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

CONTENTS

Annexes

Revision history of this document

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

SECTION A. General description of small-scale project activity

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

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Project: Chayuan First Cascade Hydroelectric Project
Version: 02.1
Date of submission: 15/06/2012

Revision history of the PDD

Version	Date	Comments
Version 01	30/10/2011	Initial PDD submitted to DOE
Version 01.1	18/11/2011	PDD revised and submitted for GSP
Version 02	12/02/2012	PDD revised to address the first round findings
Version 02.1	15/06/2012	PDD updated to include the information of UK LoA

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

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The Chayuan First Cascade Hydroelectric Project (hereinafter referred to as "the project") developed by Yuexi County Enbo Hydro Electricity Co., Ltd., involves the construction and operation of a run-of-the-river hydro power plant that utilizes the water resources of Chayuan River for power generation.

The total installed capacity of the project is 15 MW with an annual electricity supplied to the grid of 59,651.8MWh[1]. All feed-in electricity will displace part of the electricity generated by Central China Power Grid (CCPG), which is dominated by fossil fuel-fired power plants, and thus greenhouse gas (GHG) emissions will be reduced. The estimated annual GHG emission reductions are 43,211 tCO_2e.

As a hydro power project, the proposed project will contribute to the region's sustainable development through the following ways:

- Creating short-term and long-term job opportunities in the project area during both periods of project construction and operation;
- Displacing part of the electricity generated by coal-fired power plants, and thus improving the local environment and reducing greenhouse gas (GHG) emissions.

A.3. Project participants:

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Name of Party involved (*) ((host) indicates a host Party)	Private and/or public entity(ies) project participants (*) (as applicable)	Kindly indicate if the Party involved wishes to be considered as project participant（Yes/No）
People's Republic of China	Yuexi County Enbo Hydro	No

[1] According to the Feasibility Study Report, the annual electricity generation will be 64,720MWh. By applying the effective power coefficient of 0.95, the effective power generation will be 61,484MWh. After deducting the internal electricity consumption (1%) and the transmission loss (2%), the annual electricity supply to the grid will be 59,651.8MWh.

(host)	Electricity Co., Ltd.	
United Kingdom of Great Britain and Northern Ireland	Climate Bridge Ltd. (the CERs buyer)	No
United Kingdom of Great Britain and Northern Ireland	Gazprom Marketing & Trading Limited (the CERs buyer)	No
(*) In accordance with the CDM modalities and procedures, at the time of making the CDM-PDD public at the stage of validation, a Party involved may or may not have provided its approval. At the time of requesting registration, the approval by the Party (ies) involved is required.		

Detailed information on participants is included in Annex 1.

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

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

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A.4.1.1. Host Party(ies):

>>
People's Republic of China

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

>>
Sichuan Province

A.4.1.3. City/Town/Community etc:

>>
Yuexi County, Liangshan Yi Autonomous Prefecture

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 project is located on Wayan Town, Yuexi County, Liangshan Yi Autonomous Prefecture, Sichuan Province. The geographical coordinates of the Project are 102°26′51″E, 28°41′49″N. Figure A-1shows the detailed geographical location of the Project site.

Figure A-1 Locations of the Project site

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

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According to *Appendix B of the Simplified Modalities and Procedures for Small-scale CDM Project Activities*, the type and category of the proposed project are defined as follows:
Type I – *Renewable Energy Projects;*
Category I.D. –*Renewable Electricity Generation for a Grid*

The proposed project adopts run-of-the-river hydro power technology which utilizes the natural flow of the river to generate electricity.The project mainly consists of a concrete dam, a diversion system, a powerhouse, a tailrace and a transformer station. Water from the ChayuanRiver is first retained by the dam and then diverted through the water diversion system to the powerhouse to spin the turbines of associated generators for electricity generation. The installed capacity of the project is 15 MW, with three sets of 5 MW turbines and associated generators. The annual operation hour is estimated to be 4,315, and the plant load factor (PLF) is therefore 49.25%. The generated electricity will be delivered to CCPG via 110 kV transmission line. Table A-1 below shows the technical parameters of the project.

Table A-1 Key Technical Parameters of the project[2]

Hydro Turbine		Generator	
Model	CJA475-W-132/2×11	Model	SFW5000-10/2150
Rated output	5,319kW	Rated voltage	6.3kV
Lifetime	20years	Lifetime	20years

No technology transfer from other countries is involved in the project activity.

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

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The renewable crediting period of 7 years × 3 is chosen for the proposed project. The ex-ante estimated amount of annual and total emission reductions of the first crediting period are listed below.

Table A-2 Estimated Emission Reductions

Years	**Estimation of annual emission reductions in tonnes of CO_2 e**
01/09/2012-31/12/2012	14,403
2013	43,211
2014	43,211
2015	43,211
2016	43,211
2017	43,211

[2] The Parameters sourced from the Feasibility Study Report (FSR). The FSR was completed by Liangshan Survey and Design Institute of Hydraulic engineering and Electric power in May 2007 and approved by the Development and Reform Commission of Liangshan Yi Autonomous Prefecture on 20 September 2007

2018	43,211
01/01/2019-31/08/2019	28,808
Total estimated reductions (tonnes of CO_2 e)	302,477
Total number of crediting years	7
Annual average of the estimated reductions over the crediting period (tCO_2e)	43,211

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

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The project activity does not involve public funding from Parties included in Annex I of the UNFCCC.

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

The project participants confirm that there is no registered small-scale CDM project activity or an application to register another small-scale CDM project activity:

- With the same project participants;
- In the same project category and technology/measure; and
- Registered within the previous 2 years; and
- Whose project boundary is within 1 km of the project boundary of the proposed small scale activity at the closest point.

The project is not a debundled component of a large scale project activity, under the definition applied in *Appendix C to the Simplified Modalities and Procedures for Small-scale CDM Project Activities.*

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 approved small-scale methodology "AMS-I.D. Grid Connected renewable electricity generation" (version 17.0) is used for the project.

In line with application of the above methodology, the proposed project draws on the 'Tool to calculate the emission factor for an electricity system' (version 02.2.1).

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

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

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The methodology AMS-I.D. (version 17.0) is applicable to the proposed project as follows:

1. The project activity involves building a new hydro power plant at a site where there was no renewable energy power plant operating prior to the implementation of the project activity (Greenfield plant).

2. The project activity results in new reservoirs and the power density of the power plant is 2,771W/m^2, which is greater than 4 W/m^2.

3. The installed capacity of the project is 15 MW, which is within the limit of 15 MW required by the adopted methodology.

B.3. Description of the project boundary:

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According to AMS-I.D. (version 17.0), the spatial extend of the project boundary shall include the project power plant and all power plants connected physically to the electricity system that the CDM project power plants is connected to. The electricity system is defined in accordance to the "Tool to calculate the emission factor for an electricity system" (Version 02.2.1).

The project activity will transfer the electricity generated to the CCPG, so the spatial extent of the project boundary encompasses all power plants that physically connect to the CCPG, which includes Henan Power Grid, Hubei Power Grid, Hunan Power Grid, Jiangxi Power Grid, Sichuan Power Grid and Chongqing Power Grid, according to the guideline by China DNA[3]. The flow diagram of the project boundary is shown in Figure B-1 below.

[3] http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File2552.pdf

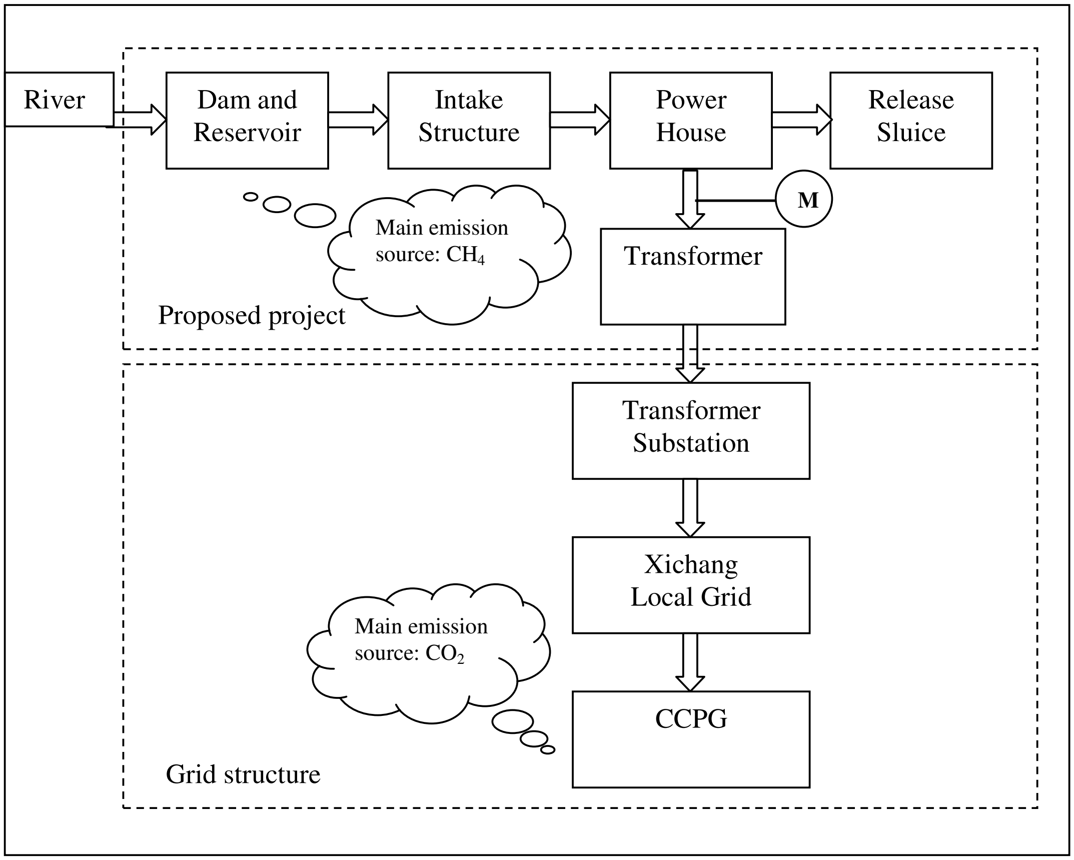

Figure B-1 Diagram of the project boundary

B.4. Description of baseline and its development:

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According to AMS-I.D. (version 17.0), the baseline scenario is that the electricity delivered to the grid by the project activity would otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources into the grid.

The baseline emissions are the product of electrical energy baseline $EG_{BL,y}$ expressed in MWh of electricity produced by the renewable generating unit, multiplied by the grid emission factor which is calculated as a combined margin (*CM*), consisting of the combination of operating margin (OM) and build margin (BM) according to the "Tool to calculate the emission factor for an electricity system" (Version 02.2.1). The detailed calculation for emission reductions are specified in B.6 and Annex 3.
The key parameters used for calculating baseline emissions of the project are listed in Table B-1:

Table B-1 Key parameters for calculation of baseline emission

Parameter	Value	Data Source
The OM of the CCPG	1.0297tCO2e/MWh	China's DNA: 2011 Baseline Emission Factors for Regional Power Grids in China. (See details in Annex3)
The BM of the CCPG	0.4191tCO2e/MWh	China's DNA: 2011 Baseline Emission Factors for Regional Power Grids in China. (See details in Annex3)
Net electricity supplied to the grid ($EG_{BL,y}$)	59,651.8MWh	Feasibility Study Report

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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In accordance to the Attachment A to Appendix B of the UNFCCC's *Simplified Modalities and Procedures for Small-scale CDM Project Activities*, additionality can be demonstrated by showing that the project activity would have not occurred due to one or more of the prohibitive barriers listed below:

(a) Investment barrier;
(b) Technological barrier;
(c) Barrier due to prevailing practice; or
(d) Other barriers.

Investment Barrier

Benchmark analysis has been used to test whether the proposed project is financially feasible without CDM revenue. According to the *Economic Evaluation Code for Small Hydropower Projects (SL 16-2010)*[4] published by the Ministry of Water Resource, the post-tax benchmark FIRR on total investment for small hydropower projects (less than 50MW) is 10%, thus a benchmark of 10% is used by the project. The main parameters for the calculation of financial indicators for the proposed project are summarized in below table B-2.

[4] The Ministry of Water Resources of P. R. China, *Hydropower [Decree 2010] No. 14* ; SL 16-2010 is in effect since 22/01/2011.

Table B-2 Main parameters for the calculation of financial indicators

Item	Unit	Value	Data Source
Installed Capacity	MW	15	Feasibility Study Report (FSR)
Operating Hours at Full Capacity	Hours	4,315	FSR
Effective Power Factor		0.95	FSR
Internal Power Consumption	%	1	FSR
Transmission loss rate	%	2	FSR
Forecast annual power supply to the grid	MWh	59,651.8	FSR
Grid Emission Factor	tCO_2/MWh	0.7244	2011 Grid Emission Factor of North-West China Power Grid
Electricity Tariff (including VAT)	CNY/kWh	0.288	FSR
Total Static Investment	CNY	120,290,000	FSR
Operation & Maintenance Expenses	CNY/year	4,040,900	FSR
Value Added Tax Rate	%	17	FSR
Surcharge for Education	%	3	FSR
City Maintenance & Construction Tax	%	5	FSR
Income Tax Rate	%	25	FSR
Expected CER Price	EUR/ tCO_2e	15	Assumed market price
Expected Project lifetime	Year	20	FSR

Table B-3 below shows the project IRR with and without the income from the CDM revenues.

Table B-3 Comparison of IRR for the proposed project and the financial benchmark

Item	Without CDM Revenue	Benchmark rate (after tax)	With CDM Revenue
Project IRR (after tax)	5.27%	10%	10.67%

Since the IRR of the proposed project is 5.27% which is lower than the benchmark IRR of 10%, the proposed project is not considered as financially attractive. With the CDM revenues, however, the project IRR will be substantially improved and reach 10.67%.

The sensitivity analysis is conducted to check whether, under reasonable variations in the critical assumptions, the project IRR remains below the benchmark IRR. The four main factors affecting the financial indicators of the project are:

- Total Static Investment
- Electricity Tariff
- Annual O&M Cost
- Annual electricity delivered to the grid

Table B-4 summarizes the results of the sensitivity analysis and Figure B-2 provides a graphic depiction of the sensitivity analysis.

Table B-4 Impact of Variations of Key Inputs on Project IRR

	-10%	0%	10%
Total static investment	6.21%	5.27%	4.38%
Electricity Tariff	3.88%	5.27%	6.44%
Annual O & M cost	5.61%	5.27%	4.9%
Annual electricity delivered to the grid	4.29%	5.27%	6.12%

Table B-5 Results of the sensitivity analysis

	% Variation of the parameter required to reach the 10% benchmark
Operating costs	-157.16%
Investment costs	-37.82%
Electricity tariff	43.85%
Annual power supplied to the grid	60.81%

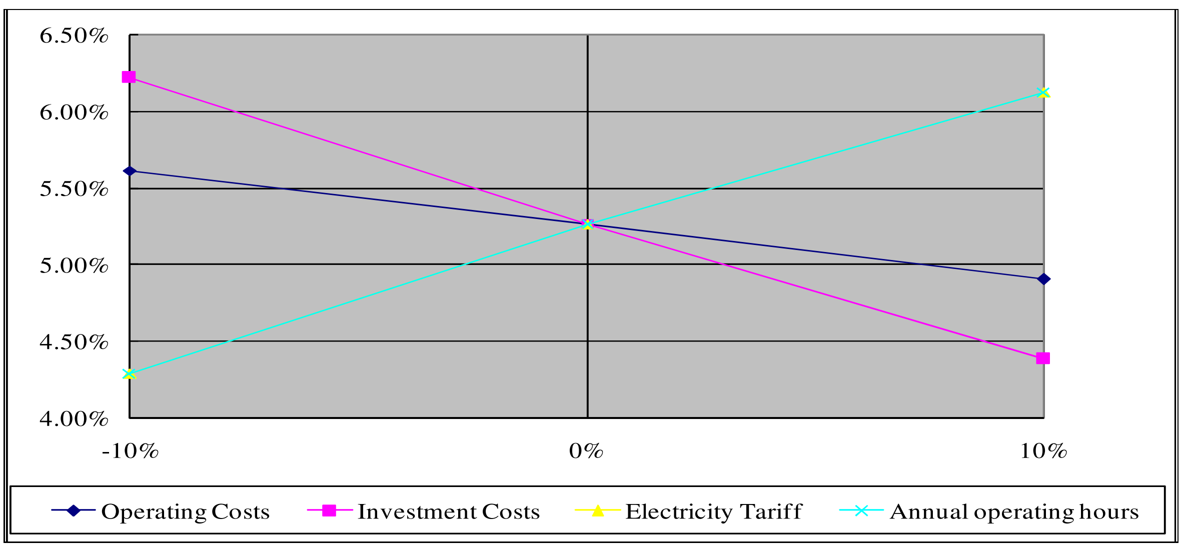

Figure B-2 **Sensitivity analysis of the proposed project**

Total static Investment
With a decrease in the total investment by 10%, the project IRR is still 6.21%, less than the benchmark of 10%. The IRR can exceed the benchmark rate of 10% only if investment is cut by 37.82%. Since the cost of materials is the main expense of the total investment during construction, a decrease in investment costs is highly unlikely, given that the prices of materials, such as iron and cement, have been increasing in recent years[5]. According to the statistics of China Renewable Energy Distribution Centre[6], the construction & installation costs of hydropower stations have also been increased significantly from 2005 to 2010 These increases demonstrate that a decrease in investment costs is extremely unrealistic, such that the IRR is not likely to reach the 10% benchmark.

Electricity Tariff The electricity tariff used in the financial analysis is consistent with the FSR. The electricity tariff assumed in the FSR was 288RMB/MWh. This was already higher than the average electricity tariff paid (250.1RMB/MWh) by Sichuan Provincial Power Grid Company[7] in2006, and therefore is considered conservative from the point of view of additionality.

In March 2005, The National Development and Reform Commission, which regulates power production, issued the "Provisional Measures for the Administration of On-Grid Electricity Tariffs" – document NDRC [2005] NO.514, which aims to regulate the determination of the electricity tariff offered to power producers in order to stabilize tariffs and increase competitiveness in the electricity market. Since then, Consistent Tariff policy regulations have also been issued in Sichuan Province: according to recent regulations (ChuanJiaFa (2005) No. 123[8] and ChuanJiaFa (2006) No.145[9] and ChuanJiaDianFa [2009] No.59[10]), the benchmark electricity tariff of 288RMB/MWh for hydropower plants regulated by Sichuan Provincial Price Bureau has not changed over the past 5 years. In addition, even if we apply the EB's highest tariff of 290RMB/MWh, the IRR of the project is also lower than the benchmark.

Due to the above mentioned price controls by the Chinese central and provincial Governments, and because of a large increase in the installed capacity operating in the grid due to the construction of many new power stations, which increases competition in the supply of electricity, future rises in the electricity tariff are likely to be limited. Given the electricity pricing structure in China and in Sichuan Province, estimating a 43.85% increase in electricity tariff was highly unrealistic for the Project developer at the time of the investment decision and as such, the IRR is not likely to reach the 10% benchmark.

Annual O&M cost
The results of the sensitivity analysis mean that even if the Project incurred zero operating costs, which is not feasible, the IRR of the Project would not reach the 10% benchmark.

Annual Electricity Delivered to the grid

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[5] http://www.gx.xinhuanet.com/newscenter/2008-08/28/content_14250814.htm

[6] http://www.hydrocost.org.cn/price/priceIndex.jsp

[7] See Sichuan Provincial Price Bureau: ChuanJiaHan (2005)No.46 (http://www.scpi.gov.cn/newzcfg/zcfg-content.asp?id=930)

[8] http://www.scpi.gov.cn/newzcfg/zcfg-content.asp?id=3238

[9] http://www.scpi.gov.cn/zcfg/zcfg-content.asp?id=1972

[10] http://www.scpi.gov.cn/newzcfg/zcfg-content.asp?id=3574

The expected annual power supplied to the grid by the Project indicated in the FSR is calculated based on 44 years' worth of historical hydrological data and therefore the long term average annual power supplied is unlikely to be significantly different to the value used in the financial analysis. Assuming a 60.81% of increase in the long term average annual power supplied to the grid is not reasonable, and the IRR is therefore not likely to reach the 10% benchmark.

Based on the above analysis, it can be concluded that the proposed Project is not financially attractive in the absence of CDM revenue given the variation of four parameters in a range of -10%～+10%. Thus the project is shown to be additional.

CDM consideration

The project developer only decided to invest and go ahead with the project after additional CDM revenue was considered. Also CDM revenues helped the project to reduce its financial risk and obtain loan from the bank.

The table below provides actions taken to secure CDM status for the project in parallel with its implementation:

Table B-6 Timeline of Milestone Events in the Project Development

Time	Milestone
07/2007	The Feasibility Study Report (FSR) of the project was completed by the Liangshan Survey and Design Institute of hydraulic engineering and electric power. The FSR concluded that the project is financially unattractive without CDM income.
20/09/2007	The FSR was approved by the Development and Reform Commission of Liangshan Yi Autonomous Prefecture.
18/03/2008	A CDM project proposal was made by the project developer. The proposal summarised the financial indicators and concluded that the project is financially unattractive without CDM income.
15/06/2008	Board Meeting held; Based on the conclusion from the FSR that the project is financially unattractive, the project owner took a decision to seek financial support from CDM.
10/12/2008	After the board decision, the project developer signed an agreement with Beijing Cronus Technology Consultancy Center on 10 December 2008.
29/04/2009	In order to collect public comments and attitudes towards the Project, the Project owner had carried out a survey to local residents which may be impacted in the area where the Project is sited on 29 April 2009.
23/11/2009	The project owner sent a loan application letter to Agricultural Bank of China Yuexi County Branch. The application letter stated that the CDM revenue can overcome the financial barriers and secure the loan repayment.
08/05/2010	The Agricultural Bank of China Yuexi County Branch issued a loan intention letter that agreed to provide a loan to the proposed project based on the fact

	that the proposed project can obtain CDM income.
27/11/2010	The Emission Reduction Purchase Agreement (ERPA) was signed between the project developer and Climate Bridge Ltd.
05/02/2011	Construction Contract was signed by the project owner and the Sichuan Renminqu Mianyang Construction Company. “The Project start date”
25/02/2011	The construction permit was issued by the Danjiangkou Hydro Complex Management Bureau
01/08/2011	The Prior consideration of the CDM Form was received and approved by Chinese DNA.
01/08/2011	The Prior consideration of the CDM Form was received by EB Secretariat
16/08/2011	Turbine generator Purchase Contract was signed by the project owner and the Sichuan Huateng Electric Equipment CO., LTD.
30/09/2011	The Validation Service Contract was signed by the project owner and Perry Jognson Registratrars Carbon Emission Services.
22/02/2012	The Letter of Approval (LoA) for the proposed project was issued by National Development and Reform Commission of the People’s Republic of China.
29/05/2012	The Letter of Approval (LoA) for the proposed project was issued by UK DNA to Climate Bridge Ltd.
14/06/2012	The Letter of Approval (LoA) for the proposed project was issued by UK DNA to Gazprom Marketing and Trading Limited.

As the starting date of the project activity (05 February 2011) is after 2 August 2008, in accordance to “Guidelines on the demonstration and assessment of prior consideration of the CDM, Version 04”, the project participant must inform a Host Party designated national authority (DNA) and the UNFCCC secretariat in writing of the commencement of the project activity and of their intention to seek CDM status within six months of the project activity start date. The Prior consideration of the CDM Form was received and approved by Chinese DNA on 1 August 2011, and the Prior consideration of the CDM Form was received by UNFCCC Secretariat on 1 August 2011, which is within six months of the project activity start date. Therefore, we can conclude that the prior consideration of the CDM in the line the latest guidance.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

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Baseline Emissions (BE_y)

According to methodology AMS-I.D. (version 17.0), the baseline emissions is the product of the electrical energy baseline $EG_{BL,y}$ expressed in kWh of electricity produced by the renewable generating unit, multiplied by an emission factor.

The baseline emissions can be calculated as follows:

$$BE_y = EG_{BL,y} \times EF_{CO2,grid,y} \quad \textbf{(1)}$$

BE_y	=	Baseline emissions in year y (tCO_2)
$EG_{BL,y}$	=	Quantity of net electricity supplied to the grid as a result of the implementation of the CDM project activity in year y (MWh)
$EF_{CO2,grid,y}$	=	CO2 emission factor of the grid in year y (t CO_2/MWh)

The emission factor can be determined through two options: (a) a combined margin (*CM*), consisting of the combination of operating margin (*OM*) and build margin (*BM*) according to the procedures prescribed in the "*Tool to calculate the emission factor for an electricity system*". Or (b) the weighted average emissions (in kg CO_2e/kWh) of the current generation mix. The data of the year in which project generation occurs must be used. Option (a) is used for the proposed project.

The "combined margin" emission factor of the electricity system (CM) is calculated based on the estimation of the "operating margin" (OM) and the 'build margin' (BM), according to 'Tool to calculate the emission factor for an electricity system' (version 02.2.1). The following six steps are applied to determine OM, BM, and CM used for calculating the project baseline emissions:

Step 1: Identify the relevant electricity systems

According to the delineation of the project electricity system and connected electricity systems published by China NDRC (China's DNA)[11], the project electricity system for the proposed project is Central China Power Grid (CCPG) which covers the grids of Henan Province, Hubei Province, Hunan Province, Jiangxi Province, Sichuan Province and Chongqing municipality.

There is net electricity imported from the North West China Power Grid to the Central China Power Grid. The Option B) is selected among the following options to determine the OM for net electricity imported: 0 tCO_2/MWh; or

a) The weighted average operating margin (OM) emission rate of the exporting grid, determined as described in step 4 (d) of the "Tool to calculate the emission factor for an electricity system''; or

b) The simple operating margin emission rate of the exporting grid, determined as described in step 4(a) of the "Tool to calculate the emission factor for an electricity system", if the conditions for this method, as described in step 3 below, apply to the exporting grid; or

c) The simple adjusted operating margin emission rate of the exporting grid, determined as described in step 4 (b) of the "Tool to calculate the emission factor for an electricity system".

Step 2: Choose whether to include off-grid power plants in the project electricity system (optional)

Option Ⅰ: Only grid power plants are included in the calculation.

[11] http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File2708.pdf

OptionⅡ: Both grid power plants and off-grid power plants are included in the calculation.

Based on China's real situation, data of off-grid power plants are unavailable, therefore Option I is selected and only grid power plants are included in the calculation.

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

The calculation of operating margin emission factor ($EF_{grid,OM,y}$) can be based on one of four options listed as follows:

(a) Simple OM, or
(b) Simple adjusted OM, or
(c) Dispatch data analysis OM, or
(d) Average OM.

In China, specific data from the grid or each power plant is treated as business confidential and thus not public available. Therefore, Option (b) and Option (c) cannot be possibly used for the proposed project. For the most recent 5 years (2005-2009), the low-cost/must run resources constituted less than 50% of total power generation of CCPG and the relevant ratios are respectively were 38.60%, 35.12%, 35.46%, 39.50% and 43% for 2005, 2006, 2007, 2008 and 2009. Hence, the low operating cost/must run sources is much less than 50% of the total grid generation, which complies with the defined condition of Option (a), but not Option (d). Based on these reasons, **Option (a)** is selected to calculate the Operating Margin emission factor of the proposed project.

The Simple OM emission factor can be calculated using either of the two following data vintages for year(s) y:

- **Ex ante option:** If the *ex ante* option is chosen, the emission factor is determined once at the validation stage. Thus, no monitoring and recalculation of the emissions factor during the crediting period is required. For grid power plants, use 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, or
- **Ex post option:** If the *ex post* option is chosen, the emission factor is determined for the year in which the project activity displaces grid electricity, requiring the emission factor to be updated annually during monitoring. If the data required to calculate the emission factor for year y is usually only available later than six months after the end of year y, alternatively the emission factor of the previous year y-1 may be used. If the data is usually only available 18 months after the end of the year y, the emission factor of the year proceeding the previous year y-2 may be used. The same data vintage (y, y-1 or y-2) should be used throughout all crediting periods.

This PDD uses **Ex ante Option** for $EF_{grid,simple\ OM,\ y}$ calculation to be in accordance with the baseline emissions factor calculation for regional power grids published by China DNA.

Step 4: Calculate the operation margin emission factor according to the selected method

The simple OM emission factor is calculated as the generation-weighted average CO_2 emission per unit net electricity generation (tCO_2e/MWh) of all generating power plants serving the system, not including low-cost/must-run power plants/units.

The simple OM may be calculated:

Option A: Based on the net electricity generation and a CO_2 emission factor of each power unit; or
Option B: Based on the total net electricity generation of all power plants serving the system and the fuel types and total fuel consumption of the project electricity system.

Option B can only be used if:
(a) The necessary data for option A is not available; and
(b) 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
(c) Off-grid power plants are not included in the calculation.

As the data required by option A is not available in China, and the nuclear and renewable power generation are considered as low-cost/must0run power sources and the quantity of electricity supplied to the grid by these sources is known in china, and off-grid power plants are not included in the calculation. Therefore, Option B is used for calculating project OM as follows:

$$EF_{grid,OMsimple,y} = \frac{\sum FC_{i,y} \times NCV_{i,y} \times EF_{CO2,i,y}}{EG_y} \quad \textbf{(2)}$$

Where:

$EF_{grid, OMsimple, y}$	=	Simple operating margin CO2 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)
$NC_{i, y}$	=	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* (tCO2/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	=	The relevant year as per the data vintage chose in Step 3

Based on the most recent three years (2007-2009) where the data are the latest and available at the time of this PDD submission, the $EF_{grid,OM\ simple,y}$ is estimated to be **1.0297** tCO_2e/MWh. Please refer to Annex 3 for detailed calculation.

<u>Step 5 Calculate the build margin emission factor (BM)</u>
In terms of vintages of data, project participants can choose between one of the following two options:

Option 1 For the first crediting period, Calculate the Build Margin Emission Factor $EF_{grid\ BM\ y}$, *ex-ante* based on the most recent information available on units already built for sample group m at the time of CDM-PDD submission to the DOE for validation. For the second crediting period, the build margin emission factor should be updated based on the most recent information available on units already built at the time of submission of the request for renewal of the second crediting period should be used. For the third crediting period, the build margin emission factor calculated for the second crediting period should be used. This option does not require monitoring the emission factor during the crediting period.

Option 2 For the first crediting period, the build margin emission factor shall be updated annually, *ex post,* including those units built up to the year of registration of the project activity or, if information up to year of registration is not yet available, including those units built up to the latest year for which information is available. For the second crediting period, the build margin emissions factor shall be calculated *ex ante*, as described in option 1 above. For the third crediting period, the build margin emission factor calculated for the second crediting period should be used.

The PDD chooses **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 on units already built for sample group *m* at the time of PDD submission.

The sample group of power units *m* used to calculate the build margin should be determined as per the following procedure, consistent with the data vintage selected above:

(a) Identify the set of five power units, excluding power units registered as CDM project activities, that started to supply electricity to the grid most recently ($SET_{5\text{-units}}$) and determine their annual electricity generation ($AEG_{SET\text{-}5\text{-units}}$, in MWh);

(b) Determine the annual electricity generation of the project electricity system, excluding power units registered as CDM project activities (AEG_{total}, in MWh). Identify the set of power units, excluding power units registered as CDM project activities, that started to supply electricity to the grid most recently and that comprise 20% of AEG_{total} (if 20% falls on part of the generation of a unit, the generation of that unit is fully included in the calculation) ($SET_{\geqslant 20\%}$) and determine their annual electricity generation ($AEG_{SET\text{-}\geqslant 20\%}$, in MWh);

(c) From $SET_{5\text{-units}}$ and $SET_{\geqslant 20\%}$ select the set of power units that comprises the larger annual electricity generation (SET_{sample});

Otherwise:

(d) Exclude from SET_{sample} the power units which started to supply electricity to the grid more than10 years ago. Include in that set the power units registered as CDM project activity, starting with power units that started to supply electricity to the grid most recently, until the electricity generation of the new set comprises 20% of the annual electricity generation of the project electricity system (if 20% falls on part of the generation of a unit, the generation of that unit is fully included in the calculation) to the extent is possible. Determine for the resulting set ($SET_{sample\text{-}CDM}$) the annual electricity generation ($AEG_{SET\text{-}sample\text{-}CDM}$, in MWh);

If the annual electricity generation of that set is comprises at least 20% of the annual electricity generation of the project electricity system (i.e. $AEG_{SET\text{-}sample\text{-}CDM} \geqslant 0.2 \times AEG_{total}$), then use the sample group $SET_{sample\text{-}CDM}$ to calculate the build margin. Ignore steps (e) and (f).

(e) Include in the sample group $SET_{sample\text{-}CDM}$ the power units that started to supply electricity to the grid more than 10 years ago until the electricity generation of the new set comprises 20% of the annual electricity generation of the project electricity system (if 20% falls on part of the generation of a unit, the generation of that unit is fully included in the calculation);

(f) The sample group of power units m used to calculate the build margin is the resulting set ($SET_{sample\text{-}CDM\text{-}>10yrs}$).

However, in China, it is very difficult to obtain the data of the five existing power plants built most recently or the power plants supply electricity to the grid that comprise 20% of the annual electricity generation (in MWh) and that were built most recently, since no data of plant specific generation and fossil fuel consumption is currently available in China. As none of the above options can be selected, the following deviations are adopted to calculate the BM[12]:

First, to calculate the newly added installed capacity and the contribution component of other various power generation technologies, then calculate of the weight of newly added installed capacity of each power generation technology, and finally, to calculate BM emission factor using the commercially optimal efficiency level of each power generation technology.

According to the "Tool to calculate the emission factor for an electricity system" (Version 02.2.1), the build margin emissions factor ($EF_{grid,BM,y}$) is calculated as the generation-weighted average emission factor (tCO_2e/MWh) of all power units *m* during the most recent year *y* for which power generation data is available. The calculation equation is as follows:

$$EF_{grid,BM,y} = \frac{\sum_m EG_{m,y} \times EF_{EL,m,y}}{\sum_m EG_{m,y}} \qquad \textbf{(3)}$$

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)
$EF_{EL,m,y}$	= CO_2 emission factor of power unit m in year *y* (tCO_2e/MWh)
m	= Power units included in the build margin
y	= Most recent historical year for which power generation data is available.

Since the generating capacity of coal-fired, oil-fired and gas-fired technologies can't be separated from the existing statistical data, the following measures are taken for the calculation:
First, based on the available data of the latest year, determine the ratio of CO_2 emissions from coal, oil, and gas consumption for power generation to the total CO_2 emission; Second, to calculate the emission factor of the thermal power based on the weight of CO_2 emission from coal, oil, and gas, and the emissions factors using commercial technologies with optimal efficiency. And finally, to multiply the thermal emission factor with the portion of the thermal power comprising 20% of the newly added capacity.

Sub-Step 1: Calculate the proportion of CO_2 emissions from solid, liquid and gaseous fuels corresponding to the total CO_2 emissions.

$$\lambda_{Coal} = \frac{\sum_{i \in COAL, j} F_{i,j,y} \times NCV_{i,y} \times EF_{co_2,i,j,y}}{\sum_{i,j} F_{i,j,y} \times NCV_{i,y} \times EF_{co_2,i,j,y}} \qquad \textbf{(4)}$$

[12] http://cdm.unfccc.int/UserManagement/FileStorage/6POIAMGYOEDOTKW25TA20EHEKPR4DM

$$\lambda_{Oil} = \frac{\sum_{i \in OIL, j} F_{i,j,y} \times NCV_{i,y} \times EF_{co_2,i,j,y}}{\sum_{i,j} F_{i,j,y} \times NCV_{i,y} \times EF_{co_2,i,j,y}} \quad \textbf{(5)}$$

$$\lambda_{Gas} = \frac{\sum_{i \in GAS, j} F_{i,j,y} \times NCV_{i,y} \times EF_{co_2,i,j,y}}{\sum_{i,j} F_{i,j,y} \times NCV_{i,y} \times EF_{co_2,i,j,y}} \quad \textbf{(6)}$$

Where:

$F_{i, j, y}$	=	the amount of fuel *i* (tce) consumed by plants in province *j* in year *y*
$NCV_{i, y}$	=	the net calorific value (energy content) of fossil fuel type *i* in year *y* (GJ/mass or volume unit)
$EF_{co2,i,j,y}$	=	the CO_2 emission factor of fossil fuel type i in province *j* in year *y*

Coal, Oil and Gas is the feet for solid fuels, liquid fuels and gas fuels.

Sub-Step 2: Calculate the emission factor of thermal power ($EF_{Thermal}$)

$$EF_{Thermal} = \lambda_{Coal} \times EF_{Coal,Adv} + \lambda_{Oil} \times EF_{Oil,Adv} + \lambda_{Gas} \times EF_{Gas,Adv} \quad \textbf{(7)}$$

$EF_{Coal, Adv}$, $EF_{Oil, Adv}$, $EF_{Gas, Adv}$ are the operating margin emission factors respectively consumed by coal-fired, oil-fired and gas-fired generation technology at the commercially optimal efficiency.

Sub-Step 3: Calculation of BM in the grid.

$$EF_{grid,BM,y} = \frac{CAP_{Thermal,y}}{CAP_{Total,y}} \times EF_{Thermal,y} \quad \textbf{(8)}$$

Where:

$CAP_{thermal,, y}$	=	the added installed capacity of thermal power generation sources (MW) in year *y*
$CAP_{total, y}$	=	the total added installed capacity of all kinds of power generation sources (MW) in year y which comprises at least 20% of the existing installed capacity
$EF_{Thermal ,y}$	=	the emission factor of thermal power plants in year *y*

Key parameters used to calculate BM emission factor include the low calorific value of each fossil fuel, the oxidation rate, the potential emission factors, and the efficiency of various power generation technologies. The data of low calorific value of each fossil fuel and their oxidation rate comes from China Energy Statistical Yearbook 2010. The potential emission factors are sourced from *"2006 IPCC Guidelines for National Greenhouse Gas Inventories*" Table 1.3 and Table 1.4 of Page 1.21-1.24 in Chapter one, Volume 2 Energy.

According to the latest and available data at the time of this PDD submission, $EF_{grid, BM,y}$ *i*s calculated to be **0.4191** tCO_2e/MWh. Please refer to Annex 3 for the details of calculation.

Step 6: Calculate the combined margin emissions factor

The calculation of the combined margin (CM) emission factor ($EF_{grid,CM,y}$) is based on one of the following methods:

(a) Weighted average CM; or
(b) Simplified CM.

The weighted average CM method (option A) should be used as the preferred option.
The simplified CM method (option b) can only be used if:

- The project activity is located in a Least Developed Country (LDC) or in a country with less than 10 registered projects at the starting date of validation; and
- The data requirements for the application of step 5 above cannot be met.

The PDD will choose option A.

The combined margin emissions factor is calculated as follows:

$$EF_{grid,CM,y} = \omega_{OM} \times EF_{grid,OM,y} + \omega_{BM} \times EF_{grid,BM,y} \quad \textbf{(9)}$$

Where:

$EF_{grid,BM,y}$	=	Build margin CO_2 emission factor in year y (tCO_2/MWh)
$EF_{grid,OM,y}$	=	Operating margin CO_2 emission factor in year y (tCO_2/MWh)
ω_{BM}	=	Weighting of build margin emissions factor(%)
ω_{OM}	=	Weighting of operating margin emissions factor (%)

As specified in "Tool to calculate the emission factor for an electricity system" (Version 02.2.1), the proposed hydropower project shall use ω_{OM}=0. 5 and ω_{BM} =0.5 for the first crediting period, and ω_{OM}0.25 and ω_{BM} =0.75 for the second and third crediting period, unless otherwise specified in the approved methodology which refers to this tool.

$EF_{grid,CM,y}$=0.5*1.0297+0.5*0.4191=0.7244 tCO_2/MWh

For detailed information, please see Annex 3.

Project Emission (PE_y)

Project emissions from the reservoir have to be considered if the power density (PD) of the power plant if greater than 4 W/m^2 and less than or equal to 10 W/m^2. The power density of the project activity is calculated as follows: $PD = \frac{Cap_{PJ} - Cap_{BL}}{A_{PJ} - A_{BL}}$

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). Since the project activity is a new hydro power plant, 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). According to the FSR, A_{PJ} is 5,413 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). Since the project activity is a new hydro power plant, this value is zero

For the proposed Project, PD = 2,771 W/m^2.

Since the PD of the power plant is greater than 10 W/m^2, $PE_y = 0$ tCO_2e/y.

Leakage *(LE_y)*

The energy generating equipment is not transferred from another activity to the proposed project, therefore, according to AMS-I.D (version 17.0), no leakage should be considered (LE_y=0 tCO_2e).

Emission Reductions (ER_y)

According to AMS-I.D (version 17.0), emission reductions are calculated as follows:

$$ER_y = BE_y - PE_y - LE_y \quad \textbf{(11)}$$

Where:

ER_y	=	Emission reductions in year y (tCO_2/yr)
BE_y	=	Baseline emissions in year y (tCO_2/yr)
PE_y	=	Project emissions in year y (tCO_2/yr)
LE_y	=	Leakage emissions in year y (tCO_2/yr)

Based on the previous calculations, PE_y and LE_y are calculated to be zero, and therefore:

$ER_y = BE_y = EG_{BL,y} \times EF_{grid,CM,y}$

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

Data / Parameter:	*$FC_{i,y}$*,
Data unit:	10^4t or $10^8 m^3$
Description:	Amount of fossil fuel type *i* consumed in the project electricity system in year *y*; or The amount of fossil fuel type *i* consumed in the project electricity system of province *j* in year *y*.
Source of data used:	*China Energy Statistical Yearbook 2007-2010*
Value applied:	See Annex 3 for details
Justification of the choice of data or description of measurement methods and procedures actually applied :	Official statistics data
Any comment:	Used for the calculation of OM and BM.

Data / Parameter:	*$NCV_{i,y}$*
Data unit:	GJ/mass or volume unit
Description:	Net calorific value (energy content) of fossil fuel type *i* in year *y*
Source of data used:	*China Energy Statistical Yearbook 2010*
Value applied:	Please refer to Annex 3 for details.
Justification of the	Official statistical data

choice of data or description of measurement methods and procedures actually applied :	
Any comment:	Used for the calculation of OM and BM

Data / Parameter:	$EF_{CO2,i,\ y}$
Data unit:	tC/TJ
Description:	CO_2 emission factor of fossil fuel type *i* used in power unit *m* in year *y*
Source of data used:	*2006 IPCC Guidelines for National Greenhouse Gas Inventories*
Value applied:	See Annex 3 for details.
Justification of the choice of data or description of measurement methods and procedures actually applied :	IPCC default value
Any comment:	Used for the calculation of OM and BM

Data / Parameter:	$EG_{\ y}$
Data unit:	MWh
Description:	Net electricity generated and delivered to the grid by all power sources in the project electricity system, not including low-cost/must-run power plants/units, in year *y*
Source of data used:	*China Electric Power Yearbook 2007-2010*
Value applied:	See Annex 3 for details
Justification of the choice of data or description of measurement methods and procedures actually applied :	Official statistics data
Any comment:	Used for the calculation of OM.

Data / Parameter:	$EF_{Coal\ ,Adv,\ y}$
Data unit:	$kgCO_2/TJ$
Description:	Emission factors reflecting the efficiency level of the best coal-based power generation technology commercially available in China.
Source of data used:	Notification of 2011 Baseline Emission Factors for Regional Power Grids in China published by China's DNA.
Value applied:	Please refer to Annex 3 for details.
Justification of the choice of data or description of measurement methods	Official released data

and procedures actually applied :	
Any comment:	Used for the calculation of $EF_{BM,y}$

Data / Parameter:	$EF_{Oil, Adv, y}$
Data unit:	$kgCO_2/TJ$
Description:	Emission factors reflecting the efficiency level of the best oil-based power generation technology commercially available in China.
Source of data used:	Notification of 2011 Baseline Emission Factors for Regional Power Grids in China published by China's DNA.
Value applied:	Please refer to Annex 3 for details.
Justification of the choice of data or description of measurement methods and procedures actually applied :	Official released data
Any comment:	Used for the calculation of *BM*

Data / Parameter:	$EF_{Gas, Adv, y}$
Data unit:	$kgCO_2/TJ$
Description:	Emission factors reflecting the efficiency level of the best gas-based power generation technology commercially available in China.
Source of data used:	Notification of 2011 Baseline Emission Factors for Regional Power Grids in China published by China's DNA.
Value applied:	Please refer to Annex 3 for details.
Justification of the choice of data or description of measurement methods and procedures actually applied :	Official released data
Any comment:	Used for the calculation of $EF_{BM,y}$

Data / Parameter:	$CAP_{i,j,y}$
Data unit:	MW
Description:	The installed capacity of power source *i* of province *j* of the CCPG in the year *y*
Source of data used:	*China Electric Power Yearbook 2008-2010*
Value applied:	See Annex 3 for details.
Justification of the choice of data or description of measurement methods and procedures actually applied :	Official released data

Any comment:	Used for the calculation of *BM*

Data / Parameter:	Cap_{BL}
Data unit:	MW
Description:	Installed capacity of the hydro power plant before the implementation of the project activity.
Source of data used:	Project site
Value applied:	0
Justification of the choice of data or description of measurement methods and procedures actually applied :	
Any comment:	

Data / Parameter:	A_{BL}
Data unit:	m^2
Description:	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, this value is zero
Source of data used:	Project site
Value applied:	0
Justification of the choice of data or description of measurement methods and procedures actually applied :	Measured from topographical surveys, maps, satellite pictures, etc.
Any comment:	

B.6.3 Ex-ante calculation of emission reductions:

>>

According to Section B.6.1, the baseline emission factor of CCPG ($EF_{grid,\ CM,\ y}$) is calculated as 0.7244tCO_2e/MWh. The annual electricity supplied to the grid is estimated to be 59,651.8MWh. Therefore, the baseline emission can be calculated as follows:

$BE_y = EG_{BL,y} \times EF_{grid,CM,y}$ =59,651.8MWh ×0.7244tCO_2e/MWh =43,211 tCO_2e

The annual estimated emission reductions of the project activity equal to the baseline emissions, as both LE_y and PE_y are zero:

$ER_y = BE_y$ = 43,211 tCO_2e.

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

>>

The ex-ante estimated amount of annual and total emission reductions of the first crediting period are listed below.

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)
01/09/2012-31/12/2012	0	14,403	0	14,403
2013	0	43,211	0	43,211
2014	0	43,211	0	43,211
2015	0	43,211	0	43,211
2016	0	43,211	0	43,211
2017	0	43,211	0	43,211
2018	0	43,211	0	43,211
01/01/2019-31/08/2019	0	28,808	0	28,808
Total (tonnes of CO_2e)	0	302,477	0	302,477

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

B.7.1 Data and parameters monitored:

Data/Parameter:	$EG_{facility,y}$
Data unit:	**MWh/yr**
Description:	Quantity of net electricity generation supplied by the project plant to the grid in year y
Source of data to be used:	Project activity site
Value of data	59,651.8
Description of measurement methods and procedures to be applied:	Bi-directional revenue meter(s) with accuracy level of 0.5S (or more accurate) will be installed at the output of the plant according to the *Technical administrative code of electric energy metering (DLT448-2000)* for continuous measurement. The reading of the meter(s) will be recorded monthly. The quantity of net electricity generation supplied by the project plant to the grid will be calculated by electricity exported to the Grid measured by the meter(s) minus electricity imported from the Grid measured by the meter(s).
QA/QC procedures to be applied (if any):	The revenue meter(s) will be calibrated yearly according to the *Verification Regulation of Electrical Energy Meters with Electronics (JJG 596-1999)* or subsequent version. Data measured by the meter(s) will be cross-checked against sale receipts. In case of inconsistency, the smaller value will be used for being conservative.
Any comment:	

Data / Parameter:	***Cap_{PJ}***
Data unit:	**W**
Description:	Installed capacity of the hydro power plant after the implementation of the project activity.
Source of data to be used:	Project site.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	15,000,000
Description of measurement methods and procedures to be applied:	Determine the installed capacity based on recognized standards. This value will be monitored yearly.
QA/QC procedures to be applied:	-
Any comment:	-

Data / Parameter:	***A_{PJ}***
Data unit:	**m^2**
Description:	Area of the reservoir measured on the surface of the water, after the implementation of the project activity, when the reservoir is full.
Source of data to be used:	Project Owner
Value of data applied for the purpose of calculating expected emission reductions in section B.5	5,413
Description of measurement methods and procedures to be applied:	The area of the reservoir has been determined on the basis of the measurement of the crest level of the dam and topographical survey from the FSR institute. The Project routinely measures water levels. An average level below design level as stated in the FSR means that the flooded area is less than the area estimated in the FSR. This value will be monitored yearly.
QA/QC procedures to be applied:	
Any comment:	Archived data will be retained during the crediting period.

B.7.2 Description of the monitoring plan:

>>

This section details the steps taken to monitor the GHG emissions reductions on a regular basis from Chayuan First Cascade Hydroelectric Project in the Host Country.

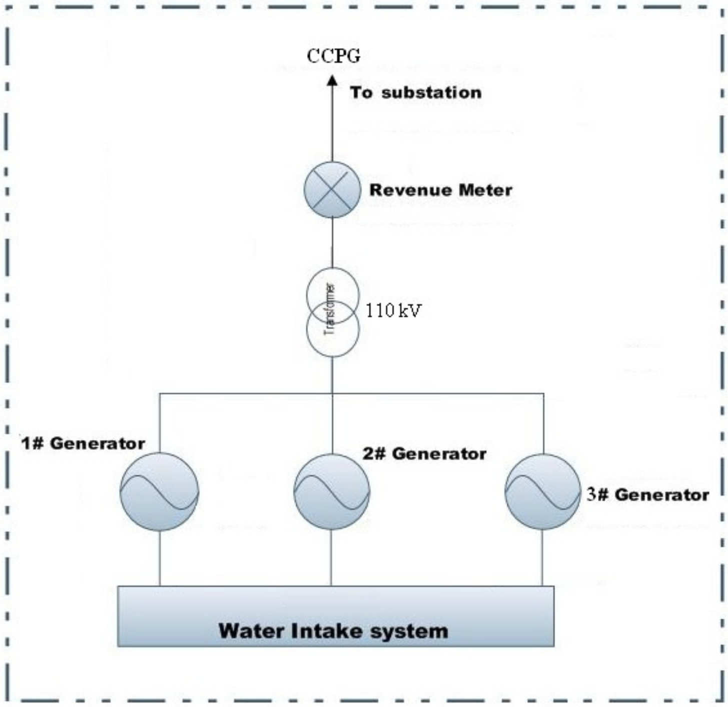

Figure B-3 Positioning of monitoring equipment

The monitoring set-up for this Project has been developed to ensure that from the start, the Project is well-organised in terms of the collection and archiving of complete and reliable data.

1. CDM monitoring Organisation

Roles and responsibilities will be defined for relevant staff involved in CDM monitoring, and the prospect of nominating a CDM Manager will be considered. If appointed, the CDM Manager will have the overall responsibility for the monitoring system on this project. All staff involved in the collection of data and records will be coordinated by him.

2. Staff training

Training is conducted on-site to ensure that staffs are capable of performing their designated tasks to high standards. This will include CDM specific training to warrant that they understand the importance of complete and accurate data and records for CDM monitoring.

3. Maintenance and calibration of monitoring equipment

The electricity meter(s) measuring electricity supplied to the grid will be calibrated in line with the relevant national standard. This will ensure that the equipment operates at the stated level of accuracy.

4. Data collection and record-keeping arrangements

All CDM relevant data will be measured and collected as detailed in Section B.7.1. All data required for verification and issuance will be backed-up and retained for at least two years after the end of the crediting period or the last issuance of CERs of the Project, whichever occurs later.

Data collected on-site will be compiled in an electronic format on a regular basis.

5. Data Quality Control and Quality Assurance

All data collected on-site will be checked internally before being compiled in an electronic format, to ensure that it is complete and of appropriate quality.

6. Emergency procedures for the monitoring system

The site manager will notify the grid company in case there is doubt about the correct functioning of the meter(s) mentioned in the monitoring plan. In that case, the grid company and the operator will check and where necessary replace the meter(s). No CERs are claimed for the period during which the meter was not functioning correctly.

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

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The baseline study and monitoring methodology of the proposed project was completed on 15/06/2012.

Name of person/entity determining baseline study and monitoring methodology:

Beijing Cronus Technology Consultancy Center

Email: lpgq1984@126.com

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:

>>
05/02/2011 (date of construction contract)

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

>>
20 years and 0 months

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:

>>
The crediting period will begin on 01/09/2012, or on the date of registration of the CDM project activity, whichever is later.

C.2.1.2. Length of the first crediting period:

>>
7 years and 0 months.

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:

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According to Clauses 13 and 19 of the Environmental Evaluation Law of the Host Country, the Project entity must analyse the environmental impacts of project activities in the Host Country before utilising natural resources and beginning Project construction. Sichuan Shunlantian Environment Protection Consultancy CO., LTD was commissioned by the Project owner to conduct the Environmental Impact Assessment (EIA) of the Project. The EIA of the Project has been approved by the Environment Protection Bureau of Liangshan Prefecture.

There is no transboundary impact related to the Project, and there is no requisite resettlement or relocation of population, buildings, or public services. Therefore social and environmental influences are considered partial, short-term, and reversible.

Where impacts of the Project were identified, mitigation measures were suggested and defined. The EIA highlights the following with regards to the Project, as shown in the table below.

Identified environmental impacts	**Measures taken**
Water pollution	
On the construction site	Connect the drain to the sedimentation tank, and water reused after sedimentation
Oil water from vehicles	Circulating usage after treatment by using oil filter.
Wastewater from the staff	Used for agriculture after being treated by biological contact oxidation process.
Air pollution	
Dust during the blast	Use advanced technology to reduce dust. Buffer blast or wet blast. Use personal protection equipment on site.
Dust during the construction and transportation	A showering system is to be installed to dampen and control dust/particulate matter. Plant trees along the road.
Noise pollution	
Blast and excavation during construction	Choose equipment with low noise, construction time to be arranged sensitively. Construction activity is not permitted in the evenings.
Solid waste	
Waste from the construction	To the specific landfill.
Waste from the staff	Waste separating: organic substance used for fertilizer by harmless treatment, and inorganic substance be carried to landfill nearby.
Biodiversity and ecosystems	
Parts of agriculture and forest will be removed, influence the river eco-environment	Reforest and restore the previous ecosystem after the construction has finished. Ensure 0.12m^3/s eco-flow.

Erosion impact assessment	
Land erosion in the Project area occurring prior to the Project activity, e.g. the movement onsite of construction-related vehicles	Prevent land erosion according to Soil and Water Conservation Plan, and establish environmental management measures during construction.
Resettlement	
Resettlement due to the construction of the power house	There is no resettlement.

The results of the survey have shown that the public has a positive attitude toward the construction of the Project. It is the general opinion that the construction of this Project could help local residents to solve the serious conflict between power supply and demand, and promote sustainable development of the national economy, especially improve living conditions for the local villagers.

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:

>>

With mitigation controls planned as part of the Project construction and EIA process, and the contribution made by the project to sustainable development for the local and national area, the Project is expected to have an overall positive impact on the local and global environments. Mitigation measures will ensure that there are no significant residual impacts associated with the Project.

SECTION E. Stakeholders' comments

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

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In order to collect public comments and attitudes towards the Project, the Project owner had carried out a survey to local residents which may be impacted in the area where the Project is sited in 29 April 2009. The survey was conducted through distributing and collecting a questionnaire.

Investigated issues are show as follows:

1) Familiarity with the Project.
2) Attitude to the construction of the Project.
3) Main impacts on the local economy development and employment situation.
4) Main impacts on the local environment.
5) Other recommendations.

Questionnaires were distributed according to the principle of both representation and randomness in order to reflect the public opinions and comments in a fair and real manner. Totally 50 questionnaires were returned with 100% response rate. Detailed information of respondents lists as follows:

Table E.1.1. Detailed information of respondents

Subject		No.	Proportion
Sex	Male	16	32%
	Female	34	68%
Education level	Elementary school	33	66%
	Middle school	15	30%
	Above middle school	2	4%
Age	30-40	10	20%
	40-50	30	60%
	>50	10	20%
Occupation	Farmers	40	80%
	Workers	6	12%

	Government employers	4	8%

E.2. Summary of the comments received:

>>
The following is a summary of the key findings based on 50 returned questionnaires.

- ✧ 50 persons (accounting for 100%) of the respondents know the Project.
- ✧ 50 persons (accounting for 100%) of the respondents support the construction of the Project.
- ✧ 50 persons (accounting for 100%) of the respondents consider construction and operation of the project may produce positive impacts on accelerating local economic development such as improving people's living standard, improving the infrastructure and increasing employment opportunities.
- ✧ 40 persons (accounting for 80%) of the respondents consider construction and operation of the project may improve the local environment. 10 persons (accounting for 20%) of the respondents consider construction and operation of the project may produce negative impacts on construction noise.
- ✧ 2 persons of the respondents suggest that the Project owner make more benefit for local residents after commission.

It shows that the local residents strongly support the Project, and they consider the Project will bring various positive impacts on their lives. Some people expressed their concerns on the construction noise.

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

>>
The Project owner will pay much attention to the comments and suggestions of stakeholders and will put all of the measures listed in the EIA into effect during construction and operation period, so as to achieve environmental benefits, social benefits and economic benefits.

The Project owner will mitigate the impacts on workers and inhabitants near the Project from noise through controlling the source and strengthening labour protection measures. The impact will be eliminated with the achievements of the construction.

The Project owner will provide plenty of short-term employment opportunities during the project construction period and many permanent jobs during the operation time for the local people.

To sum up, the local residents are very supportive on the Project. The Project owner has taken full consideration of the comments and suggestions given by stakeholders during the project implementation. The Project owner will also keep regular communication with the public regarding the construction and operation of the Project.

Annex 1

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Annex 2

INFORMATION REGARDING PUBLIC FUNDING

No public funding from Annex I countries is involved in this project activity.

Annex 3

BASELINE INFORMATION

The baseline information for calculation of *OM*, *BM* and *CM* emission factors of Central China Power Grid is shown in the Report on 2011 Baseline Emission Factors for Regional Power Grids by China DNA at http://cdm.ccchina.gov.cn released on 20th Oct. 2011. The concrete processes are shown in the following tables.

Calculation of the Operating Margin emission factor ($EF_{OM,y}$)

The low calorific value, CO_2 emission factor and oxidation factor of fuels are listed in Table1 below.

Table 1 Low calorific values, CO_2 emission factor and oxidation factor of fuels

Fuel type	Default Carbon Content	OXID	IPCC CO_2 Emission Factor (the Lower Limits of the 95% Confidence Intervals)	Low Calorific Value
	（tc/TJ）	（%）		（MJ/t,km³）
	H	I	($kgCO_2$/TJ)	
Raw Coal	25.8	100	87,300	20908
Cleaned Coal	25.8	100	87,300	26344
Other Washed Coal	25.8	100	87,300	8363
Briquette	26.6	100	87,300	20908
Coke	29.2	100	95,700	28435
Coke Oven Gas	12.1	100	37,300	16726
Other Gas	12.1	100	37,300	5227
Crude Oil	20	100	71,100	41816
Gasoline	18.9	100	67,500	43070
Diesel Oil	20.2	100	72,600	42652
Fuel Oil	21.1	100	75,500	41816
LPG	17.2	100	61,600	50179
Refinery Gas	15.7	100	48,200	46055
Natural Gas	15.3	100	54,300	38931
Other Petroleum Products	20	100	72,200	41816
Other Coke Oven Products	25.8	100	95,700	28435
Other Energies	0	0	0	0

Data Source：The emission factors and oxidation factors are form *2006 IPCC Guidelines for National Greenhouse Gas Inventories, Table 1.3,1.4, page 1.21-1.24, chapter 1Volume 2 Energy*. The net calorific values are quoted from *China Energy Statistical Yearbook 2009*

1. Calculation of Simple *OM* Emission Factor of CCPG for Year 2007

Table 2 CO_2 Emission Data of Data of CCPG in Year 2007

Fuel type	Unit	Jiangxi	Henan	Hubei	Hunan	Chongqing	Sichuan	Sub-total	Effective CO_2 EF	OXID	CO_2 emission factor of fossil fuel	Average Low Calorific Value	CO_2 emission（tCO_2e）
									（tc/TJ）	（%）	($kgCO_2$/TJ)	（MJ/t,m^3）	L=G*J*K/100000 (for mass unit)
		A	B	C	D	E	F	G=A+B+C+D+E+F	H	I	J	K	L=G*J*K/10000 (for volume unit)
Raw Coal	10^4t	2200.57	9357	3479.81	2683.81	1547.7	3239	**22507.89**	25.8	100	87,300	20,908	410,829,404
Cleaned Coal	10^4t		3.07			3.8		**6.87**	25.8	100	87,300	26,344	157,998
Other Washed Coal	10^4t	0.04	87.16		2.06	96.42		**185.68**	25.8	100	87,300	8,363	1,355,631
Briquette	10^4t						0.01	**0.01**	26.6	100	87,300	20,908	183
Coke	10^4t							**0**	29.2	100	95,700	28,435	0
Coke Oven Gas	10^8m^3	0.08	2.61	0.25	0.31	0.91		**4.16**	12.1	100	37,300	16,726	259,534
Other Gas	10^8m^3	29.17	25.79		24.69		23.98	**103.63**	12.1	100	37,300	5,227	2,020,444
Crude Oil	10^4t		0.43					**0.43**	20	100	71,100	41,816	12,784
Gasoline	10^4t				0.04	0.01		**0.05**	18.9	100	67,500	43,070	1,454
Diesel Oil	10^4t	0.98	3.21	2.51	2.83	1.93		**11.46**	20.2	100	72,600	42,652	354,863
Fuel Oil	10^4t	0.42	1.25	1.33	0.63	0.64	1.74	**6.01**	21.1	100	75,500	41,816	189,742
LPG	10^4t							**0**	17.2	100	61,600	50,179	0
Refinery Gas	10^4t	1.43	10.01	0.97	0.7			**13.11**	15.7	100	48,200	46,055	291,022
Natural Gas	10^8m^3		0.12	0.18		0.2	1.87	**2.37**	15.3	100	54,300	38,931	501,007

Other Petroleum Products	10^4t							**0**	20	100	72,200	41,816	0
Other Coke Oven Products	10^4t							**0**	25.8	100	95,700	28,435	0
Other Energies	10^4tCe	23.43	63.65	35.95	29.46	23.21		**175.7**	0	0	0	0	0
												Subtotal	415,974,066
Data source: China Energy Statistical Yearbook 2008													

Table 3 CCPG Fuel-fired Electricity Generation and *OM* EF in Year 2007

Province	**Total generation (10^8 kWh)**	**Total generation (MWh)**	**Self-consumption electricity (%)**	**Total supply (MWh)**		
Jiangxi	421	42,100,000	7.72	38,849,880		
Henan	1773	177,300,000	7.55	163,913,850		
Hubei	609	60,900,000	6.69	56,825,790	Electricity CCPG imported from NWCPG MWh	3,005,400
Hunan	542	54,200,000	7.18	50,308,440	Simple OM in NWCPG in 2007	1.01129
Chongqing	288	28,800,000	9.2	26,150,400	Total Emissions tCO_2	419,013,395
Sichuan	451	45,100,000	8.68	41,185,320	Total Power Supply MWh	380,239,080
Total				377,233,680	EF	1.10197

Data source: China Electric Power Yearbook 2008

2. Calculation of Simple OM Emission Factor of the CCPG for Year 2008

Table 4 CO_2 Emission Data of Data of CCPG in Year 2008

Fuel type	Unit	Jiangxi	Henan	Hubei	Hunan	Chongqing	Sichuan	Sub-total	Effective CO_2 EF	OXID	CO_2 emission factor of fossil fuel	Average Low Calorific Value	CO_2 emission （tCO_2e）
									（tc/TJ）	（%）	($kgCO_2$/TJ)	（MJ/t,m^3）	L=G*J*K/100000 (for mass unit)
		A	B	C	D	E	F	G=A+B+C+D+E+F	H	I	J	K	L=G*J*K/10000 (for volume unit)
Raw Coal	10^4t	2137.08	9480.74	2852.29	2620.44	1421.42	2727.61	**21239.58**	25.8	100	87,300	20,908	387,679,342
Cleaned Coal	10^4t		1.68			3.27		**4.95**	25.8	100	87,300	26,344	113,842
Other Washed Coal	10^4t	0.04	80.54		2.06	101.75		**184.39**	25.8	100	87,300	8,363	1,346,213
Briquette	10^4t				6.12		0.01	**6.13**	26.6	100	87,300	20,908	111,889
Coke	10^4t		0.78		0.92			**1.7**	29.2	100	95,700	28,435	46,261
Coke Oven Gas	10^8m^3	0.1	4.19	0.37	0.24	6.66	0.01	**11.57**	12.1	100	37,300	16,726	721,829
Other Gas	10^8m^3	23.67	41.36		3.31	0.37	0.01	**68.72**	12.1	100	37,300	5,227	1,339,814
Crude Oil	10^4t		0.17					**0.17**	20	100	71,100	41,816	5,054
Gasoline	10^4t							**0**	18.9	100	67,500	43,070	0
Diesel Oil	10^4t	0.88	7.02	2.82	3.41	1.59		**15.72**	20.2	100	72,600	42,652	486,775
Fuel Oil	10^4t	0.07	1.45		1.29		3.14	**5.95**	21.1	100	75,500	41,816	187,848
LPG	10^4t							**0**	17.2	100	61,600	50,179	0
Refinery Gas	10^4t	0.21	3.91	2.78	0.71		0.01	**7.62**	15.7	100	48,200	46,055	169,153
Natural Gas	10^8m^3		4.02	0.16		0.05	12.92	**17.15**	15.3	100	54,300	38,931	3,625,430
Other Petroleum Products	10^4t			0.59				**0.59**	20	100	72,200	41,816	17,813

Other Coke Oven Products	10^4t						0.01	**0.01**	25.8	100	95,700	28,435	272
Other Energies	10^4tCe	18.16	68.11	62.35	11.42	64.87		**224.91**	0	0	0	0	0
												Subtotal	395,851,534
Data source: China Energy Statistical Yearbook 2009													

Table 5 CCPG Fuel-fired Electricity Generation and *OM* EF in Year 2008

Province	Total generation (10^8 kWh)	Total generation (MWh)	Self-consumption electricity (%)	Total supply (MWh)		
Jiangxi	405	40,500,000	6.5	37,867,500	Electricity CCPG imported from NWCPG MWh	3,144,070
Henan	1890	189,000,000	7.22	175,354,200	Simple OM in NWCPG in 2008	0.98254
Hubei	553	55,300,000	6.62	51,639,140	Electricity CCPG imported from NCPG MWh	33,200
Hunan	537	53,700,000	6.46	50,230,980	Simple OM in NCPG in 2008	1.00495
Chongqing	286	28,600,000		28,600,000	Total Emissions tCO_2	398,974,078
Sichuan	401	40,100,000	10.21	36,005,790	Total Power Supply MWh	382,874,880
Total				379,697,610	EF	1.04205

Data source: China Electric Power Yearbook 2009

3. Calculation of Simple OM Emission Factor of the CCPG for Year 2009

Table 6 CO_2 Emission Data of Data of CCPG in Year 2009

Fuel type	Unit	Jiangxi	Henan	Hubei	Hunan	Chongqing	Sichuan	Sub-total	Effective CO_2 EF	OXID	CO_2 emission factor of fossil fuel	Average Low Calorific Value	CO_2 emission （tCO_2e）
									（tc/TJ）	（%）	($kgCO_2$/TJ)	（MJ/t, m^3）	L=G*J*K/100000 (for mass unit)
		A	B	C	D	E	F	G=A+B+C+D+E+F	H	I	J	K	L=G*J*K/10000 (for volume unit)
Raw Coal	10^4t	2184.31	9339.64	2888.29	2810.69	1413.64	2817.31	**21453.88**	25.8	100	87,300	20,908	391,590,892
Cleaned Coal	10^4t		3.35					**3.35**	25.8	100	87,300	26,344	77,044
Other Washed Coal	10^4t		59.93			136.75	97.94	**294.62**	25.8	100	87,300	8,363	2,150,991
Briquette	10^4t				2.63			**2.63**	26.6	100	87,300	20,908	48,005
Coke	10^4t		1.08	0.06	0.09			**1.23**	29.2	100	95,700	28,435	33,471
Coke Oven Gas	10^8m3	0.09	6.04	1.2		1.03		**8.36**	12.1	100	37,300	16,726	521,564
Other Gas	10^8m3	30.76	56.64		4.23	7.57		**99.2**	12.1	100	37,300	5,227	1,934,074
Crude Oil	10^4t		0.1					**0.1**	20	100	71,100	41,816	2,973
Gasoline	10^4t							**0**	18.9	100	67,500	43,070	0
Diesel Oil	10^4t	0.69	4.28	1.23	1.55	1.19		**8.94**	20.2	100	72,600	42,652	276,830
Fuel Oil	10^4t	0.02	1.44	0.48	1.27	0.06	4	**7.27**	21.1	100	75,500	41,816	229,522
LPG	10^4t							**0**	17.2	100	61,600	50,179	0
Refinery Gas	10^4t	0.25	2.18	0.82	1.91			**5.16**	15.7	100	48,200	46,055	114,544
Natural Gas	10^8m^3		7.69	0.27		0.14	21.84	**29.94**	15.3	100	54,300	38,931	6,329,176
Other Petroleum Products	10^4t			0.29				**0.29**	20	100	72,200	41,816	8,755

Other Coke Oven Products	10^4t							**0**	25.8	100	95,700	28,435	0
Other Energies	10^4tCe	12.47	76.3	26.69	14.96	84.8		**215.22**	0	0	0	0	0
												Subtotal	403,317,841
Data source: China Energy Statistical Yearbook 2010													

Table 7 CCPG Fuel-fired Electricity Generation and *OM* EF in Year 2009

Province	Total generation (10^8 kWh)	Total generation (MWh)	Self-consumption electricity (%)	Total supply (MWh)		
Jiangxi	445	44,500,000	5.8	41,919,000	Electricity CCPG imported from NWCPG MWh	3,262,010
Henan	1985	198,500,000	6.62	185,359,300	Simple OM in NWPG in 2009	1.00759
Hubei	630	63,000,000	6.21	59,087,700	Electricity CCPG imported from NCPG MWh	2,233,290
Hunan	634	63,400,000	6.39	59,348,740	Simple OM in NCPG in 2009	0.96418
Chongqing	306	30,600,000		30,600,000	Total Emissions tCO_2	408,757,899
Sichuan	504	50,400,000	7.92	46,408,320	Total Power Supply MWh	428,218,360
Total				422,723,060	EF	0.95455

Data source: China Electric Power Yearbook2010

4. Calculation of Simple OM Emission Factor of the CCPG

Table 8 Calculation of Simple *OM* Emission Factor of CCPG

	Total Power Supply (MWh)	CO_2 emission (tCO_2)	*OM* Emission Factor (tCO_2/MWh)
2007	380,239,080	419,013,395	1.10197
2008	382,874,880	398,974,078	1.04205
2009	428,218,360	408,757,899	0.95455
The weighted average *OM* Emission Factor (tCO_2/MWh)			**1.02973**

The Operating Margin (*OM*) emission factor is the weighted average emission factors of year 2007-2009, as follows: $\boldsymbol{EF_{OM}}$ **= 1.0297** tCO_2/MWh

Calculation of the Build Margin emission factor ($EF_{BM,y}$)

1. Calculation of percentages of CO_2 emissions from the coal-fired, gas-fired and oil-fired power plants in total fuel-fired CO_2 emissions

Table 9 Percentages of CO_2 emissions from the coal-fired, gas-fired and oil-fired power plants in total fuel-fired CO_2 emissions

Energy	Unit	Jiangxi	Henan	Hubei	Hunan	Chongqing	Sichuan	Total	NCV (MJ/t or $1000m^3$)	Emission factor (tC/TJ)	Oxidation rate (%)	Emission (tCO_2e)
		A	B	C	D	E	F	G=A+B+C+D+E+F	H	I	J	K=G*H*I*J/100000
Raw Coal	10^4t	2,184.31	9,339.64	2,888.29	2,810.69	1,413.64	2,817.31	21,453.88	20,908	87,300	1	391,590,892
Cleaned coal	10^4t	0	3.35	0	0	0	0	3.35	26,344	87,300	1	77,044
Other washed coal	10^4t	0	59.93	0	0	136.75	97.94	294.62	8,363	87,300	1	2,150,991
Briquette	10^4t	0	0	0	2.63	0	0	2.63	20,908	87,300	1	48,005
Coke	10^4t	0	1.08	0.06	0.09	0	0	1.23	28,435	95,700	1	33,471
Other Coke Oven Products	10^4t	0	0	0	0	0	0	0.00	28,435	95,700	1	0
Sub-Total												393,900,403
Crude oil	10^4t	0	0.1	0	0	0	0	0.1	41,816	71,100	1	2,973
Gasoline	10^4t	0	0	0	0	0	0	0	43,070	67,500	1	0
Diesel	10^4t	0.69	4.28	1.23	1.55	1.19	0	8.94	42,652	72,600	1	276,830
Fuel oil	10^4t	0.02	1.44	0.48	1.27	0.06	4	7.27	41,816	75,500	1	229,522
Other petroleum products	10^4t	0	0	0.29	0	0	0	0.29	41,816	72,200	1	8,755
Sub-Total												518,081
Nature gas	10^7m^3	0	76.9	2.7	0	1.4	218.4	299.4	38,931	54,300	1	6,329,176
Coke oven gas	10^7m^3	0.9	60.4	12	0	10.3	0	83.6	16,726	37,300	1	521,564
Other coal gas	10^7m^3	307.6	566.4	0	42.3	75.7	0	992	5,227	37,300	1	1,934,074
LPG	10^4t	0	0	0	0	0	0	0	50,179	61,600	1	0

Refinery gas	10^4t	0.25	2.18	0.82	1.91	0	0	5.16	46,055	48,200	1	114,544
Sub-Total												8,899,358
Total												403,317,841

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According to Table 9 and formula (7), (8), (9) in section B.6.1, the percentages of CO_2 emissions from the coal-fired, oil-fired and gas-fired power plants in total fuel-fired CO_2 emissions are calculated as:

$$\lambda_{Coal,y} = 97.66\%,\ \lambda_{Oil,y} = 0.13\%,\ \lambda_{Gas,y} = 2.21\%$$

2. Calculating the fuel-fired emission factor ($EF_{Thermal}$)

Table 10 Parameters used for calculating fuel-fired emission factor

	Parameter	Efficiency of Power Supply (%)	Emission Factor of Fuel ($kgCO_2/TJ$)	Oxidation Factor	Emission Factor (tCO_2/MWh)
		A	B	C	D=3.6/A/1,000,000*B*C
Coal-fired Power Plant	$EF_{Coal,Adv,y}$	39.45	87,300	1	0.7967
Oil-fired Power Plant	$EF_{Oil,Adv,y}$	51.77	75,500	1	0.5250
Gas-fired Power Plant	$EF_{Gas,Adv,y}$	51.77	54,300	1	0.3776

$$EF_{Thermal,y} = \lambda_{Coal,y} \times EF_{Coal,Adv,y} + \lambda_{Oil,y} \times EF_{Oil,Adv,y} + \lambda_{Gas,y} \times EF_{Gas,Adv,y} = 0.7871\ tCO_2e/MWh$$

3: Calculating the Build Margin (*BM*) emission factor ($EF_{BM,y}$)

Table 11 Installed Capacity data of CCPG in Year 2009

	Unit	Jiangxi	Henan	Hubei	Hunan	Chongqing	Sichuan	Total
Thermal power	MW	11,500	43,100	15,670	15,900	6,800	12,270	105,240
Hydro power	MW	3,770	3,650	30,010	11,460	4,530	25,810	79,230
Nuclear power	MW	0	0	0	0	0	0	0
Wind power and other	MW	60	50	10	2	10	0	132
Total	MW	15,330	46,800	45,690	27,362	11,340	38,080	184,602

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Table 12 Installed Capacity data of CCPG in Year 2008

	Unit	Jiangxi	Henan	Hubei	Hunan	Chongqing	Sichuan	Total
Thermal power	MW	9,340	42,680	14,210	14,430	6,660	12,770	100,090
Hydro power	MW	3,710	3,020	29,050	10,650	4,060	22,240	72,730
Nuclear power	MW	0	0	0	0	0	0	0
Wind power and other	MW	30	30	10	0	0	0	70
Total	MW	13,080	45,720	43,280	25,080	10,730	35,010	172,890

China Electric Power Yearbook 2009

Table 13 Installed Capacity data of CCPG in Year 2007

	Unit	Jiangxi	Henan	Hubei	Hunan	Chongqing	Sichuan	Total
Thermal power	MW	9,270	38,540	13,040	13,360	6,370	12,000	92,580
Hydro power	MW	3,570	2,740	24,020	9,220	2,240	19,860	61,650
Nuclear power	MW	0	0	0	0	0	0	0
Wind power and other	MW	0	0	10	17	24	0	51
Total	MW	12,840	41,280	37,070	22,597	8,634	31,860	154,281

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Table 14 Calculation of *BM* Emission Factor of CCPG

	Installed capacity in 2007	Installed capacity in 2008	Installed capacity in 2009	Newly added capacity from 2007 to 2009[1]	Newly added capacity from 2008 to 2009[2]	Share in total capacity additions
	(MW)	(MW)	(MW)	(MW)	(MW)	
	A	B	C	D	E	
Thermal power	92,580	100,090	105,240	20,280.4	10,467.5	53.25%
Hydro power	61,650	72,730	79,230	17,726.9	6,500	46.54%
Nuclear power	0	0	0	0	0	0.00%
Wind power and Other	51	70	132	81	62	0.21%
Total	**154,281**	**172,890**	**184,602**	**38,088.3**	**17,029.5**	**100.00%**
Share in total installed capacity of 2009				20.63%	9.23%	

1,2 with consideration of installed capacity, capacity of units under shutdown, the pumped-storage power generating capacity

$$EF_{BM,y}=0.7871\times53.25\%=0.4191\ tCO_2/MWh$$

Calculating the baseline emission factor (EF_y)

According to formula (8) in section B.6.1, the baseline emission factor of the CCPG is calculated as:

$$EF_y = 1.0297 \times 0.5 + 0.4191\times 0.5 = \mathbf{0.7244\ tCO_2/MWh}$$

The EF_y applied in this report is fixed for a crediting period and may be revised at the renewal of the crediting period.

Annex 4

MONITORING INFORMATION

Please refer to the Monitoring plan in Section B.7.

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