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

CONTENTS

SECTION A. General description of project activity

A.1 Title of the project activity:

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Guangxi Long'an Jinjitan Hydro Power Project

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A.2. Description of the project activity:

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Guangxi Long'an Jinjitan Hydro Power Project (the proposed project activity) utilizes hydro energy to generat~~ing~~e electricity. It provides the electric power generated from the renewable energy to Guangxi Power Grid, which is a part of China Southern power grid. Therefore, the proposed project will effectively replace fossil fuel power plants to produce electricity, and it will also avoid the CO_2 emission during the course of electricity generation and carry out the greenhouse gas (GHG) emission reductions.

The proposed project activity, which is the sixth grade project of Hydropower Cascade Development of the Xijiang water system in Zhujiang drainage area, Guangxi Zhuang Autonomous Region, locates on the downriver of Youjiang River which is on the upstream of Yujiang River. The project activity is a hydro power project with reservoir construction, with the reservoir's storage area of 15.05 km^2. It is proposed that 3 generating sets with the unit installed capacity of 24MW and the total installed capacity of 72MW will be installed, the annual power output is proposed to be 288.40 gigawatt-hours (GWh). The reservoir's average power density is 4.78(>4) W/m^2. The proposed project will replace some fossil fuel power plants in China Southern power grid to produce electricity, consequently mitigate the CO_2 emission factors of the grid; after the construction completes, the annual CO_2 emission reductions will reach 198,520t.

The construction of the proposed project activity is in compliance with the choice of China energy industry's priority area, and it is propitious to the encouraging project of "the Guiding Catalogue for Industry Restructuring". The project benefits for encouraging and driving the technological improvement and the commercialization of utilizing renewable energy to provide electricity to power grid. At the same time, it also benefits for reducing GHG emission compared to the normal electric power generating scenarios which heavily rely on coal, thus it is in line with the national policy and regulation of "transmission of electricity from the western to the eastern region".

To sum up, the proposed project could produce electric power utilizing renewable energy source, at the same time it will facilitate the sustainable development in the host party country and the local place in the following aspects:

- Solve conflict of power supply and demand;
- Offering the ship advantage;
- Increasing the employment opportunity, and offering 43 employment stations;
- Mitigating GHG emissions comparing to the normal commercial scenario;

- Mitigating emission of other pollution comparing to normal power generation manner.

A.3. Project participants:

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The participants of the proposed project include:

Table1. Information of 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)	Guangxi Long'an Guangneng power company ltd (project owner)	No
Switzerland	Ecoinvest Carbon 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.

Detailed contact information on the Participants and other Parties are provided in Annex 1.

A.4. Technical description of the project activity:

A.4.1. Location of the project activity:

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A.4.1.1. Host Party(ies):

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People's Republic of China

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

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Guangxi Zhuang Autonomous Region

A.4.1.3. City/Town/Community etc:

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Long'an county, Nanning city

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

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The project activity would be located in the Long'an County, Nanning City, Guangxi Zhuang Autonomous Region. The dam is on the Jinjitan on the low reaches of Youjiang River 8km far from Long'an County. The specific site location is at longitude 107°13′-107°39′ and at latitude 23°14′-23°34′.

About 1.5km from the low reaches of the dam, there are a Class II Highway and a railway from Nanning City to Baise City. The project is 159km from Baise City and 96km far from the provincial capital Nanning City. The fifth grade (Yuliang Power Station) and seventh grade (Laokou Power Station) of comprehensive utilization planning on Yujinag River are proposed to be built 74km upstream and 127km downstream from the proposed project respectively. The location of the project is shown in the map of Figure1 and Figure2.

Figure 1. Sketch Map for Guangxi Long'an Jinjitan Hydro Power Project in the Power Grid

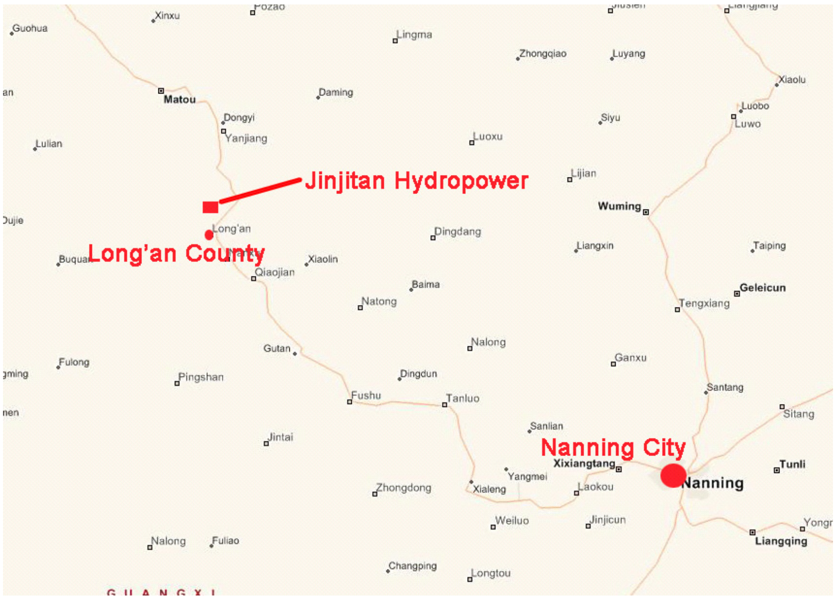

Figure 2 Geography Location of Guangxi Long'an Jinjitan Hydro Power Project

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

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The project falls within the sectoral scope1: Energy Industries.

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

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The project's main buildings consist of dam, power plant buildings and navigation passage, navigation chamber and navigation head. The highest point of the reservoir's dam reaches 27.7m, with the reservoir area at normal storage of 10.35 million m^2, the total capacity of 230.9 million m^3 and the regulating reservoir storage capacity of 10.2 million m^3. The power plant will be a part of the water resistant building, and headrace system will be not necessary. Both of the upstream and downstream approach channels are 385m long, the effective dimension of navigation chamber is 190*12*3.5 (length*width*submerged depth, m). The designed navigation capability is 2*1000t. The annual transportation capability is estimated to be 6.36 million t.

The hydro power station employed the voltage grade of 110kv to get connected to China Southern power grid through Guangxi Power Grid. Double-circuit of 110kv transmission line with the length about 9km are utilized to connect into Long'an power substation, then 110kV line is used to connect to Matou Substation of Guangxi main power grid through Long'an substation.

The proposed project utilizes 3 bulb-turbine hydro generator units made in China, there is no environmentally safe and sound technology be transferred to the host Party.

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

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The first crediting period of 7 years is selected for the project activity (Oct.1st, 2007-Sept.30th,2014)

Years	Annual estimation of emission reductions in tonnes of CO_2 e
2007	36,706
2008	163,139
2009	198,520
2010	198,520
2011	198,520
2012	198,520
2013	198,520
2014	148,890
Total estimated reductions (tonnes of CO_2e)	1,341,336
Number of the first crediting years	7
Total number of crediting years	21
Annual average over the crediting period of estimated reductions (tonnes of CO_2e)	191,619

A.4.5. Public funding of the project activity:

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No official funds of Parties included in Annex I have been involved in the project.

SECTION B. Application of a baseline and monitoring methodology

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

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Baseline and monitoring methodology ACM0002: "Consolidated baseline and monitoring methodology for grid-connected electricity generation from renewable sources" (ACM0002/Version 06, Sectoral Scope: 01, 19 May 2006). The detail information sees also on http://cdm.unfccc.int/ methodologies/approved.

Tool for the demonstration and assessment of additionality (Version 03， EB29.) http://cdm.unfccc.int/methodologies/PAmethodologies/approved.html

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

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Hydroelectricity is a substituting technical choice of fossil fuel to produce electric power. Therefore, the proposed project will adopt methodology ACM0002 approved by EB to identify the project's baseline and calculate the GHG emission reductions carried out by the project. The project meets the prescriptive utilization scope of ACM0002, because:

- The project utilizes renewable energy generating electric power and connects to grid;
- The project is a project with reservoirs, and with its power density greater than $4W/m^2$;
- The project activity does not involve switching from fossil fuels to renewable energy at the project activity site;

- The geographic and system boundary for the China Southern power grid is clearly identified and information on the characteristics of this grid at aggregate level is available[1].

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

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According to "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 Dec. 15th, 2006[2]. China Southern Power Grid is a regional grid in China, 4 provinces of Guangdong, Guangxi, Yunnan and Guizhou are included.

	Source of Emission	Gas		Instruction
Baseline	Into-grid Power Generation	CO_2	Included	Main emission source
		CH_4	Excluded	Excluded for simplifying; being conservative
		N_2O	Excluded	Excluded for simplifying; being conservative
Project Activities	Project Activity Emission	CH_4	Included	the power density is greater than $4W/m^2$ and less than or equal to $10W/m^2$
		CO_2	Excluded	The project is no emission source of CO_2
		N_2O	Excluded	Excluded for simplifying; being conservative

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

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

(1) Implementation of the proposed project not as a CDM project activity;

(2) Construction of a fuel–fired power plant with equivalent amount of installed capacity or annual electricity generation;

(3) Construction of a power plant using other sources of renewable energy with equivalent amount of installed capacity;

(4) Provision of equivalent electric power by the grid where proposed project connected into (excluding those low cost/must run plants).

The following is the feasibility analysis of the above four alternatives:

(1) The geographic position of the project is remote, and the geological condition is comparatively bad, and the project investment risk is comparatively high. If the project is not implemented as a CDM project, it's not feasible in economic, so the alternative (1) is inaccessible.

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[1] "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 Dec. 15th, 2006.http://cdm.ccchina.gov.cn/web/NewsInfo.asp?NewsId=1235

[2] http://cdm.ccchina.gov.cn/web/NewsInfo.asp?NewsId=1235

(2) Coal is a rare resource in Guangxi Zhuang Autonomous Region, and the price of the coal is comparatively high. Thus constructing a fossil fuel plant needs to import fuel materials from other areas, which is not in compliance with the economic principle. "Notice of General Office of the PRC State Council on Strictly Prohibiting Constructing Thermal Power Units with the Capacity under 135MW" (state council public notice [2002] NO.6) publicly proclaimed to prohibit constructing fossil fuel power plants with the capacity under 135MW. Therefore, constructing a thermal power plant with the capacity under 135MW as a baseline scenario alternative of the proposed project (37.66MW) is not in line with the national rule. The alternative (2) is also inaccessible.

(3)Among the alternatives for renewable energy power generation techniques in China: wind energy technology is mature relatively, but its cost is high; solar energy technology is not mature and can't become the alternative scenario; power-generation from biomass fuels is also not feasible due to the lack of abundant biomass material which is required by that technology. Therefore, the alternative (3) is not feasible.

(4) At present, the installed capacity and the newly installed capacity of China Southern power grid are in compliance with the national laws and regulations, and they are economical and feasible. Therefore, letting China Southern power grid into which the proposed project is connected provide the equal power generation capacity and amount with the proposed project is an economical and feasible alternative.

In summarization, the provision of equivalent amount of annual power output by China Southern power grid where the project is connected into is the project's baseline scenario.

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):

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

The objective of Step 1 is to identify the actual and feasible substitutable scheme by the following sub-steps. These actual and feasible substitutable scheme will become (a part of) baseline scenario.

Sub-step 1a. Identify alternatives to the project activity:

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

(1) Implementation of the proposed project not as a CDM project;

(2) Construction of a fuel–fired power plant with equivalent installed capacity or annual electricity generation;

(3) Construction of a power plant using other sources of renewable energy with equivalent amount of installed capacity;

(4) Provision of equivalent amount of electric power by the grid where proposed project connected into (excluding those low cost/must run plants).

The following is the economic and technology feasibility analysis of the above four alternatives:

(1) The geographic position of the project is remote, and the geological condition is comparatively bad, and the project investment risk is comparatively high. If the project activity is not implemented as a CDM project, it's not feasible in economic, so the alternative (1) is inaccessible.

(3)Among the alternatives for renewable energy power generation techniques in China: wind energy technology is mature relatively, but its cost is high; solar energy technology is not mature and can't become the alternative scenario; power-generation from biomass fuels is also not feasible due to the lack of abundant biomass material which is required by that technology. Therefore, the alternative (3) is not feasible.

Sub-step 1b. Enforcement of applicable laws and regulations:

In allusion to the alternative (2), on the condition of supplying equal annual power generation, the corresponding baseline alternative is to construct a fossil fuel power plant with the capacity of or below 72MW. For the project is a hydro power project connected to the power grid, the alternative should be a thermal power project connected to the power grid. According to the electric power rules in China, fossil fuel power plant with the capacity below 135MW is prohibited to construct if the district is covered by a large power grid[3], and thermal power units with the single-unit capacity below 100MW are strictly controlled to be constructed[4]. Therefore, constructing a fossil fuel power plant as a baseline alternative will violate the requirements of national laws and regulations. The alternative (2) is not feasible.

In allusion to the alternative (4), the installed capacity and the newly installed capacity of China Southern power grid into which the project is connected can meet all the requirements of national laws and regulations, and they are economical and feasible. Therefore, provision of equivalent electric power by China Southern power grid is economical and feasible.

In summarization, the project activity is not a baseline scenario, and the baseline scenario is alternative (4), which is the provision of equivalent amount of annual power output by a fossil fuel based power plant to the China Southern power grid where the project activity is connected into.

Step 2. Investment Analysis

Sub-step 2a. Determine appropriate analysis method

Tools for the demonstration and assessment of additionality suggests three analysis methods, i.e. simple cost analysis (option I), investment comparison analysis (option II) and benchmark analysis (option III). Since the proposed project will obtain the revenues not only from the electricity sales but also from CDM, the simple cost analysis method (option I) is not appropriate. Investment comparison analysis method (option II) is applicable to projects whose alternatives are also investment projects. Only on such basis, comparison analysis can be conducted. The alternative baseline scenario of the project is the China Southern power grid rather than new investment projects. Therefore the option 2 is not an appropriate method for the decision-making context. The project will use benchmark analysis method based on the consideration that benchmark IRR and equity IRR of the power sector are both available.

Sub-step 2b. Benchmark Analysis Method (Option3)

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[3] *Notification from State Council on Prohibiting Constructing Thermal Power Units with the Installation Capability under135 Thousand KWh,* 2002.

[4] Temporary Rules on Small-scale Thermal Power Units' Construction Management (August, 1997).

With reference to *Interim Rules on Economic Assessment of Electrical Engineering Retrofit Projects,* the financial benchmark rate of return (after tax) of Chinese power industries accounts for 8% of the total investment IRR or 10% of the IRR on equity. Presently, the financial benchmark rate of return is used in the analysis of the majority of power projects in China including hydropower. On the basis of above benchmark, calculation and comparison 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, basic parameters for calculation of financial indicators are as follows:

Installed capacity: 72MW

Estimated annual grid-electricity: 288.40GWh

Project lifetime: 54yrs (4 yrs construction and 50 yrs operation according to the feasibility study report)

Total investment: RMB 695.147 million yuan (equity/debt ratio=1:4)

Prospective pool purchase price: RMB 0.28 Yuan/kWh (excluding VAT)

Crediting period: 7*3yrs (renewable)

Expected CERs price: Euro 9/t CO_2e (Exchange rate: 1:10)

(2) Comparison of IRR and NPV for the proposed project and the financial benchmark

IRR and NPV of the Project, with and without CDM revenues, are shown in Table 2. Without CDM revenue, the IRR of total project investment is 7.24%, which is much lower than 8.0%.The proposed project can be considered as financially unattractive to investors. It is infeasible in business.

With the CDM revenue (according to Euro 9/t CO_2e, 20years crediting period), CERs revenue will significantly improve both IRR and NPV. IRR of total investment will be brought up more than 1 percent. Therefore, the project with CDM revenue can be considered as financially attractive to investors, and the business feasibility will also be improved.

Table 2. Financial indicators of Guangxi Long'an Jinjitan Hydro Power Project

	NPV (total investment) (RMB ten thousand Yuan)	IRR(total investment) benchmark=8%
Without CDM	-5,423	7.24%
With CDM	5,670	8.80%

Sub-step 2d. Sensitivity analysis

For the proposed project, the following financial parameters were taken as uncertain factors for sensitive analysis of financial attractiveness:

1) Total static investment

2) Pool purchase price (not including VAT)

3) Annual O&M cost

The impacts of total investment, pool purchase price and annual O&M cost of the project on IRR of total investment were analyzed. Provided the three parameters fluctuate within the range of -10%-+10%. The corresponding impacts on IRR of the project's total investment are shown in Table 3 and Figure 3 for details.

Table 3 IRR sensitivity to different financial parameters of the project (total investment, without CDM)

	-10%	-5%	0	+5%	+10%
Total static investment	8.06%	7.64%	7.24%	6.88%	6.55%
Annual O&M cost	7.37%	7.30%	7.24%	7.18%	7.12%
Pool purchase price (excluding VAT)	6.31%	6.78%	7.24%	7.69%	8.13%

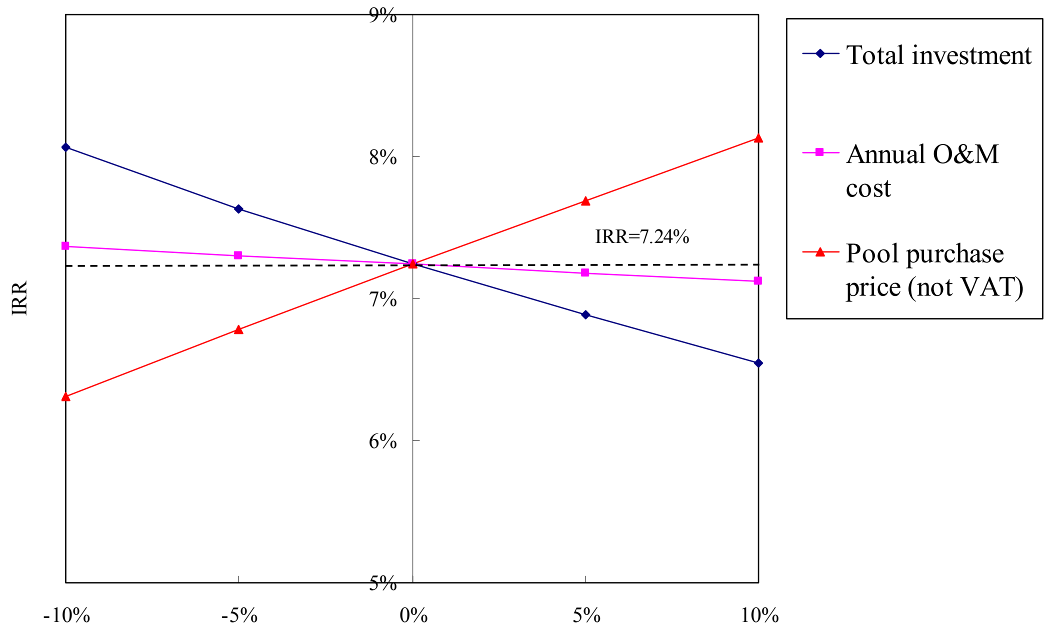


Figure 3. IRR sensitivity to different financial parameters of Guangxi Long'an Jinjitan Hydro Power Project (total investment, without CDM)

When the three financial parameters above fluctuated within the range from -10% to +10%, the IRR of total investment of the project without CDM revenue varies to different extent, as shown in table 3 and figure 3. Among them, the pool purchase price is the factor with the most significant impact on IRR, next is total investment, the impact of annual O&M cost on IRR is minimum, making it an insensitive factor.

When total investment has reduced 10%, the IRR of the project will exceed 8% of baseline IRR. According to the implement of the project, the fact total investment of the project will exceed the expectant investment, and be likely to rise continuously, so reduced 10% of total investment will not be appeared.

When pool purchase price has rise 10%, the IRR of the project will exceed 8%. According to the supply-need status of power in China, pool purchase price will be stable in the future and will not rise greatly. So rise 10% scenario of pool purchase price will not be appeared.

Step 4 Common practice analysis

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

The location of the proposed project, Guangxi Zhuang Autonomous Region, has abundant water resource, but water resources are mostly distributed in trunk stream of Hongshui River, Qianxun River, Yu River, Liu River and Gui River, there are 85.9% water resource of Guangxi in these rivers, and Hongshui River has occupied 71.3% of all developable installed capacity. The hydro resource of the valley of the project is fewer and there are many barriers to develop hydropower in the project valley.

There are mostly all large scale hydropower existed and constructed in Guangxi Zhuang Autonomous Region, for example, Tianshengqiao Hydropower (2520MW), Longtan Hydropower (9*700MW) etc, they are all located in Hongshui River. Most of existing small-scale hydro powers (<1MW) are non-grid-connected projects, the main function of these projects is to satisfy a part of local power demand, but they could not guarantee the stable power supply.

There are some similar scale (5-100MW) and time (after 1996) hydro powers in Guangxi Zhuang Autonomous Region, as follow:

Valley	Name	Installed capacity (MW)	Start working	Comment
Yu River	Jinjitan hydropower	72	2003	Developing CDM
Dishui River	Xialiujia hydropower	19.6	2005	Developing CDM
	Tingling hydropower	5	2004	
	Zhongping hydropower	5	2005	
Changtang River	Yunjiang hydropower	18	2005	Developing CDM
Dongxiao River	Baotan hydropower	37.66	2004	Developing CDM
Liu River	Fushi hydropower	54	2000	finished
	Dapu hydropower	90	2000 (third start working)	finished
	Xiaqiao hydropower	50	2002	finished
	Yemao hydropower	37.5	Put into production in 1996	finished
Gui River	Bajiangkou hydropower	90	2003	finished
	Xiafu hydropower	45	2003	finished

	Jinniuping hydropower	54	2004	Developing CDM
	Wangcun hydropower	54	2006	Developing CDM

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

These similar hydro power projects will not change the additionality of the proposed project. It is because that:

There is abundant water resource in Liu River and Gui River valley, hydro condition of existing hydro powers (Fushi, Dapu, Xiaqiao, Yemao, Bajiangkou, Xiafu etc) is better than other hydro powers, engineering and construction condition is better than constructing hydropower, so these existing hydro power projects in Liu River and Gui River will not affect the additionality of the proposed project.

Those constructing hydro powers are later than existing hydropower, their hydro and engineering condition of is worse, there are many difficulties to affect their construction. These hydro powers are developing actively CDM project to reduce their risk; therefore, the additionality of the proposed project is not affected.

Based on analysis above, it can be concluded that the project meets the additionality criteria in the aspect of environment, investment and technology. Sufficient evidence has been provided in the additionality analysis.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

The GHG emission reductions generated by the proposed project activity were calculated according to the approved methodology ACM0002.

The project activity generates GHG emission reductions mainly by substituting fossil fuel power plants with hydro power plants to generate a part of the electricity. The emission reduction ER_y during a given year *y* is calculated as follow:

$$ER_y = BE_y - PE_y - L_y \qquad (1)$$

Calculating method of necessary Project Emission (PE_y), emission from leakage (L_y) and baseline emission (BE_y) for derterming emission reductions (ER_y) will be instructed as following.

Step1: Estimate the Emission of All Kinds of Greenhouse Gas in the Project activity (PE_y)

According to the consolidated baseline and monitoring methodology ACM0002 and "Thresholds and criteria for the eligibility of hydroelectric power plants with reservoirs as CDM project activities(EB23, Annex5, http://cdm.unfccc.int/EB/Meetings/023/eb23_repan5.pdf)", for the uncertainty on science, electric power density (W/m^2, electric power density = installed capacity/ area of the reservoir) is required to decide whether the hydropower project is consistent with the requirement of the CDM project.

According to the feasibility study report, the project's reservoir area is 15.05 million m^2, and the electric power density is about 4.78W/m^2, which is above the requirement of 4W/m^2 and below 10 W/m^2. On the basis of applying the current methodology, the emission of GHG generated by the project needs to be considered, as the emission factor is $EF_{PJy}=0.09tCO2e/MWh$.

Therefore, the GHG emission induced by the proposed project could be calculated according to the following formula:

$$PE_y = EG_y \times EF_{PJ,y} \quad (2)$$

Step2: Estimate the Leakage

According to ACM0002, leakage is not considered in the project in temporary, i.e. $L_y = 0$.

Step3: Estimate the Baseline Emission (*BE_y*)

According to the consolidated baseline and monitoring methodology ACM0002 for grid-connected electricity generation from renewable energy, the baseline emission of the proposed project (BE_y) could be calculated by the following formula:

$$BE_y = EG_y \times EF_y \quad (3)$$

Where BE_y is the GHG emission generated by substitution electric power from China Southern power grid in the absence of the proposed project activity. EF_y is the emission factor of China Southern power grid. The detailed calculation process sees step4.

Step4: Determine Baseline Emission Factor (EF_y)

According to ACM0002, The detailed steps on calculating Baseline Emission Factor (EF_y) are enumerated as following:

This PDD refers to the Operating Margin (OM) Emission Factor and the Build Margin (BM) Factor published by the Chinese DNA on Dec.15th 2006. We will refer to these emission factors as the "published emission factors".

Substep1. Calculation of the Operation Margin Emission Factor ($EF_{OM,y}$)

Methodology ACM0002 provides the following four options to calculate Operation Margin Emission Factor ($EF_{OM,y}$):

(a) The Simple Operation Margin Emission Factor (S-OM);

(b) The Simple Adjusted Operation Margin Emission Factor;

(c) Dispatch data analysis Operation Margin Emission Factor;

(d) The average Operation Margin Emission Factor.

Where the option (a) —— The Simple OM method (a) can only be used where low-operating cost/must run power plants constitute less than 50% of total grid generation. Typical low cost/must run power plants usually comprise of power generation by water energy, terrestrial heat, wind energy, low-operating cost biomass energy, nuclear power and solar energy. According to the historical generating capacity data of China Southern Power Grid in last 5 years, power generation from hydropower and other renewable energy accounted for the proportion far less than 50%(according to China Electric Power Yearbook, average proportion of 2000-2004 is 33%), so it meets the condition that the proportion of generation from low-operating cost/must run power plants is less than 50% of the total grid generation. Therefore, the option (a) of Simple Operation Margin Emission Factor could be employed on calculating the project's Operation Margin Emission ($EF_{OM,y}$).

Option(b)——the option of Simple Adjusted Operation Margin Emission Factor will require the power grid to provide annual Load Duration Curve. However, Chinese electric power industry is experiencing the reforming period of "separating power grids from power plants", and most power grids and power plants take their specific dispatching data and the fuel consumption data as business secrets, so they won't release these kinds of data in public. Under most conditions, it is difficult to take the option (b) to calculate OM. With the same reason, the project also could not gain the detailed dispatching data from China Southern Power Grid. Therefore, option (b) is inaccessible.

Option (c)——Calculation of OM from grid dispatch data analysis can give the most reliable estimation of emission reduction since this method counted in the actual portion of the grid generation which will be substituted by output of the proposed project. However this option requires detailed running dispatch data of the connected-grid power plants. For the same reason with option (b), the project couldn't gain the complete dispatching data from China Southern Power Grid. Therefore, the option (c) is inaccessible.

Option (d) —— the option of average OM is suitable for low cost/must run power plant surpass 50% of the power generation of the grid, and the detailed data to apply option (b) is unavailable, and the detailed data of option (c) is unavailable. However, within the 5 years' power generation of China Southern Power Grid, the proportion of thermal power is far beyond 50%, so the project doesn't meet the condition of low cost/must run power plant must surpass 50%, and option (d) can't be applied.

According to the above analysis, option (a)—the option of Simple Operation Margin Emission Factor is the only appropriate option to calculate the Operation Margin Emission Factor. Therefore, the project will take option (a) to calculate the Operation Margin Emission Factor.

According to the description of ACM0002, The Simple OM emission factor ($EF_{OM,\ simple,\ y}$)is calculated as the generation-weighted average emissions per electricity unit (tCO_2e/MWh) of all generating sources serving the system, not including low-operating cost and must-run power plants. The calculating formula of $EF_{OM\ simple\ y}$ is shown in formula (4):

$$EF_{OM,simple,y} = \frac{\sum_{i,j} F_{i,j,y} \cdot COEF_{i,j,y}}{\sum_{j} GEN_{j,y}} \qquad (4)$$

Where $F_{i\ j,\ y}$ is the amount of fuel i (in a mass or volume unit) consumed by power plant sample j in year(s) y, j refers to the power sources delivering electricity to the grid, not including low-operating cost and must run power plants, and including imports to the grid;

$COEF_{i,j\ y}$ is the CO_2 emission coefficient of fuel i (tCO_2 /mass or volume unit of the fuel), taking into account the carbon content of the fuels used by power plant sample j and the percent oxidation of the fuel in year(s) y, and

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

According to the Formula (5), CO_2 emission coefficient $COEF_i$ is obtained as:

$$COEF_i = NCV_i \cdot EF_{CO_2,i} \cdot OXID_i \tag{5}$$

Where:

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

$OXID_i$ is the oxidation factor of the fuel (see the 2006 Revised IPCC Guidelines for default values);

$EF_{CO2 \cdot i}$ is the CO2 emission factor per unit of energy of the fuel *i* (tCO_2/TJ).

Based on calculation from DNA, the OM Emission Factor of China Southern Power Grid under the current power generation structure could be obtained as 0.9853 tCO_2/MWh.

Substep2. Calculation of the Build Margin Emission Factor ($EF_{BM,y}$)

According to the methodology ACM0002, Formula (6) is adopted to calculate baseline Build Margin Emission Factor.

$$EF_{BM,y} = \frac{\sum_{i,m} F_{i,m,y} \cdot COEF_{i,m,y}}{\sum_{m} GEN_{m,y}} \tag{6}$$

Where $F_{i,m,y}$ is the amount of fuel *i* (in a mass or volume unit) consumed by power plant sample *m* in year(s) *y*, *m* refers to the power sources delivering electricity to the grid, not including low-operating cost and must run power plants, and including imports to the grid;

$COEF_{i,m,y}$ is the CO_2 emission coefficient of fuel *i* (tCO_2/mass or volume unit of the fuel), taking into account the carbon content of the fuels used by power plant sample *m* and the percent oxidation of the fuel in year(s) *y*, and

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

Project participants shall choose between one of the following two options to calculate Build Margin Emission Factor ($EF_{BM,y}$):

Option 1: Calculate the Build Margin emission factor $EF_{BM,y}$ *ex-ante* based on the most recent information available on plants already built for sample group *m* at the time of PDD submission. The sample group *m* consists of either the five power plants that have been built in most recent, or the power plant capacity additions in the electricity system that comprise 20% of the system generation (in MWh) and that have been built most recently. Project participants should use from these two options that sample group that comprises the larger annual generation.

Option2. For the first crediting period, the Build Margin emission factor $EF_{BM,y}$ must be updated annually *ex-post* for the year in which actual project generation and associated emissions reductions occur. For subsequent crediting periods, $EF_{BM,y}$ should be calculated *ex-ante*, as described in option 1 above. Sample groups' choice is similar to the *Option 1*.

The proposed project chooses the *Option 1,* i.e. calculating the Build Margin emission factor $EF_{BM,,y}$ *ex-ante*. However, under the current circumstance of China, the power plants take the Build Margin data as important business data and won't let them published. Therefore, it is difficult to get the data of five power plants that have been put into operation most recently or the newly built power plant capacity additions in the electricity system that comprise 20% of the system generation. In allusion to the situation, CDM EB approves the following methodology deviation[5]:

(1) Estimating power grid's Build Margin Emission Factor according to the new increasing capacity in the past 1~3 years;

(2) Substituting installed capacity with annual power generation to estimating weighted, and suggesting to take the most advanced commercial technology efficiency level of provincial/ regional/ national power grid as a kind of conservative approximation.

The sample *m* of the proposed project according to the newly increased installed capacity of China Southern Power Grid of recent 1-3 years. Back to the year 2002, the accumulated newly increased installed capacity occupy 20.97% of the total installed capacity, which is the nearest to the 20% in the recent 1-3 years.

Because current statistics data can't separate coal, oil and gas fueled power, 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 business best technology, calculated the fueled power emission factor of the grid; last multiply the fuelled power emission factor and fuelled power proportion of the total power, it's the BM of the grid. Particular step and formula as follow:

1: Calculate the proportion of the CO_2 emission from coal, oil and gas fuelled power in total emission

$$\lambda_{Coal} = \frac{\sum_{i \in COAL,j} F_{i,j,y} \times COEF_{i,j}}{\sum_{i,j} F_{i,j,y} \times COEF_{i,j}} \qquad (7)$$

$$\lambda_{Oil} = \frac{\sum_{i \in OIL,j} F_{i,j,y} \times COEF_{i,j}}{\sum_{i,j} F_{i,j,y} \times COEF_{i,j}} \qquad (8)$$

$$\lambda_{Gas} = \frac{\sum_{i \in GAS,j} F_{i,j,y} \times COEF_{i,j}}{\sum_{i,j} F_{i,j,y} \times COEF_{i,j}} \qquad (9)$$

$F_{i,j,y}$ is the consumption of fuel i in number j province y year（tce）；

[5] 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

$COEF_{i,j}$ is emission factor of fuel i（tCO_2/tce），considering the carbon content and oxidation rate in y year;

COAL、OIL and GAS are feet of coal, oil and gas fuel.

2:: Calculate the emission factor of fueled power

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

$EF_{Coal,Adv}$、$EF_{Oil,Adv}$ and $EF_{Gas,Adv}$ are emission factors of the business best efficiency of fueled coal, fueled oil and fueled gas power.

3: Calculate the BM of the Grid

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

CAP_{Total} is the new added capacity, $CAP_{Thermal}$ is the new added fueled power capacity.

Based on calculation from DNA, the Build Margin Emission Factor ($EF_{BM,y}$) of China Southern Power Grid could be obtained to be: 0.5714 t CO_2/MWh.

Substep3. Calculate the Baseline Emission Factor (*EFy*)

According to methodology ACM0002, the Baseline Emission Factor (*EFy*) was calculated as a combined margin (CM), consisting of the weighted average of both the resulting OM and the resulting BM as following:

$$EF_y = \omega_{OM} \cdot EF_{OM,y} + \omega_{BM} \cdot EF_{BM,y} \quad (12)$$

Where the weights ω_{OM} and ω_{NM}, by default, are 0.5, i.e. the weights of Operation Margin Emission Factor and Build Margin Emission Factor are equal.

According to the formula, the Baseline Emission Factor is obtained to be:

$$EF_{CM,y} = 0.5 \times 0.9853 + 0.5 \times 0.5714 = 0.77835 tCO_2 / MWh$$.

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

The data and parameter used in the baseline calculation.

Data / Parameter:	1.EF_{OM}
Data unit:	tCO_2/MWh

Description:	Operation Marginal Emission Factor
Source of data used:	from DNA
Value applied:	0.9853
Justification of the choice of data or description of measurement methods and procedures actually applied :	Make the ex ante estimation according to the 3 years' average data
Any comment:	Quote from DNA data

Data / Parameter:	2.EF_{BM}
Data unit:	tCO_2/MWh
Description:	Build Marginal Emission Factor
Source of data used:	Calculation
Value applied:	from DNA
Justification of the choice of data or description of measurement methods and procedures actually applied :	Make the ex ante estimation according to the weighted emission factor of 20% recently constructed power plants
Any comment:	Quote from DNA data

Data / Parameter:	3. $EF_{CO2,\ i}$
Data unit:	tc/TJ
Description:	Emission Factor of fuel i
Source of data used:	IPCC
Value applied:	See annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	Quote from DNA data
Any comment:	Update according to DNA data

Data / Parameter:	4. $OXID_i$
Data unit:	%
Description:	Carbon Oxygenation Rate of fuel i
Source of data used:	IPCC
Value applied:	See annex 3
Justification of the choice of data or description of	Quote from DNA data

measurement methods and procedures actually applied :	
Any comment:	Update according to DNA data

Data / Parameter:	5.NCV_i
Data unit:	MJ/t,km^3
Description:	Net Caloric Value of fuel i
Source of data used:	Statistical year book of Energy, China
Value applied:	See annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	Quote from DNA data
Any comment:	Update according to DNA data

B.6.3 Ex-ante calculation of emission reductions:

The PDD apply ex-ante calculation of emission reductions.

According to B.6.1, the emission reduction of the project activity in the proposed year y is the difference between the baseline emission and the project emission and emission from leakage. The calculation formula is as following:

$$ER_y = BE_y - PE_y - L_y\ .$$

According to B6.1, under the condition of neglecting the leakage during the construction period, the emission from leakage within the project boundary (L_y) is zero. Therefore, the emission reduction of the proposed project is the difference between baseline emission (BE_y) and project activity emission (PE_y), i.e.:

$$ER_y = BE_y - PE_y = EG_y \times EF_y - EG_y \times EF_{PJ,y}$$

According to primary designed report, the annual power generation of the proposed project is estimated to be 288.40GWh.

According to baseline an monitoring methodology ACM0002, GHG emission factor within the boundary of the proposed project is 0.09tCO_2e/MWh. According to the formula in the part of B.6.1, GHG emission from the proposed project activity (PE_y) is estimated to be 25,956 tCO_2e.

According to the calculation of the marginal baseline emission factor in the part of B.6.1, the baseline emission factor of the power grid in 2005 is 0.77835 tCO_2e/MWh. According to the formula in the part of B.6.1, the annual baseline emission of the proposed project (BE_y) is estimated to be 224,476tCO_2e.

Therefore, the ex-ante estimation of the project's annual emission reductions is 198,520tCO_2e.

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

>>

The estimation of net emission reduction induced by the project activity's in the first 7 years' crediting period is 1,341,336 tCO_2e.

Year	Estimation of baseline emissions (tCO_2e)	Estimation of the project activity emissions (tCO_2e)	Estimation of leakage (tCO_2e)	Estimation of emission reductions (tCO_2e)
2007.10.1	41,506	9,599	0	36,706
2008	184,469	21,330	0	163,139
2009	224,476	25,956	0	198,520
2010	224,476	25,956	0	198,520
2011	224,476	25,956	0	198,520
2012	224,476	25,956	0	198,520
2013	224,476	25,956	0	198,520
2014.9.30	168,357	12,978	0	148,890
Total emission reductions (tCO_2e)	**1,502,099**	**173,687**	**0**	**1,341,336**

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

B.7.1 Data and parameters monitored:

Data / Parameter:	EG_y
Data unit:	MWh
Description:	Power generation delivered to grid
Source of data to be used:	Ammeter
Value of data applied for the purpose of calculating expected emission reductions in section B.5	first year is 237.0*1000 and subsequent years is 288.40*1000
Description of measurement methods and procedures to be applied:	Measured by ammeter
QA/QC procedures to be applied:	The readings of ammeter; rechecking with the electric power sale invoice of the power grid in which the project connects.
Any comment:	Rechecking the data on the purchasing party

Data / Parameter:	2.EG_{in}
Data unit:	MWh
Description:	Purchase from grid
Source of data to be used:	Ammeter

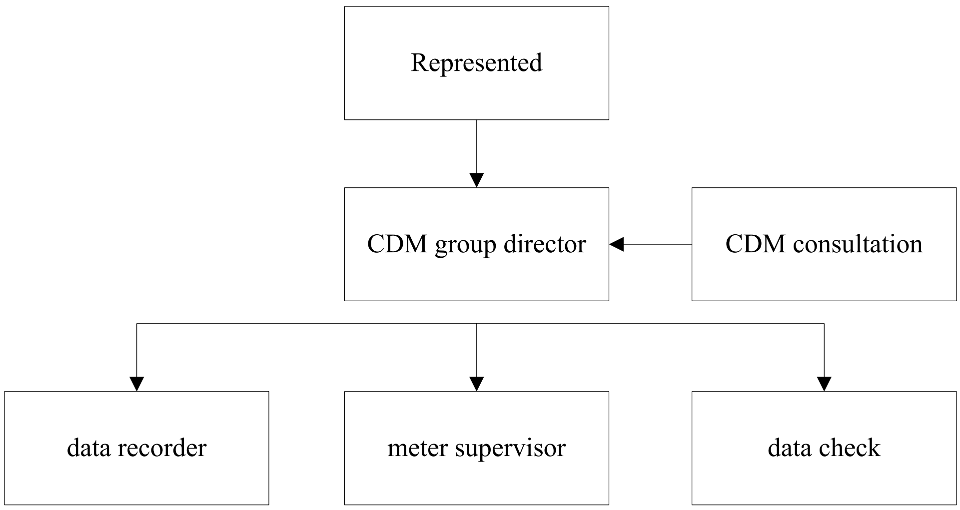
Value of data applied for the purpose of calculating expected emission reductions in section B.5	0
Description of measurement methods and procedures to be applied:	Measured by ammeter
QA/QC procedures to be applied:	The readings of ammeter
Any comment:	Recording ammeter data

B.7.2 Description of the monitoring plan:

The monitoring plan will be responsibly implemented by the project owner, it will ensure the emission reduction of the project during crediting period.

1. Monitoring organization

The project owner will set up a special CDM group to take charge data collection, supervision, verification and recordation. The group director will be trained and supported in technology by CDM consultation, the organization of the monitor group as follows:



2. Monitoring data

Because the baseline emission factor is ex-ante calculated, monitoring data is only net electricity connected to grid of the project.

3. Monitoring equipment and installation

Power measure equipment installation should be collocated according "Technique Management Regulation of Power Measure Equipment" (DL/T448-2000, issued by State Economic and Trade Commission on Nov.03, 2000 and implemented on Jan.1, 2001). Before the power measure equipment operation, the project owner and power grid company should check and accept according "Technique Management Regulation of Power Measure Equipment" (DL/T448-2000).

Three ammeters should be installed for the project. One ammeter will be installed at the export of the project transformer substation (check ammeter) to measure export electricity of the project; the other ammeter will be installed at the import of the power grid transformer substation (measure ammeter) to measure net electricity connected to grid of the project. The electricity connected to grid should be measured according to data from measure ammeter. When measure ammeter has some mistake, then data from check ammeter can be referenced. The third ammeter will be installed at the import of the transformer substation to measure import purchasing electricity from grid. The net electricity connected to grid is equal to the electricity connected to grid less electricity import from the grid.

4. Data collection

The steps of monitoring electricity connected to grid as follows:

(1) The project owner and power grid company should read data from check ammeter and measure ammeter at the end of every month, and check data from two ammeters;

(2) The power grid company will offer really electricity connected to grid and offer purchase invoice;

(3) The project owner should record net electricity connected to grid of the project (electricity connected to grid detract purchase electricity);

(4) The project owner should offer reading record of measure ammeter and invoice copy piece to verification people of DOE.

If the measure error of any ammeter exceeds the acceptable error range at any month or if any ammeter can't function normally, net electricity supplied to facility should be confirmed as follow:

(1) Firstly, reading data from check ammeter, calculating electricity connected to grid of the project according to historical line lose rate, except any one think that check ammeter is not precision after check;

(2) If check ammeter has not accepted precision or operation is not criterion, the project owner and power grid company should design a reasonable conservative method to estimate reading together, and explain that it's reasonable and conservative at verification of DOE.

(3) If the project owner and power grid company can't compass consistent idea about the method to estimate reading, it should be arbitrated according to conventional process to confirm consistency of reading estimated.

5. QC

The project owner should sign a agreement with power grid company that regulated quality control process of measure and adjust to ensure measure precision. Seasonal ammeter inspection and locale check should be implemented according to standard and regulations of state electric power industry. After inspection and locale check, ammeters must be sealed. The project owner and power grid company should inspect and seal together, any one can't remove seal or modify the ammeter when other one (or its representative) is absent.

All of installed ammeters should be tested by measure inspection institution entrusted by the project owner and power grid company together, after 10 days of some things happened as follows:

(1) Measure error of measure ammeter and check ammeter is big than accepted error;

(2) Ammeter has been repaired as parts trouble of ammeter.

6. Data management

The CDM group appointed by the project owner should keep monitoring data in the electronic archives at every month end, electronic document should be copy by CD and printed to save as letter document. The project owner should keep electricity sell/purchase invoice. Letter documents, as map, form, EIA report etc, should use with monitoring plan to check authenticity of data. In order to expediently obtain involved document and information of the project by verification people, the project owner should offer index of project document and monitoring report. All of the letter data and information should be kept in the archives by CDM group, all of the document should have one copy backup. All of the data should be saved after 2 years of crediting period.

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

The study of the baseline and the monitoring methodology was completed on 15th Jan., 2007.

The key individuals involved in the baseline study include:

1. **Mr. Li Baoshan,** seasonlong@126.com, Beijing Zishenglong environment protection science & technology company, Tel: （8610）6202-2867.

2. **Mr. Li Wangfeng**, liwangfeng@tsinghua.org.cn, Urban Planning & Design Institute of Tsinghua University. Room 407, Block B, Xueyan Building, Tsinghua University, Beijing, Tel:(8610)62785857-703.

The above individuals or organizations are 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:

>>

Sept 30th, 2007

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

>>

50 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:

>>

Oct. 1st, 2007

C.2.1.2. Length of the first crediting period:

>>

7years

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 environmental impact assessment (EIA) report was approved by the Environmental Protection Bureau of Guangxi Zhuang Autonomous Region in December, 2001 (Document No. GuiHuanGuanZi[2001]180).

The environmental impacts induced in the construction phase and the operation phases of the proposed project are analyzed respectively as following:

Construction Phase

- **Ecologic effect**

The proposed project is located in the semi-tropical monsoon climate area. There exists abundant rain water, and the vegetation coverage rate around the reservoir reaches 80% or so. But the forest coverage rate is comparatively low, only 15.96%. There are few nationally protected critical animals and flora species in the proposed reservoir area.

The reservoir's construction will submerge or occupy the surrounding lands. It will damage the vegetation in the project area in some degree. However, according to the experiences of the completed reservoirs nearby, most of the species or vegetations submerged could be reflourished after the reservoir storing water. The construction work will make a little damage on vegetation. The various plants and animals in the area will not be affected.

◆ **Soil erosion**

For the digging and construction while constructing temporary roads and permanent roads, dumping sites construction and migration resettlement district construction, the project will change the former landscape, destroy the land and vegetation. At the same time, for the breakage of vegetation and top soil, stability and structure of the soil under the natural condition will be disturbed. The loosening soil leads to the debasement of anti-erosion capability and the increase of soil erosion. In addition to the severe natural condition, soil erosion is serious. In order to avoid increased soil loss from the project construction, appropriate and efficient prevention measures are taken. Engineering measure and biologic measure are combined to revive vegetation and natural sight, and to prevent soil loss.

◆ **Impact on the Quality of Surface Water**

Waste water discharged during the construction period mostly comes from construction process and daily life. The production waster water mainly comes from the process of the dam foundation digging, concrete production system and the assistant factories. Concrete production system discharges most of the waste water, with the character of containing a lot of suspended substances. Waste water from daily life mainly comes from everyday water use of the constructing workers.

The proposed project takes the approach of treating the produced waste water with the settling ponds and discharging it after reach the discharging standards. Waste water from daily life occupies a small proportion, and it is discharged after the treatment of cesspool. Therefore, during the construction period, the quality of surface water will be affected very little.

◆ **Air pollution**

Air pollution are mainly induced by SO_2 and NO_x, which are produced by running of mechanical facilities, material transportation, dust from digging or blasting, oil burning and coal firing. According to the forecast, the daily mean concentration of SO_2, NO_x and TSP will meet the third grade standard of *Ambient air quality standard* (GB 3095-1996), and will severely affect the ambient air quality.

Therefore, the constructing corporation should appropriately arrange the construction locations, progress and intensity. Necessary measures for mitigating dust, debasing dust and limiting exhaust gas emission will also be taken to reduce the emission of air pollutant as possible. The constructing corporation should choose machines and appliances in accordance with the national standard, reduce the exhaust emission and install additional air cleaners if the exhaust is not in line with the emission standard. Dust collectors will be installed at the workplace of drilling machine; blasting technique with little dust production will be utilized; wet operation method will be taken on drilling and blasting to decrease the dust quantity. During the construction period, workplace, rich-dust materials, dump sites and road will be watered to debase dust.

The project's impact on atmosphere will be limited within the construction period, and the impacts will be automatically eliminated after construction.

◆ **Noise**

During the period of construction, the noises mainly come from activities of tunnel digging, blasting, concrete processing, concrete moulding, running of air compressor and transportation etc.

The construction area of the project is far from the residential area, so the noise will affect a little on nearby residents. Noises induced by transport appliance during the period of dam building up will probably affect some residents in certain surrounding areas and the impact will be mitigated by installing noise controlling facilities or plants near the road. The noise in the construction area is comparatively loud. In order to mitigate the noises' impact, the construction corporation will utilize machines with as little noise as possible to meet the national standard, and protect workers' audition with corresponding measures.

The project's impact on sound environment is limited within the construction period, and the impacts will be automatically eliminated during the operation period.

- **Solid Waste**

Solid waste produced in the construction period mainly comes from construction waste and living waste of construction workers. All kinds of living waste will be collected in time and be buried after being burnt in appropriate area, so it will not affect much on surrounding environment. Dumping sites will be set up, and residue soil of the construction will be transported to dumping sites in time. The dumping site will be constructed in the concave and closed area, at the same time, the run-off pollution-proof in dumping sites during the construction period will also be cared. After the dumping sites have been eliminated, the area will be renovated and the vegetation will be recovered. Therefore, the solid waste produced during the construction period affects a little on environment.

Operation Phase

- **Impact on Aquatic animals and plants**

After the construction of the reservoir, on one hand, the upstream water speed will decrease, water area will expand, the water level in the reservoir area will be stable and the capacity will expand. Increase of organic matter, plankton and aquatic plant in the water body will provide a lot of natural food for wild fish and promote their living and reproducing condition; on the other hand, the dam will obstruct the backtrack to the upstream for some fish and some fields for laying eggs will be submerged, besides, some species adapted to live in the sault will disappear for the decreasing of water current speed. Therefore, the project will invest RMB1.5 million RMB Yuan on constructing fishery multiplication station in the reservoir area to maintain the varieties of aquatic animals and plants.

- **Impact on terrestrial animals and plants**

After the construction and the sluice of the reservoir, the area of the fields submerged around the reservoir will reach 63.3ha, with the flood lands of 55.4ha. Accompanied by the decrease of fields and woods, the population in the limited terrestrial areas will comparatively increase, which will consequently affect the terrestrial animal, amphibian aves and plants to some extent. However, in the context of the whole area the proposed project will not substantially affect the types, amount and composition structure of the wildlife in the reservoir area.

- **Impact on the Quality of Surface Water**

Since the environmental capacity of water body in the reservoir area is comparatively high, after the construction of the hydro power station even at the dry seasons, the pollutants into the reservoir won't deteriorate the water quality. Besides, because the flow of Youjiang River is comparatively large, water quality of downstream river won't be affected.

◆ **Migration Allocation**

For the project occupying farmland and flooded, 191 people are involved in the migration. The migrants will be mainly allocated in local place, developing fruit planting; livestock production; township village enterprise and tertiary industry. All of them have maintained their production and living.

In conclusion, environmental impacts arising from the proposed project are considered insignificant. The insignificant impacts on local environment and residents' living condition could be solved by sorts of protection 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:

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According to the report of environment impact assessment and the ratification of relative government departments, the project's environment impacts are not considered significant. No instruction is needed.

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 realize the opinion of local communities, the public opinion survey involving related government departments, local residents and research and design institutes was carried out

Local government departments and experts in related fields expressed their comments on the impacts of the proposed project on local environment, soil erosion and biological resources. Most of these comments showed positive attitude towards the proposed project considering that the power plants will utilize hydro power resource in an appropriate manner and is likely to accelerate local economy development greatly. Supporting ratifications have been provided and will be readily accessible to DOE.

Public opinion survey was carried out in August 2006, questionnaires were distributed and collected. The comments of local stakeholders based on the result of questionnaires are summarized below and will be readily accessible to DOE.

The questionnaire included the following contents:

1. Brief introduction of the proposed project (site location, installed capacity, total investment, etc.)

2. Basic information and education level of the investigatee

3. Questions on:

   1) How do you feel about your surrounding environment? (Satisfaction, dissatisfaction)

   2) How much familiarity do you have with the proposed hydro power project?

(Detailed know, some know, know nothing)

3) What is your attitude towards the existing hydro power in the area? (Support, oppose, neutral)

4) What are the positive impacts the Project will have on your livelihood?

(Economy develop, electricity fee reduce, income increase, employment chance increase, standard of living improve, other)

5) What are the negative impacts the Project will have on your livelihood?

(Noise, occupied land, vegetation and environment destroy; dehydration or water lack in certain reach, animal and plant decrease, migration not settled appropriately, other)

6) The significance of the perceived negative impacts (severe impacts, local impact which can be mitigated by environment protecting measures, almost no negative impact)

7) What are the measures that can be taken to mitigate the negative impacts?

8) Will the overall impact of the Project on your livelihood be positive, negative or negligible?

9) Do you support the Project? (Support, not support, don't care)

10) What other comments and suggestions do you have regarding the Project?

4 Signature and date

E.2. Summary of the comments received:

>>

Comments of local stakeholders on the proposed project are summarized as follows:

The survey had a 93% effective response rate (54questionnaires returned out of 54 and 50 effective questionnaires). The following is a summary of the key findings:

1) Male (92%), female (8%)

2) Age distribution of the respondents: <30 (6%), 30~40 (46%), 40~50 (34%), >50(14%)

3) Education level of the respondents: elementary level (24%), junior level (32%), senior level (40%), high level (4%)

4) 82% of the respondents are satisfied with their life condition and surrounding environment, other 18% are not satisfied.

5) Most respondents (84%) have some understanding of proposed hydro power project while 8% has thorough understanding and other 8% has never heard of the proposed project.

6) 60% of the respondents support the existing hydro stations in the area.

7) Most respondents agree that the proposed project will promote economy development (80%) and reduce electricity fee. Among other perceived positive impacts, “increase of income” (35.7%), “increase of job opportunities” (92.9%) and “improvement of living "(35.7%).

8) Many respondents (94%) take land occupying to be the most proponent negative impact. Among other perceived negative impacts, "vegetation and environment destroy"(36%), "noise"(12%), "migration problem"(8%), "reach dehydration"(4%), "animal and plant decrease"(2%).

9) Most respondents (64%) think the proposed project will have almost no negative impact, 32% of the respondents think the proposed project may have some local impacts but the impacts can be mitigated by environment protecting measures. Only little respondents consider the negative impacts severe.

10) 18% of the respondents deemed that the project will have overall positive impacts on their livelihoods, 70% have no opinion and 12% agree negative impacts.

11) 70% of the respondents supported the construction of the project, 11% have no opinion and only 1 respondent doesn't support the project activity

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

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Judging from collected comments of local stakeholders, local residents and government showed great support to the proposed project. Hence, it is not necessary to adjust the present design, construction plan and operation manner of the proposed project.

Report of Jinjitan Hydropower Station

- The land occupied by the project has been compensated according to state and local policies, for example “Regulations on the Implementation of Land Administration of the Guangxi Zhuang Autonomous Region”, “Standard of annual land production value and compensation for requisitioned land by important infrastructure project in Guangxi Zhuang Autonomous Region”, the influence that land occupying and emigration has been eliminated. The influence to propagation and eco-environment is seldom and relevant measures have been applied see also in section D of environmental impacts. The noise problem has been resolved by some measures and no impact during operation period. The reach dehydration is short and there will be branch collection before resident area, it can’t affect production and living of downriver residents.

- The proponent negative impact of the project is land occupying, emigration and eco-environment problems. According to the environmental impacts analysis, these problems can be solved commendably and will not have too much negative impact.

- Respondent opposed to the project think that there will be some negative impacts, According to above analysis, the negative impact is seldom and will not affect the usual production and living of local, instead of that, the project will bring many economic, society and environment benefits and therefore overall positive impacts.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

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Annex 2

INFORMATION REGARDING PUBLIC FUNDING

No official funds from any Annex 1 country are involved in the proposed project.

Annex 3

BASELINE INFORMATION

According to Annex 1-3 of "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 Dec. 15th, 2006.

Table A1-A3are the basic data of the China Southern Power Grid from 2002 to 2004, including installed capacities annual power generation and the Grid Average Electricity Supply Coal Consumption.

Table A1. Basic data of China Southern Power Grid in 2002

	Installed capacity(Ten Thousand kW)					Electricity Generation(GWh)					Factory consumption rate of fueled power%
	Hydro Power	Fuel-fired Power	Nuclear Power	Other	Total	Hydro Power	Fuel-fired Power	Nuclear Power	Other	Total	
Guangdong	777.5	2523.8	279.0	7.7	3588.0	16913.0	123081.0	20877.0	135.0	161006.0	5.58
Guangxi	436.3	315.6	0.0	0.0	752.0	18634.0	13069.0	0.0	0.0	31703.0	8.31
Yunnan	583.6	293.3	0.0	0.0	876.9	25062.0	15787.0	0.0	0.0	40849.0	7.9
Guizhou	242.6	464.3	0.0	0.0	706.9	9512.0	33231.0	0.0	0.0	42743.0	8.21
Undivided District	252.0	0.0	0.0	0.0	252.0	12972.0	0.0	0.0	0.0	12972	
Imported From Middle China Grid										0.0	
Subtotal	2292.1	3596.9	279.0	7.7	6175.7	83093.0	185168.0	20877.0	135.0	276301.0	

Table A2. Basic data of China Southern Power Grid in 2003

	Installed capacity(Ten Thousand kW)					Electricity Generation(GWh)					Factory consumption rate of fueled power%
	Hydro Power	Fuel-fired Power	Nuclear Power	Other	Total	Hydro Power	Fuel-fired Power	Nuclear Power	Other	Total	
Guangdong	810.7	2723.1	378.0	8.3	3920.2	17136.0	143351.0	28930.0	159.0	189576.0	4.99
Guangxi	452.5	319.0	0.0	0.0	771.5	31279.0	17079.0	0.0	0.0	48358.0	4.09
Yunnan	654.3	355.7	0.0	0.0	1010.0	26837.0	19055.0	0.0	0.0	45892.0	6.57
Guizhou	371.4	646.6	0.0	0.0	1018.0	8019.0	43295.0	0.0	0.0	51314.0	3.77
Undivided District	252.0	0.0	0.0	0.0	252.0	11991.0	0.0	0.0	0.0	11991	
Imported From Middle China Grid										11.1	
Subtotal	2540.9	4044.4	378.0	8.3	6971.7	95262.0	222780.0	28930.0	159.0	335151.1	

Table A3. Basic data of China Southern Power Grid in 2004

	Installed capacity(Ten Thousand kW)					Electricity Generation(GWh)					Factory consumption rate of fueled power%
	Hydro Power	Fuel-fired Power	Nuclear Power	Other	Total	Hydro Power	Fuel-fired Power	Nuclear Power	Other	Total	

Guangdong	858.5	3017.3	378.0	8.3	4262.1	14114.0	169389.0	28481.0	149.0	212133.0	5.42
Guangxi	504.0	437.8	0.0	0.0	941.9	17229.0	20143.0	0.0	0.0	38272.0	8.33
Yunnan	705.9	430.7	0.0	0.0	1136.6	29350.0	24322.0	0.0	0.0	53672.0	7.06
Guizhou	441.7	780.2	0.0	0.0	1221.9	13204.0	49720.0	0.0	0.0	62924.0	7.56
Undivided District	252.0	0.0	0.0	0.0	252.0	10176.0	0.0	0.0	0.0	10176	
Imported From Middle China Grid										10951.2	
Subtotal	2762.1	4666.0	378.0	8.3	7814.4	84073.0	263547.0	28481.0	149.0	377952.2	

Data source: China Electric Power Yearbook 2003-2005, revised 2006 IPCC Guidelines for National Greenhouse Gas Inventories.

Note: 1. Undivided district refers to Tianshengqiao first grade and second grade cascade hydropower station.

2. “Other” parts of the data are calculated as clear energy with zero emission, which is in line with the conservative principle.

TableA4. simple OM calculation sheet of China Southern Power Grid in 2002

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	Ten thousand ton	4121.06	711.35	1430.68	1144.39	**7407.48**	25.8	98	20908	143582063.7
Wash extractive coal						**0**	25.8	98	26344	0
Other wash coal				35.26	13.58	**48.84**	25.8	98	8363	378664.8
Coke					6.44	**6.44**	29.5	98	28435	194114. 8
Coke oven gas	Hundred million m^3					**0**	13	99.5	16726	0
Other coal gas		0.63				**0.63**	13	99.5	5227	15618.2
Crude oil	Ten thousand ton	5.8				**5.8**	20	99	41816	176078.8
Gasoline		0.01				**0.01**	18.9	99	43070	295.5
Diesel oil		73.07	0.67		0.5	**74.24**	20.2	99	42652	2321856.4
Fuel oil		701.41	0.2			**701.61**	21.1	99	41816	22471255.5
LPG		0.09				**0.09**	17.2	99.5	50179	2833.9
Refine dry gas		1.42				**1.42**	18.2	99.5	46055	43424.1
Nature gas	Hundred million m^3					**0**	15.3	99.5	38931	0
Other oil production	Ten thousand ton	7.91				**7.91**	20	99	38369	220340.1
Other coke production						**0**	25.8	98	28435	0
Other energy	Ten thousand tce	79.28				**79.28**	0	0	0	0

									subtotal	169406545.9

TableA5. simple OM calculation sheet of China Southern Power Grid in 2003

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,km³）**	**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	Ten thousand ton	4491.79	831.84	2169.11	1405.27	**8898.01**	25.8	98	20908	172473586
Wash extractive coal		0.05				**0.05**	25.8	98	26344	1221.1
Other wash coal				36.38	20.37	**56.75**	25.8	98	8363	439992.4
Coke					0.5	**0.5**	29.5	98	28435	15071.0
Coke oven gas	Hundred million m³				0.04	**0.04**	13	99.5	16726	3173.1
Other coal gas		3.21			11.27	**14.48**	13	99.5	5227	358970.6
Crude oil	Ten thousand ton	6.85				**6.85**	20	99	41816	207955.1
Gasoline		0.02				**0.02**	18.9	99	43070	591.0
Diesel oil		31.9			0.76	**32.66**	20.2	99	42652	1021441.7
Fuel oil		627.22	0.3			**627.52**	21.1	99	41816	20098291.4
LPG						**0**	17.2	99.5	50179	0
Refine dry gas		2.85				**2.85**	18.2	99.5	46055	87154.0
Nature gas	Hundred million m³					**0**	15.3	99.5	38931	0
Other oil production	Ten thousand ton	11.35				**11.35**	20	99	38369	316164.4
Other coke production						**0**	25.8	98	28435	0
Other energy	Ten thousand	93.21			22.35	**115.56**	0	0	0	0

	tce									
									subtotal	195023612

TableA6. simple OM calculation sheet of China Southern Power Grid in 2004

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	Ten thousand ton	6017.7	1305	2643.9	1751.28	**11717.88**	25.8	98	20908	227132222.1
Wash extractive coal		0.21				**0.21**	25.8	98	26344	5128.8
Other wash coal						**0**	25.8	98	8363	0
Coke						**0**	29.5	98	28435	0
Coke oven gas	Hundred million m^3					**0**	13	99.5	16726	0
Other coal gas		2.58				**2.58**	13	99.5	5227	63960.2
Crude oil	Ten thousand ton	16.89				**16.89**	20	99	41816	512753.6
Gasoline						**0**	18.9	99	43070	0
Diesel oil		48.88			1.83	**50.71**	20.2	99	42652	1585955.5
Fuel oil		957.71				**957.71**	21.1	99	41816	30673659.3
LPG						**0**	17.2	99.5	50179	0
Refine dry gas		2.86				**2.86**	18.2	99.5	46055	87459.8
Natural gas	Hundred million m^3	0.48				**0.48**	15.3	99.5	38931	104309.2
Other oil production	Ten thousand ton	1.66				**1.66**	20	99	38369	46240.8
Other coke production						**0**	25.8	98	28435	0
Other energy	Ten	79.42				**79.42**	0	0	0	0

	thousand tce									
									subtotal	260211689.5

Data source:《2000~2002 China Energy statistics yearbook》，《2004 China Energy statistics yearbook》，《2005 China Energy statistics yearbook》

TableA7. business best efficiency of all kinds of fuel-fired power

	variable	Efficiency of power supply	Emission factor of fuel （tc/TJ）	Oxidation rate	Emission factor （tCO2/MWh）
		A	B	C	D=3.6/A/1000*B*C*44/12
Coal	$EF_{Coal,Adv}$	36.53％	25.8	0.98	0.9136
Gas	$EF_{Gas,Adv}$	45.87％	15.3	0.995	0.4381
oil	$EF_{Oil,Adv}$	45.87％	21.1	0.99	0.6011

TableA8. Calculation of BM and CM emission factor of China Southern Power Grid

	Change of installed capacity (MW)	Emission factor of fuel-fired power (tCO_2e/MWh)	BM (tCO_2e/MWh)	CM=(OM+BM)/2 (tCO_2e/MWh)
Fuel-fired power	1069. 1	0.8543	0. 5714	0. 77835
Hydro power	470. 0			
Nuclear Power	99			
Other	0. 66			
Total	1638. 7			

Data resource/ Calculation formula:

Change of installed capacity: this is the difference between 2002 and 2004;

Combined emission factor = (OM+BM)/2 (The default values of ω_{OM} and ω_{BM} are 0.5).

Annex 4

MONITORING INFORMATION

The monitoring plan and information, please see B.7.2.