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

CONTENTS

Annexes

SECTION A. General description of small-scale project activity

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

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Title: Sichuan Lengshuikou 12.1 MW Small-Scale Bundled Hydropower Project
Version: 08
Date: September 8, 2010

Version	Date	Description
Version 01.1	February 2008	PDD prepared for Host Country DNA approval
Version 02	March 2008	PDD prepared for publication on DOE website and validation
Version 03	October 2008	PDD revised according to the findings overview of the project made by DOE
Version 04	April 2009	PDD further revised following DOE indications
Version 05	August 2009	PDD further revised following DOE Technical Review
Version 06	September 2009	PDD further revised following additional CL from DOE Technical Review
Version 07	March 2010	PDD further revised following additional CAR & CL from DOE Technical Review
Version 08	September 2010	PDD further revised following EB completeness check

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

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Sichuan Lengshuikou 12.1 MW Small-Scale Bundled Hydropower Project (LSBHP), hereinafter also referred to as "the Project" or "the proposed project", includes three small-scale run-of-river diversion type hydropower stations, named Lengshuikou, Jinyuhe and Xuekoushan developed by Sichuan Mabian Tianhe Power Co., ltd. All the three stations are located in Xuekoushan River which is the first-level branch on the left bank of Mabian River in Mabian Yi Autonomous County, Leshan City, Sichuan Province, the People's Republic of China.

The objective of the Project is the generation of zero carbon emission electricity from a renewable source (i.e. hydropower) and the displacement of the same amount of electricity from the Central China Power Grid (CCPG) that is mainly dominated by coal-fired power plants. The Project intends to meet the increasing demand of electricity in Sichuan Province in a sustainable way, and to contribute to the sustainability of the CCPG.

The three hydro power stations are organised in parallel (i.e. each stage sends back to the main river the turbinated water).

The Lengshuikou project (stage 1) is a newly built hydropower station. Its installed capacity is 6.4MW with a designed water head of 357m, a designed water flow of 2.26m^3/s, an average annual operation time of 4950hrs and an annual go-to-grid electricity of 24,210 MWh which is dispatched to the CCPG.

The Jinyuhe project (stage 2) is a newly built hydropower station. Its installed capacity is 2.5MW with a designed water head of 154.4m, a designed water flow of 1.40m^3/s, an average annual operation time of 5100hrs and an annual go-to-grid electricity of 10,466 MWh which is dispatched to the CCPG.

The Xuekoushan project (stage 3) is a newly built hydropower station. Its installed capacity is 3.2MW with a designed water head of 120.3m, the designed water flow of 3.30m^3/s, an average annual operation time of 4920 hrs and an annual go-to-grid electricity of 13,222MWh which is dispatched to the CCPG.

The proposed project has a total aggregated installed capacity of 12.1 MW, with an annual total go-to-grid electricity of 47,898 MWh transmitted to the CCPG. The reservoir surface area of the 3 stages are 70 m^2, 855 m^2 and 4,848 m^2 respectively, and the power density of the 3 stages are 91,428 W/m^2, 2,924 W/m^2 and 660 W/m^2.

The Project will lead to an estimated annual greenhouse gases (GHG) emission reductions of approximately 46,679tCO_2e over the chosen crediting period annually (7 years, renewable twice). The total GHG emission reductions over the first 7 years crediting period are 326,753tCO_2e.

The Project is shown to be of great public utility and with no significant impacts on the environmental resources. The project activity's contributions to sustainable development are mainly:

- 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. The project activity also generates permanent employment for about 54 persons during the lifetime of the project activity. This direct and indirect employment would not take place in the absence of the project activity;
- The project activity results in flow of huge financial resources as investment for the project. Significant part of this investment will go into the rural economy towards construction activities in the project site as wages for unskilled labor, construction material, local construction equipment etc. Further, significant part of the investment will go to the construction equipment and project equipment. This investment flow will have a positive impact on the economy in the region;
- The project activity is electricity generation using hydro potential available in a river and it does not result in degradation of any resources, or cause any negative impact on bio-diversity, resource sustainability, human health etc. Furthermore the project does not result in environment pollution. Hence, the project activity contributes to the environmental well being.

This project fits within the Chinese government objective to reduce the dependence of power generation on exhaustible fossil fuels, thus making the Chinese energy sector in general and the power sector in particular more sustainable.

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)
P. R. China (host)	Sichuan Mabian Tianhe Power Co., Ltd.	No
Netherlands	CEZ a.s.	No
(*) In accordance with the CDM modalities and procedures, at the time of making the CDM-PDD public at the stage of validation, a Party involved may or may not have provided its approval. At the time of requesting registration, the approval by the Party (ies) involved is required.		

Sichuan Mabian Tianhe Power Co., Ltd is a Limited Company registered under the law of the People's Republic of China, and the sole investor, constructor, operator, and owner of the proposed project.

ČEZ a.s. is one of the largest power utilities in Central and Eastern Europe, and ranking in the top 10 Utilities by size and number of customers in all Europe.

Contact detailed of projects participants are given in Annex 1 to this PDD.

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

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

A.4.1.1. Host Party (ies):

>>
People's Republic of China

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

>>
Sichuan Province

A.4.1.3. City/Town/Community etc:

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Leshan City/Mabian Yi Autonomous County

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

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The Lengshuikou project is located in Wenquandang Town, 40 km from Mabian County. Its plant geographical coordinates are east longitude of 103º25' 01"and north latitude of 28º55'13" and the dam is 1.6km from it.

The Jinyuhe project is located in Wenshuidang Town, 29 km from Mabian County. Its plant geographical coordinates are east longitude of 103º26'13" and north latitude of 28º54'30" and the dam is 2.5km from it.

The Xuekoushan project is located in Xuekoushan Town, 25 km from Mabian County. Its plant geographical coordinates are east longitude of 103º27'53" and north latitude of 28º55'43" and the dam is 4.2km from it.

Stage 2 is 5km from Stage 1 and Stage 3 is also 5km from Stage 2.

The three maps in Figure A1 below show location of the Project within China, Sichuan Province and Leshan City.

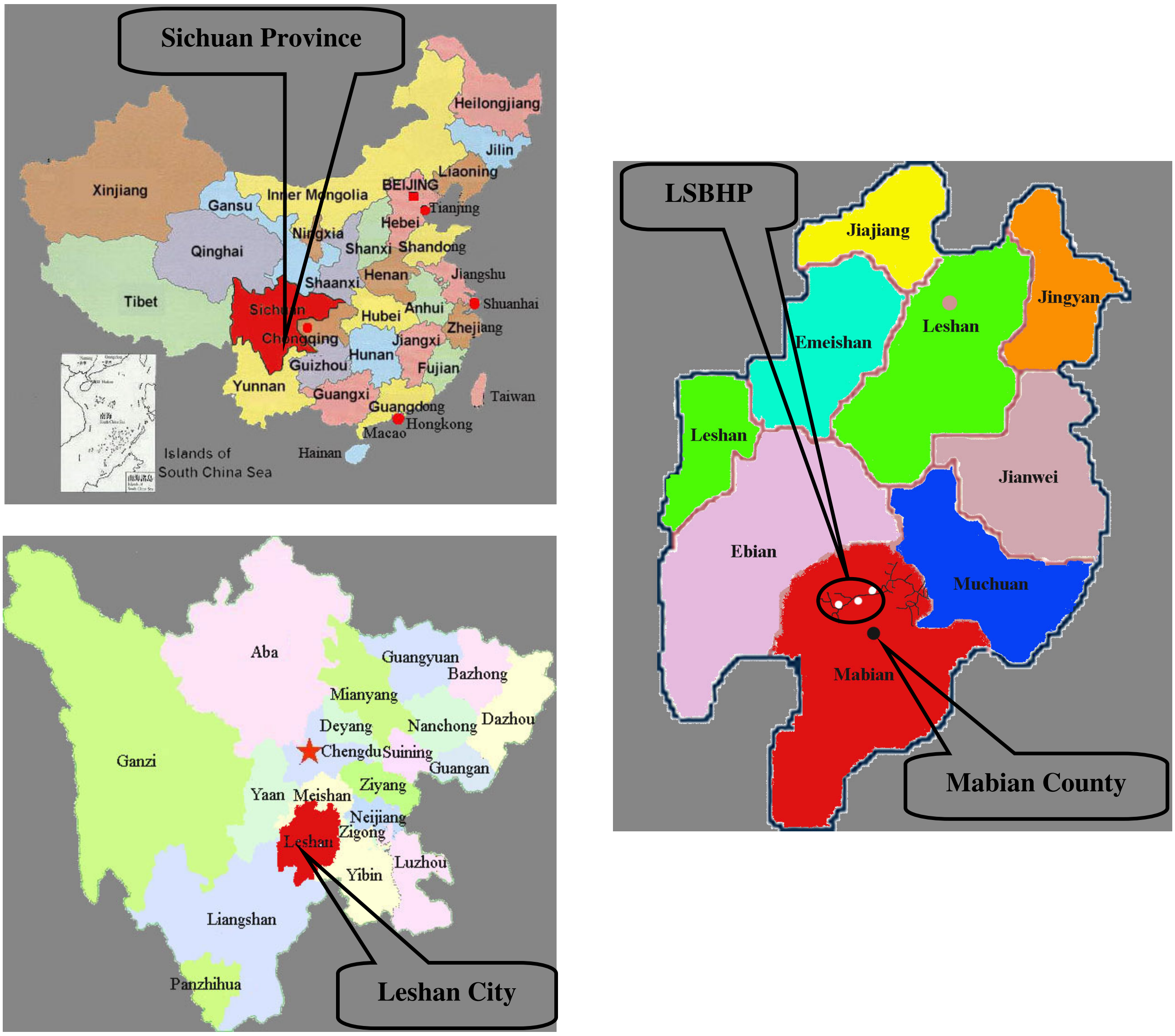

Figure A1 Location of LSBHP

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

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According to the categorization of the latest updated version of Appendix B to the Simplified Modalities and Procedures for Small-scale CDM Project Activities, the project type and category are defined as follows:

Type I: Renewable energy projects
Project Category I.D. Renewable Energy Generation for a Grid

Technology:

The three stage hydropower projects are diversion type hydropower projects organised in parallel (i.e. each stage sends back to Xuekoushan River the turbinated water). The construction of each stage of the proposed project mainly consists of:

- Dam;
- Tunnel inlet sluice;
- Diversion tunnel (culvert, tunnel);
- Fore-bay;
- Pressure pipelines
- Power house, comprising, inter alia, of a machine hall consisting of a separate turbine floor and generator floor; a control room housing all the electrical control panels required for operation of the units; annex rooms and auxiliary floors for auxiliary equipment; transformer deck; out door switchyard.

The construction schedule[1] for each stage is as follow:

Project / Date	Start Construction	Completion
Stage 1	January 1st 2007	June 30th 2008
Stage 2	January 1st 2008	February 28th 2009
Stage 3	September 24th 2008	November 30th 2009

Each stage utilizes two sets of turbine-generator. Turbine and generators are newly manufactured by Sichuan Taiji Electrical and Mechanical Equipment Co., Ltd. The key technical indicators of the hydro turbines and the generators of the project are listed in Table A1.

Table A1 Key Technological Parameters of the Project

	Stage 1	Stage 2	Stage 3
Turbine			
Type	CJA237-W100/2×9.8	HLD54-WJ-71	HLA542-WJ-90
Manufacturer	Sichuan Taiji Electrical and Mechanical Equipment Co., Ltd.[2]		
Number	2	2	2
Rated rotation speed(r/min)	750	1000	750
Rated water head(m)	357	150	118
Rated flowing(m^3/s)	1.13	1.01	1.65
Rated power(kW)	3404	1352	1757.2
Generator			
Type	SFW_{3200}-8/1730	SFW_{1250}-6/1430	SFW_{1600}-8/1730
Manufacture	Sichuan Taiji Electrical and Mechanical Equipment Co., Ltd.[4]		
Number	2	2	2
Rated voltage(kV)	6.3	6.3	6.3

[1] Construction contract of Lengshuikou(signed on December 20th 2006), Jinyuhe(signed on December 20th 2006) and Xuekoushan(signed on September 18th 2008)

[2] Manufacture contract of turbine-generator of Lengshuikou, Jinyuhe and Xuekoushan between Sichuan Mabian Tianhe Co.,Ltd. and Sichuan Taiji Electrical and Mechanical Equipment Co., Ltd.(February 12th 2007,September 17th 2007,September 17th 2008)

Rated rotation speed(r/min)	750	1000	750
Rated installed capacity(MW)	3.2	1.25	1.6
Main transformer			
Type	S9-8000/35KV	SF9-4000/35KV	SF9-4000/35KV
Number	1	1	1
Rated Capacity	8000kVA	4000kVA	4000kVA

Electricity generated from Stage 1, Stage 2 and Stage 3 will be jointly connected to Mabian Power Grid via Bajiaoxi Transformer Substation at 35kV, which is a part of Central China Power Grid.

The main equipment such as the turbines and electricity used by the project are domestically manufactured. No technology is transferred from other countries to this project activity. Technology for hydropower generation is well known throughout China and complies with worldwide environmental and safety standards.

Electricity coefficient

The three Project stages have the following electricity coefficients:

	Electricity coefficient	Source
Stage 1	0.80	PDR
Stage 2	0.87	PDR
Stage 3	0.87	PDR

The PDR of Stage 1 (i.e. Lenghsuikou project) makes specific reference to the electricity coefficient value: "*according to the adjustment capabilities of the power plant and the real situation of the Mabian Grid, the effective coefficient of the Lengshuikou Power Plant is considered to be 0.80*". The total estimated energy output is 31,682,000 kWh and the effective electricity is 25,345,600 kWh.

For Stages 2 and 3 (i.e. Jinyuhe project and Xuekoushan project respectively) the PDRs do not give specific value of the coefficient; however the coefficient can be indirectly calculated since the PDRs give value of estimated total energy output and value of effective electricity, resulted from deduction of loss due to water discharge. An electricity coefficient of 0.87 applies to both stages.

	Jinyuhe Stage 2	Xuekoushan Stage 3
Total estimated energy output	12,500,000 kWh	15,700,000 kWh
Effective electricity	10,900,000 kWh	13,700,000 kWh

The net electricity supplied to the Grid is obtained deducting electricity self-consumption by the plant and line losses as follows:

	Self-consumption	Line loss	Source
Stage 1	0.5%	4%	PDR
Stage 2	0.5%	3.5%	PDR
Stage 3	0.5%	3.0%	PDR

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

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The project will employ a renewable crediting period (7 years duration, renewable twice). The first crediting period is from January 1st 2011 to December 31st 2017.The estimated average annual and total amount of GHG emission reductions over the first 7 years crediting period are 46,679 tCO_2e and 326,753 tCO_2e respectively.

The total estimation of the emission reductions during the first crediting period is provided in Table A2.

Table A2 The estimated amount of emission reductions over the first crediting period from the project

Years	Annual estimation of emission reduction in tons of CO_2e
2011	46,679
2012	46,679
2013	46,679
2014	46,679
2015	46,679
2016	46,679
2017	46,679
Total estimated reductions(tons of CO_2e)	326,753
Total number of crediting years	7
Annual average over the crediting period of estimated reduction(tons of CO_2e)	46,679

The above is an *ex-ante* estimation of emission reductions, and shall be changed based on *ex-post* monitoring.

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

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The project does not involve any public funding from Annex 1 Parties.

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 Appendix C to the Simplified Modalities and Procedures for Small-Scale CDM project activities, a small-scale project is considered to be 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/measure;
- Registered within the previous two years; and
- Whose project boundary is within 1 km of the project boundary of the proposed small-scale activity at the closest point.

On the contrary, a specific small-scale project activity shall not be deemed to be a debundled component of a large project activity if the project does not meet at least one of the abovementioned criteria.

The Project participants did not register within the previous two years and will not apply to register another small scale CDM project activity in the same project category and technology/measure, and within 1 km of the proposed project boundary at the closest point. 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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The title and reference of the approved baseline and monitoring methodology applied to the project is AMS-I.D. (version 16) "Indicative simplified baseline and monitoring methodologies for selected small-scale CDM project activity categories". Information on the mentioned methodology can be found at: http://cdm.unfccc.int/UserManagement/FileStorage/SJI52M6QXGKFNOZABTHDYPU789EV3C

The emission reduction calculation will adopt “tool to calculate the emission factor for an electricity system” (version 02), please refer the link:
http://cdm.unfccc.int/EB/050/eb50_repan14.pdf

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

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The project meets all applicability criteria of the methodology AMS-I.D. as follow:

1. The power generated from the proposed project activity is supplied to the CCPG which is a regional grid;
2. The project installs a new hydropower plant at a site where there was no renewable energy power plant operating prior to the implementation of the project activity (Greenfield plant);
3. The project activity results in new reservoirs and the reservoir surface area of the 3 stages are 70 m^2, 855 m^2 and 4848 m^2 respectively. As per definitions given in the Project Emissions section, the power density of the 3 stages are 91,428 W/m^2, 2,924 W/m^2 and 660 W/m^2, which are all greater than 4 W/m^2;
4. The project is a newly built hydropower plant, plan to utilize the renewable water resources to generate electricity, the total installed capacity is 12.1MW, which is not exceed the limit of 15MW set by chosen methodology.

B.3. Description of the project boundary:

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Based on the methodology AMS-I.D version 16, the project boundary encompasses the physical, geographical site of the renewable generation source including all the power generating units of the three hydropower plant and the power grid they connected as shown in Figure B1. Project electricity system is defined by the spatial extent of the power plants that are physically connected through transmission and distribution lines of the project activity (e.g. the renewable power plant location or the consumers where electricity is being saved) and that can be dispatched without significant transmission constraints.

Electricity generated from the proposed project will be connected to Mabian Bajiaoxi Transformer Substation which is a part of Sichuan Provincial Power Grid, and then the electricity will be connected to

the 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.

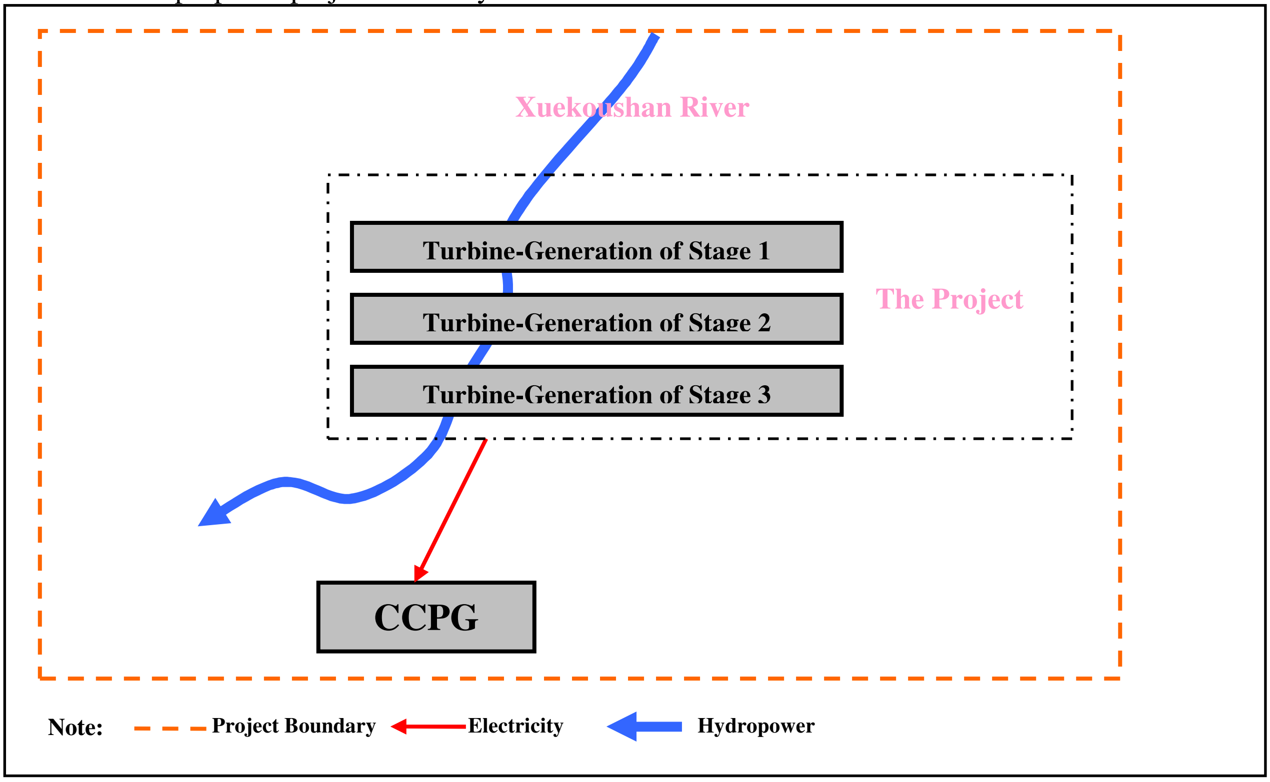

Figure B1 Project Boundary

B.4. Description of baseline and its development:

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As per AMS.I.D, as the project activity is the installation of a new grid-connected renewable power plant, and the electricity generated by the proposed project will all be transmitted to Central China Power Grid, the baseline scenario is the following: electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources, as reflected in the combined margin (CM) calculations described in the "Tool to calculate the emission factor for an electricity system".

Table B.2 Key Information and Data Used to Determine the Baseline Scenario

Variable	Value/Unit	Data Source
Operating Margin Emission Factor	1.2899 tCO2/MWh	Calculated from the China Energy Statistics Yearbooks 2004-2006 and the China Electric Power Yearbooks 2004-2006
Build Margin Emission Factor	0.6592 tCO2/MWh	
Combined Margin Emission Factor	0.97455 tCO2/MWh	

[3] China's Regional Grid Baseline Emission Factors Renewed on August 9th 2007 on http://cdm.ccchina.gov.cn

Power supplied to the grid by the project in year y	24,210 MWh (Stage 1)	PDR
	10,466 MWh (Stage 2)	
	13,222 MWh (Stage 3)	

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 Appendix A to Appendix B to the Simplified Modalities and Procedures for Small-scale CDM Project Activities, project participants shall provide an explanation to show that the project activity would not have occurred anyway due to at least one of the following barriers:

- Investment barrier;
- Technical barrier;
- Barrier due to prevailing practice;
- Other barriers.

The investment barrier is the most prohibitive factor in implementing the Project. The project participants were aware of the CDM prior to the project activity start date, and considered the benefits of the CDM a decisive factor in the decision to proceed with the project. This is demonstrated by mean of reliable evidences in the footnote of following table.

The project participants have taken real and continuing actions in order to secure the CDM status to the Project in parallel with its implementation (as per Annex 46 Para 5. of 41 EB Meeting Report). The table below shows the implementation timeline of the proposed CDM project activity and the events which have been taken to secure CDM status for the Project.

Date	Item
March 7th 2006	Permission to start the project planning work by government which means the project owner seriously considered investing the project.[4]
August 2006	PDR completion
September 5th 2006	Shareholder meeting held to consider CDM application because bank loan is difficult to get due to the project lack of economy attractiveness with the possible low electricity tariff[5].
October 28th 2006	CDM development memorandum signed between PO and Agent[6]
December 30th 2006	Bank loan reply from Agriculture Development Bank of China about CDM consideration[7].

[4] Permission to start the project planning work of Lengshuikou, Jinyuhe and Xuekoushan project by Mabian County Development and Reform Economy Bureau (document number: Ma Fa Gai (2006) Ji Zi No.57) on March 7th 2006.

[5] Minute of Shareholder Meeting about CDM consideration: September 5th 2006.

[6] CDM project development consultant memorandum signed between Sichan Mabian Tianhe Power Co., ltd. and Sichuan Unitar Clean Energy Consulting Company.,ltd. on October 28th 2006.

[7] Bank loan reply came from Agriculture Development Bank of China on Decmeber 30th 2006. The sentence: we will consider providing long term bank loan for the project construction because its repayment ability will be improved definitely if the project can be a CDM project.

January 1st 2007	Stage 1 started the real construction
March 10th 2007	PO consigns an agent to develop CDM for them[8].
April 9th 2007	Consultant contract signed between PO and agent[9]
August 2007	Enecore was assigned to find buyer for the project.
October 26th 2007	Consultant contract signed between Enecore and local agent
January 1st 2008	Stage 2 started the real construction.
March 22nd, 2008	The Project Owner signed the project LoI with CEZ a.s.
April 23rd 2008	Start of global commenting period
May 26th 2008	The Emission Reduction Purchase Agreement (ERPA) was signed between the project owner and CEZ a.s.
September 18th 2008	Chinese DNA approved the CDM project and information published on website
September 24th 2008	Stage 3 started the real construction
October 2nd 2008	Validation draft report received from DOE
November 17th 2008	LoA issued

When PDR was finished in August 2006, project owner found the project lack of economic attractiveness because required electricity tariff in PDR was much higher than the real electricity tariff level in 2006[10]. Immediately project owner held a shareholder meeting to consider CDM revenue help. It is the first time project owner develop CDM project and they lack relative experience, so they hoped some agent can help them to develop CDM project.

On October 28th 2006, the local agent of Sichuan Unitar Clean Energy Company., ltd. met PO in Leshan City after some telephone communication. Both sides signed a CDM development memorandum at that day and consigned letter and consultant agreement should be signed later mentioned in the memorandum.

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[8] The letter of Sichuan Mabian Tianhe Power Co., ltd. consigning Sichuan Unitar Clean Energy Consulting Company.,ltd. as agent for the project development.

[9] Mabian Xuekoushan Three Stage Hydropower Station CDM Project Development Cooperation Agreement between Sichan Mabian Tianhe Power Co.,ltd. and Sichuan Unitar Clean Energy Consulting Company., ltd. on April 9th 2007.

[10] Project owner knew clearly that the real electricity tariff can not reach the high level as stated in PDR through communication with local power company and other hydropower developer.

The electricity tariff of a 4MW hydropower project operated in 2006 in Mabian County the same as this project location was 0.192 yuan/kWh(ex VAT), which was approved by Sichuan Provincial Bureau of Price. The information can be found at http://scjc.scpi.gov.cn/flfg-content.asp?id=356.

Jixin Hydropower Project operated in 2006 in Mabian County, the electricity tariff is 0.18 yuan/kWh in the power sale invoice.

The following registered small scale projects in Sichuan demonstrate that the electricity tariff in 2006 exactly is less than 0.205 yuan/kWh:

- Ref 1498, Baji River Stage I 10MW Run-of-river Hydropower Project, CDM consideration in 2006, electricity tariff (ex VAT) of 0.200 yuan/kWh from Power Purchase Agreement.
- Ref 1814, Yuexi Dayan Small Hydropower Project, CDM consideration in 2006, electricity tariff (ex VAT) of 0.160 yuan/kWh from Power Purchase Agreement.

Afterwards project owner was busy dealing with the construction commence preparation and communication with bank for long term loan.

After several discussions about the project, Agriculture Development Bank of China agreed to consider long term bank loan to support the project construction due to the repayment ability of the project can be improved through receiving CDM revenue except for electricity sale and gave PO bank loan consideration reply letter on December 30th 2006. Finally, PO got the long term bank loan from Agriculture Development Bank of China based on CDM revenue consideration.

The first stage Lengshuikou hydropower station started construction on January 1st 2007 based on the bank loan confirmation from Agriculture Development Bank of China. And then PO gave the consign letter to Sichuan Unitar Clean Energy Company. , ltd. on March 10th 2007 and signed the consultant agreement on April 9th 2007 to ensure the agent can take full responsibility of the project CDM development.

The local agent actively contacted with different famous CDM Consultant Company. Finally Enecore Carbon Ltd was decided and the agent start negotiation with Enecore Carbone Ltd about detailed cooperation way from August 2007. And then the consultant contract between Enecore and local agent was signed on October 26th 2007. Then Enecore carbon started develop Project idea note, project design document of the project and seek credit buyer for the project.

Letter of intention was signed between CEZ a.s. and project owner on March 22nd 2008, which means the buyer will purchase the emission reduction produced by the project. After validation contract signed between DNV and CEZ a.s, the project started global commenting period from April 23rd 2008.

Emission reduction purchase agreement signed on May 26th 2008 and after that Enecore completed the Chinese PDD and PO prepared DNA application. Chinese DNA published the approved information for the project and LoA issued respectively on September 18th 2008 and November 17th 2008.

Investment Barrier

Financial attractiveness of the project is assessed following step 2 of the "Tool for the demonstration and assessment of additionality" (version 05.2).

Three options can be applied to conduct the investment analysis: 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.

Then the benchmark analysis (Option III) will be used to assess the financial attractiveness of the Project activity. This method has routinely been used by other similar grid connected small-scale hydropower projects registered in China.

According to Economic Evaluation Code for Small Hydropower Projects issued by the Ministry of Water Resources (Document No: SL16-95)[11], the benchmark internal rate of return (IRR) of a small hydropower project with the installed capacity of below 25MW is 10 % (after tax). Thus, 10% was chosen as the IRR benchmark for the proposed project.

Table B1 Main parameters for financial calculation

No.	Parameter	Unit	Data		
			Stage 1	Stage 2	Stage 3
	General Description				
1	Installed capacity	MW	6.4	2.5	3.2
2	Annual electricity to grid	MWh/year	24,210	10,466	13,222
3	Construction period	Months	24	18	18
4	Operation period	Years	20	30	30
5	Power tariff (VAT excluded)[12]	yuan/kWh	0.205	0.205	0.205
6	Expected CERs price	€/tCO_2e	8.5	8.5	8.5
	Investment Plan				
1	Fixed asset investment	RMB yuan	32,558,200	15,297,700	19,669,400
1.1	Of which, investment on station[13]	RMB yuan	32,558,200	14,797,700	19,469,400
1.2	Investment on transmission line	RMB yuan		500,000	200,000
2	Working capital	RMB yuan		25,000	32,000
	Tax				
1	VAT	%	17	17	17
2	Surtax for city development	%	1	1	1
3	Surtax for education	%	5	5	5
4	Income tax	%	33	33	33
	Operation Cost				
1	Great repair	%	1.5	1.5	1.5
2	Water Resource fee	yuan/kWh	0.001	0.001	0.001
3	Material	yuan/kW	5	5	5
4	Staff	Persons	22	16	16
5	Salary	RMB yuan	15000	15000	15000
6	Rate of welfare	%	41	41	41
7	Insurance	%	0.25	0.25	0.25

[11] In China, the financial analysis of small hydropower projects are required to follow the Economic Evaluation Code for Small Hydropower Project (SL16-95), which indicated the input value related to price should use the fixed current price. According to the hydropower No [2002]07 documents, Currently Effective Hydromechanics Standards Announcement, issued by the Ministry of Water Resources of the People's Republic of China, the Economic Evaluation Code for Small Hydropower Project (SL16-95) is still effective and enforceable.

[12] The Power Purchase Agreement for Lengshuikou, Jinyuhe and Xuekoushan Hydro Power Project between Sichuan Mabian Tianhe Co.,Ltd. and Mabian Changhe Power Co.,Ltd. on April 15th 2007.

[13] In the IRR calculation, the investment on transmission line isn't included for conservative.

8	Other cost	yuan/kW	22.5	24	24
9	Operation fee in transmission	RMB yuan		15200	3100

All the input values except electricity tariff used in all investment analysis are from PDR which is valid and applicable at the time of the investment decision taken by the project participant in 2006. The only electricity tariff is taken by Power Purchase Agreement signed in 2007 between the Project Owner and the Grid. This value is not a calculated value as in PDRs; hence considered more reliable and fully usable for the investment analysis. The Power Purchase Agreement is considered the best available source and evidence of the electricity tariff input in the investment analysis[14].

Table B2 shows the financial analysis results with or without CERs revenue. The project IRR is only 7.59%, 7.12% and 6.83% respectively, all of which are lower than the benchmark IRR for small hydropower projects (10%). Therefore, the project is not economically attractive. However, the project IRR is 14.51%, 13.64% and 13.69% with CERs revenue and thus financially attractive.

Table B2 IRR for each stage

	IRR			
	Stage 1	Stage 2	Stage 3	Aggregate
Without CDM revenue	7.59%	7.12%	6.83%	6.96%
With CDM revenue	14.51%	13.64%	13.69%	13.36%

A detailed sensitivity analysis for each stage was done to test the project feasibility with varying parameters. The project feasibility is mainly dependent on the following parameters:

- Electricity tariff
- Power Generation
- Fixed Asset investment
- Operation Cost

Table B3 Sensitivity analysis results

Parameter	Stage 1			Stage 2			Stage 3		
	-10%	0%	10%	-10%	0%	10%	-10%	0%	10%
Electricity Tariff	6.16%	7.59%	8.97%	5.79%	7.12%	8. 40%	5.67%	6.83%	7.94%

[14] Project owner knew clearly that the real electricity tariff can not reach the high level as stated in PDR through communication with local power company and other hydropower developer.

The electricity tariff of a 4MW hydropower project operated in 2006 in Mabian County the same as this project location was 0.192 yuan/kWh(ex VAT), which was approved by Sichuan Provincial Bureau of Price. The information can be found at http://scjc.scpi.gov.cn/flfg-content.asp?id=356.

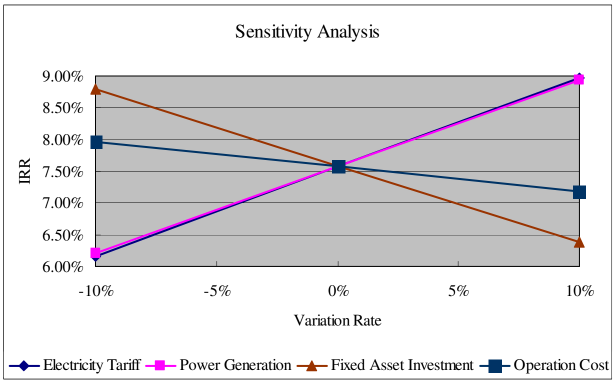
Jixin Hydropower Project operated in 2006 in Mabian County, the electricity tariff is 0.18 yuan/kWh in the power sale invoice.

The following registered small scale projects in Sichuan demonstrate that the electricity tariff in 2006 exactly is less than 0.205 yuan/kWh:

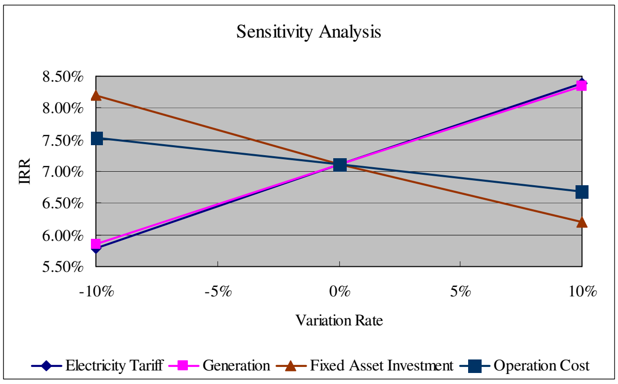
- Ref 1498, Baji River Stage I 10MW Run-of-river Hydropower Project, CDM consideration in 2006, electricity tariff (ex VAT) of 0.200 yuan/kWh from Power Purchase Agreement.
- Ref 1814, Yuexi Dayan Small Hydropower Project, CDM consideration in 2006, electricity tariff (ex VAT) of 0.160 yuan/kWh from Power Purchase Agreement.

Power Generation	6.21%	7.59%	8.94%	5.86%	7.12%	8.34%	5.73%	6.83%	7.89%
Fixed Asset Investment	8.81%	7.59%	6.39%	8.20%	7.12%	6. 21%	7.80%	6.83%	6.00%
Operation Cost	7.97%	7.59%	7.20%	7. 53%	7.12%	6.69%	7.16%	6.83%	6.48%

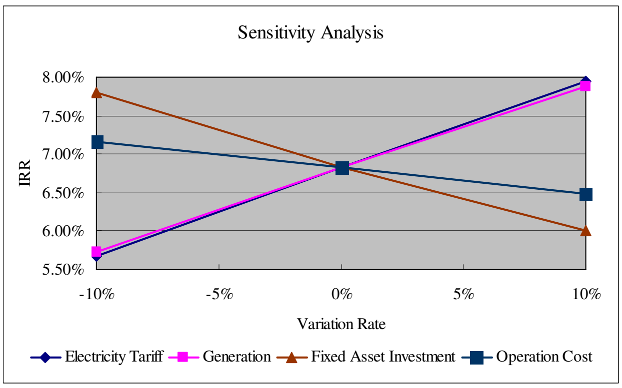
Parameter	all 3 stages		
	-10%	0%	10%
Electricity Tariff	5.71%	6.96%	8.17%
Power Generation	5.76%	6.96%	8.13%
Fixed Asset Investment	8.03%	6.96%	6.07%
Operation Cost	7.34%	6.96%	6.59%



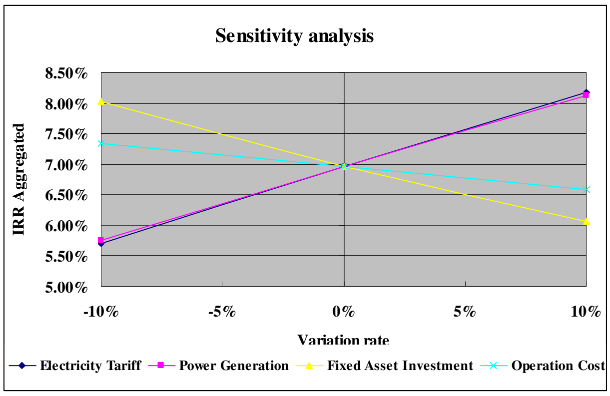
Stage 1



Stage 2



Stage 3



Aggregated

Figure B2 Sensitivity analysis result for the project

From the results listed in Table B3 and showed in Figure B2, we can find that the IRRs of the proposed project are always lower than the benchmark without revenue from CDM even the parameter various from -10% to +10%.

Meanwhile the practical possibility assessment has been done and is summarized in the following Table B4.

Table B4 Practical possibility assessment of critical parameters

Parameters	Variation range to reach benchmark			
	Stage 1	Stage 2	Stage 3	Aggregated
Electricity Tariff	+17.58%	+22.60%	+28.99%	+25.5%
Power Generation	+18.02%	+23.71%	+30.55%	+26.4%
Fixed Asset Investment	-18.05%	-23.08%	-26.98%	-24.35%
Operation Cost	-62.40%	-70.26%	-53.57%	-83%

Practical assessment

Electricity Tariff
IRR can reach benchmark when the electricity tariff increases 17.58%, 22.60% and 28.99% respectively for each stage. However in China the electricity tariff is within scope of regulation and management by central and local government[15], since policy on electricity tariffs remain stable, generally the tariff also remains stable and will not change greatly. Furthermore the project owner signed the power purchase agreement with Mabian Changhe Power Co., ltd. Tariff of 0.205 yuan RMB/kWh (excluded VAT) which was regulated by the government. In addition, even using 0.29 RMB/kWh the highest tariff of run-of-river small hydropower projects in Sichuan Province, the aggregate IRR of the 3 stages is 9.46%, which still below 10% benchmark.

Electricity generation
Three main reasons affect the electricity generation of the hydropower stations, the water resources of project site, the year's rainfall, and the regulation from the grid company.

The water resources of the Project site in PDR were determined by 48 years (1957-2005) hydrographic information, and it would not change much according to the historical hydrology data for latest 20 years[16].

The sensitivity analysis has been carried out assuming power generation as calculated using a value of coefficient of effective electricity equal to 90% and 100%. The results obtained from the calculation are shown below:

Table B5 IRR of the Project using 90% as coefficient of effective electricity

Stage	IRR using 90% c.e.e.	Remark
Xuekoushan	7.18%	Below 10% benchmark
Jinyuhe	7.53%	Below 10% benchmark
Lengshuikou	9.27%	Below 10% benchmark
Aggregate	7.88%	Below 10% benchmark

Table B6 IRR of the Project using 100% as coefficient of effective electricity

Stage	IRR using 100% c.e.e.	Remark

[15] http://chinalawlib.com/318477993.html

[16] Hydrology section in Project Design Report of Lengshuikou, Jinyuhe and Xuekoushan hydropower station

Xuekoushan	8.44%	Below 10% benchmark
Jinyuhe	8.99%	Below 10% benchmark
Lengshuikou	10.91%	Above 10% benchmark
Aggregate	9.31%	Below 10% benchmark

Due to the regulation on electricity generation from grid company, releasing surplus water during plentiful water period is very common in Sichuan Province. The capacity of hydropower station seasonal regulated is very limited. By 2004 only three hydropower stations that have big reservoirs seasonal regulated. The loss by releasing surplus water is tremendous in Sichuan Province[17]. Moreover, a case study by Greenpeace shows that in Mabian County the waterfall keeps falling with a speed of about 25ml every 10 years due to the global warming, and the rainfall appears to become more abnormal and irregular (i.e. the frequency of heavy rainfall within short time increases) with the 36% frequency rate of flood[18]. Since the project is designed as a run-of-river project with a reservoir of 43m^3 (PDR), it has no ability of regulation. Thus, it is unlikely to make full use of the hydropower. Even using 100% as coefficient of effective electricity, the aggregate IRR of the 3 stages is 9.31%, which still below 10% benchmark.

Mabian Changhe Power Co., Ltd, the grid company who purchases the electricity generated by the Project, admitted that the Project suffers from great water loss due to grid company's regulation.
The reason of water loss of Lengshuikou project is because of the large number of run-of-river hydropower stations in Mabian County which have no regulation ability. Since the electricity need load in the scale of county or village is uneven, during flood season, the electricity need load may be low, and the electricity supply load would be much higher than the electricity need load. For instance, in 2009, the max electricity supply load of Lengshuikou is 6400kWh but the electricity need load is only 4500kWh. The difference between supply and demand is tremendous, thus Lengshuikou must release surplus water without usage. Since Lengshuikou is a run-of-river project without regulating ability, the real electricity generation will be less then the designed value under the generation control from the grid company[19].

The appropriateness of assuming the expected electricity supply, as calculated in the PDRs, is confirmed through available data on the CER issuance rate of Chinese CDM hydropower projects[20]. The actual amount of CERs issued by Chinese small scale CDM hydropower projects is 77% of what was expected in the PDD; the average CER performance of hydropower projects in China compared to PDD estimate and considering both small and large scale project is 89%, while it is 97% for large scale project only. This demonstrates that it is conservative to use the *expected* electricity *supply* as calculated in PDRs (based on the *expected effective electricity generation = theoretical electricity generation x coefficient of effective electricity*) in PDDs because it is typically higher than the actual amount of electricity supplied to the grid based on monitoring data[21].

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17 http://www.sp.com.cn/zgsd/sdlt/200510/t20051028_19902.htm

18 http://www.greenpeace.org/china/zh/press/reports/poverty-report2009, or there is a brief introduction as http://discover.news.163.com/09/0617/19/5C1IMF91000125LI.html

19 The Statement on the Electricity Generation of Lengshuikou Hydropower Station by Mabian Changhe Power Co., Ltd, the grid company who purchases the electricity generated by the Project.

20 UNEP Risoe CDM/JI Pipeline Analysis, 1 November 2009gra

21 For hydropower projects, the amount of CERs is proportional to the amount of electricity supplied to the grid: CERs = amount of electricity supplied to the grid x grid emission factor

The actual electricity generation reflects the conservativeness of coefficient of effective electricity estimated in PDR. After more than 3 months commissioning, Lengshuikou hydropower station started operation in Dec. 2008, and the electricity generation from Dec. 2008 to Jan. 2010 (14 months) is 21,022,806 kWh[22], which means the average annual electricity generation would be 18,019,548 kWh, which only reach to 74.43% of the designed effective electricity generation (24,210,117kWh) and the real coefficient of effective electricity is only around 60%. The climate condition is normal from the rainfall information on the website of Sichuan Meteorological Bureau, therefore the water flow is under normal condition in 2009.

Table B7 Rainfall of Sichuan Province in 2009 (ml)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Rainfall
2009	7.3	7.6	22.8	64.4	69.0	143.4	219.6	170.3	122.7	59.1	20.5	8.7	915.4
Average value	10.4	15.5	25.7	55.0	97.1	145.2	204.9	176.7	134.0	60.9	22.3	9.8	957.6
Variation rate													-4.40%
Data source: SICHUAN METEOROLOGICAL BUREAU; http://www.scqx.gov.cn/qxfw/qhjc/index.html?pages=1													

Thus, it is unlikely for the electricity generation to increase 18.02%, 23.71% and 30.55% respectively for each stage.

Fixed Asset Investment

As there is no change for the component of total investment, so the investment of the project is mainly subject to the industrial products' price indices, and according to the chart of "ex-factory price indices of industrial products" which is published by the national bureau of statistics of china in 2006[23], the price indices increased 9.38% from 1998 to 2005, which is equal to an 1.29% annual increase rate. In addition, the total investment of Lengshuikou hydropower station is 40,080,433 RMB,[24] which is much higher than the expected value in PDR 32,558,200 RMB. So for the Project, the investment possibly increases during the construction period but impossible decrease.

O&M cost

IRR of the project just can reach benchmark even through annual O&M cost decrease 62.40%, 70.26% and 53.57% respectively that is impossible in practice because the price of construction materials and wage standard keeps rising in China[25].

Within the reasonable variation scope of the total investment, electricity tariff, go-to-grid electricity and annual O&M costs, the project IRR is always below the benchmark, so the project isn't financially attractive.

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[22] The electricity generation settlement of Lengshuikou hydropower station between Mabian Changhe Co. and Mabian Tianhe Co.

[23] Ex-factory price indices of industrial products, national bureau of statistics of china,2006 http://www.stats.gov.cn/tjsj/ndsj/2006/html/i0913C.HTM

[24] Asset Evaluation Report of Lengshuikou hydropower station by Sichuan Jiuxin Asset Evaluation Co., Ltd.

[25] http://finance.sina.com.cn/g/20080124/10024447240.shtml

In conclusion, the proposed activity will not be implemented to reduce GHG emission reductions without the registration as a CDM project. Therefore, the proposed project activity is additional.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

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Project emissions

According to AMS-I.D., project emissions from water reservoirs of hydro power plants have to be considered following the procedure described in the most recent version of ACM0002.

The Project is a run-of-river hydropower station with new reservoir. As per methodology ACM0002, hydropower activities that result in a new reservoir shall account for project emissions. However, methodology ACM0002 also states that if the PD of the power plant is greater than 10 W/m^2, project emissions are equal to zero. According to the same methodology, the Project PD is calculated as follows:

$$PD = \frac{CAP_{PJ} - CAP_{BL}}{A_{PJ} - A_{BL}} = \frac{CAP_{PJ}}{A_{PJ}} \qquad \text{(B.1)}$$

Where:

- *PD:* Power density of the project activity, in W/m^2.
- Cap_{PJ}: Installed capacity of the hydro power plant after the implementation of the project activity (W).
- Cap_{BL}: Installed capacity of the hydro power plant before the implementation of the project activity (W). For new hydro power plant, that is the case of the proposed Project, this value is zero.
- A_{PJ}: Area of the reservoir measured in the surface of the water, after the implementation of the project activity, when the reservoir is full (m^2).
- A_{BL}: Area of the reservoir measured in the surface of the water, before the implementation of the project activity, when the reservoir is full (m^2). For new reservoirs, that is the case of the proposed Project, this value is zero.

Therefore, the Project PD is
Stage 1: 6.4 MW / 70 m^2 = 91,428 W/m^2;
Stage 2: 2.5 MW / 855 m^2 = 2,924 W/m^2;
Stage 3: 3.2 MW / 4848 m^2 = 660 W/m^2.

Being the Project PD of all 3 stages greater than 10 W/m^2, the Project emissions are to be considered equal to zero ($PE_y = 0$).

Baseline emissions

According to methodology AMS-I.D version 16, the baseline emissions (BE_y) is equal to the electricity generated by project multiplied by an emission coefficient measured in kg CO_2e / kWh using to the below formula:

$$BE_y = EG_y \times EF_{grid,CM,y} \qquad \text{(B.2)}$$

Where:

BE_y = Baseline emission of Central China Power Grid in year y (tCO_2)

EG_y = Electricity supplied by the project activity to the grid(MWh/year)

$EF_{grid,CM,y}$ = Ex-ante emission factor in year y (tCO_2/MWh)

Electricity supplied by the project activity to the grid EG_y equals to the net go-to-grid electricity of the project $EG_{out,y}$ subtracting the electricity purchased by the project $EG_{in,y}$.

The baseline emissions factor ($EF_{grid,CM,y}$) is calculated according to method (a) provided by the methodology AMS-I.D.(version 16) as: (a) A combined margin (CM), consisting of the combination of operating margin (OM) and build margin (BM) according to the procedures described in the 'tool to calculate the emission factor for an electricity system'.

Step 1. Identify the relevant electric power system

The delineation of the Project electricity system and connected electricity system as defined by the Host Country DNA has been used to define the relevant electric power system[26]. As explained in section B.3 above, the power generated by the project activity will be transferred to the Central China Power Grid, comprising the provincial sub-grids of Henan, Hubei, Hunan, Jiangxi, Sichuan provinces and Chongqing municipality. Therefore the CCPG is identified as the Project electric power system.

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

In accordance with the *Tool to Calculate the Emission Factor for an Electricity System*, project participants may choose between the following two options to calculate the operating margin and build margin emission factor:
Option I: Only grid power plants are included in the calculation.
Option II: Both grid power plants and off-grid power plants are included in the calculation.
The project participants choose **Option I:** Only grid power plants are included in the calculation as the way to calculate the operating margin and build margin emission factors

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

The calculation of the operating margin emission factor is based on one of the four following methods:

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

The simple OM method is used for this Project. The selected method is applicable to this Project because low cost/ must run resources constitute less than 50% of the total grid generation in average of the five most recent years.Data from the China Electric Power Yearbook 2002-2006 indicate that the share of low cost/must run resources of the total CCPG generation accounted for 36.76% in 2001, 35.95% in 2002, 34.43% in 2003, 38.37% in 2004, and 38.59% in 2005 (See Table3-15 in Annex 3): the average is clearly lower than 50%.

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[26] http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File1364.pdf

The emission factors were determined ex ante (A 3-year generation-weighted average, based on the most recent data available at the time of submission of the CDM-PDD to the DOE for validation) and will not be updated during the first crediting period.

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

Two options are provided in the *Tool to Calculate the Emission Factor for an Electricity System* for the determination of the simple OM emission factor ($EF_{grid,OMsimple,y}$). Since 1) the data on net electricity generation and a CO_2 emission factor of each power unit in CCPG are not available; 2) only nuclear and renewable power generation are considered as low-cost/must-run power sources, and the quantity of electricity supplied to the grid by these sources is known; and 3) Off-grid power plants are not included in the calculation, Option B (based on data on the total net electricity generation of all power plants / units serving the system and the fuel types and total fuel consumption of the project electricity system) is adopted to calculate the simple OM emission factor ($EF_{grid,OMsimple,y}$). The formula of $EF_{grid,OMsimple,y}$ calculation is

$$EF_{grid,OMsimple,y} = \frac{\sum_i FC_{i,y} \times NCV_{i,y} \times EF_{CO_2,i,y}}{EG_y} \qquad \text{(B.3)}$$

Where:

$EF_{grid,OMsimple,y}$	=	Simple operating margin CO_2 emission factor in year y (tCO_2/MWh)
$FC_{i,y}$	=	Amount of fossil fuel type i consumed in the project electricity system in year y (mass or volume unit)
$NCV_{i,y}$	=	Net calorific value (energy content) of fossil fuel type i in year y (GJ/mass or volume unit)
$EF_{CO2,i,y}$	=	CO_2 emission factor of fossil fuel type i in year y (tCO_2/GJ)
EG_y	=	Net electricity generated and delivered to the grid by all power sources serving the system, not including low-cost/must-run power plants/units, in year y (MWh)
i	=	All fossil fuel types combusted in power sources in the project electricity system in year y
y	=	is the relevant year as per the data vintage chosen in Step 3

In accordance with the "Tool to calculate the emission factor for an electricity system" Version 02, the Ex-ante option is selected to calculate the OM emission factor, Therefore, equation B.2 is applied to the three latest years for which data are available, and a 3-year generation-weighted average value is taken for the OM Emission Factor.

The published OM emission factor calculates the emission factor directly from published aggregated data on fuel consumption, net calorific values, and power supply to the grid and IPCC default values for the CO_2 emission factor and the oxidation rate. Aggregated generation and fuel consumption data have been used for the calculation of the emission factors, since more disaggregated data are not publicly available in China.

On the basis of these data, the Operating Margin emission factors for 2003, 2004 and 2005 are calculated. The three-year average is calculated as a full-generation-weighted average of the emission factors. For details we refer to the publications cited above and the detailed explanations and demonstration of the calculation of the OM emission factor provided in Annex 3. We calculate the Operation Margin Emission Factor as:
$EF_{gird,OMsimple,y}$ **=1.2899** tCO_2/MWh

The operating margin emission factor of the baseline is calculated ex-ante and will not be updated in the first crediting period of the project activity.

For detailed information, please see the Annex 3.

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

According to the tool to calculate the emission factor for an electricity system, the sample group *m* consists of:

- The five power plants that have been built most recently, or
- The power plant capacity additions in the electricity system that comprise 20% of the system generation (in MWh) and that have been built most recently[27].

Project participants should use the set of power units that comprises the larger annual generation. The tool to calculate the emission factor for an electricity system provides the following two options for calculation of $EF_{grid,BM,y}$:

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

Option 2: For the first crediting period, the Build Margin emission factor $EF_{grid,BM,y}$ must be updated annually ex-post for the year in which actual project generation and associated emissions reductions occur.

For subsequent crediting periods, $EF_{grid,BM,y}$ should be calculated ex-ante, as described in option 1 above. The PDD choose Option 1, which requires the project participant to calculate the Build Margin emission factor $EF_{grid,BM,y}$ ex-ante based on the most recent information available already built for sample group *m* at the time of PDD submission.

Project participants have chosen Option 1.

Step 6. Calculate the build margin emission factor

[27] If 20% falls on part capacity of a plant, that plant is fully included in the calculation.

The build margin emission factor is the generation-weighted average emission factor (tCO_2/MWh) of all power units m during the most recent year y for which power generation data is available, calculated as follows:

$$EF_{grid,BM,y} = \frac{\sum_m EG_{m,y} \times EF_{EL,m,y}}{\sum_m EG_{m,y}} \quad \text{(B.4)}$$

Where:

$EF_{grid,BM,y}$	=	Build margin CO_2 emission factor in year y (tCO_2/MWh)
$EG_{m,y}$	=	Net quantity of electricity generated and delivered to the grid by power unit m in year y (MWh)
$EF_{EF,m,y}$	=	CO_2 emission factor of power unit m in year y (tCO_2/MWh)
m	=	Power units included in the build margin
y	=	Most recent historical year for which power generation data is available

However, a direct application of this approach is difficult in China, as data on either the five power plants that have been built most recently or the power plants capacity additions in the electricity system that comprise 20% of the system generation are classified as business confidential and are not publicly available. Therefore, a deviation approved by the EB[28] 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. This approach has been applied by several registered CDM hydropower projects using methodology ACM0002 or AMS-I.D.

The calculations of build margin emission factor are derived from the "Bulletin on the Baseline Emission Factor of the China's Regional Grids", which is renewed and published by the DNA (Office of National Coordination Committee on Climate Change) in China, on Aug. 9th, 2007.

Sub-step 1. Calculation the weights of CO_2 emissions of solid, liquid and gas fuel in total emissions for 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:

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

[28] This is in accordance with the "Request for guidance: Application of AM0005 and AMS-I.D in China", a letter from DNV to the Executive Board, dated 07/10/2005, available online at: http://cdm.unfccc.int/UserManagement/FileStorage/6POIAMGYOEDOTKW25TA20EHEKPR4DM.

$$\lambda_{Oil} = \frac{\sum_{i \in OIL, j} F_{i,j,y} \times COEF_{i,j}}{\sum_{i,j} F_{i,j,y} \times COEF_{i,j}} \qquad \text{(B.5)}$$

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

Where:

$F_{i,j,y}$	=	Amount of fuel i consumed in province j in year y (tce)
$COEF_{i,j,y}$	=	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} λ_{Oil} λ_{Gas}	=	Weights of CO_2 emissions of solid, liquid and gas fuel in total emissions respectively

For the detailed information, please see the Annex 3.

Sub-step 2. Calculate the emission factor of relevant thermal power

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

$$EF_{Thermal} = \lambda_{Coal} \times EF_{Coal,Adv} + \lambda_{Oil} \times EF_{Oil,Adv} + \lambda_{Gas} \times EF_{Gas,Adv} \qquad \text{(B.6)}$$

Where:

$EF_{Coal,Adv}, EF_{Oil,Adv}, EF_{Gas,Adv}$	=	Emission factor representing best technology commercially available for fuel of coal, oil or gas fired power plants respectively

A coal-fired power plant with a total installed capacity of 600 MW distributed over 15 turbines is assumed to be the commercially available best practice technology in terms of efficiency. The estimated coal consumption of such a National Sub-critical Power Station with a capacity of 600MW is 343.33gce/kWh, which corresponds to an efficiency of 35.82% for electricity generation.

For gas and oil power plants a 200 MW combined cycle power plant with a specific fuel consumption of 258gce/kWh, which corresponds to an efficiency of 47.67% for electricity generation, is selected as commercially available best practice technology in terms of efficiency[29].

The main parameters used for calculation of the thermal power plant emission factors $EF_{Coal,Adv}, EF_{Oil,Adv}, EF_{Gas,Adv}$ are provided in the Table A3-8 in Annex 3.

Sub-step 3. Calculate the BM of the grid

[29] The "Bulletin on the Baseline Emission Factors of the China's Grids", which has been renewed by the China DNA (Director Office of National Climate Change Coordination of NDRC) on Aug. 9th, 2007.

Based on the result above and the share of thermal power of recent 20% capacity additions, build margin emission factor can be calculated by:

$$EF_{grid,BM,y} = \frac{CAP_{Thermal}}{CAP_{Total}} \times EF_{Thermal} \qquad \text{(B.7)}$$

Where:

CAP_{Total} = Total of new capacity additions(MW)

$CAP_{Thermal}$ = New capacity addition of thermal power(MW)

The calculation result of the Building Margin emission factor is $EF_{grid,BM,y}$ **= 0.6592 tCO_2e/MWh,** which is published by the bulletin from DNA, and the details can be found in the bulletin.

The build margin emission factor of the baseline is calculated ex-ante and will not be updated in the first crediting period of the project activity.

For the detailed information, please see the Annex 3.

Step 7. Calculate the combined margin emissions factor

The combined margin emission factor is calculated as follows:

$$EF_{grid,CM,y} = EF_{grid,OMsimple,y} \times w_{OM} + EF_{grid,BM,y} \times w_{BM} \qquad \text{(B.8)}$$

Where:

$EF_{grid,BM,y}$ = Build margin CO_2 emission factor in year y (tCO_2e/MWh)

$EF_{grid,OM,y}$ = Operating margin CO_2 emission factor in year y (tCO_2e/MWh)

w_{OM} = Weighting of operating margin emissions factor, which is 0.5 by default

w_{BM} = Weighting of build margin emissions factor, which is 0.5 by default

According to steps above and the *Bulletin on Baseline Emission Factor of China Region Grid* published by the Office of National Coordination Committee on Climate Change on Aug. 9th, 2007, the operating margin emission factor ($EF_{grid,OM,y}$) of the CCPG is $EF_{grid,OM,y}$ **=1.2899 tCO_2e/MWh** and the build margin emission factor ($EF_{grid,BM,y}$) is $EF_{grid,BM,y}$ **=0.6592 tCO_2e/MW**. The value of the defaults weights of the operating margin (w_{OM}) and building margin (w_{BM}) as specified in the "Tool to calculate the emission factor of an electricity system" are w_{OM}= 0.5 and w_{BM} = 0.5.

Applying above values the combined baseline emission factor of the CCPG is**:**
$EF_{grid,CM,y}$ **=0.97455** tCO_2e/MWh.

For the detailed information, see the Annex 3.

Leakage

As newly built hydropower plants, energy generating equipment is not transferred from another activity and existing equipment is not transferred to another activity involved in the project activities. No leakage should be considered in the project. Therefore: $LE_y = 0$.

Emission Reductions

The annual emission reductions ER_y for the project activity are calculated as the baseline emissions minus the project emissions and leakage emission, using the formula below:

$$ER_y = BE_y - PE_y - LE_y \qquad \text{(B.9)}$$

Where:

ER_y = Emission reduction in year y (tCO_2e/yr)

BE_y = Baseline emission in year y (tCO_2e/yr)

PE_y = Project emission in year y (tCO_2e/yr)

LE_y = Leakage emission in year y (tCO_2e/yr)

Given the results above where project emission and project leakage are equal to zero, equation (B.9) above for the calculation of project emission reduction is reduced to:

$$ER_y = BE_y = EG_y \times EF_{grid,CM,y} \qquad \text{(B.10)}$$

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

>>

Data / Parameter:	$F_{i,y}$
Data unit:	tons
Description:	The amount of fuel i consumed in year y
Source of data used:	China Energy Statistic Yearbook (2004-2006)
Value applied:	See Annex 3 Table A3-1, A3-3, A3-5
Justification of the choice of data or description of measurement methods and procedures actually applied :	Official released statistic; public accessible and reliable data source
Any comment:	

Data / Parameter:	EG_y
Data unit:	MWh
Description:	The net electricity generation in year y
Source of data used:	China Electric Power Yearbook (2004-2006)
Value applied:	See Annex 3 Table A3-2,A3-4,A3-6
Justification of the choice of data or description of measurement methods	Official released statistic; public accessible and reliable data source

and procedures actually applied :	
Any comment:	

Data / Parameter:	$NCV_{i,y}$
Data unit:	MJ/t,km^3
Description:	Net calorific value (energy content) of fossil fuel type i in year y
Source of data used:	China Energy Statistic Yearbook(2004-2006)
Value applied:	See Annex 3 Table A3-1, A3-3, A3-5
Justification of the choice of data or description of measurement methods and procedures actually applied :	Official released statistic; public accessible and reliable data source
Any comment:	

Data / Parameter:	$OXID_i$
Data unit:	%
Description:	Oxidation factor of the fuel *i*
Source of data used:	2006 *IPCC Guideline for National Greenhouse Gas Inventories*
Value applied:	100
Justification of the choice of data or description of measurement methods and procedures actually applied :	The data obtained from *IPCC Guideline for National Greenhouse Gas Inventories* is reliable.
Any comment:	

Data / Parameter:	$EF_{CO_2,i,y}$
Data unit:	tCO_2/TJ
Description:	CO_2 emission factor of fossil fuel type i in year y
Source of data used:	2006 *IPCC Guidelines for National Greenhouse Gas Inventories*
Value applied:	See Annex 3 Table A3-1, A3-3, A3-5
Justification of the choice of data or description of measurement methods and procedures actually applied :	The data obtained from *IPCC Guideline for National Greenhouse Gas Inventories* is reliable.
Any comment:	

Data / Parameter:	Efficiency of advanced thermal power plant additions
Data unit:	%

Description:	Data are based on the best technologies available in china
Source of data used:	NDRC – Chinese DNA http://cdm.ccchina.gov.cn/website/CDM/Upfile/file1051.pdf
Value applied:	35.82%, 47.67%, and 47.67%
Justification of the choice of data or description of measurement methods and procedures actually applied :	Official released statistic; public accessible and reliable data source
Any comment:	

Data / Parameter:	$CAP_{y,j}$
Data unit:	MW
Description:	The installed capacity of power source j in year y
Source of data used:	China Electric Power Yearbook(2005,2006,2007)
Value applied:	See Annex 3 Table A3-10,A3-11,A3-12
Justification of the choice of data or description of measurement methods and procedures actually applied :	Official released statistic; public accessible and reliable data source
Any comment:	

Data / Parameter:	$CAP_{1,BL}$
Data unit:	W
Description:	Installed capacities of stage 1 before the implementation of the Project
Source of data used:	FSR
Value applied:	0
Justification of the choice of data or description of measurement methods and procedures actually applied :	The data comes from Feasibility Study Report of the Project
Any comment:	

Data / Parameter:	$A_{1,BL}$
Data unit:	m^2
Description:	Area of the reservoir measured in the surface of the water, before the implementation of stage 1, when the reservoir is full
Source of data used:	FSR
Value applied:	0
Justification of the choice of data or description of	The data comes from Feasibility Study Report of the Project

measurement methods and procedures actually applied :	
Any comment:	

Data / Parameter:	$CAP_{2,BL}$
Data unit:	W
Description:	Installed capacities of stage 2 before the implementation of the Project
Source of data used:	FSR
Value applied:	0
Justification of the choice of data or description of measurement methods and procedures actually applied :	The data comes from Feasibility Study Report of the Project
Any comment:	

Data / Parameter:	$A_{2,BL}$
Data unit:	m^2
Description:	Area of the reservoir measured in the surface of the water, before the implementation of stage 2, when the reservoir is full
Source of data used:	FSR
Value applied:	0
Justification of the choice of data or description of measurement methods and procedures actually applied :	The data comes from Feasibility Study Report of the Project
Any comment:	

Data / Parameter:	$CAP_{3,BL}$
Data unit:	W
Description:	Installed capacities of stage 3 before the implementation of the Project
Source of data used:	FSR
Value applied:	0
Justification of the choice of data or description of measurement methods and procedures actually applied :	The data comes from Feasibility Study Report of the Project
Any comment:	

Data / Parameter:	$A_{3,BL}$
Data unit:	m^2

Description:	Area of the reservoir measured in the surface of the water, before the implementation of stage 3, when the reservoir is full
Source of data used:	FSR
Value applied:	0
Justification of the choice of data or description of measurement methods and procedures actually applied :	The data comes from Feasibility Study Report of the Project
Any comment:	

B.6.3 Ex-ante calculation of emission reductions:

>>

Based on the formula in B.6.1 and data from PDR, the emission reductions of the proposed project are calculated as follows:

Stage 1: $ER_y = 24210MWh \times 0.97455tCO_2e / MWh = 23594tCO_2e$

Stage 2: $ER_y = 10466MWh \times 0.97455tCO_2e / MWh = 10200tCO_2e$

Stage 3: $ER_y = 13222MWh \times 0.97455tCO_2e / MWh = 12886tCO_2e$

The average annual emission reduction from the proposed project will be 46,679 tCO_2e. The proposed project activity is expected to achieve 326,753 tCO_2e of emission reductions during the first 7-year crediting period.

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

>>

Table B8-B11 provides the annual emission reductions in tabular form.

Table B8 Estimate of emission reductions due to Stage 1 in the first crediting period

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)
2011	0	23,594	0	23,594
2012	0	23,594	0	23,594
2013	0	23,594	0	23,594
2014	0	23,594	0	23,594
2015	0	23,594	0	23,594
2016	0	23,594	0	23,594
2017	0	23,594	0	23,594
Total	0	165,157	0	165,157

Table B9 Estimate of emission reductions due to Stage 2 in the first crediting period

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)
2011	0	10,200	0	10,200
2012	0	10,200	0	10,200
2013	0	10,200	0	10,200
2014	0	10,200	0	10,200
2015	0	10,200	0	10,200
2016	0	10,200	0	10,200
2017	0	10,200	0	10,200
Total	0	71,397	0	71,397

Table B10 Estimate of emission reductions due to Stage 3 in the first crediting period

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)
2011	0	12,886	0	12,886
2012	0	12,886	0	12,886
2013	0	12,886	0	12,886
2014	0	12,886	0	12,886
2015	0	12,886	0	12,886
2016	0	12,886	0	12,886
2017	0	12,886	0	12,886
Total	0	90,199	0	90,199

Therefore, the total aggregated project emission reductions over the first crediting period are 322,458 tCO_2e, as shown in Table B8 below.

Table B11 Estimate of emission reductions due to the project in the first crediting period

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)
2011	0	46,679	0	46,679
2012	0	46,679	0	46,679
2013	0	46,679	0	46,679
2014	0	46,679	0	46,679
2015	0	46,679	0	46,679

2016	0	46,679	0	46,679
2017	0	46,679	0	46,679
Total	0	326,753	0	326,753

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

B.7.1 Data and parameters monitored:

Data / Parameter:	$EG_{1,out,y}$
Data unit:	MWh
Description:	Electricity supplied to the grid by Stage 1 to the grid in year y
Source of data to be used:	Electricity meter reading
Value of data:	24,120MWh
Description of measurement methods and procedures to be applied:	The net supply of power to the grid by the project is measured through national standard electricity metering instruments. The reading of the electricity meter will be hourly measured and monthly recorded. The accuracy of electricity meter is 0.5s.
QA/QC procedures:	According to national standards, meter will be calibrated periodically. Data measured by meters will be cross checked by electricity sales receipt.
Any comment:	Detail see B.7.2

Data / Parameter:	$EG_{1,in,y}$
Data unit:	MWh
Description:	Electricity bought from the grid by Stage 1 in year y
Source of data to be used:	Electricity meter reading at the connection point between the proposed project and the grid
Value of data:	0MWh in PDD and real value according to the meter reading
Description of measurement methods and procedures to be applied:	The net supply of power to the grid by the project is measured through national standard electricity metering instruments. The reading of the electricity meter will be hourly measured and monthly recorded. The accuracy of electricity meter is 0.5s.
QA/QC procedures:	According to national standards, meter will be calibrated periodically. Data measured by meters will be cross checked by electricity sales receipt.
Any comment:	Detail see B.7.2

Data / Parameter:	$Cap_{1,PJ}$
Data unit:	W
Description:	Installed capacity of stage 1 after the implementation of the project activity.
Source of data to be used:	Project site.
Value of data	6,400,000
Description of measurement methods and procedures to be applied:	Determine the installed capacity based on the recognized standards yearly.
QA/QC procedures to be	-

applied:	
Any comment:	Refer to B.7.2. Description of the monitoring plan

Data / Parameter:	$A_{1,PJ}$
Data unit:	m^2
Description:	Area of the reservoir measured in the surface of the water of stage 1, when the reservoir is full.
Source of data to be used:	Project site.
Value of data	70
Description of measurement methods and procedures to be applied:	Measured from topographical surveys yearly
QA/QC procedures to be applied:	-.
Any comment:	Refer to B.7.2. Description of the monitoring plan

Data / Parameter:	$EG_{2,out,y}$
Data unit:	MWh
Description:	Electricity supplied to the grid by Stage 2 to the grid in year y
Source of data to be used:	Electricity meter reading
Value of data:	10,466MWh
Description of measurement methods and procedures to be applied:	The net supply of power to the grid by the project is measured through national standard electricity metering instruments. The reading of the electricity meter will be hourly measured and monthly recorded. The accuracy of electricity meter is 0.5s.
QA/QC procedures:	According to national standards, meter will be calibrated periodically. Data measured by meters will be cross checked by electricity sales receipt.
Any comment:	Detail see B.7.2

Data / Parameter:	$EG_{2,in,y}$
Data unit:	MWh
Description:	Electricity bought from the grid by Stage 2 in year y
Source of data to be used:	Electricity meter reading at the connection point between the proposed project and the grid
Value of data:	0MWh in PDD and real value according to the meter reading
Description of measurement methods and procedures to be applied:	The net supply of power to the grid by the project is measured through national standard electricity metering instruments. The reading of the electricity meter will be hourly measured and monthly recorded. The accuracy of electricity meter is 0.5s.
QA/QC procedures:	According to national standards, meter will be calibrated periodically. Data measured by meters will be cross checked by electricity sales receipt.
Any comment:	Detail see B.7.2

Data / Parameter:	$Cap_{2,PJ}$
Data unit:	W

Description:	Installed capacity of stage 2 after the implementation of the project activity.
Source of data to be used:	Project site.
Value of data	2,500,000
Description of measurement methods and procedures to be applied:	Determine the installed capacity based on the recognized standards yearly.
QA/QC procedures to be applied:	
Any comment:	Refer to B.7.2. Description of the monitoring plan

Data / Parameter:	$A_{2,PJ}$
Data unit:	m^2
Description:	Area of the reservoir measured in the surface of the water of stage 2, when the reservoir is full.
Source of data to be used:	Project site.
Value of data	855
Description of measurement methods and procedures to be applied:	Measured from topographical surveys yearly
QA/QC procedures to be applied:	-
Any comment:	Refer to B.7.2. Description of the monitoring plan

Data / Parameter:	$EG_{3,out,y}$
Data unit:	MWh
Description:	Electricity supplied to the grid by Stage 3 to the grid in year y
Source of data to be used:	Electricity meter reading
Value of data:	13,222MWh
Description of measurement methods and procedures to be applied:	The net supply of power to the grid by the project is measured through national standard electricity metering instruments. The reading of the electricity meter will be hourly measured and monthly recorded. The accuracy of electricity meter is 0.5s.
QA/QC procedures:	According to national standards, meter will be calibrated periodically. Data measured by meters will be cross checked by electricity sales receipt.
Any comment:	Detail see B.7.2

Data / Parameter:	$EG_{3,in,y}$
Data unit:	MWh
Description:	Electricity bought from the grid by Stage 3 in year y
Source of data to be used:	Electricity meter reading at the connection point between the proposed project and the grid
Value of data:	0MWh in PDD and real value according to the meter reading
Description of measurement methods and procedures to be applied:	The net supply of power to the grid by the project is measured through national standard electricity metering instruments. The reading of the electricity meter will be hourly measured and monthly recorded. The

	accuracy of electricity meter is 0.5s.
QA/QC procedures:	According to national standards, meter will be calibrated periodically. Data measured by meters will be cross checked by electricity sales receipt.
Any comment:	Detail see B.7.2

Data / Parameter:	***$Cap_{3,PJ}$***
Data unit:	W
Description:	Installed capacity of stage 3 after the implementation of the project activity.
Source of data to be used:	Project site.
Value of data	3,200,000
Description of measurement methods and procedures to be applied:	Determine the installed capacity based on the recognized standards yearly.
QA/QC procedures to be applied:	-
Any comment:	Refer to B.7.2. Description of the monitoring plan

Data / Parameter:	***$A_{3,PJ}$***
Data unit:	m^2
Description:	Area of the reservoir measured in the surface of the water of stage 3, when the reservoir is full.
Source of data to be used:	Project site.
Value of data	4,848
Description of measurement methods and procedures to be applied:	Measured from topographical surveys yearly
QA/QC procedures to be applied:	-
Any comment:	Refer to B.7.2. Description of the monitoring plan

B.7.2 Description of the monitoring plan:

>>

This section details the steps taken to monitor on a regular basis the GHG emissions reductions from the Sichuan Lengshuikou 12.1 MW Small-Scale Bundled Hydropower Project. 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 as shown in Figure B3. The CDM Manager will have the overall responsibility for the monitoring system on this project.

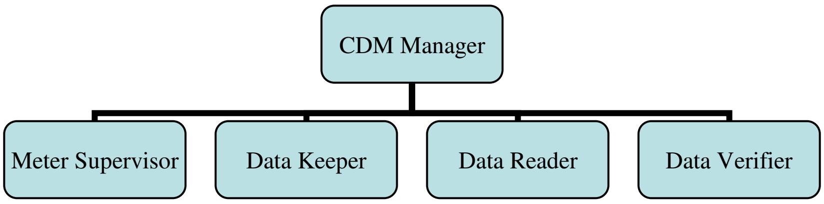

Figure B3 CDM monitoring team

2. Monitoring parameter

Given the emission factor is ex-calculated and according to the Methodology AMS-I.D.(version 13), the only data to be monitored is electricity supplied to the grid and purchased by the project (detailed in B.7.1).

3. Monitoring equipment and installation

Electricity meters should meet the relevant local standards at the time of installation. This means that, before installation, the meters should be factory calibrated by the manufacturer. The meters will be installed by either the project developer or the grid company according to the Chinese standard "electricity meter installation technical management code" (DL/T448-2000). The meters must be pasted with seal after installation or calibration. The seal is forbidden to rip by either party independently.

Totally four electricity meters with accuracy of 0.5s will be installed: No.1, No.2 and No.3 (M1, M2 and M3) will be installed respectively at the high voltage export end of main transformer of each station to monitor the go-to-grid and purchased electricity of each stage hydropower station as back-up meters.No.4 (M4) will be installed at the import end of substation to monitor the go-to-grid and purchased electricity of the project as the main meter. Generally the data read from M4 is the counting electricity. The data sum of M1+M2+M3 subtracting the line loss is used when M4 has some fault.

And project owner will purchase electricity from power grid for emergency case and construction period. So no fossil fuel will be used for the project.

Electrical grid connection diagram is shown in Figure B4.

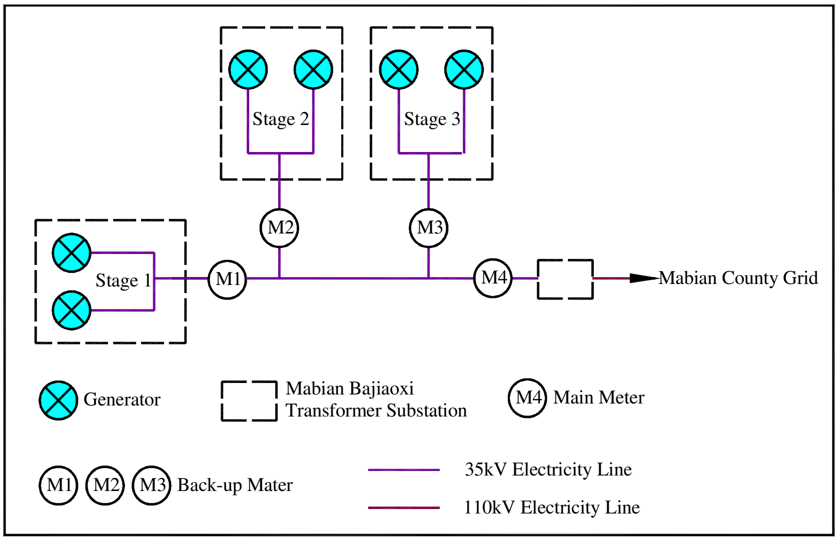

Figure B4 Electrical grid connection diagram

Area of the reservoir measured in the surface of the water, when the reservoir is full. It will be measured from topographical surveys.

4. Data recording procedure

The data is measured hourly and recorded monthly. The project owner provides the power grid company with sales receipts, and preserves the copies of the sales receipts. The power grid company provides the project owner with data of power imported from power grid. The project owner provides DOE with record of net power generation data and copies of sales receipts.

5. Quality Assurance (QA)/Quality Control (QC)

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. Internal auditing, management review and corrective actions will be set up in the management system of the proposed project.

In case the following circumstances occur on the main meter:

- any abnormal circumstances identified
- meter failure
- 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.

6. 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 the records, the EIA and the PDR, 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 collected as part of monitoring will be achieved electronically and be kept at least 2 years after the end of the last crediting period.

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

10/03/2010

Name of person of determining baseline:

Enecore Carbon Limited
Unit 1601, Tower 16, Jianwai SOHO Jianwai Da Jie 39 Chaoyang District Beijing P.R.China, 100022
Tel: +86-(0)10-59000701 Fax: +86-(0)10-59000706

Andrea Camponogara
E-mail: a.camponogara@enecore .com

Leng Qian
E-mail: s.leng@enecore.com

Zhang Xingyan
E-mail: xingyan.zhang@enecore.com

The persons/entities of determining baseline are not project participants.

SECTION C. Duration of the project activity / crediting period

C.1 Duration of the project activity:

C.1.1. Starting date of the project activity:

>>

December 20th, 2006

The date is the earliest construction contract signed date among three stages.[30]

[30] Manufacture contract of turbine-generator of Lengshuikou, Jinyuhe and Xuekoushan was signed respectively on February 12th 2007,September 17th 2007,September 17th 2008;

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

>>
20 years 0 month for Stage 1
30 years 0 month for Stage 2
30 years 0 month for Stage 3

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:

>>
01/01/2011 or the date of the project registration by the UNFCCC whichever is later

C.2.1.2. Length of the first crediting period:

>>
7 years

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

>>
Not applicable

C.2.2.2. Length:

>>
Not applicable

SECTION D. Environmental impacts

>>

D.1. 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 1, Stage 2 and stage 3 of Sichuan Lengshuikou 12.1 MW Small-Scale Bundled Hydropower Project, have been respectively approved by Leshan Environmental Protection Bureau and conclusions of the EIA report are summarized as follows:

1. Noise impact assessment

Construction contract of Lengshuikou(signed on December 20th 2006), Jinyuhe(signed on December 20th 2006) and Xuekoushan(signed on September 18th 2008);

According to the definition of starting date of a CDM project activity from glossary of CDM terms (version 04), the earliest date of December 20th 2006 was chosen as the starting date of project activity.

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. The measurements would be taken to mitigate the impacts. For example, the project owners would choose equipment with low noise; arrange construction time and the workers could not work more than eight hours a day. They should wear the personal protective equipments such as the sound proof helmet during the work time.

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 equipments are set up to enhance air circulation.

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 Xuekoushan River. Therefore, the project does not have negative effect on quality of water in nearby area.

4. Ecological impact assessment

Terrestrial plants: Detailed analysis shows that adverse impacts on terrestrial plants are quite limited, and there are no any rare and endangered species in the construction area[31]. Landscape and vegetation cover can be restored through planting trees and grass in the project site after completion of construction. This will be implemented by project owner.

Terrestrial animals: According to investigation, no any rare and endangered species near the project site. However, according to ‘People's Republic of China Law on the Protection of Wild Animals’ and ‘Sichuan Provincial Law on the Protection of Wild Animals’, workers are educated and trained not to disturb any animal or plant species in the surrounding environment. Therefore, the construction of the project would have little adverse impacts on the environment.

Aquatic creatures: No rare and endangered aquatic species were found in the river near the project site. Meanwhile, relational department take measure to protect aquatic creatures as follows: (1) eliminate bomb fish incidence; (2) forbid profit fishing in Xuekoushan River; (3) make sure ecological flow is more than $0.14m^3/s$ during dry season. Someone disobeying the regulation will be punished seriously. Thus, no adverse impacts on aquatic creatures are expected due to the project activities.

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. In the plan, total amount of soil erosion was predicted, detailed protection measures were identified.

[31] Documental evidence approved by Mabian Yi Autonomous County Forestry Bureau, December 4th,2006

It is concluded that with implementation of the plan the soil erosion will be under effective control and the soil erosion would be with an acceptable level. And Emeishan City Environment Station have monitored the situation and made a report. The result is positive.

6. Social impact assessment

The proposed project is three run-of-river hydropower projects; no inhabitants need to be resettled due to the project construction. 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 and increase inhabitants' living standards.

Furthermore, more than 100 temporary jobs are provided for local people during construction period and 52 long-term jobs are available for local people during operational period.

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:

>>

According to the results of EIA and the reply from the Environmental Protection Bureau, the impacts on the environment are not significant.

SECTION E. Stakeholders' comments

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

>>

Comments from the local stakeholders about Sichuan Lengshuikou 12.1 MW Small-Scale Bundled Hydropower Project were consulted by visiting, symposium, and questionnaire distribution methods during the Environmental Impact Assessment. In January 10th 2007, the project owner took questionnaires to better understand stakeholders' comments again after considered CDM application[32]. The local government and stakeholders were invited to submit comments on the project activity.

Total 30 questionnaires were distributed, all of the distributed questionnaires had been returned. All of the opinions from the local stakeholders had been collected and considered. A tabular questionnaire was prepared as Table E1.

Table E1 Stakeholder Questionnaire

Name： Age: Occupation:

[32] Stakeholder questionnaire, 30 originals, January 10th 2007

No.	Item	Option
1	Which district your residence will be when the project is built	(1) Project impacting district (2) Other
2	If the project provide more employments for local people	(1) Yes (2) No
3	If the project increase revenue for local people	(1) Increase obviously (2) Increase possibly (3) No impact (4) Decrease possibly
4	How the project contribute to local economy	(1) Promote (2) No relationship (3) Negative role
5	Which part the project will influence mostly	(1) Noise (2) Dust (3) Transport (4) Sight and zoology
6	How the project influence local traffic	(1) Improve (2) Not improve
7	How the project make water loss and soil erosion	(1) Seriously (2) Little seriously (3) Slightly
8	How the project impact local vegetation	(1) Seriously (2) Little seriously (3) Slightly
9	If the vegetation was destroyed in the project can be renewed	(1) Yes (2) No
10	Ho the project influence local zoology	(1) Seriously (2) Little seriously (3) Slightly
11	How the project influence local tradition of minor nation	(1) Seriously (2) Little seriously (3) Slightly
12	The place will be influenced mostly	(1) Construction district (2) Dehydrated reach (3) Backward position (4) Other
13	How the project influence the water use in backward position	(1) Seriously (2) Little seriously (3) Slightly
14	Which one is the most adversely influence	(1) Excavation and blasting will affect natural vegetation, animals and increase soil erosion. (2) Dehydration of reach will influence diversity of aquatic organisms and fish. (3) Reservoir and dam construction will impact local life. (4) Other
15	Which one is the most benefit	(1) Promote local economy (2) Improve local traffic

		(3) Provide more employment opportunity and increase income
16	What is your attitude for the project	(1) Support (2) Against (3) Does not matter

E.2. Summary of the comments received:

>>
Result of survey person is as follow:

- 10% people's age is below 30;
- 90%people's age is above and equal 30.

- 24% is officer from local government;
- 76% is local villager.

- 17% is female;
- 83% is male.

And the answer result received of each question is listed in Table E2.

Table E2 Result of Questionnaire

No.	Percentage result
1	(1) 10% (2)90%
2	(1) 100% (2)0%
3	(1) 100% (2)0% (3)0% (4)0%
4	(1) 100% (2)0% (3)0%
5	(1) 73% (2)0% (3)27% (4)0%
6	(1) 100% (2)0%
7	(1) 0% (2)3% (3)97%
8	(1) 97% (2)3% (3)0%
9	(1) 100% (2)0%
10	(1) 53% (2)47% (3)0%
11	(1) 100% (2)0% (3)0%
12	(1) 97% (2)3% (3)0% (4)0%
13	(1) 3% (2)3% (3)94%
14	(1) 37% (2)0% (3)0% (4)0% (5)63%
15	(1) 100% (2)13% (3)13%
16	(1) 90% (2)0% (3)10%

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

>>
The residents and local government are all very supportive to the proposed project. The main concerns are about the environmental impacts cased by the proposed project, especially the impacts during the construction. According to the EIA of the proposed project, the project will not bring significant impacts to the local environment. And during construction, protection measures will be implemented by the

project owner, in accordance with EIA and the approval of EIA, to maximally reduce the related environmental impacts.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

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<u>Annex 2</u>

INFORMATION REGARDING PUBLIC FUNDING

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

Annex 3

BASELINE INFORMATION

Table A3-1 Operating Margin Emission Factor of CCPG in 2003

Fuel	Unit	Jiangxi	Henan	Hubei	Hunan	Chongqing	Sichuan	Total	EF	OXID	NCV	CO_2 Emission (tCO_2e)
									(tCO_2e/TJ)	(%)	(MJ/t,MJ/10^3m^3)	J=G*H*I*J*44/12 /10000 (for mass unit)
		A	B	C	D	E	F	G=A+B+C+D+E+F	H	I	J	J=G*H*I*J*44/12 /1000 (for volume unit)
Raw Coal	10^4 t	1427.41	5504.94	2072.44	1646.47	769.47	2430.93	13851.66	25.80	100	20908.00	273971539.89
Cleaned Coal	10^4 t							0.00	25.80	100	26344.00	0.00
Other Washed Coal	10^4 t	2.03	39.63			106.12		147.78	25.80	100	8363.00	1169146.40
Coke	10^4 t				1.22			1.22	25.80	100	28435.00	32817.40
Coke Oven Gas	10^8 m^3			0.93				0.93	12.10	100	16726.00	69013.15
Other Gas	10^8 m^3							0.00	12.10	100	5227.00	0.00
Crude Oil	10^4 t		0.50	0.24			1.20	1.94	20.00	100	41816.00	59490.23
Gasoline	10^4 t							0.00	18.90	100	43070.00	0.00
Diesel Oil	10^4 t	0.52	2.54	0.69	1.21	0.77		5.73	20.20	100	42652.00	181015.94
Fuel Oil	10^4 t	0.42	0.25	2.17	0.54	0.28	1.20	4.86	21.10	100	41816.00	157229.00
LPG	10^4 t							0.00	17.20	100	50179.00	0.00
Refinery Dry Gas	10^4 t	1.76	6.53		0.66			8.95	18.20	100	46055.00	275069.63
Natural Gas	10^8 m^3					0.04	2.20	2.24	15.30	100	38931.00	489222.52
Other petroleum produce	10^4 t							0.00	20.00	100	38369.00	0.00
Other coking produce	10^4 t							0.00	25.80	100	28435.00	0.00
Other energy	10^4 t bc		11.04			16.20		27.24	0.00	100	0.00	0.00
											Subtotal	276404544.15

Data Source: China Energy Statistics Yearbook 2004

Table A3-2 Fuel-fired Electricity Generation of CCPG for Year 2003

Province	Electricity Generation (10^8 kWh)	Electricity Generation (MWh)	Internal Power Consumption Rate (%)	Supplied Electricity (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

Table A3-3 Operating Margin Emission Factor of CCPG in 2004

Fuel	Unit	Jiangxi	Henan	Hubei	Hunan	Chongqing	Sichuan	Total	EF	OXID	NCV	CO_2 Emission (tCO_2e)
									(tCO_2e/TJ)	(%)	(MJ/t,MJ/10^3m^3)	J=G*H*I*J*44/12 /10000 (for mass unit)
		A	B	C	D	E	F	G=A+B+ C+D+E+F	H	I	J	J=G*H*I*J*44/12 /1000 (for volume unit)
Raw Coal	10^4 t	1863.8	6948.5	2510.5	2197.9	875.5	2747.9	17144.1	25.8	100	20908	339092605.29
Cleaned Coal	10^4 t		2.34					2.34	25.8	100	26344	58316.13
Other Washed Coal	10^4 t	48.93	104.22			89.72		242.87	25.8	100	8363	1921441.23
Coke	10^4 t		109.61					109.61	25.8	100	28435	2948455.29
Coke Oven Gas	10^8 m^3			1.68		0.34		2.02	12.1	100	16726	149899.53
Other Gas	10^8 m^3					2.61		2.61	12.1	100	5227	60527.09
Crude Oil	10^4 t		0.86	0.22				1.08	20	100	41816	33118.27
Gasoline	10^4 t		0.06			0.01		0.07	18.9	100	43070	2089.33
Diesel Oil	10^4 t	0.02	3.86	1.7	1.72	1.14		8.44	20.2	100	42652	266627.32
Fuel Oil	10^4 t	1.09	0.19	9.55	1.38	0.48	1.68	14.37	21.1	100	41816	464893.14
LPG	10^4 t							0	17.2	100	50179	0.00
Refinery Dry Gas	10^4 t	3.52	2.27					5.79	18.2	100	46055	177950.07
Natural Gas	10^8 m^3						2.27	2.27	15.3	100	38931	495774.61
Other petroleum produce	10^4 t							0	20	100	38369	0.00
Other coking produce	10^4 t							0	25.8	100	28435	0.00
Other energy	10^4 t bc		16.92		15.2	20.95		53.07	0	100	0	0.00
											Subtotal	345671697.30

Data Source: China Energy Statistics Yearbook 2005

Table A3-4 Fuel-fired Electricity Generation of CCPG for Year 2004

Province	Electricity Generation	Electricity Generation	Internal Power Consumption Rate	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

Table A3-5 Operating Margin Emission Factor of CCPG in 2005

Fuel	Unit	Jiangxi	Henan	Hubei	Hunan	Chongqing	Sichuan	Total	EF	OXID	NCV	CO_2 Emission (tCO_2e)
									(tCO_2e/TJ)	(%)	(MJ/t,MJ/10^3m^3)	J=G*H*I*J*44/12 /10000 (for mass unit)
		A	B	C	D	E	F	G=A+B+C+D+E+F	H	I	J	J=G*H*I*J*44/12 /1000 (for volume unit)
Raw Coal	10^4 t	1869.29	7638.87	2732.15	1712.27	875.4	2999.77	17827.75	25.8	100	20908	352614496.76
Cleaned Coal	10^4 t	0.02						0.02	25.8	100	26344	498.43
Other Washed Coal	10^4 t		138.12			89.99		228.11	25.8	100	8363	1804669.00
Coke	10^4 t		25.95		105			130.95	25.8	100	28435	3522490.83
Coke Oven Gas	10^8 m^3			1.15		0.36		1.51	12.1	100	16726	112053.61
Other Gas	10^8 m^3		10.2			3.12		13.32	12.1	100	5227	308896.88
Crude Oil	10^4 t		0.82	0.36				1.18	20	100	41816	36184.78
Gasoline	10^4 t		0.02			0.02		0.04	18.9	100	43070	1193.90
Diesel Oil	10^4 t	1.3	3.03	2.39	1.39	1.38		9.49	20.2	100	42652	299797.78
Fuel Oil	10^4 t	0.64	0.29	3.15	1.68	0.89	2.22	8.87	21.1	100	41816	286959.09
LPG	10^4 t							0	17.2	100	50179	0.00
Refinery Dry Gas	10^4 t	0.71	3.41	1.76	0.78			6.66	18.2	100	46055	204688.68
Natural Gas	10^8 m^3						3	3	15.3	100	38931	655208.73
Other petroleum produce	10^4 t							0	20	100	38369	0.00
Other coking produce	10^4 t				1.5			1.5	25.8	100	28435	40349.27
Other energy	10^4 t bc		2.88		1.74	32.8		37.42	0	100	0	0.00
											Subtotal	359887487.74

Data Source: China Energy Statistics Yearbook 2006

Table A3-6 Fuel-fired Electricity Generation of CCPG for Year 2005

Province	Electricity Generation	Electricity Generation	Internal Power Consumption Rate	Supplied Electricity
	(10^8 kWh)	(MWh)	(%)	(MWh)
Jiangxi	300	30000000	6.48	28056000
Henan	1315.9	131590000	7.32	121957612
Hubei	477	47700000	2.51	46502730
Hunan	399	39900000	5.00	37905000
Chongqing	175.84	17584000	8.05	16168488
Sichuan	372.02	37202000	4.27	35613474.6
Total				286203304.6

Data Source: China Electric Power Yearbook 2006

Table A3-7 Operating Margin Emission Factor of CCPG (Weighted Average)

Item	Unit	2003	2004	2005	Weighted Average
Total CO_2 emission	tCO_2e	276404544.15	345671697.30	359887487.74	
Electricity delivered to the grid	GWh	225987719.2	249074186	286203304.6	
Operation margin(OM)	tCO_2e/MWh	1.2229	1.3893	1.2588	1.2899

Table A3-8 Share of emission from coal, oil and gas fuel in electricity generation in CCPG

		Jiangxi	Henan	Hubei	Hunan	Chongqing	Sichuan	Total	NCV	Emission Factor	OXID	CO_2 Emission
									(MJ/t, MJ/10^3m^3)	(tCO_2e/TJ)	%	(tCO_2e)
Fuel	Unit	A	B	C	D	E	F	G=A+…+F	H	I	J	J=G*H*I*J*44/12/10000
Raw Coal	10^4 t	1869.29	7638.87	2732.15	1712.27	875.4	2999.77	17827.75	20908	25.8	100	352614497
Cleaned Coal	10^4 t	0.02	0					0.02	26344	25.8	100	498
Other Washed Coal	10^4 t		138.12			89.99		228.11	8363	25.8	100	1804669
Coke	10^4 t		25.95		106.5			132.45	28435	25.8	100	3562840
Subtotal											100	357982504
											100	
Crude Oil	10^4 t		0.82	0.36				1.18	41816	20	100	36185
Gasoline	10^4 t		0.02			0.02		0.04	43070	18.9	100	1194
Diesel Oil	10^4 t	1.3	3.03	2.39	1.39	1.38		9.49	42652	20.2	100	299798
Fuel Oil	10^4 t	0.64	0.29	3.15	1.68	0.89	2.22	8.87	41816	21.1	100	286959
Subtotal											100	624136
											100	
Natural Gas	10^7 m^3						30	30	38931	15.3	100	655209
Coke Oven Gas	10^7 m^3			11.5		3.6		15.1	16726	12.1	100	112054
Other Gas	10^7 m^3		102			31.2		133.2	5227	12.1	100	308897
LPG	10^4 t							0	50179	17.2	100	0
Refinery Dry Gas	10^4 t	0.71	3.41	1.76	0.78			6.66	46055	18.2	100	204689
Subtotal												1280848
Total												359887488

Data Source: China Energy Statistics Yearbook 2006
China DNA: http://cdm.ccchina.gov.cn/WebSite/CDM/Upfile/Upfile1051.pdf

$$\lambda_{Coal} = 99.47\%, \lambda_{Oil} = 0.17\%, \lambda_{Gas} = 0.36\%$$

Table A3-9 Parameters used for calculating fuel-fired emission factor

	Parameter	Efficiency of Power Supply	Emission Factor of Fuel (tCO_2e/TJ)	Emission Factor (tCO_2e/MWh)
		A	B	C=3.6/A/1000*B*44/12
Coal-fired Power Plant	$EF_{Coal,Adv}$	35.82%	25.8	0.9508
Gas-fired Power Plant	$EF_{Gas,Adv}$	47.67%	15.3	0.4237
Oil-fired Power Plant	$EF_{Oil,Adv}$	47.67%	21.1	0.5843

China DNA: http://cdm.ccchina.gov.cn/WebSite/CDM/Upfile/Upfile1051.pdf

$$EF_{Thermal} = 99.47\% \times 0.9508 + 0.17\% \times 0.5843 + 0.36\% \times 0.4237 = 0.94828$$

Table A3-10 Installed Capacity of CCPG in 2005

Installed capacity	Unit	Jiangxi	Henan	Hubei	Hunan	Chongqing	Sichuan	Total
Fuel-fired	MW	5906	26267.8	9526.3	7211.6	3759.5	7496	60167.2
Hydro	MW	3019	2539.9	8088.9	7905.1	1892.7	14959.6	38405.2
Nuclear	MW	0	0	0	0	0	0	0
Wind & 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 A3-11 Installed Capacity of CCPG in 2003

Installed capacity	Unit	Jiangxi	Henan	Hubei	Hunan	Chongqing	Sichuan	Total
Fuel-fired	MW	5407.8	17635.5	8173.3	6446.7	3126.2	6104	46893.5
Hydro	MW	2307.4	2438	7337.2	6603.1	1329.8	12341.5	32357
Nuclear	MW	0	0	0	0	0	0	0
Wind & 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 A3-12 Installed Capacity of CCPG in 2002

Installed capacity	Unit	Jiangxi	Henan	Hubei	Hunan	Chongqing	Sichuan	Total
Fuel-fired	MW	5128.8	15904.5	8147.8	4975.6	3004.5	6142	43303.2
Hydro	MW	2197.4	2438	7213.9	6135.3	1195.5	11854.6	31034.7
Nuclear	MW	0	0	0	0	0	0	0
Wind & 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 A3-13 Newly Added Installed Capacity from Year 2002-2005

	2002	2003	2005	C-A	Percentage of newly added fuel-fired plants
	A	B	C		
Fuel-fired (MW)	43303.2	46893.5	60167.2	16864	69.52%
Hydro (MW)	31034.7	32357	38405.2	7370.5	30.38%
Nuclear(MW)	0	0	0	0	0.00%
Wind & Others(MW)	0	0	24	24	0.10%
Total（MW）	74337.9	79250.5	98596.4	24258.5	100.00%
Percentage of installed capacity to 2005	75.40%	80.38%	100%		

$$EF_{grid,BM,y} = 0.94828 \times 69.52\% = 0.6592 tCO_2 / MWh$$

Table A3-14 Baseline emission factor of CCPG (tCO_2/MWh)

Operating 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

Table A3-15 Power generation mix of Central China Power Grid, 2001-2005

Year	Electricity generation (GWh)				
	Thermal	Hydro	Others	Total	Low cost/must run (%)
2001	178,156.00	103,554.00	n.a.	281,710	36.76%
2002	200,347.00	112,440.00	n.a.	312,787	35.95%
2003	240,839.00	126,448.00	n.a.	367,287	34.43%
2004	270,846.00	169,094.00	7.25	440,665	38.37%
2005	304,825.00	191,548.00	0.57	496,430	38.59%

Data Source: China Electric Power Yearbook (2002 - 2006)

Annex 4

MONITORING INFORMATION

Please refer to the section B.7 of the PDD and The *"CDM Monitoring and Management Manual of Lengshuikou, Jinyuhe and Xuekoushan Hydropower Plant"* will be available at validation.

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