

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

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Revision history of this document

Version Number	Date	Description and reason of revision
01	25 Feb. 2008	Initial adoption
02	15 Mar. 2008	Revision according to the advice of the expert
03	22 May.2008	Revision according to the latest additionality tool
04	5 Aug. 2008	Revision according to the latest guidance for completing the PDD
05	26 Aug.2008	Updated with the latest additionality tool

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

Project: Yunnan Lincang City Nanlinghe 1st level Small-scale Hydropower Project

Version 01: 25 Feb. 2008

Version 02: 15 Mar. 2008

Version 03: 22 May.2008

Version 04: 5 Aug. 2008

Version 05: 26 Aug. 2008

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

Yunnan Lincang City Nanlinghe 1st level Small-scale Hydropower Project (hereafter referred to as the Project) is located on the intersection of Nanlahe River and Nanlinghe River in Nanla Town, Cangyuan County, Lincang City, Yunnan Province, P.R. China which is 80km to Cangyuan County and 15km to Nanla Town. The Project is developed by Lincang City Xinshui Hydropower Development Co. Ltd.. The Project is a run-of-river hydropower station with total installed capacity of 8 MW (2*4MW). The estimated annual operation hour is 4509h and annual generated electricity is 36072MWh. It will provide 30841.56 MWh generated electricity to Southern China Power Grid every year via one 35KV LGJ-185 outlet circuits. a

Southern China Power Grid is mainly comprise of fossil fuel fired power plant¹, the Project will achieve greenhouse gas emission reductions by avoiding CO₂ emissions from the business-as-usual scenario electricity generation of those fossil fuel-fired power plants connected into the China Southern Power Grid. The average annual emission reductions of the Project are estimated to be 26868tCO₂e.

The main propose of the Project is to generate electricity through hydro power. As a renewable energy project, the Project will contribute to sustainable development in following aspects:

- Providing clean electrical energy, which accords with the national and Yunnan Provincial strategic development ideas of “western electricity sent to east” and “Yunnan provincial electricity sent outside”. This can mitigate the shortage of electricity supply; on the other hand, this can promote local economic development ².
- Reducing greenhouse gas (GHG) and other pollutants emissions compared to business-as-usual scenario, protect the environment.
- Increasing local revenue and providing more than 15 job positions for the regions during the project operation period³.

A.3. Project participants:

¹ According to *China Energy Statistical Yearbook 2003-2007* among the total electricity fed into of the Southern China power Grid which the Project is connected into, the amount of fossil fuel-fired electricity accounts for about 68.4% in 2002,65.3% in 2003 and 68.4% in 2004,69.3% in 2005, 70.2% in 2006.

²Lincang City Nanlinghe 1st Level Hydropower Station Feasible Study Report P4-7

³ Lincang City Nanlinghe 1st Level Hydropower Feasible Study Report P13-2

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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)
China (host)	Lincang City Xinshui Hydropower Development Co. Ltd.	No
Japan	Mitsubishi Corporation	No

More detailed contact information of the Project Participants is provided in Annex 1.

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.:

Yunnan Province

A.4.1.3. City/Town/Community etc.:

Cangyuan County, Lincang City.

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

The Project is sited on the Nanlinghe River within Cangyuan County, Lincang City, Yunnan Province, P.R. China. The Project is located in the intersection of Nanlahe River and Nanlinghe River. The Project geographic coordinate of the workshop is 98° 59'20"E and 23° 25'05"N. Detailed physical location follows as Fig. 1.

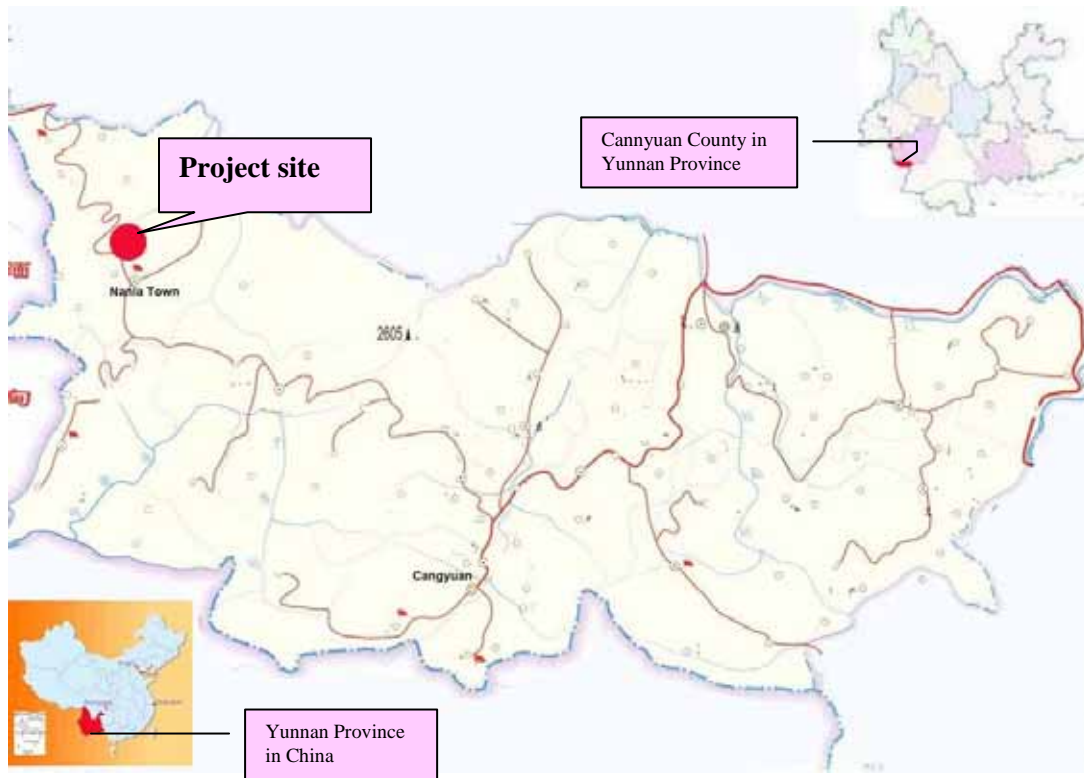


Fig. 1 Location of the Project

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

Using 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 Energy Generation for a Grid

Sub-category: Hydro

Technology of project activity

The Project is a diversion run-of-river hydropower station. The main construction of the Project include: dam, water diversion channel, water diversion tunnel, pressure pool, pressure pipelines and plants, substations.

The Project have more than one diversion area (five) , so five dams were built.

Dam 1 was located on the Nanlahe River in the upstream branch of Nanlinghe River. The type of the dam is a gravity dam with a overflow dam length of 10.5m and a height of 4.6m.

Dam 2 was located on the upstream of Daizuhe River. The type of the dam is also a gravity dam with a overflow dam length of 11.0m and a height of 4.6m.

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Dam 3 is located on the upstream of Ailanghe River. The type of the dam is also a gravity dam with a overflow dam length of 10.5m and a height of 4.6m.

Dam 4 is located on the upstream of Guanghahe River. The type of the dam is also a gravity dam with a overflow dam length of 4.8m and a height of 2.1m.

Dam 5 is located on the upstream of Manjiuhe River. The type of the dam is gravity dam with a overflow dam length of 10.5m and a height of 4.6m.

The water diversion channel is laid two channels based on the location of diversion dam. Where: the southern channel is open channel and is 5395m long . the northern channel is integrated of open channel and tunnel and 4365m long. The designed diversion flow is $3.05\text{m}^3/\text{s}$.

The pressure pool is located on the foot of Ailangzhai. It is a 70m long, 13m wide and 6m deep pool. The rated water head of the pressure pipelines is 342m and rated flow is $3\text{m}^3/\text{s}$.

The workshop is located on Ailang Village in which two sets of 4MW indigenous turbine and associated generator will be installed in this plant. It is estimated that the Project can supply 30841.56MWh electricity that via one 35KV outlet circuits to Southern China Power Grid.

The type and parameter of turbines and generators are listed in Table 1 as follows:

Table 1. Main Equipment Type and Parameter

Parameter	Type/Figure
Turbine Type	CJA237-WJ-125/2*11
Quantity	2
Rated rotate speed	600r/min
Rated water head	342m
Rated flow	$1.49\text{m}^3/\text{s}$
Generator Type	SFWG4000-10/2150
Quantity	2
Rated power	4
Rated voltage	6.3kv

The technology, which is used worldwide, is environmentally safe. All main equipments such as generator and turbine in the Project are domestically produced. The Project involves no technology and installations from abroad.

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

The renewable crediting period will be applied in the Project, it is expected that the Project activity will generate about 26,868 tCO₂e emission reductions per year during the first 7-year crediting period from Jan. 2009 to Dec. 2015.

Years	Estimation of annual emission reductions in tones of CO ₂ e
01/01/2009-31/12/2009	26868
01/01/2010-31/12/2010	26868
01/01/2011-31/12/2011	26868
01/01/2012-31/12/2012	26868
01/01/2013-31/12/2013	26868
01/01/2014-31/12/2014	26868
01/01/2015-31/12/2015	26868
Total estimated reductions (tonnes of CO₂e)	188076
Total number of crediting years	7
Estimation of annual emission reductions in tones of CO₂e	26868

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

There is no public funding from Annex I parties for this Project.

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

According to “*the Simplified Modalities and Procedures for Small-scale CDM Project Activities, Attachment C⁴*”, the project participants confirm that no project with same type and technology, whose boundary is within 1 kilometre of the proposed small-scale activity at the closest point, has been registered or is applying to register CDM project by same project owner. So the Project is not a debundled component of a larger project activity.

⁴ <http://cdm.unfccc.int/Projects/pac/howto/SmallScalePA/sscdebund.pdf>

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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:

ASM-I.D. (ver. 13) – “*Grid connected renewable electricity generation*. For more information, please refer to: <http://cdm.unfccc.int/methodologies/SSCmethodologies/approved.html>

“*Tool to calculate the emission factor for an electricity system*”(ver.1.1) . For more information, please refer to: <http://cdm.unfccc.int/Reference/Guidclarif/index.html>

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

The methodology AMS-I.D. is applicable to renewable energy generation units that supply electricity to and/or displace electricity from an electricity distribution system that is or would have been supplied by at least one fossil fuel fired generating unit. For the Project, it supply hydroelectricity to Southern China Power Grid. Southern China Power Grid is mainly comprise of fossil fuel fired power plant⁵

Moreover, the size of this run-of-river hydropower Project is 8 MW, which is not exceed the limit of 15 MW stipulated for the chosen methodology. Therefore, the methodology AMS-I.D. is applicable to the Project.

B.3. Description of the project boundary:

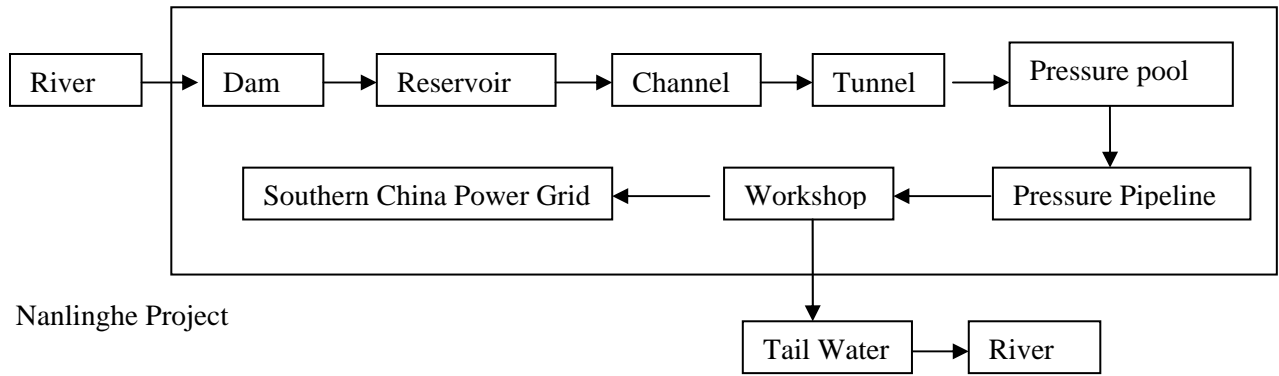
The project boundary covers the power plant such as water-retaining structure, workshop, auxiliary facilities and the reservoir area, etc.

Electricity generated by the Project will be delivered to the Yunnan Power Grid. According to the Notification on Determining Baseline Emission Factor of China’s Grid, Yunnan Power Grid is an integral part of the Southern China Power Grid. The Southern China Power Grid is defined as the electricity system boundary of the Project. It is composed of Guangdong Power Grid, Guangxi Power Grid, Yunnan Power Grid, Guizhou Power Grid.

The Project boundary included is shown in the figure below.

⁵ Southern China power Grid which the Project is connected into, the amount of low-cost/must run resources accounts for about 31.6% in 2002, 34.7% in 2003 and 31.58% in 2004, 300.7% in 2005 and 29.8% in 2006.

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Nanlinghe Project

B.4. Description of baseline and its development:

In the absence of the proposed project, the possible alternatives to the proposed project would be as follow:

- (1) The proposed hydropower plant development not undertaken as a CDM project activity;
- (2) Construction of a fossil fuel power plant with the same amount of annual electricity generation;
- (3) Construction of a power plant using other renewable energy sources with the same annual electricity generation;
- (4) the Southern China Power Grid as the provider for the same electricity generation as the proposed project.

In point of project's investment benefit, the investment risk is comparatively high. If the proposed project is not implemented as a CDM project, the IRR of total investment of the proposed project will be below the benchmark interest rate (10%) of Chinese small-scale hydropower industry (please refer to section B.5 for the detailed analysis). Alternative (1) is not feasible.

the installed capacity of the Project is 8 MW, considering the same annual electricity generation; the alternative for the Project should be a fuel-fired power plant with installed capacity lower than 8 MW. Further, as the Project is a grid-connected hydropower generation project, the alternative must be a grid connected fuel-fired power generation project. Fuel-fired power generation may be one of the type of coal-fired power generation, gas-fired power generation and oil-fired power generation. Compared with coal-fired power generation gas-fired power generation and oil-fired power generation are always restricted by the supply of fuel, high investment and low benefit which means they are not a plausible choice for the project owner. That is, the most possible fuel-fired power generation is coal-fired power generation. However, according to China's regulations, construction of fuel-fired power plants with the installed capacity lower than 135 MW is prohibited in the areas which can be covered by large

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grids such as provincial grids⁶. Alternative (2) has been excluded for it conflicts with China's current regulations.

In point of technical feasibility, among the current alternative technologies about grid-connected electricity generation from other kind of renewable energy source in China: wind energy technology is comparatively mature, but there is no usable wind resource in the site of the proposed project; biomass generation needs plenty of biomass material, there is lack of the biomass material in the mountainous area where the proposed project is located⁷. Alternative (3) is not feasible.

The Southern China Power Grid as the provider for the same electricity generation as the proposed project is in compliance with the national rules and regulations, and they are economical and feasible, so alternative (4) is feasible.

According to the above analysis, the Southern China Power Grid, to which the proposed project is connected, provides the same capacity and electricity as that of the proposed project is the baseline scenario of the proposed project.

The baseline scenario emission is power supply to the grid multiplied by the emission factor of the grid. The calculation of grid emission factor is provided in B.6.1

The system boundary of the Project is the Southern China Power Grid. Therefore, the emission reductions of the Project are the baseline emission factor of the Southern China Power Grid multiplied by the power the Project provided to the grid.

During the most recent 5 years, from 2001 to 2005, the hydroelectricity, nuclear-electricity and other low-cost/must run resources annual proportion in Southern China Power Grid is: 32.3% in 2001, 31.6% in 2002, 34.7% in 2003, 31.58% in 2004, 30.7% in 2005 and 29.8% in 2006.

parameters used to determine the baseline emission are listed in the followed table:

⁶ 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.

⁷ According to the Nanlinghe Hydrography Analysis Report, the annual average wind velocity is only 1.9m/s, which is much lower than the wind velocity needed for construction of wind power station. The project is located in the Xinning County.

The mountain accounts for 99% of the area of the county and average farmland each farmer has is only 2.67Mu mountain farmland with low production. So, for the one hand, the region has no enough biomass resource to supply for the biomass power plant; for the other hand, the transportation condition is bad (<http://www.ww8899.com/shownews.asp?newsid=2951>).

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Variable	Value / Unit	Original Data Source
Operating Margin Emission Factor	1.0607 tCO ₂ /MWh	Calculated from the China Energy Statistic Yearbooks 2005-2007 and the China Electric Power Yearbooks 2005-2007
Build Margin Emission Factor	0.6816 tCO ₂ /MWh	Calculated from the China Energy Statistic Yearbook 2007 and the China Electric Power Yearbooks 2005-2007
Combined Margin Emission Factor	0.87115 tCO ₂ /MWh	Calculated from the China Energy Statistic Yearbooks 2005-2007 and the China Electric Power Yearbooks 2005-2007
Electricity supplied by the project to the grid in year y	30841.56MWh	Feasible Study Report

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

Based on the requirement of Attachment A of Appendix B: the *Simplified Modalities and Procedures for Small-scale CDM Project Activities*. Additionality of the Project is demonstrated by investment barrier analysis.

Investment analysis

We should determine whether the Project is economically and financially less attractive than alternative 4) without considering the CERs sales revenues or not through analysis of this step. We take following sub-steps to conduct investment analysis:

The latest Tools for the Demonstration and Assessment of Additionality suggests three analysis methods which are simple cost analysis (Option I), investment comparison analysis (Option II) and benchmark analysis (Option III). Since the Project will earn revenues not only from the CERs sales but also from electricity sales, the simple cost analysis method is not appropriate. Investment comparison analysis method is only applicable to projects whose alternatives are similar investment projects. The Alternative 4 of the Project is the Southern China Power Grid rather than new investment projects. Therefore Option II is not appropriate. The Project will use benchmark analysis method (Option III) based on the consideration that benchmark IRR of the power sector is available.

(1) Benchmark analysis

According to the *Economic Evaluation Code for Small Hydropower Projects* (SL16-95), the financial benchmark rate of return adopted by the proposed is 10% for the after tax Internal Rate of Return (IRR) of total investment. It is not considered the Project is financially attractive if the project IRR (after tax) without additional revenue is lower than 10% (benchmark IRR).

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(2) Calculation and Comparison of Financial Indicators

According to the *Feasible Study Report*(FSR) which is approved by Lincang City Development and Reform Commission in Nov.03,2006, the basic parameters for calculation of financial indicators of the Project are listed in Table 2 as follows:

Table 2 Financial Parameters of the Project

Parameter	Figure	Units	Resource
Installed capacity	8	MW	FSR p13-1
Estimated annual generated electricity	36072	MWh	FSR p13-1
Project lifetime(include construction period)	21	years	FSR p13-1
Total investment	38.2755	million RMB	FSR p13-1
Expected bus-bar tariff (including VAT)	0.18	RMB/kWh	FSRp13-3
Annual O&M cost	883671	RMB	FSR p13-2
Value added tax rate	6	%	FSR p13-3
Income tax rate	33	%	FSR p13-3
Expense for city maintenance and construction	5	%	FSR p13-3
Education fee addition	3	%	FSR p13-3
CER price	EU 8 /tCO ₂ e		

Based on the data above, without CERs revenue, the IRR (after tax) of total investment of Project is 8.17% which is lower than benchmark 10%. Therefore, the Project activity is not a financially attractive project.

(3) Sensitivity analysis

According to the annex 35 of EB 39, only variables, including the initial investment cost, that constitute more than 20% of either total project costs or total project revenues should be subjected to reasonable variation. For the project, the following financial parameters were taken as uncertain factors for sensitivity analysis of financial attractiveness:

- Total investment
- Annual O&M cost
- Annual output

Assuming the above three indicators varied in the range of -10%+10%, the IRR varieties of the Project is shown in Table 3 and Figure 2.

Table 3. IRR of total investment sensitivity analysis of the Project
(Without CERs revenues)

Parameter	Range	-10%	0	+10%

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Total investment	9.66%	8.17%	6.92%
Annual O&M cost	8.49%	8.17%	7.85%
Annual output	6.78%	8.17%	9.55%

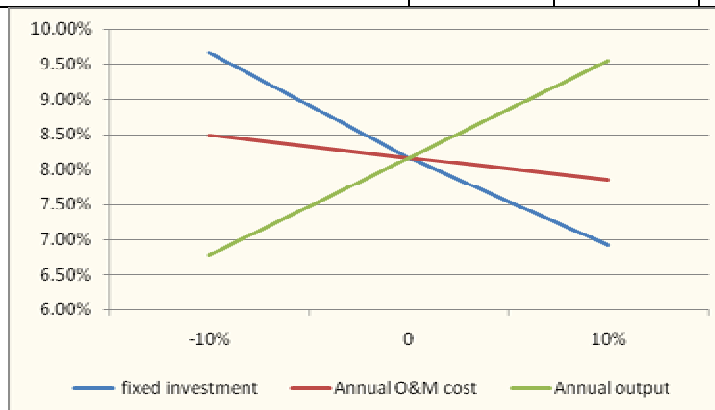


Figure 2. IRR of total investment sensitivity analysis of the Project
(Without CERs revenues)

As shown in the sensitivity analysis, impacts of total investment and annual output on IRR of total investment are obvious. Even the variation range of the factor reaches 10%, the IRR of total investment of the Project could not reach the benchmark.

If the Project can be successfully registered as a CDM project, the CERs sales revenues will improve the financial factors of the Project. Considering of the CERs revenues (calculated with EU 8/tCO₂e, 21yrs crediting period, 1:10 for exchange rate between Europe dollar and RMB), the IRR of the total investment of the Project will be increased to 15.35% which is shown in Table 4.

Table 4. The IRR of the total investment of the Project

	Without CERs Revenues	Benchmark	With CERs Revenues
IRR of the total investment of the Project(%)	8.17	10	15.35

In Sep. 2006, Lincang City Yuanfeng Hydropower Development Co. Ltd. commissioned Yunnan Province Lincang City Hydropower Reconnaissance Design Institute to develop the FSR of the Project and the FSR is approved in Nov.2006. Because the high investment and low local electricity price, which result in the low IRR of the Project, the Project has not been developed until Feb.2007. On Mar.2007, the Project owner Lincang City Xinshui Hydropower Development Co. Ltd. got the Project from Lincang City Yuanfeng Hydropower Development Co.Ltd.. As one of the shareholder has heard of CDM before, and knew CDM can help them to overcome the barrier on finance. A board meeting was then held and a decision on applying for CDM has been made. At the same time the Project owner asked the Lincang City Water Source Bureau for the support. The Lincang City Water Source Bureau answered the applying at once

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and suggested the Project owner start the issue as soon as possible and promised to provide help if needed. In Aug. 2007 the construction application has been approved which can be considered as the start of the Project.

Conclusively, the Project is additional.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:
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Step 1. Calculate the baseline emissions

The small-scale CDM methodology AMS-I.D. (Version 13) is applied in the Project, the emission reduction (ER_y) is calculated as the method (a).

Method (a): A combined margin (CM), consisting of the combination of operating margin (OM) and build margin (BM) according to the procedures prescribed in the *Tool to calculate the emission factor for an electricity system*. According to the tool, ex ante data are adopted in the Project to calculate baseline emission factors.

The following is the detailed process of calculating the baseline CO₂ emission factor of the grid which the Project connected to according to the steps provided by the Tool to calculate the emission factor for an electricity system (hereafter referred to as the Tool).

Sub-step 1a. Identify the relevant electric power system.

Chinese DNA has published a delineation of the project electricity system and connected electricity system. The project physically connects through transmission and distribution lines to the Southern China Power Grid. It is composed of Guangdong Power Grid, Guangxi Power Grid, Yunnan Power Grid, Guizhou Power Grid. Therefore, the project selects the Southern China Power Grid for the calculation of baseline emission factor.

Sub-step 1b. Select an operating margin (OM) method.

According to the *Tool*, four methods compute the Operating Margin Emission factor can be used as follows:

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

The simple OM method only can be used when low-cost/must run resources constitute less than 50% of total amount of grid generating output 1) in the recent five years, or 2) by taking into account long-term normal for hydroelectricity generation. If the dispatch data is available the (c) Dispatch Data Analysis OM method should be the first methodological choice, while in case of the Project, the (a) Simple OM method is adapted with two reasons as follows:

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- (1) In cases where China presently the power grid dispatch and load data are unavailable as business secrets, so (b) and (c) cannot apply in the Project for calculating the Operating Margin Emission Factor ($EF_{grid,OM,y}$).
- (2) During the most recent 5 years, from 2002 to 2006, the hydroelectricity, nuclear-electricity and other low-cost/must run resources annual proportion in Southern China Power Grid is: 32.3% in 2001, 31.6% in 2002, 34.7% in 2003, 31.58% in 2004, 300.7% in 2005 and 29.8% in 2006⁸, which are much less than 50%.

For simple OM, the emission factor can be calculated using either of the two following data vintages:

- Ex ante option: A 3-year generation weighted average, based on the most recent data available at the time of submission of the CDM-PDD for validation, without requirement to monitor and recalculate the emissions factor during the crediting period, or
- Ex post option: The year in which the project activity displaces grid electricity, requiring the emission factor to be updated annually during monitoring. If the data required calculating the emission factor for year y usually only available later than six months after the end of year y.

Project participant employs “ex-ante” for its operation margin calculation with two reasons as follows:

- 1) the full generation-weighted average for the most recent 3 years for which data are available at the time of PDD submission; and
- 2) the calculation adopt *Notification on Determining Baseline Emission Factor of China's Grid (Jul. 18,2008)*, which is published by Chinese DNA, therefore it is considered as authoritative data. In this notification, the OM is calculated *ex-ants*.

Sub-step 1c. Calculate the operating margin emission factor according to the selected method.

From the *Tool to calculate the emission factor for an electricity system*, ($EF_{grid,simple,OM}$) may be calculated:

- Based on data on fuel consumption and net electricity generation of each power plant / unit (Option A), or
- Based on data on net electricity generation, the average efficiency of each power unit and the fuel type(s) used in each power unit (Option B), or
- Based on data on the total net electricity generation of all power plants serving the system and the fuel types and total fuel consumption of the project electricity system (option C)

⁸ China Energy Statistical Yearbook, 2005 to 2007, China Electric Power Yearbook 2003 to 2007.

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Because the fuel consumption data is unavailable for each power plant / unit, Operation A and Operation B can not be used. At the same time only nuclear and renewable power generation are considered as low-cost / must-run power sources and the quantity of electricity supplied to the grid by these sources is known so Option C was the only operation can be used.

Where Option C is used, the simple OM method formula of $EF_{Grid,OM,Simple,y}$ calculation is:

$$EF_{Grid,OM,Simple,y} = \frac{\sum_i FC_{i,y} \cdot NCV_{i,y} \cdot EF_{CO_2,i,y}}{\sum EG_y} \quad (5)$$

where:

- $EF_{grid,OM,Simple,y}$ is simple operating margin CO₂ emission factor in year y (tCO₂/MWh);
- $FC_{i,y}$ is amount of fossil fuel type i consumed in the project electricity system in year y ;
- $NCV_{i,y}$ is net calorific value (energy content) of fossil fuel type i in year y (GJ / mass or volume unit);
- $EF_{CO_2,i,y}$ is CO₂ emission factor of fossil fuel type i in year y (tCO₂/GJ) and
- EG_y is net electricity generated and delivered to the grid by power plant / unit m in year y (MWh);
- i is all fossil fuel types combusted in power sources in the project electricity system in year y;
- y is either the three most recent years for which data is available at the time of submission of the CDM-PDD to the DOE for validation (ex ante option) or the applicable year during monitoring (ex post option), following the guidance on data vintage in step 2.

When there exists net electricity imports from a connected electricity system within the same host country(ies):

- (1) the emission factor(s) of the specific power plant(s) from which electricity is imported, if and only if the specific plants are clearly known, or
- (2) the emission factor of the exporting grid, if the specific plants are not clearly known.

The data on electricity generation and auxiliary electricity consumption are obtained from the *China Electric Power Yearbook* from 2005 to 2007 (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 2005 to 2007 (published annually after 2003). The emission factors and oxidation factors of the fuels adopted are obtained from *Revised 2006 IPCC Guidelines for National Greenhouse Gas Inventories*.

The detailed calculation can be find in Annex 3, the $EF_{grid,OM,y} = 1.0607tCO_2/MWh$

Sub-step 1d. Identify the cohort of power units to be included in the build margin (BM).

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The sample group of power units m used to calculate the build margin consists of either:

- a) The set of five power units that have been built most recently, or
- b) The set of power capacity additions in the electricity system that comprise 20% of the system generation (in MWh) and that have been built most recently⁹.

Project participants should use the set of power units that comprises the larger annual generation.

In China it is very difficult to obtain the data of the five existing power plants built most recently or the power plants capacity additions in the electricity system that comprise 20% of the system generation (in MWh) and that were built most recently. Taking notice of this situation, EB accepts¹⁰ the following deviation in methodology application:

- 1) Use of capacity additions during the last 1~3 years for estimating the build margin emission factor for grid electricity, i.e. the capacity addition over 1-3years, whichever results in a capacity addition that is closet to 20% of total installed capacity.
- 2) Use proportional weights that correlate to the distribution of installed capacity in place during the selected period above, using plant efficiencies and emission factors of commercially available best practice technology commercially available in the provincial/regional or national grid of China, as a conservative proxy.

In terms of vintage of data, project participants can choose between one of the following two options: Option 1. For the first crediting period, calculate the build margin emission factor ex-ante based on the most recent information available on units already built for sample group m at the time of CDM-PDD submission to the DOE for validation. For the second crediting period, the build margin emission factor should be updated based on the most recent information available on units already built at the time of submission of the request for renewal of the crediting period to the DOE. For the third crediting period, the build margin emission factor calculated for the second crediting period should be used. This option does not require monitoring the emission factor during the crediting period.

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

The PDD choose Option 1.

Sub-step 1e. Calculate the build margin emission factor.

According to the *Tool*, the following equation (6) is adopted to calculate $EF_{grid, BM, y}$.

⁹ If 20% falls on part capacity of a unit, that unit is fully included in the calculation.

¹⁰ [Http://cdm.unfccc.int/Projects/Deviations](http://cdm.unfccc.int/Projects/Deviations).

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$$EF_{Grid, BM, y} = \frac{\sum_m EG_{m,y} \cdot EF_{EL,m,y}}{\sum_m EG_{m,y}} \quad (6)$$

where:

$EF_{grid, BM, y}$ is build margin CO₂ emission factor in year y (tCO₂/MWh);

$EG_{m,y}$ is net quantity of electricity generated and delivered to the grid by power unit m in year y (MWh);

$EF_{EL,m,y}$ is CO₂ emission factor of power unit m in year y (tCO₂/MWh);

m is power units included in the build margin;

y is most recent historical year for which power generation data is available;

Consider of data availability, The Project adopted the following deviation method which was published by Chinese DNA and accepted by CDM EB¹¹:

- 1) Use of capacity additions during the last 1~3 years for estimating the build margin emission factor for grid electricity.
- 2) 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.

Therefore for the Project: First, calculate the share of different power generation technology in recent capacity additions. Second, calculate the weight for capacity additions of each power generation technology. And finally calculate the emission factor use the efficiency level of the best technology commercially available in China.

Since data of installed capacities can not be separated to coal based, oil based and gas based at present, BM is calculated with following steps and formula:

- (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

$$\lambda_{Coal} = \frac{\sum_{i \in COAL, j} F_{i, j, y} \times COEF_{i, j, y}}{\sum_{i, j} F_{i, j, y} \times COEF_{i, j, y}} \quad (7)$$

$$\lambda_{Oil} = \frac{\sum_{i \in OIL, j} F_{i, j, y} \times COEF_{i, j, y}}{\sum_{i, j} F_{i, j, y} \times COEF_{i, j, y}} \quad (8)$$

¹¹ <http://cdm.unfccc.int/Projects/Deviations> ; DNV deviation request, "Request for clarification on use of approved methodology AM0005 for several projects in China"

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$$\lambda_{Gas} = \frac{\sum_{i \in GAS, j} F_{i, j, y} \times COEF_{i, j, y}}{\sum_{i, j} F_{i, j, y} \times COEF_{i, j, y}} \quad (9)$$

where:

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

$COEF_{i, j, y}$ is the CO₂ emission coefficient of fuel i (tCO₂/tCe), taking into account the carbon content of the fuels (coal, oil and gas) used by power 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.

(2) Calculate emission factor for thermal power of the grid based on the result of Step a and the efficiency level of the best technology commercially available in China

$$EF_{Thermal} = \lambda_{Coal} \times EF_{Coal, Adv} + \lambda_{Oil} \times EF_{Oil, Adv} + \lambda_{Gas} \times EF_{Gas, Adv} \quad (10)$$

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

Step c. Calculate BM of the grid based on the result of Step b and the share of thermal power of recent 20% capacity additions.

$$EF_{grid, BM, y} = \frac{CAP_{Thermal}}{CAP_{Total}} \times EF_{Thermal} \quad (11)$$

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 2005 to 2007 (published annually after 2003). The emission factors and oxidation factors of the fuels adopted are obtained from *Revised 2006 IPCC Guidelines for National Greenhouse Gas Inventories*.

With reference to the Notification on Determining Baseline Emission Factor of China's Grid, the weighted average fuel consumption for power generation of the top 30 sets of 600 MW lowest coal-consumed power generators built in 2006 (329.94 gCe/kWh) and the 200 MW oil/gas based combined cycle power generators (252 gCe/kWh) are taken as the efficiency level of the best technology commercially available in China.

The detailed calculation can be find in Annex 3, the $EF_{grid, BM, y} = 0.6816$ tCO₂/MWh.

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Sub-step 1f. Calculate the combined margin (CM) emissions factor.

Based on the *Tool*, the baseline emission factor ($EF_{grid,CM,y}$) is calculated as the weighted average of the operating margin emission factor ($EF_{grid,OM,y}$) and the build margin emission factor ($EF_{grid,BM,y}$), as

$$EF_{grid,CM,y} = \omega_{OM} \cdot EF_{grid,OM,y} + \omega_{BM} \cdot EF_{grid,BM,y} \quad (12)$$

According to the *Tool*, both the weight w_{OM} and the weight w_{BM} take 0.5 as default. Therefore the combined baseline emission factor

$$EF_{grid,CM,y} = 0.5 \times 1.0607 + 0.5 \times 0.6816 = 0.87115 \text{ (tCO}_2\text{e/MWh)}.$$

Step 2. Calculate the project GHG emissions

According to methodology AMS-I.D.(ver.13), project emissions should not be considered, i.e. $PE_y = 0 \text{ tCO}_2\text{e}$.

Step 3. Calculate the project leakage GHG emissions

The Project can take no account of leakages, $L_y = 0 \text{ tCO}_2\text{e}$.

Step 4. Calculate the emission reductions

The project activity will generate GHG emission reductions by avoiding CO₂ emissions from electricity generated by fossil fuel power plants. The emission reduction (ER_y) during a given year y is calculated as follows:

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

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

Data / Parameter:	EG_y
Data unit:	MWh
Description:	net electricity generated and delivered to the grid by power plant / unit m in year y
Source of data used:	<i>China Electric Statistical Yearbook, 2005-2007</i>
Value applied:	Values depend on specifically fuel, referring to Annex 3.
Justification of the choice of data or description of measurement methods and procedures actually applied :	According to the <i>Tool to calculate the emission factor for an electricity system</i> requirement, use accurate and reliable local or national data where available.

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Any comment:	Reasonable
--------------	------------

Data / Parameter:	$FC_{i,y}$
Data unit:	mass or volume unit
Description:	Amount of fossil fuel type i consumed in the project electricity system in year y
Source of data used:	<i>China Energy Statistical Yearbook, 2005-2007</i>
Value applied:	Values depend on specifically fuel, referring to Annex 3.
Justification of the choice of data or description of measurement methods and procedures actually applied :	According to the <i>Tool to calculate the emission factor for an electricity system</i> requirement, use accurate and reliable local or national data where available.
Any comment:	Reasonable

Data / Parameter:	$F_{i,j,y}$
Data unit:	Mass or volume
Description:	The fuel consumption of fuel i in power plant j during year y
Source of data used:	<i>China Energy Statistical Yearbook, 2005-2007</i>
Value applied:	Values depend on specifically fuel, referring to Annex 3.
Justification of the choice of data or description of measurement methods and procedures actually applied :	According to the <i>Tool to calculate the emission factor for an electricity system</i> requirement, use accurate and reliable local or national data where available.
Any comment:	Reasonable

Data / Parameter:	$NCV_{i,y}$
Data unit:	TJ/t, TJ/km ³
Description:	Net calorific value (energy content) per mass or volume unit of a fuel i in year y
Source of data used:	<i>China Energy Statistical Yearbook, 2007</i>
Value applied:	Values depend on specifically fuel, referring to Annex 3.
Justification of the choice of data or description of measurement methods and procedures actually applied :	According to the <i>Tool to calculate the emission factor for an electricity system</i> requirement, use accurate and reliable local or national data where available.
Any comment:	Reasonable

Data / Parameter:	$EF_{CO_2,i,y}$
Data unit:	tC/TJ (tCO ₂ e/TJ)
Description:	CO ₂ emission factor of fossil fuel type i in year y (tCO ₂ /GJ)
Source of data used:	<i>IPCC 2006 Revised Guidelines</i>
Value applied:	Values depend on specifically fuel, referring to Annex 3.
Justification of the choice of data or description of	According to the <i>Tool to calculate the emission factor for an electricity system</i> requirement, use IPCC default value.

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measurement methods and procedures actually applied :	
Any comment:	Reasonable

Data / Parameter:	OXID _{i,y}
Data unit:	%
Description:	Oxidation factor of the fuel <i>i</i> in year <i>y</i>
Source of data used:	<i>IPCC 2006 Revised Guidelines</i>
Value applied:	Values depend on specifically fuel, referring to Annex 3.
Justification of the choice of data or description of measurement methods and procedures actually applied :	According to the <i>Tool to calculate the emission factor for an electricity system</i> requirement, use IPCC default value.
Any comment:	Reasonable

Data / Parameter:	Internal use rate of power plant
Data unit:	%
Description:	The internal power consumption of power plants in year(s) <i>y</i>
Source of data used:	<i>China Electric Power Yearbook 2005-2007</i>
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:	

Data / Parameter:	CAP _{i,j,y}
Data unit:	MW
Description:	Installed capacities of power plant category <i>i</i> of province <i>j</i> in years <i>y</i> .
Source of data used:	<i>China Electric Power Yearbook 2005-2007</i>
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:	

B.6.3 Ex-ante calculation of emission reductions:

Step 1. Estimated the baseline emissions of greenhouse gases

Baseline emissions are calculated with combined baseline emission factor and the electricity

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delivered to the grid by the Project. The electricity delivered to the grid by the Project in year y (EG_y) is calculated as subtract the electricity import from the grid in year y ($EG_{aux,y}$) from the electricity exported to the grid in year y ($EG_{output,y}$), that is:

$$BE_y = EG_y \times EF_{grid,CM,y} = (EG_{output,y} - EG_{aux,y}) \times EF_{grid,CM,y} \quad (12)$$

Assuming the $EG_{aux,y} = 0$ in ex-ante calculation of emission reductions for the Project.

According to the *FSR* of the three Plants, the electricity exported to the grid in year y is estimated to be 30841.56 MWh. According to the calculation in B.6.1, the baseline emission factor for the Project is 0.87115tCO₂e/MWh and the annual baseline emission of the Project is:

$$BE_y = EG_y \times EF_{grid,CM,y} = (EG_{output,y} - EG_{aux,y}) \times EF_{grid,CM,y} = (30841.56 - 0) \text{ MWh} \times 0.87115 \text{ tCO}_2\text{e/MWh} = 26868 \text{ tCO}_2\text{e}$$

Step 2. Estimated project activity emissions

The Project is a run-of-river hydropower plant that the project emissions should not be considered as per AMS-I.D., i.e. $PE_y = 0$ tCO₂e.

Step 3. Estimated project leakage emissions:

As above AMS-I.D., the leakage of the Project is not considered, i.e. $L_y = 0$ tCO₂e.

Step 4. Estimated emission reductions

As per formula (11), the annual emission reductions of the Project are:

$$ER_y = BE_y - PE_y - L_y = 26868 \text{ tCO}_2\text{e}$$

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

It is expected that the proposed project activity will generate about 188076 tCO₂e emission reductions over the first 7-year crediting period from Jan. 2009 to Dec. 2015.

Year	Estimation of project activity emissions (tCO ₂ e)	Estimation of baseline emissions (tCO ₂ e)	Estimation of leakage (tCO ₂ e)	Estimation of overall emissions reductions (tCO ₂ e)
01/01/2009-31/12/2009	0	26868	0	26868
01/01/2010-31/12/2010	0	26868	0	26868
01/01/2011-31/12/2011	0	26868	0	26868
01/01/2012-31/12/2012	0	26868	0	26868

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01/01/2013-31/12/2013	0	26868	0	26868
01/01/2014-31/12/2014	0	26868	0	26868
01/01/2015-31/12/2015	0	26868	0	26868
Total (tonnes of CO₂e)	0	188076	0	188076

B.7 Application of a monitoring methodology and description of the monitoring plan:
B.7.1 Data and parameters monitored:

Data / Parameter:	$EG_{output,y}$
Data unit:	MWh
Description:	Electricity exported to the grid by the Project in year y
Source of data to be used:	Accurate value from meters.
Value of data	30841.56
Description of measurement methods and procedures to be applied:	Continuously measured by ammeters and automatically recorded by computer. Recorded per month by appointed staff as backup
QA/QC procedures to be applied:	Sales receipts/records to the grid are used to ensure the consistency
Any comment:	--

Data / Parameter:	$EG_{aux,y}$
Data unit:	MWh
Description:	Electricity imported from the grid in year y
Source of data to be used:	Assuming 0 in PDD, accurate value from meters.
Value of data	0
Description of measurement methods and procedures to be applied:	Continuously measured by ammeters and recorded monthly by appointed staff.
QA/QC procedures to be applied:	Duty meter and margin meter are used to ensure the consistency.
Any comment:	--

B.7.2 Description of the monitoring plan:
1. Purpose

Baseline emission factor of the Project is determined ex ante. Therefore the electricity delivered by the Project to the Southern China Power Grid (EG_y) is defined as the key data to be monitored. The monitoring plan is drafted to focus on monitoring the electricity delivered by the Project to the Southern China Power Grid. Meanwhile the electricity delivered to the grid by the Project in year y (EG_y) is calculated as subtract the electricity import from the grid in year y ($EG_{aux,y}$) from the electricity exported to the grid in year y ($EG_{output,y}$) therefore the electricity import from the grid in year y ($EG_{aux,y}$) and the electricity exported to the grid in year y ($EG_{output,y}$) are the key parameters to be monitored.

2. Monitoring Structure

The Project owner assigns the person in charge of CDM operation with assistance of the technological department and financial department. The structure shows as the following Figure 3.

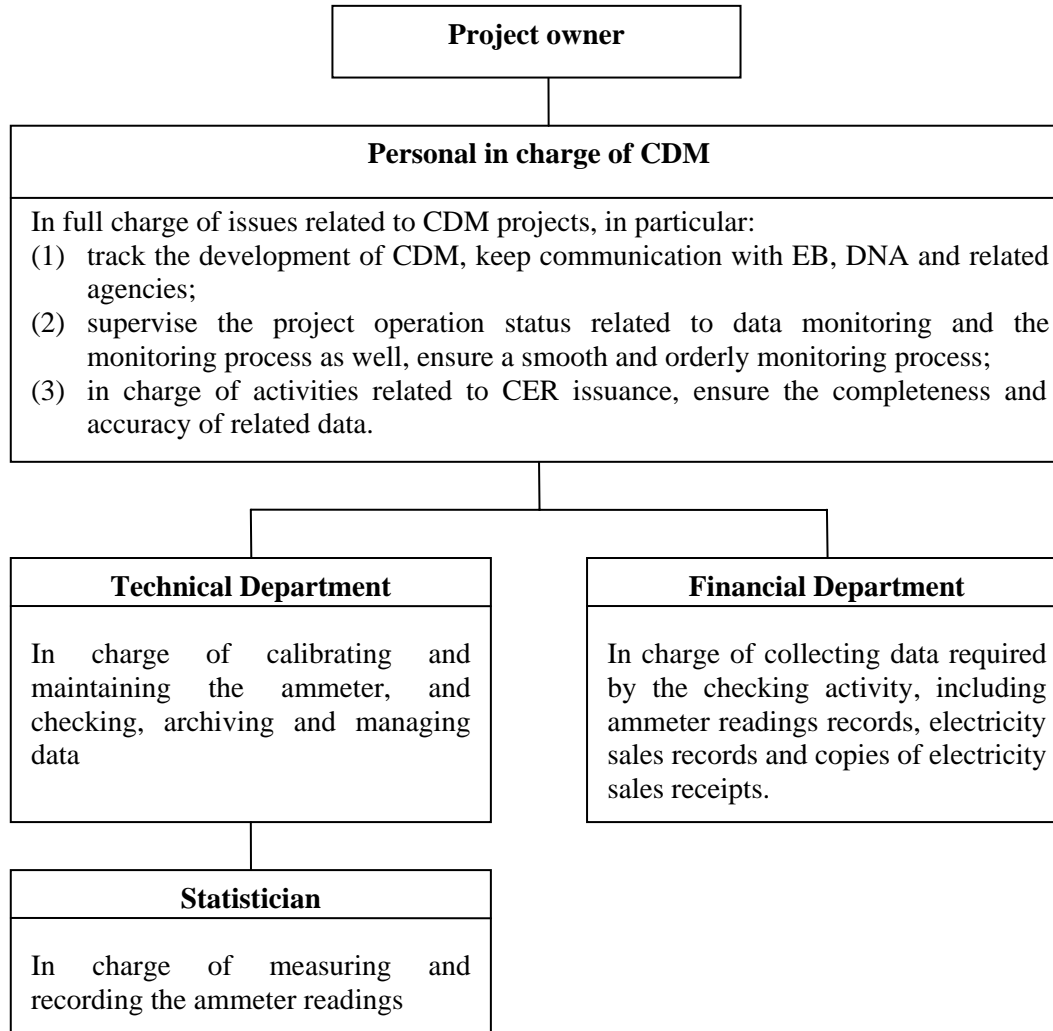


Figure 3. Management Structure of Monitoring Plan

3. Quality assurance and quality control procedures

Equipment and Installation of Monitoring

Electricity meters should meet the relevant local standards at the time of installation. Before the installation of the meters, it should be factory calibrated by the manufacturer. The meters will be installed by either the project developer or the grid company according to the national Chinese standard “electricity meter installation technical management code” (DL/T448-2000).

The main electricity meter for establishing the net electricity supplied to the grid will be installed at the output of each station. This electricity meter will be the revenue meter that measures the quantity of electricity that the project will supply to the grid ($EG_{output,y}$) as well as

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the electricity that the project will purchase from the grid ($EG_{aux,y}$). As this meter provides the main CDM measurement, it will be the key part of the verification process.

Training:

Some technicians come from electric power colleges. The others come from old power stations. The formal training has been hold before their duty. Before the formal operation of the proposed project, the personal in charge of CDM will organize the relevant personals to participate the CDM training. The period of the training will at least 3 working days.

Data Collection

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

Metering Electricity Supplied to the Grid (the revenue meter):

- (1) The data on the revenue meters are recorded separately by grid company and project owner each month.
- (2) The project owner offers relevant electricity sales receipt to grid company and keeps the photocopy of receipt; at the same time, the project owner keeps the purchase receipt which offered by grid company for showing the electricity imported.
- (3) The project owner records the net quantity of electricity offered to the grid (the net quantity of electricity offered to the grid is calculated as subtract the imported electricity from the exported electricity).

Metering of Electricity Generation from the Hydro Station (the Cross-check Meters)

The cross-check meters will be installed, operated and maintained according to the relevant Chinese standard to enable the use of the data as a cross check or back up in the case of a failure of the main meter. Every main meter reading will be crossed checked with the cross-check electricity meters.

Main meter failure – use of cross-check meter data:

If the main electricity meter is found to be faulty during its reading, data from the cross-check meters will be used in its place with a minor adjustment to allow for the losses.

Cross-check meter failure:

In the event of one of the cross-check meters failing, it will be repaired or replaced by an accredited equipment testing organisation. Maintenance records and any calibration documents will be retained by the project.

Calibration

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In order to maintain high precision for meters, the calibration should be implemented according to state and/or sector standards and rules and certificated after calibration.

The meters should be calibrated every year normally.

Within 10 days on the date of:

- (1) The error of duty meters and checking meters oversteps the permissible range;
- (2) Repairs due to meters failure.

All the installed meters should be tested by relevant qualified institution which designated by both project owner and grid company.

Data Management

The monitoring data should be saved at the end of each month, the regular summary should be made and reported to technology department by statistician periodic, all the data should be saved up to 2 years after the end of the crediting period.

4. Relevant Documents

Table 6 below outlines the key documents relevant to monitoring and verification of the emission reductions from the Project.

Table 6. List of the key documents relevant to monitoring and verification

I.D. No.	Document Title	Main Content	Source
A	PDD, including the electronic spreadsheets and supporting documentation (assumptions, estimations, measurement, etc)	Calculation procedure of emission reduction and monitoring items	the project owner, or directly download from UNFCCC website
B	Monitoring Quality Control and Quality Assurance Report	Equipments and national and industry standards	the project owner the grid company
C	The report on qualifications of the persons responsible for the monitoring and calculation	Major, the title of a technical post, working experience and etc.	the project owner the grid company
D	The report on monitoring and checking of the electricity delivered by the Project to the grid	Record based on monthly meter reading and electricity sales receipts/records	the project owner the grid company
E	Record on maintenance and calibration of metering equipment	Reasons for maintenance and calibration and the precision after maintenance and calibration	the project owner the grid company
F	Monitoring report	CO ₂ emission reduction calculation	the project owner
G	Letter of confirmation on B to F	Confirmation of monitoring and calculation data and procedure from B to F	The person in charge of CDM
H	Project Management Record (including data collection and	Comprehensive and true reflection of the	the project owner

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

The application of the baseline study and monitoring methodology of the Project was completed on 26/08/2008 by:

Miss. Haifeng jiang

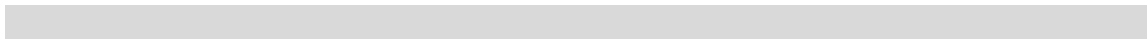
Email: jianghf@accordgetc.com.

Tel:+86(0) 10 59712655-619

Fax: +86(0) 10 59712656

Entity: Accord Global Environment Technology (Beijing) Co., Ltd.

The person/entity is not project participant listed in Annex 1.



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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

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:

01/01/2009 whenever later the date the project be registered as CDM project.

C.2.1.2. Length of the first crediting period:

7years.

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

Not applicable.

C.2.2.2. Length:

Not applicable.

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

Environmental Impact Assessment Report has been developed by Honghe Environment Science Research Institute and has been approved by Lincang City Environment Protection Bureau in 2006. According to the *Environmental Impact Assessment Report*, the environment impacts possibly caused by the Project and the corresponding measures adopted by the Project owner are analyzed as followings:

Land use

The Project is small-scale low-dam water intake, no object was submerged. No house was occupied by the permanent buildings such as dam, diversion construction, workshop and road, therefore, no migrants should be settled. 292.5Mu lands will be occupied permanently and 93.4Mu lands will be temporarily occupied by the Project during the Project construction period. To ensure the lives of residents occupied lands the Project owner provided compensation according to the cumulative value of the occupation land; The temporary occupation land should be returned to the farmers after the finishing of the Project.

Air pollution

The main impact on the surrounding atmosphere by the Project is mainly the dust generated in the course of drilling, blasting, using of construction materials such as cement; the dust caused by vehicle transporting; organic hydrocarbons, CO, SO₂, NO₂ generated by machinery fuel burning. However, due to there is no settlements near the site the construction workers are the only object influenced. And because of the total quantity of air pollutants is small and pollutants generation is intermittent and transient, in the construction site with good ventilation environment and appropriate labor insurance measures were taken by the construction staff the impact of the construction can be reduced. At the same time, the project owner has also taken certain measures to reduce air pollution: taking wet or closed operation method during the construction; strengthening the maintaining of the large-scale machine to decrease the emission of pollution; sprinkling water on the road; operators adopt labour insurance and post shifting system to reduce the impact of the air pollution.

Noise

Noise mainly generated by vehicles transportation, construction, excavation and explosion with the character of high level, ruleless and unexpected. The measures which are adopted by the construction units includes: Arrange construction time reasonably to avoid excavating during the rest time; Use equipment with low noise; strengthen the maintenance of equipment; The operators near the facilities are main noise receivers and labour insurances are adopted by the

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operators to reduce the noise impacts. There are no residential areas within 1km around the construction site, noise only impact in a certain small area.

Waste water

Production wastewater generated at the operation course of foundation excavation, cofferdam construction, concrete mixing and machine maintenance. Production wastewater has a high concentration of suspended solids and higher PH. Domestic sewage is mainly comprised of cleaning sewage water and human excrement. Measures taken by the Project owner are: set up wastewater recycling system in the construction material processing; concrete mixing wastewater should be discharged after treatment; domestic sewage should be first dealt with the settlement pond, then treated by septic tanks which is finally be used as the green water.

Solid waste

Solid waste composes of engineering discarded solid generated during the construction and residential garbage. All engineering discharged solid will be used recycled and the residential garbage will be collected and regularly sent to garbage disposal station.

Ecological impact

There is no rare animals and vegetation in the Project area. The vegetation of built-up areas is basically a secondary bushes and artificial vegetation and this type of vegetation is widely distributed in the region. Therefore, no great impact on the vegetation can be caused by the Project. Terrestrial animals in the region is mainly ordinary small rodents with broad distribution area and large number in the region. The ecological and environmental changes caused by the reservoir construction is still suitable for the animals' growth and reproduction. Therefore, no great impact on terrestrial animals generated by the Project. The Project is located in the areas with higher human activity and fish resources have been destroyed greatly, which result in a small number of fish populations. Therefore, the influence of construction of the dam on the fish population is not obvious.

The Project owner also take a series of protective measures: shed and material field was built in the open area with no vegetation and never disturbed the local vegetation; safe use of fire to prevent forest fires; and strengthening the awareness of the construction staff on wildlife and ecological environment protection and so forth.

In summary, the Project will not bring significant impacts on the environment.

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

Environmental impacts of the Project are not considered significantly.

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

The stakeholders identified for the Project are the residents near the Project and local government. The investigation was implemented in 02/2008, Total 50 questionnaires are distributed and 50 questionnaires are returned, with 100% response rate. The questionnaire includes:

- The stakeholder's attitude to the implementation of the Project;
- The positive effects cause of construction and operation of the Project;
- The negative effects cause of construction and operation of the Project;
- Any suggestion for mitigating the identified negative effects.

E.2. Summary of the comments received:

Based on the 50 returned questionnaires, the summary of the comments of each power plant shows:

- 100% of the respondents support the Project construction, no respondent is against the Project;
- Possible positive impacts considered by the people surveyed to be caused by the construction of the Project include improvement of living conditions (100%), increases in income (100%), increases in electricity supply (100%), reduction of electricity price (84%), creation of employment opportunities (100%);
- Possible negative impacts as a result of the construction of the Project concerned by the people surveyed include destruction of land occupation (96%), solid waste (90%), decreases in the output of arable land (88%), noises generated (12%);
- All of the 50 informant whose land occupied or the Project impact their using water are all obtain satisfied compensation;
- In addition, during the investigation the issues people cared more include:
 - Hope that the land compensation can be delivered in full;
 - Hope that the local labour force can participate in power station construction, and increase revenue;
 - Hope waterway improvement to facilitate transport and water aquaculture to increase revenue;

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

The Project owner take account the problems provided in the questionnaires as following:

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- (1) For the issue of land occupation, the Project owner promised to minimize the land occupation as far as possible. Temporary land occupation should be afforested timely to restore the original vegetation after the end of the construction. In addition, the Project provides compensation strictly according to the relevant laws and regulations and all the people whose lands were occupied were satisfied with the compensation;
- (2) For the issue of solid waste, the Project owner commit that the solid waste generated during the Project will be used recycled as far as possible. Those can not be used will be transported to 20 disposal sits .
- (3) For the issue of decreases in the output of arable land, the Project owner promised to build a new water-inducting channel to guarantee irrigation water using and keep the steady of agriculture output; on the other hand increasing water use efficiency is necessary and encouraged;
- (4) For the issue of the noise, the Project owner adopts modern and high-quality equipments for constructing and avoid constructing during rest-time and night-time;
- (5) In addition:
 - The Project owner will help to recommend local labour forces to participate in the construction of the power station;
 - Through the method of putting fry to the reservoir to increase the output of fish;
 - The Project owner will be in strict accordance with the relevant requirements of EIA to implement environmental protection measures. After the completion the Project can put into operation only after the check and acceptance by the environmental protection departments;

The Project owner will enhance the communication with the residents and local government, reduce negative impacts brought by the Project and promote local economy development.

In conclusion, the Project obtained support from local residents and government thus modification and adjustment on design, construction and operation of the Project are unnecessary.

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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 this Project.

Annex 3**BASELINE INFORMATION**

Data recommended in the 2008 *Baseline Emission Factor of Chinese Grid* for Southern China Power Grid are adopted for the Project.

The information provided by the tables includes data, data sources and the underlying calculations.

Table 3.1 Electricity generation of the Southern China Power Grid in 2004

Province	Electricity generation (MWh)	Auxiliary electricity consumption (%)	Electricity delivered to the grid (MWh)
Guangdong	169389000	5.42	160,208,116
Guangxi	20143000	8.33	18,465,088
Guizhou	49720000	7.06	46,209,768
Yunnan	24322000	7.56	22,483,257
Total			247,366,229

Data source: China Electric Power Yearbook 2005

Table 3.2 Electricity generation of the Southern China Power Grid in 2005

Province	Electricity generation (MWh)	Auxiliary electricity consumption (%)	Electricity delivered to the grid (MWh)
Guangdong	176453000	5.58	166,606,923
Guangxi	25023000	7.95	23,033,672
Guizhou	58430000	7.34	54,141,238
Yunnan	27281000	6.94	25,387,699
Total			269,169,531

Data source: China Electric Power Yearbook 2006

Table 3.3 Electricity generation of the Southern China Power Grid in 2006

Province	Electricity generation (MWh)	Auxiliary electricity consumption (%)	Electricity delivered to the grid (MWh)
Guangdong	188429000	5.27	178,498,792
Guangxi	27967000	4.45	26,722,469
Guizhou	76039000	6.06	71,431,037
Yunnan	39791000	4.12	38,151,611
Total			314,803,908

Data source: China Electric Power Yearbook 2007

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Table 3.4 Calculation of simple OM emission factor of the Southern China Power Grid in 2004

Fuel	Unit	Guangdong	Guangxi	Guizhou	Yunnan	Toal fuel	Default carbon content (tC/TJ)	Oxidation Rate (%)	NCV (MJ/t or 1000m ³)	Emission (tCO ₂ e) ¹²
		A	B	C	D					
coal	10 ⁴ t	6017.7	1305	2643.9	1751.28	11717.88	25.8	100	20908	231767573.55
Cleaned coal	10 ⁴ t	0.21				0.21	25.8	100	26344	5233.50
Other washed coal	10 ⁴ t					0	25.8	100	8363	0.00
Coke	10 ⁴ t					0	29.2	100	28435	0.00
Coke oven gas	10 ⁸ m ³					0	12.1	100	16726	0.00
Other gas	10 ⁸ m ³	2.58				2.58	12.1	100	5227	59831.38
Crude oil	10 ⁴ t	16.89				16.89	20	100	41816	517932.98
Gasoline	10 ⁴ t					0	18.9	100	43070	0.00
Diesel oil	10 ⁴ t	48.88			1.83	50.71	20.2	100	42652	1601975.28
Fuel oil	10 ⁴ t	957.71				957.71	21.1	100	41816	30983494.25
LPG	10 ⁴ t					0	17.2	100	50179	0.00
Refinery gas	10 ⁴ t	2.86				2.86	15.7	100	46055	75825.26
Nature gas	10 ⁸ m ³	0.48				0.48	15.3	100	38931	104833.40
Other oil products	10 ⁴ t	1.66				1.66	20	100	38369	46707.86
Other coking products	10 ⁴ t					0	25.8	100	28435	0.00
Other energy	10 ⁴ tCe	79.42				79.42	0	100	0	0.00
Total emission of the China Southern Power Grid (tCO₂e) J						265163407.45				
Fossil power supply of the China Southern Power Grid (MWh) K						247,366,229				
Imported electricity from the Central China Grid (MWh) L						10,951,240				
Emission factor of Central China Grid (tCO₂e/MWh) M						0.827319				
Total emission (tCO₂e) N=J+L*M						274,223,576				
Total electricity delivered to the grid (MWh) O=K+L						258,317,469				

Data sources: China Energy Statistical Yearbook 2005

¹² If the unit is 10⁴t, I=G*H*F*E*44/12/10²; if the unit is 10⁸m³, I=G*H*F*E*44/12/10. The same calculations used in Table 3.5 and Table 3.6.

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Table 3.5 Calculation of simple OM emission factor of the Southern China Power Grid in 2005

Fuel	Unit	Guangdong	Guangxi	Guizhou	Yunnan	Toal fuel	Default carbon content (tC/TJ)	Oxidation Rate (%)	NCV (MJ/t or 1000m ³)	Emission (tCO ₂ e)
		A	B	C	D					
coal	10 ⁴ t	6696.47	1435	3212.31	1975.55	13319.33	25.8	100	20908	263442601.85
Cleaned coal	10 ⁴ t				0.15	0.15	25.8	100	26344	3738.21
Other washed coal	10 ⁴ t			10.39	33.88	44.27	25.8	100	8363	350237.59
Coke	10 ⁴ t	4.79			8.05	12.84	29.2	100	28435	390906.18
Coke oven gas	10 ⁸ m ³				0.79	0.79	12.1	100	16726	58624.07
Other gas	10 ⁸ m ³	1.87			15.96	17.83	12.1	100	5227	413485.84
Crude oil	10 ⁴ t	10.91				10.91	20	100	41816	334555.88
Gasoline	10 ⁴ t	0.68				0.68	18.9	100	43070	20296.31
Diesel oil	10 ⁴ t	31.96	2.02		1.81	35.79	20.2	100	42652	1130638.84
Fuel oil	10 ⁴ t	887.21				887.21	21.1	100	41816	28702703.26
LPG	10 ⁴ t					0	17.2	100	50179	0.00
Refinery gas	10 ⁴ t	4.92				4.92	15.7	100	46055	130440.66
Nature gas	10 ⁸ m ³	0.93				0.93	15.3	100	38931	203114.71
Other oil products	10 ⁴ t	1.7				1.7	20	100	38369	47833.35
Other coking products	10 ⁴ t					0	25.8	100	28435	0.00
Other energy	10 ⁴ tCe	104.66	133.15		59.72	297.53	0	100	0	0.00
Total emission of the China Southern Power Grid (tCO₂e) J						295229176.74				
Fossil power supply of the China Southern Power Grid (MWh) K						269,169,531				
Imported electricity from the Central China Grid (MWh) L						96,363,000				
Emission factor of Central China Grid (tCO₂e/MWh) M						0.772159				
Total emission (tCO₂e) N=J+L*M						369,636,773				
Total electricity delivered to the grid (MWh) O=K+L						365,532,531				

Data sources: China Energy Statistical Yearbook 2006

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Table 3.6 Calculation of simple OM emission factor of the Southern China Power Grid in 2006

Fuel	Unit	Guangdong	Guangxi	Guizhou	Yunnan	Toal fuel	Default carbon content (tC/TJ)	Oxidation Rate (%)	NCV (MJ/t or 1000m ³)	Emission (tCO ₂ e)
		A	B	C	D	E=A+B+C+D	F	G	H	I=G*H*F*E*44/12/10 ²
coal	10 ⁴ t	7303.19	1490.01	4001.54	2735.88	15530.62	25.8	100	20908	307179636.00
Cleaned coal	10 ⁴ t					0	25.8	100	26344	0.00
Other washed coal	10 ⁴ t			19.53	45.8	65.33	25.8	100	8363	516851.63
Coke	10 ⁴ t	133.75				133.75	26.6	100	20908	2727466.02
Coke oven gas	10 ⁸ m ³				1.31	1.31	29.2	100	28435	39882.17
Other gas	10 ⁸ m ³		0.84		2.06	2.9	12.1	100	16726	215202.29
Crude oil	10 ⁴ t	0.89			19.15	20.04	12.1	100	5227	464736.75
Gasoline	10 ⁴ t	0.87				0.87	20	100	41816	26678.61
Diesel oil	10 ⁴ t					0	18.9	100	43070	0.00
Fuel oil	10 ⁴ t	29.92	1.26		3	34.18	20.2	100	42652	1079777.46
LPG	10 ⁴ t	685.85	0.09			685.94	21.1	100	41816	22191287.60
Refinery gas	10 ⁴ t					0	17.2	100	50179	0.00
Nature gas	10 ⁸ m ³					0	15.7	100	46055	0.00
Other oil products	10 ⁴ t	7.92				7.92	15.3	100	38931	1729751.05
Other coking products	10 ⁴ t	0.67				0.67	20	100	38369	18851.97
Other energy	10 ⁴ tCe					0	25.8	100	28435	0.00
Total emission of the China Southern Power Grid (tCO₂e) J								336190122		
Fossil power supply of the China Southern Power Grid (MWh) K								314,803,908		
Imported electricity from the Central China Grid (MWh) L								21,730,840		
Emission factor of Central China Grid (tCO₂e/MWh) M								0.77134		
Total emission (tCO₂e) N=J+L*M								352,951,910		
Total electricity delivered to the grid (MWh) O=K+L								336,534,748		

Data sources: China Energy Statistical Yearbook 2007

$$EF_{OM,y} = (N_{2002} + N_{2003} + N_{2004}) / (O_{2002} + O_{2003} + O_{2004}) = 1.0607 \text{ tCO}_2\text{e/MWh}$$

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Table 3.7 Data and result of Step (1)

Fuel	Unit	Guangdong	Guangxi	Guizhou	Yunnan	Total fuel	NCV (MJ/t 或 1000m ³) F	Default carbon content (tC/TJ) G	Oxidation Rate H	Emission (tCO ₂ e) I=G*H*F*E*44 /12/10
		A	B	C	D	E=A+B+C+D				
Coal	10 ⁴ t	7303.19	1490.01	4001.54	2735.88	15530.62	20908	25.8	1	307179636
Cleaned coal	10 ⁴ t					0	26344	25.8	1	0
Other washed coal	10 ⁴ t			19.53	45.8	65.33	8363	25.8	1	516852
coke	10 ⁴ t	133.75				133.75	20908	26.6	1	2727466
Total solid fuel										310463836
Oil	10 ⁴ t	0.87				0.87	41816	20	1	26679
Gasoline	10 ⁴ t					0	43070	18.9	1	0
Kerosene	10 ⁴ t					0	43070	19.6	1	0
Diesel oil	10 ⁴ t	29.92	1.26		3	34.18	42652	20.2	1	1079777
Fuel oil	10 ⁴ t	685.85	0.09			685.94	41816	21.1	1	22191288
Other oil products	10 ⁴ t	0.67				0.67	38369	20	1	18852
Total liquid fuel										23316596
Nature gas	10 ⁷ m ³	0.93				0.93	38931	15.3	1	203114.7063
Coke oven gas	10 ⁷ m ³				0.79	0.79	16726	12.1	1	58624.07247
Other coal gas	10 ⁷ m ³	1.87			15.96	17.83	5227	12.1	1	413485.8424
LPG	10 ⁴ t					0	50179	17.2	1	0
Finery gas	10 ⁴ t	4.92				4.92	46055	15.7	1	130440.6554
Total gas fuel										2409690
Total										336190122

Data sources: China Energy Statistical Yearbook 2007

Table 3.8 Emission factor of best technology

	Variable	Electricity supply efficiency	Carbon content of fuel* (tC/TJ)	Oxidation rate*	Emission factor (tCO ₂ /MWh)
		A	B	C	D=3.6/A/1000*B*C44/12
Coal-based power plants	$EF_{Coal,Adv}$	37.28%	25.8	1	0.9135
Gas-based power plants	$EF_{Gas,Adv}$	48.81%	15.3	1	0.4138
Oil-based power plants	$EF_{Oil,Adv}$	48.81%	21.1	1	0.5706

Calculate with formula (7), (8) and (9), the value for λ_{COAL} is 92.35%, the value for λ_{OIL} is 6.94% and the value for λ_{GAS} is 0.72% Therefore :

$$EF_{Thermal} = \lambda_{COAL} \times EF_{Coal,Adv} + \lambda_{OIL} \times EF_{Oil,Adv} + \lambda_{GAS} \times EF_{Gas,Adv} = 0.8862 \text{ MWh}_o$$

Table 3.9 Installed capacity of the Southern China Power Grid in 2006

	Guangdong	Guangxi	Guizhou	Yunnan	Tianshengqiao Hydro Power Station	Total
Thermal power (MW)	35182.6	4931.2	9634.8	4758.4	0	54507
Hydro power (MW)	6635.7	6085.3	4713	7993.1	2520	27947.1
Nuclear power (MW)	3780	0	0	0	0	3780
Wind power and Other (MW)	2483.4	0	0	0	0	2483.4
Total (MW)	48081.7	11016.5	14347.8	12751.5	2520	88717.5

Data source: China Electric Power Yearbook 2006

Table 3.10 Calculation of BM emission factor of the Southern China Power Grid

	Installed capacity in 2004 (MW) A	Installed capacity in 2005 (MW) B	Installed capacity in 2006 (MW) C	Capacity additions from 2004 to 2006 (MW) D=C-A	Share in total capacity additions
Thermal power	46659.7	54507	68963	22303.3	76.91%
Hydro power	27580.1	30347.1	34176	6595.9	22.75%
Nuclear power	3780	3780	3780	0	0.00%
Wind power and other	83.4	83.4	183	99.6	0.34%
Total	78103.2	88717.5	107102	28998.8	100.00%

$$EF_{BM,y} = 0.8862 \times 76.91\% = 0.6816 \text{ tCO}_2\text{e/MWh}$$

Annex 4

MONITORING INFORMATION

The calibration of meters & metering, the QA/QC procedure and others of the monitoring plan should be carried out with reference to the Power Purchase Agreement of the Project, the Parallel Operation Agreement of the Project and the checking and testing standard and the specification of the monitoring equipments. No other additional information.
