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

CONTENTS

Annexes

SECTION A. General description of small-scale project activity

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

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Title of the project activity: China Hunan Yuzitang Small Hydropower Project
Document version: 04
Version 01 is for GSP, 30/09/2007;
Version 02 is submitted to Host DNA for approval application, 14/11/2007;
Version 03 is submitted to DOE for technical review, 16/06/2008;
Version 04 is submitted to EB for request for review, 19/12/2008
Date of completion: 12/19/2008

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

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China Hunan Yuzitang Small Hydropower Project (hereinafter referred as *the Project*) is a diversion type power plant with total installed capacity of 9.6 MW, which consists of 3×3200kW turbines & generators. The project locates on Gongxi brook, the branch of Yuanshui River, and within Dongkou County, Shaoyang City, Hunan Province. According to the Preliminary Design Report of the project, the annual electricity generated is estimated to be 28,100MWh after all the turbines & generators are put into operation in October, 2007. And thus the net annual generation delivered to the grid can reach maximum 28,100MWh [1]. The electricity will be transmitted to the Chalu Substation and supply the Central China Power Grid (CCPG) by the 110kV×4km high-voltage transmission lines.

The project owner is used to be *Shaoyang Triumph Billion Yuzitang (International) Power station Development Ltd., Co.*[2], which is an entity registered in Hongkong, China. In July 2007, more than half of its equity is bought by Chinese domestic investors, and the project owner turned to be a domestic company. The owner of the company registered the company in the local business administration authority, and changed the name of the company as *Shaoyang Triumph Billion Yuzitang Power station Development Ltd., Co*.

The Project activity will achieve greenhouse gas (GHG) emission reductions by avoiding GHG emissions from the electricity generation of those fossil fuel-fired power plants in CCPG, and the CCPG is dominated by fossil fuel-fired power plants. It is evaluated that the annual emission reductions will be 27,398 tCO_2e during the first crediting period.

The project will bring the community with positive impacts in the social, economic, and environmental aspects:

1. The project would mitigate the global warming trend by indirectly reducing the GHG emissions from dominated fossil fuel-fired power plants in CCPG;
2. The district where the project is located in is facing the problem of electricity shortage [3], especially in Nuoxi Yaozu Town. The project can release the conflict situation of electricity demand and supply, and improve the living standard of the local people;
3. The project is located in the poor minority area. The project will improve the infrastructure

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[1] The Preliminary Design Report of Yuzitang hydropower project, Hydro & Water Design Institute of Loudi City, Hunan, April 2004

[2] Business licence of project owner, 22 March 2004

[3] Page 6 & 7 of Preliminary Design Report of Yuzitang hydropower project

conditions, provide short-term job opportunities to the local people [4] and create 10 long-term positions[5], relieve the poverty of the region and make contribution to the sustainable development of local social-economy.

The brief history line of the project is summarized as follows:

Time(D/M/Y)	**Progress of project**	**Relevant document**
04/2004	Preliminary Design Report (PDR) completed	Loudi Hydropower Design and Investigation Institute, PDR
04/05/2004	Director Board (DB) meeting – Introduction of CDM implementation concept	Shaoyang Triumph Billion Yuzitang Power station Development Ltd., Co. (STBY), DB meeting minutes
12/06/2004	DB meeting – Decided to apply for CDM project registration	STBY, DB meeting minutes
08/07/2004	Reached CDM development agreement with the local consultant (namely Hunan Science & Technology Information Research Institute (HNSTI))	STBY & HNSTI, Letter of Intent (LoI) on CDM project development
05/07/2005	HNSTI submitted the application to establish a CDM center	HNSTI, Application letter for establishment of Hunan Province CDM Service Center (HNCDM) (Xianigkexin [2005] No.15)
20/07/2005	Obtained approval from the Head of Hunan Provincial Seicence & Technology Bureau on establishment of HNCDM	Hunan Provincial Science & Technology Bureau, Hand – written approval for establishment of HNCDM
19/07/2004	With consideration of CDM income to the project, the bank (Industrial & Commercial Bank of China (ICBC) – Shaoyang Branch) expressed the preliminary loan approval and further submission to Provincial Branch for endorsement	ICBC (Shaoyang Branch), LoI for loan approval
16/08/2004	Obtained project construction approval (Project starting date)	Shaoyang Municipal WRB, Approval of construction commencement
02/09/2004	DB meeting – Decided on establishment of CDM working group & CDM implementation	STBY, DB meeting minutes
05/11/2004	Obtained bank loan approval from ICBC (Dongkou Branch)	ICBC (Dongkou Branch) approval (Gongyinxiangdaishen [2004] No.131)
05/07/2005	Obtained approval from the Head of Hunan Provincial Seicence & Technology Bureau on establishment of Hunan Province CDM Service Center (HNCDM)	Hunan Provincial Science & Technology Bureau, Hand – written approval for establishment of HNCDM
09/11/2005	Establishment of HNCDM.	Ministry of Science and Technology of P. R. China (MOST), online announcement on establishment of

[4] Table 8.6-1 in Page 198 of PDR shows that the project construction consumes 237900 man-day in construction period

[5] Page 16 of Preliminary Design Report of Yuzitang hydropower project

		HNCDM http://www.most.gov.cn/dfkjgznew/200512/t20051208_26678.htm
18/08/2006	Signed CDM consultant service contract with HNCDM	STBY & HNCDM, CDM service contract
29/09/2006	Sign the LoI with carbon buyer (i.e. Carbon Asset Management Sweden nAB (CAM))	STBY & CAM, LoI on CER purchase
15/03/2007	Internal discussion within CAM on Emission Reductions Purchase Agreement (ERPA) negotiation	Internal email communication of CAM
21/07/2007	DB meeting – Decided to change the company name & capital structure so as to become a Chinese-owned company with 53.9% share of domestic capital (fulfilling requirements of Chinese DNA to issue host country approval)	STBY, DB meeting minutes
15/10/2007	Confirmation with Tuv Rheinland (TUVR) on DOE validation service	Email communication between CAM & TUVR
21/10/2007-19/11/2007	The proposed project starts to be globally published in TUVR's & UNFCCC's websites	UNFCCC's CDM website: http://cdm.unfccc.int/Projects/Validation/DB/ACXPC3NVIAHGMQJ2X63UYRX9VZFTL2/view.html TÜVR's website: http://www.tuvdotcom.com/pi/web/TuvdotcomIdSearchResults.xml?TUVdotCOMID=9105043936&LanguageSelected=en-us&strUserId=&strUrlId=3&strLevel=-1
14/12/2007	Draft validation report issued by TUVR	Draft validation report
29/01/2008	Swedish Letter of Approval (LoA) received	Swedish Energy Agency
March 2008	Chinese LoA received	NDRC
12/08/2008	Final validation report issued by TUVR	Final validation report

A.3. Project participants:

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Name of Party involved (*) ((host) indicates a host Party)	Private and/or public entity(ies) project participants (*) (as applicable)	Kindly indicate if the Party involved wishes to be considered as project participant (Yes/No)
P. R. China (host)	Shaoyang Triumph Billion Yuzitang Power station Development Ltd., Co.	No

Sweden	Carbon Asset Management Sweden AB	No

The details information for both participants is available 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):

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People's Republic of China

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

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Hunan Province

A.4.1.3. City/Town/Community etc:

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Nuoxi Town / Dongkou County / Shaoyang City

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 the Nuoxi Town, Dongkou County, Shaoyang City, Hunan Province, P. R. China. It is 80km away from the Dongkou County Town, and is one of cascade development hydropower stations on Gongxi brook, which is a branch of Yuanshui River. The geographical coordinates of the project site is: 27°03′15″ N 110°11′26″ E. Figure 1 and 2 shows the location of the proposed project activity in satellite map.

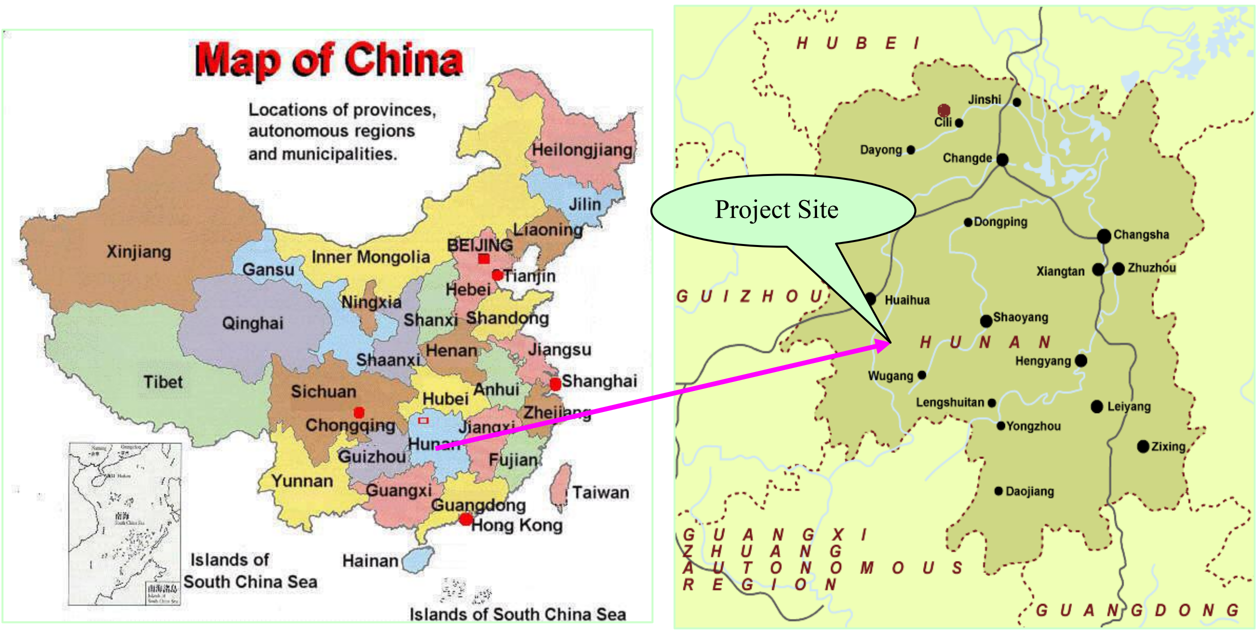

Figure 1 the location of the project

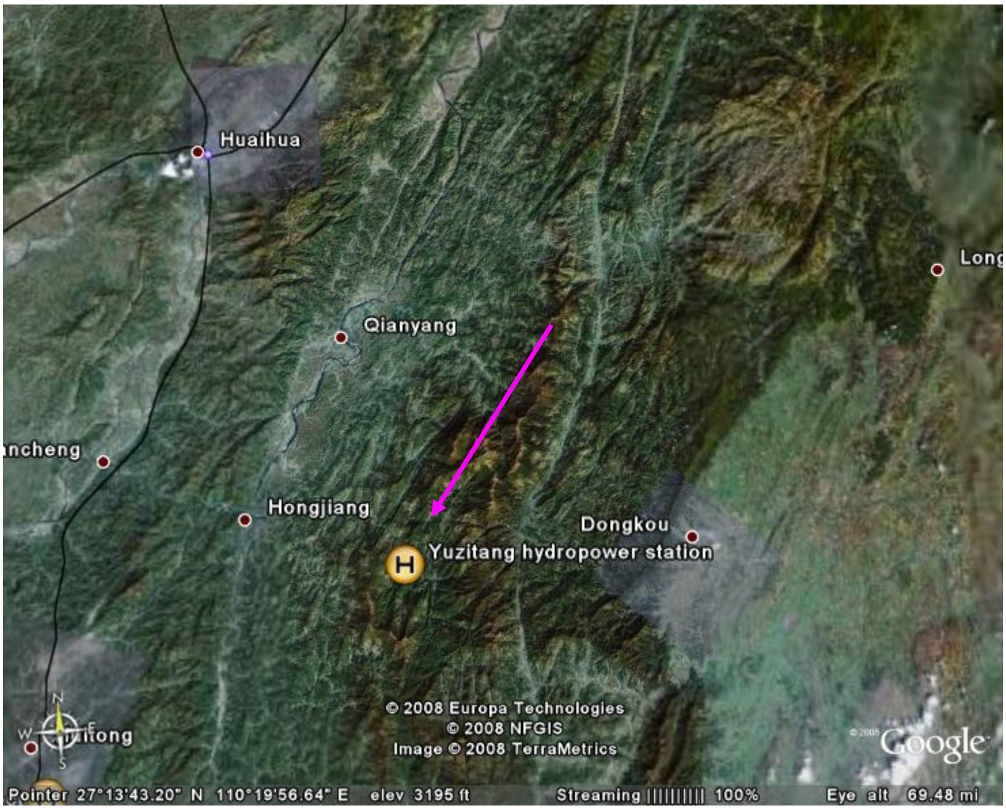

Figure 2 the project location in Google Earth

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

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1. Type and category(ies) of the small-scale project activity

The capacity of the proposed project is 9.6 MW, within the threshold capacity of 15 MW; the project activity can be regarded as a small scale CDM project activity and fit the simplified modalities and procedures of UNFCCC. The project activity utilizes water resources for power generation, thus the project type is renewable energy. According to the small-scale CDM modalities, the project type and category are classified as follows:

Type Ⅰ——Renewable Energy Projects

Category I.D. ——Grid Connected Renewable Electricity Generation

2. Technologies applied on the small-scale project activity

The project is a diversion type power plant. The main buildings consist of diversion dams (Chalu diversion dam and Anshunhe diversion dam), scouring gate, diversion cave, a frontal pressure pool and penstock, powerhouse, and step-up substation etc. There are three water turbine & generators installed in the powerhouse, the capacity of each is 3.2MW, and the total installed capacity is 9.6MW. The annual operation hour is 2927 h [6], and thus the annual power generation is 28,100MWh [7].

When the project is operating, the water is conducted running through the dam and hydropower station to

[6] 9.6MW × 2927 h = 28,100 MWh

[7] Page 2 of Preliminary Design Report of Yuzitang hydropower project, when the whole project (Phase 1 & 2) is completed, the annual power generation is 28,100 MWh

rotate the turbine to generate electricity, and the tail water will flow back to the river. Therefore, the The project is connected to the Chalu substation with 110kV×4km transmission lines. Table 1 shows the key technical parameters and data of the project.

Table 1 key technical parameters and data of the project [8]

Installed capacity（MW）			9.6
Annual electricity delivered to grid（MWh）			28,100
Averaged water flow rate			$5.09m^3/s$
Main building	Chalu diversion dam		Dam height: 13m Dam width: 62m
	Anshunhe diversion dam		Dam height: 12m Dam width: 16.5m
	Diversion cave	Banpo cave	Length: 1950m [9]
		Yanggongping cave	Length: 1098m
Equipment	Penstock		Maximum water head: 60.7m Rated water head (Design): 59.0m Minimum water head: 50.4m
	Hydro Turbine	Type	HLA551-WJ-82
		Manufacturer	Hangzhou Chengde Electric Factory
		Quantity	3 unit
		Rated power	3333kW
		Rated rotation	750r/min
	Generator	Type	SFW3200-8/1730
		Manufacturer	Hangzhou Chengde Electric Factory
		Quantity	3 unit
		Reated power	3200 kW
		Rated rotation	750r/min
		Power factor	0.8
Main transformer	Type		SF9-12500/110
Transmission lines			110kV×4km

Before the project enter into operation, all staff should receive appropriate training program, and for some specific positions, the staff should be qualified by local relevant authority.

The project owner compiled the *Yuzitang Hydropower Station Management Handbook*, which prescribes that, the maintenance activities contains regular inspection, repairs after accidence, annual maintenance, heavy repair of key facilities etc., the activities are up to the practical demands.

3. Environmentally safe technology:
The technologies applied in the proposed project are environmentally friendly, and shall not be harmful to the ecosystem.

4. Technology transfer:

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[8] The parameters and data are collected from Project Particulars Table (Part 0) from the Preliminary Design Report

[9] The length parameter of diversion cave collected from Paragraph 4 & 6 of part 5.4 in page 107 of PDR

All the main equipments, such as the turbines and electricity generators, are manufactured in the host country. There is no technology import from aboard in the project activity.

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

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The first crediting period of the project activity is 7 years, which is from November 1st 2008 to October 31st 2015. During the period, the total estimated emission reductions are 191,786 t CO_2e. The amount of annual and total emission reductions are explained in the following table 2:

Table 2 Estimation of emission reductions during crediting period

Years	Annual estimation of emission reductions in (tCO_2e)
2008.11—2009.10	27,398
2009.11—2010.10	27,398
2010.11—2011.10	27,398
2011.11—2012.10	27,398
2012.11—2013.10	27,398
2013.11—2014.10	27,398
2014.11—2015.10	27,398
Total estimated reductions (tonnes of CO_2e)	191,786
Total number of crediting years	7
Annual average over the crediting period of estimated reductions (tonnes of CO_2 e)	27,398

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

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

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

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According to the Appendix C of the Simplified Modalities and Procedures for small-scale CDM project activities, the project is not a debundled component of a larger project activity because there is not a registered small-scale activity or an application to register another small-scale CDM activity:

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

Hence, the project is eligible as a small-scale CDM project and can use 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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Title of the approved baseline and monitoring methodology: AMS—I.D Renewable electricity generation for a grid (Version 12, 10 August, 2007).
It can be found from the following website:
http://cdm.unfccc.int/UserManagement/FileStorage/CDMWF_AM_LPQNF2IC0HM1LAZCQGJPWLSGCP5BB8

Title of the methodology to calculate the emission factor: ACM0002-Consolidated baseline methodology for grid-connected electricity generation from renewable sources (Version 06, 19 May 2006).
It can be found from the following website:
http://cdm.unfccc.int/UserManagement/FileStorage/CDMWF_AM_BW759ID58ST5YEEV6WUCN5744MN763

Reference: Appendix B of the simplified modalities and procedures for small scale CDM project activities, version 06, 28 November 2005
http://cdm.unfccc.int/Reference/COPMOP/08a01.pdf#page=43

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

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1. The project is a diversion type hydropower plant, designed to make use of the renewable water resources to generate electricity, the total installed capacity is 9.6MW, lower than the threshold of 15MW for small scale hydropower projects;
2. the project activity doesn't involve in switching from fossil fuels to renewable energy at the site of the project activity;
3. The geographic and system boundaries for the relevant electricity grid can be clearly identified and information on the characteristics of the grid is available.

Therefore the methodology AMS—I.D. and ACM0002 are applicable to the project.

B.3. Description of the project boundary:

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According to methodology AMS—I.D, the project boundary encompasses the physical, geographical site of the renewable generation sources. The generated electricity of the project will be delivered to CCPG, which includes Henan Province, Hubei Province, Hunan Province, Jiangxi Province, Sichuan Province and Chongqing Municipality Power Grid [10].

B.4. Description of baseline and its development:

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In this part, the project developer identified all the potential substituted scenarios as follows:

Scenario 1 — The project activity not undertaken as CDM project activity.

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[10] Chinese DNA's Guideline of emission factors of Chinese grids, published in Aug. 9th, 2007
http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File1364.pdf

This scenario is to implement the project activity but not undertake it as CDM project activity. The scenario don't face any barrier from national or local laws and regulations, and there is no technical or resource obstacle for project owner to implement the project construction and operation. The potential financial barrier needs further assessment for justification, and thus would be discussed in the part B.5.

Therefore, the scenario 1 is a possible baseline scenario.

Scenario 2 — Construct a fossil fuel-fired power plant with equivalent annual electricity generation, connected to the grids.

This scenario is to construct a fossil fuel-fired power plant with equivalent annual electricity generation. Because the annual utilization hour of the fossil fuel plant is 5,633 [11], which is larger than the annual utilization hour of hydro plant. Therefore, the installed capacity of the fossil fuel plants with equivalent annual electricity generation as proposed project will be smaller than 9.6MW.

According to the current laws and regulations of China, to build such a small capacity (less than 135MW) coal-fired power plant in the district covered by large-scale power grids is forbidden [12]. Thus, it is not feasible to construct a fossil fuel-fired power plant as alternative.

Therefore, the scenario 2 can not be a possible baseline scenario either.

Scenario 3 – Construct a renewable power plant with equivalent annual electricity generation

Besides hydropower resources, the wind power, solar PV, geothermal and biomass are the possible grid-connected renewable energy technologies that could be applied in China.

However, biomass power generation technology is still in the demonstration phase and can bring only poor economic benefits without significant support from the national/regional policies. The official report summarizes that the biomass power generation industry in China faces difficulties of unavailability of inexpensive technologies and equipments, much higher cost than fossil fuel, lacking of appropriate long-term supporting polices, and in need of diversified & effective investment approaches etc.[13]

Due to the technology development status, rare natural resources or high investment cost for power generation, the solar PV [14], geothermal [15] and wind farm [16] with the similar installed capacity as the proposed project are alternatives far from being attractive investment in Dongkou county, and thereby there is no such renewable power plant has been or plan to be build.

Therefore, the scenario 3 can not be a possible baseline scenario either.

Scenario 4 – Get equivalent electricity supply from the CCPG annually

The scenario is permitted by the national and local laws and regulations, and there is no obstacle in

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[11] *National Statistics Bulletin of Power Industry in 2006*, China Electricity Council

[12] *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, The State Electricity Regulatory Commission

[13] Page 13 of text, *Development Plan of Agricultural Biomass Power Generation Industrial(2007-2015)*, National Department of Agricultural, May 2007, link to http://www.agri.gov.cn/xxlb/P020070705456007024820.doc

[14] *China solar energy distribution*, Energy dictionary, Page 392

[15] http://www.wesharer.com/html/xuejie/20070905/1059.html, which states that there is only 29.17MW geothermal power plant installed in China from 1991, in which only Tibetan Yangbajin geothermal power plant has 25.18MW installed capacity and larger than 2MW

[16] *China wind energy distribution*, Energy dictionary, Page 413

economical, technical or any other aspects to realize this scenario. Meanwhile, the CCPG is increasing its installed capacity through expansion of existing power plants and constructing new power plants for decades, and the CCPG is a fossil fuel-fired dominant power grid, that is, a majority of the power provided by CCPG is generated by the fossil fuel-fired power plants.

Therefore, this scenario is a possible baseline scenario.

As a conclusion of the above assessment, the possible scenarios of the project are:
Scenario 1 — The project activity not undertaken as CDM project activity.
Scenario 4 — Get equivalent electricity supply from the CCPG annually.
The part B.5 is about to employ the additionality assessment and demonstration steps to determine the only reasonable and credible baseline scenario.

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

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Assessment and demonstration of additionality

According to Appendix B of the simplified modalities and procedures for small scale CDM project activities, the simplified model is given. The project must face at least one discriminating barrier that it self can't overcome.See it as follows.

- Investment barrier
- Technical barrier
- Practice barrier
- Other barrier

Investment Barrier

The barrier met by the project is mainly on investment. And there are three analysis methods recommended to conduct investment analysis, including simple cost analysis, investment comparison analysis and benchmark analysis.

The simple cost analysis is not applicable to the project because the project activity generates the revenue from the sales of generated electricity. And the investment comparison analysis is not applicable because the baseline scenario of the proposed project is to purchase electricity from the grids, which is irrelevant for the project owner to make business decision. According to *the Economic Assessment Rules of Small Hydropower Project SL16-95*, the Article 4.3 states "The project is financially feasible only when the IRR is above or equal to benchmark IRR. The benchmark IRR for small scale hydropower projects is 10%." and the benchmark evaluation method is widely applied in Chinese small hydropower industry [17]; therefore, the benchmark analysis is applicable for the proposed project.

The data related to calculating IRR are listed in Table 3:

[17] Link to http://www.cws.net.cn/guifan/bz/SL16-95/

Table 3 Basic Parameters of the Financial Indicators Calculation

Project	Unit	Value	Source
Installed capacity	MW	9.6	PDR
Total investment	Million RMB	60.97	PDR
Annual net electricity to the grid	MWh/yr	28,100	PDR
Electricity tariff (including value-added tax)	RMB￥/kWh	0.278	PDR, which is in line with Dongjifazi[2004]No.102
Loan rate	%	5.76	PDR
Value-added tax	%	6	PDR, which is in line with Caishuizi[1994]No.004 [18]
Construction surtax	%	1	Guofa[1985]No.19
Education surtax	%	3	State Council, No.448
Income tax	%	33	PDR, which is in line with document of State Council, No.137 [19]
Project life cycle (including construction period)	year	22	SL16-95
Annual operational cost	Million RMB	1.20	Calculated based on basic assumptions in PDR and the relevant official documents referred above

The comparative IRR table for the project with and without CER incomes is demonstrated in Table 4 as below:

Table 4 Comparative table of the financial indicators with and without CERs sale revenue

Item	Unit	Project IRR	With CERs income	Benchmark IRR [20]
Internal rate of return	%	6.62	11.30	10
Net Present Value	Million RMB	-11.74	4.91	0

The IRR is less than the benchmark without CERs sale revenues, and thus the project isn't attractive to investors; meanwhile the IRR can be improved to exceed the benchmark with CERs revenues, and then be attractive to investors. Therefore, the CERs sale revenues will enable the project to overcome the investment barrier.

Sensitive analysis

The purpose of the sensitivity analysis is to examine how is the uncertainty of single variable such as total investment, net power output, electricity tariff, and annual O&M cost impact on the IRR, so as to check the credibility of the results obtained in above. The assumption of factors' variation set in the analysis

[18] Link to http://www.js-n-tax.gov.cn/Page/StatuteDetail.aspx?StatuteID=1269

[19] Temporary bill on Income tax of People's Republic of China, State Council No.137 document, 26th Nov. 1993

[20] Link to http://www.cws.net.cn/guifan/bz/SL16-95/

process is increasing/decreasing 10% from the original level of factors, and the set of variation assumptions is employed in the PDR of the project.

The outcomes of sensitivity analysis shown in Table 5 as follows:

Table 5 Sensitivity Analysis results

IRR / Variation / Factor	−10%	0%	+10%
Total investment	7.93%	6.62%	5.51%
Net power output	5.44%	6.62%	7.75%
Electricity tariff	5.44%	6.62%	7.75%
Annual O&M cost	6.88%	6.62%	6.35%

Within the reasonable variation scope of the total investment, net power output, electricity tariff and annual O&M cost, all the calculated IRR results beneath the benchmark IRR, thus the project keeps economically unfeasible all the while. Moreover, a further practical assessment is done to discuss the theoretical probability of the factors' variation exceed the benchmark IRR set in table 5. The assessment is summarized in the following table 6.

Table 6 Variation possibility assessment of critical factors

variation range & assessment / Factor	10.00%	Practical assessments of the critical factors
Total investment	−22.8%	When total investment of project decrease, the IRR of project moves up. The total investment of project is mainly subject to the industrial products' price indices, and according to the chart of "Ex-factory Price Indices of Industrial Products", which is published by the National Bureau of Statistics of China in 2006 (http://www.stats.gov.cn/tjsj/ndsj/2006/html/I0913C.HTM), the item of Total Industry Products increased 9.38% from 1998 to 2005, which is equal to an annual 1.29%increase rate. And thus, as the recent published statistics, it is unlikely for the total investment of project to decrease more than 20%.

Tariff	+30.8%	When the tariff increase, the IRR of project moves up. That means that only when the electricity tariff achieves 0.363 RMB Yuan, the project IRR would overtop the benchmark of 10%. But it is impossible due to the topmost tariff for small scale hydropower project is 0.315 RMB Yuan and it would be stable[21], which is according to the document form Hunan Price Bureau[22]. And thus, the 30.8% increase of project's tariff shall not occur.
Annual operation hour	+30.8%	When the annual operation hour increase, the IRR of project moves up. Except the determined design proposal of the project, the variation of annual operation hour is mainly subject to the water resources of project site, and also be the outcome of the year's rainfall. It is impossible for the annual operation hour of project to increase more than 30%, because the annual operation time was speculated according to the hydrology documents of more than 40 years (1959-2000)[23], and it is obtained from scientific approaches. And thus, the 30.8% increase of project's annual operation hour shall not occur, or occur by a great climate change.
Annual O&M cost	When the annual O&M cost increase, the IRR of project moves up. The IRR can not reach benchmark even if the annual O&M cost is zero.	

From the above assessment, it is concluded that, the project IRR is lower than the industrial benchmark, and the financial unattractiveness result is robust to the sensitive analysis.

The impact brought by CDM

Due to the weak financial indicator in Preliminary Design Report (PDR), the project owner decided to apply for CDM in shareholders' meeting on 4 May 2004.

On 8 July 2004, the project owner signed the LoI of CDM Project Development for CDM development and application with Hunan Science & Technology Information Research Institute (HNSTI), which is a public service unit belonged to Science & Technology Bureau of Hunan Province. Science & Technology Bureau is one of two CDM administration authority in China, another authority is Development & Reform Commission.

On 19 July 2004, the Industrial & Commercial Bank of China (ICBC) Shaoyang Branch agreed to submit the bank loan application from project owner to ICBC Hunan Provincial Branch for approval since CDM can improve the financial indicators for the project.

On 16 August 2004, Shaoyang Bureau of Water Resources issued the construction permission for the

[21] http://www.ndrc.gov.cn/zcfb/zcfbtz/zcfbtz2005/t20050613_6670.htm

[22] http://www.shp.com.cn/news/info/2007/8/6/1410010238.html

[23] PDR of Yuzitang Hydropower project, Page 25-31, April 2004

project. Thus the data is defined as the starting date of the project. However, the bank loan was only approved on 5 November 2004 and under the condition that CDM money was sought).

From the milestones and key events above, it can be concluded that CDM incentives were essential for project owner to go ahead with the implementation of the project activity.

In the following section, we'll explain why the CDM development is delayed for such a long time. The CDM development was entrusted to HNSTI, including PDD development, buyer search and so on. The responsible department for CDM in HNSTI was Science Policy & Strategy Research Department. However, the focus of job duty of Science Policy & Strategy Research Department is on soft science research and CDM research rather than CDM development. The Science Policy & Strategy Research Department lacked of English professionals and PDD writers. The job responsibility regarding CDM for Science Policy & Strategy Research Department was to visit the project sites and identify projects. Due to the huge pressure from project owners and urgent demand of special CDM development team, the HNSTI submitted the "Application Regarding Organizing Hunan Province CDM Project Service Center (HNCDM)" to Science & Technology Bureau of Hunan Province on 5 July 2005 and the application was approved by the Head officer of Science & Technology Bureau of Hunan Province on 20 July 2005. The HNCDM was officially established on 9 November 2005.

The HNCDM were mainly depended on professors from universities to develop PDD at early stage due to it took a little long time to recruit capable people for PDD development. The HNCDM sent first batch of PINs to Ministry of Science & Technology and Tsinghua University for buyer seeking at the end of 2005 and then sent first 4 PDDs to them for assessing. During 2005 and first half year of 2006, the staffs from HNSTI and HNCDM attended many CDM Training Courses held in China. One of the training programs is the "Sino-Canada CDM cooperation program", which started from October 2005 and concluded in April 2006, the capacity building program systematically trained the invited developers of HNCDM to own the capacity of developing CDM projects[24].

The project owner of Yuzitang small hydropower project signed the Letter of Intent (LoI) of Emission Reductions Purchase with Carbon Asset Management Sweden AB on 29th September 2006. The project is a small scale hydropower plant, it took long time for negotiation with buyer. Due to time is limited, it is hard to find all the written communication about ERPA negotiation. We present email regarding CERs price negotiation in March 2007 to prove it.

After signing of LoI of Emission Reduction Purchase with foreign buyer, the project still can not be developed immediately since the project is invested by Hong Kong based company, by when there is no clear CDM application policy for Hongkong based company according to Chinese Regulation on CDM[25]. Due to the key importance of getting CDM support to refine the investment nature of the Project, the project owner finally decided to change the company's equity structure to comply with the Chinese regulation on CDM. On 21st July 2007, the project owner held a board meeting and modified the Article of Association, it determines that the Hong Kong shareholders sold shares to domestic persons, which made the equity of company is controlled by domestic capital, and turn the company property to be eligible in applying CDM in China.

From above analysis, it is obvious that the delay of the CDM development was due to PDD development and because there was no clear CDM application policy for Hongkong based company. The financing of the project was achieved due to the CDM. The given explanation on delay of PDD development is

[24] http://www.most.gov.cn/dfkjgznew/200604/t20060410_30365.htm

[25] http://cdm.ccchina.gov.cn/web/NewsInfo.asp?NewsId=458

suitable and not unusual for the host country environment. It can be found from UNFCCC validation webpage, there are totally only around 170 projects submitted for validation and 125 projects approved by NDRC[26] until end of September 2006, by when the project signed LoI of Emission Reductions Purchase with Carbon Asset Management Sweden AB. The figure shows the PDD development is a bottleneck at that time.

Conclusion

From the above analysis, it is very clear that the project is not financially attractive without CER revenues and can not be implemented with out CDM. The CDM was considered before the project starting date. The financing of the project was achieved due to the CDM. The given explanation on delay of PDD development is suitable and not unusual for the host country environment. Thus, the project is additional.

B.6. Emission reductions:

>>

B.6.1. Explanation of methodological choices:

>>

Project Emissions

As assessment in EIA of project, the new flooding area caused by the project is 49.1 mu (a Chinese area unit) [27], 1 mu is equal to 666.67 m^2, that is the new flooding area is about 32,733.5 m^2, while the total installed capacity of project is 9600kW, and the power density of project is PD=9600kW/32,733.5 m^2 =293W/ m^2.

According to the baseline methodology, when the project power density is greater than 10W/ m^2, it is unnecessary to calculate the project GHG emissions. Therefore, the project emissions PE = 0.

Baseline Emissions

According to baseline methodology ACM0002, the baseline emissions are the CO_2 emissions from the equivalent electricity generation in CCPG that are displaced by the project activity. So the baseline emissions by the project activity during a given year y is obtained as follow:

According to ACM0002, the project emission should be calculated as:

$$BE_y = EG_y \cdot EF_y \quad (2)$$

Where:

EG_y is electricity supplied by the project activity to the grid in year y, in MWh;

EF_y is baseline emission factor in year y, in tCO_2e/MWh.

According to baseline methodology ACM0002, the baseline emission factor (EF_y) is calculated as a Combined Margin (CM), which is consisting of the weighted average of Operating Margin (OM) emission factor and Build Margin (BM) factor by utilizing an ex-ante 3 years data vintage for the CCPG. The data used for calculation are from an official source (where available) and publicly available. The calculation processes are as follows:

Step 1. Calculating the Operating Margin emission factor （$EF_{OM,y}$）；

Step 2. Calculating the Build Margin emission factor （$EF_{BM,y}$）；

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[26] http://cdm.ccchina.gov.cn/english/NewsInfo.asp?NewsId=1206

[27] Page 39, part 2.5.1 of EIA report of project, Shaoyang Municipal Environmental Protection Institute

Step 3. Calculating the baseline emission factor （EF_y）.

Step 1: Calculate the Operating Margin emission factor(s) ($EF_{OM,y}$)

According to baseline methodology ACM0002, there are four methods for calculating the $EF_{OM,y}$:

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

Method (c) should be the first methodological choice. However, this method requires the detailed dispatch data of the CCPG, which is confidential information and is not available to be obtained by public. Thus, method (c) is not applicable. Due to the same reasons, the method (b) is not applicable.

Method (a) can be used where low-cost/must run resources constitute less than 50% of total grid generation in: 1) average of the five most recent years, or 2) based on long-term normals for hydroelectricity production. The only low-cost/must run resource in CCPG is hydropower plants. It can be found from table 7 that installed capacity of hydropower plants constitute less than 50% of CCPG during year 2001 to 2005. Thus, method (a) is applicable to calculate $EF_{OM,y}$. And method (d) can only be used where low-cost/must run resources constitute more than 50% of total grid generation, therefore, method (d) is not applicable to calculate $EF_{OM,y}$.

Table 7 Electricity generation of low cost/must-run power plants in CCPG during year 2001～2005 [28]

Year	2001	2002	2003	2004	2005
Electricity generation of low cost/ must-run power plants (%)	36.76	35.95	34.43	38.37	38.56

According to baseline methodology ACM0002, the method (a) Simple OM is chosen for calculating the $EF_{OM,y}$. The $EF_{OM,y}$ is calculated by utilizing an *ex-ante* 3 years data vintage for CCPG, the formula as follow:

$$EF_{OM,simple,y} = \frac{\sum_{i,j} F_{i,j,y} \cdot COEF_{i,j}}{\sum_{j} GEN_{j,y}} \qquad (3)$$

Where:

$F_{i,j,y}$ is the amount of fuel *i* (in a mass or volume unit) consumed by relevant power sources *j* in year (s) *y*;
j refers to the power sources delivering electricity to the grid, not including low-operating cost and must-run power plants, and including imports to the grid;
$COEF_{i,j,y}$ 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 percent oxidation of the fuel in year (s) *y*; and
$GEN_{j,y}$ is the electricity (MWh) delivered to the grid by source *j*.
The CO_2 emission coefficient $COEF_i$ is obtained as:

$$COEF_i = NCV_i \cdot EF_{CO2,i} \cdot OXID_i \qquad (4)$$

Where:

[28] China Electric Power Yearbook 2002～2006

NCV_i is the net calorific value (energy content) per mass or volume unit of a fuel *i*;
$OXID_i$ is the the oxidation factor of the fuel;
$EF_{CO2,i}$ is the CO_2 emission factor per unit of energy of the fuel *i*.

There are net exports from the CCPG to other power grids, thus the imports are not taken into account.

$EF_{OM,y}$ is calculated according to the statistics information of recent 3 years (from 2002 to 2004), the data are the newest and available at the time of this PDD submission, the detailed calculation is shown in Annex 3.

Step 2: Calculating the Build Margin emission factor ($EF_{BM,y}$)
According to baseline methodology ACM0002, the Build Margin emission factor ($EF_{BM,y}$) is calculated by utilizing an *ex-ante* 3 years data vintage for CCPG, the formulae as follow:

$$EF_{BM,y} = \frac{\sum_{i,m} F_{i,m,y} \cdot COEF_{i,m}}{\sum_{m} GEN_{m,y}} \qquad (5)$$

Where：
$F_{i,m,y}$, $COEF_{i,m}$ and $GEN_{m,y}$ are analogous to the variables described for the simple OM method above for plants *m.*

Due to the difficulty of separating the coal-fired, gas-fired or oil-fired installed capacity from the total fuel-fired installed capacity, according to the approved deviation [29] by CDM EB, the $EF_{BM,y}$ will be calculated as:

1) Based on the most recent years energy balance of the CCPG, calculating the proportions of CO_2 emissions from the coal-fired, oil-fired and gas-fired power plants in total fuel-fired CO_2 emissions;

2) Based on the most advanced commercialized technologies which applied by the coal-fired, oil-fired and gas-fired power plants, calculating the fuel-fired emission factor of the CCPG;

3) Calculating the $EF_{BM,y}$ through fuel-fired emission factor times the weighted-average of fuel-fired installed capacity which is more close to 20% in the new capacity additions.

Sub-Step 2a: Calculating the percentages of CO_2 emissions from the coal-fired, gas-fired and oil-fired power plants in total fuel-fired CO_2 emissions

$$\lambda_{coal} = \frac{\sum_{i \in COAL,j} F_{i,j,y} \times COEF_{i,j}}{\sum_{i,j} F_{i,j,y} \times COEF_{i,j}} \quad \lambda_{Oil} = \frac{\sum_{i \in OIL,j} F_{i,j,y} \times COEF_{i,j}}{\sum_{i,j} F_{i,j,y} \times COEF_{i,j}} \quad \lambda_{Gas} = \frac{\sum_{i \in GAS,j} F_{i,j,y} \times COEF_{i,j}}{\sum_{i,j} F_{i,j,y} \times COEF_{i,j}} \qquad (6)$$

Where:

λ_{Gas}, λ_{Oil} and λ_{Coal} are respectively the percentages of CO_2 emissions from the gas-fired, oil-fired, coal-fired power plants in total fuel-fired CO_2 emissions;
$F_{i,j,y}$ is the amount of fuel *i* (tce) consumed by the power grid in year *y*;

[29] EB approved deviation for Methodologies AM0005 and AMS-I.D on 7 October 2005. link:

$COEF_{i,j}$ is the CO_2 emission coefficient (tCO_2/tce) of fuel *i*, taking into account the carbon content of the fuels used by the grid and the percent oxidation of the fuel in year *y*.

Sub-Step 2b: Calculating the fuel-fired emission factor ($EF_{Thermal}$)

$$EF_{Thermal} = \lambda_{Coal} \times EF_{coal,adv} + \lambda_{Oil} \times EF_{oil,adv} + \lambda_{Gas} \times EF_{gas,adv} \qquad (7)$$

Where:

$EF_{Thermal}$ is the fuel-fired emission factor;

$EF_{Coal,Adv}$, $EF_{Oil,Adv}$ and $EF_{Gas,Adv}$ are corresponding to the emission factors of coal, oil and gas, which are applied by the most advanced commercialized technologies.

Sub-Step 2c: Calculating the Build Margin (BM) emission factor ($EF_{BM,y}$)

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

Where:

$EF_{BM,y}$ is the Build Margin (BM) emission factor with advanced commercialized technologies for year *y*;

CAP_{Total} is the new capacity additions;

$CAP_{Thermal}$ is the new fuel-fired capacity additions;

$EF_{Thermal}$ is fuel-fired emission factor.

Step 3: Calculating the baseline emission factor (EF_y)

According to baseline methodology ACM0002, 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 ($EF_{BM,y}$):

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

Where:

The weighs w_{OM} and w_{BM}, by default, are 50% (i.e., w_{OM}= w_{BM}= 0.5), and $EF_{OM,y}$ and $EF_{BM,y}$ are calculated as described in Steps 1 and 2 above and are expressed in tCO_2e/MWh.

Leakage

There is neither energy generating equipment transfer from another activity nor existing equipment transfer to another activity exists in the project. Therefore, according to the methodology AMS-I.D, it is not needed to consider leakage of the project.

$$L_y = 0 \qquad (10)$$

Emission Reductions

The annual emission reduction (ER_y) of the bundle project is the difference between baseline emissions, project emissions and the emission due to leakage. The final GHG emission reduction is calculated as follows:

$$ER_y\ (tCO_2e/yr) = BE_y - PE_y - L_y \qquad (11)$$

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

>>

Data / Parameter:	NCV_i
Data unit:	kJ/t or kJ/m^3
Description:	The net calorific value (energy content) per mass or volume unit of fuel *i*
Source of data used:	*The China Energy Statistical Yearbook 2005*, Page 365, *General*

	Code Comprehensive Energy Consumption Calculation (GB2589-81)
Value applied:	See Annex 3 for details.
Justification of the choice of data or description of measurement methods and procedures actually applied :	Data used are from Chinese authorities.
Any comment:	Used in OM & BM calculation steps

Data / Parameter:	$OXID_i$
Data unit:	%
Description:	Oxidation rate of the fuel *i*
Source of data used:	*Revised 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 :	No specific local value available, adopt the IPCC default value.
Any comment:	Used in OM & BM calculation steps

Data / Parameter:	$F_{i,j,y}$
Data unit:	10^4 t, 10^7 m^3
Description:	The quantity of fuel *i* (in a mass or volume unit) consumed by the relevant power sources j in year(s) *y*
Source of data used:	*the China Energy Statistical Yearbook 2004-2006*
Value applied:	See Annex 3 for details.
Justification of the choice of data or description of measurement methods and procedures actually applied :	Data are collected from the published official statistics.
Any comment:	Used in OM & BM calculation steps

Data / Parameter:	PR_y
Data unit:	%
Description:	The internal power consumption of power plants in year(s) *y*
Source of data used:	*The China Electric Power Yearbook 2002-2006*
Value applied:	See Annex 3 for details.
Justification of the choice of data or description of measurement methods and procedures actually applied :	Data used are from Chinese authorities.

Any comment:	Used in OM calculation step

Data / Parameter:	$EF_{CO2,\,i}$
Data unit:	tC/TJ
Description:	The CO_2 emission factor per unit of fuel i
Source of data used:	*Revised 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 :	No specific local value available, adopt the IPCC default value.
Any comment:	Used in OM & BM calculation steps

Data / Parameter:	$GEN_{j,\,y}$
Data unit:	MWh
Description:	The electricity quantity generated to the power grid
Source of data used:	"The China Electric Power Yearbook 2002-2006"
Value applied:	See Annex 3 for details.
Justification of the choice of data or description of measurement methods and procedures actually applied :	Data are collected from the published official statistics.
Any comment:	Used in OM calculation steps

Data / Parameter:	$GENE_{best,coal,}$
Data unit:	Percentage
Description:	the efficiency of generating electricity by the optimized commercial coal-fired plants
Source of data used:	*the bulletin on the baseline emission factor of China district power grids*, published by the office of National Coordination Committee on Climate Change, 9th August 2007
Value applied:	35.82%
Justification of the choice of data or description of measurement methods and procedures actually applied:	The Country-specific value. Link to http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File1365.pdf
Any comment:	Used to calculate BM factor

Data / Parameter:	$GENE_{best,oil/gas}$
Data unit:	Percentage
Description:	the efficiency of generating electricity by the optimized commercial oil-fired and gas-fired plants

Source of data used:	*the bulletin on the baseline emission factor of China district power grids*, published by the office of National Coordination Committee on Climate Change, 9th August 2007
Value applied:	47.67%
Justification of the choice of data or description of measurement methods and procedures actually applied:	The Country-specific value. Link to http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File1365.pdf
Any comment:	Used to calculate BM factor

Data / Parameter:	$CAP_{i, y}$
Data unit:	MW
Description:	Installed capacities of hydropower and fuel-fired power of the CCPG during 2001-2005
Source of data used:	*the China Electric Power Yearbook 2002-2006*
Value applied:	See Annex 3 for details.
Justification of the choice of data or description of measurement methods and procedures actually applied :	Data used are from Chinese authorities.
Any comment:	Used in BM calculation steps

Data / Parameter:	Additional Flooded Area
Data unit:	m^2
Description:	New flooded area
Source of data used:	Shaoyang Municipal Environmental Protection Institute
Value applied:	32,733.5
Justification of the choice of data or description of measurement methods and procedures actually applied :	The data provided by Shaoyang Municipal Environmental Protection Institute is reliable and creditable.
Any comment:	/

B.6.3 Ex-ante calculation of emission reductions:

>>

Project emission

According to the part B6.1, the project emission is zero, therefore:

$$PE_y = 0$$

Baseline emission

As the discussion in Section B 6.1, the baseline emission factor i.e. the Combined Margin emission factor will be calculated as the average of EF_{OM} and EF_{BM} as Equation [12].

For CCPG, the Baseline Emission Factor is given as table 8:

Table 8 CM calculation for CCPG (tCO_2e/MWh)

OM	BM	CM
1.29086	0.65923	0.97504

Since the annual power supply to the grid from the Project is 28,100MWh, the annual baseline emission (BE_y) of the Project is calculated as follow:

$$BE_y = 28{,}100 MWh \times 0.97504\ tCO_2e\ /MWh = 27{,}398\ tCO_2\ e\ /yr$$

Leakage

As mentioned in Section B.6.1, $L_y = 0$

Emission Reductions

Since both the project emission and leakage of the Project are zero, the estimated CER per year for the Project is obtained from the follows:

$$ER_y = BE_y - PE_y - L_y = 27{,}398\ tCO_2e\ /yr$$

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

>>

The estimated project emission reductions in the first crediting period are listed in Table 9:

Table 9 . The ex-ante estimation of emission reductions

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)
2008.11—2009.10	0	27,398	0	27,398
2009.11—2010.10	0	27,398	0	27,398
2010.11—2011.10	0	27,398	0	27,398
2011.11—2012.10	0	27,398	0	27,398
2012.11—2013.10	0	27,398	0	27,398
2013.11—2014.10	0	27,398	0	27,398
2014.11—2015.10	0	27,398	0	27,398
Total estimated reduction (tonnes of CO_2e)	0	191,786	0	191,786
Number of crediting years(year)		7		
Annual average over the crediting period of estimated reductions (tonnes of CO_2e)		27,398		

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

>>

B.7.1 Data and parameters monitored:

>>

Data / Parameter:	***EGy***
Data unit:	MWh
Description:	Electricity Quantity to CCPG delivered by project
Source of data to be used:	Measured by the meter
Value of data	28,100MWh
Description of measurement methods and procedures to be applied:	The net generated electricity is the difference of the generated electricity exported to power grid and electricity imported from power grid. The imported electricity and exported electricity are monitored hourly through bidirectional Master Meter and will be recorded monthly. All the electronic and paper monitoring documents will be archived during the crediting period and two years after.
QA/QC procedures to be applied:	Net power supply data from power grid company and sales receipts will be used for double check of data. The meters will be calibrated in line with Chinese regulation. The accuracy of the Master Meter will be 0.5s or above.
Any comment:	With low uncertainty

B.7.2 Description of the monitoring plan:

>>

The aim of the monitoring plan is to make sure that the emission reduction quantity monitored and evaluated during the project activities' vintage is completed, consistent, clear and precise. The details of the plan are summarized as follows:

1. Monitoring subject

Due to the emission factor is determined by the ex-ante calculation, the only data need monitoring is the net electricity quantity delivered to the grid.

2. Operational and management structure

In order to insure the monitor plan works effectively and efficiently, the project owner has established the processing and managing structure as shown in Figure 3, which identified the relative staffs and institution for data collection and preservation. The staff of project owner would receive technical supports from the Hunan CDM project service centre.

The duty of each position summarized as follows:

General Manager is the responsible person for the monitoring plan, and helps the consultant to prepare the monitor reports and collecting the evidence materials, including the settlement sheet from grid company etc., and keeps close communication with related parties;
Engineer implements the monitoring plan accordingly, and be responsible for collecting, settling, and preserving the monitored data, and also supervise the daily implementation of operation teams and maintenance team;
Maintenance Team assures all the equipments and meters operate in normal status;
Operation Teams divided into three teams, every team implement the daily monitoring works in power station, keep watching and operating the computer based monitoring system, and write down the relevant data.

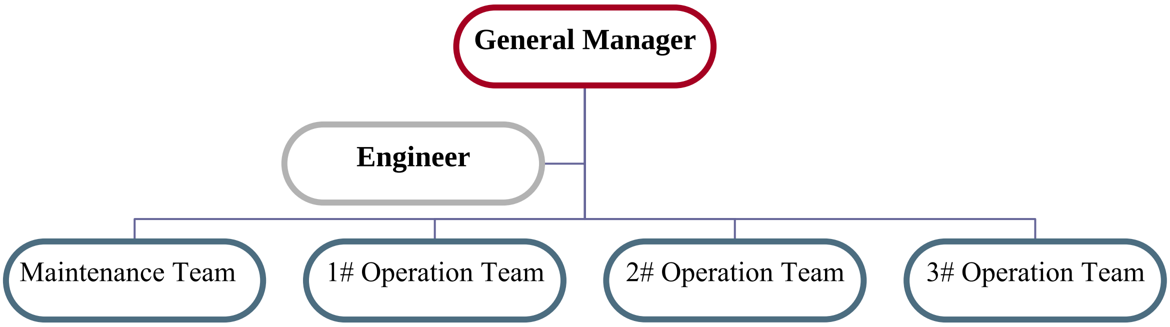

Figure 3 processing and management of project

3. Monitoring apparatus and instalment:

The Master Meter is installed at the connection point to power grid in step-up substation, and the ammeter is monitored and managed by the grid company, the readings of the Master Meter provide the direct evidence on power sales settlement with the project owner and the emissions reductions amount generated by the project.

The ammeters will be configured to meet the technology requirements of "Management Regulations for Power Metered Device Technology" (DL/T5137-2001) and the subsequent industrial standards. The ammeter installed at the connection point to the grid should reach 0.5S or above in accuracy degree. Ahead of the operation time, the apparatus for electricity quantity measurements should be examined and approved by the qualified calibration institution and the grid company, and then sealed when it in use.

4. Data monitoring and recording

During operation time, the project owner keeps watching the operation status of meters except the Master Meter, and the Master Meter is monitored by Grid Company. And when the meters operate in normal status, the detailed operation process listed bellow:
(1) The electricity imported and exported will be monitored hourly and recorded monthly through the Master Meter. The difference of exported and imported electricity is the net electricity generation.
(2) The designated staff of the grid company or project owner records the readings of Master Meter at connection point to grids, from which the designated staff can obtain and confirm the net electricity quantity delivered to grid.
(3) The staff fills the settlement sheet according to the readings, and the grid company will settle the power sales payment with project owner according to the sheet. And the project owner preserves the settlement records as proof.
(4) The project owner provides DOE verifiers with the readings record and the copies of power trade settlement sheets.

The principle of the processes is to guarantee the verification officers could obtain the actual records of monitored parameters.

5. Quality control

1) Meters calibration

The meters' periodic calibration should follow the national industrial standards in order to ensure the accuracy. After then the meter should be sealed. Any party is not allowed to dismantle or change it independently.

2) Data and information management

All monitored data should be archived through the crediting years and two years after, including the manual records, electronic data recorded by computer system and the power settlement records. The data is the basis materials for compiling emission reductions monitoring report.

6. Training program

The project owner should train all the relative staff, and the training program contains the CDM knowledge, the operational regulations, the quality control (QC) standard flows, the recording requirements and the management rules.

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

>>

Final Date of completion of the application of the baseline and monitoring methodology

26/02/2008 (DD/MM/YYYY)

Name of person/entity of completion of the application of the baseline and monitoring methodology

Name: Feng LI
Address: Hunan CDM Project Service Center, No 59 Bayi Road, Changsha, Hunan, China
Tel: +86-731-4586955-818
Email: fligter@gmail.com

Above individuals / entities determined the baseline are not as project participants.

SECTION C. Duration of the project activity / crediting period

C.1 Duration of the project activity:

C.1.1. Starting date of the project activity:

>>
16/08/2004 (Issuing date of project construction approval)

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

>>
32 years (construction period included)

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:

>>
01/11/2008 or the date of registration, whichever is later

C.2.1.2. Length of the first crediting period:

>>
7 years

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

>>
Not applicable

C.2.2.2. Length:

>>
Not applicable

SECTION D. Environmental impacts

>>

D.1. If required by the host Party, documentation on the analysis of the environmental impacts of the project activity:

>>

The project's Environmental Impact Assessment report (EIA) has been approved by the Environmental Protection Bureau of Hunan province at 27th November 2006, refer as the document of Shaohuanping[2006]No.116. The conclusion stated in part 10 of the report is: the project is in compliance with the industrial policies and the development plan for the water resources, the implementation of the project will bring local community with social-economy benefits. The project developer could take measures to eliminate the negative environmental effects; when the environmental protection measures are adopted according to the suggestions given in the EIA, to implement the project on the designated site is feasible.

The main impacts on the surrounding environment brought by the project and the remediation measures are classified as follows:

1. When the project is under construction:

The main impact of the construction period is water and soil loss, which is caused by the deposit of waste dregs. The deposited dregs will block the channel, and may cause negative impacts when discharging floods.

The remediation measures include specifying an area for depositing dregs, and making use of the waste dregs to construct flood preventing walls. These measures could prevent the dregs to destroy water and soils on land surface in downstream of Gongxi River, and naturally solve the problem of obtaining the materials sources for constructing the flooding preventing walls.

2. When the project is put into operation:

- The water preventing structure will be applied in the project, which is used for water diversion. However, to guarantee the necessary ecology demands for river water, the designed water release structure should ensure the water discharge rate in the downstream from the project site. The designed water discharge flow of Chalu dam is at least $0.51m^3/s$, and that of Anshun dam is at least $0.1m^3/s$.

  The design of the two water release structure should be reported to local Environment Protection Administration (EPA), and be approved prior to the construction; moreover, the effects of the structures releasing water would be supervised by EPA sometimes.

- The project will bring little impact on water temperature, water quality and local climate during operation period. There is few kinds of fish is the assessing section of the river, which are mainly common species like white line fish, crucian and carp etc. When the reservoir is built, it will improve the quality of water body for the fish living in, and the amount and species will increase.

- When the reservoir storage water, there will be some trees and plants growing under the water controlling line will be flooded. As investigated by the EIA complier, the trees and plants flooded by the project fall in common species. The flooded area is limited, even the submerged area will cause reductions of local plants resources, the impacts on local ecology is limited. The legal protected plants or trees can only be found on the mountains, which locate on at least 400 meters upon the standard sea level. Therefore, there is no impact to the protected species brought by the project.

- The reservoir has nice stability and there will be no leakage and flood. There will also not fill up because there is little solid in the river.

- There is no resettlement issue brought by the project, and no fundamental infrastructure will be destroyed. The land taken by the project is limited, and the loss caused by flooding of reservoirs built for water diversion is very small. The negative social-environment impacts of the project activity are pimping; meanwhile, the project activity could benefit the regional social-economy environment a lot, and contribute to mitigating the poverty index of the local region.

Moreover, according to part 10.6 of the EIA, the report suggests:

1. The project owner and project developer should sign a contract for project environment management to enhance the supervising and examination of the project, and strength the effectiveness of implementing the environment protection measures. The project should implement the construction works strictly according to *the project water and soil conservation plan* and *the environment protection approaches*. The environment protection facilities should be designed, built and put into operation with the steps of the project's main body.

2. The cleaning work for the bottom land of reservoir should be completed prior to the reservoir saving water, and the examining for the cleaning work should be executed by the administrative departments at appropriate time, including the participation of EPA. The water storage of reservoir can only be implemented after approving by the administrative departments.

3. The project locates in an area with no living resident but nice natural surroundings, it is suggested that the project developer and staff of the power station should recognize their duty on preserving the natural surroundings, and do their best to protect the environment of project site.

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:

>>

Both of the Host Party and the project owner consider that the proposed project will not bring significant negative impacts on the environment. After the completion of the project construction, the project should commence operation under the conditions of being inspected by local EPA and concluded that the project activity is in compliance with the requirements of laws and regulations on environment protection.

SECTION E. Stakeholders' comments

>>

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

>>

For the public to get a better understanding of the project's construction progress and plan, the Shaoyang Environmental Protection Research Institute publicly investigated the local people to collect the public opinions to the project. The investigator put up a notice on the official website of Dongkou County Government in July 2006, which indicates that when and in which way the public investigation on the project will be done. The investigation team visited the related departments of Dongkou County Government for comments and suggestions during 12th to 14th August 2006, and allocated questionnaires to the residents living in the area around the project site and the employees work in government offices.

50 residents are randomly interviewed, including males and females, from age 19 to age 60, from people received elementary education to the ones received college level education, and from the ones living near the project site to the ones work in government offices. The interviewer considered the extensiveness of the public representatives.

Since the investigation can be divided into two parts, one is on-site visiting to government offices and the other is public questionnaires, and the details of content are illustrated by two parts in table 10 as follows:

Table 10 the content of public investigations

Objects	Approach	Content	Result of investigation
Residents who may be affected	On-site questionnaire	1. Types of impacts brought by the project.	Given in section 1 of E.2 part
		2. Impacts on local residents' daily life.	
		3. Which major aspects of the environment will the project affect on?	
		4. Whether agree on the development of the project or not?	
		5. Additional opinions and suggestions.	
Departments of environment protection, forestry, water conservancy, river way management, land resources etc.	On-site interview	1. Overall opinion or attitude towards the project.	Some questions are selected for interview, which is given in section 2 of E.2 part
		2. Whether the project contribute to the development of local region or not?	
		3. The possible impact on local production, forestry, tourism, river way and ecological environment.	
		4. The possible impact on residents' lives during construction and operation period.	
		5. Appropriate approach for mitigating the negative impact.	

E.2. Summary of the comments received:

>>

Section 1. Public questionnaires

50 investigation forms are allocated and 46 copies are collected, the results of the investigation are shown in table 11:

Table11. The result of public investigation

Number	Questions	Percent (%)				Remark
1	Types of impacts brought by the project (1) land requisitioned (2) no land requisitioned	(1) 24	(2) 76			
2	Impacts on local residents' daily life (1) favourable (2) adverse (3) nothing (4) others	(1) 24	(2) 0	(3) 74	(4) 2	
3	Which major aspects of the environment will the project affect on? (1) plant destroy (2) water quantity of the river (3) hydrobiology (4) trench on the river way	(1) 4	(2) 59	(3) 15	(4) 20	Multiple choices and some choices left blank
4	Whether agree on the development of the project or not? (1) yes (2) no (3) have no idea (4) not care	(1) 98	(2) 0	(3) 0	(4) 0	2 are left blank

According to the public opinions, the analysis is as follows:

(1) Types of impacts brought by the project
There are not too much people living around the project site, so only 24% of the interviewees are affected by land levy.

(2) Impacts on local residents' daily life.
24% of the interviewees thought there would be positive impacts brought by the project and 74% of the interviewees thought the project would not have impact to their normal life which mainly because they did not live in the project region.

(3) Which major aspects of the environment will the project affect on?
Most of the interviewees thought there would be impact to river water quantity, which takes 59%; secondly, 20% thought the waste dregs would block the river way; thirdly, 15% thought the most impact would be brought to hydrobiology of Gongxihe River and 4% thought it would destroy vegetation of local region.

(4) Whether agree on the development of the project or not?
Most interviewees thought the project could improve electric supply conditions of local region, improve living standard of local people. So 98% of interviewees agreed on the development of the project, at the same time, the project owner should take in charge of road maintenance and river way dredging.

Section 2. Government opinions
(1) Local government
Dongkou County was facing electric shortage which had limited the development of local economy. The project can improve electric condition of Dongkou County and accelerate the development of local economy. So they support the construction of the project.

(2) EPA and Forestry department

The project is located in Xuefeng Mountain which was covered by thick forest. So the EIA and Forestry department suggested protecting the ecological environment and species diversity; enough water should be discharged into down-stream of the river to keep the ecological balance and meet vegetation needs.

(3) Water conservancy, River way department
Water conservancy and River way department thought the project can improve economic development of local region, but the waste dregs had blocked some section of the river because of lack of correct direction. So the project owner should plan sufficient space for the waste dregs deposition and discharging floods.

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

>>
The project owner received the investigation results from research centre, and promised to take measures as bellow for the environmental protection:
(1) Clean up the waste dregs produced in the construction period and dredge the river way.
(2) Fill the billabong with waste dregs and build protection mound.
(3) The project owner should consign a qualified department to fix up discharge sets for two water diversion dam to ensure the least required water flow discharging.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Project Owner

Organization:	Shaoyang Triumph Billion Yuzitang Power station Development Ltd., Co.
Street/P.O.Box:	Yuzitang, Anshun Village, Nuoxi town, Dongkou county
Building:	/
City:	Shaoyang City
State/Region:	Hunan Province
Postfix/ZIP:	422000
Country:	P. R. China
Telephone:	+86-731-5236335
FAX:	+86-731-5236338
E-Mail:	xltangjz@163.com
URL:	/
Represented by:	Xiao Linhui
Title:	President
Salutation:	Mr.
Last Name:	Xiao
Middle Name:	/
First Name:	Linhui
Department:	/
Mobile:	+86-13927764711
Direct FAX:	+86-731-5236338
Direct tel:	+86-731-5236335
Personal E-Mail:	xltangjz@163.com

Project Participant

Organization:	Carbon Asset Management Sweden AB
Street/P.O.Box:	C/o Tricorona AB, Box 704 26
Building:	/
City:	Stockholm
State/Region:	/
Postfix/ZIP:	SE-107 25
Country:	Sweden
Telephone:	+46 8 506 885 00
FAX:	+46 8 34 60 80
E-Mail:	co2@tricorona.se
URL:	www.tricorona.se
Represented by:	Niels Von Zweigbergk
Title:	President & CEO
Salutation:	Mr.
Last Name:	Von Zweigbergk
Middle Name:	/
First Name:	Niels
Department:	/
Mobile:	+46 708 59 35 00
Direct FAX:	+46 8 34 60 80
Direct Phone:	+46 8 506 885 51
Personal E-Mail:	nvz@tricorona.se

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

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

Annex 3

BASELINE INFORMATION

The installed capacity, fuel consumption data used for OM and BM calculation is derived from <China Energy Statistical Yearbook>, <China Electric Power Yearbook>.

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

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

Fuel	Low Calorific Value	Emission Factor (tC/TJ)	Oxidation Factor
Raw Coal	20908 kJ/kg	25.8	100%
Cleaned Coal	26344 kJ/kg	25.8	100%
Other Washed Coal	8363 kJ/kg	25.8	100%
Coke	28435 kJ/kg	29.2	100%
Crude Oil	41816 kJ/kg	20.0	100%
Gasoline	43070 kJ/kg	18.9	100%
Diesel Oil	42652 kJ/kg	20.2	100%
Fuel Oil	41816 kJ/kg	21.1	100%
Natural Gas	38931 kJ/m^3	15.3	100%
Coke Oven Gas	16726 kJ/m^3	12.1	100%
Other Gas	5227 kJ/m^3	12.1	100%
LPG	50179 kJ/kg	17.2	100%
Refinery Dry Gas	46055 kJ/kg	15.7	100%

Data Source:

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

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

Step 1: Calculating the Operating Margin emission factor ($EF_{OM,y}$)

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

Fuel	Unit	Jiangxi	Henan	Hubei	Hunan	Chongqing	Sichuan	Total	EF	Oxidation	Average Low Calorific Value	CO_2 Emission (tCO_2e)
									(tC/TJ)	(%)	($MJ/t,km^3$)	K=G*H*I*J*44 /12/10000 (for mass unit)
		A	B	C	D	E	F	G=A+B+ C+D+E+F	H	I	J	K=G*H*I*J*44 /12 /1000 (for volume unit)
Raw Coal	10^4 t	1427.41	5504.94	2072.44	1646.47	769.47	2430.93	13851.66	25.8	100	20908	273971539.89
Cleaned Coal	10^4 t							0	25.8	100	26344	0
Other Washed Coal	10^4 t	2.03	39.63			106.12		147.78	25.8	100	8363	1169146.40
Coke	10^4 t				1.22			1.22	29.2	100	28435	37142.18
Coke Oven Gas	10^8 m^3			0.93				0.93	12.1	100	16726	69013.15
Other Gas	10^8 m^3							0	12.1	100	5227	0
Crude Oil	10^4 t		0.5	0.24			1.2	1.94	20	100	41816	59490.23
Diesel Oil	10^4 t	0.52	2.54	0.69	1.21	0.77		5.73	20.2	100	42652	181015.94
Fuel Oil	10^4 t	0.42	0.25	2.17	0.54	0.28	1.2	4.86	21.1	100	41816	157229.00
LPG	10^4 t							0	17.2	100	50179	0
Refinery Dry Gas	10^4 t	1.76	6.53		0.66			8.95	15.7	100	46055	237285.34
Natural Gas	10^8 m^3					0.04	2.2	2.24	15.3	100	38931	489222.52
											Total	**276371084.63**

Data Source: <China Energy Statistical Yearbook 2004>

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

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

Data Source: <China Electric Power Yearbook 2004>

According to Table A2, the total CO_2 emissions of CCPG is **276371084.63** tCO_2e in year 2003. According to Table A3, the total supplied electricity of CCPG is 225987719.2 MWh. According to formula (2) in section B.6.1, the $EF_{OM, Simple, 2003}$ is 1.2229 tCO_2e/MWh.

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

Fuel	Unit	Jiangxi	Henan	Hubei	Hunan	Chongqing	Sichuan	Total	EF	Oxidation	Average Low Calorific Value	CO_2 Emission (tCO_2e)
									(tC/TJ)	(%)	($MJ/t,km^3$)	K=G*H*I*J*44/12/10000 (for mass unit)
		A	B	C	D	E	F	G=A+B+C+D+E+F	H	I	J	K=G*H*I*J*44/12 /1000 (for volume unit)
Raw Coal	10^4 t	1863.8	6948.5	2510.5	2197.9	875.5	2747.9	17144.1	25.8	100	20908	339092605.29
Cleaned Coal	10^4 t		2.34					2.34	25.8	100	26344	58316.13
Other Washed Coal	10^4 t	48.93	104.22			89.72		242.87	25.8	100	8363	1921441.23
Coke	10^4 t		109.61					109.61	29.2	100	28435	3337011.41
Coke Oven Gas	10^8 m^3			1.68		0.34		2.02	12.1	100	16726	149899.53
Other Gas	10^8 m^3					2.61		2.61	12.1	100	5227	60527.09
Crude Oil	10^4 t		0.86	0.22				1.08	20	100	41816	33118.27
Gasoline	10^4 t		0.06			0.01		0.07	18.9	100	43070	2089.33
Diesel Oil	10^4 t	0.02	3.86	1.7	1.72	1.14		8.44	20.2	100	42652	266627.32
Fuel Oil	10^4 t	1.09	0.19	9.55	1.38	0.48	1.68	14.37	21.1	100	41816	464893.14
LPG	10^4 t							0	17.2	100	50179	0
Refinery Dry Gas	10^4 t	3.52	2.27					5.79	15.7	100	46055	153506.38
Natural Gas	10^8 m^3						2.27	2.27	15.3	100	38931	495774.61
											Total	**346035809.73**

Data Source: <China Energy Statistical Yearbook 2005>

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

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

Data Source: <China Electric Power Yearbook 2005>

According to Table A4, the total CO_2 emissions of CCPG is 346035809.73 tCO_2e in year 2004. According to Table A5, the total supplied electricity of CCPG is 249074186 MWh. According to formula (2) in section B.6.1, the $EF_{OM, Simple, 2004}$ is 1.3893 tCO_2e/MWh.

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

Fuel	Unit	Jiangxi	Henan	Hubei	Hunan	Chongqing	Sichuan	Total	EF	Oxidation	Average Low Calorific Value	CO_2 Emission (tCO_2e)
									(tC/TJ)	(%)	(MJ/t,km^3)	K=G*H*I*J*44 /12/10000 (for mass unit)
		A	B	C	D	E	F	G=A+B+ C+D+E+F	H	I	J	K=G*H*I*J *44/12/1000 (for volume unit)
Raw Coal	10^4 t	1869.29	7638.87	2732.15	1712.27	875.4	2999.77	17827.75	25.8	100	20908	352614496.76
Cleaned Coal	10^4 t	0.02	0					0.02	25.8	100	26344	498.43
Other Washed Coal	10^4 t		138.12			89.99		228.11	25.8	100	8363	1804669.00
Coke	10^4 t		25.95		105			130.95	29.2	100	28435	3986695.05
Coke Oven Gas	10^8 m^3			1.15		0.36		1.51	12.1	100	16726	112053.61
Other Gas	10^8 m^3		10.2			3.12		13.32	12.1	100	5227	308896.88
Crude Oil	10^4 t		0.82	0.36				1.18	20	100	41816	36184.78
Gasoline			0.02			0.02		0.04	18.9	100	43070	1193.90
Diesel Oil	10^4 t	1.3	3.03	2.39	1.39	1.38		9.49	20.2	100	42652	299797.78
Fuel Oil	10^4 t	0.64	0.29	3.15	1.68	0.89	2.22	8.87	21.1	100	41816	286959.09
LPG	10^4 t							0	17.2	100	50179	0.00
Refinery Dry Gas	10^4 t	0.71	3.41	1.76	0.78			6.66	15.7	100	46055	176572.11
Natural Gas	10^8 m^3						3	3	15.3	100	38931	655208.73
											Total	**360283226.12**

Data Source: <China Energy Statistical Yearbook 2006>

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

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

Data Source: <China Electric Power Yearbook 2006>

According to Table A6, the total CO_2 emissions of CCPG is 360283226.12 tCO_2e in year 2005. According to Table A7, the total supplied electricity of CCPG is 286203304.6 MWh. According to formula (2) in section B.6.1, the $EF_{OM, Simple, 2005}$ is 1.2588 tCO_2e/MWh.

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

$$EF_{OM} = 1.29086\ tCO_2e/MWh$$

Step 2: Calculating the Build Margin emission factor ($EF_{BM,y}$)

Sub-Step 2a: Calculating 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 A8 Percentages of CO_2 emissions from the coal-fired, gas-fired and oil-fired power plants in total fuel-fired CO_2 emissions

		Jiangxi	**Henan**	**Hubei**	**Hunan**	**Chongqing**	**Sichuan**	**Total**	**Average Low Calorific Value**	**Emission Factor (tC/TJ)**	**Oxidation**	**CO_2 Emission (tCO_2e)**
Fuel	Unit	A	B	C	D	E	F	G=A+…+F	H	I	J	K=G*H*I*J*44 /12/100
Raw Coal	10^4 t	1869.29	7638.87	2732.15	1712.27	875.4	2999.77	17827.75	20908 kJ/kg	25.8	100%	352614496.76
Cleaned Coal	10^4 t	0.02	0					0.02	26344 kJ/kg	25.8	100%	498.43
Other Washed Coal	10^4 t		138.12			89.99		228.11	8363 kJ/kg	25.8	100%	1804669.00
Coke	10^4 t		25.95		105			130.95	28435 kJ/kg	29.2	100%	3986695.05
Subtotal												**358406359.24**
Crude Oil	10^4 t		0.82	0.36				1.18	41816 kJ/kg	20	100%	36184.78
Gasoline	10^4 t		0.02			0.02		0.04	43070 kJ/kg	18.9	100%	1193.90
Diesel Oil	10^4 t	1.3	3.03	2.39	1.39	1.38		9.49	42652 kJ/kg	20.2	100%	299797.78
Fuel Oil	10^4 t	0.64	0.29	3.15	1.68	0.89	2.22	8.87	41816 kJ/kg	21.1	100%	286959.09
Subtotal												**624135.55**
Natural Gas	10^7 m^3						30	30	38931 kJ/m^3	15.3	100%	655208.73
Coke Oven Gas	10^7 m^3			11.5		3.6		15.1	16726 kJ/m^3	12.1	100%	112053.61
Other Gas	10^7 m^3		102			31.2		133.2	5227 kJ/m^3	12.1	100%	308896.88
LPG	10^4 t							0	50179 kJ/kg	17.2	100%	0.00
Refinery Dry Gas	10^4 t	0.71	3.41	1.76	0.78			6.66	46055 kJ/kg	15.7	100%	176572.11
Subtotal												**1252731.33**
Total												**360283226.12**

Data Source: <China Energy Statistical Yearbook 2006>

According to Table A8 and formula (6) 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:

$$\lambda_{Coal} = 99.48\%,\ \lambda_{Oil} = 0.17\%,\ \lambda_{Gas} = 0.35\%$$

Sub-Step 2b: Calculating the fuel-fired emission factor ($EF_{Thermal}$)

The most advanced commercialized technologies for coal-fired power plants in China are domestic 600 MW sub-critical generators, with the standard coal consumption of power supply of 343.33 gce/kWh. For gas-fired and oil-fired power plants in China, the most advanced commercialized technologies are 200 MW combined cycle generators. The standard coal consumption (equivalent) for power supply of oil-fired and gas-fired power plants is 258 gce/kWh.

Parameters used for calculating fuel-fired emission factor are shown in Table A9 below:

Table A9 Parameters used for calculating fuel-fired emission factor

	Parameter	Efficiency of Power Suppy	Emission Factor of Fuel (tc/TJ)	Oxidation Factor	Emission Factor (tCO2/MWh)
		A	B	C	D=3.6/A/1000*B*C*44/12
Coar-fired Power Plant	$EF_{Coal,Adv}$	35.82%	25.8	100%	0.9508
Gas-fired Power Plant	$EF_{Gas,Adv}$	47.67%	15.3	100%	0.4237
Oil-fired Power Plant	$EF_{Oil,Adv}$	47.67%	21.1	100%	0.5843

According to Table A9 and formula (7) in section B.6.1, the $EF_{Thermal}$ is 0.94828 tCO_2e/MWh

Sub-Step 2c: Calculating the Build Margin (BM) emission factor ($EF_{BM,y}$)

Table A10 Installed Capacities of CCPG

Installed Capacity	**Unit**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**
Fuel-fired	MW	39864.6	42569.2	43303.2	46893.5	53744.7	60167.3
Hydro	MW	28637.8	30397	31034.7	36557	34642	38405.1
Nuclear	MW	0	0	0	0	0	0
Wind & Others	MW	0	0	0	0	0	24
Total	MW	**68502.4**	**72966.2**	**74337.9**	**83450.5**	**88386.7**	**98596.4**

Data Source: <China Electric Power Yearbook 2001-2006>

Table A11 Newly Added Installed Capacity from Year 2000-2005

	2000	**2001**	**2002**	**2003**	**2004**	**2005**	**F-C**
	A	**B**	**C**	**D**	**E**	**F**	
Fuel-fired (MW)	39864.6	42569.2	43303.2	46893.5	53744.7	60167.3	16864.1
Hydro (MW)	28637.8	30397	31034.7	36557	34642	38405.1	7370.4
Nuclear	MW	0	0	0	0	0	0
Wind & Others	MW	0	0	0	0	24	24
Total （MW）	68502.4	72966.2	74337.9	83450.5	88386.7	98596.4	24258.5
Percentage of newly installed capacity to 2005	30.51%	25.98%	24.59%	15.34%	10.33%	0.00%	
Percentage of newly added fuel-fired plants		69.52%					

It can be concluded from Table A11 that capacity additions from year 2002 to 2005 is closer to 20% of the total additions and it is obvious the capacity additions during year 2002 to 2005 are larger than the capacity of five plants, so year 2002 and 2005 are chosen to calculate the BM emission factor of CCPG.

According to Table A11 and formula (8) in section B.6.1, the EF_{BM} is calculated as:

$$EF_{BM} = 0.65923\ tCO_2e/MWh$$

Step 3: Calculating the baseline emission factor (EF_y)

According to formula (9) in section B.6.1, the baseline emission factor of CCPG is calculated as:

$$EF_y = 0.97504\ tCO_2e/MWh$$

The EF_y applied in this PDD is fixed for a crediting period and may be revised when renewing the crediting period.

Annex 4

Monitoring Plan

Please refer to the part B.7 of PDD for details, no additional information is given here.
