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 : Song Ba Hydroelectric Power Plant
Version : 01
Date : 11/08/2006

A.2. Description of the project activity:

>> The proposed project activity comprises a run-of-the-river small hydroelectric plant (SHP) on the Ge Ji He river in the Xianggelila County, Yunnan Province. The installation will have a capacity of 26 MW. The main purpose of the project is to generate electricity using the hydro potential available in the river. The power station will be connected to the county's power grid, which in turn is connected to the Yunnan Provincial Grid and to the South China Power Grid. The development of the project would reduce, among other benefits, the greenhouse gas emissions produced by the grid mix, which is dominated by thermal power plants. The project is planned to be commissioned end of 2008.

The proposed project is expected to have several positive impacts for sustainable development. Some of the socio-economic benefits that are expected are:

a) Employment in the region and especially for local people during construction of the power plant. More than 200 jobs are expected to be created for a period of 24 months;
b) Permanent employment during the operation of the project. A hydro power plant of 26 MW size is expected to create permanent employment for over 22 skilled people and an equal number of unskilled persons;
c) Rural infrastructure development such as creation of roads and other facilities due to the construction;
d) Meeting the power demands of the region and outside the region through sustainable electricity generation;
e) Conservation of depleting fossil fuels such as coal, oil, natural gas, currently predominantly used for power generation;
f) Reduction of greenhouse gases and air pollutants (especially NOx, SO_2, particulates) from combustion of fossil fuels.

A.3. Project participants:

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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 participate (Yes/No)
People's Republic of China (host)	Xianggelila Xian Ge Ji He Liu Yu Hydroelectric Development Ltd	No
Italy	EcoEnergia s.r.l.	No

Full contact details of 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):

>>
China, People's Republic

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

>>
Yunnan province, Diqing prefecture

A.4.1.3. City/Town/Community etc:

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Dong Ba Village, Xianggelila Xian county.

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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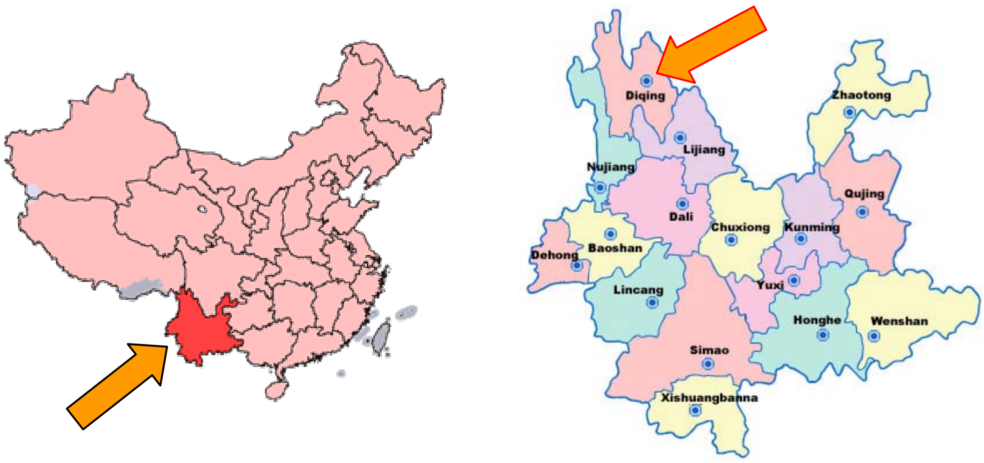
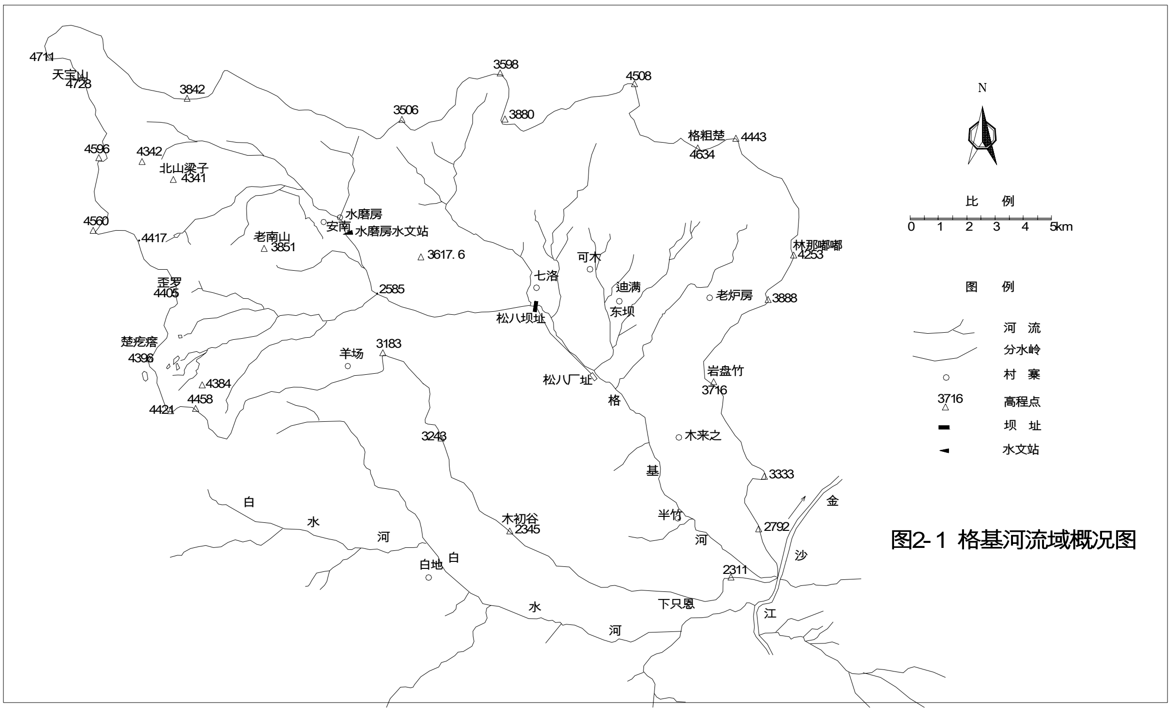
The proposed project is located in Yunnan Province, in the South West of China. The power plant location is in the Diqing prefecture, Xiang Ge li la county, in the North of the Yunnan province, approximately 700 km from the provincial capital, Kunming. The project intends to exploit the water drop of the Ge Ji He River near the village of Dong Ba. The Ge Ji river is a branch of Jing Sha River and it is located 99°56'-100°49' East and 27°17'-27°43' North with a total length of 32 km and a catchments area of 306 km^2.

The location of the project is indicated in the maps below.



Map 1. China, People's Republic, the Yunnan Province and the Diqing Prefecture



Map 2. Dong Ba village

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

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The project activity is a large-scale potential CDM project that fits under the Category 1: Energy Industries (renewable - / non-renewable sources) as per 'List of Sectoral Scopes', Version 04.

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

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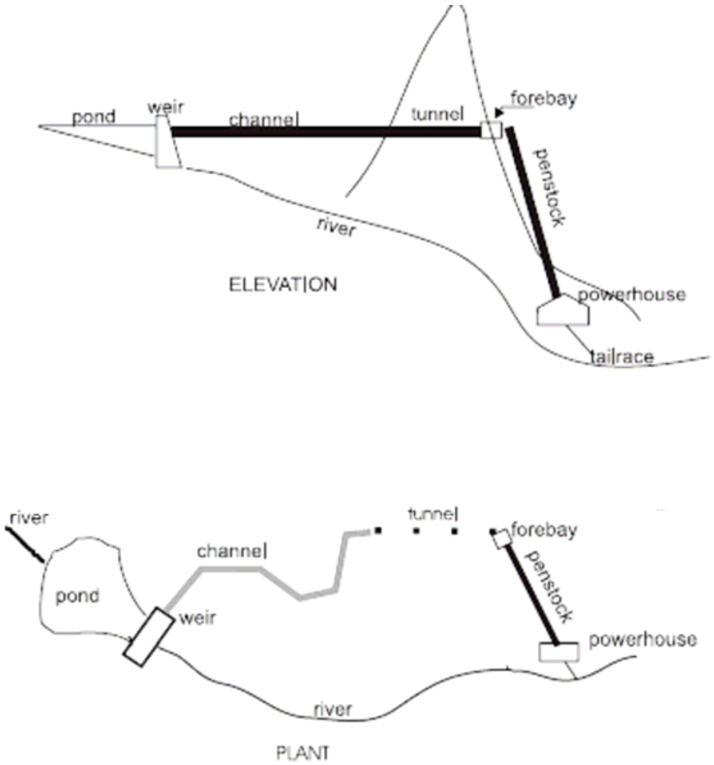
The proposed project is a run-of-river and deep valley hydropower plant without regulating capacity. It consists of an intake structure, a pipeline and a powerhouse. The intake structure is a small weir situated high up in the river catchment area where a portion of the river flow is channelled into a pipeline that leads down the hillside. The pipeline carries the water down from the intake to the powerhouse. The powerhouse contains two Pelton turbines, a generator (26MW) and a transformer. The two Pelton type turbines to be installed exploit a height drop of 336 meters. Once the water has passed through the turbines, it is returned to the river from which it was taken. The maximum height of the dam is less than 9 meters. A schematic view of the run-of-river and deep-valley type of power plant is shown in figure 1.

The installed capacity is 26MW, and the potential gross output per year in the long-term should be in average 130 GWh. The projected net generation available for sale to the grid is 112 GWh, where the difference is due to scheduled and unscheduled plant outage, and losses before feed-in into the grid.



Vertical

Horizontal

Figure 1. Schematic vertical and horizontal views of the project

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

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The crediting period selected is a single span of ten years. The estimated amount of emission reductions, the project is expected to generate is 83.500 tCO_2 per year over the crediting period.

Table 1. Emission reductions during the crediting period

Years	**Annual estimation of emission reductions in tons of CO_2 e**
2009	83.500
2010	83.500
2011	83.500
2012	83.500
2013	83.500
2014	83.500
2015	83.500
Total Emission reductions (tons of CO_2e)	584.500
Total number of crediting years	7
Annual average over the crediting period of estimated reductions (tons of CO_2 e)	584.500

A.4.5. Public funding of the project activity:

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There is no public funding involved in the project.

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:

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The project activity follows the following methodology: "Consolidated Baseline Methodology for grid connected electricity generation from renewable sources"(ACM0002 Version 06, 19 May 2006)

In line with the application of the methodology the project draws on element of the following tools and methodologies:
Version 02 of the Tool for the demonstration and assessment of additionality

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

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As specified in ACM0002, it is applicable to grid-connected renewable power generation project activities under the following conditions:

- Applies to electricity capacity additions from run-of-the river hydro power plants; hydro power projects with existing reservoirs where the volume of the reservoir is not increased
- This methodology is not applicable to project activities that involve switching from fossil fuels to renewable energy at the site of the project activity, since in this case the baseline may be the continued use of fossil fuels at the site;
- The geographic and system boundaries for the relevant electricity grid can be clearly identified and information on the characteristics of the grid is available.

The proposed project is a run-of-river hydroelectric power schemes and does not include the creation of a dam or reservoir upstream of the project locations. The geographic and system boundaries for the South China Power Grid can be clearly identified and information on the characteristics of the grid is available.

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

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The consolidated methodology ACM0002 defines the spatial extent of the project boundary to *include project site and all power plants connected physically to the electricity system that the CDM project power plant is connected to*. For the purpose of build margin and operating margin emission factors it defines the Project electricity system to include power plants that can be dispatched without significant transmission constraints.

The electricity system in China is divided into large power networks: Northeast, Northwest, North, East, Central, South and three independent provincial (regional) power grids. This project is connected to the Southern regional grid which is one of the regional power grids with the largest installed capacity in China. It covers Guangdong, Guangxi, Yunnan, Guizhou and Hainan, linking with Hong Kong and Macao. Hainan, though administered by the China Southern Grid Company, is not connected to the other provinces. The power flow within the South China Power Grid takes place without any transmission constraints. The load dispatch centre of the South China Power Grid controls power flows in that region. Therefore, the project boundary[1], or project electricity system, for this project includes the Southern regional grid without the Hainan grid. In the text we will use the acronym SCPG to indicate it. In the calculation of emission reduction, the only greenhouse gas included is CO_2.

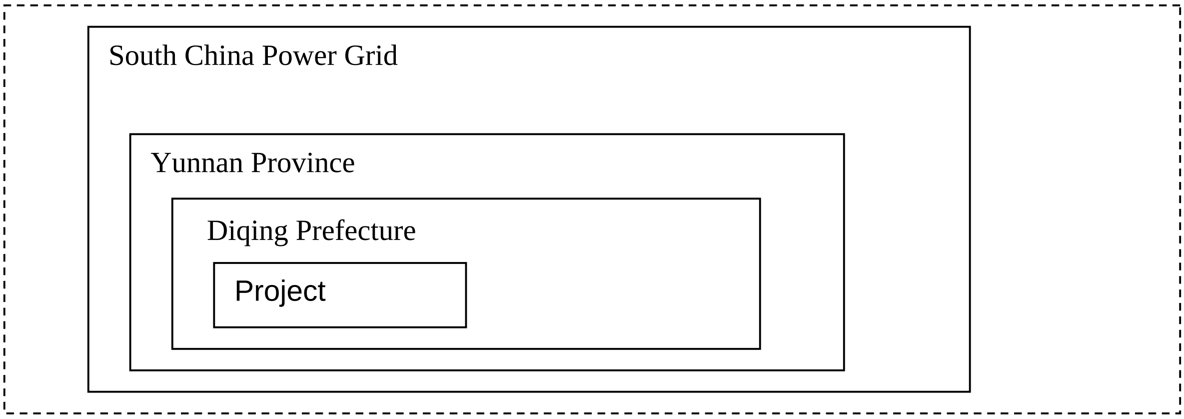

Figure 2. Schematic view of the Project Boundary

	Source	Gas	Included ?	Justification / Explanation
Baseline	Electricity generation from the project electricity system	CO_2	Yes	Main source of emissions
		CH_4	No	Small source and not required by the methodology
		N_2O	No	Small source and not required by the methodology
Project Activity		CO_2	Yes	Zero emissions
		CH_4	No	Zero emissions and anyway not required by the methodology
		N_2O	No	Zero emissions and anyway not required by the methodology

[1] The chosen Project boundary is consistent with p.3 of the Methodology: "In large countries with layered dispatch systems (e.g. state/provincial/ regional/national) the regional grid definition should be used. A state/provincial grid definition may indeed in many cases be too narrow given significant electricity trade among states/provinces that might be affected, directly or indirectly, by a CDM project activity."

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

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According to methodology ACM0002, for project activities that do not modify or retrofit an existing electricity generation facility, the baseline scenario is the increased generation of grid-connected power plants and the addition of new generation sources[2]. as reflected in the combined margin (CM) calculations.
Without the proposed project, an equivalent amount of electricity would be produced by other power stations. Currently, more than 80 percent of electricity is produced with thermal plants and the trend is going towards a further increase in the share of thermal generation. The proposed project helps to replace carbon-intensive energy with electricity from a renewable source. The calculations for the CM, the data used, the key assumptions and the rationale are presented in section B.6.1. and section B.6.2.

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): >>

>>
The following steps demonstrate additionality for this project activity according to the "Tool for the demonstration and assessment of additionality" (Ver. 2) as required by the methodology:

Step 0. Preliminary screening based on starting date of the project activity

The crediting period is expected to start after the project begins to generate and supply power to the grid. It is expected that the CDM registration process will be over by then. Since the project participants do not wish to have the crediting period start prior to the registration of their project activity, the Step 0 is not applicable.

However, for the assessment of additionality, it is important to note that CDM benefits were taken into account in the planning stage and in the investment decision for the project. The directors of Xianggelila Xian Ge Ji He Liu Yu Hydroelectric Development Ltd. as early as in 2004 agreed in one of their board meetings to pursue benefits under the Kyoto Protocol as an essential source of revenue for the project activity (meeting minutes provided to the DOE as evidence)..

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

Sub-Step 1 a. Define alternatives to the project activity:

The possible alternatives to the project activity are as follows:

1) No investment, which means that no power from the available renewable source would be produced, and the regional power demand would be met by the current grid electricity mix (dominated by thermal sources).

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[2] ACM0002, version 06, 19/05/06 at page 4 states: "For project activities that do not modify or retrofit an existing electricity generation facility, the baseline scenario is the following: Electricity delivered to the grid by the project would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources as reflected in the combined margin (CM) calculations …"

2) The proposed project activity is not undertaken as a CDM project activity. The hydro power plant would be implemented, but without returns from carbon credits.
3) Build the similar capacity fossil fuel fired thermal power plant with the equivalent annual electricity generation at the same site.

The purpose of the following analysis is to assess whether Alternative 2 and 3) are less likely than Alternative 1, and that therefore the project activity is not the baseline scenario in the absence of CDM benefits, while the Alternative 1) is the economically most attractive and technologically available main course of action, and hence the baseline scenario.

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

The above mentioned alternatives are tested for their compliance with the applicable legal and regulatory requirements. These are mainly safety guidelines and environment regulations. Except for the Alternative 3), all alternatives are found to meet all the legal and regulatory requirements in China. And according to the relevant regulation in China, the coal fired power units with capacity 135 MW and below are strictly restricted to be built in the area covered under the existing large electric power grid[3]. Therefore the alternative 3) is not compliance with this regulation, and hence is not a realistic and credible alternative.

The investment analysis below shows that in absence of the CERs sales revenue from a CDM project, the proposed project activity itself has the less financially competitive than other alternatives, and hence the Alternative 2) would not be a realistic and credible alternative.

Step 2. Investment Analysis

The purpose of investment analysis is to determine whether the proposed project activity is economically or financially less attractive than other alternatives without the revenue from the sale of certified emission reductions (CERs). To conduct the investment analysis, following sub-steps are used:

Sub-step 2a. Determine appropriate analysis method

Determine whether to apply simple cost analysis, investment comparison analysis or benchmark analysis (sub-step 2b). If the CDM project activity generates no financial or economic benefits other than CDM related income, then apply the simple cost analysis (Option I). Otherwise, use the investment comparison analysis (Option II) or the benchmark analysis (Option III).

Option 1, the simple cost analysis, is not appropriate since the project activity has additional revenues from the sale of the generated electricity. Between the remaining two options, the investment comparison analysis (Option II) has been excluded. The reason is given by the defined alternatives above that the only realistic and creditable alternative, i.e. the baseline scenario, is the continuation of electricity supply from the existing power grid to meet the electricity demand other than a new power investment project. Therefore no appropriate alternative to apply an investment comparison analysis is available from the viewpoint of the project participants. The Option III assesses if the project's financial indicators, such as the Internal Rate of Return (IRR) and/or the Net Present Value (NPV), would reach the sector required and market based benchmark IRR and/or NPV level without and with revenue from the sale of the CERs. So out of the Option II and Option III, the benchmark analysis (Option III) has been selected.

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

[3] …….. tba

The likelihood of the development of this project will be determined by comparing the project IRR (without CERs revenues) with the benchmark applied to the local investor. The "Tool for the demonstration and assessment of additionality" defines the benchmark as the standard return in the market considering the specific risk of the project type, but not linked to the subjective profitability expectation or risk profile of a particular project developer.

According to "Economic Evaluation Code for Small[4] Hydropower Project SL-16-95" (Ministry of Water Resources)[5], the IRR on equity should be higher than the sectoral benchmark IRR indicated as 10%. This value is quite low in the international comparison, especially for small projects located in remote areas. Hence the majority of investors would likely require an equity IRR a few percentage points above 10%. Nevertheless, 10% is adopted as a conservative benchmark for the equity IRR for the purpose of this additionality analysis[6].

This benchmark profitability is representative for the project participants as well as other potential investors, i.e. it is not linked to the specific profitability expectation or risk profile of the project developer.

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

Basic data and assumptions for the calculation of the financial indicator of the proposed project are summarized in the following table:

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[4] The definition of small project includes projects with a capacity less than 50MW

[5] see www.cws.net.cn/guifan/bz%5CSL16-95/

[6] The 10% benchmark is confirmed by the "Interim Rules on Economic Assessment of Electrical Engineering Retrofit Projects" issued by former State Power Corporation of China. The benchmark of total investment financial internal rate of return (FIRR) of retrofit projects in theelectric power industry should not be lower than 8 percent after tax (i.e. for an investment with a 30/70 equity/debt ratio and lending rate around 7%, the IRR for the equity should not be lower than 10%), and only if the total investment IRR of the project is higher than the benchmark, the proposed project is financially feasible (State Power Corporation of China - Interim Rules on Economic Assessment of Electrical Engineering Retrofit Projects (2002)).

Table 3. Main parameters for the financial analysis

Parameters	**Value**
Total Investment	137.16 Million CNY
Means of finance: Equity Loans	 30% 70%
Installed Capacity	26 MW
Annual Net Output	112.000 MWh
Electricity Tariff	0.185 CNY/kWh
Value Added Tax	6%
Corporate Tax: I°, II°, III° year IV°, V° > V°	 0% 16,5% 33%
Royalties for use of water	0.005 CNY/kWh
Annual emission reductions	83.500 tCO_2
Expected CERs price	52 CNY/tCO_2
Interest Rate on Loan	7.2%

Financial calculations including the details on the underlying assumptions are available to the DOE.

Table 4. IRR with and without the CERs revenues

	Without CERs	With CERs
IRR	6.3 %	10.9%

Table 4 shows the project IRR of the proposed project with and without the revenue of CERs. Without the revenue of CERs, the project IRR is 6.3 percent which is clearly lower than financial benchmark. Thus the proposed project is not considered to be financially viable under business as usual conditions.

However, taking into account the CDM revenues, the project IRR is 10.9 percent, which is higher than the financial benchmark. Therefore the CDM revenues enable the project to overcome the investment barrier. However, it is important to note that the project also faces important non-quantifiable barriers, which are equally mitigated by the CDM (see Steps 3 and 5 below for details).

Sub-step 2d. Sensitivity analysis

The sensitivity analysis shall show whether the conclusion regarding financial attractiveness is robust to reasonable variations in the critical assumptions.

The following key parameters have been selected as sensitive indicators to test the financial attractiveness for the proposed project.

(1) Total investment costs
(2) Operation & Maintenance costs

(3) Revenues from output

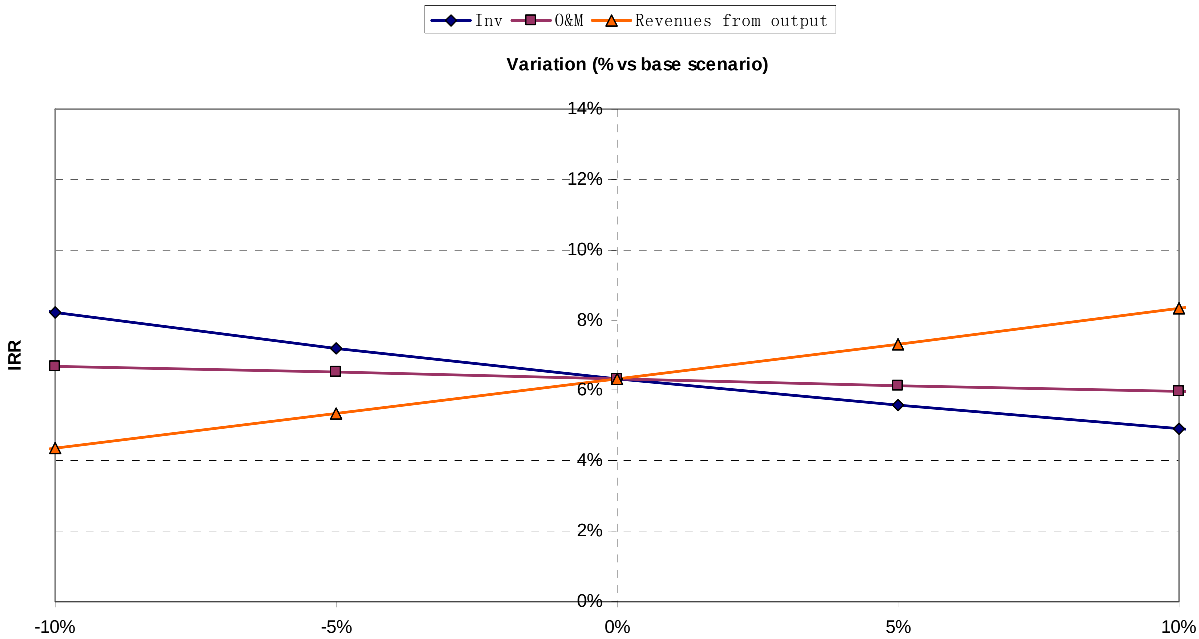

Figure 3. Outcome of the sensitivity analysis

Firstly, the effect of changes in the total investments, O&M costs and electricity sales revenue is examined on the internal return rate (IRR). The three parameters are varied in a range of ±10%. The resulting IRRs are presented in Figure 3

The sensitivity analysis shows that the O&M costs do not strongly affect IRR, whereas electricity generation and total investment have a more relevant influence. However, even with a decrease of more than 10% in the construction costs or an increase of more than 10% in the revenues from output (price or production change), the equity IRR still remains well below the benchmark level.

Step 3. Barriers Analysis

Sub-Step 3a: Identify barriers that could prevent a wide spread implementation of the proposed project activity.

Small hydro projects in remote, rural and not yet developed areas face very high barriers when developed by private investors as in this case. These barriers are due to the high project risks, lack of access to financing, and uncertain tariffs combined with weak enforcement of the PPA. The following barriers are identified for the proposed activity.

I. Performance risks
The project faces a range of risks that can affect the physical performance. A key barrier is the resource risk due to uncertain and fluctuating water flow. As observed in the past, the hydrological flow fluctuates greatly with the variations in rain over the seasons. The climate of the area c changes seasonally, with wet and dry seasons. Most rainfall occurs during the wet season with a strong influence on the average monthly flow (from 3 m^3/s in March to over 11 m^3/s in October). The amount of rainfall can vary substantially between years. Hence the project is subject to both seasonal as well as interannual variations in water flow. In addition, there is a lack of long term measurements on water flow. As a result, there is high uncertainty with regard to availability of water resources in the river, especially since the plant has no regulating capacity. This leads to uncertainty with respect to the return on investment.

II. Lack of access to financing

The project is located in Diqing, one of the poorest prefectures in Yunnan Province, which itself is one of the poorest provinces in China in terms of GDP per capita. Located in a very remote area, the project faces prohibitive barriers related to access to financing. At the early stage of project, the promoter even had limited equity to start the project preparation.
Yunnan Province doesn't have a well-established financial services sector that provides a wide range of financial instruments for financing projects of different risk levels. The company promoting the project, Xianggelila Xian Ge Ji He Liu Yu Hydroelectric Development Ltd, has had very few choices of debt financing and has been struggling to secure financing ever since it obtained the license to develop this project. A long-term loan in China normally requires a third-party guarantee or a collateral from the borrowing entity. The promoting company has limited assets and therefore didn't qualify for a domestic standard bank loan. During the stage of seeking project financing, the company has contacted the local branch of the Bank of Agriculture, the main financier in Yunnan Province, with no positive response so far.

The promoter has looked at CDM as an additional revenue stream and as a way to mitigate the perceived high project risks. The registration of the project as a CDM activity and the emissions reduction purchase agreement with an international carbon credit buyer will make it possible for the promoter to secure financing and to proceed.

III. Risks related to Power Purchase Agreement (PPA)

Prior to the power sector reform, the state-owned power company was the only party that could make investment decisions regarding hydro development projects. Full cost recovery and a small return on investment was assured through the tariff structure. During the transition period of the power sector to a market-oriented system, the tariff structure has changed, making it uncertain whether all costs can be recovered for renewable energy projects. In the Yunnan Province, a formal PPA is set aside for the generator and the grid operator to work out in detail after the tariff authorization letter. The tariff is calculated based on recovering the project cost in a certain period plus a low return on equity. To date the promoter has received an offer for the purchase of electricity, but was not able to sign a PPA contract. Typically, this is possible only once the project is in a more advanced phase of development. For any investors interested in renewable energy development, these uncertainties present a serious risk and result in significant barriers to project development.

Sub-Step 3b: Show that the identified barriers would not prevent a wide spread implementation of at least one of the alternatives

The identified barriers will not affect the alternatives to the project or will affect them to a lesser extent. The thermal power plants are developed by state owned power generating company which can have easy access to finance and have enough influence to secure a competitive off take price. Moreover, thermal power plants have shorter construction periods and are not affected by performance risks as there are no foreseeable risks for fuel supplying.

Step 4. Common Practice analysis

In China, with the abundant coal resource, relatively low investment risks, stable and mature national policy on coal mine exploration, and the historic use of fossil fuel, coal plays an important role in contributing to China’s social and economic development as a source of energy. Coal will not be substituted as the dominate fuel resource in the next decades, especially during the crediting period of the proposed project. Today the grid electricity is clearly dominated by thermal generation, predominantly from coal. The overall nationwide mix of thermal to hydro-electric power has deteriorated in the past five decades. The production mix stands currently at around 83:17. Given the growth rate of electricity demand, decision makers prefer large thermal power plants.

Although the development of renewable energy is in principle encouraged by the Chinese government, the policies in place tend to have many restrictions. Priority is still given to large and very large hydro power plants (>500MW). Only state or provincial owned companies, or major companies, are encouraged to invest in those kind of projects. The rest of the private sector – small and medium size companies - is left with the hydro resources found in remote regions and where the economic viability of the development of hydro power is less attractive.

Sufficient information exists to demonstrate in a transparent and conservative manner that the type of activity in the Song Ba project is not common practice at the time that the project was prepared and the investment decision was made.
By the end of 2002, Yunnan province had been exploiting only 11% of its overall hydropower potential[7]. A number of hydropower projects are under development in the Yunnan province. However, the vast majority of these planned investments are very-large or mega projects[8].

In the entire Diqing Prefecture there are overall only 200 MW of hydropower plants and merely 60 MW were recently developed (after 2002). All the hydro power plants developed before 2002 were undertaken by public companies (state or provincial level). The hydro projects taken up recently with partial private sector investment (after 2002) are all very small scale (< 5MW). It is evident that there are no projects comparable in size to the proposed activity and that the proposed project is the first project developed by a county-level developer with a size over 5MW.

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[7]Economic Cooperation Office, Yunnan Province

[8]There are several hydro projects under development, but most of them have a planned installed capacity in the range of 400-6.000 MW (Source: Yunnan Hydropower Expansion; Chiang Mai University and Green Watershed; March 2004)

In conclusion, hydro generation in the size of 5-100 MW in the region is not sufficiently wide-spread to qualify as "common practice", and there are important differences between the existing plants and the project activity. The project activity therefore satisfies Step 4.

Step 5. Impact of CDM registration

This section explains how the approval and registration of the project as a CDM activity will lower the barriers showed in step 2&3 and thus enable the project to be undertaken. The benefits and incentives brought about by the CDM to the shareholders of the proposed project activity are as follows:

The main impact of CDM registration is the generation of additional revenue from the sale of the CERs. At an assumed sales price of 52 CNY, the CER revenue increases the project IRR from 6.3 % to 10.9%, bringing it over the benchmark profitability.

In addition, the CDM offers the following qualitative benefits:

- Currency & revenue certainty: CER revenues are in hard currency (typically Euro, Yen, or US dollars) and come from international buyers with a good credit rating. This helps to diversify and stabilize the revenues of the project substantially.

- Strategic interest: The Xianggelila Xian Ge Ji He Liu Yu Hydroelectric Development Ltd. considers the global carbon market to be of strategic interest. CDM allows the promoter to implement this project as a first pilot activity and thereby collect experience in the global carbon market.

These qualitative CDM benefits are difficult to put into quantitative terms. However, they clearly add to the attractiveness of the project.

Thus, all the steps specified in the consolidated tools to determine additionality are satisfied and it can be expected that the proposed project activity is not the baseline scenario.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

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The emission reductions for a given year are calculated as baseline emissions minus the project emissions and leakage:

$ER_y = BE_y – PE_y – L_y$

According to the ACM0002 methodology, the project emissions (PE_y) as well as the leakage (L_y) are zero for hydro power projects, and therefore the emission reductions are equal to the baseline emissions:

According to the methodology the baseline emissions are the amount of electricity produced (EG_y) times the grid emission factor which is the Combined Margin emission factor (EF_{CM}), calculated as the simple average of the Operating Margin emission factor (EF_{OM}) emission factor and the Build Margin emission factor (EF_{BM}). Hence the emission reductions can be calculated as:

$ER_y = BE_y = EF_{CM} * EG_y = (0.5 \times EF_{OM} + 0.5 \times EF_{BM}) * EG_y$

The following procedure was adopted to determine EF_{CM} and BE_y:
Step 1 – Calculation of the Operating Margin Emission Factor (EF_{OM})
Step 2 – Calculation of the Build Margin Emission Factor (EF_{BM})
Step 3 – Calculation of the Baseline Emission Factor (EF_{CM})
Step 4 – Calculation of the Baseline Emissions Reductions (BE_y)

Step 1 – Calculation of the Operating Margin

The approved consolidated methodology recommends the use of dispatch data as the first methodological choice. However, in China accurate data on grid system dispatch order for each power plant in the system and the amount of power dispatched from all plants in the system during each hour is not available. In view of this it is proposed to apply other choices as suggested in the ACM0002. Since historical data available for the last five years show that the ratio of electricity generated by low operating cost and must run sources, identified in the SCPG as hydro and nuclear power plants, to the total electricity generated in the SCPG are 34.2%, 33.7%, 33.0%, 31.0%, 28% from 2000 through 2004, with a decreasing trend clearly below 50%, it was decided to apply the Simple OM method as suggested in ACM0002[9].

[9] Methodology ACM0002 states “The Simple OM method (a) can only be used where low-cost/must run resources constitute less than 50% of total grid generation in: 1) average of the five most recent years, or 2) based on long-term normals for hydroelectricity production.”

	Annual Generation SCPG [GWh]									
	2000	***%***	***2001***	***%***	***2002***	***%***	***2003***	***%***	***2004***	***%***
Thermal	149'555	65.8%	162'908	66.3%	185'164	67.0%	222'780	68.9%	263'574	72.0%
Hydro	63'163	27.8%	67'895	27.6%	70'121	25.4%	71'280	22.1%	73'896	20.2%
Nuclear	14'701	6.5%	15'000	6.1%	20'877	7.6%	28'930	9.0%	28'481	7.8%
Other	0	0.0%	0	0.0%	0	0.0%	172	0.1%	149	0.0%
Total	227'419	100.0%	245'803	100.0%	276'162	100.0%	323'162	100.0%	366'100	100.0%
Must-run/Low Cost		34.2%		33.7%		33.0%		31.0%		28.0%

Table 1. Generation mix in the SCPG (Source: China Electric Power Yearbook[10])

In the Simple OM method, the emission factor is calculated as generation weighted average emissions per electricity unit (tCO_2/MWh) of all generating sources serving the system, not including low-operating cost and must-run power plants as defined in ACM0002. The data vintage option selected is the ex-ante approach, where a 3-year-average OM is calculated based on the most recent power production statistics - with fuel type details - available at the time of the PDD submission (2002-2003-2004). Given the increasing ratio of thermal energy, the ex-ante approach is conservative.

$$EF_{OM} = \frac{\sum F_{i,j,y} \times COEF_{i,j}}{\sum GEN_{j,y}} \qquad (1)$$

Where:

EF_{OM} is emission factor of the Operating Margin by Simple method, in tCO_2/MWh

$F_{i,j,y}$ is the quantity of fuel i (tons or m^3 of fuel) consumed by relevant power sources j in years y; j refers to the power sources delivering electricity to the grid, not including low-operating cost and must-run power plants, and including imports to the grid[11],

$COEF_{i,j}$ is the CO_2 emission coefficient of fuel i for relevant power sources j in the years y in $tCO_2/tons$ taking into account carbon content and the percent of oxidation of the fuel

$GEN_{j,y}$ is the electricity delivered to the grid by power source j in the year y in MWh

The CO_2 emission coefficient COEFi is obtained as:

$COEFi = NCV_i * OXID_i * EF_{CO2,\, i}$

Where:

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

$EF_{CO2,\, i}$ is the CO_2 emission factor per unit of energy of the fuel *i*.

$OXID_i$ is the oxidation factor of the fuel.

According to ACM0002, when data on individual plants is not available in a consistent manner, $EF_{OM,simple,y}$ may be calculated by using the aggregated generation and fuel consumption data. As data

[10]China Electric Power Yearbook 2001, pag 667; China Electric Power Yearbook 2002, pag 617; China Electric Power Yearbook 2003, pag 585; China Electric Power Yearbook 2004, pag 679; China Electric Power Yearbook 2005, pag 474

[11] As described above, the electricity import from the connected electricity grid system can be seen as a source *j*.

($F_{i,j,y}$ and $GEN_{j,y}$) per each plant is not available in a consistent manner the aggregated generation fuel consumption data for the provincial grids which constitutes SCPG are used. Data on different fuel consumption for power generation in the SCPG are taken from the Energy Balance Table of Yunnan, Guizhou, Guangxi and Guangdong (Years 2002 through 2004) from the China Energy Statistical Yearbook.

In this PDD, NCV_i , $OXID_i$ and $EF_{CO2,i}$ for different fuels i were taken from China Energy Statistical Yearbook and "Note on China's regional power grid baseline for determining emission factors"[12] (see Annex 3 for detailed values).

Based on the formulae and data, the values for EFOM, in tCO_2e/MWh, are:

Table 2. Operating Margin Emission Factor

2002	2003	2004	Average 2002-2004
0.943	0.904	0.999	0.949

Therefore, the average operating margin emission factor is:
EF_{OM} = 0.949 tCO_2e/MWh

Detailed step-by-step calculations can be found in Annex 3.

Step 2 – Calculation of the Build Margin

The ACM0002 offers two options: ex ante and ex post determination of the Build Margin emission factor (EF_{BM}). In the latter case the build margin emission factor is required to be updated annually in the first crediting period. It has been observed that the power plants built in the past few years and those expected to be built in the next couple of years are thermal plants based on fossil fuels. As such the build margin emission factors have increased in the past and are likely to continue so. Nevertheless, option 1 is selected wherein the build margin emission factor is calculated ex ante based on most recent information available on plants already built for sample group *m* at the time of PDD submission. This simplifies the monitoring procedures, but also offers a conservative approach of EF_{BM} calculation.
The Build Margin emission factor ($EF_{BM,\ y}$) *ex-ante* is defined as the generation-weighted average emission factor of the greater annual generation of:

a) The five power plants that have been built most recently, or
b) 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.

Both sets of plants exclude registered CDM project activities.

Given the size of the SCPG, the annual generation of the most recently built 20% of capacity far exceeds the annual generation of the five most recently built plants. Hence option (b) is selected and we calculate EF_{BM} using the most recently built 20% of capacity.

The calculation of the EF_{BM} is as follows (detailed step-by-step calculations can be found in Annex 3):

EF_{BM} = 0.543 tCO_2e/MWh

[12] National Development and Reform Commission – (11/8/2006)

Step 3 – Calculation of the baseline emission factor (Combined Margin)

The baseline emission factor in year *y* is calculated as the simple average of the EF_{OM} and EF_{BM} emission factors, i.e. EF_{OM} and EF_{BM} are each weighted with 50%:

$EF = W_{OM} \times EF_{OM} + W_{BM} \times EF_{BM}$ = 0.5 * 0.949 + 0.5 * 0.543 = 0.746 tCO_2e/MWh

Step 4 – Calculation of the baseline emissions

The baseline emissions in year *y* are calculated as

$BEy = EF_{CM} * EGy$

where: EGy is the electricity produced by the project activity in year *y*, and EF_{CM} the baseline emission factor determined above.

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

(Copy this table for each data and parameter)

Data / Parameter:	$F_{i,j,y}$
Data unit:	ton or m^3
Description:	Quantity of fuel i consumed by relevant power sources j delivering electricity to the grid in years y
Source of data used:	China Energy Statistical Yearbook
Value applied:	Varies for each fuel and year
Justification of the choice of data or description of measurement methods and procedures actually applied :	The choice of data satisfies the guidance in the methodology ACM0002
Any comment:	Full data set provided in Annex 3

Data / Parameter:	$GEN_{j,y}$
Data unit:	MWh
Description:	Electricity delivered to the grid by power source j in the year y
Source of data used:	China Energy Statistical Yearbook
Value applied:	Varies for each type of fuel used and year
Justification of the choice of data or description of measurement methods and procedures actually applied :	The choice of data satisfies the guidance in the methodology ACM0002
Any comment:	Full data set provided in Annex 3

Data / Parameter:	NCV_i

Data unit:	TJ/ton or TJ/m^3
Description:	Net calorific value (energy content) per mass or volume unit of a fuel *i*.
Source of data used:	China Energy Statistical Yearbook 2004, China Climate Change Initial National Communication
Value applied:	Varies for each type of fuel used
Justification of the choice of data or description of measurement methods and procedures actually applied :	The choice of data satisfies the guidance in the methodology ACM0002
Any comment:	Full data set provided in Annex 3

Data / Parameter:	$OXID_{i,}$
Data unit:	not applicable
Description:	Oxidation factor of the fuel i
Source of data used:	China Energy Statistical Yearbook and "Note on China's regional power grid baseline for determining emission factors" (National Development and Reform Commission)
Value applied:	0.9656 for coal, 0.99 for fuel oil, 0.9874 for diesel 0.99 and 0.99 for other fuels
Justification of the choice of data or description of measurement methods and procedures actually applied :	The choice of data satisfies the guidance in the methodology ACM0002
Any comment:	Full data set provided in Annex 3

Data / Parameter:	$EF_{CO2,i,}$
Data unit:	tC/TJ
Description:	CO_2 emission factor per unit of energy of the fuel *i*.
Source of data used:	China Energy Statistical Yearbook and "Note on China's regional power grid baseline for determining emission factors" (National Development and Reform Commission)
Value applied:	26.72 for coal, see Annex 3 other values
Justification of the choice of data or description of measurement methods and procedures actually applied :	The choice of data satisfies the guidance in the methodology ACM0002
Any comment:	Please note that to get to CO_2 emission factor per unit of energy it is necessary to multiply by 44/12. Full data set provided in Annex 3

Data / Parameter:	Installed capacity
Data unit:	MW
Description:	Installed generation capacity per year and provincial grid
Source of data used:	China Electric Power Yearbook

Value applied:	Varies with province and year
Justification of the choice of data or description of measurement methods and procedures actually applied :	The choice of data satisfies the guidance in the methodology ACM0002. Data is from an official national source.
Any comment:	Full data set provided in Annex 3

Data / Parameter:	Electricity Generation
Data unit:	GWh
Description:	Electricity generated
Source of data used:	China Electric Power Yearbook
Value applied:	Varies with province and year
Justification of the choice of data or description of measurement methods and procedures actually applied :	The choice of data satisfies the guidance in the methodology ACM0002. Data is from an official national source.
Any comment:	

Data / Parameter:	SCC
Data unit:	gce/kWh
Description:	Specific coal equivalent consumption for coal and fuel oil new power plants
Source of data used:	National Development and Reform Commission – Note on China's regional power grid baseline for determining emission factors (11/8/2006)
Value applied:	327 gce/kWh for coal and 268 gce/kWh for fuel oil/diesel
Justification of the choice of data or description of measurement methods and procedures actually applied :	The choice of data satisfies the guidance in the methodology ACM0002. Data is from an official national source.
Any comment:	

Data / Parameter:	EGCCy and ESCCy
Data unit:	gce/kWh
Description:	Average amount of standard coal consumed to generate one kWh of electricity at the thermal power plants in the SCPG (EGCCy)and average amount of standard coal consumed at the thermal power plants in the SCPG (ESCCy) to supply one kWh of electricity to the grid
Source of data used:	China Electric Power Yearbook 2003, 2004, 2005
Value applied:	
Justification of the choice of data or description of measurement methods	The choice of data satisfies the guidance in the methodology ACM0002. Data is from an official national source.

and procedures actually applied :	
Any comment:	Full data set provided in Annex 3

B.6.3 Ex-ante calculation of emission reductions:

>>

The emission reductions for a given year are calculated as baseline emissions minus the project emissions and leakage:

$ER_y = BE_y – PE_y – L_y$

The baseline emissions in year *y* (Bey) are calculated as

BEy = EF * EGy

where: EGy is the electricity produced and sold by the project activity in year *y*, and EF the baseline emission factor determined above.

According to the ACM0002 methodology, the project emissions (PE_y) as well as the leakage (L_y) are zero for hydro power projects, and therefore the emission reductions are equal to the baseline emissions:

$ER_y = BE_y = EF * EG_y$

The proposed hydro power plants will sell approx. 112 GWh of power to the grid . Annual baseline GHG emissions based on the above methodology and data sources are estimated at 83.500 tCO_2/y

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

>>

Year	Estimation of project activity emissions (tons of CO_2e)	Estimation of baseline emissions (tons of CO_2e)	Estimation of leakage (tons of CO_2e)	Estimation of emission reductions (tons of CO_2e)
2009	0	83.500	0	83.500
2010	0	83.500	0	83.500
2011	0	83.500	0	83.500
2012	0	83.500	0	83.500
2013	0	83.500	0	83.500
2014	0	83.500	0	83.500
2015	0	83.500	0	83.500
Total (tons of CO_2e)	0	584.500	0	584.500

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

B.7.1 Data and parameters monitored:

(Copy this table for each data and parameter)

Data / Parameter:	EGy
Data unit:	MWh
Description:	Electricity quantity supplied to the grid by the project
Source of data to be used:	Plant records
Value of data applied for the purpose of calculating expected emission reductions in section B.5	112.000
Description of measurement methods and procedures to be applied:	The electricity supplied to the grid will be continuously measured. Recording of data will be taken from energy meters located at the project activity site.
QA/QC procedures to be applied:	Payment invoices made to the grid operator and payment receipts together with the meter reading records would be used to verify the energy exported to the grid. This data will be cross checked on a regular basis between the metering system at the Project stations to assure consistency.
Any comment:	

B.7.2 Description of the monitoring plan:

>>

As detailed in the project design document under Section B.7.1, electricity supplied to the grid by the project activity will be monitored under this monitoring plan using calibrated metering devices. As detailed in Section B.6.1 above, the Combined Margin emission factor is fixed ex ante and need not be monitored.

The authority and responsibility for registration, monitoring, measurement, reporting and reviewing of the data rests with the management or the Board of Directors of Xianggelila Xian Ge Ji He Liu Yu Hydroelectric Development Ltd who may delegate the same to a designated person.

The designated person will collect, record and review the data collected with reference to the criteria determined in the Section B.7.1. In addition, the management will introduce an internal audit system for the GHG compliance. The auditor so appointed will be given clear instructions about his scope of work and reporting requirements. He will carry out his work on a monthly basis or as required by the monitoring plan. His report will indicate the compliance requirements and achievements. He will work directly under the control of the Board of Directors and all his reports will be addressed to the Board. The internal auditor will report to the management in particular on non-compliance of corrective actions, if any, by the operating staff.

The management will also examine the internal audit reports independent of the plant manager’s report and take note of deviations in data, if any, over the norms and monitor that the corrective actions have resulted in adherence to the standards. It will be the responsibility of the designated person to report to the management about the compliance of management’s instructions on corrective actions.

The project employs latest high accuracy monitoring and control equipment that will measure, record, report, monitor and control of various key parameters including generation by the project and net energy exported to the grid. Necessary standby meters or check meters will be installed, to operate in standby mode when the main meters are not working. All meters will be calibrated and sealed as per the industry practices at regular intervals. Hence, high quality is ensured for all the above parameters. Sales records will be used and kept for checking consistency of the recorded data..

All the data monitored under the monitoring plan will be kept in electronic and hard copy format for 2 years after the end of crediting period or the last issuance of CERs for this project activity, whichever occurs later. The monitored data will be presented to the verification agency or DOE to whom verification of emission reductions is assigned.

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

>>
Date of completing the final draft of this baseline section: 15/08/2006

The contact information for the entity that has determined the monitoring methodology is given below.

Organization:	Factor Consulting + Management AG
Street/P.O. Box, Building:	Binzstrasse, 18
City:	Zurich
State/Region:	
Postfix/ZIP:	8045
Country:	Switzerland
Telephone:	+41 444556100
FAX:	
E-Mail:	marcello.balasini@factorglobal.com
URL:	
Represented by:	
Title:	Mr.
Salutation:	
Last Name:	Balasini
Middle Name:	
First Name:	Marcello

The above entity is not a Project participant.

SECTION C. Duration of the project activity / crediting period

C.1 Duration of the project activity:

C.1.1. Starting date of the project activity:

>>

01/01/2009 date of commissioning

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

>> 30y-0m

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:

>> 1/1/2009

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 transboundary impacts:

>>

An environmental impact study has been carried out in accordance with local regulations. The project proponent has obtained the necessary clearances from the Yunnan Province Environmental Protection Bureau (see box).

While delivering tangible environmental benefits, the project will also generate a few negative environmental impacts. The impacts are common to other infrastructural projects, concentrated during the construction period and confined within a limited geographical scope. The following potential environmental issues were identified during the impact assessment:

- Water and fisheries: Since the project is a run-of-river scheme, impact on fisheries is not predicted. There is no discharge of polluted water and the water quality will remain as in the pre-project period. Only during the construction phase - limited to 18-24 months - wastewater from tunnel construction and sand and rock processing may silt the water body. The weir will reduce water flow and during the dry season there may be an impact of the aquatic life and surrounding flora down the weir. In order to minimize the impact and according to the Environmental Bureau indications, a minimum flow throughout the year ($0.61m^3/s$) will be ensured.
- Flora and Fauna: No sensitive areas like national parks, wild life sanctuaries, biosphere reserve are affected by the project.
- Air quality: The hydro power does not have any impact on air quality as the hydro plants do not have any emissions during its operation. The only impact may be envisaged during construction where dust due to the procurement of construction material and due to the operation of heavy vehicles and movement of machinery/equipment.
- Noise: the hydro power plant does not have any adverse impact as no noise is emitted during operation. During construction noise is limited to the level associated to traffic, crushing plants and material handling.
- Submerged area: as it is a run-of-river project the submerged area is negligible.
- Soil erosion: during the construction period, it is necessary to conduct earth and rock excavation and collect soil, sand and gravel from a small quarry. Some temporary routes, residences and workshops will be built. These activities will disturb land surfaces and aquatic ecosystems. Some erosion is likely to occur.

Yunnan Environment Protection Bureau
Decision for Granting the Administrative Permit
YHXZ [2006] No. 36

Shangri-la County Geji River Valley Hydropower Development Co., Ltd:
Upon investigation, your application submitted on March 13, 2006 for approval of the Environmental Impact Report for Yunnan Diqing Geji River Songba Power Station Project complies with the relevant regulations of China and Yunnan Province for examination and approval on the environmental impact assessment for the construction project. We have decided to grant the permit on the following conditions:

1. The Environmental Impact Report for Yunnan Diqing Geji River Songba Power Station Project (draft for approval) should be used as the base for the environmental management during the construction and operation of the project.
2. It is to timely carry out the ecological restoration and water and soil conservation for the construction road, stock ground, residue yard and temporarily used land to prevent the damage of plantation from being damaged and the loss of water and soil. The construction residues should be timely cleared away and shifted to the residue yard where the residues should be blocked before being disposed of. Disposal of residues along the river side at random will not be allowed. The water and soil conservation measures for the project should be carried out as per program for the water and soil conservation.
3. The production and livelihood sewage arising from the construction should be recycled in compliance with the requirement for recycling. Setting up any sewage outlet shall not be allowed. The livelihood refuses should be collected for proper treatment and shall not be discharged into the river to pollute the river water. The livelihood sewage during the operation period shall be treated for recycling and the treated water shall not be discharged.
4. The relevant requirements on the bottom clearance method for the reservoir should be strictly followed.
5. The initial water storage period should be rationally chosen for the reservoir. During the initial water storage of the reservoir, the discharge flow must reach $0.61m^3/s$ to ensure the ecological water requirement for the downstream. The dam should be equipped with the ecological discharge outlet and flow meter. During the operation, it is to make sure the downward discharge flow of the power station should be greater than $0.61m^3/s$ to avoid any cutout of the downstream river bed.
6. It is to strengthen the environmental supervision during the construction, which should be included in the tender for the project consulting. The local environment supervision authority should be consigned to under the environment monitoring and supervision during the construction period. For environment protection acceptance upon completion of the project, the engineering environment supervision report for the construction period and the environment monitoring report during the construction shall be one of the necessary bases for acceptance processing.
7. It is to strengthen the leadership, regulate the institution and strictly execute the system of "three concurrencies". Trial operation shall be undertaken upon our inspection and approval for completion of the project. The formal operation shall start only upon our acceptance.
8. Within 30 days upon receipt of this decision, the construction unit shall deliver the environmental impact report respectively to the environment protection bureaus of Diqing Prefecture and Shangri-la County. Environment protection bureaus of Diqing Prefecture and Shangri-la County and Yunnan Provincial Environment Supervision Station will be responsible for the site inspection for the environment protection during the construction period of the project.

Checked by: Zhao Shengxiang Issued by: Gao Zhengwen
Processed by: Cai Juanjuan LE Certificate No.: YN087157

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 environmental impacts are not considered significant as explained above and even minor impacts are being addressed by the project proponent by taking suitable steps as described in section D.1.

SECTION E. Stakeholders' comments

>>

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

>>

Project participants have worked closely with local authorities and representatives to ensure that the project has the community's support and proceeds smoothly. The project participants have conducted public consultations inviting comments, views, objections and suggestions from the public in respect of the 26 MW small hydro project. The project participants have also approached other identified stakeholders for the approval of the project activity.

In particular, project participants have approached directly various institutions / organizations such as Dinquin County Development and Reform Commission, Dinquin County Environmental Protection Bureau, Yunnan Province Development and Reform Commission, Water Resources Department of Yunnan, Department of Land and Resources of Yunnan Province, Yunnan Province Environmental Protection Bureau and Forestry Department of Yunnan Province for obtaining necessary clearances and approvals for setting up the project. All required clearances and approvals have been received for implementing the project as detailed in the table below:

Clearance	*Institution or Organization*
River Resources Plan of Dinquin Prefecture	Dinquin Prefecture Development and Reform Commission
River Resources Plan and Environmental Protection of Prefecture County	Dinquin Prefecture Environmental Protection Bureau
Approval of pre-feasibility study	Yunnan Province Development and Reform Commission
Initial Assessment feasibility study	Yunnan Province Development and Reform Commission
Water Resources Management	Water Resources Department of Yunnan
Conservation and Protection of Water and Land	Water Resources Department of Yunnan
Geological Risk Assessment	Department of Land and Resources of Yunnan Province
Underground resources assessment	Department of Land and Resources of Yunnan Province
Environmental Impact Assessment	Yunnan Province Environmental Protection Bureau
Land use	Department of Land and Resources of Yunnan Province
Forestry Land use	Forestry Department of Yunnan Province

Approval feasibility study	Yunnan Province Development and Reform Commission

The communities or individuals likely to be affected directly by the proposed CDM project activity and preparation actions are mainly the inhabitants of the Dong Ba village. During the preparation a round of consultations have been conducted with directly impacted stakeholders, although there is no formal requirements set by the Chinese Law for the project under consideration. A public notice – providing a description of the project and inviting the inhabitants of Dong Ba village to a meeting was placed in various locations of the village. A meeting, organized by the head of the village, was held followed by direct contacts. A number of questionnaires were filled in by local villagers (around 10% of the population)

E.2. Summary of the comments received:

>> The project activity has not received any negative comments from any of the stakeholders. The outcomes of the consultations –as written comments about the project –and approvals received from other stakeholders are available for verification by the validator. A summary of comments received from stakeholders is furnished below:

- The project should provide economic benefits to the people of the village
- The road to the site should be built in a way that can serve the needs of the villagers.
- Agricultural land lost due to the construction has to be compensated

There are no comments opposing the project per se from any of the stakeholders.

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

>>
The project proponents have accepted the suggestions and views expressed during the public hearing process and will implement them for the benefit of the local stakeholders. The important suggestions made by the local stake holders which are being implemented as part of the project activity are summarized as follows:

- During the construction period many people, among the over 200 people employed, will come from the village. More importantly, during the operation phase, at least 44 people from the village will be permanently employed, hence securing economic development to the village;
- Currently there is no road that leads to the site and many scattered houses of the village are reachable only though narrow paths. During the planning phase for the construction of the service road, particular care will be taken in order to ensure an easier mobility to the inhabitants of those houses. Although very few can afford a transport vehicle, an easy access to the road will facilitate mobility in the future.

- Individuals and households affected by the project participate in measuring the affected land and impacts. Land claim agreements have been signed with villagers in different occasions after fair negotiations.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Organization:	Xianggelila Xian Ge Ji He Liu Yu Hydroelectric Development Ltd
Street/P.O.Box:	
Building:	
City:	Xianggelila county
State/Region:	Yunnan
Postfix/ZIP:	
Country:	China
Telephone:	
E-Mail:	
URL:	
Represented by:	
Title:	
Salutation:	Mr.
Last Name:	Xu
Middle Name:	
First Name:	Dongwei
Department:	
Mobile:	13606692389
Direct FAX:	
Direct tel:	
Personal E-Mail:	

Organization:	Ecoenergia S.r.l.
Street/P.O.Box:	Corso Sempione 77
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City:	Milano
State/Region:	
Postfix/ZIP:	20149
Country:	Italy
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FAX:	+39 02 99989747
E-Mail:	info@ecoenergia.mi.it
URL:	
Represented by:	
Title:	
Salutation:	Mr.
Last Name:	Hu
Middle Name:	
First Name:	Shaopan
Department:	
Mobile:	
Direct FAX:	
Direct tel:	+39 3402487177
Personal E-Mail:	info@ecoenergia.mi.it

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

The project has not received any public funding

Annex 3

BASELINE INFORMATION

The following paragraphs summarize results from applying the formulae in the ACM0002 Methodology for grid-connected electricity generation from renewable sources (including data, data sources and the underlying computations).

Calculation of the Operating Margin

Tables below provide statistics from the SCPG for years 2002, 2003, and 2004. Data on different fuel consumption for power generation in the SCPG are taken from the Energy Balance Table of Yunnan, Guizhou, Guangxi and Guangdong (Years 2002 through 2004) from the China Energy Statistical Yearbook

In this PDD, NCV_i , $OXID_i$ and $EF_{CO2,i}$ for different fuels i were taken from China Energy Statistical Yearbook and "Note on China's regional power grid baseline for determining emission factors"[13]. $EF_{CO2,coal}$ use the country-specific value defined as 26.72 tC/TJ. The $EF_{CO2,\ i}$ for other fuels are based on default values set by IPCC Good Practice Guidance. The fraction of carbon oxidized for coal is 0.9656 and fraction of carbon oxidized for fuel oil is 0.99. OXID value for coal is much more conservative than the IPCC value.

According to methodology ACM0002 the operating margin emission factor should be calculated using the net electricity supplied to the grid in every year ($GEN_{j,y}$). That is, because the Project is replacing electricity (excluding low cost/must run power plants) in the grid, the basis for the emission reduction calculation should be the electricity delivered directly to SCPG, $GEN_{Thermal\ ,\ y}$. However, there is no data available that identifies $GEN_{Thermal,\ y}$ in China. Nevertheless, it is still possible to calculate net electricity delivered to the grid by fuel type with data on gross generation by using the following formula:

$$GEN_{Therma,Supply,coal,y} = GEN_{Thermal,Generated,coal,y} \times (EGCCy\ \ /\ ESCCy\ )$$

Where:

$GEN_{Therma,Supply,coal,y}$ is the electricity delivered to the grid (net generation) by coal-fired thermal power sources in year *y*.

$GEN_{Thermal,Generated,coal,y}$ is the electricity generated (gross generation) by coal-fired thermal power sources in year y.

$EGCC_y$ is the average amount of standard coal equivalent consumed to generate one (gross) kWh of electricity at the thermal power plants in the SCPG. (gce/kWh).

$ESCC_y$ is the average amount of standard coal equivalent consumed at the thermal power plants in the SCPG to supply one (net) kWh of electricity. (gce/kWh).

gce is called gram coal equivalent, or gram standard coal

For other fuel types fired in the thermal power plants, such as fuel oil fired or gas fired power plant, the formulae is similar but refers to given fuel type.

According to ACM0002 methodology, in the calculation formulae for OM emission factor, the denominator $GEN_{thermal,supply,y}$ is the total net electricity delivered by all thermal power plants to SCPG in y year, including coal fired, fuel oil fired and gas fired, if any, power plants. Similarly the calculation formulae are as following:

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[13] National Development and Reform Commission – (11/8/2006)

$$GEN_{Therma,Supply,y} = GEN_{Thermal,Generated,y} \times (EGFCy \;/ ESFCy\,)$$

Where:

$GEN_{Therma,Supply,y} = \sum_i GEN_{Thermal,\sup ply,i,y}$ is the electricity supplied to the grid by all thermal power plants in y year, *i* is the fuel types = coal, fuel oil, gas;

$GEN_{Thermal,Generated,y} = \sum_i GEN_{Thermal,Generated,i,y}$ is the electricity generated by all thermal power plants in the grid in y year, *i* is the fuel types;

$EGFCy = \frac{Fuel_y}{GEN_{Thermal,Generated,y}} = \frac{\sum_i Fuel_{i,y}}{GEN_{Thermal,Generated,y}}$ is defined as the average fuel intensity for all thermal power sources in the SCPG in *y* year, in unit of coal equivalent consumed per kWh electricity generation. (gce/kWh).

$ESFCy = \frac{Fuel_y}{GEN_{Thermal,Supply,y}} = \frac{\sum_i Fuel_{i,y}}{GEN_{Thermal,Supply,y}}$ is defined as the average fuel intensity for all thermal power sources in the SCPG in year *y*, in unit of coal equivalent consumed per kWh electricity supply to the SCPG. (gce/kWh). For SCPG grid, EGFC and ESFC are taken from Table 1.

Of which $Fuel_y$ is the total fuel consumption for electricity generated by all thermal power plants in the SCPG in y year, in unit of coal equivalent, 1kgce=7000Kcal.

Thus the calculation formulae for OM emission factor for a regional power grid can be derived as above. Please note that the coal equivalent is merely a energy unit, not representing any particular type of coal. Only in the case where no oil fired and gas fired power occurring in the power generation mix, the above mentioned formulae are reduced to refer to coal only. (Sometime people informally refer the fuel intensity for per kWh electricity generation or supply in unit of coal equivalent/kWh as the standard coal intensity per kWh electricity generation or supply. Please note that it does not mean the coal intensity per kWh electricity generation or supply in a real sense for a coal fired power plant.)

Table 1 Average EGFC and ESFC for the thermal power plants in the SCPG in 2002- 2004[14]

EGFCy – Fuel Consumption per unit Electricity Generation (kgce/MWh)			ESFCy – Fuel Consumption per unit Electricity Supply (kgce/MWh)		
2002	2003	2004	2002	2003	2004
345	351	341	369	375	365

Data is presented by Province and by years in the tables below.

[14] Source: China Electric Power Yearbook (2003) p.584, p.585, p.592; China Electric Power Yearbook (2004) p.670, p.679, p.709 Source: China Electric Power Yearbook 2005, pag 505

Table 2. China Southern Power Grid Fuel consumption and emissions 2002[15]

2002		Fuel Consumption (Fi,j,y)					$EF_{CO2,i}$	NCV_i	$OXID_i$	tCO2
Type of fuel	Unit	Yunnan	Guizhou	Guangxi	Guandong	Total	tC/TJ	Tj/A		
	A					B	C	D	E	F=B*C*D*E*44/12
Raw Coal	10^4 Tonne	1144.39	1430.68	711.35	4121.6	7408.02	26.72	192.2	0.9656	134'697'852
Clean coal	10^4 Tonne					0	26.72	192.2	0.9656	0
Other washed coal	10^4 Tonne	13.58	35.26			48.84	26.72	192.2	0.9656	888'043
Coke	10^4 Tonne	6.44				6.44	29.5	284.7	0.9900	196'337
Coke Oven gas	10^4 Tonne					0	13	167.26	0.9900	0
Other gas	10^4 Tonne				2.63	2.63	20.2	522.7	0.9900	100'801
Crude oil	10^4 Tonne				5.8	5.8	20	418.16	0.9900	176'079
Gasoline	10^4 Tonne				0.01	0.01	18.9	430.7	0.9900	295
Diesel	10^4 Tonne	0.5		0.67	73.07	74.24	20.2	433.3	0.9874	2'352'570
Fuel oil	10^4 Tonne			0.2	701.41	701.61	21.1	418.16	0.9900	22'471'256
LPG	10^8 m3				0.09	0.09	17.2	501.79	0.9900	2'820
Refinery gas	10^8 m3				1.42	1.42	18.2	460.55	0.9900	43'206
Natural gas	10^8 m3					0	13.22	3893.1	0.9900	0
Other petroleum product	10^4 Tonne				7.91	7.91	20	401.9	0.9900	230'798
Other coking product	10^4 Tonne					0	29.5	280	0.9900	0
Other energy (Standard Coal)	10^4 Tonne				79.28	79.28	24.73	292.8	0.9800	2'062'796

Table 3 Operating Margin Emissions Factor in 2002

2002	Unit	Yunnan	Guizhou	Guangxi	Guandong	Total SCPG
Total Electricity Generation (GWh)	GWh	15787	33'231	13'069	123'081	185'168
Total Electricity Supply (GWh)	GWh					173'125
Total Emissions	Tonne					163'222'853
Simple OM Emission Factor	tCO2/MWh					0.943

Table 4. China Southern Power Grid Fuel consumption and emissions 2003[16]

2003		Fuel Consumption (Fi,j,y)					$EF_{CO2,i}$	NCV_i	$OXID_i$	tCO2
Type of fuel	Unit	Yunnan	Guizhou	Guangxi	Guandong	Total	tC/TJ	Tj/A		
	A					B	C	D	E	F=B*C*D*E*44/12
Raw Coal	10^4 Tonne	1405.27	2169.11	831.84	4491.79	8898.01	26.72	192.2	0.9656	161'789'903
Clean coal	10^4 Tonne				0.05	0.05	26.72	192.2	0.9656	909
Other washed coal	10^4 Tonne	20.37	36.38			56.75	26.72	192.2	0.9656	1'031'869
Coke	10^4 Tonne	0.5				0.5	29.5	284.7	0.9900	15'244
Coke Oven gas	10^4 Tonne	0.04				0.04	13	167.26	0.9900	316
Other gas	10^4 Tonne	11.27			3.21	14.48	20.2	522.7	0.9900	554'982
Crude oil	10^4 Tonne				6.85	6.85	20	418.16	0.9900	207'955
Gasoline	10^4 Tonne				0.02	0.02	18.9	430.7	0.9900	591
Diesel	10^4 Tonne	0.76			31.9	32.66	20.2	433.3	0.9874	1'034'953
Fuel oil	10^4 Tonne			0.3	627.22	627.52	21.1	418.16	0.9900	20'098'291
LPG	10^8 m3					0	17.2	501.79	0.9900	0
Refinery gas	10^8 m3				2.85	2.85	18.2	460.55	0.9900	86'716
Natural gas	10^8 m3					0	13.22	3893.1	0.9900	0
Other petroleum product	10^4 Tonne				11.35	11.35	20	401.9	0.9900	331'170
Other coking product	10^4 Tonne	13.35				13.35	29.5	280	0.9900	400'284
Other energy (Standard Coal)	10^4 Tonne	22.35			93.21	115.56	24.73	292.8	0.9800	3'006'770

[15] Source China Energy Statistical Power Yearbook 2003 and "Note on China's regional power grid baseline for determining emission factors" by the National Development and Reform Commission

[16] Source China Energy Statistical Power Yearbook 2004 and "Note on China's regional power grid baseline for determining emission factors" by the National Development and Reform Commission

Table 5. Operating Margin Emission Factor in 2003

2003	Unit	Yunnan	Guizhou	Guangxi	Guandong	Total SCPG
Total Electricity Generation (GWh)	GWh	19'055	43'295	17'079	143'351	222'780
Total Electricity Supply (GWh)	GWh					208'522
Total Emissions	Tonne					188'559'953
Simple OM Emission Factor	tCO2/MWh					0.904

Table 6. China Southern Power Grid Fuel consumption and emissions 2004[17]

2004		Fuel Consumption (Fi,j,y)					$EF_{CO2,i}$	NCV_i	$OXID_i$	tCO2
Type of fuel	Unit	Yunnan	Guizhou	Guangxi	Guandong	Total	tC/TJ	Tj/A		
	A					B	C	D	E	F=B*C*D*E*44/12
Raw Coal	10^4 Tonne	1751.28	2518.12	1305	6017.7	11592.1	26.72	192.2	0.9656	210775750
Clean coal	10^4 Tonne				0.21	0.21	26.72	192.2	0.9656	3'818
Other washed coal	10^4 Tonne				0	0	26.72	192.2	0.9656	0
Coke	10^4 Tonne	0.5			0	0.5	29.5	284.7	0.9900	15'244
Coke Oven gas	10^4 Tonne					0	13	167.26	0.9900	0
Other gas	10^4 Tonne				2.58	2.58	20.2	522.7	0.9900	98'885
Crude oil	10^4 Tonne				16.89	16.89	20	418.16	0.9900	512754
Gasoline	10^4 Tonne					0	18.9	430.7	0.9900	0
Diesel	10^4 Tonne				48.88	48.88	20.2	433.3	0.9874	1'548'944
Fuel oil	10^4 Tonne	1.83	2.66		957.71	962.2	21.1	418.16	0.9900	30'817'466
LPG	10^8 m3					0	17.2	501.79	0.9900	0
Refinery gas	10^8 m3				2.86	2.86	18.2	460.55	0.9900	87'020
Natural gas	10^8 m3					0	13.22	3893.1	0.9900	0
Other petroleum product	10^4 Tonne				1.66	1.66	20	401.9	0.9900	48'435
Other coking product	10^4 Tonne				0.48	0.48	29.5	280	0.9900	14'392
Other energy (Standard Coal)	10^4 Tonne				79.42	79.42	24.73	292.8	0.9800	2'066'439

Table 7. Operating Margin Emission Factor in 2004

2004	Unit	Yunnan	Guizhou	Guangxi	Guandong	Total SCPG
Total Electricity Generation	GWh	24'322	49'720	20'143	169'389	263'574
Total Electricity Supply	GWh					246'243
Total Emissions	Tonne					245'989'147
Simple OM Emission Factor	tCO2/MWh					0.999

Full-generation weighted averaged OM emission factor for all three years: EFOM = 0.952 tCO2e/MWh
Three year averaged arithmetically OM emission factor: EFOM = 0.949 tCO2e/MWh

Calculation of the Build Margin Emission Factor EF_{BM}

For calculating BM, we select Option 1. The Build Margin emission factor (EF_{BM}) ex-ante is defined as the generation weighted average emission factor of the greater of annual generation of:

- the five power plants that have been built most recently
- the power plant capacity additions in the electricity system that comprises 20% of the system generation built most recently

Given the size of the SCPG, the annual generation of the most recently built 20% of capacity far exceeds the annual generation of the five most recently built plants. Hence option (b) is selected and we calculate *BM* using the most recently built 20% of capacity.

[17] Source China Energy Statistical Power Yearbook 2005 and "Note on China's regional power grid baseline for determining emission factors" by the National Development and Reform Commission

Following guidance issued by the Executive Board in response to a request for guidance from an accredited DOE (DNV letter to the CDM EB; request for guidance: application for AM0005 and AMS-I-D in China, dated 7/10/2005) on the determination of the Build Margin in approved methodologies in China, EF_{BM} is calculated as the capacity weighted average emissions factor of new installed capacity rather than the generation weighted factor. Furthermore it is suggested in the same guidance note that the efficiency level of the best technology commercially available in the provincial/regional or national grid of China is used as a conservative proxy for each fuel type in estimating the fuel consumption when calculating the Build Margin.

The BM is calculated by direct comparison of total installed capacity in the SCPG in the most recent year where data is available, in this case 2004, and with historical data from previous year until the 20% threshold is achieved. The percentage is calculated as follows: % of recent Capacity Additions = [(C2004-Cn)/C2004*100], where C2004 is the capacity 2004 (most recent year for which the data is available); and Cn is the capacity in the reference year n.

Table 8. Capacity in SCPG 2000-2004 (Source: China Electric Power Yearbook[18])

	Installed Capacity (MW)	Installed Capacity (MW)	Installed Capacity (MW)	Installed Capacity (MW)	Installed Capacity (MW)
	2004	2003	2002	2001	2000
Thermal	46'660	40'444	35'969	34'716	32'441
Hydro	25'101	22'889	20'401	18'952	18'484
Nuclear	3780	3780	2790	1'800	1'800
Other	83	83	77		
Total	75'624	67'197	59'237	55'468	52725
Increase over previous year (MW)	8427	7960	3769	2743	-
Increase over previous year (as % of 2004 capacity)	11.14%	10.53%	5.61%	4.63%	-
Cumulative increase (%)	11.14%	21.67%	27.28%	31.91%	-

Comparing the installed capacity data (as shown in table 8), it can be seen that Build Margin is most accurately represented by new capacity added to the system since 2002 (overall 21.67%). In this period thermal power plants accounted for 65.24 % of all capacity additions in SCPG in 2003-2004.

Table 9. Capacity addition per fuel type in 2003-2004

Capacity Addition in 2003 - 2004		
	MW	%
Thermal	10, 690	65.24%
Hydro	4,700	28.68%
Nuclear	990	6.04%
Others	7	0.04%
Total	16,387	100%

Because $EF_{\text{Hydro new plant}}$ and $EF_{\text{Nuclear new plant}}$ are zero, the BM is the percentage weight of thermal electricity supplied to SCPG times the $EF_{\text{Thermal New plants}}$.

[18] China Electric Power Yearbook 2001, page 667; China Electric Power Yearbook 2002; China Electric Power Yearbook 2003, page 584, 585, 592; China Electric Power Yearbook 2005, page505 (2nd , 8th columns)

$EF_{BM,y}$ = 65.24 % * EF $_{\text{Thermal New plants}}$
There is an implicit assumption using the above mentioned method: the average annual operational hours of non-fossil fuel fired power plants are the same as those of fossil fuel power plants. In reality as the former are much lower than latter (except nuclear power which with 6% represents only a small fraction of the added capacity), this assumption is conservative.

The emission factor EF $_{\text{Thermal New plants}}$ depends on the emission factors for both the new coal-fired plants and the new fuel-oil/diesel plants. Therefore the EF $_{\text{Thermal New plants}}$ will be calculated as a weighted emission factor according to:

$EF_{\text{Thermal New plants}} = EF_{\text{Coal New plants}} * W_c + EF_{\text{Fuel Oil/diesel New plants}} * W_f$

Where:
EF $_{\text{Coal New plants}}$
EF $_{\text{Fuel Oil/diesel New plants}}$
W_c and W_f are the weight of electricity supply by coal fired power plants and fuel oil/diesel fired power plants in actual generation each year.

The composition of electricity supply of thermal power plants by different sources are as follows:

Table 10. Composition of electricity supply by fuel in 2003[19]

Electricity Generation (GWh)	Guangdong	Guangxi	Yunnan	Guizhou	Total	Weight by electricity
Coal	104459	17077	19055	43295	183886	82.5%
Fuel Oil/Diesel	38828	2			38830	17.4%
Natural gas					0	0.00%
Landfill gas	64				64	0.03%
Total (GWh)	143351	17079	19055	43295	222780	100.00%

Based on the figures above, a conservative 80:20 ratio for electricity supply by coal plants to that by fuel oil/diesel is assumed (W_c = 80% and W_f = 20%).

W_c and W_f are calculated based on the actual generation instead of the capacity additions because the breakdown of thermal additions into coal and other fuels is not available. This is a very conservative assumption as shown in table 11, where it is shown that generation from Fuel oil has even declined in 2003-2004. As the carbon intensity of fuel oil is lower than the carbon intensity of coal, using a weight (W_f) higher than the value reported in the last two years leads to a lower EF $_{\text{Thermal New plants}}$ and therefore is a conservative assumption.

[19] Source: China Electric Power Yearbook (2004), p. 679

	2002		2003		2004	
Annual Generation in the SCPG from coal and fuel oil	GWh	%	GWh	%	GWh	%
Coal	139'016	75.1%	183'866	82.6%	217'817	82.8%
Oil	46'148	24.9%	38'830	17.4%	45'309	17.2%
Total	185'164	100.0%	222'696	100.0%	263'126	100.0%
Generation increase over the previous year	GWh	%	GWh	%	GWh	%
Coal	-	-	44'850	119.5%	33'951	84.0%
Oil	-	-	-7'318	-19.5%	6'479	16.0%
Total	-	-	37'532	100.0%	40'430	100.0%

Table 11. Breakdown per fuel of increase of annual generation in the year 2003-2004[20]

The emission factor for newly built coal power plants $EF_{\text{Coal New plants}}$ is calculated as follows:

$EF_{\text{Coal New plants}} = SCC_{\text{Coal}} * COEF_{\text{Coal}}$

Where:

- SCC = estimated specific coal consumption of advanced coal fired power technology, which may be assumed equal to 327 Kgce /MWh [21]
- $COEF_{\text{Coal}}$ is calculated as $NCV_{\text{tce}} * EFCO_{2,\text{coal}} * OXID_{\text{coal}}$
  - Where:
    - NCV_{coal} is the net calorific value (energy content) of standard coal per unit of mass which may assumed equal to 29.28 $GJ/t_{\text{standard coal}}$ [22]
    - $EFCO_{2,\text{coal}}$ is the CO_2 emission factor of coal per unit of thermal heat value which may be assumed equal to 26.72 tC/TJ times 3.667 tCO_2/tC [23]
    - $OXID_{\text{coal}}$ is the oxidation factor of the coal fuel combustion which may be assumed equal to 0.98[24]

Hence $COEF_{\text{Coal}}$ = 2.81 tCO_2/tce and therefore $EF_{\text{Coal New plants}}$ = 0.919 tCO_2/MWh

The emission factor for newly built fuel oil/diesel power plants $EF_{\text{Fuel Oil/diesel New plants}}$ is calculated as follows:

- $EF_{\text{Fuel Oil/diesel New plants}} = SCC_{\text{Fuel Oil/diesel New plants}} * NCV_{\text{standard coal}} * EFCO_{2\text{ fuel oil}} * OXID_{\text{fuel oil}}$

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[20] Source: China Electric Power Yearbook

[21] Source: National Development and Reform Commission – Note on China's regional power grid baseline for determining emission factors (11/8/2006)

[22] Source: National Development and Reform Commission – Note on China's regional power grid baseline for determining emission factors (11/8/2006)

[23] Source: National Development and Reform Commission – Note on China's regional power grid baseline for determining emission factors (11/8/2006)

[24] Source: Revised 1996 IPCC guidelines for national GHG Inventories Reference Manual

Where:

$SCC_{\text{Fuel Oil/diesel New plants}}$ = estimated specific fuel consumption in standard coal equivalent for advanced fuel oil/diesel technology, which may assumed equal to 268 Kg_{coal}/MWh[25]
$NCV_{\text{standard coal}}$ = is the net calorific value (energy content) of standard coal per unit of mass which may assumed equal to 29.28 GJ/$t_{\text{standard coal}}$[26]
$EFCO_{2\text{ fuel oil}}$ = is the CO_2 emission factor of fuel oil per unit of energy which may assumed equal to 20.2 tC/TJ times the conversion factor 3.667 tCO_2/tC [27]
$OXID_{\text{fuel oil}}$ = is the oxidation factor of the fuel which may assumed equal to 0.98[28]

Hence $COEF_{\text{fuel oil/diesel}}$ = 2.125 tCO_2/tce, and $EF_{\text{Fuel Oil/diesel}}$ = 0.570 tCO_2/MWh

Please note that it is not possible to distinguish between Fuel Oil and Diesel generation, therefore only one EF will be calculated. $EFCO_2$ for fuel oil is slightly higher than $EFCO_2$ for diesel, in order to be conservative $EFCO_2$ for diesel has been applied to fuel oil as well.

Therefore $EF_{\text{Thermal New plants}}$ = 0.919 tCO_2/MWh * 80% + 0.570 tCO_2/MWh * 20% = 0.832 tCO_2/MWh

Finally the Build Margin Emission Factor is calculated as follows:
$EF_{BM,y}$ = 65.24 % * $EF_{\text{Thermal New plants}}$ = 0.543 tCO_2/MWh

The $EF_{BM,y}$ *is* fixed ex-ante and does not need to be updated.

[25] Source: National Development and Reform Commission – Note on China's regional power grid baseline for determining emission factors (11/8/2006)

[26] Source: National Development and Reform Commission – Note on China's regional power grid baseline for determining emission factors (11/8/2006)

[27] Source: National Development and Reform Commission – Note on China's regional power grid baseline for determining emission factors (11/8/2006)

[28] Source: Revised 1996 IPCC guidelines for national GHG Inventories Reference Manual

Annex 4

MONITORING INFORMATION

As only the quantity of electricity supplied to the grid (EGy) by the project has to be monitored, no further information are necessary.