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

CONTENTS

Revision history of this document

Version Number	Date	Description and reason of revision
01	21 January 2003	Initial adoption
02	8 July 2005	1. The Board agreed to revise the CDM SSC PDD to reflect guidance and clarifications provided by the Board since version 01 of this document. 2. As a consequence, the guidelines for completing CDM SSC PDD have been revised accordingly to version 2. The latest version can be found at <http://cdm.unfccc.int/Reference/Documents>.
03	22 December 2006	3. The Board agreed to revise the CDM project design document for small-scale activities (CDM-SSC-PDD), taking into account CDM-PDD and CDM-NM.

SECTION A. General description of small-scale project activity

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

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Project: Yunxi Cascade Hydropower Project in Chun'an

Version: 11

Date: 12/01/2012

Revision history of the PDD:

Version	Date	Comments
Version01	25/06/2008	PDD submitted to DOE for GSP
Version02	25/08/2009	Revised PDD according to Table 3
Version03	12/08/2010	Revised PDD according to Table 3 Ver2
Version04	11/11/2010	Revised PDD according to Table 3 Ver3
Version05	13/04/2011	Revised PDD according to Table from TR
Version06	22/05/2011	Revised PDD according to Second Table from TR
Version07	30/06/2011	Revised PDD according to Second Table from TR
Version08	25/07/2011	Revised PDD according to Second Table from TR
Version09	15/09/2011	Revised PDD according to Second Table from TR
Version10	04/01/2012	Revised PDD according to Third Table from TR
Version11	12/01/2012	Revised PDD according to Third Table from TR

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

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Yunxi Cascade Hydropower Project in Chun'an(hereafter referred to as the proposed project or the Project) is located on the upstream of Jinxian River Yunxi Basin northwest of Chun'an county. The project is a diversion type of run-of-river hydropower station, includes two levels with a total installed capacity of the Project is 5MW. The first level station will employ one set of turbine, the installed capacity is 4MW, which corresponds to a net annual electricity supply to the grid of 8,237MWh, the surface area is 108,500 m^2, the dam height is 42.5m and the water head of hydro turbine is 243.5m. The second level station will employ two turbines with a total installed capacity of 1MW which corresponding to a net annual electricity supply to the grid of 2,386MWh, the surface area is 8,333 m^2, the dam height is 42.5m and the water head of hydro turbine is 25m-80m.

As a grid-connected renewable energy project, the proposed project utilises hydrological resources to generate the electricity which is to be sold into the Zhejiang Grid, a sub-grid of an independent regional grid-East China Grid (ECG). The proposed project activity will achieve greenhouse gas (GHG) emission reductions by avoidance the emissions from the coal-dominated business-as-usual scenario of the ECG. It is estimated that the net annual amount of electricity supplied to the ECG by the proposed project is 10,623MWh, which would reduce 66,094 tCO_2e during the first crediting period. The proposed project will not only supply green electricity to grid, but also contribute to sustainable development of the local community, the host country and the world in the social, economic, and environmental by means of:

- Supply clean electricity to the grid and reduce GHG emissions since the portfolio of energy supply in Zhejiang province is still dominated by large scale thermal power plants.

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- Reduce emissions of environmental pollutants, such as the CO, SO_2 and dust derived from thermal power plants.
- Support the underprivileged and the poverty-stricken region and increase the local incomes.
- Create job opportunities during the project construction and operation period.

A.3. Project participants:

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Please list project participants and Party(ies) involved and provide contact information in Annex 1. Information shall be in indicated using the following tabular format.

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)
The People's Republic of China (host)	Chun'an Yunxi Tongda hydropower development Co., Ltd.	No
UK	Trading Emissions PLC	No

(*) In accordance with the CDM modalities and procedures, at the time of making the CDM-PDD public at the stage of validation, a Party involved may or may not have provided its approval. At the time of requesting registration, the approval by the Party(ies) involved is required.

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

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

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A.4.1.1. Host Party(ies):

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The People's Republic of China

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

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Zhejiang Province

A.4.1.3. City/Town/Community etc:

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Hangzhou City, Chun'an County

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

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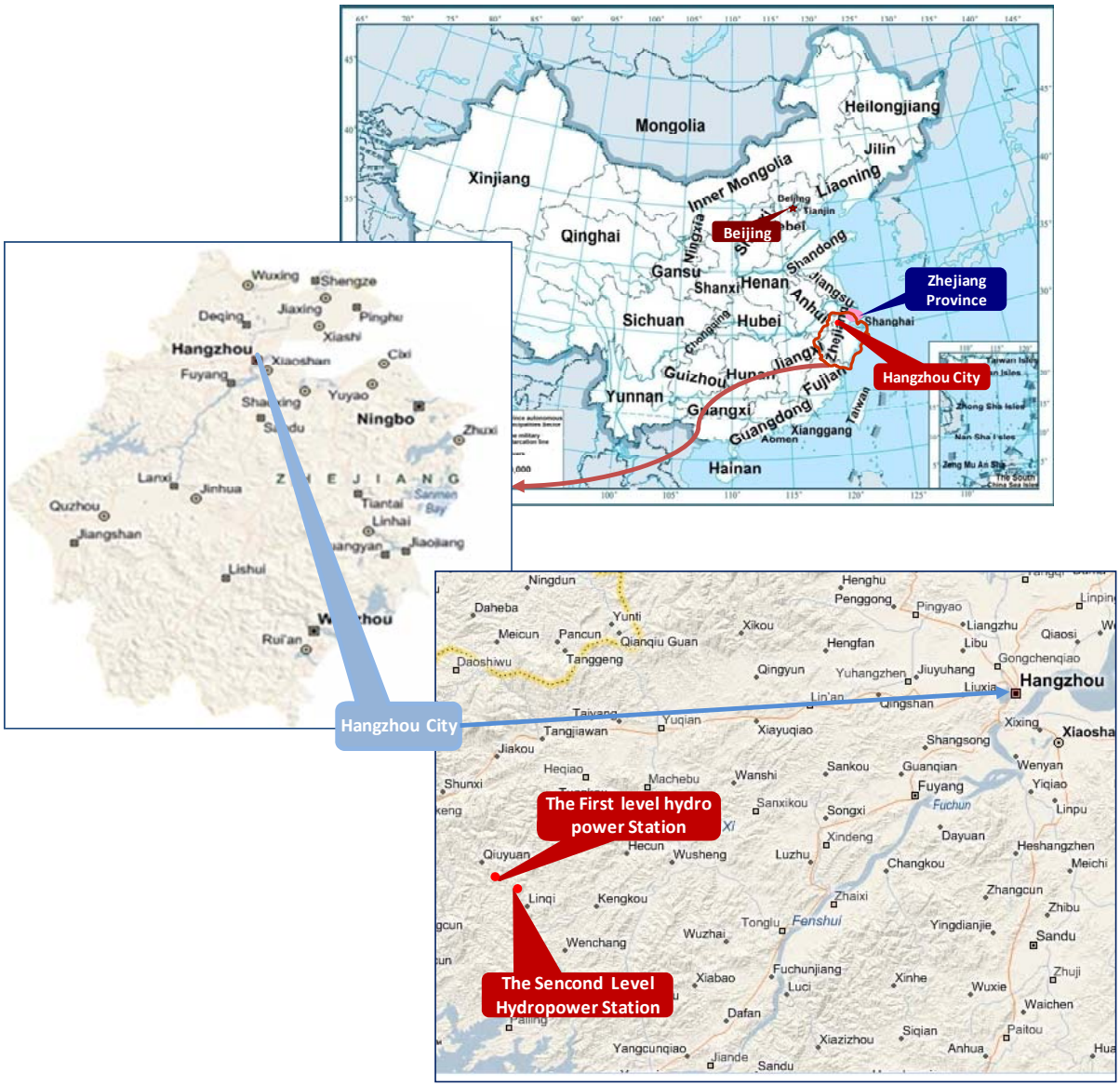
The proposed project is located on the upstream of Jinxian River northwest of Chun'an County, approximately 7km away from the Yaoshan Town government, with the coordinate of 29°47′25″N,119°21′34″E(First level power station) and 29°45′26″N,119°23′43″E(Second level power station) For information in detail, please refer to the following map:

Figure1. Geography Location of the Project



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

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According to the categorization of 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.: Grid Connected Renewable Energy Generation

Sub-category: Hydro

The proposed project is a new cascade-type hydropower station and each station has the main buildings

consist of a dam, conduct water system, a powerhouse, and a booster stations. The water flows through the dam and hydropower station to rotate the turbine to generate electricity, then the water flows into the downstream of the river. As the main equipments, the turbines and generators used by the proposed project are designed and manufactured domestically. The key technical indicators of the hydro turbines and generators of the proposed project are listed in Table 1.

Table1 .Key technical index of the key equipments of the proposed project

Key index		First Level	Second Level
Hydro turbines	Type	HLA351-WJ-71	HLA194-WJ-50
	Number	1	2
	Head（m）	243.5	25-80
	Flow (m^3/s)	1.9	0.84-1.60
	Output（kw）	4167	178-1067
Generators	Type	SFW2-J4000-4/1480	SFW500-6/850
	Number	1	2
	Rated power(Kw)	4000	500
	Rated voltage(Kv)	6.3	400

Data sources: PDR and Equipment optimization report

The electricity output from Yunxi First and Yunxi Sencond hydro power stations will adopt 35KV transmission lines and connect to Linqi substation, which is a part of ECG.

With all technologies and facilities provided domestically. The proposed project involves no technology transfer from abroad.

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

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The chosen crediting period for the Project is 7×3 years. During the first crediting period, 1st Jul 2012to 30st Jun 2019, the Project is expected to lead to emission reductions of 66,094tCO_2e. The estimated amount of emission reductions over the chosen crediting period is indicated below.

Years	Annual estimation of emission reductions in tonnes of CO_2e
01/07/2012-31/12/2012	4,721
2013	9,442
2014	9,442
2015	9,442
2016	9,442
2017	9,442
2018	9,442
01/01/2019-30/06/2019	4,721
Total estimated reductions (tonnes of CO_2e)	66,094
Total number of crediting years	7
Annual average over the crediting period of estimated reductions (tonnes of CO_2e)	9,442

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

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

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

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The project participants confirm that there is no registered small-scale CDM project activity or a request for registration for another small-scale project activity:

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

According to "*the Simplified Modalities and Procedures for Small-scale CDM Project Activities, Attachment C*", the Project is not a debundled component of a larger project activity.

SECTION B. Application of a baseline and monitoring methodology

B.1. Title and reference of the approved baseline and monitoring methodology applied to the small-scale project activity:

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The methodology applied for the proposed project is the approved methodology for small-scale CDM project- AMS.I.D. "Grid connected renewable electricity generation" (Version 17). For more information regarding the methodology, please refer to:
http://cdm.unfccc.int/methodologies/SSCmethodologies/approved.html

ACM0002 "Consolidated baseline methodology for grid-connected electricity generation from renewable sources" (Version 12.1). For more information regarding the methodology, please refer to:
http://cdm.unfccc.int/methodologies/DB/C505BVV9P8VSNNV3LTK1BP3OR24Y5L

"Tool to calculate the emission factor for an electricity system" (Version 2.2.1). For more information regarding the methodology, please refer to:

http://cdm.unfccc.int/EB/050/eb50_repan14.pdf

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

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Yunxi first level is satisfies the applicable condition of AMS-I.D.(version 17):

1. The installed capacity of the Project is 4MW, which is less than 15MW.

2. The Project activity is a renewable electricity project (hydroelectric).

3. The electricity generated by the Project will be connected with ECG, which is dominated by fossil fuel generation.

4. The Project activity is not a combined heat and power (co-generation) system.

5. The Project is a newly-built project, which does not involve the retrofit or modification part for existing facility for renewable energy generation.

6. The proposed project does not have a non-renewable component.

7. The project activity results in new reservoirs. The power density is 36.8 W/m^2 which is higher than 4W/m^2.[1]

Yunxi second level is satisfies the applicable condition of AMS-I.D.(version 17):

1. The installed capacity of the Project is 1MW, which is less than 15MW.

2. The Project activity is a renewable electricity project (hydroelectric).

3. The electricity generated by the Project will be connected with ECG, which is dominated by fossil fuel generation.

4. The Project activity is not a combined heat and power (co-generation) system.

5. The Project is a newly-built project, which does not involve the retrofit or modification part for existing facility for renewable energy generation.

6. The proposed project does not have a non-renewable component.

7. The project activity results in new reservoirs. The power density is 120W/m^2 which is higher than 4W/m^2.[2]

The whole project is satisfies the applicable condition of AMS-I.D.(version 17):

1. The installed capacity of the Project is 5MW, which is less than 15MW.

2. The Project activity is a renewable electricity project (hydroelectric).

3. The electricity generated by the Project will be connected with ECG, which is dominated by fossil fuel generation.

4. The Project activity is not a combined heat and power (co-generation) system.

5. The Project is a newly-built project, which does not involve the retrofit or modification part for existing facility for renewable energy generation.

6. The proposed project does not have a non-renewable component.

7. The project activity results in new reservoirs. The power density of Yunxi first level is 36.8 W/m^2 which is higher than 4W/m^2 and the power density of Yunxi second level is 120W/m^2 which is higher than 4W/m^2.

As described above, the approved small-scale methodology, AMS-I.D: "Grid connected renewable electricity generation" is applicable to the proposed project.

B.3. Description of the project boundary:

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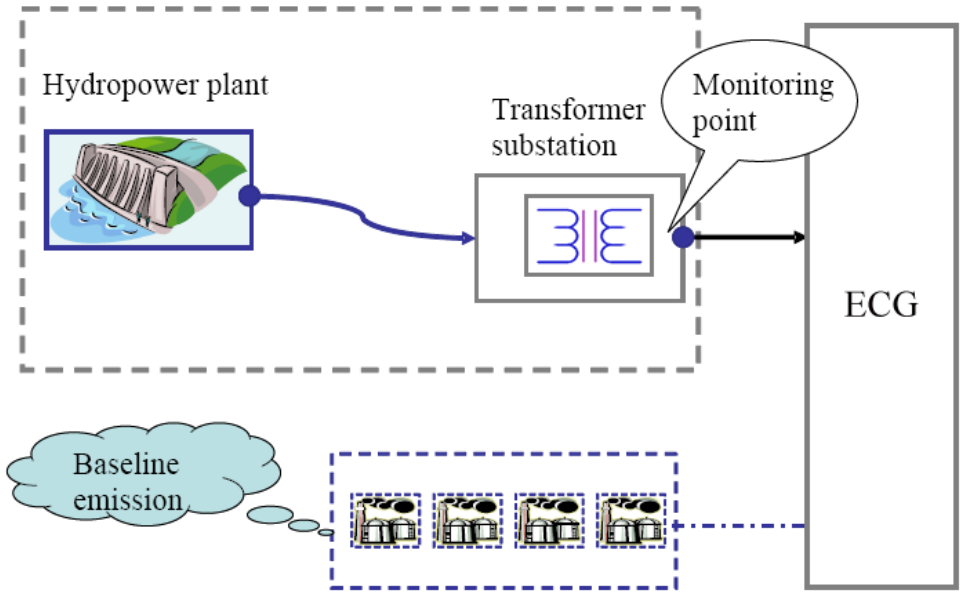
Based on the methodology AMS-I.D.(Version 17), the project boundary encompasses the physical,

[1] The surface area is 108,500 m^2. The installed capacity of the project is 4MW. Therefore, the power density is 36.8 W/m^2.

[2] The surface area is 8,333 m^2. The installed capacity of the project is 1MW. Therefore, the power density is 120W/m^2.

geographical site of the renewable generation source.

Moreover, the electricity displaced by the Project should be the electricity generated by the ECG. Therefore, the Project boundary also encompasses those fossil fuel-fired power plants physically connected into the ECG. According to the guideline published in 2008 by China DNA[3] the geographical range of the ECG includes Shanghai, Jiangsu, Zhejiang, Anhui and Fujian grids.



Emission sources included or excluded from the boundary are listed below:

Source		Gas	Included?	Justification / Explanation
Baseline	Power plant of ECG	CO_2	Included	Main emission source.
		CH_4	Excluded	Excluded for simplification. This is conservative.
		N_2O	Excluded	Excluded for simplification. This is conservative.
Project Activity	Project Emission	CO_2	Excluded	This Project is a hydropower project with no CO_2 discharge.
		CH_4	Excluded	The power density of two levels are 36.8W/ m^2 and 120W/ m^2, which all higher than 10W/m^2. According to the methodology, the CH_4 emission is 0.
		N_2O	Excluded	This is a renewable energy generation project. No N_2O discharge.

B.4. Description of baseline and its development:

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The baseline of the Project is determined based on the methodology AMS-I.D.(Version 17).

The project is a new built hydropower plant delivering electricity to ECG, so the baseline scenario of the project is electricity delivered to the ECG by the project that would otherwise have been generated by the existing power plants and addition of new generation sources within ECG.

[3] http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/2008/20081230102527637.pdf

According to the methodology AMS-I.D, the baseline emissions are the product of electrical energy baseline expressed in MWh of electricity produced by the renewable generating unit multiplied by the grid emission factor. Therefore, the baseline emission of the Project is the baseline emission factor of ECG multiplied by the electricity produced by the Project.

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

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Prior consideration of CDM

The implementation timeline of the level 1 is indicated below:

Date	Key Event
9/2003	Environmental Impact Assessment (EIA) report.
24/10/2003	Approval reply for EIA report.
12/10/2005	Preliminary Design Report of the proposed project.
27/4/2006	Approval of the PDR
7/6/2006	Equipment optimization report
13/7/2006	Approval of equipment optimization
8/8/2006	The shareholders' meeting made a decision to apply for CDM.
1/3/2007	The project owner signed the CDM development contract with CCT.
30/11/2007	The project owner signed the equipment purchase contract of first level.
10/2007	The project owner signed the ERPA with Mandarin Global Carbon Ltd.
20/11/2007	The project owner Received approval of Construction.(The construction start date)
22/11/2007	The project owner signed the Construction contract of the project. (Include the dam, conduct water system, powerhouse, and booster stations of each level.)
22/4/2008	Project was approved by China DNA as a CDM project.
2/9/2008	The CCT signed the Validation contract of the CDM project activity with DOE.
11/12/2009	The project owner signed the contact release letter with Mandarin Global Carbon Ltd.

24/1/2010	The ERPA with Trading Emissions PLC was signed
31/7/2010	The project was put into commissioning.
18/04/2011	The LoA which changed buyer was approved by China DNA

The implementation timeline of the level 2 is indicated below:

Date	Key Event
9/2003	Environmental Impact Assessment (EIA) report.
24/10/2003	Approval reply for EIA report.
12/10/2005	Preliminary Design Report of the proposed project.
27/4/2006	Approval of the PDR
8/8/2006	The shareholders' meeting made a decision to apply for CDM.
1/3/2007	The project owner signed the CDM development contract with CCT.
11/11/2007	The project owner signed the equipment purchase contract of second level.
08/10/2007	The project owner signed the ERPA with Mandarin Global Carbon Ltd.
20/11/2007	The project owner Received approval of Construction.(The construction start date)
22/11/2007	The project owner signed the Construction contract of the project. (Include the dam, conduct water system, powerhouse, and booster stations of each level.)
22/4/2008	Project was approved by China DNA as a CDM project.
2/9/2008	The CCT signed the Validation contract of the CDM project activity with DOE.
11/12/2009	The project owner signed the contact release letter with Mandarin Global Carbon Ltd.
24/1/2010	The ERPA with Trading Emissions PLC was signed
31/7/2010	The project was put into commissioning.
18/04/2011	The LoA which changed buyer was approved by China DNA

On12 October 2005, the Preliminary Design Report of the proposed project was completed. After that, project owner plan to change the equipment type for better use of water resources and saving investment

and submitted an equipment optimization report on 7 June 2006 to Hangzhou City Forestry and Water Conservancy Bureau and received the approval of equipment optimization on 14 July 2006. But, based on the PDR and the equipment optimization report, the project owner found that the internal return rate (IRR) of the project was much lower than the benchmark (10%), means that the project was not economically attractive. The project owner hesitated to invest in the project because of the great investment risk and decided not to apply for construction permission until obtain additional financial support or policy support.

Fortunately, the project owner got information about CDM, learning that the small scale hydropower stations could apply for CDM revenues. Considering CDM revenue, the project IRR would reach the benchmark. Therefore, the project owner held a directorate meeting on 8 August 2006 and the project owner made a intent to apply for CDM. From then on, the project owner began to seek for CDM developer and CER buyer, and then on 1st March 2007, project owner signed the CDM development contract with CCT. On October 2007, the project owner signed the EPRA with Mandarin Global Carbon Ltd. After that, due to the change of international financial market and increasing risk of dealing, the buyer (Mandarin Global Carbon Ltd.) chose to terminate the Term Sheet and the buyer of project was changed to Trading Emissions PLC. The new EPRA was signed on 24 Jan 2010. The new LoA was approved by China DNA on 18 Apr 2011.

From the analysis above, it is evident that the project owner has considered CDM support seriously before starting the project.

According to EB33, the starting date of the project activity is the date when equipment purchase contract was signed. It is the earliest date of implementation or construction or real action of the project.

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

(a) Investment barrier;

(b) Technological barrier;

(c) Barrier due to prevailing practice;

(d) Other barriers;

As a small hydropower project located in poor mountainous area, the proposed project faces many problems, which make the proposed project far from financial attractive. The investment barrier is the most prohibitive factor in implementing the proposed project. Detailed analysis is shown as follows:

Investment Barrier

Step 1.Determine appropriate analysis method

The *Tool for the Demonstration and Assessment of Additionality* suggests three analysis methods, options as listed in the additionality tool include:

Option1. Simple cost analysis

Option2. Investment comparison analysis

Option3. Benchmark analysis

The Project will use benchmark analysis method (Option3) based on the consideration that benchmark IRR of Small Hydropower Projects is available.

The benchmark analysis is adopted to analyze the investment situation of the Project. According to the *Economic Evaluation Code for Small Hydropower Projects* (SL 16-95)[4], the benchmark Internal Rate of Return (IRR after tax) for small hydropower projects is about 10%. It is considered that the Project is not financially attractive if the Project IRR (after tax) without additional revenue is lower than 10%.

Step 2.Calculation and comparison

1. Basic parameters for calculation of financial indicators

The basic parameters for calculation of financial indicators of the proposed project are shown in Table 2.

Table2. The financial indicators for the proposed project

Indicator	Unit	Yunxi First	Yunxi Second	Data sources
Installed capacity	KW	4000	1000	PDR
Electricity generated by the Project	MWh/a	8492	2460	PDR and equipment optimization report(First Level)
Electricity supplied to grid	MWh/a	8237	2386	Calculation
Tariff(VAT)	RMB/MWh	450	450	Tariff document from Price Bureau of Zhejiang Province and the Zhejiang Electric Power Industry Bureau[5]
Static total investment	10^4RMB	2844.35	802	PDR and equipment optimization report(First Level)
O&M Cost	10^4RMB	33	14	PDR
Maintenance cost rate	%	0.2	0.2	PDR
Number of employees	Person	8	6	PDR
Employees' welfare	%	14	14	PDR
Laborage	10^4RMB/Person	1.1	1.1	PDR
Management cost for small hydropower station level	%	0.5	0.5	PDR
Other cost level	10^4RMB/KW	0.001	0.001	PDR
Interests of the loan	%	6.39	6.39	http://www.pbc.gov.cn/publish/zhengcehubisi/631/2011/20110406165308868396674_.html
Value added tax rate	%	6	6	PDR
City construction tax rate	%	1	1	PDR

[4] "*Economic Evaluation Code for Small Hydropower Projects*". http://www.cws.net.cn/law/guifan/sl16-95/

[5] "*The adjustment notice of hydropower tariff in ZheJiang province" approved by Price Bureau of Zhejiang Province in May 2005.*

Education tax rate	%	3	3	PDR
Project lifetime	year	20	20	PDR
Income tax rate	%	25	25	http://202.108.90.130/n8136506/n8136563/n8193451/n8193481/n8193962/8241021.html
Crediting Period	year	7*3=21 (Renewable)	7*3=21 (Renewable)	
Expected CERs price	EURO/ t CO_2e	8.5	8.5	EPRA

2. Comparison of IRR for the proposed project and the financial benchmark

In accordance with the benchmark analysis method, if the financial indicators (such as IRR) of the Project are lower than the benchmark, the Project is not considered as financially attractive, Table 3 shows the IRR of the Project.

Table3. The IRRs for the proposed project

Station	Yunxi First	Yunxi Second
IRR	8.01%	7.76%

As is seen in Table 3, without CDM revenues, the IRR of two stations are 8.01% and 7.76%, lower than the benchmark of 10%, thus the proposed project is not viable and not applicable commercially as well. With CDM, CERs revenues will improve IRR of total investment, which results in a much improved investment returns to investors, and the Project becomes financially viable for further implementation.

Step 3. Sensitivity Analysis

For the project, the following financial parameters were taken as uncertain factors for sensitive analysis of financial attractiveness:

- Static total investment
- Tariff
- Electricity supplied to Grid
- Annual O&M Costs

Taking no account of CERs revenue, sensitivity analysis is performed to identify how IRR is impacted and changed to support additionality justification with assumed fluctuation of these 4 parameters.

When the above three financial indicators were fluctuated within the range of -10% to +10%, the IRR of total investment of the Project varies to different extent, as shown in table 4 and figure 2~3.

Table4. Sensitivity analysis data

		-10%	**-5%**	**0**	**5%**	**10%**
Yunxi First	Static total investment	9.50%	8.72%	8.01%	7.36%	6.75%
	Tariff	6.33%	7.18%	8.01%	8.82%	9.62%
	Electricity supplied to Grid	6.33%	7.18%	8.01%	8.82%	9.62%
	Annual O&M Cost	8.17%	8.09%	8.01%	7.93%	7.86%
Yunxi	Static total investment	9.22%	8.46%	7.76%	7.11%	6.51%

Second	Tariff	6.01%	6.90%	7.76%	8.60%	9.42%
	Electricity supplied to Grid	6.01%	6.90%	7.76%	8.60%	9.42%
	Annual O&M Cost	7.99%	7.87%	7.76%	7.64%	7.53%

Fig 2. Yunxi First Level -IRR curve of sensitivity analysis

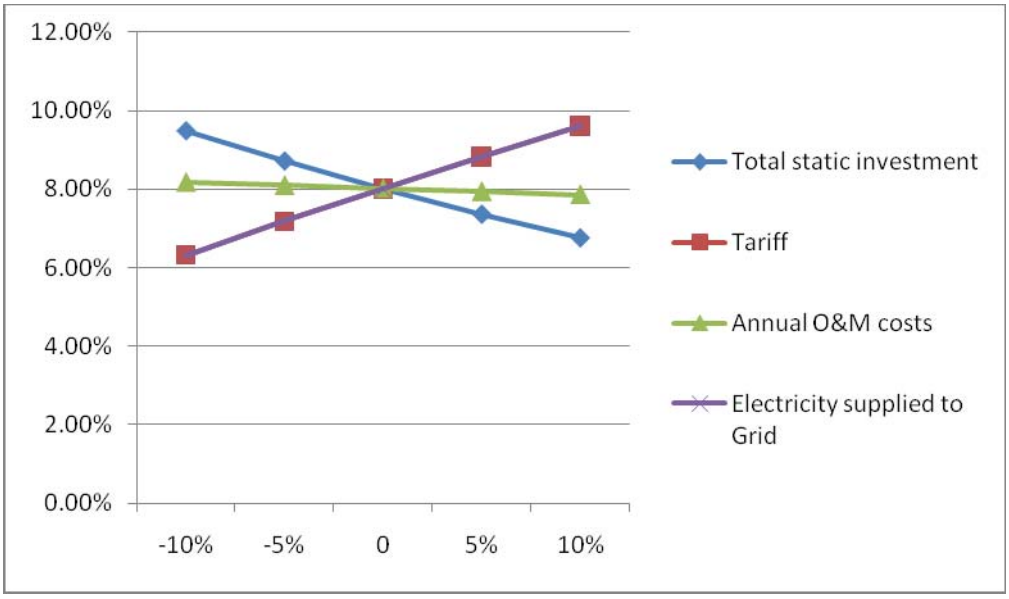
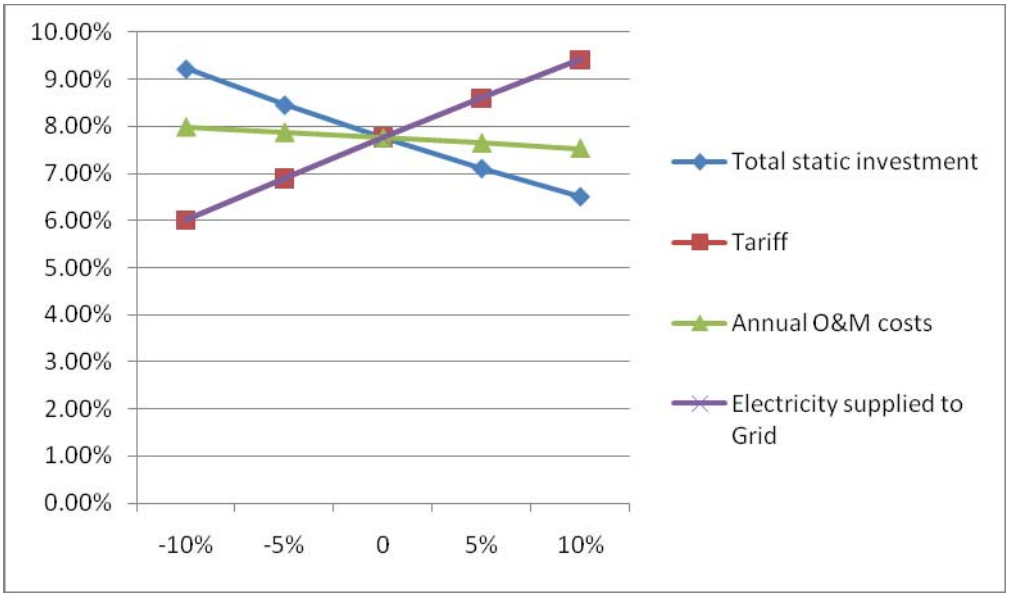


Fig 3. Yunxi Second Level -IRR curve of sensitivity analysis



As shown in the sensitivity analysis, when Static total investment, Annual O&M Cost and Tariff are ranging from -10% to 10%, IRR will not reach the benchmark IRR of 10%..

Further discussion of the practical possibility of variation

Table 5 Practical possibility assessment of factors

	Variation range to reach benchmark	Practical assessment of factors
Total static investment	**First Level** -13.1%	The IRR go up when the total investment of the plant decreases. According to the 'China Statistical Book', which is published by the National Bureau of Statistics of China in 2008[6], the investment is increasing every year(+1.5% in 2006, +4.4% in 2007), Thus the case that investment will not appear.
	Second Level -14.7%	According to the investment audit report which finished by the consultant company of project, the actual total investment is 4021.43×10^4 RMB which is higher than the total investment in PDR(3646.27×10^4 RMB). So, the IRR of Project will not reach 10%.
Tariff	**First Level** 12.5%	When the tariff increases, the IRR of the project go up. In April 2003, the Price Bureau of Zhejiang Province and the Zhejiang Electric Power Industry Bureau jointly published a highest tariff of 0.45 RMB/kWh (Including VAT)[7] for small scale hydropower stations and it didn't change in document published by Price Bureau of Zhejiang Province in May 2005[8]. Up to now, the highest tariff of Zhejiang Province is still unchanged. So, the case that the tariff raises will not appear.
	Second Level 13.7%	
Electricity supplied to Grid	**First Level** 12.5%	When the electricity supplied to grid increases, the IRR goes up. The electricity generation of the proposed project was calculated according to the historical hydrological data for 46 years (1957-2002), the hydrological data will not impose significant changes in normal situations. Thus, the increase of the electricity generation would not occur.
	Second Level 13.7%	
Annual O&M costs		When the annual O&M costs decrease, the IRR goes up. Annual O&M costs include maintenance cost, employee payroll, management cost for small

[6] China Statistical Book, National Bureau of Statistics of China, 2008 http://www.stats.gov.cn/tjsj/ndsj/2008/indexch.htm

[7] "*The adjustment notice of tariff from Price Bureau of Zhejiang Province and Zhejiang Electric Power Industry Bureau" approved by Price Bureau of Zhejiang Province and Zhejiang Electric Power Industry Bureau in April 2003.*

[8] "*The adjustment notice of hydropower tariff in ZheJiang province" approved by Price Bureau of Zhejiang Province in May 2005.*

		hydropower station, maintenance cost of line and other cost.(Data sources: PDR) The IRR is still below benchmark even if O&M costs are zero. Thus, the O&M costs have little impact on IRR.

As can be concluded from the above analysis, the Project has additionality indeed.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

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The methodology AMS.I.D (Version 17) is applicable to the project. Therefore, the project emissions reduction was calculated according to the methodology AMS.I.D (Version 17), and the main steps are as follows:

Step1.Baseline emissions calculation

Based on the analysis of B.4, the baseline is the kWh produced by the Project multiplied by the emission coefficient (CM) of ECG, calculated as follows:

Step 1.1 Calculate the emission factor for electricity system

According to the "Tool to calculate the emission factor for an electricity system (Version 2.2.1)", the following 7 steps should be applied to calculate the emission factor for an electricity system:

Step 1: Identify the relevant electric power system;

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

Step 3: Select an operating margin method (OM);

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

Step 5: Identity the cohort of power units to be included in the build margin;

Step 6: Calculate the build margin (BM) emission factor;

Step 7: Calculate the combined margin (CM) emission factor.

Sub-Step 1: Identity the project electric system

According to "2008 Baseline Emission Factors for Regional Power Grids in China" announced by Office of National Coordination Committee on Climate Change, National Development and Reform Commission (NDRC) of China (Chinese DNA) in 2008, ECG is a regional power grid in China, which includes Shanghai city, Jiangsu province, Zhejiang province, Anhui province and Fujian province. As the DNA of China (host country) has published a delineation of the project electricity system and connected electricity systems, these delineations should be used. Hence the electric power system defined by DNA

of China is applied and the relevant electric power system of the project electricity system is ECG[9].

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

Two options are provided in the "Tool to calculate the emission factor for an electricity system" to calculate the operating margin and build margin emission factor:

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

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

Option I has been chosen for the calculation of the operating margin and build margin emission factors, i.e. only grid power plants are included in the calculation.

Sub-Step 3: Select an operating margin method (OM)

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

Option a) Simple OM; or

Option b) Simple adjusted OM; or

Option c) Dispatch Data Analysis OM; or

Option d) Average OM.

Methods (A), Simple OM, is used when low-cost/must run resources constituted less than 50% of the total grid generation in an average of 5 most recent years. According to the data from *China Power Yearbook 2003~ 2007*, the share of the low-cost/must run resources in ECG are 11.86 %(2002), 10.96% (2003), 9.77 %(2004), 11.98% (2005) and 11.34% (2006) respectively (see Annex 3 for details), so method (A) is selected to calculate the OM emission factor.

For the simple OM, the emissions 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 to the DOE for validation, without requirement to monitor and recalculate the emissions factor during the crediting period.

Ex post option: The year in which the project activity displaces grid electricity, requiring the emissions factor to be updated annually during monitoring. If the data required to calculate the emission factor for year y is usually only available later than six months after the end of year y,

The data vintage to be used emission factor calculation is Option A in this PDD.

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

The simple OM emission factor is calculated as the generation-weighted average CO_2 emissions per unit net electricity generation (tCO_2/MWh) of all generating power plants serving the system, not including low-cost / must-run power ps / units. It may be calculated:

[9] *http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/2008/20081230102527637.pdf*

- 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)

Because the power sector in China is in a transitional period of "separating the plant operation from the grid operation", resulting in the detailed data of dispatch and fuel consumption are often taken as confidential business information by the grid company and the power plants, the fuel consumption data for each power plant / unit is not publicly available. Therefore option C is chosen and the Simple OM emission factor (EFgrid,OMsimple,y) is calculated as:

$$EF_{grid,OMsimple,y} = \frac{\sum_i FC_{i,y} \cdot NCV_{i,y} \cdot EF_{CO2,i,y}}{EG_y} \quad (1)$$

Where:

$FC_{i,y}$ is the amount of fossil fuel type i consumed in the project electricity system in year y (mass or volume unit)

$NCV_{i,y}$ is the net calorific value (energy content) of fossil fuel type i in year y (GJ / mass or volume unit)

$EF_{CO2,i,y}$ is the CO_2 emission factor of fossil fuel type i in year y (tCO_2/GJ)

EG_y is the net electricity generated and delivered to the grid by all power sources serving the system, not including low-cost / must-run power plants / units, in year y (MWh)

The Simple OM Emission Factor ($EF_{grid,OM,y}$) of the proposed project is calculated based on the electricity generation mix of the ECG, excluding low-operating cost and must-run power stations, such as hydropower, wind power etc. The data of installed capacity and electricity generation of different power generation sources are taken from the *China Electric Power Yearbook* (published annually, 2005, 2006 and 2007editions). The data on different fuel consumptions by type for power generation in the ECG are taken from the *China Energy Statistical Yearbook* (2005, 2006 and 2007 editions).

The detailed calculation can be found in Annex 3, the $EF_{grid,OM,y}$ =0.9540

Sub-Step 5: Identity the cohort of power units to be included in the build margin.

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

- The set of five power units that have been built most recently, or
- 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 recently

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

In terms of vintage of data, project participants choose the ex-ante option.

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 because these data are considered as confidential business information by the plants owners.

Taking into account such situations in China, on the 22nd meeting of CDM EB, it is decided to accept three deviations[10] based on the request for deviation proposed by DNV on Oct. 7th, 2005[11], to use the grid aggregated data at generation mix level instead of those at power plant level, as follows:

(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 the EB suggested that the Project participants use the following alternative solution in absence of data:

(a) For small scale project activities, use the average emission factor of the grid described in the AMS.I.D (Version 17);

(b) Use the efficiency level of the best technology commercially available in the provincial/regional or national grid of China, as a conservative proxy, foe each fuel type in estimating the fuel consumption to estimate the build margin. For the estimation of the operating margin the average emission factor for the grid for each type can be used.

In this PDD, as required, according to the data published by DNA[12] was used for estimating the $EF_{grid,BM,y}$

In terms of vintage of data, project participants can choose between one of the following two options: 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

[10] *"Request for clarification on use of approved methodology AM0005 for several projects in China"* http://cdm.unfccc.int/UserManagement/FileStorage/AM_CLAR_QEJWJEF3CFBP1OZAK6V5YXPQKK7WYJ

[11] *"Request for guidance: Application of AM0005 and AMS-I.D in China"* http://cdm.unfccc.int/UserManagement/FileStorage/6POIAMGYOEDOTKW25TA20EHEKPR4DM

[12] http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/2008/20081230102527637.pdf

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

In this PDD, option 1 is chosen.

Sub-Step 6: Calculate the build margin (BM) emission factor:

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

$$EF_{grid,BM,y} = \frac{\sum_{m} EG_{m,y} \cdot EF_{EL,m,y}}{\sum_{m} EG_{m,y}} \quad (2)$$

Where:

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

$EF_{EL,m,y}$ is the CO_2 emission factor of power unit m in year y (tCO_2/MWh)

As described above, the necessary data for the calculation of $EF_{EL,m,y}$ is unavailable. As a result, in this PDD, as required, according to the data published by DNA[13] was used for estimating the $EF_{grid,\ BM,y}$. Therefore it is calculated as follows:

Step a: Calculate the proportions of the corresponding CO_2 emissions of the solid fuel, liquid fuel and gas fuel to the total emission by the energy information available of the last year;

$$\lambda_{Coal} = \frac{\sum_{i \in COAL, j} F_{i,j,y} \times COEF_{i,j}}{\sum_{i,j} F_{i,j,y} \times COEF_{i,j}} \quad (3)$$

$$\lambda_{Oil} = \frac{\sum_{i \in OIL, j} F_{i,j,y} \times COEF_{i,j}}{\sum_{i,j} F_{i,j,y} \times COEF_{i,j}} \quad (4)$$

$$\lambda_{Gas} = \frac{\sum_{i \in GAS, j} F_{i,j,y} \times COEF_{i,j}}{\sum_{i,j} F_{i,j,y} \times COEF_{i,j}} \quad (5)$$

[13] http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/2008/20081230102527637.pdf

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Where:

$F_{i,j,y}$ is the fuel（tce）consumed by the province j in the year y;

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

COAL, OIL and *GAS* are the footnotes of the solid fuel, liquid fuel and gas fuel respectively.

Step b: Calculate the fuel-fired emission factors ($EF_{Thermal}$) of the grids based on the emissions of the best technology commercially

$$EF_{Thermal} = \lambda_{Coal} \times EF_{Coal,Adv} + \lambda_{Oil} \times EF_{Oil,Adv} + \lambda_{Gas} \times EF_{Gas,Adv} \quad (6)$$

Where:

$EF_{Coal,Adv}$, $EF_{Oil,Adv}$ and $EF_{Gas,Adv}$ *is* emission factor of coal, oil, the gas-fired power with the most efficiency level of the best technology commercially available in China was selected (see Annex 3 for details).

Step c: Calculate $EF_{BM,y}$ of the grid based on equation (7):

$$EF_{grid,BM,y} = \frac{CAP_{Thermal}}{CAP_{Total}} \times EF_{Thermal} \quad (7)$$

Where*:*

CAP_{Total} is the total Change in installed capacity of the Grid, MW;

$CAP_{Thermal}$ is the Incremental capacity of fuel-fired power of the Grid, MW. See Annex 3 for details.

The detailed calculation can be found in Annex3, the $EF_{grid,BM,y}$ =0.8236tCO_2/MWh.

Sub-Step 7: Calculate the combined margin (CM) emission factor:

The baseline emission factor $EF_{BM,y}$ should be calculated as the weighted average of the Operating Margin emission factor ($EF_{OM,y}$)) and the Build Margin emission factor($EF_{BM,y}$). Adopting an 50/50 weight by default, $EF_{CM,y}$ is calculated as follows.

$$EF_{CM.y} = \omega_{OM} \cdot EF_{OM,y} + \omega_{BM} \cdot EF_{BM,y}$$

$EF_{CM.y}$=0.9540×0.5+0.8236×0.5=0.8888 (tCO_2e/MWh)

Baseline emissions are calculated with combined baseline emission factor and the electricity delivered to the grid by the project as follows:

$$BE_y = EG_y \times EF_y$$

Step 2. Project activity emissions

According to the methodology AMSI.D, the power dentistry of the project is higher than 10W/m^2,

PE_y =0 tCO_2e

Step 3. Leakage

The proposed project is newly built and there is no energy generating equipment be transferred from another activity and no existing equipment be transferred to another activity involved in the proposed project activities, according to AMS.I.D. (Version 17), so leakage is not to be considered., as

L_y = 0 tCO_2e.

Step 4. Emission reductions

The project activity will generate GHG emission reductions by avoiding CO_2 emissions from electricity generation by fossil fuel power plants. The emission reduction (ER_y) is calculated as follows:

$$ER_y = BE_y - PE_y - L_y$$

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

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Data / Parameter:	NCV_i
Data unit:	TJ per mass or volume unit of fuel i
Description:	The net calorific value (energy content) per mass or volume unit of a fuel i
Source of data used:	*China Energy Statistical Yearbook 2007*
Value applied:	See Annex 3 for details.
Justification of the choice of data or description of measurement methods and procedures actually applied :	The data is obtained from the China Energy Statistical Yearbook 2007 and is satisfying the requirement of latest version of Tool to calculate the emission factor for an electricity system.
Any comment:	The three most recent years for which data is available at the time of submission of the CDM-PDD to the DOE for validation.

Data / Parameter:	$OXID_i$
Data unit:	%
Description:	Oxidation rate of the fuel *i*
Source of data used:	2006 revised IPCC guidelines
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 IPCC and is satisfying the requirement of latest version of Tool to calculate the emission factor for an electricity system.

Any comment:	The three most recent years for which data is available at the time of submission of the CDM-PDD to the DOE for validation.

Data / Parameter:	$EF_{CO_2,i}$
Data unit:	tC/TJ
Description:	CO_2 emission factor per unit of energy 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 :	The data is obtained from the *Revised 2006 IPCC Guidelines for National Greenhouse Gas Inventories* and is satisfying the requirement of latest version of Tool to calculate the emission factor for an electricity system.
Any comment:	The three most recent years for which data is available at the time of submission of the CDM-PDD to the DOE for validation.

Data / Parameter:	$F_{i,j,y}$
Data unit:	t or m^3
Description:	The fuel consumed in ECG in the year y.
Source of data used:	*China Energy Statistical Yearbook 2007*
Value applied:	See Annex 3 for details.
Justification of the choice of data or description of measurement methods and procedures actually applied :	Official released statistic, publicly accessible and reliable data source. The data is obtained from the *China Energy Statistical Yearbook 2007* and is satisfying the requirement of latest version of Tool to calculate the emission factor for an electricity system.
Any comment:	The three most recent years for which data is available at the time of submission of the CDM-PDD to the DOE for validation.

Data / Parameter:	$GEN_{i,y}$
Data unit:	MWh/year
Description:	The electricity supplied by ECG in the year y.
Source of data used:	China Electric Power Yearbook,2005-2007
Value applied:	See Annex 3 for details.
Justification of the choice of data or description of measurement methods and procedures actually applied :	The data is obtained from the China Electric Power Yearbook2005-2007 and is satisfying the requirement of latest version of Tool to calculate the emission factor for an electricity system.
Any comment:	The three most recent years for which data is available at the time of submission of the CDM-PDD to the DOE for validation.

Data / Parameter:	CAP_{PJ}
Data unit:	kW

Description:	Installed capacity of the hydro power plant after implement of the project activity.
Source of data used:	China Electric Power Yearbook,2005-2007
Value applied:	See Annex 3 for details.
Justification of the choice of data or description of measurement methods and procedures actually applied :	The installed capacity was measured after the implement of the project activity.
Any comment:	Measurement yearly.

Data / Parameter:	$EF_{Coal,adv,y}$
Data unit:	%
Description:	Best power supply efficiency by the most advanced technology commercially used in coal-fired plants in China.
Source of data used:	http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/2008/20081230102527637.pdf
Value applied:	See Annex 3 for details.
Justification of the choice of data or description of measurement methods and procedures actually applied :	Official data from Chinese DNA
Any comment:	-

Data / Parameter:	$EF_{Oil,adv,y}$
Data unit:	%
Description:	Best power supply efficiency by the most advanced technology commercially used in oil-fired plants in China.
Source of data used:	http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/2008/20081230102527637.pdf
Value applied:	See Annex 3 for details.
Justification of the choice of data or description of measurement methods and procedures actually applied :	Official data from Chinese DNA
Any comment:	-

Data / Parameter:	$EF_{Gas,adv,y}$
Data unit:	%
Description:	Best power supply efficiency by the most advanced technology commercially used in gas-fired plants in China.
Source of data used:	http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/2008/20081230102527637.pdf

Value applied:	See Annex 3 for details.
Justification of the choice of data or description of measurement methods and procedures actually applied :	Official data from Chinese DNA
Any comment:	-

B.6.3 Ex-ante calculation of emission reductions:

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Step 1 Calculation of the Baseline Emission ($BE_{grid,y}$)

Step 1.1 Calculate the Operating Margin Emission Factor ($EF_{grid,OM,y}$)

According to the analysis in B6.1 and Annex 3, the $EF_{grid,OM,y}$ of the ECG is 0.9540tCO$_2$/MWh.

Step 1.2 Calculate the Build Margin Emission Factor ($EF_{grid,BM,y}$)

According to the analysis in B6.1 and Annex 3, the $EF_{grid,BM,y}$ of the ECG is 0.8236 tCO$_2$/MWh.

Step 1.3 Calculate the baseline emission factor $EF_{grid,y}$

According to the analysis in B6.1, $EF_{grid,y} = EF_{grid,OM,y} \times w_{OM} + EF_{grid,BM,y} \times w_{BM}$ = 0.8888tCO$_2$/MWh.

Step 1.4 Calculate the baseline emission

The calculation of the baseline emission applied the following equation:

$BE_y = EG_y \times EF_y$ =10,623MWh/y×0.8888 tCO$_2$e/MWh=9,442tCO$_2$e/y

Where:

EG$_y$ is the net electricity supplied by the proposed project, MWh;

EF$_y$ is the baseline emission factor, tCO$_2$/MWh.

Step 2 Calculation of Project Emission (PE_y)

According to the analysis in B6.1, the proposed project emission, PE_y = 0tCO$_2$/a.

Step 3 Calculation of the Leakage (L_y)

According to the analysis in B6.1, no leakage is considered. i.e., L_y = 0 t CO$_2$e

Step 4 Calculate the Emission Reductions (ER_y)

According to the analysis in B6.1, the emission reduction of the proposed project is calculated as follows:

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$ER_y = BE_y - PE_y - L_y$ =9,442-0-0=9,442 tCO_2e

Where:

ER_y is emissions reductions in year y (tCO_2e);

BE_y is emissions in the baseline scenario in year y, t CO_2e/a;

PE_y is emissions in the proposed project scenario in year y, 0tCO_2e/a;

L_y is emissions due to leakage in year y, 0tCO_2e/a.

Therefore, the emission reductions in the year y is 9,442tCO_2e/a.

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

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The ex-ante annual emission reduction of the Project in the renewable crediting period is 9,442tCO_2e/a., and the estimated crediting period is Jul 1, 2012 or the date of registration, which is later. Details regarding the calculation are provided in Annex 3.

Years	Estimation of baseline emissions (tCO_2e)	Estimation of project activity emissions (tCO_2e)	Estimation of leakage (tCO_2e)	Estimation of overall emission reductions (tCO_2e)
01/07/2012-31/12/2012	4,721	0	0	4,721
2013	9,442	0	0	9,442
2014	9,442	0	0	9,442
2015	9,442	0	0	9,442
2016	9,442	0	0	9,442
2017	9,442	0	0	9,442
2018	9,442	0	0	9,442
01/01/2019-30/06/2019	4,721	0	0	4,721
Total (tCO_2e)	**66,094**	**0**	**0**	**66,094**

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

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B.7.1 Data and parameters monitored:

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Data to be monitored in tables below shall be archived for 2 years following the end of the crediting period.

Data / Parameter:	EG_y
Data unit:	MWh
Description:	Net electricity supplied by the Project
Source of data to be used:	Measured
Value of data applied for the purpose of calculating expected emission reductions in	10,623

section B.5	
Description of measurement methods and procedures to be applied:	$EG_y=EG_{supplied,y} - EG_{imported,y}$ (both of which are measured by Main meter) The readings of meter will be measured hourly and recorded monthly. Data will be archived for 2 years following the end of the crediting period by means of electronic and paper backup.
QA/QC procedures to be applied:	The meters will be periodically checked according to the relevant national electric industry standards and regulations (DL/T448-2000); Data measured by meters will be cross checked against electricity sales receipts.
Any comment:	

Data / Parameter:	$EG_{First\ level,y}$
Data unit:	MWh
Description:	Net electricity supplied by the first level
Source of data to be used:	Measured
Value of data applied for the purpose of calculating expected emission reductions in section B.5	8,237
Description of measurement methods and procedures to be applied:	The readings of meter will be measured hourly and recorded monthly. Data will be archived for 2 years following the end of the crediting period by means of electronic and paper backup.
QA/QC procedures to be applied:	The meters will be periodically checked according to the relevant national electric industry standards and regulations (DL/T448-2000).
Any comment:	

Data / Parameter:	$EG_{Second\ level}$
Data unit:	MWh
Description:	Net electricity supplied by the second level
Source of data to be used:	Measured
Value of data applied for the purpose of calculating expected emission reductions in section B.5	2,386
Description of measurement methods and procedures to be applied:	The readings of meter will be measured hourly and recorded monthly. Data will be archived for 2 years following the end of the crediting period by means of electronic and paper backup.
QA/QC procedures to be applied:	The meters will be periodically checked according to the relevant national electric industry standards and regulations (DL/T448-2000).
Any comment:	

Data / Parameter:	$EG_{supplied,y}$
Data unit:	MWh
Description:	The electricity supply to the grid by the proposed project
Source of data to be used:	Measured
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Measured by the Main Meter
Description of measurement methods and procedures to be applied:	The readings of meter will be measured hourly and recorded monthly. Data will be archived for 2 years following the end of the crediting period by means of electronic and paper backup.
QA/QC procedures to be applied:	The meters will be periodically checked according to the relevant national electric industry standards and regulations (DL/T448-2000); Data measured by meters will be cross checked against electricity sales receipts.
Any comment:	

Data / Parameter:	$EG_{imported,y:}$
Data unit:	MWh
Description:	The electricity imported from the grid by the proposed project
Source of data to be used:	Measured
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Measured by the Main Meter
Description of measurement methods and procedures to be applied:	The readings of meter will be measured hourly and recorded monthly. Data will be archived for 2 years following the end of the crediting period by means of electronic and paper backup.
QA/QC procedures to be applied:	The meters will be periodically checked according to the relevant national electric industry standards and regulations (DL/T448-2000); Data measured by meters will be cross checked against electricity sales receipts.
Any comment:	

Data / Parameter:	$EG_{supplied1,y}$
Data unit:	MWh
Description:	the electricity supply to the grid by the unit1
Source of data to be used:	Measured
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Measured by the Backup Meter1
Description of measurement methods and procedures to be applied:	The readings of meter will be measured hourly and recorded monthly. Data will be archived for 2 years following the end of the crediting period by means of electronic and paper backup.
QA/QC procedures to be applied:	The meters will be periodically checked according to the relevant national electric industry standards and regulations (DL/T448-2000).
Any comment:	

Data / Parameter:	$EG_{supplied2,y}$
Data unit:	MWh
Description:	The electricity supply to the grid by the unit2
Source of data to be used:	Measured
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Measured by the Backup Meter2
Description of measurement methods and procedures to be applied:	The readings of meter will be measured hourly and recorded monthly. Data will be archived for 2 years following the end of the crediting period by means of electronic and paper backup.
QA/QC procedures to be applied:	The meters will be periodically checked according to the relevant national electric industry standards and regulations (DL/T448-2000).
Any comment:	

Data / Parameter:	$EG_{supplied3,y}$
Data unit:	MWh
Description:	The electricity supply to the grid by the unit3
Source of data to be used:	Measured
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Measured by the Backup Meter3
Description of measurement methods and procedures to be applied:	The readings of meter will be measured hourly and recorded monthly. Data will be archived for 2 years following the end of the crediting period by means of electronic and paper backup.

QA/QC procedures to be applied:	The meters will be periodically checked according to the relevant national electric industry standards and regulations (DL/T448-2000).
Any comment:	

Data / Parameter:	$EG_{imported1,y}$
Data unit:	MWh
Description:	The electricity imported from the grid by the unit1
Source of data to be used:	Measured
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Measured by the Backup Meter1
Description of measurement methods and procedures to be applied:	The readings of meter will be measured hourly and recorded monthly. Data will be archived for 2 years following the end of the crediting period by means of electronic and paper backup.
QA/QC procedures to be applied:	The meters will be periodically checked according to the relevant national electric industry standards and regulations (DL/T448-2000).
Any comment:	

Data / Parameter:	$EG_{imported2,y}$
Data unit:	MWh
Description:	The electricity imported from the grid by the unit2
Source of data to be used:	Measured
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Measured by the Backup Meter2
Description of measurement methods and procedures to be applied:	The readings of meter will be measured hourly and recorded monthly. Data will be archived for 2 years following the end of the crediting period by means of electronic and paper backup.
QA/QC procedures to be applied:	The meters will be periodically checked according to the relevant national electric industry standards and regulations (DL/T448-2000).
Any comment:	

Data / Parameter:	$EG_{imported3,y}$
Data unit:	MWh
Description:	The electricity imported from the grid by the unit3
Source of data to be used:	Measured
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Measured by the Backup Meter3
Description of measurement methods and procedures to be applied:	The readings of meter will be measured hourly and recorded monthly. Data will be archived for 2 years following the end of the crediting period by means of electronic and paper backup.
QA/QC procedures to be applied:	The meters will be periodically checked according to the relevant national electric industry standards and regulations (DL/T448-2000).
Any comment:	

Data / Parameter:	$A_{First\ level}$
Data unit:	m^2
Description:	Area of the reservoir measured in the surface of the water of first level, after the implementation of the project activity, when the reservoir is full
Source of data to be used:	Project site
Value of data applied for the purpose of calculating expected emission	Measured from topographical surveys, maps, satellite pictures, etc

reductions in section B.5	
Description of measurement methods and procedures to be applied:	The area of the reservoir was measured before the implement of the project activity.
QA/QC procedures to be applied:	
Any comment:	Measurement yearly.

Data / Parameter:	$A_{Second\ level}$
Data unit:	m^2
Description:	Area of the reservoir measured in the surface of the water of second level, after the implementation of the project activity, when the reservoir is full
Source of data to be used:	Project site
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Measured from topographical surveys, maps, satellite pictures, etc
Description of measurement methods and procedures to be applied:	The area of the reservoir was measured before the implement of the project activity.
QA/QC procedures to be applied:	
Any comment:	Measurement yearly.

Data / Parameter:	$CAP_{First\ level}$
Data unit:	MW
Description:	Installed capacity of the first level after the implementation of the project activity
Source of data to be used:	Project site
Value of data applied for the purpose of calculating expected emission reductions in section B.5	4MW
Description of measurement methods and procedures to be applied:	Determine the installed capacity based on recognized standards
QA/QC procedures to be applied:	
Any comment:	Measurement yearly.

Data / Parameter:	$CAP_{Second\ level}$
Data unit:	MW
Description:	Installed capacity of the second level after the implementation of the project activity
Source of data to be used:	Project site
Value of data applied for the purpose of calculating expected emission reductions in section B.5	1MW
Description of measurement methods and procedures to be applied:	Determine the installed capacity based on recognized standards
QA/QC procedures to be applied:	
Any comment:	Measurement yearly.

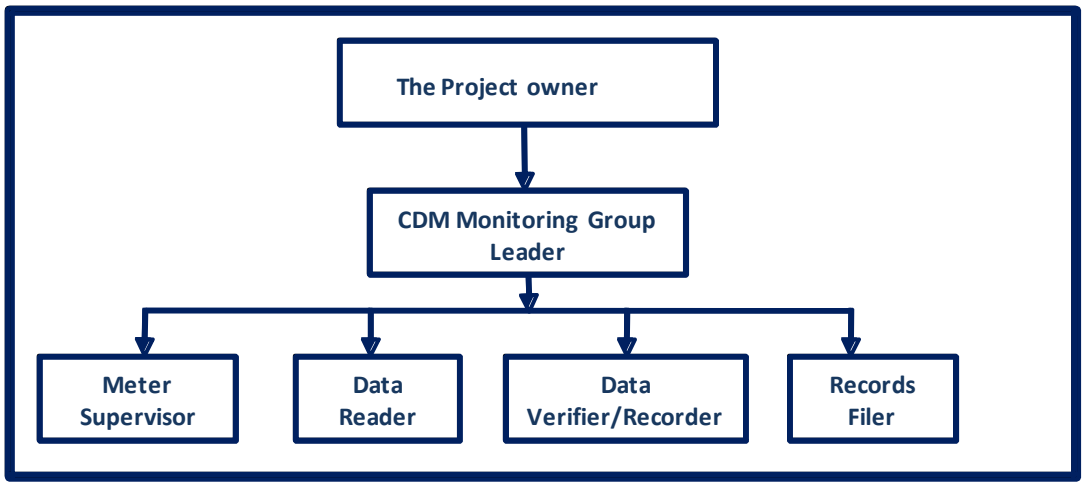
B.7.2 Description of the monitoring plan:

>>

The monitoring plan, implemented by the proposed project owner, is made to ensure that the emission reductions will be monitored transparently and clearly in the crediting period. In this PDD emission factor of the proposed project is determined ex-ante, therefore the electricity quantity supplied to the ECG by the proposed project is defined as the key data to be monitored.

1. Monitoring institution

The Project owner will be charge of collecting, monitoring and verifying the data, while the CDM group director will be assisted by the CDM consultant company. The operational and management structure is as follows:



2. The data to be monitored

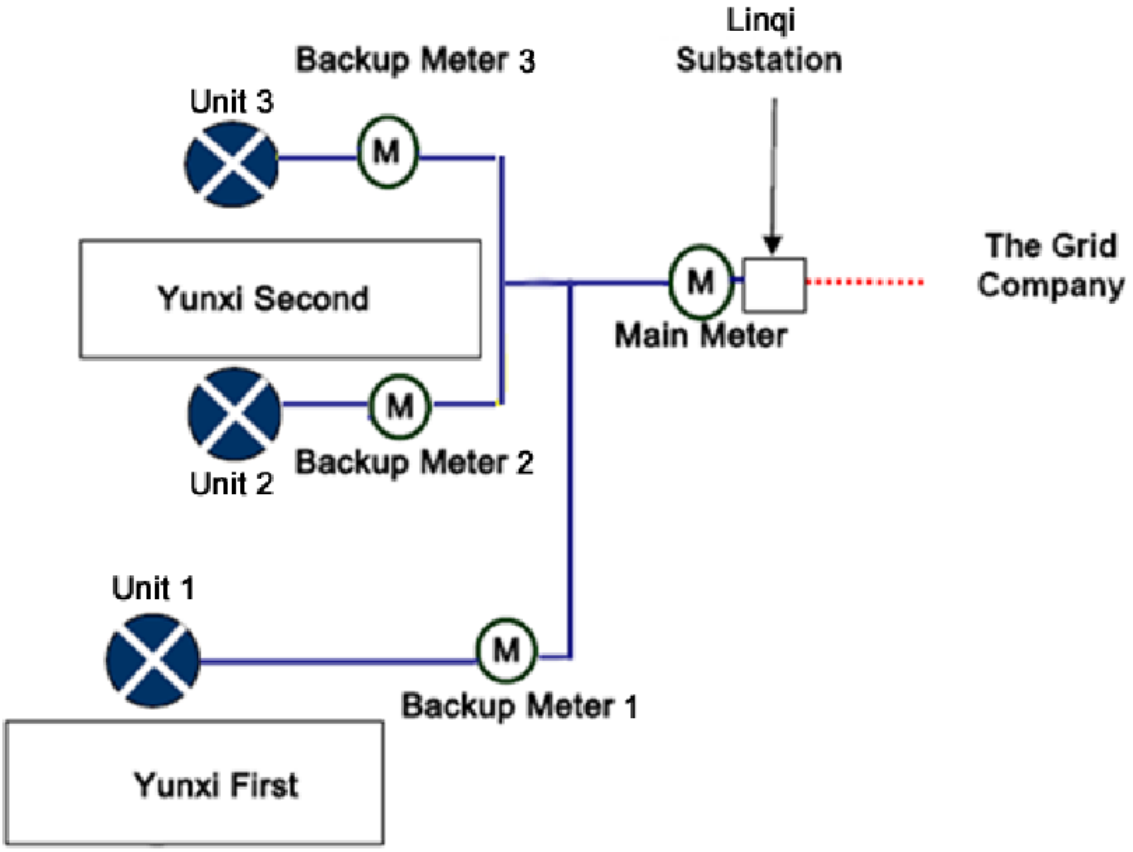
The emission reduction is ex-ante calculation, so the total electricity supply to the ECG by the Project (EG_y) is the key data to be monitored, which is the sum of net electricity supply to the ECG by the first level and second level.

3. The equipments for monitoring and installation

The meters should be installed according to the Technical Rules for meter (DL/T448-2000 issued by the State Economic and Trade Commission of the People's Republic of China, in the 3 November 2000, and as effective in 1 January 2001), and checked before acceptance by both grid company and the Project owner before the meter is operational.

The meters should be checked and adjusted according to the Technical Rules for Meter (DL/T448-2000), by the third party (local entity with certification issued by the nation) assigned by the Project owner before the meter is operational.

A set of the meters, which consists of one main meter and 3 backup meters are to be installed at the Metering Point as shown in the following Figure. The accuracy rates of the meters are not less than 0.5S and all meters are bidirectional meter.



The monitoring parameters for this project are as followed:

1. The net electricity by this proposed project which can be monitored by main meter in Linqi Substion :

$EG_y=EG_{supplied,y} - EG_{imported,y}$

Where:

EG_y: The net electricity supply to the grid by the project

$EG_{supplied,y}$: the electricity supply to the grid by the proposed project, and can be determined by the reading of the Main Meter;

$EG_{imported,y:}$ the electricity imported from the grid by the proposed project, and can be determined by the reading of the Main Meter.

2. The net electricity by the level 1

$$EG_{firstlevel,y}[14] = EG_{supplied1,y}/(EG_{supplied1,y}+EG_{supplied2,y}+EG_{supplied3,y}) \times EG_{supplied,y} - EG_{imported1,y}/(EG_{imported1,y}+EG_{imported2,y}+EG_{imported3,y}) \times EG_{imported,y}$$

Where:

$EG_{firstlevel,y}$: net electricity supplied by the first level;

$EG_{supplied,y}$: the electricity supply to the grid by the proposed project, and can be determined by the reading of the Main Meter;

[14] The historical data will be used to confirm the transmission loss of first level.

$EG_{imported,y:}$ the electricity imported from the grid by the proposed project, and can be determined by the reading of the Main Meter;

$EG_{supplied1,y}$: the electricity supply to the grid by the unit1, and can be determined by the reading of the Backup Meter1;

$EG_{supplied2,y}$: the electricity supply to the grid by the unit2, and can be determined by the reading of the Backup Meter2;

$EG_{supplied3,y}$: the electricity supply to the grid by the unit3, and can be determined by the reading of the Backup Meter3;

$EG_{imported1,y}$: the electricity imported from the grid by the unit1, and can be determined by the reading of the Backup Meter1;

$EG_{imported2,y}$: the electricity imported from the grid by the unit2, and can be determined by the reading of the Backup Meter2;

$EG_{imported3,y}$: the electricity imported from the grid by the unit3, and can be determined by the reading of the Backup Meter3.

3. The net electricity by the level 2

$EG_{secondlevel,y}$[15]$= (EG_{supplied2,y}+EG_{supplied3,y})/(EG_{supplied1,y}+EG_{supplied2,y}+EG_{supplied3,y}) \times EG_{supplied,y}-(EG_{imported2,y}+EG_{imported3,y})/(EG_{imported1,y}+EG_{imported2,y}+EG_{imported3,y}) \times EG_{imported,y}$

Where:

$EG_{secondevel,y}$: net electricity supplied by the second level;

$EG_{supplied,y}$: the electricity supply to the grid by the proposed project, and can be determined by the reading of the Main Meter;

$EG_{imported,y:}$ the electricity imported from the grid by the proposed project, and can be determined by the reading of the Main Meter;

$EG_{supplied1,y}$: the electricity supply to the grid by the unit1, and can be determined by the reading of the Backup Meter1;

$EG_{supplied2,y}$: the electricity supply to the grid by the unit2, and can be determined by the reading of the Backup Meter2;

$EG_{supplied3,y}$: the electricity supply to the grid by the unit3, and can be determined by the reading of the Backup Meter3;

$EG_{imported1,y}$: the electricity imported from the grid by the unit1, and can be determined by the reading of the Backup Meter1;

$EG_{imported2,y}$: the electricity imported from the grid by the unit2, and can be determined by the reading of the Backup Meter2;

$EG_{imported,3y}$: the electricity imported from the grid by the unit3, and can be determined by the reading of the Backup Meter3.

The readings of the main meter will be used for the business as well as CDM purposes, if the main meter is not with acceptable limits of accuracy or is otherwise performing improperly, the net electricity supplied/imported by the proposed project can be determined according to the backup meters, or

[15] The historical data will be used to confirm the transmission loss of second level.

determined according to PPA signed between the project owner and grid.

4. Data collection

Detailed monitoring arrangements of the amount of electricity supplied to grid are as follows:

1) The representatives from the Project owner will read the meter and record the readings of the Main meter and Backup meter every 1st of the month at 0:00 am, and the records $EG_{y,m}$ will be readily accessible for the verification of the DOE.
2) The Project owner would provide the electricity sales receipt according to the EG_y verified by the grid company.
3) The Project owner would provide the DOE with readings of Main meter and copies of the receipts which include the receipt of import electricity from grid and receipt of export electricity to grid.

If the reading of the main meter in a certain month is so inaccurate as to be out of the error range or the meter doesn't work normally, the net electricity shall be worked out by using the following measures:

1) The net electricity of project will be confirmed by using the readings recorded by backup meters, the historical wasting rate will be used to confirm the deviation between main meter and backup meter;
2) The reasonable and conservative method for metering of power supply will be designed and the abundant evidence will be provided to verifying DOE by the Project owner and the power plant if meter accuracy is not acceptable or the operation is not standardization.

5. Calibrations

The Project owner will sign agreement with local third party possessed state qualification in order to regulate the measurement and adjustment processes of quality control for ensuring reliability of the system. Meters and the spots must be regularly verified according to the laws and regulations relation to power industry. Meters must be sealed after verified and must not be dismantled and changed by the Project owner unless in presence of quality monitoring institution. Power meters should be calibrated every year.

All meters must be tested by that qualified body consigned by the Project owner within 10 days after the following events happen:

1) Metering error for the checking meters and gateway meter is beyond the acceptable accurate range;
2) Meters are repaired owing to problems of the meters' components.

6. Data management

The CDM team assigned by the Project owner would save the monitoring data as paper documents by the end of per month.

Physical documentation such as paper-based maps, diagrams and environmental assessment will be collated in a central place, together with this monitoring plan. In order to facilitate auditor's reference, monitoring results will be indexed. All paper-based information will be stored by the CDM team and kept at least one copy. All these data should be kept until two years after the end of the crediting period.

7. Monitoring report

The CDM group director is responsible for finalising the monitoring report of the Project, and the records of calibration, reading and invoices will be readily accessible for the verification of the DOE. The monitoring report shall include all information used to calculate the emission reductions of the Project, which can reflect the real, measurable and long-term GHG reductions achieved by the proposed project.

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 date of completion of the application of the baseline study and monitoring methodology is 25June 2008.

The technicians determining the baseline methodology include:

Mr. Zhang Yanlong China Carbon Technology Co., Ltd. Tel: +86 10 66574180 E-mail: yanlong@china-carbon.cn

Mr. Ding Xuefei China Carbon Technology Co., Ltd., Tel: +86 10 66574168 E-mail: dingxuefei@china-carbon.cn

Miss. Jiang Pujuan China Carbon Technology Co., Ltd., Tel: +86 10 66574168 E-mail: pj_jiang@china-carbon.cn

None of them is the 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:

>>

11/11/2007

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:

>>

01/07/2012[16]

C.2.1.2. Length of the first crediting period:

[16] *The crediting period shall start after the registration of the project. If the registration date is later than the 01/07/2012, the starting date of the first crediting period should be revised to the registration date.*

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>>

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:

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The Environmental Impact Assessment (EIA) of the Project was conducted to ensure that the proposed project complied with national, regional and local environmental regulations and was approved by Environmental Protection Bureau of Chun'an County according to the current legislation.

According to the *Feasibility Study Report* and the *Environmental and Ecological Impact Report*, environmental impacts possibly caused by the proposed project and protective measures adopted by the project owner are analyzed as follows:

Construction Phase

Wastewater

Wastewater discharged during the construction period is mostly come from stone aggregate process, concrete mix process, machineries and equipments cleaning, and domestic sewage. Settlement pool and screw separator will be built to disposal waste water to ensure that complied with relevant guidelines before discharged. Domestic sewage should be treated by cesspool. Therefore the implementation of this project will nearly not affect the water environment

Air

The major air pollutant is dust generation by construction work, materials handling, transports and vehicles during the construction period. Measures will be taken to mitigate this pollutant, such as anti-dust respirator for constructors, improve the moisture content of the material surface and spraying water at construction site and on dusty roads etc. . Air pollution only impact in a certain small area and the impacts will eliminate when the proposed project construction finish.

Noise

The noise pollution mainly originates from the construction equipments and vehicles and blasting in a flash. Mitigation measures, including using low-noise machinery and equipment, installing noise barriers, enhancing maintenance, avoiding blasting in the night and other measures, the noise impact is very limited.

Solid Waste

The main solid waste generated from the site will be construction waste as well as the household waste from the personnel at the site, these garages will be recycled as far as possible and the left will be transported regularly for stacking together, and the overall impact of solid waste on the environment is considered to be insignificant.

Land use and ecology

Little land will be used, but it is temporary and can be recycled after the construction period and the effect is to be considered insignificant.

The wild animals is almost rabbits and snakes in Yunxi Valley, part exercise yard of the wild animals may be flooded when the reservoir storage, but animals will migrate higher with water level increased, and their number will reach a new equilibrium after a period of time. The local aquatic organisms are warm-water fish which will not be affected by the increased hydrologic basin. Moreover, as there is no rare and extinct species existing in the region.The overall impact of ecology on the environment is considered to be insignificant.

Six families need to be migrated for the construction of the proposed project and the migration agreements have been signed.

Operation Phase

Wastewater

The wastewater discharged during the operation of the Project will be primarily domestic sewage, which should be treated by wastewater treatment and oil-water separator before discharged, sludge, rubbish and waste oil will be transported by environment department timely. By taking these mitigating measures into account, the impact of wastewater is minimal.

In conclusion, environmental impacts arising from the Project are considered insignificant.

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:

>>

The EIA of the proposed project was approved by the Environmental Protection Administration

Those findings and approval evidence that strict environmental monitoring and mitigation measures will be carried out during the construction and operation phase of the proposed project.

Multiple measures are taken into account to deal with environmental impacts that might arise from or hide in the proposed project minimizing negative effects to the lowest possible level with little significance.

SECTION E. Stakeholders' comments

>>

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

>>

In September 2007, questionnaires were distributed to the villagers to better understand stakeholders' comments by the project owners in purpose of receiving the related stakeholders' opinions on the proposed project. The information of the proposed project was provided to the villagers, including the issues on the site, capacity, estimated amount of feed-in electricity etc. The content of the questionnaire includes the following information:

1. Introduction of the Project

2. Basic information about the interviewee

3. Questions:

   1) Your views on the current quality of environment;(very good, good, general, dissatisfied)

   2) How familiar are you with hydropower and hydropower projects? (familiar, heard about it, or not at all)

   3) Are you satisfied with the supply of local electricity?(very satisfied, satisfied, unsatisfied)

   4) What may be the impacts brought by the Project?

   5) What are the overall impacts of the construction of the Project? (positive, negative or basically no effect)

   6) Do you support the construction of the Project? (support, opposition)

4. Signature of interviewee and date

E.2. Summary of the comments received:

>>

The Survey was conducted through distributing and collecting responses to a questionnaire. Totally 30 questionnaires returned out of 30 with 100% response rate. The following is a summary of the key findings based on returned questionnaires.

1. The level of respondents' education

The targets of this investigation are the people who will be affected by the Project. Most of them (75%) know much about the hydroelectric systems and the left have the primary knowledge about it.

2. Attitude of the residents toward the Project

The respondents generally deem (100%) that the Project will bring multiple benefits to them, particularly hoping that the Project can improve the supply of the local electricity (100%), rational use of natural resources (95%) and creation of job opportunities (80%), otherwise reduction electricity fees（65%） is considered a positive impact.

The survey shows that the Project receives very strong support from local people (100%). This is closely linked to the fact that the all respondents think the construction of the Project contribute to local economic development.

3. Conclusion

The survey shows that the Project receives very strong support from local people who believe the Project will have positives impacts in many aspects, especially on economy and social development.

In conclusion, both the survey and the EIA indicate that the Project has a few negative impacts on local environment.

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

>>

Both the local resident and government gave strong support to the construction of the proposed project. According to comments from the stakeholders, it is not necessary to adjust the design, construction or operation of the proposed project.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Organization:	Trading Emissions PLC
Street/P.O.Box:	Third Floor, Exchange House 54-62 Athol Street
Building:	
City:	Douglas
State/Region:	Isle of Man IM1 1JD
Postfix/ZIP:	
Country:	United Kingdom of Great Britain and Northern Ireland
Telephone:	+44 1624 681 335
FAX:	+44 1624 681 392
E-Mail:	eb@tradingemissionsplc.com
URL:	
Represented by:	Mr. Philips Scales
Title:	
Salutation:	
Last Name:	Scales
Middle Name:	
First Name:	Philip
Department:	
Mobile:	
Direct FAX:	+44 1624 681 392
Direct tel:	+44 1624 681 335
Personal E-Mail:	eb@tradingemissionsplc.com

Organization:	Chun'an Yunxi Tongda Hydropower Development Co., Ltd
Street/P.O.Box:	Xin'an north road, qiandaohu town
Building:	Building 38
City:	Chun'an County, Hangzhou
State/Region:	Zhejiang
Postfix/ZIP:	311700
Country:	China
Telephone:	+86 13588265500
FAX:	+86 571-64998331
E-Mail:	guxii@126.com
URL:	
Represented by:	Kong Qingfu
Title:	
Salutation:	
Last Name:	Kong
Middle Name:	
First Name:	Qingfu
Department:	
Mobile:	+86 13588265500
Direct FAX:	+86 571-64998331
Direct tel:	
Personal E-Mail:	guxii@126.com

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

There is no public funding from Annex I for the proposed project.

Annex 3

BASELINE INFORMATION

Table A1. Power generation of ECG in year 2002～2006（GWh）

Year	Region	Hydropower	Fuel-Fired Power	Other	Total
2006	**Jiangsu**	31.1	25,140.3	194.1	**25,365.5**
	Zhejiang	1,397.6	14,034.9	2231.1	**17,663.6**
	Fujian	3,468.2	5,558.0	16.3	**9,042.5**
	Shanghai	0	7,106.6	160	**7,266.6**
	Anhui	129.5	7,214.3	0	**7,343.8**
	Total	**5,026.4**	**59,054.1**	**2,601.5**	**66,682**
2005	**Jiangsu**	327	211,404	269	**212,000**
	Zhejiang	13,511	109,464	22,667	**145,642**
	Fujian	29,100	48,688	37	**77,825**
	Shanghai	0	72,710	30	**74,162**
	Anhui	1,248	63,590	0	**64,838**
	Total	**44,187**	**505,855**	**24,425**	**574,467**
2004	**Jiangsu**	327	163,545	29	**163,901**
	Zhejiang	8,545	95,255	22,083	**125,883**
	Fujian	15,457	50,490	19	**65,966**
	Shanghai	0	71,127	7	**71,134**
	Anhui	1,227	59,875	0	**61,102**
	Total	**25,556**	**440,292**	**22,138**	**487,986**
2003	**Jiangsu**	400	133,277	0	**133,677**
	Zhejiang	11,123	83,089	15,009	**109,221**
	Fujian	18,899	42,146	24	**61,069**
	Shanghai	0	69,444	0	**69,444**
	Anhui	1,560	54,156	0	**55,716**
	Total	**31,982**	**382,112**	**15,033**	**429,127**
2002	**Jiangsu**	160	116,716	0	**116,876**
	Zhejiang	13,883	69,287	5,751	**88,921**
	Fujian	22,435	30,850	24	**53,309**
	Shanghai	0	61,648	0	**61,648**
	Anhui	1,357	45,703	0	**47,060**
	Total	**37,835**	**324,204**	**5,775**	**367,814**

Data source: China Electric Power Yearbook 2003-2007

Table A2. Fuel-Fired Power Generation of ECG in 2004

Regions	Electricity Generation (MWh)	Rate of Electricity Consumption (%)	Electricity Supply to Grid (MWh)
Shanghai	71,127,000	5.22	67,414,171
Jiangsu	163,545,000	5.93	153,846,782
Zhejiang	95,255,000	5.68	89,844,516
An'hui	59,875,000	6.03	56,264,538
Fujian	50,490,000	6.07	47,425,257
Total			**414,795,263**

Data source: China Electric Power Yearbook 2005

Table A3 Power Import of CCG in 2004

Power Import from CCG		26,933,850
	Emission Factor of CO_2 (tCO_2/MWh)	0.8273
	Total Emission of CO_2 in CCG (tCO_2)	346,035,830
	Total Power Supply of CCG (MWh)	418,261,666
Power Import from Yangcheng Power Plant		11,649,610
	Emission Factor of CO_2 for Yangcheng Powe Plant	1.113259
	Fuel Consumption of Yangcheng Power Plant	341gce/kwh

Data source: http://cdm.ccchina.gov.cn/web/index.asp

Table A4 Calculate the Operating Margin Emission Factor of ECG in 2004

Fuel	Unit	Shanghai	Jiangsu	Zhejiang	An'hui	Fujian	Total	Emission Factors[17] tc/TJ	Oxidation Factor[18] %	Average Low Calorific Value MJ/t,km^3	Emission of CO_2 tCO_2e
Raw Coal	10^4t	2,779.6	7,601.9	4,008.9	2906.2	2183.7	**19,480.3**	25.8	100	20,908	385,300,230
Cleaned Coal	10^4t						**0**	25.8	100	26,344	0
Other Washed Coal	10^4t		5.46			4.63	**10.09**	25.8	100	8,363	79,826
Coke	10^4t						**0**	29.2	100	28,435	0.00
Coke Oven Gas	10^8m^3	2.59					**2.59**	12.1	100	16,726	192,197.9
Other Gas	10^8m^3	72.46					**72.46**	12.1	100	5,227	1680380
Crude Oil	10^4t						**0**	20	100	41,816	0
Gasoline	10^4t						0	18.9	100	43,070	0.00
Diesel Oil	10^4t	2.69	27.17	6.23			**36.09**	20.2	100	42,652	1,140,116
Fuel Oil	10^4t	58.52	55.07	202.89		23.26	**339.74**	21.1	100	41,816	10,991,148
PLG	10^4t						**0**	17.2	100	50,179	0
Refinery Gas	10^4t	0.77	0.55				**1.32**	15.7	100	46,055	34,996
Nature Gas	10^8m^3		0.14				**0.14**	15.3	100	38,931	30,576
Other Petroleum Products	10^4t	21.22	1.37	24.89			**47.48**	20	100	38,369	1,335,957
Other Coking Products	10^4t						**0**	25.8	100	28,435	0
Other Energy	10^4tce	6.43		15.48			**21.91**	0	0	0	0
										Subtotal	**400,785,429**
										OM	**0.96175**

Data source: China Energy statistical Yearbook 2005

[17] *Revised 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Workbook*

[18] *Revised 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Workbook*

Table A5. Fuel-Fired Power Generation of ECG in 2005

Regions	Electricity Generation (MWh)	Rate of Electricity Consumption (%)	Electricity Supply to Grid (MWh)
Shanghai	74,606,000	5.05	70,838,397
Jiangsu	211,429,000	5.96	198,827,832
Zhejiang	108,110,000	5.59	102,066,651
An'hui	62,918,000	5.9	59,205,838
Fujian	48,600,000	4.57	46,378,980
Total			**477,317,698**

Data source: China Electric Power Yearbook 2006

Table A6. Power Import of CCG in 2005

Power Import from CCG	27,039,000
Emission Factor of CO_2 (tCO_2/MWh)	0.77216
Power Import from Yangcheng Power Plant	11,282,000
Emission Factor of CO_2 for Yangcheng Power Plant	1.1463
Fuel Consumption of Yangcheng Power Plant	339gce/kwh

Data source: http://cdm.ccchina.gov.cn/web/index.asp

Table A7. Calculate the Operating Margin Emission Factor of ECG in 2005

Fuel	Unit	Shanghai	Jiangsu	Zhejiang	An'hui	Fujian	Total	Emission factors[19] tc/TJ	oxidation factor[20] %	Average low calorific Value MJ/t,km^3	Emission of CO_2 tCO_2e
Raw Coal	10^4t	2847.31	9888.06	4801.52	3082.9	2107.69	22727.48	25.8	100	20908	449526099.64
Cleaned Coal	10^4t						0	25.8	100	26344	0.00
Other Washed Coal	10^4t						0	25.8	100	8363	0.00
Coke	10^4t			0.03			0.03	29.2	100	28435	913.33
Coke Oven Gas	10^8m^3	1.68	1.38		1.71		4.77	12.1	100	16726	353970.67
Other Gas	10^8m^3	83.72	24.97	0.06	30		138.75	12.1	100	5227	3217675.86
Crude Oil	10^4t			27.01			27.01	20	100	41816	828263.45
Gasoline	10^4t						0	18.9	100	43,070	0.00
Diesel Oil	10^4t	1.25	16	4.52		1.67	23.44	20.2	100	42652	740491.04
Fuel Oil	10^4t	59.39	13.22	153.22		7.45	233.28	21.1	100	41816	7546991.82
PLG	10^4t						0	17.2	100	50179	0.00
Refinery Gas	10^4t	0.57	0.83				1.4	15.7	100	46055	37117.26
Nature Gas	10^8m^3	1.09	1.85	0.62			3.56	15.3	100	38931	777514.36
Other Petroleum Products	10^4t	21	8.38	34.8			64.18	20	100	38369	1805849.77
Other Coking Products	10^4t						0	25.8	100	28435	0.00
Other Energy	10^4tce	12.36		15.29			27.65	0	100	0	0.00
										Subtotal	**464,834,887**
										OM	**0.96704**

Data source: China Energy statistical Yearbook 2006

[19] *Revised 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Workbook*

[20] *Revised 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Workbook*

Table A8. Fossil Fuel-fired Power Generation of ECG in 2006

Regions	Electricity Generation (MWh)	Rate of Electricity Consumption (%)	Electricity Supply to Grid (MWh)
Shanghai	72,033,000	5.06	68,388,130
Jiangsu	251,258,000	5.69	236,961,420
Zhejiang	140,349,000	5.62	132,461,386
An'hui	71,867,000	6.05	67,519,047
Fujian	55,580,000	4.51	53,073,342
Total			558,403,325

Data source: China Electric Power Yearbook 2007

Table A9. Power Import of CCG in 2006

Power Import from CCG	24,029,150
Emission Factor of CO_2 (tCO_2/MWh)	0.77134
Power Import from Yangcheng Power Plant	11,150,820
Emission Factor of CO_2 for Yangcheng Powe Plant	1.07481
Fuel Consumption of Yangcheng Power Plant	336gce/kwh

Data source: http://cdm.ccchina.gov.cn/web/index.asp

Table A10. Calculate the Operating Margin Emission Factor of ECG in 2006

Fuel	Unit	Shanghai	Jiangsu	Zhejiang	An'hui	Fujian	Total	Emission Factors[21] tc/TJ	Oxidation Factor[22] %	Average Low Calorific Value MJ/t,km[3]	Emission of CO_2 tCO_2e
Raw Coal	10^4t	2,744.45	10,945.42	6,065	34,55.2	2,369.63	25,579.7	25.8	100	20908	505,940,068
Cleaned Coal	10^4t						0	25.8	100	26344	0
Other Washed Coal	10^4t		150.54		23.06		173.6	25.8	100	8363	1,373,419
Coke	10^4t			39.07			39.07	29.2	100	28435	1,189,463
Coke Oven Gas	10^8m^3	1.71	3.13	0.23	0.71		5.78	12.1	100	16726	428,920
Other Gas	10^8m^3	84.64	106.54	3.28	25.12		219.58	12.1	100	5227	5,092,160
Crude Oil	10^4t			20.3			20.3	20	100	41816	622,501
Gasoline	10^4t						0	18.9	100	43070	0
Diesel Oil	10^4t	2.13	3.7	4.11	1.21	1.11	12.26	20.2	100	42652	387,305
Fuel Oil	10^4t	44.51	3.77	71.98	0.02	4.5	124.78	21.1	100	41816	4,036,838
PLG	10^4t						0	17.2	100	50179	0
Refinery Gas	10^8m^3	0.29	0.4		2.95		3.64	15.7	100	46055	96,505
Nature gas	10^4t	3.2	13.5	9.18			25.88	15.3	100	38931	5,652,267
Other Coking Products	10^4t	18.82	3.57				22.39	20	100	38369	629,993
Other Petroleum Products	10^4t						0	25.8	100	28435	0
Other Energy	10^4tce	6.66	2.8	27.45	3.21		40.12	0	100	0	0
										Subtotal	**525,449,440**
										OM	**0.93663**

Data source: China Energy statistical Yearbook 2007

[21] *Revised 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Workbook*

[22] *Revised 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Workbook*

Table A11. The Operating Margin Emission Factor of ECG in 2004~2006

Year	2004	2005	2006	OM
CO_2 emission (tCO_2e)	436,037,347	498,646,329	555,969,130	**0.9540**
Fuel-fired power generation of ECG (MWh)	453,378,723	515,638,698	593,583,295	

Data source: Table A1-A10

Table A12. The Oxidation Factor, Emission Factors and Average Low Calorific Value of the Fuel

Fuel	Low Calorific Value	Emission Factors tc/TJ	Oxidation Factor
Raw Coal	20,908 kJ/kg	25.80	1
Cleaned Coal	26,344 kJ/kg	25.80	1
Other Washed Coal	8,363 kJ/kg	25.80	1
Moulded coal	20,908 kJ/kg	26.60	1
Coke	28,435 kJ/kg	29.20	1
Crude Oil	41,816 kJ/kg	20.00	1
Gasoline	43,070 kJ/kg	18.90	1
Coal oil	43,070 kJ/kg	19.60	1
Diesel Oil	42,652 kJ/kg	20.20	1
Fuel oil	41,816 kJ/kg	21.10	1
Other Petroleum Products	38,369 kJ/kg	20.00	1
Natural gas	38,931 kJ/m3	15.30	1
Coke oven gas	16,726 kJ/m3	12.10	1
Other coal gas	5,227 kJ/m3	12.10	1
LPG	50,179 kJ/kg	17.20	1
Refinery gas	46,055 kJ/kg	15.70	1

According to the statistical analysis of newly-built fuel-fired power plants in the 10th Five-Year Plan (2000-2005) a by State Electricity Regulatory Commission of China, for the coal-fired power plant, the most efficiency level of the best technology commercially available in China was selected as 600MW. The fuel consumption is 329.94 gce/kWh, while the corresponding efficiency of the power supply is 37.28%.

The best technology commercially with the most efficiency level applied in the combined cycle power plant (including gas power plant and oil power plant) is selected as 200MW level, (equals to the technology of 9E unit from GE). According to the data in 2006, the fuel consumption of the combined cycle power plant with the actual most efficiency level of the best technology commercially is 252 gce/kWh, while the corresponding efficiency of the power supply is 48.81%.

The emission factors of coal-fired power, oil-fired power and gas-fired power respectively with the most efficiency level of the best technology commercially was described in Table A13.

Table A13. The Emission Factor of Coal, Oil, Gas-Fired Power Plant

	Variable	Efficiency of Power Supply A	Emission Factor of the Fuel (tc/TJ) B	Oxidation Factor C	Emission Factor (tCO_2/MWh) D=3.6/A/1000*B*C*44/12
Coal-fired power plant	$EF_{Coal,Adv}$	37.28%	25.8	1	0.9135
Gas-fired power plant	$EF_{Gas,Adv}$	48.81%	15.3	1	0.4138
Oil-fired power plant	$EF_{Oil,Adv}$	48.81%	21.1	1	0.5706

Table A14. Emission of CO_2 of ECG (*Data Source: The China Energy Statistical Yearbook 2007*)

Fuel	Unit	Shanghai A	Zhejiang B	Jiangsu C	Anhui D	Fujian E	Total F=A+…+E	Calorific Value G	Emission Factor of the Fuel (tc/TJ) H	Oxidation Factor I	Emission of CO_2
Raw coal	10^4t	2,744.45	6,065	10,945.4	3,455.2	2,369.63	25,579.7	20908	25.8	1	505,940,068
Cleaned coal	10^4t	0	0	0	0	0	0	26344	25.8	1	0
Other washed	10^4t	0	0	150.54	23.06	0	173.6	8363	25.8	1	1,373,419
Moulded coal	10^4t	0	0	0			0	20908	26.6	1	0
Coke	10^4t	0	39.07	0	0	0	39.07	28435	29.2	1	1,189,463
						Subtotal					**508,502,949**
Crude oil	10^4t	0	20.3	0	0	0	20.3	41816	20	1	622,501
Gasoline	10^4t	0	0	0	0	0	0	43070	18.9	1	0
kerosene	10^4t	0	0	0	0	0	0	43070	19.6	1	0
Diesel	10^4t	2.13	4.11	3.7	1.21	1.11	12.26	42652	20.2	1	387,305
Fuel oil	10^4t	44.51	71.98	3.77	0.02	4.5	124.78	41816	21.1	1	4,036,838
Other Petroleum Products	10^4t	18.82	0	3.57	0	0	22.39	38369	20	1	629,993
						Subtotal					**5,676,637**
Coke oven gas	10^7 m^3	32	91.8	135	0	0	258.8	38931	15.3	1	5,652,267
Other coal gas	10^7 m^3	17.1	2.3	31.3	7.1	0	57.8	16726	12.1	1	428,920
Liquefied Petroleum	10^7 m^3	846.4	32.8	1065.4	251.2	0	2,195.8	5227	12.1	1	5,092,160
Refinery gas	10^4t	0	0	0	0	0	0	50179	17.2	1	0
Natural gas	10^4t	0.29	0	0.4	2.95	0	3.64	46055	15.7	1	96,505
						Subtotal					**11,269,853**
						Total					**525,449,440**

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Based on tableA14 and formula (3),(4) and (5) , λ_{Coal} =96.77% , λ_{Oil} =1.08% , λ_{Gas} =2.14%

So $EF_{Thermal}=\lambda_{Coal}\times EF_{Coal,Adv}+\lambda_{Oil}\times EF_{Oil,Adv}+\lambda_{Gas}\times EF_{Gas,Adv}=0.8991$

Table A15. The Installed Capacity of ECG in 2006

	Unit	Shanghai	Jiangsu	Zhejiang	Anhui	Fujian	Total
Fuel-fired power	MW	14,526	51,776	35,391	14,134	13,001	**128,828**
Hydropower	MW	0	136	8,369	1,001	8,957	**18,463**
Nucleus power	MW	0	0	3,066	0	0	**3,066**
Wind power and others	MW	253	162	43	0	89	**547**
Total	**MW**						**150,904**

Data source：China Electric Power Yearbook 2007

Table A16. The Installed Capacity of ECG in 2005

	Unit	Shanghai	Jiangsu	Zhejiang	Anhui	Fujian	Total
Fuel-fired power	MW	13,113.50	42,506.40	27,688.10	11,423.20	9,345.40	**104,076.60**
Hydropower	MW	0.00	142.60	6,952.10	749.80	8,224.90	**16,069.40**
Nucleus power	MW	0.00	0.00	3,066.00	0.00	0.00	**3,066.00**
Wind power and others	MW	253.30	58.80	37.20	0.00	52.00	**401.30**
Total	**MW**						**123,613.30**

Data source：China Electric Power Yearbook 2006

Table A17. The Installed Capacity of ECG in 2004

	Unit	Shanghai	Jiangsu	Zhejiang	Anhui	Fujian	Total
Fuel-fired power	MW	12,014.90	28,289.50	21,439.80	9,364.50	8,315.40	**79,424.10**
Hydropower	MW	0.00	126.50	6,418.40	692.80	7,180.10	**14,417.80**
Nucleus power	MW	0.00	0.00	3,056.00	0.00	0.00	**3,056.00**
Wind power and others	MW	3.40	17.50	39.70	0.00	12.00	**72.60**
Total	**MW**						**96,970.50**

Data source：China Electric Power Yearbook 2005

Table A18. Change in Installed Capacity of ECG in 2004~2006

Year	2004 A	2005 B	2006 C	Change in Installed Capacity from 2005 to 2006 D=C-A	The Proportion of the Total Change Capacity
Fuel-fired power(MW)	79,424.10	104,076.60	128,828	49,403.90	91.60%
Hydropower(MW)	14,417.80	16,069.40	18,463	4,045.20	7.50%
Nucleus power	3,056.00	3,066.00	3,066	10.00	0.02%
Wind powewr (MW)	72.60	401.30	547	474.40	0.88%
Total(MW)	96,970.50	123,613.30	150,904	53,933.50	100.00%
Share in total installed capacity of 2005	64.26%	81.92%	100%		

$EF_{BM,y}=0.8991\times91.60\%=0.8236\ tCO_2/MWh$

Annex 4

MONITORING INFORMATION

The detailed monitoring plan can be seen in Section B.7.2.