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 : 29 MW Mai Di He Hydroelectric Power Plant
Version : 01
Date : 21/11/2006

A.2. Description of the project activity:

>> The proposed project activity comprises two run-of-the-river small hydroelectric plants (SHP) on the Mai Di He River in the Xianggelila County, Yunnan Province with capacities of 22 MW and 7 MW. The installations will have an overall capacity of 29 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 beginning 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 240 jobs are expected to be created for a period of 24 months;
b) Permanent employment during the operation of the project. A hydro power plantwith an overall capacity of 29 MW is expected to create permanent employment for over 30 skilled people and an equal number of unskilled persons;
c) Promote the social economic development in the poor minority area in the remote South- West Region, like Yunnan Province, especially the 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)	Xiang Ge Li La Xian Mai Di He Hydro Power Development Co., Ltd	No
Switzerland	Factor Consulting + Management AG	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):

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China, People's Republic

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

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Yunnan province, Diqing prefecture

A.4.1.3. City/Town/Community etc:

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Santong 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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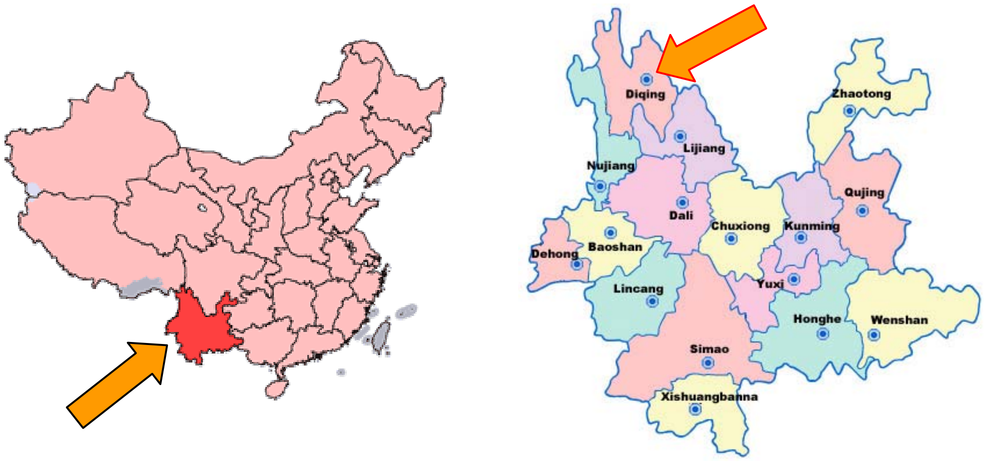
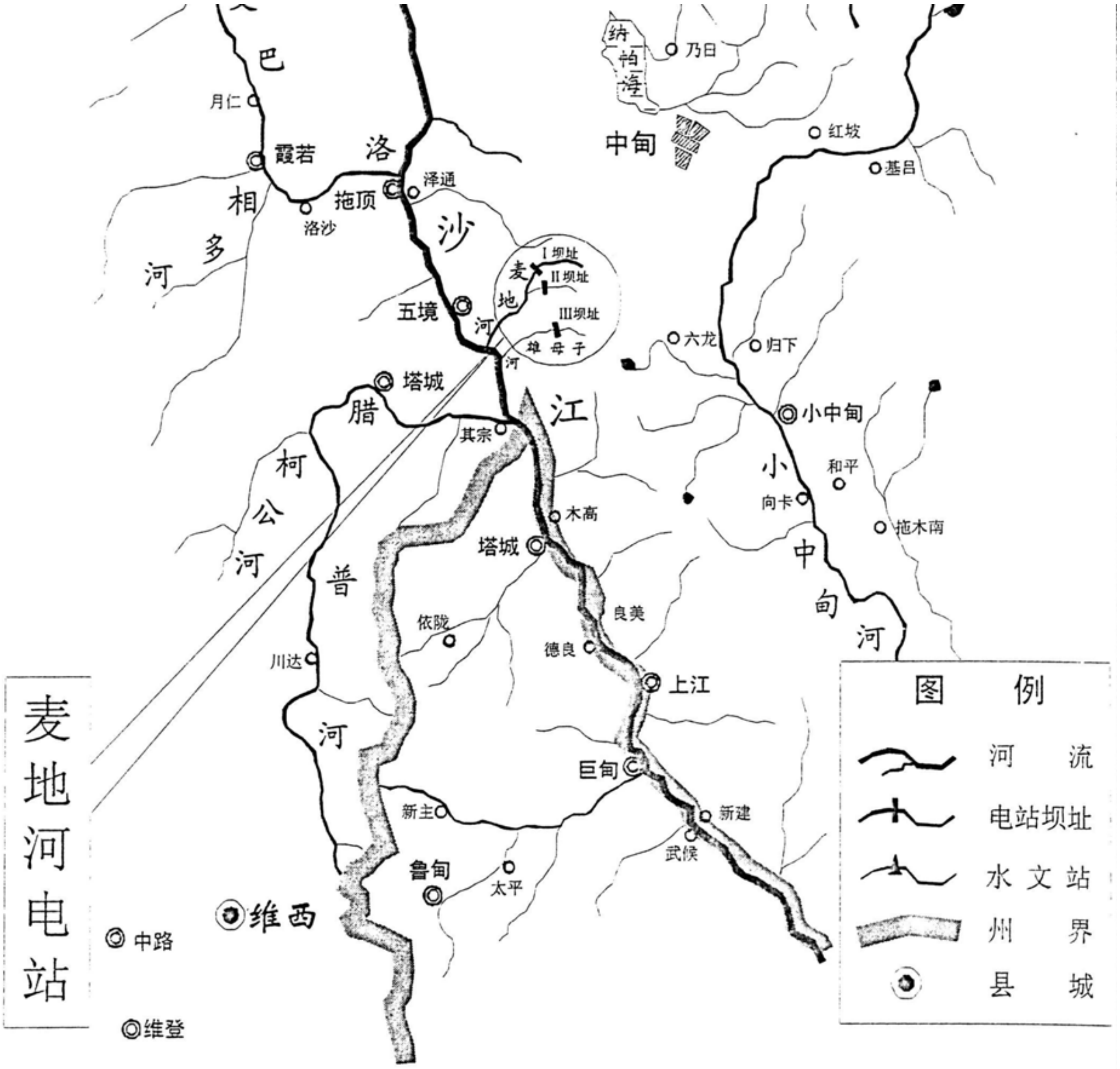
The proposed project is located in Yunnan Province, in the South West of China. The power plant location is in the Diqing prefecture, Xiang Ge li la county, in the North of the Yunnan province, approximately 700 km from the provincial capital, Kunming. The project intends to exploit the water drop of the Maidihe River near the Santong and Zongji villages.

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. Santong and Zongji villages

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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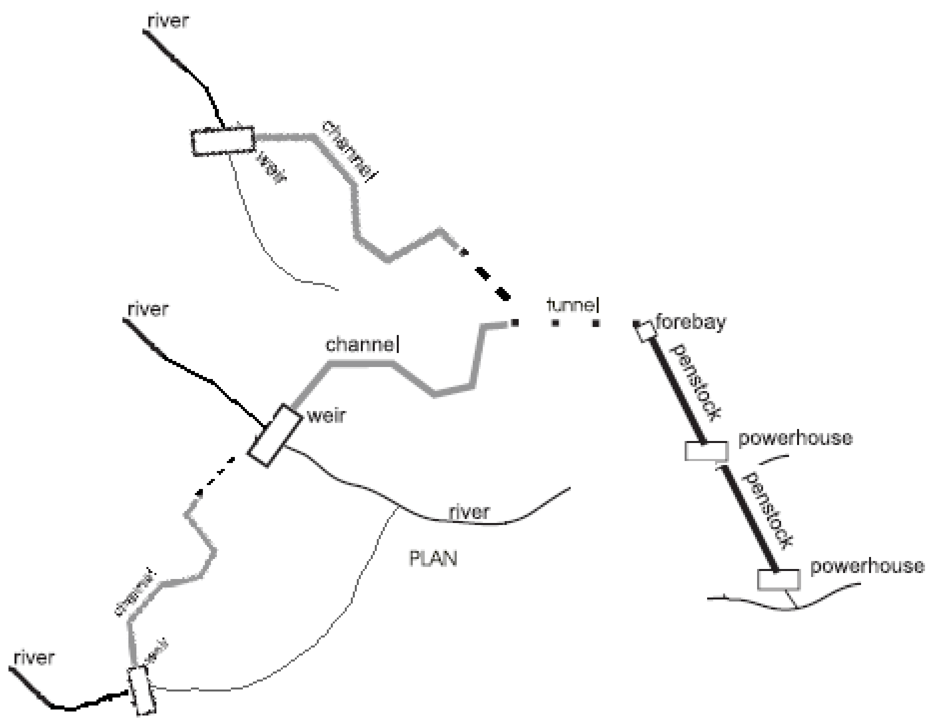
The proposed project is a run-of-river and deep valley hydropower plant without regulating capacity. It consists of three intake structures, two pipelines and two powerhouses. The intake structures are small weirs situated high up in the river catchment area where a portion of the river flow is channeled into pipelines that lead down the hillside. The pipelines carry the water down from the intakes to the first powerhouse. The first powerhouse contains two Pelton turbines, a generator (22MW) and a transformer. The two Pelton type turbines to be installed exploit a gross height drop of 384 meters. Once the water has passed through the turbines, it is channeled in another pipeline to the second powerhouse. The second powerhouse contains two Francis turbines, a generator (7 MW) and a transformer. The two turbines to be installed exploit a height drop of 116 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 three intake structures intercept water from three catchment areas with surfaces of 30.5, 12.8 and 15.3 km^2. The average flow is 4.27 m^3/s.

The installed capacity is 29MW, and the potential gross output per year in the long-term should be in average 137 GWh. The projected net generation available for sale to the grid is 130 GWh, where the difference is due to scheduled and unscheduled plant outage, and losses before feed-in into the grid.



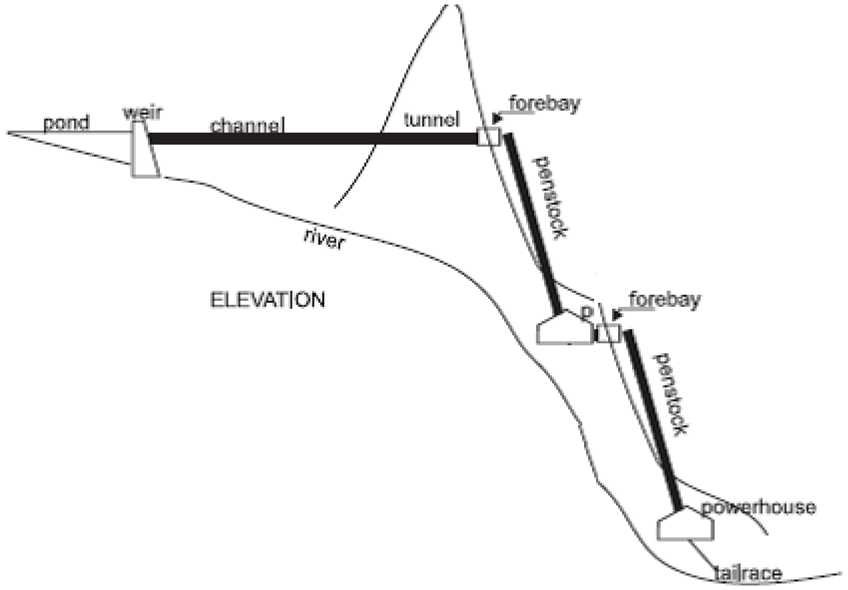


Figure 1. Schematic vertical and horizontal views of the project

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 101.800 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**
2008	101.800
2009	101.800
2010	101.800
2011	101.800
2012	101.800
2013	101.800
2014	101.800
2015	101.800
2016	101.800
2017	101.800
Total Emission reductions (tons of CO_2e)	1.018.000
Total number of crediting years	10
Annual average over the crediting period of estimated reductions (tons of CO_2 e)	101.800

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 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;
- New hydro electric power projects with reservoirs having power densities (installed power generation capacity divided by the surface area at full reservoir level) greater than 4 W/m^2;
- 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 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 physically 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 CO2. The project boundary as defined is in line with the "Application Report of the Project and the Notification on Determining Baseline Emission Factor of China's Grid" made publicly available on the website of China's DNA (http://cdm.ccchina.gov.cn/) on October 16th, 2006.

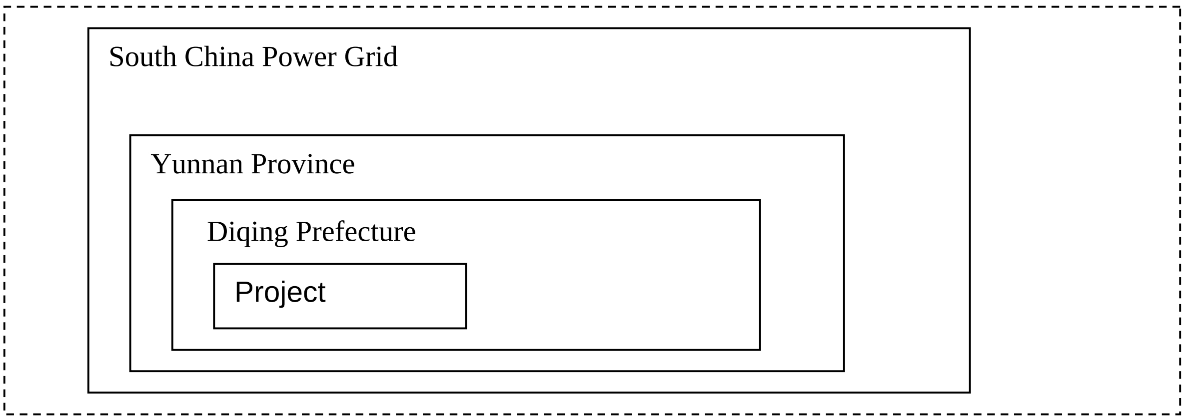

Figure 2. Schematic view of the Project Boundary

	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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The possible alternatives scenarios to the proposed CDM 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).
- 2) The proposed project activity 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 within the same area.

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. According to the relevant regulation in China, the coal fired power units with capacity below 135 MW are strictly restricted to be built in the area covered under the existing large electric power grid[2]. Therefore the alternative 3) is not compliance with this regulation, and hence is not a realistic and credible alternative.

The investment analysis in section B.5. (Step 2) shows that in absence of the CERs sales revenue from a CDM project, the proposed project activity itself is less financially competitive than other alternatives, and hence the Alternative 2) would not be a realistic and credible alternative.

Therefore 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[3] 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): >>

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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

[2] Notice on strictly prohibiting the installation of fuel-fired generators with the capacity of 135 MW or below issued by State Council Office, decree no. 2002-6, http://www.cct.org.cn/cct/content.asp?ID=5576

[3] 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 …"

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 Xiang Ge Li La Xian Mai Di He Hydro Power Development Co., Ltd as early as in 2004 agreed to pursue benefits under the Kyoto Protocol as an essential source of revenue for the project activity (meeting minutes and ERPA signed with the buyer 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).
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 within the same area.

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. 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[4]. 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, 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

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[4] Notice on strictly prohibiting the installation of fuel-fired generators with the capacity of 135 MW or below issued by State Council Office, decree no. 2002-6, http://www.cct.org.cn/cct/content.asp?ID=5576

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 more likely baseline scenario, is the increased 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

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[5] Hydropower Project SL-16-95" (Ministry of Water Resources)[6], 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[7].

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.

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

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

[7] 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 the electric 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)).

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:

Table 3. Main parameters for the financial analysis

Parameters	**Value**
Total Investment	136.735 Million CNY
Means of finance: Equity Loans	 71% 29%
Installed Capacity	29 MW
Annual Net Output	130.500 MWh
Electricity Tariff	0.155 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	101.800 tCO_2
Expected CERs price	52 CNY/tCO_2
Interest Rate on Loan	7.73%

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	7.3 %	11.2%

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 7.3 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 11.2 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).

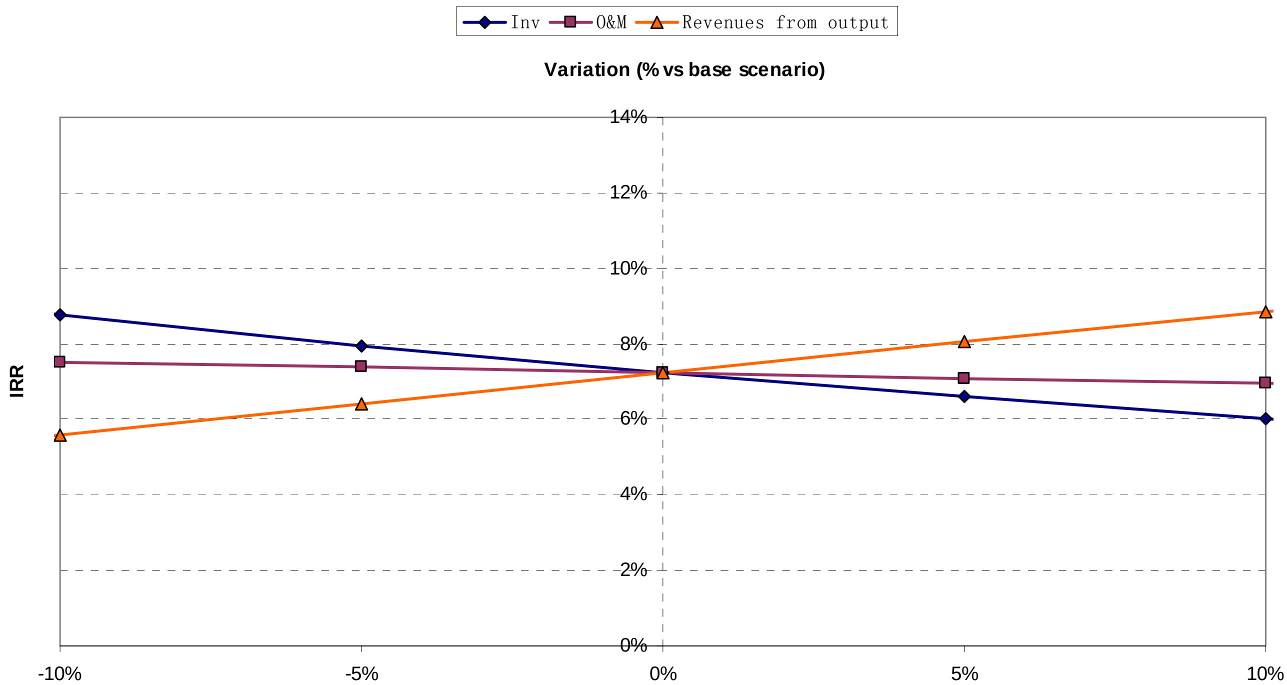
Sub-step 2d. Sensitivity analysis

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 changes seasonally, with wet and dry seasons. Most rainfall occurs during the wet season with a strong influence on the average monthly flow (70% of the rainfall is concentrated in 5 months). 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.
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, Xiang Ge Li La Xian Mai Di He Hydro Power Development Co., 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 .
This is also proved by the unusually high proportion of equity capital versus debt. The project proponent had to raise enough capital to cover more than 70% of the investment as equity whereas normally the equity part is lower than 50% and ideally around 30%. This is a clear indication of the perceived risk of the project from the lenders' perspective.

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 not received any tariff authorization letter. Typically, this is possible only once the project is in a more advanced phase of development or even after commissioning. 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 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 Maidihe 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[8]. 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[9].

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

[8] Economic Cooperation Office, Yunnan Province

[9] 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)

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.

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 shown in step 2 and 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 7.3 % to 11.2%, bringing it over the benchmark profitability.

In addition, the CDM offers the following qualitative benefits:

- Currency and 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 Xiang Ge Li La Xian Mai Di He Hydro Power Development Co., 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[10].

[10] 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[11])

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[12],

$COEF_{i,j}$ 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, EFOM,simple,y may be calculated by using the aggregated generation and fuel consumption data. As data

[11]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

[12] 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 as indicated in the Notification on Determining Baseline Emission Factor of China's Grid published on the official web site of the Chinese DNA on October 16th 2006 [13]. 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 the Notification on Determining Baseline Emission Factor of China's Grid published on the official web site of the Chinese DNA on October 16th 2006 (http://cdm.ccchina.gov.cn)." (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**	**Weighted Average 2002-2004**
0.978	0.923	1.047	0.9873

Therefore, the average operating margin emission factor is:
EF_{OM} = 0.9873 tCO_2e/MWh

The operating margin is fixed ex-ante and doesn't need to be updated.

More details 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.

[13] See http://cdm.ccchina.gov.cn/web/index.asp and in particular http://cdm.ccchina.gov.cn/website/cdm/upfile/file1052.xls for the calculation process of the baseline OM emission factor

The calculation of the EF_{BM} is done as indicated in the Notification on Determining Baseline Emission Factor of China's Grid published on the official web site of the Chinese DNA on October 16th 2006 [14]. and the result is as follows (detailed step-by-step calculations can be found in Annex 3):

EF_{BM} = 0.5714 tCO_2e/MWh

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 * 0.9873 + 0.5 * 0.5714 = 0.7794 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:	Notification on Determining Baseline Emission Factor of China's Grid published on the official web site of the Chinese DNA on October 16th 2006 (http://cdm.ccchina.gov.cn)
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:	See Annex 3 for detailed data

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:	Notification on Determining Baseline Emission Factor of China's Grid

[14] See http://cdm.ccchina.gov.cn/web/index.asp and in particular http://cdm.ccchina.gov.cn/website/cdm/upfile/file1052.xls for the calculation process of the baseline OM emission factor

	published on the official web site of the Chinese DNA on October 16th 2006 (http://cdm.ccchina.gov.cn)
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:	See Annex 3 for detailed data

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:	Notification on Determining Baseline Emission Factor of China's Grid published on the official web site of the Chinese DNA on October 16th 2006 (http://cdm.ccchina.gov.cn)
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:	See Annex 3 for detailed data

Data / Parameter:	$OXID_{i,}$
Data unit:	not applicable
Description:	Oxidation factor of the fuel i
Source of data used:	Notification on Determining Baseline Emission Factor of China's Grid published on the official web site of the Chinese DNA on October 16th 2006 (http://cdm.ccchina.gov.cn)
Value applied:	0.98 for solid fuel (coal), 0.99 for fuel oil, 0.995 for gas
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:	See Annex 3 for detailed data

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:	Notification on Determining Baseline Emission Factor of China's Grid published on the official web site of the Chinese DNA on October 16th 2006 (http://cdm.ccchina.gov.cn)
Value applied:	25.8 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.

Data / Parameter:	Installed capacity
Data unit:	MW
Description:	Installed generation capacity per year and provincial grid
Source of data used:	Notification on Determining Baseline Emission Factor of China's Grid published on the official web site of the Chinese DNA on October 16th 2006 (http://cdm.ccchina.gov.cn)
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:	See Annex 3 for detailed data

Data / Parameter:	Electricity Generation
Data unit:	GWh
Description:	Electricity generated
Source of data used:	Notification on Determining Baseline Emission Factor of China's Grid published on the official web site of the Chinese DNA on October 16th 2006 (http://cdm.ccchina.gov.cn)
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:	See Annex 3 for detailed data

Data / Parameter:	λ_{Coal}, λ_{Oil}, λ_{Gas}
Data unit:	%
Description:	
Source of data used:	Notification on Determining Baseline Emission Factor of China's Grid published on the official web site of the Chinese DNA on October 16th 2006 (http://cdm.ccchina.gov.cn)
Value applied:	λ_{Coal} is 87.29%, λ_{Oil} is 12.61% and λ_{Gas} is 0.10%
Justification of the choice of data or	The choice of data satisfies the guidance in the methodology ACM0002. Data is from an official national source.

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

Data / Parameter:	$EF_{Coal, Adv}$ $EF_{Oil, Adv}$ and $EF_{Gas, Adv}$
Data unit:	tCO_2/MWh
Description:	Emission Factor of the best available commercial power plants for coal, oil and gas power plants.
Source of data used:	Notification on Determining Baseline Emission Factor of China's Grid published on the official web site of the Chinese DNA on October 16th 2006 (http://cdm.ccchina.gov.cn)
Value applied:	$EF_{Coal, Adv}$:0.9136, $EF_{Oil, Adv}$:0.6011, $EF_{Gas, Adv}$:0.4381
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:	

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. 130,5 GWh of power to the grid . Annual baseline GHG emissions based on the above methodology and data sources are estimated at 101.800 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)
2008	0	101.800	0	101.800
2009	0	101.800	0	101.800
2010	0	101.800	0	101.800
2011	0	101.800	0	101.800
2012	0	101.800	0	101.800
2013	0	101.800	0	101.800
2014	0	101.800	0	101.800
2015	0	101.800	0	101.800
2016		101.800		101.800
2017		101.800		101.800
Total (tons of CO_2e)	0	1.018.000	0	1.018.000

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	130.500
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:

>>

The following will be registered with the CDM EB as a part of the Project Design Document, describes the monitoring organisation, parameters and variables, monitoring practices, QA and QC procedures, data storage and archiving in order to ensure on-site monitoring of projected greenhouse gas (GHG) emission reductions accrued by the project activity. The project participants will implement this monitoring protocol before the start of operation of the project. Its general objective is to provide credible, accurate, transparent and conservative monitoring data of the emission reductions, based on which the real, measurable and long term global environmental benefits relating to the GHG emission reduction emission reduction accrued by the proposed project activity can be verified and certified.

Data to be monitored

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.

Monitoring Organization and training

The authority and responsibility for monitoring, reviewing, reporting and recording of data rests with the management or the Board of Directors of Xiang Ge Li La Xian Mai Di He Hydro Power Development Co., Ltd who may delegate the same to a designated person.

The Board of Directors will be responsible to make sure that any person designated to collect, record and review the data collected with reference to the criteria determined in the Section B.7.1 is trained and receive written documents supporting his activity. To this end a written document describing the main issues related to monitoring will be prepared under the responsibility of the Board of Directors of Xiang Ge Li La Xian Mai Di He Hydro Power Development Co., Ltd. The document will be based on the technical Annexes to the Power Purchase Agreement signed with the grid operator[15].

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 periodic basis. 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.

Quality Assurance and Quality Control

[15] The technical Annexes to the Power Purchase Agreement provides procedures for monitoring the energy fed to the grid, emergency preparedness, calibration of monitoring equipment, company's Operation and maintenance responsibilities etc.

The quality assurance and quality control procedures for recording, maintaining and archiving data shall be implemented as part of this CDM project activity according to EB rules and real practice in terms of the need for verification of the emission reductions on an annual basis according to this PDD.

The electricity delivered by the Project to the Grid will be monitored through metering equipment at the substation (interconnection facility connecting the Project to the grid). The project employs latest microprocessor based high accuracy monitoring and control equipment for measuring the net energy exported to the grid. All meters will be calibrated and sealed as per the industry practices at regular intervals. And all the records will be documented and maintained by the project owner for DOE's verification. Hence, high quality is ensured for all the above parameters. Sales records will be used and kept for checking consistency of the recorded data.

Data storage and Archiving

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 baseline and monitoring section: 23/11/2006

The contact information for the entity that has applied the baseline and monitoring methodology is Factor Consulting + Management AG (see Annex 1 for contact details).

The above entity is 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:

>>

01/01/2008 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:

>> Not applicable

C.2.1.2. Length of the first crediting period:

>> Not applicable

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

>>01/01/2008

C.2.2.2. Length:

>>10 years

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.

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:

- Damages to the natural environment: Different areas will be used for construction purposes, hence some trees will be cleared. After construction all the damaged areas will be restored with indigenous species;
- 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 ($0.4m^3/s$) 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 their 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 little 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 Province Environment Protection Bureau
Decision for granting the Administrative Permission

Yunnan Environmental Permission [2005] #10

Xiang Ge Li La Xian Mai Di He Hydro Power Development Co., Ltd:

The environment impact report as of January 11, 2005 put forward by your company for application of Diqing Prefecture Shangri-la County Maidihe First-grade Hydraulic Power project agrees to the concerned regulations set forth in the national and provincial environment impact assessment documents. It is planned that Maidihe Hydraulic Powerstation will be established above the Maidihe River of Shangri-la County and is approximately 100km from the county capital. It is a water-diversion hydraulic powerstation development project and is developed solely for power generation. Its installed capacity is 22MW, its normal water level is 2,418m and its total storage capacity is 6,000m^3. Our bureau hereby agrees to your application and puts forward the requirements below:

1. The Environment Impact Report about Diqing Prefecture Shangri-la County Maidihe First-grade Hydraulic Power Project of Xiang Ge Li La Xian Mai Di He Hydro Power Development Co., Ltd. is the foundation for environment management of the project during the construction and operation period. The various environment protection measures put forward in the environment impact assessment report and the water conservancy plan shall be implemented carefully and attention shall be paid to problems to be taken care of.
2. The construction shall be limited to the woodland approved for the project and it is strictly prohibited to cut woods outside the plot approved for the construction of the project. The suitable plants shall be selected and planted to recover the vegetation of the construction site as directed by the local departments and authorities after the construction is over. It is prohibited to introduce foreign plants.
3. The effluent shall be taken into consideration during the design. The effluence during the dry season shall be 0.4m^3/s, which will be used as the biological water of the behind-dam river sections. Efforts shall be made to reduce influence to water for farming irrigation and water for living of residents of Santong Village and Zongji Village.
4. The wastewater from the construction of the project shall be collected by the drains, screening grates and water accumulators, which will be used to irrigate woods after it is treated and shall not be discharged randomly. The wastewater treatment station shall be established or the integrated wastewater treatment equipment shall be provided to treat the domestic waste water, which shall be recovered and used again. It is prohibited to discharge it randomly.
5. Management for spoil earth produced by the construction shall be intensified. It shall be cleared in time and sealed and stored collectively. The domestic waste produced in the course of the construction shall be cleared regularly and buried collectively, so as to produce no pollution to the environment.
6. The powerstation is located at the borderline of Qianhushan Scenic Spot. The planning and design of the project shall agree to the overall planning of Qianhushan Scenic Spot and destroy not the landscape of the scenic spot.
7. The leadership over the scenic spot shall be intensified and the management mechanism for it shall be perfected. The completed project can be put into trial production only after it passes the examination and approval of the environment protection departments and put into formal production only after it passes the receiving inspection of the environment protection department.
8. The construction unit shall submit the environment impact assessment report to Diqing Prefecture Environment Protection Bureau and Shangri-la Environment Protection Bureau respectively within thirty (30) days after receiving the Letter of Administrative Permission. Diqing Prefecture Environment Protection Bureau, Shangri-la Environment Protection Bureau and the provincial environment supervision office shall intensify environment protection and supervision work during the construction period of the project.

Checked by: Yang Yonghong   Issued by: Deng Jiarong
Processed by: Cai Juanjuan

Contact Number: 0871-4197370

Yunnan Province Environment Protection Bureau January 21, 2005

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

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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 29 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 Santong and Zongji villages. 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 Santong and Zongji villages to a meeting was placed in various locations of the two villages. 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 8% 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. The local population is welcoming the project due to various benefits such as development of infrastructure in the area, increase of employment opportunities due to setting up of the project and improvement in their standards of living; A summary of comments received from stakeholders is furnished below:

- The project should be compatible with the irrigation needs of the farmers of the villages;
- 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 operation phase, a minimum flow of water will be guaranteed throughout the year in order to safeguard the irrigation needs of the farmers;
- During the construction period many people, among the over 240 people employed, will come from the villages (and nearby areas). More importantly, during the operation phase, at least 60 people from the villages (and nearby areas) will be permanently employed, hence securing economic development to the village;

- There were no roads that lead to the sites and many scattered houses of the villages were reachable only though narrow paths. During the planning phase for the construction of the service road, particular care has been 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:	Xiang Ge Li La Xian Mai Di He Hydro Power Development Co., Ltd (香格里拉县麦地河水电开发有限责任公司)
Street/P.O.Box:	Xiang ge li la xian wu jing xiang you zheng suo da lou (香格里拉县五境乡邮政所大楼)
Building:	
City:	Xianggelila county
State/Region:	Yunnan
Postfix/ZIP:	
Country:	China
Telephone:	
E-Mail:	
URL:	
Represented by:	
Title:	
Salutation:	Mr.
Last Name:	Bo (波)
Middle Name:	
First Name:	Zhang Ying (颖)
Mobile:	
Direct FAX:	
Direct tel:	+86 0887 8846228
Personal E-Mail:	

Organization:	Factor Consulting + Management AG
Street/P.O.Box:	Binzstrasse, 18
Building:	
City:	Zurich
State/Region:	
Postfix/ZIP:	8045
Country:	Switzerland
Telephone:	+41 44 455 6100
FAX:	+41 44 455 6069
E-Mail:	thomas.stetter@factorglobal.com
URL:	
Represented by:	
Title:	Mr.
Salutation:	
Last Name:	Stetter
Middle Name:	
First Name:	Thomas
Mobile:	
Direct FAX:	
Direct tel:	
Personal E-Mail:	

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). This PDD makes use of the official note on the Build Margin and Operating Margin published on the web site of the Chinese DNA on October 16th 2006. More information on the published OM and BM emission factors can be found on the web site, to which we refer for details. See http://cdm.ccchina.gov.cn/web/index.asp and in particular:

- http://cdm.ccchina.gov.cn/website/cdm/upfile/file1053.pdf for the calculation of the baseline emission factor of Chinese power grid (including SCPG);
- http://cdm.ccchina.gov.cn/website/cdm/upfile/file1052.xls for the calculation of the baseline Operating Margin emission factor;
- http://cdm.ccchina.gov.cn/website/cdm/upfile/file1051.pdf for the calculation process of the baseline Build Margin emission factor.

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 as reported in the Notification on Determining Baseline Emission Factor of China's Grid published on the official web site of the Chinese DNA on October 16th 2006 (http://cdm.ccchina.gov.cn).

Table 1. China Southern Power Grid Fuel consumption and emissions 2002[16]

[16] Source China Energy Statistical Power Yearbook 2003 as reported in the Notification on Determining Baseline Emission Factor of China's Grid published on the official web site of the Chinese DNA on October 16th 2006 (http://cdm.ccchina.gov.cn)

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	4121.06	7407.48	25.8	209.08	0.98	143'582'063.683
Clean coal	10^4 Tonne					0	25.8	263.44	0.98	0.000
Other washed coal	10^4 Tonne	13.58	35.26			48.84	25.8	83.63	0.98	378'664.825
Coke	10^4 Tonne	6.44				6.44	29.5	284.35	0.98	194'114.788
Coke Oven gas	10^8 m3					0	13	1672.6	0.995	0.000
Other gas	10^8 m3				0.63	0.63	13	522.7	0.995	15'618.198
Crude oil	10^4 Tonne				5.8	5.8	20	418.16	0.99	176'078.813
Gasoline	10^4 Tonne				0.01	0.01	18.9	430.7	0.99	295.490
Diesel	10^4 Tonne	0.5		0.67	73.07	74.24	20.2	426.52	0.99	2'321'856.410
Fuel oil	10^4 Tonne			0.2	701.41	701.61	21.1	418.16	0.99	22'471'255.503
LPG	10^4 Tonne				0.09	0.09	17.2	501.79	0.995	2'833.919
Refinery gas	10^4 Tonne				1.42	1.42	18.2	460.55	0.995	43'424.120
Natural gas	10^8 m3					0	15.3	3893.1	0.995	0.000
Other petroleum product	10^4 Tonne				7.91	7.91	20	383.69	0.99	220'340.122
Other coking product	10^4 Tonne					0	25.8	284.35	0.98	0.000
Other energy (Standard Coal)	10^4 Tonne				79.28	79.28	0	0	0	0.000

Table 2 Operating Margin Emissions Factor in 2002

2002	Unit	Yunnan	Guizhou	Guangxi	Guandong	Total
Total Electricity Generation (GWh)	GWh	15'787	33'231	13'069	123'081	185'168
Losses (%)	%	8.21	7.90	8.31	5.58	
Total Electricity Supply (GWh)	GWh	14490.8873	30605.751	11982.9661	116213.0802	173'293
Total Emissions	Tonne					169'406'546
Simple OM Emission Factor	tCO2/MWh					0.977575

Table 3. China Southern Power Grid Fuel consumption and emissions 2003[17]

17 Source China Energy Statistical Power Yearbook 2004 as reported in the Notification on Determining Baseline Emission Factor of China's Grid published on the official web site of the Chinese DNA on October 16th 2006 (http://cdm.ccchina.gov.cn)

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	25.8	209.08	0.98	172'473'586
Clean coal	10^4 Tonne				0.05	0.05	25.8	263.44	0.98	1'221
Other washed coal	10^4 Tonne	20.37	36.38			56.75	25.8	83.63	0.98	439'992
Coke	10^4 Tonne	0.5				0.5	29.5	284.35	0.98	15'071
Coke Oven gas	10^8 m3	0.04				0.04	13	1672.6	0.995	3'173
Other gas	10^8 m3	11.27			3.21	14.48	13	522.7	0.995	358'971
Crude oil	10^4 Tonne				6.85	6.85	20	418.16	0.99	207'955
Gasoline	10^4 Tonne				0.02	0.02	18.9	430.7	0.99	591
Diesel	10^4 Tonne	0.76			31.9	32.66	20.2	426.52	0.99	1'021'442
Fuel oil	10^4 Tonne			0.3	627.22	627.52	21.1	418.16	0.99	20'098'291
LPG	10^4 Tonne					0	17.2	501.79	0.995	0
Refinery gas	10^4 Tonne				2.85	2.85	18.2	460.55	0.995	87'154
Natural gas	10^8 m3					0	15.3	3893.1	0.995	0
Other petroleum product	10^4 Tonne				11.35	11.35	20	383.69	0.99	316'164
Other coking product	10^4 Tonne					0	25.8	284.35	0.98	0
Other energy (Standard Coal)	10^4 Tonne	22.35			93.21	115.56	0	0	0	0

Table 4. Operating Margin Emission Factor in 2003[18]

2003	Unit	Yunnan	Guizhou	Guangxi	Guandong	Total
Total Electricity Generation (GWh)	GWh	19'055	43'295	17'079	143'351	222'780
Losses (%)	%	3.77	6.57	4.09	4.99	
Total Electricity Supply (GWh)	GWh	18336.6265	40450.5185	16380.4689	136197.7851	211'365
Total Emissions	Tonne					195'023'612
Simple OM Emission Factor	tCO2/MWh					0.9226804

Table 5. China Southern Power Grid Fuel consumption and emissions 2004[19]

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	2643.9	1305	6017.7	11717.88	25.8	209.08	0.98	227132222.1
Clean coal	10^4 Tonne				0.21	0.21	25.8	263.44	0.98	5128.829059
Other washed coal	10^4 Tonne				0	0	25.8	83.63	0.98	0
Coke	10^4 Tonne				0	0	29.5	284.35	0.98	0
Coke Oven gas	10^8 m3					0	13	1672.6	0.995	0
Other gas	10^8 m3				2.58	2.58	13	522.7	0.995	63960.23777
Crude oil	10^4 Tonne				16.89	16.89	20	418.16	0.99	512753.6462
Gasoline	10^4 Tonne					0	18.9	430.7	0.99	0
Diesel	10^4 Tonne	1.83			48.88	50.71	20.2	426.52	0.99	1585955.53
Fuel oil	10^4 Tonne				957.71	957.71	21.1	418.16	0.99	30673659.31
LPG	10^4 Tonne					0	17.2	501.79	0.995	0
Refinery gas	10^4 Tonne				2.86	2.86	18.2	460.55	0.995	87459.84814
Natural gas	10^8 m3				0.48	0.48	15.3	3893.1	0.995	104309.2298
Other petroleum product	10^4 Tonne				1.66	1.66	20	383.69	0.99	46240.78404
Other coking product	10^4 Tonne					0	25.8	284.35	0.98	0
Other energy (Standard Coal)	10^4 Tonne				79.42	79.42	0	0	0	0

Table 6. Operating Margin Emission Factor in 2004[20]

2004	Unit	Yunnan	Guizhou	Guangxi	Guandong	Total
Total Electricity Generation (GWh)	GWh	24'322	49'720	20'143	169'389	263'574
Losses (%)	%	7.56	7.06	8.33	5.42	
Total Electricity Supply (GWh)	GWh	22483.2568	46209.768	18465.0881	160208.1162	247'366
Total Emissions	Tonne					260'211'689
Simple OM Emission Factor	tCO2/MWh					1.046783

[18] Source: Notification on Determining Baseline Emission Factor of China's Grid published on the official web site of the Chinese DNA on October 16th 2006 (http://cdm.ccchina.gov.cn. Please note that an import from the Central Power Grid (Average Grid Emission Factor is 0.8423 tCO2/MWh) of 11.100 MWh is considered in the calculation.

[19] Source China Energy Statistical Power Yearbook 2005 as reported in the Notification on Determining Baseline Emission Factor of China's Grid published on the official web site of the Chinese DNA on October 16th 2006 (http://cdm.ccchina.gov.cn

[20] Source: Notification on Determining Baseline Emission Factor of China's Grid published on the official web site of the Chinese DNA on October 16th 2006 (http://cdm.ccchina.gov.cn. Please note that an import from the Central Power Grid (Average Grid Emission Factor is 0.9305 tCO2/MWh) of 10.951.240 MWh is considered in the calculation.

Full-generation weighted averaged OM emission factor for all three years: EF_{OM} = 0.9873 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.

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. It shall be pointed out that CDM EB decision on the agreed deviations is a formal response to the DNV's request for deviation: " the application of AM0005 and AMS-I.D in China". Nevertheless it can be reasonably understood that these agreed deviations are also effective to ACM0002, since the simple OM and BM method applied by the AM0005 and ACM0002 methodology are almost the same[21]. Moreover this approach is in line with the Notification on Determining Baseline Emission Factor of China's Grid published on the official web site of the Chinese DNA on October 16th 2006 [22].

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 7. Capacity in SCPG 2000-2004[23] (

	Installed Capacity (MW)	**Installed Capacity (MW)**	**Installed Capacity (MW)**
	2004	**2003**	**2002**
Thermal	46'659.7	40'444.1	35'969.2

[21] In fact, CDM EB holds the same understanding, and accepts requests for registration of such kind PDDs, in which ACM0002 methodology is applied and those deviations originally agreed by CDM EB for AM0005 are applied as well. Especially, given that the AM0005 has been cancelled and its major elements are intergraded into ACM0002, decided by the CDM EB 23 meeting, legally we can apply these three deviation approaches into the ACM0002 application.

[22] See http://cdm.ccchina.gov.cn/web/index.asp and in particular http://cdm.ccchina.gov.cn/website/cdm/upfile/file1051.pdf for the calculation process of the baseline BM

[23] Source: Notification on Determining Baseline Emission Factor of China's Grid. See http://cdm.ccchina.gov.cn/web/index.asp.

Hydro	27'580.1	25'409.3	22'921.0
Nuclear	3'780.0	3'780.0	2'790.0
Other	83.4	83.4	76.8
Total	78'103.2	69'717	61'757
% versus 2004	100%	89%	79%
Increase over previous year (MW)	8'386.4	7'959.8	6'289.4
Cumulative increase (%)	10.74%	20.93%	29.95%

Comparing the installed capacity data (as shown in table 7), it can be seen that Build Margin is most accurately represented by new capacity added to the system since 2002 (overall 20.93%). In this period thermal power plants accounted for 65.24 % of all capacity additions in SCPG in 2003-2004.

Table 8. Capacity addition per fuel type in 2003-2004

Capacity Addition in 2003 - 2004		
	MW	%
Thermal	10'690.5	65.40%
Hydro	4'659.10	28.50%
Nuclear	990	6.06%
Others	7	0.04%
Total	16'346	100.00%

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

$EF_{BM,y} = 65.40\ \% * EF_{Thermal\ New\ plants}$

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

$$EF_{Thermal\ New\ Plants} = \lambda_{Coal} * EF_{Coal,\ Adv} + \lambda_{Oil} * EF_{Oil,\ Adv} + \lambda_{Gas} * EF_{Gas,\ Adv}$$

Where $EF_{Coal,\ Adv}$ $EF_{Oil,\ Adv}$
$EF_{Gas,\ Adv}$ correspond the Emission Factor of the best available commercial power plants as indicated in the Notification on Determining Baseline Emission Factor of China's Grid published on the official web site of the Chinese DNA on October 16th 2006 (http://cdm.ccchina.gov.cn)

And λ_{Coal}, λ_{Oil}, λ_{gas} are weights calculated based on the contribution of each type of fuel to the total CO_2 emissions from thermal power generation instead of the capacity additions because the breakdown of thermal additions into coal and other fuels is not available. There is an implicit assumption using the above mentioned method: the respective share of emissions per type of fuel are constant over time.

The approach for calculating λ_{Coal}, λ_{Oil}, λ_{Gas} is detailed in the Notification on Determining Baseline Emission Factor of China's Grid published on the official web site of the Chinese DNA on October 16th 2006 (http://cdm.ccchina.gov.cn).

Table 9. $EF_{Coal, Adv}$, $EF_{Oil, Adv}$ and EF_{Gas} [24]

	A	B	C	D = 3.6/A/1000*B*C*44/12
	Efficiency	**Carbon Content**	**Oxidation factor**	**Emission Factor**
	%	tc/TJ		tCO_2/MWh
EF Coal Adv	36.53	25.80	0.98	0.9136
EF Oil Adv	45.87	21.1	0.99	0.6011
EF Gas Adv	45.87	15.3	0.995	0.4381

The formulas for λ_{Coal}, λ_{Oil}, λ_{gas} are as follows:

$$\lambda coal = \frac{\sum_{i \in coal,i} F_{i,j,y} \times COEF_{i,j}}{\sum_{i,j} F_{i,j,y} \times COEF_{i,j}}$$

$$\lambda oil = \frac{\sum_{i \in oil,i} F_{i,j,y} \times COEF_{i,j}}{\sum_{i,j} F_{i,j,y} \times COEF_{i,j}}$$

$$\lambda gas = \frac{\sum_{i \in gas,i} F_{i,j,y} \times COEF_{i,j}}{\sum_{i,j} F_{i,j,y} \times COEF_{i,j}}$$

[24] Notification on Determining Baseline Emission Factor of China's Grid published on the official web site of the Chinese DNA on October 16th 2006 (http://cdm.ccchina.gov.cn)

Table 10. Breakdown per fuel of annual emissions in the year 2004[25]

2004		Fuel Consumption (Fi,j,y)					EFCO2, i	NCVi	OXIDi	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	2643.9	1305	6017.7	11717.88	25.8	209.08	0.98	227'132'222
Clean coal	10^4 Tonne				0.21	0.21	25.8	263.44	0.98	5'129
Other washed coal	10^4 Tonne				0	0	25.8	83.63	0.98	0
Coke	10^4 Tonne				0	0	29.5	284.35	0.98	0
Sub-Total										227'137'351
Crude oil	10^4 Tonne				16.89	16.89	20	418.16	0.99	512'754
Gasoline	10^4 Tonne					0	18.9	430.7	0.99	0
Kerosene	10^4 Tonne						19.6	430.7	0.99	0
Diesel	10^4 Tonne	1.83			48.88	50.71	20.2	426.52	0.99	1'585'956
Fuel oil	10^4 Tonne				957.71	957.71	21.1	418.16	0.99	30'673'659
Other petroleum product	10^4 Tonne				1.66	1.66	20	383.69	0.99	46'241
Sub-Total										32'818'609
Coke Oven gas	10^8 m3					0	13	1672.6	0.995	0
Other gas	10^8 m3				2.58	2.58	13	522.7	0.995	63'960
LPG	10^4 Tonne					0	17.2	501.79	0.995	0
Refinery gas	10^4 Tonne				2.86	2.86	18.2	460.55	0.995	87'460
Natural gas	10^8 m3				0.48	0.48	15.3	3893.1	0.995	104'309
Sub-Total										255'729

Therefore λ_{Coal} is 87.29%, λ_{Oil} is 12.61% and λ_{Gas} is 0.10%. Thus $EF_{Thermal\ New\ Plants}$ =
= λ_{Coal} * EFCoal, Adv + λ_{Oil} * EFOil, Adv + λ_{Gas} * EFGas, Adv =
= 87.29% * 0.9136 + 12.61% * 0.6011 + 0.10% * 0.4381 = 0.8737 tCO_2/MWh

Finally the Build Margin Emission Factor is calculated as follows:
$EF_{BM,y}$ = 65.40 % * $EF_{Thermal\ New\ plants}$ = 0.5714 tCO_2/MWh

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

[25] Source: Notification on Determining Baseline Emission Factor of China's Grid published on the official web site of the Chinese DNA on October 16th 2006 (http://cdm.ccchina.gov.cn

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.