distributed in Yunnan Province, though it will be affected in certain degree, can not induce extinction, and the local residents and construction workers will be educated to protect the species and its habitat. Plant construction will bring certain impact on local ecological environment, project participant should enhance environment protection supervision and management, and make effort in providing publicity and education work of environmental protection for the builders, and recover the damaged vegetation after plant has been put into operation.

- **Wastewater impact**

The wastewater produced during construction period is mainly industrial wastewater. Constructor will install wastewater recovery and treatment system connected to aggregate processing system to meet the requirement of related standards. As for scattered industrial wastewater sources, according to the terrain condition, simple grit chambers and water collection pools should be installed to lower the water sands content and then flow into the river. Medical wastewater will be let off after disinfection, septic tank will be built at the living and office area. Therefore the surface water quality will not be influenced significantly during construction period.

- **Air pollution**

Air pollution of construction period was mainly due to the dust pollution. In dry season, watering cart will be used for dust suppression at construction sites and roads; construction procedure will adopt wet dust removal pattern; use injection pump during cement transportation; tunnel construction should under ventilated condition; apply certain measures to enhance the builder's personal protection.

- **Noise**

The main construction noise mainly comes from the construction machinery and vehicles, certain measures should be adopted to protect builders, such as wearing earplugs and headpiece etc. Low noise equipment will be preferred choice during equipment selection.

- **Solid waste**

The project will build 6 discard sediment spots, corresponding measures will be adopt to prevent from discard sediment loss. The waste produced during construction will be under landfill treatment to facilitate vegetation recovery and replantation. In order to prevent from waste pollution, solid waste will be gathered and removed by car periodically at living and office area.

In general, the Project Activity has limited negative impact on the environment, and has less impact on the ecological environment and the residents' living. All impacts can be resolved by lots of measures.

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

The project participants and the host party all consider that the Project Activity's environment impacts are not significant. No instruction is needed.

SECTION E. Stakeholders' comments

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

>>

In Aug 2005, public opinion survey was carried out at the main counties, villages, social communities which are involved in Youfanggou Hydropower Station and the residents in the area of the project construction.

Means of participation

The survey was carried out by distributing and collecting questionnaires. The results are described in the following, and can be provided to DOE auditing.

Participants

The participants who fulfilled the questionnaire are local residents who will be possibly directly affected by the Project Activity.

Contents of the investigation for local residents:

1. Do you know Youfanggou hydropower station will be constructed in your hometown?

(Yes; No)

2. What's the impact on local environment and residents of the waste water, waste gas, waste residue and noise during the construction period?

(Great; Moderate; Small; Unclear)

3. What's the impact on ecological environment during the construction of the project?

(Great; Moderate; Small; Unclear)

4. What's the impact of water and soil loss during the construction of the project?

(Great; Moderate; Small; Unclear)

5. Do you know the occupied lands by project will influence contracted lands?

(Yes; No)

6. What's the impact on irrigation and domestic water during the construction of the project?

(Great; Moderate; Small; Unclear)

7. What do you think of the impact on local economic development caused by the Project Activity?

(Positive; Moderate; Small; Unclear)

8. Do you agree the Youfanggou project construction?

(Yes; No)

E.2. Summary of the comments received:

The survey had a 88% effective response rate (there are 42 questionnaires for local residents in which 37 questionnaires returned). The following is a summary of the key findings from the stakeholders:

The profiles of respondents are as follows:

Age	20~30 year	31~40 year	Above 41year
Amount	18	11	8
Ratio	48.7%	29.7%	21.6%

Profession	employee	farmer	technician	Official	No answer
Amount	8	6	5	8	10
Ratio	22%	16%	13%	22%	27%

The issues local residents concerned:

1) 100% of the informants knew and supported the establishment of Youfanggou hydropower plant; 86% think that the construction of hydropower station has positive impact on local economy.

2) Impact on local environment due to waste water, waste gas, waste residue, and 43% of the informants thought that it has great impact; 30% thought the impact is moderate, 27% thought the impact is small, 3% answer unknown.

3) Impact on local ecological environment due to hydropower station construction, 40% of the informants thought that it has moderate impact; 38% thought the impact is great, 14% thought the impact is small, 8% answer unknown.

4) Impact on water and soil loss due to hydropower station construction, 54% of the informants thought that it has moderate impact; 27% thought the impact is great, 16% thought the impact is small, 3% answer unknown.

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

The Project Entity will adopt the following measures to solve every question or issue concerned by local stakeholders.

- Developed water and soil conservation program to prevent from water and soil loss, vegetation will be replanted to relieve the impact on local ecological environment.
- Diversion tunnel water dispensing has certain impact on water condition and water resource, appropriate measures will be adopted to ensure the requirement of needed water of the reach, minimize the impact on local environment.
- Appropriate measures will be taken to relieve the impact of waste gas, waste water, industrial residue and noise.
- As for occupied contracted lands, through the measures of land compensation, replantation, and improvement of land productivity etc to relieve the impact on life and industry of local residents.

After these measures, the issues that public worried about basically have been properly dealt with, there is no need to adjust the design, construction and operation mode of this project.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

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Annex 2

INFORMATION REGARDING PUBLIC FUNDING

No public funding from Annex 1 countries is provided for the Project Activity.

ANNEX 3

BASELINE INFORMATION

Please refer to annex 3 of the "*Bulletin on the Baseline Emission Factors of the China's Regional Grids"* reviewed by Director Office of National Climate Change Coordination of National Development and Reform Commission (NDRC) of China (DNA of China) on Jul. 18th, 2008.

Table A1 Proportion of the electricity generation from low operating cost/must-run power plants among the total electricity generations of the China Southern Power Grid

	Fuel-fired (10^8kWh)	Hydropower (10^8kWh)	Nuclear (10^8kWh)	Others (10^8kWh)	Total of all the power plants (10^8kWh)	Total of low operating cost/must-run power plants (10^8kWh)	Percentage of the electricity generation from low operating cost/must-run power plants
2002	1837.33	639.31	208.77	1.35	2686.76	849.43	31.62%
2003	2227.79	810.64	289.30	23.65	3351.3	1123.59	33.53%
2004	2195.41	809.66	284.81	32.55	3322.43	1127.02	33.92%
2005	2871.86	916.26	304.76	34.33	4127.21	1255.35	30.42%
2006	3377.15	1045.16	312.13	35.86	4766.3	1393.15	29.23%

Remark:

1、 Low cost and must run resources in this case include hydro, nuclear and others.

2、Data resource：2003-2007 China electric power yearbooks

According to the data above, we can use the simple OM method to calculate operation margin emission factor.

Table A2 Power generation from fuel-fired power of CSPG in 2004

	Power generation (10^8kWh)	Power generation (MWh)	Internal consumption rate (%)	Power supply to grid (MWh)
GuangDong	1693.89	169389000	5.42	160,208,116
GuangXi	201.43	20143000	8.33	18,465,088
GuiZhou	497.2	49720000	7.06	46,209,768
YunNan	243.22	24322000	7.56	22,483,257
Total				**247,366,229**

Data resource：2005 China electric power yearbook

Table A3. Simple OM calculation sheet of CSPG in 2004

Fuel sort	unit	Guangdong	Guangxi	Guizhou	Yunnan	subtotal	Emission factor (tc/TJ)	Oxidation rate (%)	Average caloric value ($MJ/t,km^3$)	Emission of CO_2 (tCO_2e) I=G*H*F*E*44/12/10000
		A	B	C	D	E=A+B+C+D	F	G	H	I=G*H*F*E*44/12/1000 (volume)
Raw coal		6017.7	1305	2643.9	1751.28	11717.88	25.8	100	20908	231,767,574
Wash extractive coal	10^4 ton	0.21				0.21	25.8	100	26344	5,233
Other wash coal						0	25.8	100	8363	0.00
Coke						0	25.8	100	28435	0.00
Coke oven gas	10^8 m^3					0	12.1	100	16726	0.00
Other coal gas		2.58				2.58	12.1	100	5227	59,831
Crude oil		16.89				16.89	20	100	41816	517,933
Gasoline						0	18.9	100	43070	0.00
Diesel oil	10^4 ton	48.88			1.83	50.71	20.2	100	42652	1601975
Fuel oil		957.71				957.71	21.1	100	41816	30,983,494
LPG						0	17.2	100	50179	0.00
Refine dry gas		2.86				2.86	15.7	100	46055	75,825
Nature gas	10^8 m^3	0.48				0.48	15.3	100	38931	104,833
Other oil production	10^4 ton	1.66				1.66	20	100	38369	46,708
Other coke						0	25.8	100	28435	0.00
Other energy	10^4 tce	79.42				79.42	0	100	0	0.00
Total										265,163,407
Net import electricity from CCPG							10,951,240			
Average emission rate of CCPG in 2004							0.82732			
Total emission of CO_2 from CSPG in 2004							265,163,407+10,951,240*0.82732=274,223,576			
Electricity delivered to grid generated by **fuel-fired Power** ,2004 CSGP							10,951,240+247,366,229=258,317,469			
2004 Emission factor of CSPG							**1.06158**			

Data source: *2005 China Energy Statistics Yearbook*

Table A4 Power generation from fuel-fired power of CSPG in 2005

	Power generation (10^8kWh)	**Power generation (MWh)**	Internal consumption rater (%)	**Power supply to grid (MWh)**
GuangDong	1764.53	176453000	5.58	166,606,923
GuangXi	250.23	25023000	7.95	23,033,672
GuiZhou	584.3	58430000	7.34	54,141,238
YunNan	272.81	27281000	6.94	25,387,699
Total				**269,169,531**

Data resource：2006 China electric power yearbook

Table A5. Simple OM calculation sheet of CSPG in 2005

Fuel sort	unit	Guangdong	Guangxi	Guizhou	Yunnan	subtotal	Emission factor (tc/TJ)	Oxidation rate (%)	Average caloric value ($MJ/t,km^3$)	Emission of CO_2 (tCO_2e) I=G*H*F*E*44/12/10000
		A	B	C	D	E=A+B+C+D	F	G	H	I=G*H*F*E*44/12/1000 (volume)
Raw coal	10^4 ton	6696.47	1435	3212.31	1975.55	13319.33	25.8	100	20908	263,442,602
Wash extractive coal					0.15	0.15	25.8	100	26344	3,738
Other wash coal				10.39	33.88	44.27	25.8	100	8363	350,238
Coke		4.79			8.05	12.84	29.2	100	28435	390,906
Coke oven gas	10^8 m^3				0.79	0.79	12.1	100	16726	58,624
Other coal gas		1.87			15.96	17.83	12.1	100	5227	413,486
Crude oil	10^4 ton	10.91				10.91	20	100	41816	334,556
Gasoline		0.68				0.68	18.9	100	43070	20296
Diesel oil		31.96	2.02		1.81	35.79	20.2	100	42652	1,130,639
Fuel oil		887.21				887.21	21.1	100	41816	28,702,703
LPG						0	17.2	100	50179	0.00
Refine dry gas	10^8 m^3	4.92				4.92	15.7	100	46055	130,441
Nature gas		0.93				0.93	15.3	100	38931	203,115
Other oil production	10^4 ton	1.7				1.7	20	100	38369	47,833
Other coke						0	25.8	100	28435	0.00
Other energy	10^4 tce	104.66	133.15		59.72	297.53	0	100	0	0.00
Total										295,229,177
Net import electricity from CCPG							20,264,000			
CM of CCPG in 2005							0.77216			
Total emission of CO_2 from CSPG in 2005							0.77216*96,363,000+295,229,177=310,876,215			
Electricity delivered to grid generated by **fuel-fired Power** ,2005 CSGP							20,264,000+269,169,531=289,433,531			
2005 Emission factor of CSPG							**1.07409**			

Data source: *2006 China Energy Statistics Yearbook*

Table A6 Power generation from fuel-fired power of CSPG in 2006

	Power generation (10^8kWh)	**Power generation (MWh)**	Internal consumption rater (%)	**Power supply to grid (MWh)**
GuangDong	1884.29	188429000	5.27	178,498,792
GuangXi	279.67	27967000	4.45	26,722,469
GuiZhou	760.39	76039000	6.06	71,431,037
YunNan	397.91	39791000	4.12	38,151,611
Total				**314,803,908**

Data resource：2007 China electric power yearbook

Table A7. Simple OM calculation sheet of CSPG in 2006

Fuel sort	unit	Guangdong	Guangxi	Guizhou	Yunnan	subtotal	Emission factor (tc/TJ)	Oxidation rate (%)	Average caloric value ($MJ/t,km^3$)	Emission of CO_2 (tCO_2e) I=G*H*F*E*44/12/10000
		A	B	C	D	E=A+B+C+D	F	G	H	I=G*H*F*E*44/12/1000 (volume)
Raw coal		7303.19	1490.01	4001.54	2735.88	15530.62	25.8	100	20908	307,179,636
Wash extractive coal	10^4 ton					0	25.8	100	26344	0
Other wash coal				19.53	45.8	65.33	25.8	100	8363	516,852
Briquette coal		133.75				133.75	26.6	100	20908	2,727,466
Coke					1.31	1.31	29.2	100	28435	39,882
Coke oven gas	10^8 m^3		0.84		2.06	2.9	12.1	100	16726	215,202
Other coal gas		0.89			19.15	20.04	12.1	100	5227	464,737
Crude oil		0.87				0.87	20	100	41816	26,679
Gasoline						0	18.9	100	43070	0
Diesel oil	10^4 ton	29.92	1.26		3	34.18	20.2	100	42652	1,079,777
Fuel oil		685.85	0.09			685.94	21.1	100	41816	22,191,288
LPG						0	17.2	100	50179	0
Refine dry gas						0	15.7	100	46055	0
Nature gas	10^8 m^3	7.92				7.92	15.3	100	38931	1,729,751
Other oil production	10^4 ton	0.67				0.67	20	100	38369	18,852
Other coke						0	25.8	100	28435	0
Other energy	10^4 tce	93.54	189.68		20.29	303.51	0	100	0	0.00
Total										336,190,122
Net import electricity from CCPG							21,730,840			
CM of CCPG in 2006							0.77134			
Total emission of CO_2 from CSPG in 2006							0.77134*21,730,840+336,190,122=352,951,910			
Electricity delivered to grid generated by **fuel-fired Power** ,2006 CSGP							21,730,840+314,803,908=336,534,748			
2006 Emission factor of CSPG							**1.04878**			

Data source: *2007 China Energy Statistics Yearbook*

Table A8. Weighted average emission factor of CSPG in the past 3 years

		2004	2005	2006	Remark
1	Total generation(MWh)	258,317,469	289,433,531	336,534,748	884,285,748(2004-2006)
2	Total emissions (tCO_2e)	274,223,576	310,876,215	352,951,910	938,051,701(2004-2006)
	Weighted average emission factor	Total generation of 2004-2006/Total emissions of 2004-2006			**1.06080**

Calculation for BM:

Table A9. sheet for λ_{Coal}, λ_{Oil}, $\lambda_{Gas\ calculation}$, 2006 CSPG

Fuel sort	unit	Guangdong	Guangxi	Guizhou	Yunnan	subtotal	Emission factor	Oxidation rate	Average caloric value	Emission of CO_2（tCO_2e）
							（tc/TJ）	（%）	（MJ/t,km^3）	I=G*H*F*E*44/12/10000(quality)
		A	B	C	D	E=A+B+C+D	F	G	H	I=G*H*F*E*44/12/1000 (volume)
Raw coal	10^4 ton	7303.19	1490.01	4001.54	2735.88	15530.62	25.8	100	20908	307,179,636
Refined coal		0	0	0	0	0	25.8	100	26344	0
Other washed coal				19.53	45.8	65.33	25.8	100	8363	516,852
Briquette coal		133.75	0	0	0	133.75	26.6	100	20908	2,727,466
Coke		0	0	0	1.31	1.31	29.2	100	28435	39,882
Sort total										310,463,836
Crude oil	10^4 ton	0.87	0	0	0	0.87	20	100	41816	26,679
Gasoline		0	0	0	0	0	18.9	100	43070	0
kerosene		0	0	0	0	0	19.6	100	43070	0
Diesel oil		29.92	1.26	0	3	34.18	20.2	100	42652	1,079,777
Fuel oil		685.85	0.09	0	0	685.94	21.1	100	41816	22,191,288
Other petroleum products		0.67	0	0	0	0.67	20	100	38369	18,852
Other coke products		0	0	0	0	0	25.8	100	28435	0
Sort total										23,316,596
Natural gas	10^8 m^3	79.2	0	0	0	79.2	15.3	100	38931	1,729,751
Coke oven gas		0	8.4	0	20.6	29	12.1	100	16726	215,202
Other coal gas		8.9	0	0	191.5	200.4	12.1	100	5227	464,737
LPG	10^4 ton	0	0	0	0	0	17.2	100	50179	0
Refine dry gas		0	0	0	0	0	15.7	100	46055	0
Sort total										2,409,690
Total										336,190,122

Data source: *2007 China Energy Statistics Yearbook*

According to the table above：$\lambda_{Coal,y}$ = 92.35%，$\lambda_{Oil,y}$ = 6.94%， $\lambda_{Gas,y}$ = 0.71%

Table A10. Eefficiency Level of the Best Power Generation Technology Commercially

	Variable	Consumption rate (gce/kWh)	Efficiency of Power Supply	Emission Factor of Fuel （tc/TJ）	Oxidation Factor	Emission Factor（tCO_2e /MWh）
			A	B	C	D=3.6/A/1000*B*C*44/12
Coal	$EF_{Coal,Adv}$	329.94	37.28%	25.8	1	0.9135
Gas	$EF_{Gas,Adv}$	252	48.81%	15.3	1	0.4138
Oil	$EF_{Oil,Adv}$	252	48.81%	21.1	1	0.5706

Data source: DNA publication of 18 Jul. 2008

Table A11. Percentage of the CO_2 emission from different type of fossil fuel among total CO_2 emission

	Coal	Oil	Gas	Emission factor of fuel-fired power (tCO_2e/MWh) (λ_{Coal}*$EF_{coal,Adv}$+λ_{Oil}*$EF_{oil,Adv}$+λ_{Gas}*$EF_{gas,Adv}$)
λ	92.35%	6.94%	0.71%	**0.8862**
EF_{Adv}	0.9135	0.5706	0.4138	

Table A12. BM calculation of CSPG

	Installed Capacity in 2004	Installed Capacity in 2005	Installed Capacity in 2006	New Added Installed Capacity in 2004~2006	% of New Added Installed Capacity
	A	B	C	D=C-A	
Fuel-fired Power（MW）	46659.7	54507	68963	22303.3	76.91%
Hydro Power（MW）	27580.1	30347.1	34176	6595.9	22.75%
Nuclear Power（MW）	3780	3780	3780	0	0.00%
Wind Power（MW）	83.4	83.4	183	99.6	0.34%
Total（MW）	78103.3	88717.5	107102	28998.7	100.00%
% of Installed Capacity in 2006	72.92%	82.84%	100%		

$EF_{BM,y}$=0.8862×76.91%=0.6816 tCO_2e/MWh

Calculation of CM:

Table A13. Calculation Sheet of CM Emission Factor of CSPG

	OM Emission Factor (tCO_2e/MWh)	BM Emission Factor (tCO_2e/MWh)	CM Emission Factor =(OM+BM)/2 (tCO_2e/MWh)
CSPG	1.0608	0.6816	0.8712

Formula: CM Emission Factor = (BM + Simple OM) /2 (Weights ω_{OM} and ω_{BM}, by default, are 0.5.)

Annex 4

MONITORING PLAN

There is no supplementary information about the monitoring plan. For detailed information about the plan, please refer to Section B.7.2.