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

CONTENTS

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:

Changshatou 10MW Hydropower Project in Hubei Province

Version number of the document: 01

Date: 22/08/2007

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

Changshatou 10MW Hydropower Project in Hubei Province (hereafter simplified as the Project) which is developed by Yichang Changfeng Hydropower Development Co., Ltd. is located in Langping Town, Changyang Autonomous County, Yichang City, Hubei Province, P.R.China. The purpose of the Project is to utilize the water resources of the Langping River to generate electricity, which will be delivered to Central China Power Grid (CCPG) through the Hubei Power Grid (HBPG) without CO_2 emissions.

The Project is a newly built hydropower project with 10 MW installed capacity. The reservoir volume is 3,518,400 m^3 and its surface area at full reservoir water level is 0.1631 km^2, and the power density of the reservoir is 61.3 W/m^2. It is estimated that the electricity supplied to the grid will be 33.8844 GWh annually. The Project activity will achieve greenhouse gas (GHG) emission reductions by dispatching equivalent electricity supplied by CCPG, which is predominated by fossil fuel-fired power plants. The estimated annual emission reductions are 33,022 tCO_2e.

Besides generating the renewable energy electric power, the Project activity will contribute positive effects for the local sustainable development through the following aspects:

- To contribute to local economy development by providing electricity to meet local increasing energy demands;

- To reduce GHG emissions and to mitigate the emissions of other pollutants caused from local coal-fired power plants compared with a business-as-usual scenario by displacing part of electricity from fossil fuel-fired power plants;

- The project fulfil the requirement of energy industry development in China, it will help to improve the power constitution in Central China Power Grid and increase the sustainable energy;

- To create plenty of short-term employment opportunities during the construction period of the Project and 11 long-term employment opportunities during the operation period for the local people.

A.3. Project participants:

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)	Yichang Changfeng Hydropower Development Co., Ltd. (project owner)	No
the Netherlands	Essent Energy Trading B.V. (purchasing party)	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.

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):

The People’s Republic of China

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

Hubei Province

A.4.1.3. City/Town/Community etc:

Changyang Autonomous County, Yichang City

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

The Project lies in Wangjia River reach, upper Langping River in Changyang Autonomous County, Yichang City, Hubei Province, P.R.China, 115km away from downtown of Changyang Autonomous County, 116km away from the Yichang City. The location of the Project is shown as Fig.1 and Fig.2.

Figure 1.The location of Hubei Province in China (left) and the location of Yichang City in Hubei Province (right)

Figure 2. The location of the Project in Changyang Autonomous County

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

As per the categorization 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

Category I.D.: Renewable electricity generation for a grid

Sub-category: Hydropower

The Project is a diversion hydropower station and will install two sets of 5 MW hydro turbines (CJA237-W-110/2×11) and associated generators (SFW5000-8/1730). The turbines and generators are made in China. The key technical indicators of the hydro-turbines and the generators of the Project are listed in table 1.

Table 1. Key technical parameters of the hydro turbines and the generators

Category		**Parameters**
Hydro Turbine	**Type**	CJA237-W-110/2×11
	Raito head	435.18 m
	Raito output	5263 kW
	Raito flux	1.44m^3/s
Generator	**Type**	SFW5000-8/1730
	Raito power	5000kW
	Power factor	0.8
	Raito voltage	6.3kV

Facilities used in the Project are produced domestically and there is no technology transfer from abroad.

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

It is expected that the Project activity will generate emission reductions for about 33,022 tCO_2e per year over the first 7-year crediting period from Jan. 1st, 2008 to Dec. 31st, 2014.

Years	**Annual estimation of emission reductions in tonnes of CO_2e**
2008	33,022
2009	33,022
2010	33,022
2011	33,022
2012	33,022
2013	33,022
2014	33,022
Total estimated reductions (tonnes of CO_2e)	**231,154**
Total number of crediting years	**7**
Annual average over the crediting period of estimated reductions (tonnes of CO_2e)	**33,022**

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

There is no public funding from Annex I Parties for the Project.

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.

According to Appendix C to the *Simplified Modalities and Procedures for Small-scale CDM Project Activities*, the Project is not a debundled component of a larger 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:

The methodology applied to the Project is the approved methodology for small-scale CDM project- AMS-I.D. "Grid connected renewable electricity generation" (version 12). For more information regarding the methodology, please refer to the link:
http://cdm.unfccc.int/methodologies/SSCmethodologies/ approved.html.

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

1.The Project is a small hydropower project with a total designed capacity of 10 MW.

2. The Project is connected to CCPG, which is dominated by fossil fuel generation.

Therefore, the methodology AMS-I.D. is applicable to the Project.

B.3. Description of the project boundary:

Based on the methodology AMS-I.D., the project boundary encompasses the physical, geographical site of the renewable generation source. The electricity displaced by the Project should be the electricity generated by CCPG. Therefore, the boundary could be identified as CCPG. The spatial extent of the project boundary covers those fossil fuel-fired power plants physically connected into CCPG that is influenced by the project activity.

CCPG is composed of Hubei Power Grid, Hunan Power Grid, Henan Power Grid, Jiangxi Power Grid, Chongqing Power Grid and Sichuan Power Grid[1].

B.4. Description of baseline and its development:

For the Project, the possible alternative scenarios that provide outputs or services comparable to the Project should be as follows:

Alternative I: To implement the proposed project activity, but not as a CDM project activity;
Alternative II: To construct a thermal power plant with the same installed capacity as the Project;
Alternative III: To provide for the same annual electricity output as the Project by CCPG.

These alternatives are discussed as below:

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1 *Notification on Determining Baseline Emission Factor of China's Grid* issued by China's DNA on Aug. 9th, 2006 http://cdm.ccchina.gov.cn

Alternative I: The alternative is in compliance with current laws and regulations of China. However, according to the investment analysis in section B.5, the proposed project activity without CDM revenues is economically unattractive because the total investment's internal rate of return (IRR) is only 6.7%, lower than the financial benchmark IRR (10%). Therefore, Alternative I is not feasible and should not be the baseline scenario of the Project.

Alternative II: According to the current regulations in China, construction of coal-fired power plants with capacity of less than 135 MW are forbidden in the areas which can be covered by large grids[2], and the fossil fuel-fired power units with capacity less than 100 MW is strictly limited for installation[3]. Therefore, Alternative II is not in compliance with current laws and regulations of China, and should not be the baseline scenario of the Project.

Alternative III: The alternative is in compliance with current laws and regulations of China and economically feasible.

In conclusion, Alternative III is the most likely one to be implemented among all the alternatives. Therefore Alternative III is identified as the baseline scenario of the Project. In absence of the Project, CCPG will provide for the same annual electricity output as the Project.

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:

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

As a small hydropower project located in poor mountainous area, the Project faces problems such as geological and transportation condition, which make the Project an economically unattractive course of action. The investment barrier is the most prohibitive factor in implementing the Project. Detailed analysis is shown as follows:

Investment Barrier Analysis

The purpose of this part is to determine whether the Project is economically attractive or not through appropriate analysis method.

Determine appropriate analysis method

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

3 *Interim Rules on the Installation and Management of Small-scale Fuel-fired Generators* (issued in Aug., 1997).

Three analysis methods are available: simple cost analysis, investment comparison analysis and benchmark analysis. Considering the Project has income from electricity sales, benchmark analysis is selected among these options. And also the internal return rate (IRR) of the total investment is identified as the financial indicator.

According to *Economic Evaluation Code for Small Hydropower Projects* issued by the Ministry of Water Resources (Document No. SL16-95), the benchmark IRR for small hydropower projects is 10%. Accordingly, if the total investment's IRR of the Project is lower than 10%, the project is not an economically attractive course of action and fulfils the requirement of additionality.

Calculation and comparison

The basic parameters for calculation of financial indicators of the Project are shown in *Table 2*.

Table 2. Basic parameters for calculation of financial indicators of the Project

Parameter	Unit	Amount
Installed capacity	MW	10
Estimated annual output	GWh	33.8844
Project lifetime	Years	22
Total investment	Million RMB	69.8444
Expected bus-bar tariff (including VAT)	RMB/kWh	0.28
Interests of the loan		6.12%
Period of depreciation	Years	20
VAT	%	6
Income tax	%	33
Tax of expense for city maintenance and construction	%	3
Tax of education fee addition	%	1
Operation cost	Million RMB	1.0457
Rate of scrap value	%	5

Calculated based on these data, the IRR of the total investment of the Project is only 6.7% without CERs sales revenues. It is lower than the benchmark IRR for small hydropower projects (10%). Therefore, the Project is not economically attractive and fulfils the requirement of additionality.

Sensitivity Analysis

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

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

- Estimated annual output
- Total investment
- Operation Cost

Assuming that the above three factors fluctuate within the range of –10%~10%, the corresponding impacts on the total investment's IRR of Project are shown in Table 3 and Figure 3:

Table 3. Results of sensitivity analysis

Range Scope / IRR / Parameters	-10%	-5%	0	5%	10%
Estimated annual output	5.60%	6.16%	6.70%	7.24%	7.76%
Total Investment	7.82%	7.24%	6.70%	6.21%	5.75%
Operation and maintenance cost	6.83%	6.77%	6.70%	6.64%	6.58%

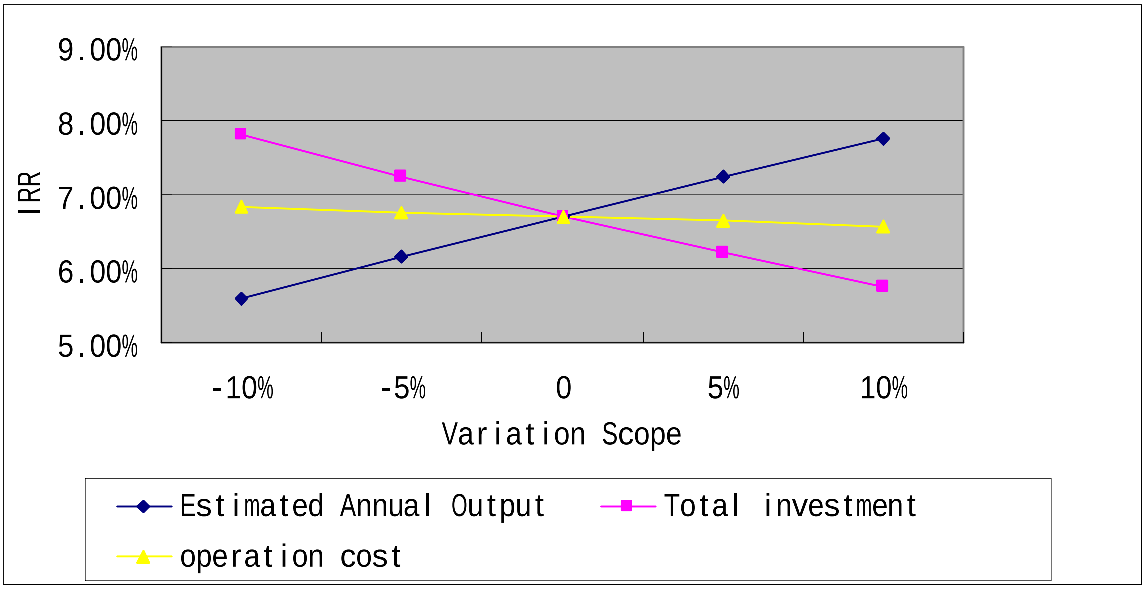

Figure 3. Sensitivity Analysis for the Project

The sensitivity analysis shows that even the fluctuation range of the those sensitivity indicators reach 10%, the IRR of the total investment of the Project could not reach the benchmark and the conclusion regarding that the Project is financially unattractive is still tenable.

To sum up, the Project has obvious investment barrier and fulfils the requirement of additionality.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

The methodology AMS-I.D is applicable to the Project.

Step 1. Baseline emissions calculation

Based on the methodology AMS.I.D, the baseline is the electricity produced by the renewable generating unit multiplied by an emission coefficient (measured in tCO_2e/MWh) calculated in a transparent and conservative manner as:

(a) A combined margin (CM), consisting of the combination of operating margin (OM) and build margin (BM) according to the procedures prescribed in the approved methodology ACM0002. Any of the four procedures to calculate the operating margin can be chosen, but the restrictions to use the Simple OM and the Average OM calculations must be considered

(b) The weighted average emissions (in tCO_2e/MWh) of the current generation mix. The data of the year in which project generation occurs must be used.

For the Project, method (a) is adopted to calculate the baseline emission coefficient.

According to ACM0002, to calculate the baseline emissions, emission factors of operating margin ($EF_{OM,y}$) and build margin ($EF_{BM,y}$) were determined by ex-ante. Then the baseline emission factor (EF_y) is calculated as a combined margin (CM) of $EF_{OM,y}$ and $EF_{BM,y}$.

Substep 1.1. Calculate the Operating Margin emission factor(s) ($EF_{OM,y}$ ***)***

The Operating Margin Emission Factor(s) ($EF_{OM,y}$) is calculated based on one of the four following methods according to the approved methodology ACM0002:

(a) Simple OM, or

(b) Simple adjusted OM, or

(c) Dispatch data analysis OM, or

(d) Average OM.

The application of method (c) requires availability of dispatch data. However, the detailed data of dispatch are taken as confidential business information by the grid company and not publicly available. Thus, method (c) cannot be adopted for the Project. Similarly, the data of annual load duration curve required by method (b) also can not be obtained publicly. Therefore, method (b) is also not applicable here.

Among the total electricity generations of CCPG, the amount of low-cost/must run resources accounts for about 37% in 2001, 36% in 2002, 34% in 2003, 39% in 2004, and 38% in 2005[4], all less than 50%. It can't fulfil the requirement of method (d), but fulfils the requirement of method (a). Thus, the method (a) can be used to calculate the operating margin emission factor（$EF_{OM,y}$）

For the Project, *ex-ante* data are used for calculating the OM emission factor ($EF_{OM,y}$).

In accordance with ACM0002, the simple OM emission factor ($EF_{OM,simple,y}$) is calculated as:

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

where:

$F_{i,j,y}$ is the total amount of fuel ***i*** (in a mass or volume unit) consumed by all the relevant power sources ***j*** in year(s) ***y***, ***j*** refers to the power sources serving the grid, excluding those low-operating cost and must-run power plants, and including imports to the grid[5],

$COEF_{i,j,y}$ is the CO_2 emission coefficient of fuel ***i*** (tCO_2/mass or volume unit of the fuel), taking into account the carbon content of the fuels used by relevant power sources ***j*** and the oxidation rate of the fuel in year(s) ***y***, and

$GEN_{j,y}$ is the electricity output (MWh) supplied to the grid by the sources ***j***.

The CO_2 emission coefficient $COEF_i$ is obtained from formula (2) as:

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

where:

NCV_i is the net calorific value (energy content) per mass or volume unit of fuel ***i*** (here the county-specific values are adopted),

$EF_{CO2,i}$ is the CO_2 emission factor per unit of energy of the fuel ***i*** (here the IPCC default values are adopted),

4 China Electric Power Yearbook, 2002~2006 Edition.

5 An import from a connected electricity system should be considered as one power source ***j***.

$OXID_i$ is the oxidation factor of the fuel *i* (here the IPCC default values are adopted).

The data on electricity generation and auxiliary electricity consumption are obtained from the *China Electric Power Yearbook* from 2002 to 2006 (published annually). The data on different fuel consumptions for power generation and the net caloric values of the fuels are obtained from the *China Energy Statistical Yearbook* from 2004 to 2006 (published annually). The emission factors and oxidation factors of the fuels adopted are obtained from *Table 1.3 and Table 1.4, Volume 2 Energy," 2006 IPCC Guidelines for National Greenhouse Gas Inventories", P1.21-1.24.*

Substep 1.2. Calculate the Build Margin emission factor ($EF_{BM,y}$ ***)***

For the Project, *ex-ante* data are used for calculating the BM emission factor ($EF_{BM,y}$).

According to ACM0002, the build margin emission factor ($EF_{BM,y}$) is calculated using the following formula (3):

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

where:

$F_{i,m,y}$, $COEF_{i,m,y}$ and $GEN_{m,y}$ are analogous to the variables described in *Substep 1.1* above for plants *m*.

Currently in China, the build margin data of sampling plants group *m* are not available publicly. Taking notice of this situation, EB accepts the following deviation in application of methodology AM0005 in China[6]:

- Use of capacity additions during the last 1~3 years for estimating the build margin emission factor for grid electricity.
- Use of weights estimated using installed capacity in place of annual electricity generation.

And it is suggested to use the efficiency level of the best technology commercially available in the provincial/regional or national grid of China, as a conservative proxy.

Since methodology AM0005 has been replaced by the consolidated methodology ACM0002, the deviation above is also applicable to the consolidated methodology ACM0002. Therefore, for the Project: Firstly, calculate the share of different power generation technology in recent capacity additions. Secondly,

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

calculate the weight for capacity additions of each power generation technology. And finally, calculate the emission factor using the efficiency level of the best technology commercially available in China.

Since the data of thermal power capacities, which can be obtained at present, can not be separated into coal-based, oil-based and gas-based, the BM is calculated with following steps and formula:

Substep 1.2.1 Calculate the power generation emissions for solid, liquid and gas fuel and each share of total emissions based on the Energy Balance Table of the most recent year.

$$l_{Coal} = \frac{\sum_{i \in COAL, j} F_{i,j,y} \times COEF_{i,j}}{\sum_{i,j} F_{i,j,y} \times COEF_{i,j}} \quad (4)$$

$$l_{Oil} = \frac{\sum_{i \in OIL, j} F_{i,j,y} \times COEF_{i,j}}{\sum_{i,j} F_{i,j,y} \times COEF_{i,j}} \quad (5)$$

$$l_{Gas} = \frac{\sum_{i \in GAS, j} F_{i,j,y} \times COEF_{i,j}}{\sum_{i,j} F_{i,j,y} \times COEF_{i,j}} \quad (6)$$

where:

$F_{i,j,y}$ is the amount of fuel ***i*** (in a mass or volume unit) consumed by province ***j*** in year(s) ***y***,

$COEF_{i,j,y}$ is the CO_2 emission coefficient of fuel ***i*** (tCO_2/tCe), taking into account the carbon content of the fuels (coal, oil and gas) used by province ***j*** and the percent oxidation of the fuel in year(s) ***y***, and

COAL, *OIL* and *GAS* are footnote group for solid fuels, liquid fuels and gas fuels.

Substep 1.2.2 Calculate emission factor for thermal power of each grid based on the result of Substep 1.2.1 and the efficiency level of the best technology commercially available in China.

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

Where $EF_{Coal,Adv}$, $EF_{Oil,Adv}$ and $EF_{Gas,Adv}$ represent the efficiency level of the best coal-based, oil-based and gas-based power generation technology commercially available in China.

Substep 1.2.3 Calculate BM of the grid based on the result of Substep1.2.2 and the share of thermal power of recent 20% capacity additions.

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

Where CAP_{Total} is total capacity additions while $CAP_{Thermal}$ is capacity additions of thermal power.

The data on different fuel consumptions for power generation and the net caloric values of the fuels are obtained from the *China Energy Statistical Yearbook* from 2004 to 2006 (published annually). The emission factors and oxidation factors of the fuels adopted are obtained from ***Table 1.3 and Table 1.4****, Volume 2 Energy, "2006 IPCC Guidelines for National Greenhouse Gas Inventories" , P1.21-1.24.*

With reference to the *Notification on Determining Baseline Emission Factors of China Power Grid*[7], the weighted average fuel consumption for power generation of 15 sets of 600 MW sub-critical coal-fired power generators built in 2005 (343.33 gCe/kWh) and the 200 MW oil/gas based combined cycle power generators (258 gCe/kWh) are taken as the efficiency level of the best technology commercially available in China.

Substep 1.3. Calculate the Baseline Emission Factor (EF_y ***)***

Based on the approved methodology ACM0002, the baseline emission factor (EF_y) is calculated as the weighted average of the operating margin emission factor ($EF_{OM,y}$) and the build margin emission factor ($EF_{BM,y}$), as

$$EF_y = w_{OM} \cdot EF_{OM,y} + w_{BM} \cdot EF_{BM,y} \qquad (9)$$

According to the approved methodology ACM0002, the weight w_{OM} and the weight w_{BM} are both take 0.5 as default.

Substep 1.4 Calculate the Baseline Emissions

Baseline emissions are calculated with baseline emission factor (EF_y) and electricity supplied by the Project to the grid (EG_y), as follows:

7 Chinese DNA (http:// http://cdm.ccchina.gov.cn), Aug. 9th, 2007

$$BE_y = EG_y \times EF_y \qquad (10)$$

Step 2. Project activity emissions

According to the approved methodology ACM0002, the reservoir power density of the Project (61.3W/m^2) is larger than the benchmark (10 W/m^2). the Project emission (PE_y) could be regard as zero, as PE_y =0 tCO_2e.

Step 3. Leakage

As newly built hydropower plants, there is no energy generating equipment be transferred from another activity and no existing equipment be transferred to another activity involved in the project activities. No leakage is considered in the Project, as $L_y = 0$ tCO_2e.

Step 4. Emission reductions

The emission reductions (ER_y) by the Project activity during a given year y is the difference between baseline emissions (BE_y), project activity emissions (PE_y) and leakage (L_y), as follows:

$$ER_y = BE_y - PE_y - L_y \qquad (11)$$

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

Data / Parameter:	*Power generation*
Data unit:	*MWh*
Description:	*The total power generation and power generated by low-cost/must run power plants within CCPG in year 2001, 2002, 2003, 2004 and 2005.*
Source of data used:	*China Electric Power Yearbook 2002, 2003, 2004, 2005 and 2006 Edition.*
Value applied:	
Justification of the choice of data or description of measurement methods and procedures actually applied:	*CCPG is defined as the project boundary of the Project.* *According ACM0002, method of simple OM can only be used where low-cost/must run resources constitute less than 50% of total grid generation.*
Any comment:	*Official data*

Data / Parameter:	$GEN_{j,y}$
Data unit:	*MWh*
Description:	*The power generation supplied to CCPG in year 2003, 2004 and 2005,, excluding those generated by low-cost/must run power plants.*
Source of data used:	*China Electric Power Yearbook 2004, 2005 and 2006 Edition.*
Value applied:	*Detailed in Annex 3.*
Justification of the choice of data or description of measurement methods and procedures actually applied:	*CCPG is defined as the project boundary of the Project.* *According ACM0002, the generation by low-operating cost and must-run power plants within CCPG are excluded from calculation of simple OM emission factor.*
Any comment:	*Official data*

Data / Parameter:	*Installed Capacity*
Data unit:	*MW*
Description:	*The installed capacity of different power sources within CCPG in year 2003, 2004 and 2005.*
Source of data used:	*China Electric Power Yearbook 2004, 2005 and 2006 Edition.*
Value applied:	*Detailed in Annex 3.*
Justification of the choice of data or description of measurement methods and procedures actually applied:	*CCPG is defined as the project boundary of the Project.* *According to the deviation accepted by the EB, the installed capacities of different power sources within CCPG are used in place of annual electricity generation for calculation of BM emission factor.*
Any comment:	*Official data*

Data / Parameter:	$F_{i,j,y}$
Data unit:	*10^4t or 10^8m^3*
Description:	*Different fossil fuel consumptions for power generation within CCPG in year 2003, 2004 and 2005..*
Source of data used:	*China Energy Statistical Yearbook 2004, 2005 and 2006 Edition.*
Value applied:	*Detailed in Annex 3.*
Justification of the choice of data or description of measurement methods and procedures actually applied:	*CCPG is the project boundary of the Project.*
Any comment:	*Official data*

Data / Parameter:	NCV_i
Data unit:	*MJ/t or MJ/10^3m^3*
Description:	*Average low calorific values of different fuels for electricity generation.*
Source of data used:	*China Energy Statistical Yearbook* 2006 Edition, P287.
Value applied:	*Detailed in Annex 3.*
Justification of the choice of data or description of measurement methods and procedures actually applied:	*China-specific values are adopted.*
Any comment:	*Official data*

Data / Parameter:	$EF_{CO_2,i}$
Data unit:	*tC/TJ*
Description:	*Emission factors of fuels for electricity generation.*
Source of data used:	*Table 1.3 and Table 1.4, Volume 2 Energy,” 2006 IPCC Guidelines for National Greenhouse Gas Inventories” , P1.21-1.24.*
Value applied:	*Detailed in Annex 3.*
Justification of the choice of data or description of measurement methods and procedures actually applied:	*IPCC world-wide default values are adopted.*
Any comment:	*IPCC data*

Data / Parameter:	$OXID_i$
Data unit:	
Description:	*Oxidation rates of fuels for power generation.*
Source of data used:	*Table 1.3 and Table 1.4, Volume 2 Energy," 2006 IPCC Guidelines for National Greenhouse Gas Inventories" , P1.21-1.24.*
Value applied:	*Detailed in Annex 3.*
Justification of the choice of data or description of measurement methods and procedures actually applied:	*IPCC world-wide default values are adopted.*
Any comment:	*IPCC data*

Data / Parameter:	*Best efficiency level of thermal power*
Data unit:	
Description:	*The efficiency level of the best coal-based, oil-based and gas-based power generation technology commercially available in China.*
Source of data used:	*Notification on Determining Baseline Emission Factors of China Power Grid*
Value applied:	*Detailed in Annex 3.*
Justification of the choice of data or description of measurement methods and procedures actually applied:	*According to the deviation accepted by EB, the efficiency level of the best technology commercially available in the national grid of China is used as a conservative value for the calculation of BM emission factor.*
Any comment:	*Official data*

B.6.3 Ex-ante calculation of emission reductions:

Baseline emissions calculation

With reference to the *Notification on Determining Baseline Emission Factors of China Power Grid*[8] issued by Chinese DNA on August 9th, 2007, the OM emission factor ($EF_{OM,y}$) of CCPG is 1.2899 tCO_2e/MWh, and the build margin emission factor ($EF_{BM,y}$) of CCPG is 0.6592 tCO_2e/MWh.

Based on formula (9) in section B.6.1, the baseline emissions factor (EF_y) of CCPG is calculated as 0.97455 tCO_2e/MWh.

The electricity output of the Project is estimated as 33.8844GWh per year, therefore the baseline emissions of the Project is estimated as 33,022 tCO_2e per year.

8 Chinese DNA (http:// http://cdm.ccchina.gov.cn), Dec. 15th, 2006

Project activity emissions calculation

As described in section B.6.1, the Project activity emissions (PE_y) will be 0 tCO_2e.

Leakage

As described in section B.6.1, the leakage of the Project (L_y) will be 0 tCO_2e.

Emission reductions calculation

Based on formula (11) in section B.6.1, the ex-ante annual emission reductions are estimated as 33,022 tCO_2e.

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

It is expected that the project activity will generate emission reductions for about 33,022 tCO_2e per year over the first 7-year crediting period from Jan. 1st, 2008 to Dec. 31st, 2014.

Year	Estimation of project activity emissions (tonnes of CO_2e)	Estimation of baseline emissions (tonnes of CO_2e)	Estimation of leakage (tonnes of CO_2e)	Estimation of overall emission reductions (tonnes of CO_2e)
2008	0	33,022	0	33,022
2009	0	33,022	0	33,022
2010	0	33,022	0	33,022
2011	0	33,022	0	33,022
2012	0	33,022	0	33,022
2013	0	33,022	0	33,022
2014	0	33,022	0	33,022
Total (tCO_2e)	**0**	**231,154**	**0**	**231,154**

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

B.7.1 Data and parameters monitored:

Data / Parameter:	EG_y
Data unit:	*GWh*
Description:	*Electricity supplied to the grid by the Project per year.*
Source of data to be used:	*Measured by Gateway Meter.*
Value of data	
Description of measurement methods and procedures to be applied:	*Please refer to Part B.7.2.*
QA/QC procedures to be applied:	*Please refer to Part B.7.2.*
Any comment:	

Data / Parameter:	*Surface area of the reservoir*
Data unit:	m^2
Description:	*Surface area of the reservoir at full level*
Source of data to be used:	
Value of data	
Description of measurement methods and procedures to be applied:	*The area will be monitored based on topographical data and the height of the dam*
QA/QC procedures to be applied:	
Any comment:	*Monitored once at start of the project. Monitored data will be kept during the crediting period.*

B.7.2 Description of the monitoring plan:

In this PDD, emission factor of the Project is determined ex-ante. Therefore the electricity supplied to the grid by the Project is defined as the key data to be monitored. The monitoring plan is drafted to focus on monitoring of the above electricity of the Project.

1. Implementation of the monitoring plan

The Project owner will take the responsibility for the monitoring plan implementation. A CDM working team, which is supervised by a manager, will be established. It consists of CDM principal, technical staff, and statistic staff. Organizational structure of the CDM team is shown as *figure 4.*

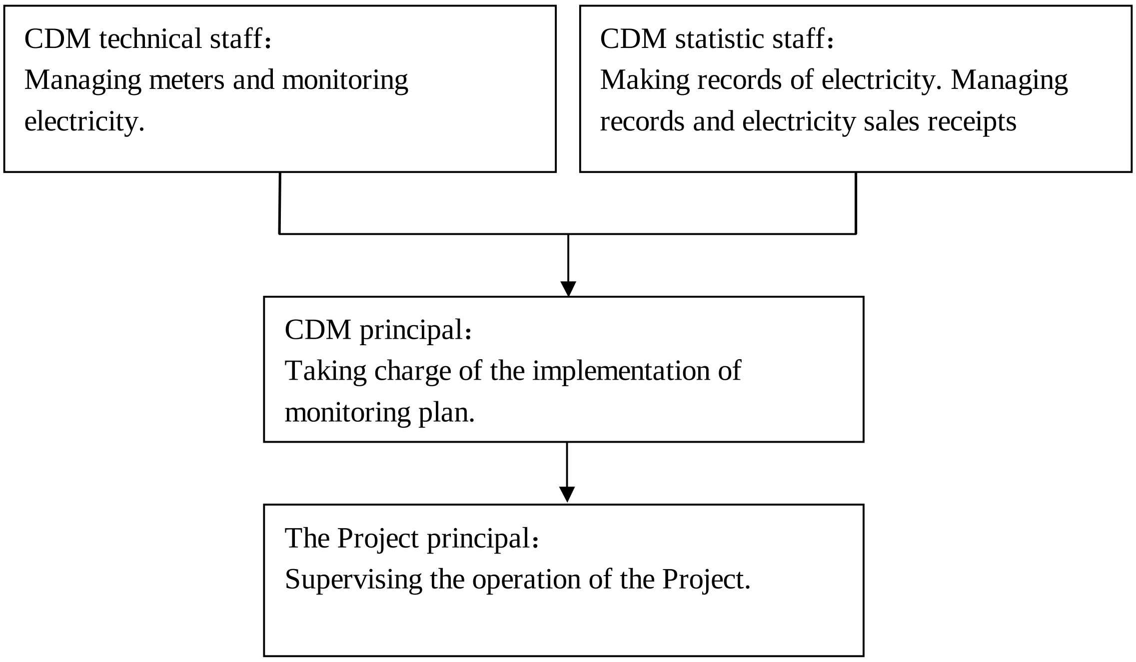

Figure 4 Structure of the CDM team

2. Monitoring of the electricity supplied to and drawn from the grid by the Project

The electricity delivered to CCPG by the Project will be continuously monitored through Gateway meters. The measured data will be collected and recorded monthly.

All the relevant data records will be kept by the Project owner during the crediting period and two years after for DOE’s verification.

3. Quality assurance and quality control

The quality assurance and quality control procedures involves of data monitoring, recording, maintaining and archiving, and monitoring equipment calibration.

The electricity delivered to CCPG will be monitored through Gateway meters. The data should be cross-checked against relevant electricity sales receipts and/or records from the grid for quality control. Since the data required to be monitored is consist with the data required during project operation by the project owner and the grid company, the Parallel Operation Agreement and the Power Purchase Agreement between these two parties can be used as guidance on data collection and documentation.

Calibration of Meters & Metering should be implemented according to national standards and rules. And all the records should be documented and maintained by the project owner for DOE’s verification.

4. Verification

It is expected that the verification of emission reductions generated from the Project will be done annually.

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

Completion date: 22/08/2007

Entity: Cleanergy Investment Service (Beijing) Co., Ltd.

Address: 11FL, Capital Times Square, 88 Xichangan Jie, Beijing, China, 100031.

Tel: +86 10 83914567

Fax: +86 10 83914555

The entity is not the project participants listed in Annex 1.

SECTION C. Duration of the project activity / crediting period

C.1 Duration of the project activity:

C.1.1. Starting date of the project activity:

01/08/2007(Operation starting date)

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

20 years

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:

01/01/2008

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 *Environmental Impact Assessment* (EIA) for this project has already been approved by the *Environmental Protection Bureau of Hubei Province* on Jul., 4th, 2005.

According to the *Feasibility Study Report* and the *Environmental Impact Assessment*, environmental impacts possibly caused by the Project and protect and guard measures adopted by the project owner are analyzed as follows:

Compensation for submerged land

The submerged land of this project is 230.51Mu, most area of submerged land of reservoir are forest and worthless mine, and there is no more submerged loss. The Project owner will make compensations agreement with Changyang Autonomous County Government according to the *Compensation Standard of Yichang Freeway and Wuhan Natural Gas Pipe Project in Changyang Autonomous County Section* (Document No.: Changzhenbanfa [2003]12).

Air pollution and Noises

The Project would cause air pollution from dust and vehicles tail gas during construction and these will have temporary impacts on the quality of local air environment. The Project Owner will adopt the technology that causes less dust during construction and will sprinkle water regularly in the construction area, and corresponding protection measures will be applied to avoid dust impact to the operator, and these impacts will eliminated at the end of the construction period. The air quality in the construction atmosphere will be controlled to meets the requirement of the *Environmental Air Quality Standards* (GB3095-96).

The Project would generate various mechanical noises during construction of the Project and these will have temporary impacts on the quality of local sound environment. Since it is located in a mountainous area with low population density, the Project has little impact on ambient environment and residents. The Project owner will employ low noise machines, set sound insulation device, prohibit high noise device from operation in the nighttime, limit the labor strength in the high noise area and provide anti-noise articles for the construction staff. The noise management will meet the requirement of *Noise Limit Standard in Construction Field* (GB12523-90).

Wastewater

Wastewater will be generated by production and living activities during the construction and operation of the Project. Since the main pollutants in the wastewater resulting from production are primarily inorganic suspended solids (SS) which are not toxic, and measures of flocculation sedimentation will applied to remove the suspending particulates before discharging; the waste water resulting from living activities will be treated by the sets of sewage treatment equipment before discharging it. All the wastewater treatment will meet the requirement of *Wastewater Integrated Discharging Standard* (GB8978-1996).

Water and soil losses

The Project has designed plenty of integral solution in order to prevent the water and soil losses in the construction and operation period. The main measures include recovery or reconstruction for the farm land and forest land; taking engineering and planting measures to recover and maintain the water and soil conservation capacity; the waste residue produced during the project construction period will be collected and proper measures will be put into practice; taking measures such as farm recovery and vegetation to the temporary and permanent occupied land by the Project. The water and soil losses will be validly reduced by the measures discussed above. The water and soil conservation scenario will meet the requirement of *Water and Soil Conservation Technical Criterion for Project Development and Construction* (SL204-98).

Ecological environment

The Project activity does not have any migrants and plantation occupation. Beside the permanent occupied land, the temporary occupied land will also be treated with land formation and vegetation planting. The Project construction units and local government will arrange the propaganda and management well for forest and wild animal protection.

There is no rare or endangered wildlife in the project construction area and submerged area, so the Project has little impact on the terrestrial wildlife. The fish source in this basin is not abundant and there is no endangered fish, so the Project has little impact on fish source.

In general, the reservoir area of the Project is very small and with the implementing of the environment protection measures, the impact of the Project on ecological environment will be quite limited.

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:

As stated above, the Project will not bring obvious environmental impact by a series of environmental protection measures during the construction and operation periods.

SECTION E. Stakeholders' comments

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

In 2006, staff from the Project conducted a survey by sending questionnaires to the local stakeholders. Totally 50 questionnaires were distributed and 50 valid ones are recovered. The recovery rate is 100%. Among the 50 informants, 36 of them are male, 14 are female. Among these informants, 20 of them are peasants, 12 are workers, 9 are government officers and 2 of them are militaries.

E.2. Summary of the comments received:

The comments from the respondents are concluded as follows:

(1) All the respondents (100%) agree with the construction of the Project, all of them consider that the Project activity will benefit the local economy and environment;

(2) The respondents consider that the Project activity will bring positive impacts such as improve local economy (100%), local environment (96%), people's Living Level (36%), traffic condition (88%), the flood control ability (26%), and increase employment opportunities(62%);

(3) Most of the respondents (86%) consider the negative impact of the Project activity is land flooding, none response refer to any other negative impact;

(4) There are no comments and suggestions from respondents.

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

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

For the comment that respondents are worried about the problem of land submergence, since the Project construction site is far from local village and there is no residents in the construction and influence scale of the Project, the Project activity has little impact on local environment and people. The Project owner will determine the land expropriation price according to the national policy and local practical situation, and eliminate the project activity impacts to the environment by taking reasonable measures, according to the requirement of EIA and corresponding approved documents.

To sum up, the local people are very supportive to the Project. According all the result from the survey, it is not necessary to take any adjustment for the Project design, construction and operation.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

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Annex 2

INFORMATION REGARDING PUBLIC FUNDING

There is no public funding from Annex I Parties for the Project.

Annex 3

BASELINE INFORMATION

Data recommended in the *Notification on Determining Baseline Emission Factors of China power Grid* [9]（issued by Chinese DNA）for CCPG are adopted for the Project.

Table A1~A3 show the thermal power generation supplied to CCPG in 2003, 2004 and 2005.

Table A1. Thermal power supplied to CCPG in 2003

	Thermal power generation	**Auxiliary electricity consumption**	Thermal power supplied to the grid
	（MWh)	（%）	**（MWh)**
Jiangxi	27165000	6.43	25418291
Henan	95518000	7.68	88182218
Hubei	39532000	3.81	38025831
Hunan	29501000	4.58	28149854
Chongqing	16341000	8.97	14875212
Sichuan	32782000	4.41	31336314
Total			225987719

Data source: China Electric Power Yearbook 2004 Edition.

9 http://cdm.ccchina.gov.cn/

Table A2. Thermal power supplied to CCPG in 2004

	Thermal power generation	**Auxiliary electricity consumption**	Thermal power supplied to the grid
	(MWh)	**(%)**	**(MWh)**
Jiangxi	30127000	7.04	28006059
Henan	109352000	8.19	100396071
Hubei	43034000	6.58	40202363
Hunan	37186000	7.47	34408206
Chongqing	16520000	11.06	14692888
Sichuan	34627000	9.41	31368599
Total			249074186

Data source: China Electric Power Yearbook 2005 Edition.

Table A3. Thermal power supplied to CCPG in 2005

	Thermal power generation	**Auxiliary electricity consumption**	Thermal power supplied to the grid
	(MWh)	**(%)**	**(MWh)**
Jiangxi	30000000	6.48	28056000
Henan	131590000	7.32	121957612
Hubei	47700000	2.51	46502730
Hunan	39900000	5.00	37905000
Chongqing	17584000	8.05	16168488
Sichuan	37202000	4.27	35613475
Total			286203305

Data source: China Electric Power Yearbook 2006 Edition.

With reference to the *Notification on Determining Baseline Emission Factors of China Power Grid*, Table A4 shows the low calorific values, emission factors and oxidation rates of fuels consumed for electricity generation that are to be used in the following OM emission factor calculation and BM emission factor calculation.

Table A4. Data of fuels consumed for electricity generation

Fuel type	**Low calorific value**	**Emission factor (tc/TJ)**	**Oxidation rate**
Raw coal	20908 kJ/kg	25.80	1
Cleaned coal	26344 kJ/kg	25.80	1
Other washed coal	8363 kJ/kg	25.80	1
Coke	28435 kJ/kg	25.80	1
Crude oil	41816 kJ/kg	20.00	1
Gasoline	43070 kJ/kg	18.90	1
Kerosene	43070 kJ/kg	19.60	1
Diesel	42652 kJ/kg	20.20	1

Fuel oil	41816 kJ/kg	21.10	1
Other petroleum products	38369 kJ/kg	20.00	1
Natural gas	38931 kJ/m^3	15.30	1
Coke over gas	16726 kJ/m^3	12.10	1
Other coal gas	5227 kJ/m^3	12.10	1
LPG	50179 kJ/m^3	17.20	1
Refinery gas	46055 kJ/m^3	18.20	1

Data sources: China Energy Statistical Yearbook 2006 Edition, P287;

Table 1.3 and Table 1.4, Volume 2 Energy, " 2006 IPCC Guidelines for National Greenhouse Gas Inventories" , P1.21-1.24.

Table A5~A7show the calculation of the simple OM emission factor of CCPG in 2003, 2004 and 2005.

Table A5. Calculation of the simple OM emission factor of CCPG in 2003

Fuel type	Unit	Jiangxi	Henan	Hubei	Hunan	Chongqing	Sichuan	Total	Emi fa
									（tc
		A	B	C	D	E	F	G=A+B+C+D+E+F	
Raw coal	10^4t	1427.41	5504.94	2072.44	1646.47	769.47	2430.93	**13851.66**	2
Clean washed coal	10^4t							**0**	2
Other washed coal	10^4t	2.03	39.63			106.12		**147.78**	2
Coke	10^4t				1.22			**1.22**	2
Coke oven gas	10^8m^3			0.93				**0.93**	1
Other gas	10^8m^3							**0**	1
Crude oil	10^4t		0.5	0.24			1.2	**1.94**	[illegible]
Gasoline	10^4t							**0**	1
Diesel	10^4t	0.52	2.54	0.69	1.21	0.77		**5.73**	2
Fuel oil	10^4t	0.42	0.25	2.17	0.54	0.28	1.2	**4.86**	2
LPG	10^4t							**0**	1
Refined gas	10^4t	1.76	6.53		0.66			**8.95**	1
Natural gas	10^8m^3					0.04	2.2	**2.24**	1
Other petroleum products	10^4t							**0**	[illegible]
Other coking products	10^4t							**0**	2
Other energy	10^4t Ce		11.04			16.2		**27.24**	
Total emissions of CCPG (tCO_2e)									
Thermal power supplied to CCPG (MWh)									
Simple OM emission factor of CCPG (tCO_2e/MWh)									

Data sources: China Energy Statistical Yearbook 2004 Edition.

Table A6. Calculation of the simple OM emission factor of CCPG in 2004

Fuel type	**Unit**	**Jiangxi**	**Henan**	**Hubei**	**Hunan**	**Chongqing**	**Sichuan**	**Total**	**Emi fa**
									（tc
		A	**B**	**C**	**D**	**E**	**F**	**G=A+B+C+D+E+F**	
Raw coal	10^4t	1863.8	6948.5	2510.5	2197.9	875.5	2747.9	**17144.1**	2
Clean washed coal	10^4t		2.34					**2.34**	2
Other washed coal	10^4t	48.93	104.22			89.72		**242.87**	2
Coke	10^4t		109.61					**109.61**	2
Coke oven gas	10^8m^3			1.68		0.34		**2.02**	1
Other gas	10^8m^3					2.61		**2.61**	1
Crude oil	10^4t		0.86	0.22				**1.08**	
Gasoline	10^4t		0.06			0.01		**0.07**	1
Diesel	10^4t	0.02	3.86	1.7	1.72	1.14		**8.44**	2
Fuel oil	10^4t	1.09	0.19	9.55	1.38	0.48	1.68	**14.37**	2
LPG	10^4t							**0**	1
Refined gas	10^4t	3.52	2.27					**5.79**	1
Natural gas	10^8m^3						2.27	**2.27**	1
Other petroleum products	10^4t							**0**	
Other coking products	10^4t							**0**	2
Other energy	10^4t Ce		16.92		15.2	20.95		**53.07**	
Total emissions of CCPG (tCO_2e)									
Thermal power supplied to CCPG (MWh)									
Simple OM emission factor of CCPG (tCO_2e/MWh)									

Data sources: China Energy Statistical Yearbook 2005 Edition.

Table A7. Calculation of the simple OM emission factor of CCPG in 2005

Fuel type	**Unit**	**Jiangxi**	**Henan**	**Hubei**	**Hunan**	**Chongqing**	**Sichuan**	**Total**	**Em fa**
									（tc
		A	**B**	**C**	**D**	**E**	**F**	**G=A+B+C+D+E +F**	
Raw coal	10^4t	1869.29	7638.87	2732.15	1712.27	875.4	2999.77	**17827.75**	2
Clean washed coal	10^4t	0.02						**0.02**	2
Other washed coal	10^4t		138.12			89.99		**228.11**	2
Coke	10^4t		25.95		105			**130.95**	2
Coke oven gas	10^8m^3			1.15		0.36		**1.51**	1
Other gas	10^8m^3		10.2			3.12		**13.32**	1
Crude oil	10^4t		0.82	0.36				**1.18**	
Gasoline	10^4t		0.02			0.02		**0.04**	1

Diesel	10^4t	1.3	3.03	2.39	1.39	1.38		**9.49**	2
Fuel oil	10^4t	0.64	0.29	3.15	1.68	0.89	2.22	**8.87**	2
LPG	10^4t							**0**	1
Refined gas	10^4t	0.71	3.41	1.76	0.78			**6.66**	1
Natural gas	10^8m^3						3	**3**	1
Other petroleum products	10^4t							**0**	
Other coking products	10^4t				1.5			**1.5**	2
Other energy	10^4t Ce		2.88		1.74	32.8		**37.42**	
Total emissions of CCPG (tCO_2e)									
Thermal power supplied to CCPG (MWh)									
Simple OM emission factor of CCPG (tCO_2e/MWh)									

Data sources: China Energy Statistical Yearbook 2006 Edition.

The Simple OM emission factor is the weighted average value of the Simple OM emission factors in the year 2003, 2004 and 2005, i.e. $EF_{OM,y}$ =(276404544 ＋ 345671697 ＋ 359887488)/(225987719+249074186+286203305)=1.2899 tCO_2e/MWh.

Build Margin emission factor is calculated according to the steps and formulae described in Section B.6.1.

Table A8 is the calculation of the emission factor reflecting the efficiency level of the best electricity generation technology commercially available in China with reference to the *Notification on Determining Baseline Emission Factors of China Power Grid* issued by Chinese DNA.

Table A8. The efficiency level of the best electricity generation technology commercially available in China

	Parameter	**Efficiency of supplying electricity**	**Fuel emission factor (tc/TJ)**	**Oxidation rate**	**Emission factor (tCO_2e/MWh)**
		A	B	C	D=3.6/A/1000*B*C*44/12
Coal-fired power plant	$EF_{Coal,Adv}$	35.82%	25.8	1	0.9508
Gas-fired power plant	$EF_{Gas,Adv}$	47.67%	15.3	1	0.4237
Oil-fired power plant	$EF_{Oil,Adv}$	47.67%	21.1	1	0.5843

Table A9 shows the CO_2 emissions of CCPG in 2005.

Table A9. CO_2 emissions of CCPG in 2005

Fuel type	Unit	Jiangxi	Henan	Hubei	Hunan	Chongqing	Sichuan	Total	Emission factor
		A	B	C	D	E	F	G=A+…+F	H
Coal	10^4t	1869.29	7638.87	2732.15	1712.27	875.4	2999.77	17827.75	25.8
Cleaned coal	10^4t	0.02	0	0	0	0	0	0.02	25.8
Other washed coal	10^4t	0	138.12	0	0	89.99	0	228.11	25.8
Coke	10^4t	0	25.95	0	106.5	0	0	132.45	25.8
Sub-total									
Crude oil	10^4t	0	0.82	0.36	0	0	0	1.18	20
Gasoline	10^4t	0	0.02	0	0	0.02	0	0.04	18.9
Kerosene	10^4t	0	0	0	0	0	0	0	19.6
Diesel	10^4t	1.3	3.03	2.39	1.39	1.38	0	9.49	20.2
Fuel oil	10^4t	0.64	0.29	3.15	1.68	0.89	2.22	8.87	21.1
Other petroleum products	10^4t	0	0	0	0	0	0	0	20
Sub-total									
Natural gas	10^8m^3	0	0	0	0	0	30	30	15.3
Coke oven gas	10^8m^3	0	0	11.5	0	3.6	0	15.1	12.1
other coke gas	10^8m^3	0	102	0	0	31.2	0	133.2	12.1
LPG	10^4t	0	0	0	0	0	0	0	17.2
Refinery gas	10^4t	0.71	3.41	1.76	0.78			6.66	18.2
Sub-total									
Total									

Data sources: China Energy Statistical Yearbook 2006 Edition.

Calculate with data provided in Table A9 and formula (4)~(6) in section B.6.1, the value for l_{Coal} is 99.47%, the value for l_{Oil} is 0.17% and the value for l_{Gas} is 0.36%.

Based on Table A8 and formula (7) in section B.6.1, the emission factor for thermal power is:
$EF_{Thermal} = l_{Coal} \times EF_{Coal,Adv} + l_{Oil} \times EF_{Oil,Adv} + l_{Gas} \times EF_{Gas,Adv}$ =0.9482 tCO_2e/MWh.

Table A10~A12 show the installed capacity of CCPG in 2005, 2003and 2002 and Table A13 shows the calculation of BM emission factor of CCPG.

Table A10. Installed capacity of CCPG in 2005

	Jiangxi	Henan	Hubei	Huanan	Chongqiong	Sichuan	Total
Thermal power (MW)	5906	26267.8	9526.3	7211.6	3759.5	7496	60167.2
Hydro power (MW)	3019	2539.9	8088.9	7905.1	1892.7	14959.6	38405.2
Nuclear power (MW)	0	0	0	0	0	0	0

Wind power and Other (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 Edition.

Table A11. Installed capacity of CCPG in 2003

	Jiangxi	**Henan**	**Hubei**	**Huanan**	**Chongqiong**	**Sichuan**	**Total**
Thermal power (MW)	5407.8	17635.5	8173.3	6446.7	3126.2	6104	46893.5
Hydro power (MW)	2307.4	2438	7337.2	6603.1	1329.8	12341.5	32357
Nuclear power (MW)	0	0	0	0	0	0	0
Wind power and Other (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 Edition.

Table A12. Installed capacity of CCPG in 2002

	Jiangxi	Henan	Hubei	Huanan	Chongqiong	Sichuan	Total
Thermal power (MW)	5128.8	15904.5	8147.8	4975.6	3004.5	6142	43303.2
Hydro power (MW)	2197.4	2438	7213.9	6135.3	1195.5	11854.6	31034.7
Nuclear power (MW)	0	0	0	0	0	0	0
Wind power and Other (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 Edition.

Table A13. Calculation of BM emission factor of CCPG

	Installed capacity in 2002	Installed capacity in 2003	Installed capacity in 2005	Capacity additions during 2002-2005	Share in total capacity additions
	A	**B**	**C**	**D=C-A**	
Thermal power(MW)	43303.2	46893.5	60167.2	16864	**69.52%**
Hydro power(MW)	31034.7	32357	38405.2	7370.5	30.38%
Nuclear power(MW)	0	0	0	0	0.00%
Wind power (MW)	0	0	24	24	0.10%
Total(MW)	**74337.9**	**79250.5**	**98596.4**	**24258.5**	**100%**
Proportion to the installed capacity in 2005	75.40%	80.38%	100.00%		

As shown in Table A13, the proportion of capacity additions during 2002~2005 to the total installed capacity in 2005 is 24.6% (1-75.4%), which is the most close to 20%, therefore year 2002 is determined as the reference year for BM emission factor calculation. Among the capacity additions, the thermal power share is 69.52% (16864/24258.5).

Based on Table A13 and formula (8) in section B.6.1, calculate the BM emission factor of ECPG as:

$$EF_{BM,y} = \frac{CAP_{Thermal}}{CAP_{Total}} \times EF_{Thermal} = 0.6952 \times 0.9482 = 0.6592 \ tCO_2e/MWh.$$

Annex 4

MONITORING INFORMATION

Please refer to section B.7. No need to provide more information here.