CLEAN DEVELOPMENT MECHANISM
PROJECT DESIGN DOCUMENT FORM (CDM-SSC-PDD)
Version 03 - in effect as of: 22 December 2006

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Revision history of this document

Version Number	Date	Description and reason of revision
01	21 January 2003	Initial adoption
02	8 July 2005	• The Board agreed to revise the CDM SSC PDD to reflect guidance and clarifications provided by the Board since version 01 of this document. • As a consequence, the guidelines for completing CDM SSC PDD have been revised accordingly to version 2. The latest version can be found at <http://cdm.unfccc.int/Reference/Documents>.
03	22 December 2006	• The Board agreed to revise the CDM project design document for small-scale activities (CDM-SSC-PDD), taking into account CDM-PDD and CDM-NM.

SECTION A. General description of small-scale project activity

A.1 Title of the small-scale project activity:

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Title: Yuexi Dayan Small Hydropower Project

Version: 03

Date of Submission: 22/08/2008

Gelöscht: 02¶

Gelöscht: 26/09/2007

A.2. Description of the small-scale project activity:

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Yuexi Dayan Small Hydropower Project (hereafter, the Project) developed by Yuexi County Liyuan Hydropower Development Co. Ltd. (hereafter, the Project Developer) is a run-of-river hydropower project locates in Banqiao Town of Yuexi County, the south of Sichuan Province, P.R.China. According to the water resource development plan of Dayan River, 3 hydropower plants will be constructed on Dayan River. The proposed project includes 2 of them: Stage II and Stage III. The other plant (Stage I) will be constructed by another company. The parameters of Stage II and Stage III were listed below:

Stage II: The installed capacity of Stage II is 1.6MW (0.8MW * 2), with a rated water head of 120m, rated flux of 0.82*2 m^3/s and annual operation by 4242 h, Stage II is expected to generate electricity by 6787 MWh per year, and the net power exported to the grid is expected to be 6319 MWh. The estimated emission reduction will be 6158 tCO_2e. The structures of Stage II involve a barrage with a height of 3m, an intake gate, penstocks, powerhouse, power evacuation system, and tailrace canal.

Gelöscht: 1.76

Gelöscht: 6161

Stage III: The installed capacity of Stage III is 12.6MW (6.3MW * 2), with a rated water head of 508m, rated flux of 1.48*2 m^3/s and annual operation by 3731 h, Stage III is expected to generate electricity by 47008 MWh per year, and the net power exported to the grid is expected to be 45316 MWh. The estimated of emission reduction is 44163 tCO_2e. Stage III involves construction of a barrage with maximum height of 6m, an intake gate, diversion structure, and a tunnel with length of 3346m, penstocks, powerhouse, power evacuation system, and tailrace canal.

Gelöscht: 525m

Gelöscht: .96

Gelöscht: 44186

In conclusion, the total installed capacity of the proposed project is 14.2 MW. The annual generation from the Project is expected to be 53795 MWh. The net power exported to the grid is 51635 MWh. The estimated of emission reduction is 50321 tCO_2e. The electricity will be exported to the Central China Power Grid.

Gelöscht: 50347

Implementation of the project activity is expected to contributing to sustainable development of the Host Country.

(1) Purpose of the project

The main purpose of the project activity is to generate electricity by using the renewable hydro resources to meet the ever-increasing demand for energy in the region.

(2) Environmental protection

With a total installed capacity of 14.2 MW, the project is expected to generate electricity 53795 MWh per year, and then the equal amount of electricity from coal-fired power will be displaced, which result in about 50321 tCO_2e is decreased by the Project and thus contribute to the global greenhouse gases control. In the meantime, the emission amount of SO_2, NO_x and particulates

Gelöscht: 50347

associated with power generation from fossil fuels will be decreased significantly. Furthermore, the project does not result in degradation of any natural resources, health standards, etc. at the project area.

(3) Accelerating the local economy development

The Project locates in a remote undeveloped area of P. R. China, where the economy and culture is quite undeveloped and the productivity is quite low. The project activity generates additional employments during the construction period. Majority of the additional employment opportunities are for unskilled labor, hence unemployed unskilled labor around the project region will get the benefits directly from the project activity.

In views mentioned above, the proposed project activity strongly contributes to the sustainable development.

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 participant**(Yes/No)
People's Republic of China (the host)	Yuexi County Liyuan Hydropower Development Co. Ltd.	No
Sweden	Carbon Asset Management Sweden AB	No

A.4. Technical description of the small-scale project activity:

A.4.1. Location of the small-scale project activity:

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A.4.1.1. Host Party (ies):

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People's Republic of China

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

>>

Sichuan Province

A.4.1.3. City/Town/Community etc:

>>

Yuexi County/ Banqiao Town

A.4.1.4. Details of physical location, including information allowing the unique identification of this small-scale project activity:

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Yuexi Dayan Small Hydropower Project includes 2 small power plants: Stage II and Stage III. Stage II locates on the upriver of Stage III. Both of them use water potential in Dayan River which is a small branch of Dadu River to generate electricity. The project site belongs to Banqiao Township of Yuexi County, where is the southern Sichuan Province, P.R. China.

The geographical coordinates of Stage II and Stage III are as following:

	Stage II	Stage III
Intake gate	102°29′23.3″ E	102°30′25″ E
	28°49′42″ N	28°48′16″ N
Powerhouse	102°30′25″ E	102°29′24″ E
	28°48′16″ N	28°49′29″ N

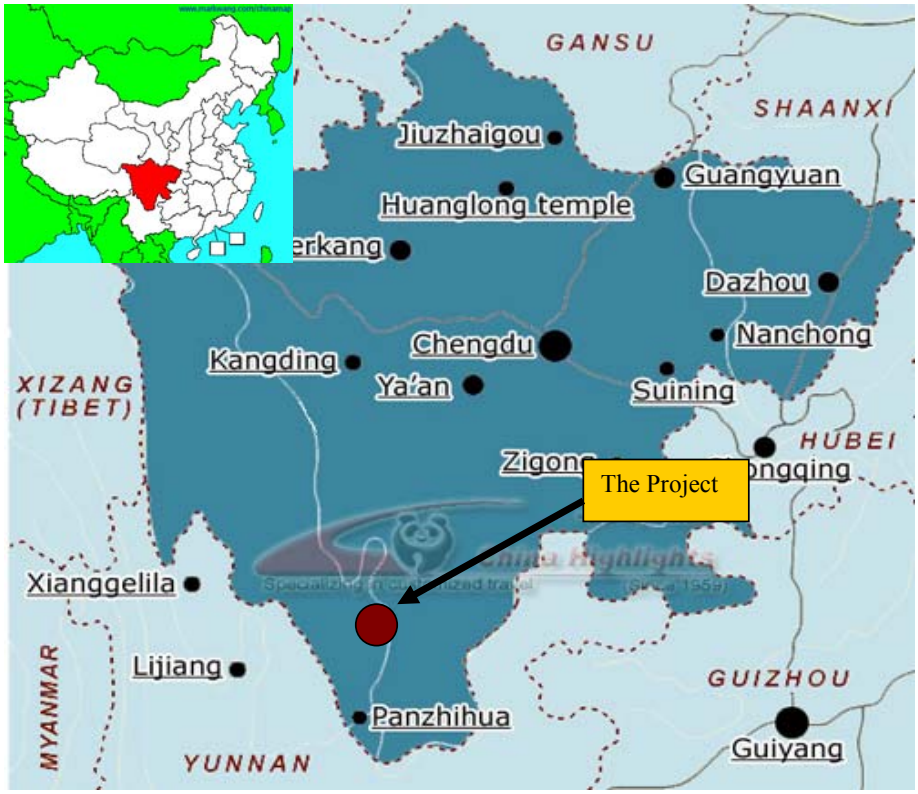

Figure 1 Location of the Project

A.4.2. Type and category (ies) and technology/measure of the small-scale project activity:

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The proposed project is about generating electricity from renewable energy of hydro and supplying to the nearby grid, and the total installed capacity is 14.2 MW, thus, the methodology of AMS-I.D (Version 11) is applicable for the proposed project. The type and category of the proposed project is as following:

Type I: Renewable Energy Project
Category 1.D: Grid connected renewable electricity generation.

Technology of project activity

Yuexi Dayan Small Hydropower Project, a run-of-river hydropower project located on Dayan River, includes two small hydropower plants of Stage II and Stage III. Each of them involves construction of diversion system, tunnel, pressure regulation pool, the steel penstock and power house. Water from Dayan River is diverted through Stage II to generate electricity, and the tail water returns to Dayan River, and then diverted through Stage III. At last, the tail water returns to Dayan River, which is a small branch of Dadu River.

Electricity generated from Stage II and Stage III will be jointly connected to Yuexi Power Grid via Naituo Transformer Substation at 35kV, and then connected to Sichuan Provincial Power Grid. The main design features and characteristics of the Project were listed in Table 1.

Table 1 Major technological parameters of the Project

	Stage II[1]	Stage III[2]
Turbine		
Type	HLD54-WJ-60	CJA237-W-120/2×11
Quantity	2	2
Rated rotation speed (r/min)	1000	750
Rated water head (m)	120	508
Rated flux (m^3/s)	0.82*2	1.48*2
Generators		
Type	SFW800-8/1180	SFW6300-8/2150
Quantity	2	2
Others		
Tunnel (m)	0	3346

Gelöscht: A

Gelöscht: 121.0

Gelöscht: 525.0

Gelöscht: 1.76

Gelöscht: .96

Gelöscht: 6

Gelöscht: Rated power (... [1]

[1] Data source: The Preliminary Design Report for Installed Capacity Regulation in Dayan Stage II (R-PDR-II) written by Yuexi County Water Conservancy and Hydroelectric Power Reconnaissance and Design Group in April 2007, and then approved by both Development & Reform Bureau of Yuexi County and the Water Conservancy Bureau of Yuexi County on April 29, 2007 (document No: Yue Fa Gai [2007]48).

[2] Data source: The Preliminary Design Report for Installed Capacity Regulation in Dayan Stage III (R-PDR-III) which was written by the Institute of Water Conservancy and Hydroelectric Power Reconnaissance and Design of Liangshan State in November 2006, and then approved by both Development & Reform Committee of Liangsha State and the Water Conservancy Bureau of Liangshan State on February 5, 2007 (document No: Liang Fa Gai Jiao Neng [2007]49).

Gelöscht: Hydropower Project

Operation hours (h)	4242	3731
Penstock (m)	771	1447

Environmental Safe Technology:

The technology, which is used worldwide, is environmentally safe. Characteristics of the Project and its construction method will not permit a negative damage to the ecosystem by using tunnel technology to divert water from the river to the powerhouse.

Technology transfer:

The main equipments, such as the turbines and electricity generators, are made in the host country. No technology transferred from other countries is involved in this project activity.

A.4.3 Estimated amount of emission reductions over the chosen crediting period:

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The renewable crediting period of 7*3 years is chosen for the proposed project. The annual emission reduction is expected to be 50321 tCO_2e in total, and about 352247 tCO_2e in total during the first 7 years as shown in the Tables below. The estimated amount of emission reductions from Stage II and Stage III have been listed in Table 2 and Table 3, respectively.

Stage II

Table 2 the estimated amount of emission reductions over the first crediting period (Stage II)

Years	Annual estimation of emission reductions in tons of CO_2e
Oct.2008-Sep.2009	6158
Oct.2009-Sep.2010	6158
Oct.2010-Sep.2011	6158
Oct.2011-Sep.2012	6158
Oct.2012-Sep.2013	6158
Oct.2013-Sep.2014	6158
Oct.2014-Sep.2015	6158
Total estimated reductions (tCO_2e)	43106
Total number of crediting years (y)	7
Annual average over the crediting period of estimated reductions (tCO_2e)	6158

Stage III

Table 3 The estimated amount of emission reductions over the first crediting period (Stage III)

Gelöscht: 50347
Gelöscht: 352429
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Gelöscht: Jul
Gelöscht: 6161
Gelöscht: Aug
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Years	Annual estimation of emission reductions in tons of CO_2e
Oct.2008-Sep.2009	44163
Oct.2009-Sep.2010	44163
Oct.2010-Sep.2011	44163
Oct.2011-Sep.2012	44163
Oct.2012-Sep.2013	44163
Oct.2013-Sep.2014	44163
Oct.2014-Sep.2015	44163
Total estimated reductions (tCO_2e)	309141
Total number of crediting years (y)	7
Annual average over the crediting period of estimated reductions (tCO_2e)	44163

A.4.4. Public funding of the small-scale project activity:

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The project doesn't involve public funding from parties included in Annex -I.

A.4.5. Confirmation that the small-scale project activity is not a debundled component of a large scale project activity:

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According to paragraph 2 of Appendix C to the Simplified Modalities and Procedures for Small-Scale CDM project activities, a small-scale project is considered a debundled component of a large project activity if there is a registered small-scale activity or an application to register another small-scale activity:

- With the same project participants;
- In the same project category and technology;
- Registered within the previous two years; and
- Whose project boundary is within 1 km of the project boundary of the proposed small scale activity?

According to the Yuexi County Dayan River Basin Hydropower Development Report, three hydropower plants (Stage I, Stage II and Stage III) would be built. Both Stage II and Stage III were owned and developed by Yuexi County Liyuan Hydropower Development Co. Ltd. (the proposed project), and Stage I belongs to another company. Thus, the proposed project participants don't have another hydropower plant within 1 km of the project boundary. Therefore, the proposed project is not a debundled component of a large project activity.

SECTION B. Application of a baseline and monitoring methodology

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

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Gelöscht: Aug
Gelöscht: Jul
Gelöscht: 44186
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Gelöscht: 44186
Gelöscht: 309302
Gelöscht: 44186

Gelöscht: water resource development plan of
Gelöscht: will
Gelöscht: are being
Gelöscht: which has not applied as a CDM project

The title of the approved baseline and monitoring methodology applied to the proposed small-scale project activity is "AMS.I.D. Grid connected renewable electricity generation" (version11).

For more information regarding the methodology, please refer to the link:
http://cdm.unfccc.int/methodologies/SSCmethodologies/approved.html

The emission reduction calculation will adopt ACM0002 (Version 06, effected on 19th May 2006) according to AMS.I.D. For more information regarding the methodology ACM0002, please refer to the link: http://cdm.unfccc.int/methodologies/PAmethodologies/approved.html

B.2 Justification of the choice of the project category:

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The proposed project activity is a run-of-river hydropower project delivering electricity to the Central China Power Grid (CCPG). Thus, the proposed project activity satisfies the requirements of (1) the capacity of a project should be less than 15 MW; (2) the project should concern renewable power generation; and (3) the electricity generated from the proposed project supply to a grid (CCPG). Therefore, all applicability conditions for the use of simplified baseline methodology category I.D have been satisfied.

B.3. Description of the project boundary:

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As for the guidelines mentioned in paragraph 4 of Type I.D. described in Appendix B of the simplified modalities & procedures for small-scale CDM-project activities, the project boundary is "encompasses the physical, geographical site of the renewable generation source".

Electricity generated from the proposed project will be connected to Sichuan Provincial Power Grid via Naituo Transformer Substation, which is a part of Central China Power Grid (CCPG). According to the Chinese DNA guidance, CCPG is composed of Jiangxi Provincial Power Grid, Henan Provincial Power Grid, Hubei Provincial Power Grid, Hunan Provincial Power Grid, Sichuan Provincial Power Grid and Chongqing Power Grid[3]. CCPG is then defined as the proposed project boundary. The other reason for the boundary chosen is:

- There is a guidance available from China DNA on project boundary identifying the applicable grid as the project boundary;

Thus, the project boundary will include the physical and geographical site of the proposed project, and all of the power plants in CCPG which related to the electricity to be replaced by the proposed project activity.

B.4. Description of baseline and its development:

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In the absence of the proposed project, four baseline scenarios to the project are considered to meet increased electricity demand:

Baseline scenario 1: the proposed project activity without CDM: construction of a new hydropower plant with an installed capacity of 14.2 MW connected to the local grid, implemented without considering CDM revenues;

[3] Data source: *Baseline Emission Factors of Regional Power Grid of China issued* by China's DNA on August 9, 2007 on, http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File1364.pdf.

Baseline scenario 2: Construction of a new thermal power plant with the same installed capacity or the same annual power output as the proposed project;
Baseline scenario 3: Construction of a new power plant using other sources of renewable energy with equivalent amount of annual electricity generation; and
Baseline scenario 4: Continuation of the current situation. Electricity will continue to be generated by the existing generation mix operating in the grid.

Assessment of baseline scenario:

Baseline scenario 1:
This baseline scenario would face investment barrier outlined in section B.5 below, therefore is not considered viable in the absence of the CDM. Thus, it is not the baseline scenario.

Baseline scenario 2:
According to the regulation of "China Electricity Development", it is forbidden to build a thermal power station with an installed capacity lower than 135MW[4]. And there is not enough nature gas resource in the project site. Therefore baseline scenario 2 is not in line with applicable laws and regulations in China and will not be considered as the baseline scenario.

Baseline scenario 3:
There are no enough wind resources, wave and tidal resources or geothermal sources in the proposed project site, and biomass sources power plant with a similar scale to the proposed project has previously been built in the same area[5]. Moreover, other renewable energy, such as solar PV, are suffered with high cost that not commercially viable in China at present[6]. Therefore, it is also not the baseline scenario.

Baseline scenario 4:
Continuation of the current situation, electricity would continue to be generated by the existing mix of power plants in the grid. This situation accords with applicable laws and regulations in China and will not face large technical or financial barriers. Thus, it is therefore identified as the baseline scenario.

B.5. Description of how the anthropogenic emissions of GHG by sources are reduced below those that would have occurred in the absence of the registered small-scale CDM project activity:

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Additionality of the Project is demonstrated based on the requirement of Attachment A to Attachment B "*the Simplified Modalities and Procedures for Small-scale CDM Project Activities*".

As a small hydropower project locates in poor mountainous area, the Project faces many problems, which make the Project far from financial attractive. The barrier due to a lack of access to financial resources is the most prohibitive factor in implementing the proposed project. Detailed analysis is shown as follows:

Gelöscht: investment

[4] Notice on Strictly Prohibiting the Installation of Fuel-fired Generators with the Capacity of 135 MW or below issued by the General Office of the State Council, decree no. 2002-6.

[5] Data source: China Electric Power Year book 2006.

[6] Data source: Solar energy photo-electric technology in China: Current situation and prospect, published on http://newenergy.org.cn/html/2005-6/20056684.html on June 30, 2005.

Yuexi County Dayan River Basin Hydropower Development Report was approved by the Development & Reform Commission of Liangshan Yi Autonomous Prefecture on Sep. 13, 2005 (Document No: Liang Ji Jiao Neng [2005]435). According to the Report, the hydro-energy of Dayan River would be developed by 3 hydroelectric stations named Stage I, II and III. The installed capacity of Stage I, II and III are 1.26 MW, 1.85MW and 10.0MW, respectively. Stage II and III was owned and developed by Yuexi County Liyuan Hydropower Development Co. Ltd., and Stage I was owned and developed by another company.

The Preliminary Design Report of Stage III was approved by the Development & Reform Committee of Liangshan Yi Autonomous Prefecture on Dec. 22, 2005[7]. But the IRR value of the proposed project was found to be quite low. According to the economic evaluation results of Stage II and III carried by Agricultural Bank of China Yuexi County Branch, unit kWh investment was 1.251 Yuan/kWh, which was much high; and the IRR was only 6.87% of the total investment, and the NPV was –1143.49 Yuan. Thus, the financial indicates were unacceptable. The loan application was rejected by Agricultural Bank of China Yuexi County Branch on January 26, 2006. In the meantime, the bank suggested the project owner to apply CDM project[8]

Considering the low investment return, three shareholders with 30% of the total shares retreated from the company on Feb. 25, 2006[9].

With the suggestion of the Bank, the project owner considered CDM. And the successful experiences of CDM project development in China also encouraged the shareholders. A decision about developing Yuexi Dayan Small Hydropower Project as a CDM project was achieved on the fifth general meeting of shareholders on May 6, 2006[10], and then an agreement on CDM development cooperation was signed between Yuexi County Liyuan Hydropower Development Co. Ltd. and the CDM experts from Hunan province on June 2, 2006[11]. CDM revenues will be expected to increase the project IRRs greatly. Thus, the proposed project will be investment attractive with CERs revenue.
CDM revenues provide a secure long term source of revenues from the project in hard currency, mitigating the risks associated with investing in this project. Considering CDM revenues, four new shareholders joined in the proposed project activity on June 8, 2006 by providing up-front financing, and 25% of the total shares were transferred to the new shareholders12

Gelöscht:

Formatiert: Hochgestellt

Formatiert: Hochgestellt

[7] The Preliminary Design Report of Stage III has been approved by both Development & Reform Committee of Liangsha State and the Water Conservancy Bureau of Liangshan State on Dec. 22, 2005 (Document No: Liang Shui Fa [2005]197).

[8] Reply to the loan application of Yuexi County Liyuan Hydropower Development Co. Ltd. to Agriculture Bank of China Yuexi County Branch on March 26, 2006, where the loan application was rejected due to the poor profit.

[9] The decision of the third general meeting of shareholders, Yuexi County Liyuan Hydropower Development Co. Ltd. on Feb. 25, 2006, where three shareholder retreated from Yuexi County Liyuan Hydropower Development Co. Ltd.

[10] The decision on CDM development achieved in the fifth general meeting of shareholders, Yuexi County Liyuan Hydropower Development Co. Ltd., May 6, 2006.

[11] Agreement on CDM project development cooperation signed between Yuexi County Liyuan Hydropower Development Co. Ltd and Sangzhi Nanfang Hydro Development Co. Ltd. on June 2, 2006.

[12] The decision of the sixth general meeting of shareholders, Yuexi County Liyuan Hydropower Development Co. Ltd. on June 8, 2006, where four shareholders (Mr. Sun Guangming, etc) joined in Yuexi County Liyuan

Then, the preparation works including the supply of water, electricity and road and ground leveling started on July 1, 2006 for Stage III[13]. But the following exploration revealed that the geological condition of the location where the powerhouse of the Stage II would be built was quite bad. Thus, the location of the powerhouse of Stage II had to be moved upriver by 220m, and the intake gate of Stage III was moved upriver by 250m accordingly. By the regulation, the rated water head of Stage II would be deducted by 18m, and the water head of Stage II would increased by 17m. Thus, the installed capacity of Stage II was regulated from 1.85MW to 1.6 MW and the installed capacity of Stage III was regulated from 10MW to 12.6MW in Nov, 2006. The Preliminary Design Report for Installed Capacity Regulation in Dayan Stage II and III Hydropower Project was jointly approved by both Development & Reform Committee of Liangsha Yi Autonomous Prefecture and the Water Conservancy Bureau of Liangshan Yi Autonomous Prefecture on February 5, 2007 (document No: Liang Fa Gai Jiao Neng [2007]49). The tunnel construction of Stage III started on Feb. 6, 2007. And the construction of Stage II started on April 6, 2007[14].

Gelöscht: Dayan Stage III

Some key events related to CDM consideration were listed in the table below:

Sep. 13, 2005	*Yuexi County Dayan River Basin Hydropower Development Report* was approved by the Development & Reform Commission of Liangshan Yi Autonomous Prefecture (Document No: Liang Ji Jiao Neng [2005]435). Stage II and Stage III with installed capacity of 1.85MW and 10.0MW, respectively, would be owned and developed by Yuexi County Liyuan Hydropower Development Co. Ltd.
Dec. 22, 2005	The Preliminary Design Report of Stage III was approved by the Development & Reform Committee of Liangshan Yi Autonoums Prefecture (Document No: Liang Shui Fa [2005]197).
Jan. 26, 2006	The loan application for Stage II and III construction was rejected by Agricultural Bank of China Yuexi County Branch, and the bank suggested the project owner to apply CDM.
Feb. 25, 2006	Three shareholders with 30% of the total shares retreated from the company.
May 6, 2006	The decision about developing Yuexi Dayan Small Hydropower Project as a CDM project was achieved on the fifth general meeting of shareholders.
June 2, 2006	Agreement on CDM development cooperation was signed between the project owner and the CDM consulter.
June 8, 2006	Four new shareholders joined in the proposed project activity, and 25% of the total shares were transferred to the new shareholders.

Hydropower Development Co. Ltd., and the Article of Association of Yuexi County Liyuan Hydropower Development Co. Ltd. which was revised on June 16, 2006.

[13] The Notice of Construction Starting for Stage III issued by Yichang Jiangxia Construction Surveillance Co. Ltd. on June 26, 2006, which stated that the project construction would started on July 1, 2006.

[14] The Notice of Construction Starting for Stage II issued by Yichang Jiangxia Construction Surveillance Co. Ltd. on April 5, 2007.

July 1, 2006	The preparation works including the supply of water, electricity and road and ground leveling started for Stage III.
Nov, 2006	The geological condition of the location where the powerhouse of the Stage II would be built was quite bad. Thus, the location of the powerhouse of Stage II had to be moved upriver by 220m, and the intake gate of Stage III was moved upriver by 250m accordingly. By the regulation, the water head of Stage II would be deducted by 18m, and that of Stage III would increased by 17m. Thus, the installed capacity of Stage II was regulated from 1.85MW to 1.6 MW and the installed capacity of Stage III was regulated from 10MW to 12.6MW.
Feb. 5, 2007	The Preliminary Design Report for Installed Capacity Regulation for Stage II and III was jointly approved by both Development & Reform Committee of Liangsha Yi Autonomous Prefecture and the Water Conservancy Bureau of Liangshan Yi Autonomous Prefecture on (Document No: Liang Fa Gai Jiao Neng [2007]49).
April 6, 2007	the prepare works for the construction of Stage II started.
June 4, 2007	The Emission Reduction Purchase Agreement (ERPA) was signed between the project owner and Carbon Asset Management Sweden AB.

Although the proposed project is scaled up after considering CDM and the total installed capacity is regulated from 11.85MW to 14.2MW due to project optimization according to geological conditions, the proposed project is still financially unattractive based on IRR analysis whose data source is based on the Power Purchase Agreement for Stage II and Stage III dated 6 March 2007 and the Preliminary Design Report for Installed Capacity Regulation for Stage II and III hydro respectively.

Gelöscht: due to bad geological situation

Investment Analysis

Gelöscht: The spreadsheets of IRR calculation has been provided to OE.

Gelöscht: After the installed capacity regulation in Stage II and III, the financial indicates are still unacceptable as analyzed below

Gelöscht: ¶

According to "Tool for the demonstration and assessment of additionality (version 03)", three options can be applied to conduct the investment analysis. They are: the simple cost analysis (Option I), the investment comparison analysis (Option II) and the benchmark analysis (Option III).

Since this project will generate financial/economic benefits other than CDM-related income, through the sale of generated electricity, Option I (Simple Cost Analysis) is not applicable.

The investment comparison analysis (Option II) is also not applicable for the proposed project because investment comparison analysis method is only applicable to projects whose alternatives are similar investment projects. The Central China Power Grid is not a new investment project; therefore Option II is not appropriate.

Thus, Benchmark analysis method was chosen for the proposed project. According to the "Economic Evaluation Code for Small Hydropower Projects (document No. SL16-95)" issued by the Ministry of Water Resources which is the most important reference for small-scale hydropower projects economic

evaluation in China and is still in force, the benchmark IRR of small hydropower project is 10%[15]. Thus, 10% was chosen as the benchmark for the proposed project.

The investment barriers of Stage II and Stage III of the proposed project were analyzed respectively.

Stage II

The basic parameters for calculation of financial indicators of Stage II are shown in Table 4.

Table 4 Main parameters for calculation of financial indicators (Stage II)

Formatiert: Zentriert

No	Parameters	Unit	Value	Data Source
1	Installed capacity	MW	1.6	R-PDR-II, page 10-1
2	Total investment in fixed assets	million RMB Yuan	7.11	R-PDR-II, page 10-1
3	Annual electricity generation	MWh/y	6787	R-PDR-II, page 10-1
4	Annual electricity export to CCPG	MWh	6319	R-PDR-II, page 10-1
5	Power price (including VAT)	RMB Yuan/kWh	0.16	The Power Purchase Agreement[16]
6	Financial calculation period	y	21	R-PDR-II, page 10-1
7	Value added tax (VAT)	%	6	R-PDR-II, page 10-1
8	Income tax (0 for the first 2 years and 50% discount for the following 3 years, 33% later)	%	33	R-PDR-II, page 10-2
9	Additional tax for city development	%	5	R-PDR-II, page 10-1
10	Additional tax for education	%	3	R-PDR-II, page 10-1
11	Operational cost	million RMB Yuan	0.238	Calculated based on data in R-PDR-II, page 10-1
12	Benchmark IRR	%	10	R-PDR-II, page 10-3

Gelöscht: 12 ... [2]

Gelöscht: 5

Table 5 shows the financial analysis results for Stage II without CER finance. As shown, IRR of Stage II (without income from CERs: 6.21%), is lower than the benchmark rate of return applicable, which is 10% for power project investment in China. This therefore indicates that in comparison to other investments, the proposed project would not be a more financially viable investment option for securing the best returns.

Gelöscht: with and

Table 5 IRR without income from CERs (Stage II)

Formatiert: Zentriert

Gelöscht: with or

[15] Data source: Economic Evaluation Code for Small Hydropower Projects (SL16-95), http://www.chinawater.net.cn/law/guifan/sl16-95/

[16] The Power Purchase Agreement for Yuexi Dayan Small Hydropower Project signed between Yuexi County Electricity Co. Ltd. and Yuexi County Liyuan Hydropower Development Co. Ltd. on March 6, 2007.

Item	IRR	Benchmark
Without income from CERs	6.21%	10 %

Sensitivity analysis

A detailed sensitivity analysis of the proposed project activity was done to test the project feasibility with varying project parameters. The project activity feasibility is mainly dependent on the following parameters.

- Total investment
- Annual electricity output amount
- Electricity tariff
- Operation cost

The sensitivity analysis results of Stage II were listed in Table 6 and shown in Figure 2 below.

Table 6 Sensitive analysis results (Stage II)

Item	-87.70%	-25.08%	-10.00%	0.00%	10.00%	28.10%
Total investment	-	10.00%	7.52%	6.21%	4.90%	-
Annual electricity output	-	-	4.84%	6.21%	7.58%	10.00%
Electricity tariff	-	-	4.84%	6.21%	7.58%	10.00%
Operational cost	10.00%	-	6.69%	6.21%	5.73%	-

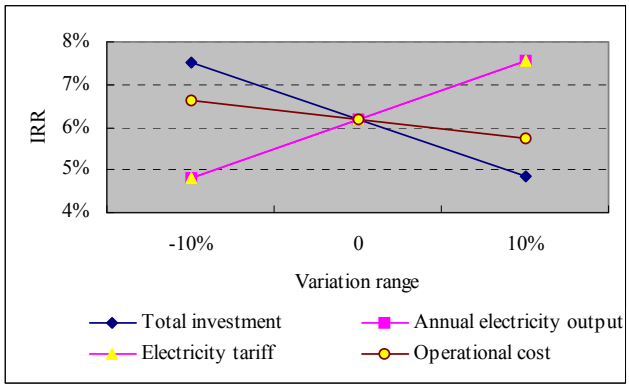

Figure 2 Sensitive analysis results (Stage II)

From the results shown in Table 6 and Figure 2, we can find that the IRR values have the same trends when variation with annual electricity output or with electricity tariff. However, without revenue from CERs, the IRRs of the proposed project are always lower than the benchmark of 10% even the four indicators various from -10% to +10%.

But if the total investment in fixed assets decreases by 25.08%, the IRRs value of the proposed project will rise up to the benchmark of 10%. However, this hypothesis will not come true with the price of

Formatiert: Nummerierung und Aufzählungszeichen

Formatiert: Zentriert

Gelöscht: 0
Gelöscht: 4
Gelöscht: 80
Gelöscht: 26
Gelöscht: 1
Gelöscht: 18
Gelöscht: 85
Gelöscht: 0
Gelöscht: 18
Gelöscht: 6
Gelöscht: 0
Gelöscht: 18
Gelöscht: 6
Gelöscht: 4
Gelöscht: 18
Gelöscht: 2
Formatiert: Zentriert

Gelöscht: 4

construction materials and wage standard rising in China[17].

If the annual electricity output increase by 28.10 %, the IRR value of the proposed project will rise up to the benchmark of 10%. However, the annual electricity output from the proposed project is calculated based on a long-term hydrological parameters, it's unlikely to increase by 28.10% for the annual electricity output.

And if the electricity tariff increases by 28.10%, the IRR value of the proposed project will up to the benchmark of 10%. The electricity tariff is mainly regulated by the market. And the proposed project owner, which is a small private company and with a small hydropower project, has very limited capacity to negotiate with the power grid company for the electricity tariff. Thus, it's also unlikely for the electricity tariff increased by 28.10% in recent years.

As for the operational cost, the influence on the IRR value is quite weak. Only when the operational cost decrease by 83.70%, the IRR value will reach the benchmark of 10%. But it's impossible for the operational costs decreasing by 83.70% because the price of construction materials and wage standard is rising in China.

In a word, Stage II is not a financial acceptable project without other revenue.

Stage III

The basic parameters for calculation of financial indicators of Stage III are shown in Table 7.

Table 7 Main parameters for calculation of financial indicators (Stage III)

No	Parameters	Unit	Value	Data Source
1	Installed capacity	MW	12.6	R-PDR-III
2	Total investment in fixed assets	million RMB Yuan	50.49	R-PDR-III, page 98
3	Annual electricity generation	MWh/y	47008	R-PDR-III, page 90
4	Annual electricity export to CCPG	MWh	45316	R-PDR-III, page 90
5	Power price (including VAT)	RMB Yuan/kWh	0.16	The Power Purchase Agreement[18]
6	Financial calculation period	y	22	R-PDR-III, page 91
7	Value added tax (VAT)	%	6	R-PDR-III, page 92
8	Income tax (0 for the first 2 years and 50% discount for the following 3 years, 33% later)	%	33	R-PDR-III, page 92
9	Additional tax for city	%	5	R-PDR-III, page 92

[17] Data source: The price of raw materials, fuel and electricity grew by 4.4% in 2007, and the producer price of industrial products grew by 3.1% in 2007in China, stated by the State Statistical Bureau in Jan. 2008. Also see http://finance.sina.com.cn/g/20080124/10024447240.shtml for details.

[18] The Power Purchase Agreement for Yuexi Dayan Small Hydropower Project signed between Yuexi County Electricity Co. Ltd. and Yuexi County Liyuan Hydropower Development Co. Ltd. on March 6, 2007.

	development			
10	Additional tax for education	%	3	R-PDR-III, page 92
11	Operation and maintenance cost	million RMB Yuan	0.824	Calculated based on data in R-PDR-III, page 91
12	Benchmark IRR	%	10	R-PDR-III, page 91

Table 8 shows the financial analysis results for Stage III without CER finance. As shown, IRR of Stage III (without income from CERs: 7.59%), is lower than the benchmark rate of return applicable, which is 10% for power project investment in the China. This therefore indicates that in comparison to other investments, the project would not be a more financially viable investment option for securing the best returns.

Table 8 IRR without income from CERs (Stage III)

Item	IRR	Benchmark
Without income from CERs	7.59%	10%

Sensitivity analysis for Stage III

A detailed sensitivity analysis of Stage III was done to test the project feasibility with varying project parameters. The project activity feasibility is mainly dependent on the following parameters:

- Total investment
- Annual electricity output amount
- Electricity tariff
- Operation cost

The sensitivity analysis results of Stage III were listed in Table 9 and shown in Figure 3 below.

Table 9 Sensitive analysis results (Stage III)

Item	-90%	-17.10%	-10%	0	10%	20%
Total investment	-	10.00%	8.92%	7.59%	6.26%	-
Annual electricity output	-	-	6.37%	7.59%	8.81%	10.00%
Electricity tariff	-	-	6.37%	7.59%	8.81%	10.00%
Operational cost	9.42%	-	7.80%	7.59%	7.38%	-

Gelöscht: 12 ... [3]
Gelöscht: 5
Gelöscht: with and
Gelöscht: 60
Formatiert: Zentriert
Gelöscht: with or
Gelöscht: 60
Formatiert: Nummerierung und Aufzählungszeichen
Formatiert: Zentriert
Gelöscht: 0
Gelöscht: .17
Gelöscht: 60
Gelöscht: 8
Gelöscht: 40
Gelöscht: 60
Gelöscht: 0
Gelöscht: 40
Gelöscht: 60
Gelöscht: 0
Gelöscht: 29
Gelöscht: 79
Gelöscht: 60
Gelöscht: 41

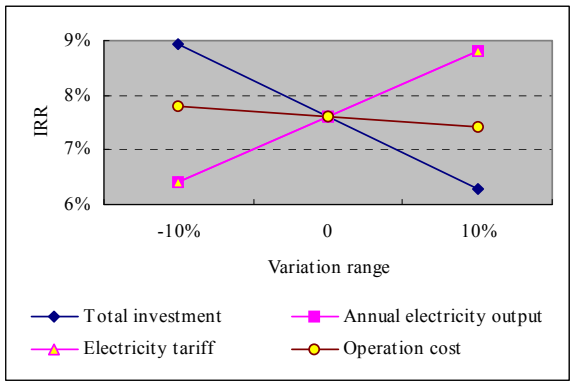

Figure 3 Sensitive analysis results (Stage III)

From the results in Table 9 and Figure 3, we can find that without revenue from CDM, the IRR values of Stage III are always lower than the benchmark even the four parameters change from -10% to +10%. Thus, the proposed project is financial unacceptable.

But If the total investment in fixed assets decreases by 17,10%, the IRRs value of the proposed project will rise up to the benchmark of 10%. However, this hypothesis will not come true with the price of constructure materials and wage standard rising in China.

If the annual electricity output increase by 20%, the IRR value of the proposed project will up to the benchmark of 10%. However, the annual electricity output from the proposed project is calculated based on a long-term hydrological parameters, it's unlikely to increase by 20% for the annual electricity output.

And if the electricity tariff increases by 20%, the IRR value of the proposed project will up to the benchmark of 10%. The electricity tariff is mainly regulated by the market. The proposed project is a small scale and run-of-river type hydropower project, the electricity amount generated from the proposed project is unstable and difficult to be under control. On the other hand, the proposed project owner is a county-level small private company; it has very limited capacity to negotiate with the big power grid company for the electricity tariff. Thus, it's also unlikely for the electricity tariff increased by 20% in recent years.

As for the operational cost, the influence on the IRR value is quite weak. The IRR value will not reach the benchmark of 10% even when the operational cost decreases by 90%.

Thus, Stage III is not financial acceptable without CDM revenue.

According to the analysis above, we can conclude that Stage II and Stage III were financial unacceptable before the installed capacities were regulated. And they were still unacceptable after the installed capacity scale-up. Without considering CDM revenues, the proposed project will not be carried out due to the investment barriers. Therefore, the proposed project activity is additional.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

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Gelöscht: .17

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Gelöscht: .17

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2Economic Evaluation Code for Small Hydropower Projects" , 2Economic Evaluation Code for Small Hydropower Projects,

Gelöscht: ¶

Gelöscht: According to the analysis above, we can conclude that the proposed project will not carried out without CDM revenues due to the investment barriers. Therefore, the proposed project activity is additional. ¶

>>
According to the methodology of AMS-I.D. (version 11) and analysis in B.3. above, Central China Power Grid (CCPG) is selected as the project boundary. The baseline emissions factor (EF_y) is calculated according to method (a) provided by the methodology AMS-I.D.(version 11) as: (a) A combined margin (*CM*), consisting of the combination of operating margin (*OM*) and build margin (*BM*) according to the procedures prescribed in the approved methodology ACM0002 (version 06).

The emission reduction of the proposed project was analyzed in the following four steps:

Step 1: calculation of the baseline GHG emissions;
Step 2: calculation of the project GHG emissions;
Step 3: calculation of the project leakage;
Step 4: calculation of the emission reductions.

Step 1: calculation of the baseline GHG emissions

In accordance with ACM0002 (version 06), baseline emissions are equal to power generated by the project activity and delivered to the grid, multiplied by the baseline emission factor. In accordance with methodology ACM0002 the baseline emission factor is calculated as either the "average of the approximate operating margin and the build margin", or the "weighted average emissions (in tCO_2e/MWh of the current generation mix)". The first option was chosen to calculate the baseline emissions by using methodology ACM0002. Baseline emission factors of operating margin ($EF_{OM,y}$) and build margin ($EF_{BM,y}$) were determined ex-ante. The baseline emission is calculated in the following 4 sub-steps:

Sub-step 2a: Calculation of the Operating Margin Emission Factor ($EF_{OM,y}$)
Sub-step 2b: Calculation of the Build Margin Emission Factor ($EF_{BM,y}$)
Sub-step 2c: Calculation of the Combines Margin Emission Factor ($EF_{CM,y}$)
Sub-step 2d: Calculation of the Baseline emission.

Sub-step 2a: Calculation of the Operating Margin Emission Factor ($EF_{OM,y}$)

Calculation of the Operating Margin should be based on one of the four following methods according to the instruction of ACM0002:

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

Although Dispatch Data Analysis should be considered the first methodology choice as required in the ACM0002, unavailability of detailed information in China, such as the dispatch data make method (c) not feasible for the calculation in China.

In China, specific data from the grid or each power plant is treated as business confidential and thus not publicly available. The data of load curves are not available. Therefore, the Simple adjusted OM (b) cannot be possibly used for the proposed project either.

The low-cost must run resources constitute less than 50% of total grid generation in Central China Power Grid, the percentage of the low-cost must run resources in the recent 5 years are: 37% in 2001,

36% in 2002, 34.43% in 2003, 38.44% in 2004 and 38.18% in 2005[19], which accords with the defined condition of method (a), but not method (d). Consequently, Simple OM method is selected to calculate the Operating Margin emission factor of the proposed project.

The Simple OM emission factor ($EF_{OM,simple,y}$) is calculated as the generation-weighted average emissions per electricity unit of all generating sources serving in the system, excluding low operating cost and must-run power plants. The formula is as following:

$$EF_{OM,simple,y} = \frac{\sum_{i,j} F_{i,j,y} \cdot COEF_{i,j}}{\sum_{j} GEN_{j,y}} \quad (1)$$

Where:
$F_{i,j,y}$ is the amount of fuel i consumed by relevant power sources j in year y,
j refers to the power sources delivering electricity to the grid, not including low-operating cost and must-run power plants, and including imports to the grid.
$COEF_{i,j}$ is the CO_2 emission coefficient of fuel i, taking into account the carbon content of the fuels used by relevant power sources j and the percent oxidation of the fuel in years y, and
$GEN_{j,y}$ is the electricity delivered to the grid by source j.

The CO_2 emission coefficient of fuel type i ($COEF_i$) is obtained as:

$$COEF_i = NCV_i \cdot EF_{CO2,i} \cdot OXID_i \quad (2)$$

Where:
NCV_i is the net calorific value per ton or m^3 of a fuel i, a country-specific value is used.
$OXID_i$ is the oxidation factor of the fuel i, an IPCC default value is used.
$EF_{CO2,i}$ is the CO_2 emission factor per GJ of fuel type i, an IPCC default value is used.

$EF_{OM,y}$ = 1.2899 tCO_2e/MWh.
For the detailed information, please see the Annex 3.

Gelöscht: 29086

Sub-step 2b: Calculation of Build Margin Emission Factor ($EF_{BM,y}$)

To calculate the Build Margin (BM), the formula is the following according to the methodology:

$$EF_{BM,y} = \frac{\sum_{i,m} F_{i,m,y} \cdot COEF_{i,m}}{\sum_{m} GEN_{m,y}} \quad (3)$$

Where:
$F_{i,m,y}$ is the amount of fuel i consumed by plant m in year y,
$COEF_{i,m,y}$ is the CO_2 emission coefficient of fuel i, taking into account the carbon content of the fuels used by plant m and the percent oxidation of the fuel in year y.
$GEN_{m,y}$ is the electricity delivered to the grid by plant m.

ACM0002 provides two options for calculating $EF_{BM,y}$, both options have the same requirement on

[19] Data source: China Electric Power Yearbook 2002-2006.

sample group *m:* either the five power plants built most recently, or the power plants capacity additions in the electricity system that comprising 20% of the system generation and that have been built most recently.

However, it is very difficult to obtain the data of the five power plants built most recently because these data are considered as confidential information by the company itself and the Grid in China. Therefore, a deviation approved by the EB[20] is applied here in the calculation that is to calculate the new capacity additions and the proportion of each technology of power generation. Then the weighing of capacity additions of different technologies will be worked out. Finally the emission factor will be calculated by employing the efficiency factor representing the best technology commercially available in the national grid of China, as a conservative proxy. The project chooses ex-ante $EF_{BM,y}$.

Deviated Calculation of Build Margin (BM):

(1) Calculation of the new capacity additions:

The formula derived from the deviation of the methodology is expressed as:

$$EF_{BM,y} = \frac{CAP_{thermal,y-n,y}}{\sum_j CAP_{j,y-n,y}} \bullet EF_{thermal,adv} \qquad \textbf{(4)}$$

Where:

$CAP_{thermal,y-n,y}$ is the incremental installed capacity of thermal power generation sources (MW) in year *y* compared to that of year *y-n*;

$\sum_j CAP_{j,y-n,y}$ is the aggregate incrementally installed capacity of all kinds of power generation sources (MW) in year *y* compared to that of year *y-n*;

The way of defining "*n*" is the following:
The generation capacity addition used to calculate the BM has to be above 20% of the current electricity generation capacity in year *y*. "*n*" is therefore the number of years (y-1, y-2,…, y-n) which have to be considered to achieve the 20% capacity addition to the current electricity generation capacity.

The result for "*n*" should mean that:

$$\frac{\sum_j CAP_{j,y-n}}{\sum_j CAP_{j,y}} \geq 20\% \qquad \textbf{(5)}$$

From 2002 to 2005 (the most recent year for which data is available), the amount of capacity additions is over 20% of the total capacity in 2005 in the Central China Power Grid. Therefore "*n*" =3 (See Annex 3).

(2) Calculation of weights of CO2 emissions of solid, liquid and gas fuel in total emissions for

[20] http://cdm.unfccc.int/Projects/Deviations

power generation:

The weights of CO_2 emissions from solid, liquid and gas fuels in the total emissions in CCPG are calculated by the formulae as follows:

$$\lambda_{Coal} = \frac{\sum_{ieCOAL,j} F_{i,j,y} \times COEF_{i,j}}{\sum_{i,j} F_{i,j,y} \times COEF_{i,j}} \quad (6)$$

$$\lambda_{Oil} = \frac{\sum_{ieOIL,j} F_{i,j,y} \times COEF_{i,j}}{\sum_{i,j} F_{i,j,y} \times COEF_{i,j}} \quad (7)$$

$$\lambda_{Cas} = \frac{\sum_{ieGAS,j} F_{i,,j,y} \times COEF_{i,j}}{\sum_{i,j} F_{i,j,y} \times COEF_{i,j}} \quad (8)$$

Where:
λ_{Coal}, λ_{Oil} and λ_{Oil} respectively refers to weights of CO_2 emissions of solid, liquid and gas fuel in total emissions; *Coal,Oil and Gas* respectively refers to the group of solid, liquid, and gas fuels;
$F_{i,j,y}$ is the amount of fuel *i* consumed in province *j* in year *y*;
$COEF_{i,j,y}$ is the CO_2 emission coefficient of fuel *i*, taking into account the carbon content of the fuels *i* used in province *j* and the percent oxidation of the fuel in years *y*.

λ_{Coal} = 99.47%, λ_{Oil} = 0.17%, and λ_{Gas} = 0.36%
For the detailed information, please see the Annex 3.

Gelöscht: 48
Gelöscht: 35

(3) Calculation of Emission Factor of Relevant Thermal Power:

The emission factor of thermal is then calculated by using a formula as follows:

$$EF_{Thermal,adv} = \lambda_{Coal} * EF_{Coal.\,Adv} + \lambda_{Oil} * EF_{Oil.Adv} + \lambda_{Gas} * EF_{Gas.\,Adv} \quad (9)$$

Where:
$EF_{Coal,Adv}$, $EF_{Oil,Adv}$ and $EF_{Gas,Adv}$ respectively refers to the emission factor representing best technology commercially available for fuel of coal, oil or gas fired power plants.
$\lambda_{Coal,}$ λ_{Oil} and λ_{Gas} respectively refers to the weighing of capacity additions for fuel of coal, oil or gas fired power plants.

According to analysis in Sub-step 2, CO_2 emissions from the coal, oil and gas in CCPG accounted for 99.47%, 0.17% and 0.36% in total emissions of the grid in 2005, respectively, (see annex 3 for details). So, most of the CO_2 emissions in CCPG come from coal.

Gelöscht: 48
Gelöscht: 35

The most advanced and commercially available coal power technology in China in 2005 is 600MW sub-critical unit with power supply coal consumption of 343.33 gce/kWh, which is equivalent to a

power supply efficiency of 35.82%[21]. Thus, $EF_{Coal,Adv}$ is calculated to be 0.9508 tCO_2e/MWh (see Table 14 in annex 3 for details).

According to above analysis and Equation (9), the estimated emission coefficient of new thermal power plants ($EF_{Thermal,adv}$) is:

$EF_{thermal,adv}$= 99.47% * 0.9508 + 0.17% * 0.5843 + 0.36% * 0.4237 = 0.94833 tCO_2e/MWh.

Formatiert: Einzug: Erste Zeile: 0,5 ch

Gelöscht: $EF_{thermal,adv}$ = 99.48% * 0.9508 + 0.17% * 0.5843 + 0.35% * 0.4237 = 0.94833 tCO_2e/MWh.¶

(4) Calculation of BM of the Grid:

The calculation of the Grid BM is based on the results above and the weighing of thermal power of recent 20% capacity additions.

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

Where:
CAP_{Total} is the total of new capacity additions;
$CAP_{Thermal}$ is the new capacity addition of thermal power.

The share of thermal power of recent 20% capacity addition is 69.52% (See Annex 3 for details), thus, the Build Margin emission factor ($EF_{BM,y}$) of the Central China Power Grid is calculated as:

$EF_{BM,y}$ = 69.52% * $EF_{Thermal,adv}$ = 69.52% * 0.94833 = 0.6592 tCO_2e/MWh.

Formatiert: Einzug: Erste Zeile: 2,56 ch

Gelöscht: ¶
$EF_{BM,y}$ = 69.52% * $EF_{Thermal,adv}$ = 69.52% * 0.94833 = 0.65928 tCO_2e/MWh.¶

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Sub-step 2c: Calculation of Combined Margin Emission Factor

To calculate EF_y with the combined margin (CM), the following equation is used:

$$EF_y = w_{OM} * EF_{OM,y} + w_{BM} * EF_{BM,y} \quad \textbf{(11)}$$

Where:
EF: baseline emission factor (tCO_2e/MWh);
w_{OM}: Operation Margin weight, which is 0.5 by default;
$EF_{OM,y}$: Operational Margin emission factor (tCO_2e/MWh);
w_{BM}: Build Margin weight, which is 0.5 by default;
$EF_{BM,y}$: Build Margin emission factor (tCO_2e/MWh);
y: a given year.

Thus, EF_y = 0.5 * 1.2899 + 0.5 * 0.6592 = 0.97455 (tCO_2e/MWh)

Gelöscht: 29086

Gelöscht: 8

Gelöscht: 97507

Sub-step 2d: Calculation of the Baseline emission

The baseline emissions (BE_y) are obtained as:

$$BE_y = EG_y * EF_y \quad \textbf{(12)}$$

[21] Data source: http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File1374.pdf

Where:

BE_y: the baseline emission of Central China Power Grid in year *y*;
EG_y: the amount of power generated by the Project and supplied to the grid;
EF_y: the ex-ante emission factor in year *y*.

$$EG_y = EG_{output,y} - EG_{imput,y} \quad \textbf{(13)}$$

Where:

EG_y: the net Electricity supplied to the grid by the Project in year *y*;
$EG_{output,y}$: the Electricity supplied to the grid by the Project in year *y*;
$EG_{import,y}$: the Electricity purchased from the grid by the Project in year *y*;

Step 2: calculate the project GHG emissions

The proposed project is a run-of-river hydro project; hence, the Project emission is zero.

Step 3: calculate the project leakage

As newly built hydropower plants, there is no energy generating equipment be transferred from another activity and no existing equipment be transferred to another activity involved in the Project activities. No leakage needs to be considered in the Project.

Step 4: calculate the emission reductions

The annual emission reductions ER_y for the Project activity are calculated as the baseline emissions minus the Project emissions. The final GHG emission reductions are calculated as follows:

$$ER_y\ (tCO_2e/y) = BE_y - PE_y = EG_y * EF_y - 0 \quad \textbf{(14)}$$

Where:

PE_y: Project emissions in year *y* in tCO_2e;
GE_y: Electricity supplied to the grid by the Project each year in MWh/y;
EF_y: GHG emission factor of the Central China Power Grid (ex-ante) in tCO_2e/MWh.

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

(Copy this table for each data and parameter)

Data / Parameter:	***Installed Capacity of the project activity (Stage II)***
Data unit:	MW
Description:	The installed capacity of the project activity (Stage II)
Source of data used:	The Preliminary Design Report for Installed Capacity Regulation in Dayan Stage II;
Value applied:	1.6
Justification of the choice of data or description of measurement methods and procedures actually applied :	These data are from the Preliminary Design Report for Installed Capacity Regulation in Dayan Stage II, which has been approved by the local governments.
Any comment:	*The data has been approved by the local government*

Data / Parameter:	***Installed Capacity of the project activity***
Data unit:	MW

Description:	The installed capacity of the project activity (Stage III)
Source of data used:	The Preliminary Design Report for Installed Capacity Regulation in Dayan Stage III
Value applied:	12.6
Justification of the choice of data or description of measurement methods and procedures actually applied :	These data are from the Preliminary Design Report for Installed Capacity Regulation in Dayan Stage III, which has been approved by the local governments.
Any comment:	*The data has been approved by the local government*

Data / Parameter:	$F_{i,j,y}$
Data unit:	ton or m^3
Description:	The amount of fuel *i* consumed by relevant power source *j* in year y.
Source of data used:	China Energy Statistics Yearbook 2006
Value applied:	See Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	Official released statistic; publicly accessible and reliable data source.
Any comment:	*Official data*

Data / Parameter:	***Electricity generation in CCPG***
Data unit:	MWh
Description:	The electricity generation by source *j* in year *y* of each province connected to CCPG
Source of data used:	China Electric Power Yearbook (2004-2006)
Value applied:	See Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	Official released statistic; publicly accessible and reliable data source
Any comment:	*Official data*

Data / Parameter:	***Internal use rate of power station***
Data unit:	%
Description:	The internal use rate of power source *j* in each province connected to CCPG
Source of data used:	China Electric Power Yearbook (2004-2006)
Value applied:	See Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	Official released statistic; publicly accessible and reliable data source
Any comment:	*Official data*

Data / Parameter:	NCV_i
Data unit:	kJ/tm^3

Description:	The net calorific value (energy content) per mass or volume unit of fuel *i*.
Source of data used:	China Energy Statistic Yearbook (2004-2006)
Value applied:	See Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	Official released statistic; publicly accessible and reliable data source
Any comment:	*Official data*

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

Data / Parameter:	$OXID_i$
Data unit:	%
Description:	The oxidation factor of the fuel
Source of data used:	2006 IPCC Guidelines for National Greenhouse Gas Inventories: Volume 2 Energy
Value applied:	See Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	IPCC default value
Any comment:	*IPCC data*

Data / Parameter:	$SCC_{Coal,adv}$
Data unit:	gce/kWh
Description:	Standard coal consumption in a 600MW sub-critical unit with coal consumption in a thermal power plant
Source of data used:	http://cdm.ccchina.gov.cn/Website/CDM/UpFile/File1374.pdf
Value applied:	343.33
Justification of the choice of data or description of measurement methods and procedures actually applied :	Official released statistic; publicly accessible and reliable data source
Any comment:	*Official data*

Data / Parameter:	$CAP_{m,y,j}$
Data unit:	MW

Description:	The installed capacity of power source *j* of province *m* in years *y*.
Source of data used:	China Electric Power Yearbook (2003-2006)
Value applied:	See Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	Official released statistic; publicly accessible and reliable data source
Any comment:	*Official data*

B.6.3 Ex-ante calculation of emission reductions:

>>

As described in B.6, the emission reductions of the proposed project are calculated as follows:

Baseline emissions

According to the Preliminary Design Reports of the proposed project, the annual electricity delivered to the grid (GE) is approximately 6319 MWh from Stage II and 45316 MWh from Stage III.

Based on the calculation results in B.6.1 above, the emission factors is as follows:

$EF_{OM,y}$ = 1.2899 tCO_2e/MWh
$EF_{BM,y}$ = 0.6592 tCO_2e/MWh

Gelöscht: 29086
Gelöscht: 8

According to the calculation result above, the combined ex-ante baseline emission factor of the project is 0.97455 tCO_2e/MWh. The calculation equation is as follows:

Gelöscht: 97507

EF_y = 1.2899 * 0.5 + 0.6592 * 0.5 = 0.97455 tCO_2e/MWh

Gelöscht: 29086
Gelöscht: 8
Gelöscht: 97507

Annual baseline emissions are 6158 tCO_2e for Stage II and 44163 tCO_2e for Stage II, respectively. The calculation equation is as follows:

Gelöscht: 6161
Gelöscht: 44186

$BE_{II,y}$ = 6319 * 0.97455 = 6158 tCO_2e
$BE_{III,y}$ = 45316 * 0.97455 = 44163 tCO_2e

Gelöscht: 97507 = 6161
Gelöscht: 97507 = 44186

Project emissions

The proposed project is a run-of-river hydropower project; hence, the project emission is zero. Therefore, $PE_y = 0$

Leakage

As described in section B.6.1, the leakage of the Project ($L y$) will be 0 tCO_2e.
Therefore, $L_y = 0$

Emission reductions calculation

Based on formula (14) in section B.6.1, the ex-ante annual emission reductions are estimated as 6158 tCO_2e for Stage II and 44163 tCO_2e for Stage III. Thus, the total emission reduction from the proposed project will be 50321 tCO_2e per year. The proposed project activity is expected to achieve

Gelöscht: 6161
Gelöscht: 44186
Gelöscht: 50347

352247 tCO_2e of net emission reductions during the first 7-year crediting period.

Gelöscht: 352429

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

>>

Stage II

Year	Estimation of project activity emissions (tCO_2e)	Estimation of baseline emissions (tCO_2e)	Estimation of leakage (tCO_2e)	Estimation of overall emission reductions (tCO_2e)
Oct.2008-Sep.2009	0	6158	0	6158
Oct.2009-Sep.2010	0	6158	0	6158
Oct.2010-Sep.2011	0	6158	0	6158
Oct.2011-Sep.2012	0	6158	0	6158
Oct.2012-Sep.2013	0	6158	0	6158
Oct.2013-Sep.2014	0	6158	0	6158
Oct.2014-Sep.2015	0	6158	0	6158
Total (tCO_2e)	**0**	**43106**	**0**	**43106**

Gelöscht: 43127… [4]

Stage III

Year	Estimation of project activity emissions (tCO_2e)	Estimation of baseline emissions (tCO_2e)	Estimation of leakage (tCO_2e)	Estimation of overall emission reductions (tCO_2e)
Oct.2008-Sep.2009	0	44163	0	44163
Oct.2009-Sep.2010	0	44163	0	44163
Oct.2010-Sep.2011	0	44163	0	44163
Oct.2011-Sep.2012	0	44163	0	44163
Oct.2012-Sep.2013	0	44163	0	44163
Oct.2013-Sep.2014	0	44163	0	44163
Oct.2014-Sep.2015	0	44163	0	44163
Total (tCO_2e)	0	309141	0	309141

Gelöscht: 309302… [5]

B.7 Application of a 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:	$EG_{output,y}$
Data unit:	MWh
Description:	Electricity supplied to the grid by the project
Source of data to be used:	Cumulative reading of electricity meter installed at Naituo Transformer Substation.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	51635
Description of measurement methods and	The electricity generated from Stage II and Stage III will be jointly exported to the power grid. The main electricity meter is located at

procedures to be applied:	Naituo Transformer Substation that is owned and managed by the grid company. The readings of the electricity meter will be hourly measured and monthly recorded. Data will be archived for 2 years following the end of the crediting period by means of electronic and paper backup. The accuracy of electricity meter is 0.5s
QA/QC procedures to be applied:	According to national standards, meters will be calibrated periodically. Data measured by meters will be cross checked by electricity sales receipt. All calibration and maintenance standards and procedures will follow the industrial codes and regulations of the grid company. The main meter will be jointly read by the project developer and the grid company.
Any comment:	Calibration on both the revenue meter and the backup meter will be done by a qualified party every year. In case of a reading of the revenue meter is evidenced to be wrong (or a calibration is not ok), readings from the backup meter which is owned and managed by the project developer would be adopted.

Data / Parameter:	$EG_{import,y}$
Data unit:	MWh
Description:	Electricity purchased from the Grid by the proposed project during year y
Source of data to be used:	Cumulative reading of electricity meter installed at Naituo Transformer Substation.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	According to the actual records.
Description of measurement methods and procedures to be applied:	The main data source meter is located at Naituo Transformer Substation that is owned and managed by the grid company. The readings of the electricity meter will be hourly measured and monthly recorded. Data will be archived for 2 years following the end of the crediting period by means of electronic and paper backup. The accuracy of electricity meter is 0.5s.
QA/QC procedures to be applied:	All calibration and maintenance standards and procedures will follow the industrial codes and regulations of the grid company. According to national standards, meters will be calibrated periodically. Data measured by meters will be cross checked by electricity sales receipt.
Any comment:	Calibration on both the revenue meter and the backup meter will be done by a qualified party every year. In case of a reading of the revenue meter is evidenced to be wrong (or a calibration is not ok), readings from the backup meter which is owned and managed by the project developer would be adopted.

B.7.2 Description of the monitoring plan:

>>

The Monitoring Plan for this project has been developed to ensure that from the start, the project is

well organized in terms of the collection and archiving of complete and reliable data.

1. Monitoring organization

Prior to the start of the crediting period, the organization of the monitoring team will be established. Clear roles and responsibilities will be assigned to all staff involved in the CDM project and a single CDM Manager will be nominated. The CDM Manager will have the overall responsibility for the monitoring system on this project.

All other CDM monitoring staff will have clearly defined roles and responsibilities. The CDM Manager will manage the process of training new staff, ensuring trained staff performs the monitoring duties and that where trained monitoring staff is absent; the integrity of the monitoring system is maintained by other trained staff.

A handbook of monitoring will be established prior to the start of the project. These procedures will detail the organization, control and steps required for certain key monitoring system features, including:
1. Introduction
2. CDM project management system
3. CDM data and record keeping arrangements
   3.1 CDM data to be monitored and recorded
   3.2 CDM data quality control and quality assurance
   3.3 Equipment calibration
4. Internal Reporting Procedure
5. Meter failure

See Annex 4 for a description and the scope of these procedures.

The CDM Manager will be responsible for ensuring that the procedures are followed on site and for continuously improving the procedures to ensure a reliable monitoring system is established.

All staff involved in the CDM project will receive some relevant training from the project consulting company laid down in training procedures agreed on by the project developer and the consulter (further details of the training procedure is provided in Annex 4). Records of trained CDM staff will be retained by the Project Developer. The CDM Manager will ensure that only trained staff is involved in the operation of the monitoring system.

2. Monitoring equipment and installation

Given the emission factor is ex-calculated and according to AMS.I.D. (version 11), the only data to be monitored is electricity supplied to the grid by the project (detailed in B.7.1).

Metering of Electricity Supplied to the Grid. The main electricity meter for establishing the electricity delivered to the grid (detailed in B.7.1) will be installed at Naituo Transformer Substation at 35kV level, which is owned and managed by the grid company, the accuracy of electricity meter is 0.5s. This electricity meter will be the revenue meter that measures the quantity of electricity that the project will be paid for. As this meter provides the main CDM measurement, it will be the key part of the verification process.

To ensure maximum availability of CDM data and to introduce quality controls of the CDM data, a backup meter will be installed in addition to the revenue meter. The revenue meter will be located at the export of transmission line where is at Naituo Transformer Substation, measuring the electricity exported from the project. And the back-up meter will be located at the powerhouse of Stage III. The principal diagram of the meter positions are as Figure 4.

Electricity meters should meet the relevant local standards at the time of installation. Before the installation of the meters, it should be factory calibrated by the manufacturer. The meters will be installed by either the project developer or the grid company according to the national Chinese standard "electricity meter installation technical management code" (DL/T448-2000). Records of the meter (type, make, model and calibration documentation) will be retained in the quality control system.

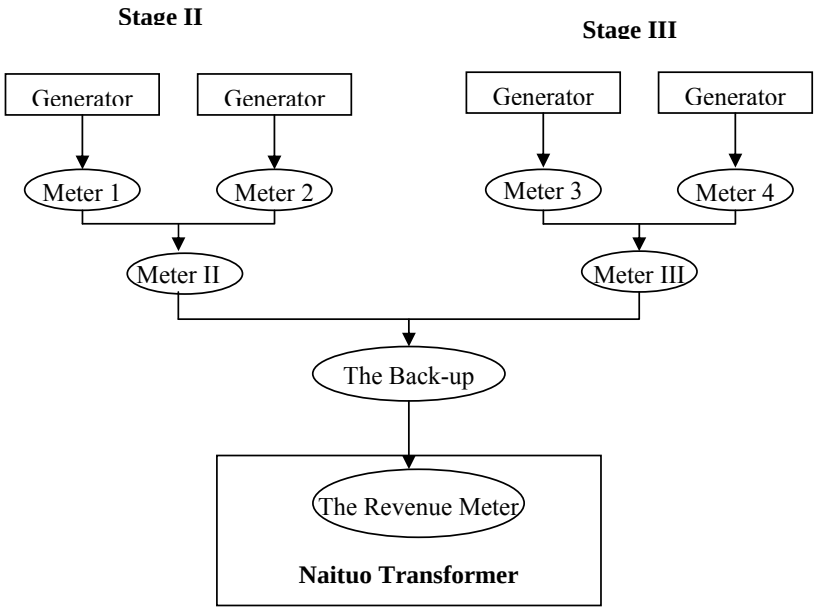

Figure 4 Meter positions of the project

QC/QA

The project developer will sign an agreement with the grid company to specify the QA procedure for measurement and calibration to ensure the measurement accuracy of the main meter. Periodic checks should be conducted according to the relevant national standard. For further details on the CDM data quality control and quality assurance see the CDM Monitoring System Procedures in Annex 4.

In case the following circumstances occur on the revenue meter:

a) any abnormal circumstances identified
b) meter failure
c) meter is repaired or replaced due to faults of the meter parts

The project developer and the grid company will ensure informing the counterparty immediately to jointly appoint a qualified third party conduct appropriate action accordingly. In the mean time, readings from the backup meter that is owned and managed by the project developer will be adopted.

3. Data recording procedure

The process for collecting the electricity meter data will be detailed in a procedure. A summary of this procedure is provided below.

Metering Electricity Delivered to the Grid (the revenue meter)

(a) At the end of each month, the project developer and the grid company will take a meter reading and record this figure.
(b) The grid company provides the project developer with the amount of electricity supplied to the grid. This will form the electricity supply figure on the purchase receipt;
(c) After a cross check with the project developer's own meter, the project developer records the electricity delivered to the grid;

Metering of Electricity Output from the Hydro Station (the Backup Meter)

The backup meter will be installed, operated and maintained according to the relevant Chinese standard [JJG597-89] to enable the use of the data as a cross check or back up in the case of a failure of the main meter. Every main meter reading will be crossed checked with the site electricity meter. The actual readings are expected to show a slight variation as a result of transmission losses. The difference between the readings will be recorded over time to establish the typical transmission losses and to take account of these in any situation where the backup meter data is used in CDM calculation (only where accurate main meter data is unavailable).

Main meter failure – use of backup meter data

If the main electricity meter is found to be faulty during its reading, data from the backup meter will be used in its place. In this circumstance, the electricity delivered to the grid should be calculated as follows:

a) The data from backup meter will be used for the period, with a minor adjustment to allow for transmission losses.
b) According to the historical transmission loss rate, the electricity delivered to the grid can be calculated.

Backup meter failure

In the event of the backup meter failing, it will be repaired or replaced by an accredited equipment testing organization. Maintenance records and any calibration documents will be retained by the project developer.

Possible fault with either meter

During the process of cross-checking the electricity data from the two meters, a difference may be established that is considerably larger than the historic difference (allowing for transmission losses).

In this unlikely case, it could be either electricity meter at fault. The data recording procedures for this circumstance will be specified in a separate procedure.

4. Data and records management

At the end of each month the monitoring data needs to be filed electronically. The electronic files need to have CD back-up or print-out. The project developer needs to keep electricity sale and purchase invoices.

All written documentation such as maps, drawings, the EIA and the Feasibility study, should be stored and should be available to the verifier so that the reliability of the information may be checked.

In order to make it easy for the verifier to retrieve the documentation and information in relation to the project emission reduction verification, the project developer should provide a document register. The document management system will be developed to ensure adequate document control for CDM purposes.

The dedicated CDM Manager of the project developer is responsible for checking the data (according to a formal procedure) and the CDM Manager will be responsible for managing the collection, storage and archive of all data and records. A procedure will be developed to manage the CDM record keeping arrangements. All the data shall be kept until two years after the end of credit period.

For details of the operational and management structure used for the monitoring of the project activity, please see Annex 4.

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

>>

Date of completing the final draft of this baseline section (DD/MM/YYYY)

20/08/2008

Gelöscht: 26/09/2007¶

Name of person of determining baseline:

Dr. Jing LI
Unit: College of Environmental Science and Engineering, Hunan University
Address: Yuelu Mountain, Changsha, Hunan 410082, P.R.China

Dr. Hongyu LIU
Unit: College of Environmental Science and Engineering, Hunan University
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Email: hyliuhnu@126.com

The persons of determining baseline are not project participant.

SECTION C. Duration of the project activity / crediting period

C.1 Duration of the project activity:

Formatiert

C.1.1. Starting date of the project activity:

>>
06/04/2007 for Stage II (the starting date for the construction activity)
01/07/2006 for Stage III (the starting date for the construction activity)

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

>>
20 years 0 month

Gelöscht: 21

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

C.2.1. Renewable crediting period

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

>>
01/10/2008 or the project register date

Gelöscht: 08

C.2.1.2. Length of the first crediting period:

>>
7 years 0 month

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. If required by the host Party, documentation on the analysis of the environmental impacts of the project activity:

>>
The complete Environmental Impact Assessment (EIA) for Stage II and Stage III of Yuexi Dayan Small Hydropower Project have been carried out respectively. The EIA report of Stage II was approved by Yuexi County Environmental Protection Bureau on May 8, 2007 (document number Yue

Huan Han [2007]14)[22]. and the EIA report of Stage III was approved by by Liangshan State Environmental Protection Bureau on April 25, 2006 with a document number of Liang Huan Han [2006]72[23]. Conclusions of the EIA reports are summarized as follows:

1. Noise impact assessment

Noise pollution will result from the explosion, machinery running and materials transportation during construction of the project. But no significant negative impacts are considered to the local inhabitants because they live far from the project site.

2. Atmospheric/air impact assessment

Some air pollutants will be let out from the explosion and machinery running. No significant negative impacts are considered because most of these pollutants are let in the tunnel and no inhabitants live near the project site. During the construction of the tunnel, the workers will wear gas mask, and Ventilation condition of the tunnel will be enhanced.

3. Water quality impact assessment

Waste water will be generated during the construction and operation periods of the proposed project. All of this waste water will be treated before drained into Dayan River. Therefore, the project does not have negative effect on quality of water in nearby area.

4. **Ecological Impact assessment**

The proposed project is a run-of-river hydropower project, no reservoir and no flooding area will come into being as stated in the EIA reports of the proposed project.

Terrestrial plants: Detailed analysis shows that adverse impacts on terrestrial plants are quite limited because there are no any rare and endangered species in the construction area.

Terrestrial animals: According to investigation, no any rare and endangered species near the project site. Therefore, the construction of the project would have little adverse impacts on it.

Aquatic creatures: No rare and endangered aquatic species were found in the river near the project site. Thus, no adverse impacts on aquatic creatures are expected due to the project activities.

The diversion system will reroutes water away from the natural river course, reducing the volume between the diversion and the point where the water is returned to the river. According to the investigation, no big fish and other aquatic creatures were found in the river. And according to the

[22] The Environmental Impact Assessment Report of Stage II of Yuexi Dayan Small Hydropower Project was written by Sichuan Provincial Nuclear Industry Geologic Survey Institute on Dec. 22, 2006, and was approved by Yuexi County Environmental Protection Bureau on May 8, 2007 (document No: Yue Huan Han [2007]14).

[23] The Environmental Impact Assessment Report of Stage III of Yuexi Dayan Small Hydropower Project was written by Xichang Lantian Environmental Protection Consulting Co. Ltd. in April 2006, and was approved by Liangshan State Environmental Protection Bureau on April 25, 2006 (document No: Liang Huan Han [2006]72).

EIA, the project developer will ensure that minimum ecological water flows will be maintained, therefore the negative impacts are not considered to be significant.

5. Erosion impact assessment

In China, the Law of Water and Soil Conservation requires that a soil conservation plan should be prepared and implemented for all kind of hydropower projects. The Water and Soil Conservation Plan for Stage II was prepared and approved by Yuexi County Water Resources Bureau on September 27, 2006 (document number: Yue Shui Bao Han [2006]19), and that for Stage III was approved by Liangshan State Water and Soil Conservation Bureau on November 10, 2005 (document number: Liang Shui Bao Fa [2005]24). In the plan, total amount of soil erosion was predicted, detailed protection measures were identified.

It is concluded that with implementation of the plan the soil erosion will be under effective control and the soil erosion due to construction of the GHP would be with an acceptable level.

6. Social impact assessment

The proposed project is a run-of-river hydropower project; no inhabitants need to be resettled due to the project construction[24]. The EIA states that the project will contribute to the development of the local economy and society. The project will also enhance the investment environment for the local economy. Both the EIA reports and the Preliminary Design Reports note that the implementing of the project will increase local inhabitants' living standards, improve infrastructure and therefore make it a more attractive environment for investment.

7. Conclusion

It can be concluded that the proposed project activity does not have obvious negative effects to the environment on the whole, and the project will results in more positive environmental benefits by reducing both GHG emissions and local environmental pollutants caused by coal combustion, increasing in local inhabitants' living standards, improvement in infrastructure level etc. Therefore the project will have positive impact on socioeconomic environment.

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

>>

Strict environmental monitoring and mitigation measures will be carried out during the construction and operation phase of the project. Through these measures, the negative environmental impacts arising from the project will be reduced to minimum. Therefore, environmental impacts of the project are considered to be insignificant. Taking into account the contribution to sustainable development for the local and national area, the project will have an overall positive impact on the local and global environment. The EIA report for the proposed project indicated that the project would have

[24] Data source: Statement on No inhabitant resettlement in Yuexi County Dayan Stage II Hydropower Plant issued by the people's government of Yuexi County on May 23, 2006, and
Statement on No inhabitant resettlement in Yuexi County Dayan Stage III Hydropower Plant issued by the people's government of Yuexi County on May 23, 2006

significant positive impacts on local environment.

SECTION E. Stakeholders' comments

>>

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

>>

According to the requirement by the Measures for Operation and Management of Clean Development Mechanism Projects in China, a survey on the local villagers and residents has been conducted. The local government and stakeholders were invited to submit comments on the project activity.

A two-page questionnaire was designed to be easily filled in with the following questions. 50 questionnaires were sent to the stakeholders by the project developer. The stakeholders include local governmental officials, local residents and related employees. This consultation was conducted in July and August 2006.

The questionnaire included Questions on the following:

The questions include:

(1) Description of the proposed project;
(2) Basic information about the stakeholders and their educational level;
(3) Questions:

Environmental impacts

1) Will construction, operation or decommissioning of the Project use or affect natural resources or ecosystems, such as land, water, forests, habitats, and materials or, especially any resources which are non-renewable or in short supply?
2) Will the Project involve use, storage, transport, handling, production or release of substances or materials (including solid waste) which could be harmful to the environment?
3) Will the Project release pollutants or any hazardous, toxic or noxious substances to air?
4) Will the Project cause noise and vibration or release of light, heat energy or electromagnetic radiation?
5) Will the Project lead to risks of contamination of land or water from releases of pollutants onto the ground or into surface waters, groundwater, coastal wasters or the sea?
6) Are there any areas on or around the location which are protected under international or national or local legislation for their ecological value, which could be affected by the project?
7) Are there any other areas on or around the location, which are important or sensitive for reasons of their ecology, e.g. wetlands, watercourses or other water bodies, the coastal zone, mountains, forests or woodlands, which could be affected by the project?
8) Are there any areas on or around the location which are used by protected, important or sensitive species of fauna or flora e.g. for breeding, nesting, foraging, resting, over wintering, migration, which could be affected by the project?
9) Are there any inland, coastal, marine or underground waters on or around the location which could be affected by the project?
10) Is the project location susceptible to earthquakes, subsidence, landslides, erosion, flooding or extreme or adverse climatic conditions e.g. temperature inversions, fogs, severe winds, which could cause the project to present environmental problems?

Socioeconomic and Health Impacts

1) Will the Project involve use, storage, transport, handling, production or release of substances or materials (including solid waste) which could be harmful to human health or raise concerns about actual or perceived risks to human health?
2) Will the Project release pollutants or any hazardous, toxic or noxious substances into air that can adversely affect human health?
3) Will the Project cause noise and vibration or release of light, heat energy or electromagnetic radiation that could adversely affect human health?
4) Will the Project lead to risks of contamination of land or water from releases of pollutants onto the ground or into surface waters, groundwater, coastal wasters or the sea that could adversely affect human health?
5) Will there be any risk of accidents during construction or operation of the Project which could affect human health?
6) Will the Project result in social changes, for example, in demography, traditional lifestyles, employment?
7) Are there any areas on or around the location, protected or not under international or national or local legislation, which are important for their landscape, historic, cultural or other value, which could be affected by the project?
8) Are there any transport routes or facilities on or around the location which are used by the public for access to recreation or other facilities and/or are susceptible to congestion, which could be affected by the project?
9) Is the project in a location where it is likely to be highly visible to many people?
10) Are there existing or planned land uses on or around the location e.g. homes, gardens, other private property, industry, commerce, recreation, public open space, community facilities, agriculture, forestry, tourism, mining or quarrying which could be affected by the project?
11) Are there any areas on or around the location which is densely populated or built-up, or occupied by sensitive uses e.g. hospitals, schools, places of worship, community facilities, which could be affected by the project?
12) Are there any areas on or around the location which contain important, high quality or scarce resources e.g. groundwater, surface waters, forestry, agriculture, fisheries, tourism and minerals, which could be affected by the project?
13) Is the project location susceptible to earthquakes, subsidence, landslides, erosion, flooding or extreme or adverse climatic conditions e.g. temperature inversions, fogs, severe winds, which could cause the project to present socioeconomic problems?

E.2. Summary of the comments received:

>>

The survey received 100% participation (50 questionnaires retuned out 50). The survey shows that stakeholders believe that the project will have positive impacts on the local ecological, environmental, employment, and social life. The survey forms are available from the company.

question	answer			comment
	YES	NO	Quit	
Environmental Impacts				
1	0	100%		
2	0	100%		
3	0	96%	4%	
4	4%	96%		The noise impact is not significant because the project site is far from the inhabitants.

5	0	100%		
6	0	100%		There are not areas on or around the location which are protected under international or national or local legislation
7	0	100%		The project activity is far from the local inhabitants.
8	0	100%		There are not any important or sensitive species of fauna or flora near the project location.
9	0	100%		
10	0	94%	6%	
Socioeconomic and Health Impacts				
1	0	100%		
2	0	100%		
3	0	100%		The noise impact is not significant because the project site is far from the inhabitants.
4	0	100%		
5	0	100%		There are not areas on or around the location which are protected under international or national or local legislation
6	80%	16%	4%	The project activity will improve the local economic situation.
7	0	100%		There are not any important or sensitive species of fauna or flora near the project location.
8	0	100%		The noise impact is not significant because the project site is far from the inhabitants.
9	0	100%		
10	0	100%		There are not areas on or around the location which are protected under international or national or local legislation
11	0	100%		The project activity is far from the local inhabitants.
12	0	100%		
13	0	100%		

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

>>

In conclusion, the local government and inhabitants support the project activities. The proposed project will benefit the local economic development.

But some stakeholders worry about noise pollution due to the proposed project construction. The main effected stakeholders are the builders. To control noise pollution, low-noise equipments and soundproof treatments were carried out in the proposed project. However, the inhabitants will not suffer from noise pollution because they live far from the proposed project site.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Organization:	**Yuexi Liyuan hydropower Development Co. Ltd.**
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Annex 2

INFORMATION REGARDING PUBLIC FUNDING

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

Annex 3

The installed capacity, fuel consumption data used for OM and BM calculation are derived from <China Energy Statistical Yearbook>, <China Electric Power Yearbook>. Furthermore, the data are compiled by Chinese DNA, for more information, please refer to following link:
http://cdm.ccchina.gov.cn/web/NewsInfo.asp?NewsId=1235

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

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

Fuel	Low Calorific Value	Emission Factor (tC/TJ)	Oxidation Factor (%)
Raw Coal	20908 kJ/kg	25.8	100
Cleaned Coal	26344 kJ/kg	25.8	100
Other Washed Coal	8363 kJ/kg	25.8	100
Coke	28435 kJ/kg	25.8	100
Crude Oil	41816 kJ/kg	20.0	100
Gasoline	43070 kJ/kg	18.9	100
Diesel Oil	42652 kJ/kg	20.2	100
Fuel Oil	41816 kJ/kg	21.1	100
Natural Gas	38931 kJ/m^3	15.3	100
Coke Oven Gas	16726 kJ/m^3	12.1	100
Other Gas	5227 kJ/m^3	12.1	100
LPG	50179 kJ/kg	17.2	100
Refinery Dry Gas	46055 kJ/kg	18.2	100

Gelöscht: 29.2

Gelöscht: 15.7

Data Source:

The net calorific values are quoted from <China Energy Statistical Yearbook 2006>, Page 287.

The emission factors and oxidation factors are quoted from <Revised 2006 IPCC Guidelines for National Greenhouse Gas Inventories >, Volume 2 Energy, Table 1.3 and Table 1.4 in Page 1.21-1.24 of Chapter 1.

Sub-step 2a: Calculation of the Operating Margin emission factor ($EF_{OM,y}$)

Table A2 Simple OM Emission Factors Calculation of CCPG for Year 2003

Fuel type	Unit	Province in the regional grid						Subtotal	NCV (MJ/t, m^3,tce)	Emission Factor (tC/TJ)	OXID	CO_2 emission (tCO_2e)
		Jiangxi	Henan	Hubei	Hunan	Chongqing	Sichuan					
Raw	Mt	14.274	55.049	20.72	16.465	7.6947	24.309	138.517	20908	25.8	1	273971539.89
Other washed coal	Mt	0.0203	0.3963	0	0	1.0612	0	1.4778	8363	25.8	1	0.00
Clean Coal	Mt							0	26344	25.8	1	1169146.40
Coke	Mt	0	0	0	0.0122	0	0	0.0122	28435	25.8	1	32817.4
Coke oven gas	Mm^3			0.0093				0.0093	16726	12.1	1	69013.15
Other coal gas	Mm^3	0	0	0	0	0	0	93	16726	13.0	1	0.00
Crude oil	Mt	0	0.005	0.002	0	0	0.012	0.0194	41816	20.0	1	59490.23
Gasoline	Mt							0	43070	18.9	1	0.00
Diesel	Mt	0.0052	0.0254	0.007	0.0121	0.0077	0	0.0573	42652	20.2	1	181015.94
Fuel oil	Mt	0.0042	0.0025	0.022	0.0054	0.0028	0.012	0.0486	41816	21.1	1	157229.00
LPG	Mt							0	50179	17.2	1	0.00
Refinery gas	Mt	0.0176	0.0653	0	0.0066	0	0	0.0895	46055	18.2	1	275069.63
Natural gas	Mm^3	0	0	0	0	4	220	224	38931	15.3	1	489222.52
Other oil products	Mt							0	38369	20.0	1	0.00
Other coke products	Mt							0	28435	25.8	1	0.00
Other energy	Mt-tce	0	0.1104	0	0	0.162	0	0.2724	0	0	1	0.00
Total CO_2 emission	tCO_2e											276404544.15

Data Source: China Energy Statistical Yearbook 2004

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Gelöscht: 29.2

Gelöscht: 37142.18

Gelöscht: 15.7

Gelöscht: 237285.34

Gelöscht: 276371084.6

Table A3 Fuel-fired Electricity Generation of CCPG for Year 2003

Province	Electricity Generation	Electricity Generation	Auxiliary Power Ratio	Supplied Electricity
	(10^8 kWh)	(MWh)	(%)	(MWh)
Jiangxi	271.65	27165000	6.43	25418291
Henan	955.18	95518000	7.68	88182218
Hubei	395.32	39532000	3.81	38025831
Hunan	295.01	29501000	4.58	28149854
Chongqing	163.41	16341000	8.97	14875212
Sichuan	327.82	32782000	4.41	31336314
Total				225987719

Data Source: China Electric Power Yearbook 2004

According to Table A2, the total CO_2 emissions of CCPG are **276404544.15** tCO_2e in year 2003. According to Table A3, the total supplied electricity of CCPG is 225987719.2 MWh. According to formula (2) in section B.6.1, the $EF_{OM,Simple\ 2003}$ is **1.223095** tCO_2e/MWh.

Gelöscht: 276371084.6

Gelöscht: 222947

Table A4 Simple OM Emission Factors Calculation of CCPG for Year 2004

Fuel type	Unit	Province in the regional grid						Sub total	NCV (MJ/t, m^3,tce)	Emission Factor (tC/TJ)	OXID	CO_2 emission (tCO_2e)
		Jiangxi	Henan	Hubei	Hunan	Chongqing	Sichuan					
Raw	Mt	18.638	69.285	25.105	21.979	8.755	27.479	171.441	20908	25.8	1	339092605.3
Clean Coal	Mt	0	0.0234	0	0	0	0	0.0234	26344	25.8	1	58316.13
Other washed coal	Mt	0.4893	1.0422	0	0	0.8972	0	2.4287	8363	25.8	1	1921441.23
Coke	Mt	0	1.0961	0	0	0	0	1.0961	28435	25.8	1	2948455.29
Coke oven gas	Mm^3	0	0	168	0	34	0	202	16726	12.1	1	149899.53
Other coal gas	Mm^3	0	0	0	0	261	0	261	5227	12.1	1	60527.09
Crude oil	Mt	0	0.0086	0.0022	0	0	0	0.0108	41816	20.0	1	33118.27
Gasoline	Mt	0	0.0006	0	0	0.0001	0	0.0007	43070	18.9	1	2089.33
Diesel	Mt	0.0002	0.0386	0.0107	0.0172	0.0114	0	0.0781	42652	20.2	1	266627.32
Fuel oil	Mt	0.0109	0.0019	0.0955	0.0138	0.0048	0.0168	0.1437	41816	21.1	1	464893.14
LPG	Mt							0	50179	17.2	1	0.00
Refinery gas	Mt	0.0352	0.0227	0	0	0	0	0.0579	46055	18.2	1	177950.07
Natural gas	Mm^3	0	0	0	0	0	227	227	38931	15.3	1	495774.61
Other oil products	Mt							0	38369	20.0	1	0.00
Other coke products	Mt							0	28435	25.8	1	0.00
Other energy	Mt-tce	0	0.1692	0	0.152	0.2095	0	0.5307	0	0	1	0.00
Total CO_2 emission	tCO_2											345671697.3

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Gelöscht: 29.2

Gelöscht: 3337011.41

Gelöscht: 15.7

Gelöscht: 153506.38

Gelöscht: 346035809.7

Data Source: China Energy Statistical Yearbook 2005

Table A5 Fuel-fired Electricity Generation of CCPG for Year 2004

Province	Electricity Generation	Electricity Generation	Auxiliary Power Ratio	Supplied Electricity
	(10^8 kWh)	(MWh)	(%)	(MWh)
Jiangxi	301.27	30127000	7.04	28006059
Henan	1093.52	109352000	8.19	100396071
Hubei	430.34	43034000	6.58	40202363
Hunan	371.86	37186000	7.47	34408206
Chongqing	165.2	16520000	11.06	14692888
Sichuan	346.27	34627000	9.41	31368599
Total				249074186

Data Source: China Electric Power Yearbook 2005

According to Table A4, the total CO_2 emissions of CCPG are **345671697.3** tCO_2e in year 2004. According to Table A5, the total supplied electricity of CCPG is 249074186 MWh. According to formula (2) in section B.6.1, the $EF_{OM, Simple, 2004}$ is **1.387826** tCO_2e/MWh.

Gelöscht: 346035809.7

Gelöscht: 389288

Table A6 Simple OM Emission Factors Calculation of CCPG for Year 2005

Fuel type	Unit	Province in the regional grid						Sub total	NCV (MJ/t, m^3,tce)	Emission Factor (tC/TJ)	OXID	CO_2 emission (tCO_2e)
		Jiangxi	Henan	Hubei	Hunan	Chongqing	Sichuan					
Raw	Mt	18.6929	76.3887	27.3215	17.1227	8.754	29.9977	178.2775	20908	25.8	1	352614496.8
Clean Coal	Mt	0.0002						0.0002	26344	25.8	1	498.43
Other washed coal	Mt		1.3812			0.8999		2.2811	8363	25.8	1	1804669.00
Coke	Mt		0.2595		1.05			1.3095	28435	25.8	1	3522490.83
Coke oven gas	Mm^3			0.0115		0.0036		0.0151	16726	12.1	1	112053.61
Other coal gas	Mm^3		0.102			0.0312		0.1332	5227	12.1	1	308896.88
Crude oil	Mt		0.0082	0.0036				0.0118	41816	20.0	1	36184.78
Gasoline	Mt		0.0002			0.0002		0.0004	43070	18.9	1	1193.90
Diesel	Mt	0.013	0.0303	0.0239	0.0139	0.0138		0.0949	42652	20.2	1	299797.78
Fuel oil	Mt	0.0064	0.0029	0.0315	0.0168	0.0089	0.0222	0.0887	41816	21.1	1	286959.09
LPG	Mt							0	50179	17.2	1	0.00
Refinery gas	Mt	0.0071	0.0341	0.0176	0.0078			0.0666	46055	18.2	1	204688.68
Natural gas	Mm^3						3	0.03	38931	15.3	1	655208.73
Other oil products	Mt							0	38369	20.0	1	0.00
Other coke products	Mt							0	28435	25.8	1	0.00
Other energy	Mt-tce		0.0288		0.0174	0.328		0.3742	0	0	1	0.00
Total CO_2 emission	tCO_2											359847138.48

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Gelöscht: 29.2

Gelöscht: 3986695.05

Gelöscht: 15.7

Gelöscht: 176572.11

Gelöscht: 0.015

Gelöscht: 360283226.1

Data Source: China Energy Statistical Yearbook 2006

Table A7 Fuel-fired Electricity Generation of CCPG for Year 2005

Province	Electricity Generation (10^8 kWh)	Electricity Generation (MWh)	Auxiliary Power Ratio (%)	Supplied Electricity (MWh)
Jiangxi	300	30000000	6.48	28,056,000
Henan	1315.9	131590000	7.32	121,957,612
Hubei	477	47700000	2.51	46,502,730
Hunan	399	39900000	5	37,905,000
Chongqing	175.84	17584000	8.05	16,168,488
Sichuan	372.02	37202000	4.27	35,613,475
Total				286,203,305

Data Source: China Electric Power Yearbook 2006

According to Table A6, the total CO_2 emissions of CCPG is 359847138.48 tCO_2e in year 2005. According to Table A7, the total supplied electricity of CCPG is 286203305 MWh. According to formula (2) in section B.6.1, the $EF_{OM, Simple, 2005}$ is **1.257313** tCO_2e/MWh.

Gelöscht: 360283226.1

Gelöscht: 258837

The Operating Margin (OM) emission factor is the weighted average emission factors of year 2003-2005, as follow:

Table A8 Operation Margin Emission Factor of Central China Power Grid (Weighted Average)

Item	Unit	2003	2004	2005	Weighted average
Total CO_2 emission	tCO_2e	276404544.2	345671697.3	359847138.5	
Electricity delivered to the grid	GWh	225987719.2	249074186.3	286203305	
Operation margin (OM)	tCO_2e/MWh	1.223095	1.387826	1.257313	1.289857

Gelöscht: 276371084.6

Gelöscht: 346035809.7

Gelöscht: 360283226.1

Gelöscht: 1.222947

Gelöscht: 1.389288

Gelöscht: 1.258837

Gelöscht: 29086

Sub-step 2b: Calculation of the Build Margin Emission Factor ($EF_{BM,y}$)

Table A9 Percentages of CO_2 emissions from the coal-fired, gas-fired and oil-fired power plants in total fuel-fired CO_2 emissions

Fuel type	Unit	Province in the regional grid						Sub total	NCV (MJ/t, m^3,tce)	Emission Factor (tC/TJ)	OXID	CO_2 emission (tCO_2e)
		Jiangxi	Henan	Hubei	Hunan	Chongqing	Sichuan					
Raw	Mt	1869.29	7638.87	2732.15	1712.27	875.4	2999.77	17827.75	20908	25.8	1	352614497.76
Clean Coal	Mt	0.02	0	0	0	0	0	0.02	26344	25.8	1	498.43
Other washed coal	Mt	0	138.12	0	0	89.99	0	228.11	8363	25.8	1	1804669
Coke	Mt	0	25.95	0	105	0	0	130.95	28435	25.8	1	3562840
Total coal	Mt											**357982504**
Crude oil	Mt	0	0.82	0.36	0	0	0	1.18	41816	20	1	36185
Gasoline	Mt	0	0.02	0	0	0.02	0	0.04	43070	18.9	1	1194
Kerosene	Mt	0	0	0	0	0	0	0	43070	19.6	1	0
Diesel	Mt	1.3	3.03	2.39	1.39	1.38	0	9.49	42652	20.2	1	299798
Fuel oil	Mt	0.64	0.29	3.15	1.68	0.89	2.22	8.87	41816	21.1	1	286959
Other oil products	Mt	0	0	0	0	0	0	0	38369	20	1	0
Total oil	Mt											**624136**
Natural gas	Mm^3	0	0	0	0	0	30	30	38931	15.3	1	655209
Coke oven gas	Mm^3	0	0	11.5	0	3.6	0	15.1	16726	12.1	1	112054
Other coal gas	Mm^3	0	102	0	0	31.2	0	133.2	5227	12.1	1	308897
LPG	Mt	0	0	0	0	0	0	0	50179	17.2	1	0
Refinery gas	Mt	0.71	3.41	1.76	0.78	0	0	6.66	46055	18.2	1	204689
Total gas	Mt											**1280848**
Total of Coal, Oil and Gas												**359887488**

According to Table A9 and formula (6), (7) and (8) in section B.6.1, the percentages of CO_2 emissions from the coal-fired, oil-fired and gas-fired power plants in total fuel-fired CO_2 emissions are calculated as: λ_{Coal} = 99.47%, λ_{Oil} = 0.17%, λ_{Gas} = 0.36%

Data source: China Energy statistics Yearbook 2006

China DNA: http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File1374.pdf.

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Gelöscht: 29.2

Gelöscht: 3986695.05

Gelöscht: 358406359

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Gelöscht: 15.7

Gelöscht: 176572

Gelöscht: 1252731

Gelöscht: Total of Coal, Oil and Gas ... [6]

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Gelöscht: 48

Gelöscht: 35

Table A10 Installed Capacity of CCPG in 2005

Installed capacity	Unit	Jiangxi	Henan	Hubei	Hunan	Chongqing	Sichuan	Total
Thermal plant	MW	5906	26267.8	9526.3	7211.6	3759.5	7496	60167.2
Hydropower plant	MW	3019	2639.9	8088.9	7905.1	1892.7	14959.6	38405.2
Nuclear power plant	MW	0	0	0	0	0	0	0
Wind power plant and Others	MW	0	0	0	0	24	0	24
Total	MW	8925	28807.7	17615.2	15116.7	5676.2	22455.6	98596.4

Data Source: China Electric Power Yearbook 2006

Table A11 Installed Capacity of CCPG in 2004

Installed capacity	Unit	Jiangxi	Henan	Hubei	Hunan	Chongqing	Sichuan	Total
Thermal plant	MW	5496	21788.5	9509.3	6779.5	3271.1	6900.3	53744.7
Hydropower plant	MW	2549.9	2438	7415.1	7448.2	1407.9	13382.9	34642
Nuclear power plant	MW	0	0	0	0	0	0	0
Wind power plant and Others	MW	0	0	0	0	0	0	0
Total	MW	8045.9	24226.5	16924.4	14227.8	4679	20283.2	88386.8

Data Source: China Electric Power Yearbook 2005

Table A12 Installed Capacity of CCPG in 2003

Installed capacity	Unit	Jiangxi	Henan	Hubei	Hunan	Chongqing	Sichuan	Total
Thermal plant	MW	5407.8	17635.5	8173.3	6446.7	3126.2	6104	46893.5
Hydropower plant	MW	2307.4	2438	7337.2	6603.1	1329.8	12341.5	32357
Nuclear power plant	MW	0	0	0	0	0	0	0
Wind power plant and Others	MW	0	0	0	0	0	0	0
Total	MW	7715.2	20073.5	15510.5	13049.8	4456	18445.5	79250.5

Data Source: China Electric Power Yearbook 2004

Table A13 Installed Capacity of CCPG in 2002

Installed capacity	Unit	Jiangxi	Henan	Hubei	Hunan	Chongqing	Sichuan	Total
Thermal plant	MW	5128.8	15904.5	8147.8	4975.6	3004.5	6142	43303.2
Hydropower plant	MW	2197.4	2438	7213.9	6135.3	1195.5	11854.6	31034.7
Nuclear power plant	MW	0	0	0	0	0	0	0
Wind power plant and Others	MW	0	0	0	0	0	0	0
Total	MW	7326.2	18342.5	15361.7	11110.9	4200	17996.6	74337.9

Data Source: China Electric Power Yearbook 2003

Table A14 Building Emission Calculation of CCPG

Item	Installed Capacity (MW)				2002-2005 newly installed capacity (MW)	Percentage to the newly installed capacity
	2002	2003	2004	2005		
	A	B	C	D	E=D-A	
Thermal plant	43303.2	46893.5	53744.7	60167.2	16864	69.52%
Hydropower plant	31034.7	32357	34642	38405.2	7370.5	30.38%
Nuclear power plant	0	0	0	0	0	0.00%
Wind power plant and Others	0	0	0	24	24	0.10%
Total	74337.9	79250.5	88386.8	98596.4	24258.5	100.00%
Percentage to that in 2005	75.40%	80.38%	89.64%	100%		

Table A15 Calculation parameter of BM

	Variation	Power supply efficiency	Emission factor (tc/TJ)	OXID	CO_2 emission (TCO_2/MWh)
		A	B	C	D=3.6/A/1000*B*C*44/12
Coal plant	$EF_{Coal,adv}$	35.82%	25.8	1	0.9508
Oil plant	$EF_{Oil,adv}$	47.67%	21.1	1	0.5843
Gas plant	$EF_{Gas,adv}$	47.67%	15.3	1	0.4237

According to equation (9) in B.6.1, $EF_{Thermal,adv} = \lambda_{Coal} * EF_{Coal.\,Adv} + \lambda_{Oil} * EF_{Oil.Adv} + \lambda_{Gas} * EF_{Gas.\,Adv}$
Based on the results of Table A9, λ_{Coal} = 99.47%, λ_{Oil} = 0.17%, λ_{Gas} = 0.36%
Thus, $EF_{thermal,adv}$ = 99.47% * 0.9508 + 0.17% * 0.5843 + 0.36% * 0.4237 = 0.9482 tCO_2e/MWh

Thus, $EF_{BM,y}$ will be calculated based on equation (10) as:

$EF_{BM,y}$ = 69.52% * $EF_{Thermal,adv}$ = 69.52% * 0.9482 = 0.6592 tCO_2e/MWh.

Data source: http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File1374.pdf

Table 16 Baseline emission factor of Central China Power Grid (CCPG, tCO_2e/MWh)

Operation Margin Emission Factor	A	1.2899
Build Margin Emission Factor	B	0.6592
Combined Emission Factor	C = 0.5*A + 0.5 *B	0.97455

Annex 4

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MONITORING INFORMATION

1. Introduction

This monitoring plan includes the management and implementation structures of monitoring activity, parameter to be monitored and quality control process. This plan should be modified to actual conditions and requirements of DOE in order to ensure that the monitoring is credible, transparent and conservative.

2. CDM project management system

Prior to the start of the crediting period, a monitoring team comprising of persons from relevant departments will be established. Clear roles and responsibilities will be assigned to all staffs involved in the CDM team and a single CDM Manager will be nominated. The CDM Manager will have the overall responsibility for the monitoring system on this project.

The CDM Manager will manage the process of training new staff, ensuring trained staffs perform the monitoring duties and that when trained monitoring staffs are absent, and the integrity of the monitoring system is maintained by other trained staff.

On a monthly basis, the data and records of the electricity generated from the proposed project will be checked by the CDM manager. In case of any irregularity observed by any of the CDM team member, it is informed to the concerned person for necessary actions.

3. CDM data and record keeping arrangements

3.1 CDM data to be monitored and recorded

The monitoring plan for Yuexi Dayan Small Hydropower Project requires the CDM manager to monitor the power generation from the proposed project. All the other parameters for the calculation of the baseline emission factor are fixed throughout the crediting period and the emission factor of the grid is determined ex-ante.

The net MWh generated from the proposed project and supplied to the grid will be monitored continuously by an on-site power meter installed in accordance with applicable national standards. The data will be collected from the main grid company electricity meter and the back up meter.

The output of the plant as measured by the meter will be recorded electronically on an hourly basis. And the output of the plant will also be recorded on a chart by hand (hardcopy) on a daily basis. All these hardcopy and electronic copy will be archived.

Monthly electricity sales invoices will also be available as an additional check if there is a failure/ uncertainty in the data recorded by the metering system. This data set will be provided by the CDM manager from its normal recording system.

3.2 CDM data quality control and quality assurance

Data and records will be checked prior to being stored and archived. Data from the project will be checked to identify possible errors or omissions. The data checks will include cross checks of the two electricity meters (the main meter and the back up meter), and checks of the electricity figures on the receipts. All records will be checked for completeness.

All staffs are responsible for ensuring the collection and archiving of complete and accurate data and records.

3.3 Equipment calibration

The calibration of the electricity meters will be conducted by a suitable company according to the relevant standards at least once a year. The CDM Manager is responsible for organizing the calibration and ensuring that records are retained. Documents evidencing these calibrations will be kept and archived.

4. Internal Reporting Procedure

The data from Yuexi Dayan Small Hydropower Project will be forwarded to the CDM responsible person in once a month. She/he will check the performance of the project against the PDD and also the delivery schedule of the Emission Reductions Purchase Agreement. This CDM responsible person charges of the relative reports written and communication with the EB and the CER Buyer.

Annually (or whenever verifications take place) the CDM responsible person will create a report for the total generation from Yuexi Dayan Small Hydropower Project. In addition, the CDM responsible person will charge the emission reduction calculation from the project by using the ex-ante grid emission factor.

All records will be kept in accordance with company's guidelines and the applicable industrial codes and regulations. The records will be kept electronically and on paper for the length of the crediting period of the project plus 2 years.

5. Meter failure

When the revenue meter failures, the data recorded in the back up meter will be used. And when both meters failure, the data will be calculated according to the meters installed in the main board which monitoring each generator and balance with daily recorded in the paper. This procedure should be agreed by the grid company and the project developer.

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Seite 6: [1] Gelöscht **tina** **25.08.2008 18:49:00**

Rated power (kW)	800 ×2	6300 ×2

Seite 14: [2] Gelöscht **tatiana.boldyreva** **29.08.2008 17:58:00**

12	Annual emission reduction	tCO_2e/y	6158	Calculated result
13	CERs crediting period	years	7*3	
14	Estimated CERs price	US$/CERs	10.0	

Seite 17: [3] Gelöscht **tatiana.boldyreva** **29.08.2008 18:00:00**

12	Annual emission reduction	tCO_2e/y	44163	
13	CERs crediting period	y	7*3	
14	CERs price	US$/CERs	10.0	

Seite 28: [4] Gelöscht **tina** **25.08.2008 18:49:00**

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Seite 28: [4] Gelöscht **tina** **25.08.2008 18:49:00**

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