CLEAN DEVELOPMENT MECHANISM
PROJECT DESIGN DOCUMENT FORM (CDM-PDD)
Version 03 - in effect as of: 28 July 2006

CONTENTS

Annexes

SECTION A. General description of project activity

A.1. Title of the project activity:

Zhejiang Provincial Energy Group Zhenhai Natural Gas Power Generation Co., Ltd.'s NG Power Generation Project

Version of document: 04

Date of document: 08/07/2007

A.2. Description of the project activity:

Zhejiang Provincial Energy Group Zhenhai Natural Gas Power Generation Co., Ltd.'s NG Power Generation Project (the proposed project) is located in Zhenhai Power Plant, Hongqiao Village, Zhenhai District, Ningbo City, Zhejiang Province. The proposed project is the construction and operation of a new natural gas fired grid-connected power plant owned by ZheJiang Southeast Electric Power Co., Ltd. It will install two sets of gas-steam combined cycle for power generation units with the total rated output of 795.6MW. The generated electricity will be sold to the East China Power Grid (ECPG), which covers Shanghai, Zhejiang, Jiangsu, Anhui and Fujian provincial grids.

According to baseline scenario analysis described in section B.4, in the absence of the project activity, the baseline alternative is the construction of the 600MW coal-fired plant. Comparing with the coal-fired plant, the project activity leads to substantial greenhouse gas emission reductions due to the use of less carbon intensive fuel and the application of the much higher efficient power generation technology. It is expected that the project will achieve an *ex-ante* estimated average emission reductions of 937,067 tCO_2e/year and 6,559,469 tCO_2 over the first seven-year crediting period.

The project activity will not only meet the rising demand of electricity demand of ECPG, but also improve the peak load regulating capability of the grid. Furthermore, the project will contribute to the sustainable development to both local, global and the host country in a number of ways:

- The project will lead a reduction in greenhouse gas emissions compared to a business as usual approach, thereby benefit the global climate change;
- The project will reduce other pollutants (e.g. SO_2, NO_x , dust, etc) compared to a business as usual approach, thereby improve the local environment quality;
- The project will enhance the ability of peak regulation to the local grid and improve the electric quality of the local grid;
- Promoting greatly the use of natural gas in a traditionally coal gas metropolitan city for better safety and environment;
- Promoting the application of gas-fired combined cycle power generation technology widely in the East China Region.
- The project will create the employment opportunities for the local people.

A.3. Project participants:

Name of Party involved (*) ((host) indicates a host Party)	Private and/or public entity(ies) project participants (*) (as applicable)	Kindly indicate if the Party involved wishes to be considered as project participant (Yes/No)
P.R. China (host)	Zhejiang Provincial Energy Group Zhenhai Natural Gas Power Generation Co., Ltd.	No
U.K.	Trading Emissions PLC.	No

Please see Annex 1 for detailed contact information.

A.4. Technical description of the project activity:

A.4.1. Location of the project activity:

A.4.1.1. Host Party(ies):

People's Republic of China

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

Zhejiang Province

A.4.1.3. City/Town/Community etc:

Zhenhai District, Ningbo City

A.4.1.4. Detail of physical location, including information allowing the unique identification of this project activity (maximum one page):

The proposed project is located in Zhenhai Power Plant, Zhenhai District, Ningbo City, Zhejiang Province, P.R. China. It is about 7km far from Yong River Quay, 2km far from Zhenhai Chengguan Town center and 18km far from Ningbo City center. The geographical coordinates are east longitude 121°43′ and north latitude 29°58′. The location of the proposed project is shown in the map of Figure A1.


RUSSIA
KAZAKHSTAN
MONGOLIA
INDIA
BURMA
THAILAND
China
The location of project in China


Huangwan
Toupeng
Hangzhou
Xiaoshan
Qianqing
Maan
Songxia
Kanxi
Guancheng
Yuyao
Cicheng
Shaoxing
Diankou
Fenghui
Zhenhai
Ningbo
Zhuji
ZHEJIANG
Daqiao
Paitou
Shengxian
Xinchang
Zhuxi
Xizhou
Dancheng
The Proposed Project

Figure A1. Location of the proposed project

A.4.2. Category(ies) of project activity:

This category will fall within sectoral scope 1: energy industries.

A.4.3. Technology to be employed by the project activity:

The proposed project activity applies large-scale gas-steam combined cycle power generation technology provided by GE.

The operation principle of the gas-steam combined cycle power generation is: the gas turbine drives the power generator to generate electricity. At the same time the exhaust gas from the gas turbine after combustion of nature gas enters the heat recovery steam generator and generates steam using demineralised water, and then, the steam generated enters into the steam turbine and drive the generator to generate electricity. The project involves two sets of gas-steam combined cycle power generation units. Each unit includes a gas turbine, heat recovery steam generator, steam turbine and generator. The thermal efficiency of the technology can arrive 58.2%.

According to the feasibility study report[1], natural gas will be the only type of fuel consumed in the proposed project, with the fuel consumption of 0.206 Nm^3/kWh. During the design of the project, the letter of natural gas purchase intent was signed between the Zhejiang Provincial Natural Gas Development Co., Ltd. and Zhejiang Provincial Energy Group Zhenhai Natural Gas Power Generation Co., Ltd., which ensures a continuous and stable supply for 20 years.

The information of the main parameters of the gas-steam combined cycle power unit is shown below:

Table A1 Main parameters of the gas-steam combined cycle power unit

Equipment	Manufacturer	Model	Rated output
Gas turbine	GE	PG9351FA	
Steam generator	Ha'erbin Heat Recovery Boiler Plant	HF-9FA-285.4/9.87-566.5-3P(R)	
Steam turbine	Ha'erbin Steam Turbine Plant	D10	
Power generator	Ha'erbin Power Generator Plant	390H	397.8MW

A.4.4. Estimated amount of emission reductions over the chosen crediting period:

[1] The feasibility study report of the Zhejiang Provincial Energy Group Zhenhai Natural Gas Power Generation Co., Ltd.'s NG Power Generation Project is completed by Zhejiang Power Design Institute, an independent party, which is rated as A class for power designing.

The proposed project is expected to generate an estimated annual emission reduction of tCO2e and tCO2e during the first crediting period.

Years	Annual estimation of emission reductions in tones of CO_2 e
2007[2]	937,067
2008	937,067
2009	937,067
2010	937,067
2011	937,067
2012	937,067
2013	937,067
Total estimated reductions (tonnes of CO_2e)	6,559,469
Total number of crediting years	7
Annual average over the crediting period of estimated reductions (tonnes of CO_2e)	937,067

A.4.5. Public funding of the project activity:

There is no public funding for the proposed project.

SECTION B. Application of a baseline and monitoring methodology:

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

The project participants propose to use the approved baseline methodology AM0029 (Version 01, 19 May 2006) "Baseline Methodology for Grid Connected Electricity Generation Plants using Natural Gas" and approved monitoring methodology AM0029 (Version 01, 19 May 2006) "Grid Connected Electricity Generation Plants using Non-Renewable and Less GHG Intensive Fuel".

The project also uses the build margin (BM) and operation margin (OM) approach as specified in ACM0002 "Consolidated methodology for grid-connected electricity generation from renewable sources" and makes reference to the latest approved version of "tool for the demonstration and assessment of additionality".

For more information regarding the methodology please refer to Website of Executive Board.

http://cdm.unfccc.int/methodologies/PAmethodologies/approved.html

[2] The first crediting period is expected to be from 01 October 2007 to 30 September 2004.

B.2. Justification of the choice of the methodology and why it is applicable to the project activity:

The application of the baseline methodology AM0029 to the proposed project is justified for satisfying the three conditions:

- Condition 1: The project activity is the construction and operation of a new nature gas fired grid-connected electricity generation plant.

  The project activity is a new nature gas fired grid-connected electricity generation plant and no other fuel except natural gas is consumed. The project activity is currently under construction and will be commission completely in December of 2007.

- Condition 2: The geographical/physical boundaries of the baseline grid can be clearly identified and information pertaining to the grid and estimated baseline emissions is publicly available.

  Natural gas is sufficiently available in Zhejiang Province. The electricity generated by the proposed project will be sold to Zhejiang Power Grid, which is an integrated part of the East China Power Grid. As demonstrated in B.6, the grid for baseline emissions calculation is the East China Power Grid, whose geographical/physical boundaries can be clearly identified and the information pertaining to the East China Power Grid and estimated baseline emissions is publicly available[3].

- Condition 3: Nature gas is sufficiently available in the region or country, e.g. future nature gas based power capacity additions, comparable in size to the project activity, are not constrained by the use of nature gas in the project activity.

  According to the *Natural Gas Pipeline Net Planning of Zhejiang Province (Gui-497, September of 2005)*, the natural gas supply of Zhejiang Province comes from three sources: natural gas transferred from west, East China Sea gas field and imported LNG. The natural gas supply is as follows:

Table B1 Natural Gas Supply in Zhejiang Province (unit: $10^8 Nm^3/a$)

	Natural Gas source	2005	2010	2015	2020
1	Natural gas transferred from west	7.98	14.5	18	19.2
2	East China Sea gas field	0.8	23.3	23.3	23.3
3	Imported LNG	0	44.18	88.36	132.54
Total supply		8.78	81.98	129.66	175.04

The natural gas supply in Zhejiang Province will be operated by Zhejiang Provincial Natural Gas Development Co., Ltd.[4]. According to the feasibility study report of the project, the expected

[3] http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/2006/2006121591135575.pdf

[4] Approval letter of the Establish of Zhejiang Provincial Natural Gas Development Co., Ltd. by Zhejiang Provincial Development and Plan Commission, [2001]758

consumption of natural gas by the proposed project is $5.3354 \times 10^8 Nm^3/a$, which is very small compared with the total amount of natural gas available in Zhejiang Province. Furthermore, in the *Natural Gas Pipeline Net Planning of Zhejiang Province*, the natural supply to industry user, natural gas power plant, natural gas thermal plant and civil use is ensured. Therefore the natural gas which will be consumed by the proposed project would not displace the natural gas that would otherwise be used elsewhere in an economy.

To summarize, the approved baseline methodology, AM0029: "Baseline Methodology for Grid Connected Electricity Generation Plants using Natural Gas" is applicable to the proposed project.

The approved monitoring methodology AM0029 "Grid Connected Electricity Generation Plants using Non-Renewable and Less GHG Intensive Fuel" is applicable for:

- ✧ The applicability of the associated baseline methodology is justified. Under the same conditions this monitoring methodology is applicable.
- ✧ This monitoring methodology is used in conjunction with the approved baseline methodology AM0029 for the proposed project.

Based on the discussion above, the approved monitoring methodology AM0029 is applicable to the proposed project.

B.3. Description of how the sources and gases included in the project boundary:

Overview of GHG emissions sources included in or excluded from the project boundary are listed as follows:

	Source	Gas	Included?	Justification / Explanation
Baseline	Power generation in baseline	CO_2	Yes	Main emission source
		CH_4	No	Excluded for simplification. This is conservative.
		N_2O	No	Excluded for simplification. This is conservative.
Project Activity	On-site fuel combustion due to the project activity	CO_2	Yes	Main emission source
		CH_4	No	Excluded for simplification.
		N_2O	No	Excluded for simplification.

B.4. Description of how the baseline scenario is identified and description of the identified baseline scenario:

According to AM0029, baseline scenario is identified using the following steps:

Step 1: Identify plausible baseline scenarios

Step 2: Identify the economically most attractive baseline scenario alternative

In step 2 of the above, the following sub-steps are involved.

Sub-step 1: Calculate levelized cost of electricity production in Yuan / kWh for all alternatives remaining after step1.

Sub-step 2: Sensitivity analysis for all alternatives remaining after step 1.

Step 1: Identify plausible baseline scenarios

According to AM0029, the identification of alternative baseline scenarios of the project activity should include all possible realistic and credible alternatives that provide outputs or services comparable with the project activity within the project's boundary. The plausible baseline scenarios identified include:

(1) The project activity not implemented as a CDM project

Scenario (1) is a plausible baseline alternative which can deliver similar services as the proposed project.

(2) Power generation using natural gas, but technologies other than the project activity

Natural gas for power generation using technologies other than the project activity, i.e. simple cycle gas turbine, has relatively lower thermal efficiency of 32%-35%[5] and is rarely used now[6]. According to the official statistics[7], all other natural gas projects that have recently been constructed or are under construction or are being planned in the region, which can deliver the similar service as the proposed project, apply or will apply the same technology – Large-scale gas-steam combined cycle for power generation as the proposed project. Therefore alternative (2) is not the baseline scenario of the proposed project.

(3) Power generation technologies using energy sources other than natural gas

Power generation technologies using energy sources other than natural gas may include (a) renewable energy power plant, (b) nuclear power plant and (c) coal-fired power plant. The proposed project operates as peak load regulation.

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[5] http://www.bjx.com.cn/files/wx/ahdl/2001-1/2.htm

[6] http://www.hdrqw.com/news/20060505-31.htm

[7] Zhejiang Provincial 11th electric power 5-year expansion plan

Pumped storage hydro power station can be constructed for peak load regulation operation. However, according to China's latest survey on hydro resources[8], 70.6% of hydro resources are located in the southwest region while only 4% exist in the eastern region. Moreover, 56.3% of exploitable hydro resource in east China has already been developed. The hydro sources based on large rivers within the project's boundary were developed many years ago, such as Xin'anjiang Hydro Station, Fuchunjiang Hydro Station, etc.[9]. The remaining limited hydro sources have low utilization hours, small installed capacity and are difficult to be developed[10], which can not provide similar service as the proposed project. Furthermore, the development of the wind-electric sources in china is being at the start-up status, the installation capacity of wind power plants is relatively smaller. Besides, wind power does not provide peak load regulation service[11]. So (a) is not a realistic and credible baseline alternative.

At present, the nuclear power stations provide the base load electricity to the grid and don't provide the peak regulation service.[12] So it does not provide similar services compared with the proposed CDM project. Scenario (b) is not a realistic and credible baseline alternative.

According to the data from China Power Yearbook 2004, the total installed capacity of the East China Power Grid in 2003 is 81,096.7MW, in which coal-fired installed capacity is 65,036.5MW, accounting for 80.2%. Therefore, the East China Power Grid generation system is dominated by coal-fired power, and this fact will not change in quite a long time in future. So construction of a coal-fired power plant to operate as peak load and medium load power, with comparable capacity or electricity generation is business-as-usual scenario. Considering the generation capacity commonly used in China now, (c) 300MW and 600MW desulfurized coal-fired power unit is selected as realistic and credible baseline alternatives.

(4) Import of electricity from connected grids, including the possibility of new interconnections.

The grid connected to the East China Power Grid is the Central China Power Grid (Including Sichuan grid and Three Gorge**Error! Bookmark not defined.**). The electricity imported from Central China Power Grid is 7380 GWh, 1620 GWh and 2569 GWh in year 2002, 2003 and 2004 respectively[13]. The imported electricity from the Central China Power Grid usually provides base load power to the East China Power Grid[14], which is not similar as the proposed CDM project. So scenario (4) is not a realistic and credible baseline alternative.

As analyzed above, scenario (1) and scenario (c) of (3) are selected as realistic and credible alternatives, listed as Table B-1. The further investment analyses are used in Step 2 to identify the economically most attractive baseline scenario alternative.

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8 http://www.shp.com.cn/zhwx/showcontent.asp?id=18090

9 *White Book of Zhejiang Provincial Energy Development Statusy,2003*

10 White Book on Energy of Zhejiang, the People's Government of Zhejiang Province, Zhejiang Daily,09 Decemember,2004, http://zjdaily.zjol.com.cn/gb/node2/node802/node803/node274189/node274194/userobject15ai3603909.html

11 http://tech.163.com/05/0330/15/1G3OHFFD00091537.html

12 http://np.chinapower.com.cn/article/1000/art1000062.asp

13 China Electric Power Book, 2003-2005

14 engine.cqvip.com/content/tv/95255x/1998/016/003/gc23_tv1_3203139.pdf

Table B2 Identified Plausible Baseline Scenarios

No.	Baseline Alternative
(i)	The project activity not implemented as a CDM project
(ii)	Construction of a 300MW coal-fired power unit
(iii)	Construction of a 600MW coal-fired power unit

Step 2 Identify the economically most attractive baseline scenario alternative

According to AM0029, the economically most attractive baseline scenario alternative is identified using investment analysis. The levelised cost of electricity production should be used as a financial indicator in the investment analysis for all alternatives remaining after step 1. The levelised cost methodology used is based on Appendix 5 of *Projected Costs of Generation Electricity* published by IEA[15]. The formula applied to calculate the levelised cost of electricity (*LCOE*) is the following:

$$LCOE = \sum_t \frac{I_t + M_t + F_t}{(1+r)^t} \Big/ \sum_t \frac{E_t}{(1+r)^t} \qquad (1)$$

Where:

LCOE: levelised cost of electricity per kWh

I_t: Capital expenditures in the year *t*

M_t: Operation and maintenance expenditures in the year *t*

F_t: Fuel expenditures in the year *t*

E_t: Electricity generation in the year *t*

r: Discount rate

$\sum_t$: The summation over the period including construction, operation during the economic lifetime and decommissioning of the plant as applicable

The parameters needed in *LCOE* calculating for the three baseline alternatives are listed in the following Tables.

Table B3 Parameters in the calculation of the levelised cost of electricity per kWh for the alternatives

Item in the formula	Parameter	Unit	The proposed project[16]	300MW coal-fired power unit	600MW coal-fired power unit
Capital Expenditures[17]	Unit Cost	RMB/kW	3588	4246	4281
	Discount Rate	%	6.21%	6.12%	6.12%

[15]Projected Costs of Generating Electricity- *2005 Update*, International Energy Agency, http://www.iea.org/Textbase/publications/free_new_Desc.asp?PUBS_ID=1472

[16] Project feasibility study report

[17] Construction Cost of power engineering in East China Areas, Provided by State Electricity Regulation Committee

Operation and Maintenance Expenditures[18]	Material Expenditure	RMB /MWh	8.5	6	5
	Water Expenditure	RMB/MWh	0.04	1	1
	Desulfuration Expenditure	RMB/ton fuel	NA	3.64	3.64
	Waste Expenditure	10^4RMB/unit	NA	626	1136
	Repair Expenditure	%	2.5%	2.5%	2.5%
	Issuance Expenditure	%	0.25%	0.25%	0.25%
	Pay &Welfare	10^4RMB/Year.Person	6.783	8	8
	Quantity of employees	Person/MW	120	234	247
	Other Expenditure	RMB/MWh	15	12	10
	Annual Operation Hour	Hour	3500	5000	5000
Fuel Expenditure[19]18	Fuel Consumption	gce/kWh Nm^3/kWh	0.206	322	314
	Fuel Price	RMB/ton SCE RMB/Nm^3	1.31[20]	430	430
Electricity generation	Capacity	MW	740[21]	300	600

Based on the above data, the levelised cost of electricity production in RMB/kWh[22] for the three baseline alternatives can be calculated and the results are presented below:

Table B4 Levelised cost of electricity production in RMB/kWh for the alternatives

[18] Unit Cost Referenced Index of coal-fired power engineering and design of 2005,China Electricity Power Press, Beijing, 2006

[19] Statistic Annals of China Power Industry 2005, Provided by State Electricity Regulation Committee

[20] Notice regarding the price of natural gas, National Development and Reform Commission, 28 September 2003, [2003] No. 1323.

[21] Capacity of 740MW is used for the proposed project in the levelised cost calculation to be consistent with that in the investment analysis and is justified as the same reason as the capacity used in the investment analysis.

[22] Exchange rate: 1US Dollar=8.2RMB in 2004

	Baseline alternatives	Levelised cost of electricity production in RMB/kWh
(i)	The project activity not implemented as a CDM project	0.387
(ii)	Construction of a 300MW coal-fired power unit	0.214
(iii)	Construction of a 600MW coal-fired power unit	0.172

From the Table B4, levelised cost of 600MW coal-fired power unit is the lowest. A sensitivity analysis is performed for all alternatives to confirm that the conclusion regarding the financial attractiveness is robust to reasonable variations in the critical assumptions, i.e. fuel prices and the load factor. The result of sensitivity analysis is shown in Table B5.

Table B5 Sensitivity Analysis of Levelised Cost

Baseline alternatives	Fuel prices					Load Factor				
	-10%	-5%	0	+5%	+10%	-10%	-5%	0	+5%	+10%
The proposed project	0.36	0.374	0.388	0.401	0.414	0.397	0.392	0.388	0.383	0.379
300MW coal-fired	0.202	0.208	0.214	0.22	0.226	0.222	0.218	0.214	0.211	0.208
600MW coal-fired	0.163	0.168	0.172	0.177	0.181	0.181	0.176	0.172	0.169	0.165

The sensitivity analysis shows that when the fuel prices and load factor vary in the range of -10% to + 10%, the levelised cost of 600MW coal-fired power unit is always the lowest, that's to say, the pre-selected baseline scenario of 600MW coal-fired power unit is likely to remain the most economically and/or financially attractive, thus is identified as the baseline scenario.

B.5. Description of how the anthropogenic emissions of GHG by sources are reduced below those that would have occurred in the absence of the registered CDM project activity (assessment and demonstration of additionality):

According to AM0029, the additionality of the project activity will be demonstrated through the following three steps:

Step 1: Benchmark Investment Analysis

Benchmark Analysis Method

According to *Interim Rules on Economic Assessment of Electrical Engineering Retrofit Projects*[23] issued by former State Power Corporation of China, the project IRR for total investment should not be lower than 8% considering economic assessments of hydropower projects, fuel-fired projects, transmission and

[23] *Interim Rules on Economic Assessment of Electrical Engineering Retrofit Projects,2003*

substation projects. Hence, The IRR of the total investment is used as financial indicator for performing the benchmark investment analysis in this PDD.

Calculation and comparison of financial indicators

Based on FSR of the project, the basic data for calculation of the IRR of the project are as Table B6.

According to the feasibility study report of the project, the output of the natural gas-fired electricity generation unit is critical to the working circumstance. Considering the circumstance the project located, the output of the electricity generation unit can not reach the rated output all over the year. Therefore, the installed capacity used in the financial assessment of the FSR and in the investment analysis of the PDD is calculated as 370MW for each set of gas-steam combined cycle power generation unit, with total of 740MW.

Table B6 Basic assumptions in the calculation of IRR

Basic Assumptions	Unit	Amount	Data Source
Static total investment	RMB	2537680000	FSR
Operational Lifetime	years	21	FSR
Installed capacity	MW	740	FSR
Annual operation hour	hours	3500	FSR
Self Electricity Consumption	%	2.5	FSR
Annual electricity supplied to the grid	GWh	2525.25	FSR
Nature gas consumption per unit electricity	Nm^3/MWh	206	FSR
Natural gas price (Including tax)	RMB/Nm^3	1.31[24]	
Depreciable period	years	15	FSR
Repair expenditure	%	2.5	FSR
Insurance expenditure	%	0.25	FSR
Material expenditure	RMB/MWh	8.5	FSR
Water expenditure	RMB/MWh	0.04	FSR
Employee expenditure	RMB/year/person	42000	FSR
welfare expenditure	%	61.5	FSR
Quantity of employee	person	120	FSR
Other expenditure[25]	RMB/MWh	15	FSR
Legal accumulation fund	%	10	FSR
Commonweal fund	%	5	FSR

[24] Notice regarding the price of natural gas, National Development and Reform Commission, 28 September 2003, [2003] No. 1323.

[25] According to the FSR, other fee including disposal& clean of construction place, project management in construction period, project technical service in construction period and production preparation, etc.

Value added tax (VAT)	%	17	FSR
Income tax	%	33	FSR
Expected electricity tariff (Including VAT)	RMB/kWh	0.4664	FSR
Expected CERs price	Euro/tCO_2e	8	

Based on the above data, The IRR for total investment of the project activity could be calculated and its calculation result is shown below:

IRR for total investment of the project activity not implemented as CDM project	6.53%

It is clear that the IRR of total investment of the project activity is lower then 8%. Therefore, this CDM project activity can not be considered financially attractive.

Sensitivity analysis

The sensitivity analysis shall show whether the conclusion regarding the financial attractiveness is robust to reasonable variations in the critical assumptions. The following parameters are taken as financial factors for sensitivity analysis:

1) Total investment;
2) Nature gas price;
3) Annual output
4) Annual Operation & Maintenance cost

The electricity tariff is not considered in the sensitivity analysis because the tariff is strictly regulated by the government.

The results of the sensitivity analysis are presented in the following table.

Table B7 Sensitivity analysis

Critical assumptions	-10%	-5%	0%	+5%	+10%
Total investment	7.95%	7.21%	6.53%	5.90%	5.32%
Nature gas price	8.51%	7.52%	6.53%	5.15%	4.11%
Annual output	5.32%	6.03%	6.53%	7.01%	7.62%
Annual Operation & Maintenance cost	7.28%	6.91%	6.53%	6.15%	5.76%

The sensitivity analysis shows that while the total investment, annual output and annual Operation & Maintenance cost vary between -10% to 10%, the IRR for total investment will remain below the benchmark 8%. If the natural gas price decreases by about 7%, the IRR begins to exceed the benchmark. However, the natural gas price is increasing these years. In the document issued by Zhejiang Provincial Price Bureau in 2006, the natural gas supplied to NG power plant increased to 1.445 RMB/Nm^3. The price of natural gas is expected to keep on increasing in the following years[26], therefore the IRR will not exceed the benchmark 8%.

Based on the results of the sensitivity analysis, the proposed project can not be considered as financially attractive without the income from CERs sales.

Step 2: Common practice analysis

Step 4 (common practice Analysis) of the latest version of the "Tool for demonstration assessment and of additionality" agreed by the CDM Executive Board is used to conduct the common practice analysis.

Sub-step 2a. Analyze other activities similar to the proposed project activity:

The projects are considered similar, if they are in the same region, rely on a broadly similar technology, and are of the similar scale. Considering the conditions of the proposed project, the similar projects in east China region are identified as below：

Table B8 List of Similar Project Activity[7,27]

The activity similar to the proposed project activity	Information of the projects	Notes
Zhejiang Yuyao CCGT power project	Location: Yuyao County, Ningbo City, Zhejiang Province Installed capacity: 2 X 350 MW level Expected operational time: 2007	Under the development as a CDM project
Zhejiang Xiaoshan CCGT power project	Location: Xiaoshan County, Hangzhou City, Zhejiang Province Installed capacity: 2 X 350 MW level Expected operational time: 2007	Under the development as a CDM project
Zhejiang Banshan CCGT power project	Location: Banshan District, Hangzhou City, Zhejiang Province Installed capacity: 3 X 350 MW level Operational time: 2005	Under the development as a CDM project
Shanghai Shidongkou CCGT power project	Location: Shanghai city Installed capacity: 3 X 300 MW level Expected operational time: 2007	Under the development as a CDM project
Jiangsu Huanengjinling CCGT power project	Location: Jinling County, Nanjing City, Jiangsu Province Installed capacity: 2 X 390 MW Expected operational time: 2007	Under the development as a CDM project
Fujian Jinjiang CCGT power	Location: Jinjiang City, Fujian	Under the development as a

[26] http://www.ocn.com.cn/reports/2006123tianranqi.htm

[27] http://cdm.ccchina.gov.cn/web/index.asp, http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File1272.pdf

project	Province Installed capacity: 4 X 350 MW level Expected operational time: 2007	CDM project
Fujian Xiamendongbu CCGT power project	Location: Xiamen City. Fujian Province Installed capacity: 2 X 350 MW level Expected operational time: 2008	This project is fully invested by an international company, East Asia Power (EAP) China, which is owned by RGM International, a multinational corporation with the head office in Singapore. This is the first gas-fired power plant fully invested by a multinational company in China
Fujian Putian CCGT power project	Location: Putian City, Fujian Province Installed capacity: 4 X 350 MW level Expected operational time: 2007	Under the development as a CDM project

Sub-step 2b. Discuss any similar options that are occurring:

Therefore, excluding the projects which have been under development as CDM projects, one similar activity can be identified, Fujian Xiamendongbu CCGT power project. As a foreign enterprise in Xiamen City, Fujian Province, China, this project enjoys lots of benefits[28]. With the large benefits, this project must be more financially attractive than the proposed project.

To conclude, there are essential distinctions between the proposed project and the similar one. Therefore, the similar projects identified do not contradict the claim that the proposed project activity is financially unattractive.

Step 3: Impact of CDM Registration

According to investment analysis the IRR for total investment of the project is 6.34%, which is obviously lower than the benchmark, showing that the project is unlikely financially attractive without the CERs revenues. The main barrier of the project is that the gas price has increased continuously while the electricity tariff received by the project is unlikely to reach the optimal level. Considering the project can reduce CO2 emissions due to using natural gas, the less carbon intensive fuel comparing to coal-fired plant, the project owner has been seeking helps from the clean develop mechanism (CDM) since it realized the potential of the proposed project as a CDM project. The incentive of CDM was also evaluated and considered when the Ningbo Branch of Industrial and Commercial Bank of China granted loans to the proposed project, which is reflected in the Letter of Loan Intent by Ningbo Branch of Industrial and Commercial Bank of China on 18 September 2004.

[28] http://www.fjit.gov.cn/display.jsp?articleId=2385,http://www.huaxia.com/gd/csdh/xm/00258615.html

If the project activity is registered as a CDM project, and the price of the project's CERs is assumed to be 7 EURO/ tCO_2e, the IRR of the total investment of the project activity will increase to 9.10%, making the project financially attractive.

Project IRR of the proposed project without and with CDM revenues

	Project IRR
Without CERs	6.53%
With CERs	9.85%

The successful registration of the project activity will also encourage the development of the technology of gas-steam combined cycle power generation, and will lead to further GHG emission reductions.

In a summary, all three steps are satisfied, the project is considered additional.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

According to AM0029, the procedure for estimation of the emission reductions from the project activity during the crediting period are stated as the following four steps:

Step 1: Project Emissions (PE_y)

The project activity is on-site combustion of nature gas to generate electricity. According to the feasibility study report, natural gas will be the only type of fuel consumed in the proposed project. The CO_2 emissions from electricity generation (PE_y) are calculated as follows:

$$PE_y = \sum FC_y \times COEF_y$$

Where,

$FC_{,y}$	Quantity of nature gas combusted in the project plant in year '*y*'. This parameter will be monitored during the crediting period and its value for *ex-ante* assessment is $5.3354\times10^8 Nm^3/a$, which is based from the FSR of the project.
$COEF_{,y}$	The CO_2 emission coefficient for nature gas (tCO_2/m^3) in year '*y*'. This parameter is obtained as the following equation.

$$COEF_y = NCV_y \cdot EF_{CO_2,y} \cdot OXID_{NG}$$

Where,

NCV_y	The net calorific value per volume unit of nature gas in year '*y*' (MJ/m^3) as determined from the nature gas supplier. This parameter will be monitored during the crediting period and its value for *ex-ante* assessment is 33.656 MJ/m^3, the data is provided by the natural gas supplier - Zhejiang Provincial Natural Gas Development Corporation, as indicated in the FSR of the project.
$OXID_{NG}$	The oxidation factor of nature gas. This parameter will be monitored during the

	crediting period and its value is 1, which is from IPCC 2006 Guidelines for National Greenhouse Gas Inventories.
$EF_{CO2,y}$	The CO_2 emission factor per unit of energy of nature gas in year '*y*' (tCO_2/TJ) as determined from the nature gas supplier, wherever possible, otherwise from local or national data. This parameter will be monitored during the crediting period and its value is converted into 56.1 tCO_2/TJ (IPCC default value is 15.3 tC/TJ).

Step 2: Baseline Emission (BE_y)

Baseline emissions are calculated by multiply the electricity generated in the project plant (EG_y) with a baseline emission factor ($EF_{BL.CO2.y}$), as follows:

$$BE_y = EG_y \times EF_{BL,CO2,y}$$

Where,

EG_y	Net electricity generation in the project plant in year '*y*'. This parameter will be monitored during the crediting period and its value for *ex-ante* assessment is 2525.25 GWh which is taken from the FSR of the project.
$EF_{BL,co2,y}$	The baseline CO_2 emission factor (tCO_2/MWh) in year '*y*'. The determination of this parameter will be made once at the validation stage based on an *ex-ante* assessment, once again at the start of each subsequent crediting period. If BM or CM is selected, they will be estimated ex post, as described as ACM0002. This parameter is obtained by calculation as follows.

$$EF_{BL.CO2.y} = \min(EF_{BL.BM.y}, EF_{BL.CM.y}, EF_{BL.CO2.option3})$$

Where,

$EF_{BM,y}$	The build margin (tCO_2e/MWh), calculated according to ACM0002. Its value is 0.770 tCO_2e/MWh.
$EF_{CM,y}$	The combined margin (tCO_2e/MWh), calculated according to ACM0002, using a 50/50 OM/BM weight. $EF_{CM.y} = \omega_{OM} \cdot EF_{OM,y} + \omega_{BM} \cdot EF_{BM,y}$ The combined margin is calculated to be 0.844 tCO_2e/MWh.
$EF_{BL,CO2,option3}$	The emission factor (tCO_2e/MWh) of the technology (and fuel) identified as the most likely baseline scenario under "Identification of the baseline scenario" in section B.4 of this PDD. In this PDD, the technology (and fuel) of the most likely baseline scenario is 600MW coal-fired power generation unit. This parameter is obtained by calculation as follows.

The calculation of** $EF_{BM,y}$ **and** $EF_{CM,y}$ **are as follows:

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

$EF_{OM,y}$ will be calculated based on one of the four following methods:

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

The method (c) requires the detailed operation and dispatch data of power plants in the grid. But there is no publicly available dispatch data for the East China Grid. Therefore, the method (c) is not applicable.

The method (b), simple adjusted OM, needs the annual load duration curve of the grid. Based on the same reason stated in the above paragraph, the necessary data for the method (b) are difficult to obtain, so the method (b) is not applicable.

The Simple OM method (a) 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 2001~ 2005*, the share of the low-cost/must run resources in the East China Power Grid are 10.47% (2000), 11.49% (2001), 11.86% (2002), 10.96% (2003), and 9.77% (2004), respectively. Therefore, it is reasonable to select the method (a) to calculate the OM emission factor.

The method (d), average OM, is used when low-cost/must run resources[29] constitute more than 50% of total amount of power generation in the grid. Based on the above data, the method (d) is not applicable.

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

- (*ex-ante*) the full generation-weighted average for the most recent 3 years for which data are available at the time of PDD submission, if or,
- the year in which project generation occurs, if $EF_{OM,y}$ is updated based on ex-post monitoring.

Here ex-ante vintage is chosen, and EF_{OM} is fixed during the crediting period.

According to the ACM0002, the Simple OM emission factor ($EF_{OM, simple,y}$) is calculated as the generation-weighted average emissions per electricity unit (tCO2/MWh) of all generating sources that serve the system, excluding low-operating cost and must-run power plants. The formula of $EF_{OM,simple,y}$ calculation is

$$EF_{OM,simple,y} = \frac{\sum_{i,j} F_{i,j,y} \cdot COEF_{i,j,y}}{\sum_{j} GEN_{j,y}} \qquad (6)$$

Where:

[29] Low operating cost and must run resources typically include hydro, geothermal, wind, low-cost biomass, nuclear and solar generation. If coal-fired power is obviously a must-run, it should also be included in this list, i.e. excluded from the set of plants.

$F_{i,j,y}$ is the amount of fuel *i* (in a mass or volume unit) consumed by relevant power sources j in year(s) *y*, while *j* refers to the power sources delivering electricity to the grid, not including low-operating cost and must-run power plants, and including imports to the grid[30];

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

And $GEN_{j,y}$ is the electricity (MWh) delivered to the grid by the source *j*.

The CO_2 emission coefficient $COEF_{i,j,y}$ is obtained as

$$COEF_{i,j,y} = NCV_i \cdot EF_{CO2,i} \cdot OXID_i \tag{7}$$

Where:

NCV_i is the net calorific value (energy content) per mass or volume unit of a fuel *i;*

$OXID_i$ is the oxidation factor of the fuel *i,*

$EF_{CO2,ii}$ is the CO_2 emission factor per unit of energy of the fuel *i.*

If available, local values of NCV_i and $EF_{CO2,i}$ shall be used. If not, country-specific values are preferable to IPCC default values. In this PDD, NCV_i of different fuels are obtained from *China Energy Statistical Yearbook 2005*. With regard to the fuel types where NCV_i fluctuate in a certain range, the floor values of the fluctuation range are used for conservatism. $EF_{CO2,\,i}$ of fossil fuel comes from IPCC default values.

The Simple OM Emission Factor ($EF_{OM,\,simple,y}$) of the proposed project is calculated on the basis of the fuel consumption data for electricity generation of the East China Grid, excluding those of low-operating cost and must-run power plants, such as wind power, hydropower and nuclear etc. These data are obtained from the *China Electric Power Yearbook* (2003~2005, published annually) and *China Energy Statistical Yearbook* (2000~2005). Based on these data, the Simple OM Emission Factor ($EF_{OM,\,simple,y}$) of the East China Power Grid is calculated as 0.917 tCO_2e/MWh (see Annex 3 for details).

STEP 2. Calculate the Build Margin emission factor ($EF_{BM,y}$):

According to ACM0002, $EF_{BM,y}$ is determined by the formula as follow:

$$EF_{BM,y} = \frac{\sum_{i,m} F_{i,m,y} \cdot COEF_{i,m,y}}{\sum_{m} GEN_{m,y}} \tag{8}$$

where $F_{i,m,y}$, $COEF_{i,m}$ and $GEN_{m,y}$ are analogous to the variables described for the simple OM method in step 1 for plants m.

ACM0002 provides two options for sample group m:

(1) The five power plants that have been built most recently, or

[30] As described above, imports from a connected electricity system should be considered as one power source j.

(2) The power plants capacity additions in the electricity system that comprise 20% of the system generation (in MWh) and that have been built most recently.

The one with larger annual generation should be used.

In the East China Grid, the information on the five power plants built most recently is not available. According to the EB's guidance on DNV deviation request, "Request for clarification on use of approved methodology AM0005 for several projects in China", the EB accepted the following deviation[31]:

- Use of capacity additions during last 1 - 3 years for estimating the build margin emission factor for grid electricity;

- Use the efficiency level of the best technology commercially available in the provincial/regional or national grid of China, as a conservative proxy, for each fuel type in estimating the fuel consumption to estimate the build margin (BM).

Therefore, this proposed project uses the alternative method to calculate $EF_{BM,Y}$, and the formula is

$$EF_{BM,y} = \left[EF_{BTCA\_fire,y} \times CAP_{fire,y-n,y}\right] / \left[\sum_j CAP_{j,y-n,y}\right] \quad (9)$$

Where $CAP_{fire,y-n,y}$ is the incremental installed capacity of fuel-fired power (MW) in *y* year compared to that of *y-n* year;

$\sum_j CAP_{j,y-n,y}$ is the total incremental installed capacity of various power sources in the grid during the years from y to y-n year;

$\left[CAP_{fire,y-n,y}\right] / \left[\sum_j CAP_{j,y-n,y}\right]$ represents the share of incremental installed capacity of fuel-fired power in the whole incremental installed capacity.

where, *n* is fixed by:

Starting from *y* year, the differences of installed capacity between *y* year and *y-1* year, y year and *y-2* year,…*y* year and *y-n* year, *y* year and *y-n-1* year, …are calculated respectively, and then divided by the installed capacity of *y* year. The year that can make the left-hand side of the following formula greater than 20% will be regarded as *n*. The formula is as follows:

$$\frac{\sum_j CAP_{j,y-n}}{\sum_j CAP_{j,y}} \geq 20\% \quad (10)$$

$EF_{BTCA\_fire,y}$ is the emission factor of fuel-fired power with best technology commercially available (BTCA). It represents the trend of decreased coal consumption in the fuel-fired power generation brought by technology advancement in the coming years. Compared with the method for $EF_{BM,y}$ provided by

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

ACM0002 Methodology, the value of $EF_{BTCA\_fire,y}$ is lower than that of other types of fuel-fired power plants to be built in the grid, because the emission factor of the alternative method reflects the fuel efficiency of the fuel-fired power plants which use the best technology commercially available. Therefore, the building margin factor through this method is conservative.

The following section describes the process of calculating $EF_{BTCA\_fire,y}$ for the East China Grid. According to the data from *China Power Yearbook 1999-2005*, and with the year 2004 regarded as the most recent year of *y,* the incremental installed capacity between year 2001and year 2004 are used for $EF_{BM,y}$ calculation.

The calculation for value of $EF_{BTCA\_fire,y}$ is based on the 320g/kWh of standard coal consumption for fuel-fired power generation. This is conservative compared with the coal consumption efficiency of 336.66 g SCE/kWh which is defined as the best technology commercially available in China (http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File1051.pdf)

Strictly speaking, fossil-fuel fired power plants other than coal fired such as oil-fired and gas-fired plant should be included when calculating the emission factor of fuel-fired power with best technology commercially; However, the respective capacity for fossil-fuel fired power plants other than coal fired ones in China is not publicly available, therefore, it is impossible to calculate BM using this weighted average Carbon Emission Factor method[32].

As far as East China Power Grid is concerned, there is little oil and gas consumption for fuel-fired power plant, e.g., CO_2 emission from the oil (Percentage:3.39%) and gas (Percentage:0.53%) in East China Power Grid account for 3.92% in total emission of the grid in 2004[33]. Therefore, to neglect the impact of other types of fossil fuelled power plants on BM calculation is acceptable. It must also be noted that the standard coal consumption of 320g/kWh applied to determine the BM emission factor is conservative compared with the fuel consumption of the best available coal plant 336.66g/kWh determined by the DNA of China[33]), therefore, the value of 320g/kWh both reflects the best available technology (with lowest carbon emission level) in China and is very conservative, thus compensating for not all fossil fuelled consumed for power generation being coal.

Therefore, by multiplying the value of $\left[CAP_{fire,y-n,y}\right]/\left[\sum_j CAP_{j,y-n,y}\right]$ with the value 0.886 of $EF_{BTCA\_fire,y}$, the value of $EF_{BM,y}$ is 0.770. (See Annex 3 for details)

Step3. Calculate the combined margin emission factor EF_y

Based on ACM0002, the baseline emission factor EF_y should be calculated as the weighted average of the Operating Margin emission factor ($EF_{OM,y}$) and the Build Margin emission factor($EF_{BM,y}$),

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[32] DNV's response to requests review of "Saihanba East 45.05MW Windfarm project" , which can be found at the website:http://cdm.unfccc.int/Projects/DB/DNV-CUK1155680126.47/ReviewInitialComments/ERTROU4VJT56H2K8RIBISF5BYZ0NWF; The 28th meeting of CDM-Executive Board agreed with DNV's response and agreed to register this project, which can be found in the meeting report of EB's 28th meeting: http://cdm.unfccc.int/EB/028/eb28rep.pdf

[33] http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File1051.pdf,

where the weights w_{OM} is 0.50 and w_{BM} is 0.50 by default, and ($EF_{OM,y}$) and ($EF_{BM,y}$) are calculated as described in Step 1 and 2.

EF_y= 0.917*0.50+0.770*0.50=0.844 (tCO_2e/MWh)

The calculation of $EF_{BL,CO2,option3}$ is as follows:

$$EF_{BL,CO2.\text{option3}} = \frac{COEF_{BL}}{\eta_{BL}} \times 3.6GJ/MWh$$

Where**,**

$COEF_{BL}$	The fuel emission coefficient (tCO_2e/GJ), based on national average fuel data, if available, otherwise IPCC defaults can be used. The value of 0.0946 tCO2e/GJ is applied in this PDD based on *2006 IPCC Guidelines for National Greenhouse Gas Inventories.*
η_{BL}	The energy efficiency of the technology, as estimated in the baseline scenario analysis in section B.4 of this PDD. Its value is 36.53% which is taken from the *Notification on Determining Baseline Emission Factor of China's Grid* issued by China's DNA on Dec 15th, 2006 on http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File1051.pdf.

Step 3: Leakage (LE_y)

Because the project plant doesn't take use of liquid natural gas (LNG), the leakage of the project activity is calculated as follows:

$$LE_y = \lfloor FC_y \times NCV_y \times EF_{NG,upstream,CH4} - EG_y \times EF_{BL,upstream,CH4} \rfloor \times GWP_{CH4}$$

Where:

LE_y	Leakage emissions during the year *y* in tCO_2e
FC_y	Quantity of nature gas combusted in the project plant during the year *y* in m^3. This parameter will be monitored during the crediting period. Its value for *ex-ante* assessment is $5.3354\times10^8 Nm^3$/a, which is taken from the FSR of the project.
NCV_y	Average net calorific value of the nature gas combusted during the year y in TJ/m^3. This parameter will be monitored during the crediting period. Its value for *ex-ante* assessment is 33.656 MJ/m^3. The data is provided by the natural gas supplier - Zhejiang Provincial Natural Gas Development Corporation, as indicated in the FSR of the project.
$EF_{NG,upstream,CH4}$	Emission factor for upstream fugitive methane emissions of natural gas from production, transportation and distribution in t CH per GJ fuel supplied to final consumers. This parameter's value is 296 tCH_4/PJ which taken the IPCC default value.
EG_y	Electricity generation in the project plant during the year y in GWh. This parameter will be monitored during the crediting period and its value for ex ante

	assessment is 2525.25 GWh which taken from the FSR of the project.
GWP_{CH4}	Global warming potential of methane valid for the relevant commitment period. This parameter's value is taken 21 $tCO_2e/tCH4$.
$EF_{BL,upstream,CH4}$	Emission factor for upstream fugitive methane emissions occurring in the absence of the project activity in t CH4 per MWh electricity generation in the project plant.

$EF_{BL,\ upstream,\ CH4}$ should be calculated consistent with the baseline emission factor ($EF_{BL,\ co2}$) used above, as follows:

- Option 1 Build Margin:

$$EF_{BL,upstream,CH4} = \frac{\sum_j FF_{j,k} \cdot EF_{k,upstream,CH4}}{\sum_j EG_j}$$

- Option 2 Combined Margin:

$$EF_{BL,upstream,CH4} = 0.5\frac{\sum_j FF_{j,k} \cdot EF_{k,upstream,CH4}}{\sum_j EG_j} + 0.5\frac{\sum_i FF_{i,k} \cdot EF_{k,upstream,CH4}}{\sum_i EG_i}$$

- Option 3 Baseline technology:

$$EF_{BL,upstream,CH4} = \frac{EF_{k,upstream,CH4}}{\eta_{BL}} * 3.6GJ/MWh$$

Where,

$FF_{j,\ k}$: quantity of fuel type k (a coal or oil type) combusted in power plant j included in the build margin.
$EF_{k,\ upstream,\ CH4}$: Emission factor for upstream fugitive methane emissions from production of the fuel type k (a coal or oil type) in t CH_4 per MJ fuel produced.
EG_j: Electricity generation in the plant j included in the build margin in MWh/a
i: Plants included in the operating margin.
$FF_{i,\ k}$: quantity of fuel type k (a coal or oil type) combusted in power plant i included in the operating margin.
EG_i: Electricity generation in the plant i included in the operating margin in MWh/a
η_{BL}: Energy efficiency of the most likely baseline technology

Since the underground mines account about 97% of total coal production capacity in China[34], which are obviously the predominant source, the default of $EF_{k,\ upstream,\ CH4}$ = 13.4 t CH4/kt coal is chosen from table 2 of the methodology. If $EF_{BL,upstream,CH4}$ is determined based on the build margin or the combined margin, the calculation should be consistent with the calculation of CO_2 emissions in the build margin and the combined margin, therefore, $FF_{i,\ k}$ can be calculated by multiplying EG_j with CEF. Where total net

[34] http://info.bosslink.com/htmlnews/2005/09/06/620498.htm

leakage effects are negative (LEy<0), project participants should assume $LE_y = 0$

Step 4: Emission Reductions (ER_y)

The emission reductions of the project activity (ER_y) is calculated as follows:

$$ER_y = BE_y - PE_y - LE_y$$

Where,

BE_y	Emissions in the baseline scenario in year y (t CO_2)
PE_y	Emissions in the project scenario in year y (t CO_2)
LEy	Leakage in year y (t CO_2)

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

Data / Parameter:	$F_{i,j,y}$
Data unit:	t or m^3
Description:	Amount of fuel i (in a mass or volume unit) consumed by relevant power sources j in year(s) y
Source of data used:	China Energy Statistical Yearbook
Value applied:	See Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	Since the detailed fuel consumption data by power plants are not publicly available, therefore the aggregated data by fuel types are used instead.
Any comment:	

Data / Parameter:	$GEN_{j,y}$
Data unit:	MWh
Description:	Electricity delivered to the grid by relevant power sources j excluding low operating cost/must run power plants in year y
Source of data used:	China Electric Power Yearbook
Value applied:	See Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	Since the detailed generation data by power plants are not publicly available, therefore the aggregated data by fuel types are used instead.
Any comment:	

Data / Parameter:	NCV_i
Data unit:	TJ/t(m^3)

Description:	Net calorific value (energy content) per mass or volume unit of fuel *i*
Source of data used:	China Energy Statistical Yearbook
Value applied:	See Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	According to ACM0002, the national specific value shall be used preferentially.
Any comment:	

Data / Parameter:	$OXID_i$
Data unit:	
Description:	Oxidation factor of the fuel *i*
Source of data used:	2006 IPCC Guidelines for National Greenhouse Gas Inventories
Value applied:	See Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	The country specific values of oxidation factors in China are not available. As such IPCC default values are used instead.
Any comment:	

Data / Parameter:	$EF_{CO2,i}$
Data unit:	tCO_2/TJ
Description:	CO_2 emission factor per unit of energy of the fuel *i*
Source of data used:	2006 IPCC Guidelines for National Greenhouse Gas
Value applied:	See Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	The country specific values of fuel carbon emission factor in China are not available. As such IPCC default values are used instead.
Any comment:	

Data / Parameter:	$CAP_{j,y}$
Data unit:	MW
Description:	Installed capacity of relevant power source *j* connected to the grid in year *y*
Source of data used:	China Electric Power Yearbook
Value applied:	See Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	Following the EB guidance regarding application of AM0005 in China, the capacity weighted is used instead of generation weighted in calculation of BM emission factor.
Any comment:	

Data / Parameter:	$FC_{Adv, coal}$
Data unit:	gce/kWh
Description:	The coal consumption of power supply with the best thermal power technology commercially available.
Source of data used:	*Fuel-fired Power Generation*. http://www.ccchina.gov.cn/source/fa/fa2002082803.htm
Value applied:	320g/kWh
Justification of the choice of data or description of measurement methods and procedures actually applied :	This is conservative compared with the data defined by the DNA of China http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File1051.pdf
Any comment:	

Data / Parameter:	η_{BL}
Data unit:	
Description:	Energy efficiency of the technology
Source of data used:	Chinese DNA
Value applied:	36.53%
Justification of the choice of data or description of measurement methods and procedures actually applied :	This data is recommended by Chinese DNA
Any comment:	

Data / Parameter:	GWP_{CH4}
Data unit:	tCO2e/tCH4
Description:	Global Warming Potential for CH4
Source of data used:	IPCC default value
Value applied:	21 for the first commitment period.
Justification of the choice of data or description of measurement methods and procedures actually applied :	
Any comment:	Shall be updated according to any future COP/MOP decisions.

B.6.3. Ex-ante calculation of emission reductions:

Based on the procedures and data mentioned in sections B 6.1, B 6.2 and B7.1 of this PDD, the ex-ante calculation of emission reductions of the project activity is presented as follows:

Ex-ante calculation of project emission (PE_y)

Item	FCy (m^3/a)	NCV_y (MJ/m^3)	$EF_{CO2,y}$ (tCO_2/TJ)	$OXID_{NG}$	PE_y (tCO_2e/a)
	A	B	C	D	E
Data	533,540,000	33.656	56.1	1	1,007,377
Data source	FSR of the project	Natural gas supplier	IPCC 2006	IPCC 2006	$E=A*B*C*D/10^9$

Ex-ante calculation of baseline emission (BE_y)

Item	$COEF_{BL}$ (tCO_2/GJ)	η_{BL}	$EF_{BL,CO2,option3}$ (tCO_2/MWh)	$EG_{,y}$ (MWh)
	F	G	H	I
Data	0.0946	36.53%	0.9323	2525250
Data source	25.8 tC/TJ * (44/12)/1000	DNA of China	H=(F/G)*3.6GJ/MWh	FSR of project

Item	$EF_{BM,y}$ (tCO_2/MWh)	$EF_{OM,y}$ (tCO_2/MWh)	$EF_{CM,y}$ (tCO_2/MWh)	$EF_{BL,co2,y}$ (tCO_2/MWh)	$BE_{,y}$ (tCO_2e/a)
	J	K	L	M	N
Data	0.770	0.917	0.844	0.770	1,944,445
Data source	China's DNA	China's DNA	L=0.5*J+0.5*K	E= min(J,L,H)	N= I*M

Ex-ante calculation of leakage (LE_y)

Item	$EF_{NG,upstream,CH4}$ (tCH_4/PJ)	$EF_{BL,upstream,CH4}$ (tCH_4/MWh)	GWP_{CH4} (tCO_2/tCH_4)	$LE_{,y}$ (tCO_2e/a)
	P	Q	R	S
Data	296	0.003726	21	-85989 < 0, so $LE_{,y} = 0$
Data source	AM0029	Annex 3 of the PDD	IPCC 2006	$S=[A*B*P/10^9 - I*Q]*R$

Ex-ante calculation of emission reductions (ER_y)

$ER_y = BE_{,y} - PE_{,y} - LE_{,y}$ =1944445-1007377-0=937067 tCO_2e/a

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

Year	Estimation of project activity emissions (tons of CO_2e)	Estimation of baseline emissions (tons of CO_2e)	Estimation of leakage (tons of CO_2e)	Estimation of overall emission reductions (tons of CO_2e)
2007[35]	1,007,377	1,944,445	0	937,067
2008	1,007,377	1,944,445	0	937,067
2009	1,007,377	1,944,445	0	937,067
2010	1,007,377	1,944,445	0	937,067
2011	1,007,377	1,944,445	0	937,067
2012	1,007,377	1,944,445	0	937,067
2013	1,007,377	1,944,445	0	937,067
Total (tons of CO_2e)	7,051,644	13,611,113	0	6,559,469

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

B.7.1. Data and parameters monitored:

The primary parameters to be monitored for the project emissions during the crediting period are listed below:

Data / Parameter:	$FC_{Natural\ gas}$
Data unit:	m^3/a
Description:	Net quantity of nature gas consumed in project activity in year '*y*'.
Source of data to be used:	Fuel flow meter reading at project boundary
Value of data applied for the purpose of calculating expected emission reductions in section B.5	533540000
Description of measurement methods and procedures to be applied:	The total fuel consumption will be monitored both at supplier and project end for cross-verification. The accuracy of the natural gas flow meter at the plant is 0.5% and the accuracy of the natural gas flow meter at the supplier's station is 1%. The measurement will be taken online continuously by the flow meter and the data will be recorded daily. All the measurement instruments and procedure adopted shall be as per the industry practice.
QA/QC procedures to be applied:	Nature gas metering to the project will be subject to regular maintenance and testing in accordance with stipulation of the meter supplier, applicable industry and national standards and relevant agreements to ensure accuracy. The readings will be double checked (cross-verified) by the gas supply company.

[35] The first crediting period is expected to be from September 1st 2007 to 31 August 2014.

Any comment:	Data will be archived by electronic/paper as available.

Data / Parameter:	$NCV_{Natural\ gas}$
Data unit:	GJ/m^3
Description:	Net calorific value of nature gas consumed in the project plant in year '*y*'. The values will be recorded fortnightly.
Source of data to be used:	Natural gas supplier
Value of data applied for the purpose of calculating expected emission reductions in section B.5	0.033656
Description of measurement methods and procedures to be applied:	The value is according to the report from supplier and the details are based on the relevant terms in the Purchase Agreement. Alternative data sources are local authority and country specific values.
QA/QC procedures to be applied:	No addition QA/AC procedures may need to be planned.
Any comment:	Data will be archived by electronic/paper.

Data / Parameter:	$EF_{CO2,natural\ gas}$
Data unit:	tCO_2/TJ
Description:	The CO_2 emission factor per unit of energy of nature gas in year '*y*'
Source of data to be used:	Local/Regional/Global (IPCC)
Value of data applied for the purpose of calculating expected emission reductions in section B.5	56.1
Description of measurement methods and procedures to be applied:	Use supplier-provided data, local data, country-specific values, that order of preference. The data will be recorded annually.
QA/QC procedures to be applied:	No addition QA/AC procedures may need to be planned.
Any comment:	Data will be archived by electronic/paper.

Data / Parameter:	$OXID_{Natural\ gas}$
Data unit:	%
Description:	Oxidation factor of nature gas used by the project plant
Source of data to be used:	IPCC
Value of data applied for the purpose of calculating expected emission reductions in section B.5	100 The data will be recorded annually.
Description of measurement methods and procedures to be applied:	Use IPCC current default
QA/QC procedures to be applied:	No addition QA/AC procedures may need to be planned.
Any comment:	Data will be archived by electronic/paper.

Data / Parameter:	FC_y
Data unit:	m^3
Description:	Net quantity of fuel other than consumed in project activity in year '*y'*.
Source of data to be used:	Fuel flow meter reading at project boundary
Value of data applied for the purpose of calculating expected emission reductions in section B.5	0
Description of measurement methods and procedures to be applied:	According to the feasibility study report, the only type of fuel used in the project is natural gas. There is no other fuel used. This data is monitored in case of emergency.
QA/QC procedures to be applied:	
Any comment:	Data will be archived by electronic/paper.

Data / Parameter:	NCV_y
Data unit:	GJ/m^3
Description:	Net calorific value of fuel other than nature gas consumed in the project plant in year '*y'*. The values will be recorded fortnightly.
Source of data to be used:	Fuel Supplier, Local Authority, Country specific, IPCC
Value of data applied for the purpose of calculating expected emission reductions in section B.5	N/A
Description of measurement methods and procedures to be applied:	Use supplier-provided data, local data, country-specific values, that order of preference. IPCC values can be used for startup fuel. According to the feasibility study report, the only type of fuel used in the project is natural gas. There is no other fuel used. This data is monitored in case that fuel other than natural gas is used.
QA/QC procedures to be applied:	No addition QA/AC procedures may need to be planned.
Any comment:	Data will be archived by electronic/paper.

Data / Parameter:	$EF_{CO2,y}$
Data unit:	tCO_2/TJ
Description:	The CO_2 emission factor of the fuel other than nature gas in year '*y*'
Source of data to be used:	Local/Regional/Global (IPCC)
Value of data applied for the purpose of calculating expected emission reductions in section B.5	N/A
Description of measurement methods and procedures to be applied:	Use supplier-provided data, local data, country-specific values, that order of preference. IPCC values can be used for startup fuel. According to the feasibility study report, the only type of fuel used in the project is natural gas. There is no other fuel used. This data is monitored in case that fuel other than natural gas is used.
QA/QC procedures to be applied:	No addition QA/AC procedures may need to be planned.

Any comment:	Data will be archived by electronic/paper.

Data / Parameter:	$OXID_y$
Data unit:	%
Description:	Oxidation factor of the fuel other than nature gas used by the project plant
Source of data to be used:	IPCC
Value of data applied for the purpose of calculating expected emission reductions in section B.5	N/A
Description of measurement methods and procedures to be applied:	Use IPCC current default According to the feasibility study report, the only type of fuel used in the project is natural gas. There is no other fuel used. This data is monitored in case that fuel other than natural gas is used.
QA/QC procedures to be applied:	No addition QA/AC procedures may need to be planned.
Any comment:	Data will be archived by electronic/paper.

Data / Parameter:	GWP_{CH4}
Data unit:	tCO2e/tCH4
Description:	Global Warming Potential for CH4
Source of data to be used:	IPCC default value
Value of data applied for the purpose of calculating expected emission reductions in section B.5	21 for the first commitment period.
Description of measurement methods and procedures to be applied:	Applying the up-to-date data recommended by COP/MOP decisions.
QA/QC procedures to be applied:	
Any comment:	

The primary parameters to be monitored for baseline emissions as per ACM0002 during the crediting period are listed below:

Data / Parameter:	EG_y
Data unit:	MWh
Description:	Net electricity delivered to the grid by the project activity in year ‘*y*’.
Source of data to be used:	Electricity meters reading at project boundary
Value of data applied for the purpose of calculating expected emission reductions in section B.5	2525250
Description of measurement methods and procedures to be	The readings of electricity meters will be continuously measured and monthly recorded. The accuracy of the electricity meters is 0.2S level.

applied:	The measurement will be taken online and the data is recorded in the control system. All the measurement instruments and procedure adopted will be as per the industry practice.
QA/QC procedures to be applied:	The electricity meters will be subject to regular maintenance and testing in accordance with stipulation of the applicable industry, national standards and relevant agreements to ensure accuracy. The electricity meters will be calibrated at least once a year. Double check by receipt of sales.
Any comment:	Data will be archived by electronic/paper.

Data / Parameter:	$EF_{BM,y}$
Data unit:	t CO_2e/MWh
Description:	Build Margin emission factor
Source of data to be used:	Calculated
Value of data applied for the purpose of calculating expected emission reductions in section B.5	0.770
Description of measurement methods and procedures to be applied:	Data will be yearly recorded and will be archived by electronic/paper.
QA/QC procedures to be applied:	
Any comment:	

Data / Parameter:	BTCA
Data unit:	*g/kWh*
Description:	fuel consumption for best technology commercially available
Source of data to be used:	DNA of China
Value of data applied for the purpose of calculating expected emission reductions in section B.5	320
Description of measurement methods and procedures to be applied:	Applying the most conservative value from the DNA of China
QA/QC procedures to be applied:	No addition QA/AC procedures may need to be planned.
Any comment:	

Data / Parameter:	$CAP_{fire\text{-}y}$
Data unit:	MW
Description:	installed capacity of fuel-fired power in year y within the east china grid
Source of data to be used:	China Electric Power Yearbook
Value of data applied for the purpose of calculating expected emission reductions	See Annex 3 for details

in section B.5	
Description of measurement methods and procedures to be applied:	According to the requirements of methodology, Applying the data in China Electric Power Yearbook
QA/QC procedures to be applied:	
Any comment:	

Data / Parameter:	CAP_y
Data unit:	MW
Description:	Total installed capacity of various power in year y within the east china grid
Source of data to be used:	China Electric Power Yearbook
Value of data applied for the purpose of calculating expected emission reductions in section B.5	See Annex 3 for details
Description of measurement methods and procedures to be applied:	According to the requirements of methodology, Applying the data in China Electric Power Yearbook
QA/QC procedures to be applied:	
Any comment:	

Data / Parameter:	Fuel Energy Value
Data unit:	GJ/tSCE
Description:	Fuel energy value of Standard Coal Equivalent
Source of data to be used:	Chinese National Standard
Value of data applied for the purpose of calculating expected emission reductions in section B.5	29.27
Description of measurement methods and procedures to be applied:	Applying the value of national standard
QA/QC procedures to be applied:	
Any comment:	

Data / Parameter:	η_{BL}
Data unit:	%
Description:	Energy efficiency of the technology
Source of data to be used:	Chinese DNA
Value of data applied for the purpose of calculating expected emission reductions in section B.5	36.53

Description of measurement methods and procedures to be applied:	Applying the up-to-date data recommended by DNA of China
QA/QC procedures to be applied:	
Any comment:	

Data / Parameter:	OXIDf
Data unit:	
Description:	Oxidation rate of the fuel y
Source of data to be used:	IPCC default value
Value of data applied for the purpose of calculating expected emission reductions in section B.5	See Annex 3 for details
Description of measurement methods and procedures to be applied:	Applying the up-to-date value of IPCC
QA/QC procedures to be applied:	
Any comment:	

B.7.2. Description of the monitoring plan:

Monitoring plan for the project activity includes the details of the operation and management of the project activity during the crediting period and the measurement of the parameters in baseline and project emission scenarios that will be used to calculate actual emission reductions.

The monitoring plan of the project activity is organized as per the statement presented below. The detailed background information include under Annex 4.

<u>Introduction</u>

The Xiaoshan Power Plant's NG Power Generation Project of Zhejiang Southeast Electric Power Co., Ltd. adopts the approved monitoring methodology AM0029 (version 01, 19 May 2006) "Grid Connected Electricity Generation Plants using Non-Renewable and Less GHG Intensive Fuel." to determine the emission reductions from the net electricity generation from the project.

<u>Organizational structure & procedures during project implementation</u>

The host entity of this project is Zhejiang Southeast Electric Power Co., Ltd. An independent institution of operation and management for CDM project will be formed, and directed by the general manager of Zhejiang Southeast Electric Power Co., Ltd. Its operation and management framework is described below:

CDM Project Director:

Part-time by the General Director or Deputy General Director of ZheJiang Southeast Electric Power Co., Ltd, who will take charge of the management of the CDM project, take responsibility for Chinese DNA and stakeholders, meanwhile, take charge of the coordination with developed countries and DOE;

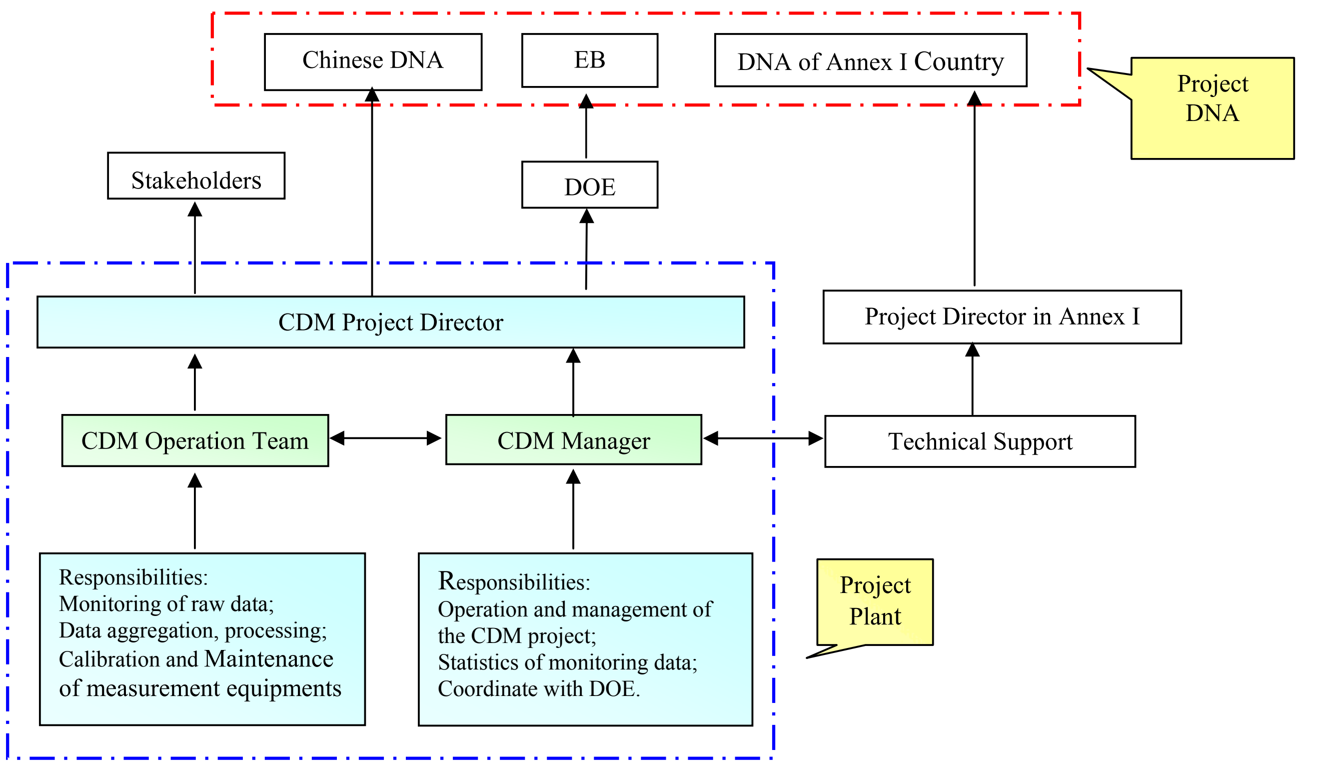
CDM Manager:

He/she will take charge of the operation and management of CDM project, monitoring and statistics of material supply and utilization, project production, and cooperate with validation and verification, etc;

CDM Operation Team:

They will take charge of the regular monitor works, including monitoring of raw data, data aggregation and processing, statistic and storage of the processed data, calibration and maintenance of the measurement equipments, and cooperate with validation and certification, etc;

Please refer to following figure for details regarding the management structure of the monitoring plan.



Training

All staff involved in any of the procedures related with the CDM project activity will be trained before the start of the crediting period in order to perform the tasks specified in the monitoring plan.

Calibration, testing and maintenance for measurement equipments

The detailed calibration, testing and maintenance procedure for the measurement equipments used to monitor data of the project activity shall be prepared by the CDM Manager based on the agreements with the nature gas supplier, equipment manufacturer's recommendations and the industry and national standards as applicable.

Data monitoring

The data monitoring of the CDM project activity within the crediting period include:

Monitoring of electricity generated by the project activity:

The electricity generated by the project will be monitored through the electric meters within the project plant. This data should be monitored and recorded daily by the computer system. There should be main and backup metering system in the control centre. The recorded readings should be readily accessible for DOE in verification. The records for calibration, testing and maintenance of the electric meters should be also readily accessible for DOE in verification.

Monitoring of quantity of nature gas combusted by the project activity:

Quantity of nature gas combusted will be monitored though the gas flow meters both at the project end and nature gas supplier for cross-verification. This data should be monitored and recorded daily by the computer system. The detailed monitoring procedure of this data should be established in accordance with the agreements with the nature gas supplier. The recorded readings should be readily accessible for DOE in verification. The records for calibration, testing and maintenance of the gas flow meters should be also readily accessible for DOE in verification.

Monitoring of NCV of natural gas combusted by the project activity:

The detailed monitoring procedure of NCV of nature gas combusted by the project activity should be established in accordance with the agreements with the nature gas supplier. This data should be monitored and recorded fortnightly by the computer system. The recorded readings should be readily accessible for DOE in verification. The records for calibration, testing and maintenance of the gas flow meters should be also readily accessible for DOE in verification.

Monitoring of relevant data used to calculate the baseline emission factor of BM:

According the approved monitoring methodology AM0029, the relevant baseline emission parameters will be monitored per ACM0002. In this PDD, the baseline emission factor has been selected to BM, so the relevant parameters used to calculate BM should be publicly available (e.g. raw data of *China Electric Power Yearbook*, IPCC, etc.) in china and monitored and recorded annually by the computer system. The recorded data and revised ex-post calculation should be readily accessible for DOE in verification

Recording and archiving of data

The on-site control centre will be established from where all electronic data will be remotely monitored and recorded. Staff working at the control centre will prepare a daily report on the operations of the CDM project activity and this daily report will record data readings and equipment defects, outages, repairs and maintenance activities. All relevant information, notes of meetings, data files, maintenance records, defect reports, hard copy and computerised records of monitoring will be kept at the control centre or other designated location, and arranged in an orderly and transparent manner to facilitate audit as and when required. All monitored data required for verification and issuance will be kept for two years after the end of the crediting period or the last issuance of CERs, for this project activity, whichever occurs later.

Meters failure

Should any reading of the main meters be inaccurate by more than the allowable error, or otherwise functioned improperly, the monitored parameters will be determined by:
(a) First, by reading backup meter installed, unless a test by either party reveals it is inaccurate;
(b) If the backup system is not within acceptable limits of accuracy or is otherwise performing improperly, the developer, the Grid Company and the natural gas supply company will jointly prepare an estimate of the correct reading;
(c) If the developer, the Grid Company and the natural gas supply company fail to agree then the matter will be referred for arbitration according to agreed procedures.

Emergency preparedness

Disposal of Emergency will be implemented according to the stipulations in the Management Regulations of the Xiaoshan Power Plant of Zhejiang Southeast Electric Power Co., Ltd.

Review of monitored data

Monitored data will be reviewed by responsible personnel. This audit will check compliance with operational procedures in this monitoring plan.

This internal audit will also identify potential improvements to procedures to improve monitoring and reporting in future years. If such improvements are proposed these will be reported to the DOE and only operated after approval from the DOE.

Verification of monitoring results

The verification of the monitoring results of the project activity is a mandatory process required for all CDM projects. The main objective of the verification is to independently verify that the project has achieved the emission reductions as reported and projected in the PDD. It is expected that the verification will be done annually.

The responsibilities for verification of the projects are as follows:

- CDM Manager will take charge of the arrangements for the verification and will prepare for the audit and verification process to the best of his/her abilities.
- CDM Manager will provide the DOE with all required necessary information, before, during and, in the event of queries, after the verification due to facilitate verification.
- CDM Manager will fully cooperate with the DOE, instruct other relevant staff, management to be available for interviews and respond honestly to all questions from the DOE.

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

The study of the baseline and the monitoring methodology was completed on July 8th, 2007.

The key individuals involved in the baseline study include:

1. Mr. Ding Zhaoming, edding@china-carbon.cn, China Carbon Technology Co., Ltd, Room 809, Block B, Focus Place, No. 19, Financial Street, Xicheng District, Beijing, PRC.
2. Mr. Zhang Yanlong, yanlong@china-carbon.cn, China Carbon Technology Co., Ltd, Room 809, Block B, Focus Place, No. 19, Financial Street, Xicheng District, Beijing, PRC.
3. Cao Kun, EEDT@163.com , Beijng EEDT Kemao Ltd.

The above individuals or organizations are not the project participants.

SECTION C. Duration of the project activity / Crediting period

C.1. Duration of the project activity:

C.1.1. Starting date of the project activity:

The project activity started operation in July 2007.

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

21 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:

01/10/2007

C.2.1.2. Length of the first crediting period:

7 years

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

NA

C.2.2.2. Length:

NA

SECTION D. Environmental impacts

D.1. Documentation on the analysis of the environmental impacts, including transboundary impacts:

The environmental impacts of the proposed project are elaborated in the following two phases:

Construction Phase

The waste mineral oil produced in the construction phase will mainly include fuel oil, transformer oil and lubricating oil. The fuel mainly comes from the oil residue in the oil tank, detritus adhere to the bottom of the oil tank and oily waste water in the pipe of the boiler. All of these will be collected together for waste treatment. Transformer oil is expensive. So the drained transformer oil from the transformers by injecting nitrogen will be recycled for utilization. Lubricating oil is from generators and gas turbines and will be also recycled.

When the direct current system is being removed, some vitriol will be abstracted from the system. The acidity of vitriol is very strong, which might be dangerous. Considering the acid/alkali-containing waste water treatment in the power plant, the vitriol will be recycled.

The construction garbage will be transported to solid waste treatment site. The waste equipment will be disposed by Zhenhai Materials Recyling Co.Ltd.

Other environmental impacts such as noise, dust and construction waste water pollution will also be controlled. The dust mainly comes from transportation and construction on site, and it will be reduced by sprinkling. Noise and vibrating mainly come from operation of construction machines, test of security for valves of boilers, which can be controlled through installation of silencers and operating machines according to relevant Chinese standards. The construction waste water will be recycled after deposition.

To conclude, the environmental impacts during the construction period are temporal and will be controlled in an appropriate way. There will be no significant environment impacts during the construction period.

Operation Phase

- **Air pollution**

The fuel of the proposed project is natural gas, whose main component is methane. The smoke after burning almost does not include soot and the emission of SO_2 is very little. The emission of NO_x is also much lower than the emission of coal fired power generation units. So the natural gas is a kind of clean fuel with high thermal value and low pollution. Besides, the gas-steam combined cycle technique taken by the proposed project has the merits of complete combustion and minimal pollution emission.

Therefore, the project will not install dust catcher or desulfurizer. The gas turbine will take low-NO_x burner to control the emission of NO_x, and the concentration of NO_x emission will be controlled at 86mg/m^3, which is much lower than the requirement of 650mg/m^3 of III period of time in the GB13223-1996 *Emission Standard of Air Pollutants for Thermal Power Plants*. Waste heat boiler's emission will be through 2 single-pipe chimneys with the diameter of 60m. According to the estimated result of the model, after the construction of the proposed project, it contributes very little to the NO_2 consistency indicator of the local area air (including max subsided consistency of one hour average value under the normal condition, one hour average value under calm wind condition, daily average value and annual average value). According to the impact analysis of daily average consistency, after the construction of the proposed project, the local environmental air pollution factor NO2 will meet the requirements of the second standard in GB3095-1996 *The Standard Environmental Air Quality*.

◆ **Waste water**

The waste water of the proposed project is from both the production and the daily lives. Production waste water mainly comprises of the acidic/basic regeneration waste water, polluted water discharged from cooling tower, cooling water and acidic waste water from waste heat boiler. Waste water from cooling tower with the main pollution factor as salt content takes the biggest proportion. The main pollutants of the waste water from daily lives are SS and COD. The waste water produced by the project will be disposed, recycled or discharged. Waste water from heating boiler will be discharged directly; after the neutralization, acidic/ basic waste water and the discontinuous acidic waste water from boiler will be used as the ash-sluicing water for the coal fired power plants owned by the project owner; the daily lives waste water will be utilized on mechanical draft cooling and coal yard washing after disposed through extended aeration activated sludge process and SBR.

After the construction of the proposed project, the discharging quantity of cool water from gas-steam combined cycle unit will be 15.0m^3 and will be discharge into Yongjiang River. According to the estimated result of the model, after the construction of the proposed project, the maximum envelopes sof 3.2℃ warm water confines in 90m within the outfall; envolopes of 2℃ warm water confines in 50m within the outfall. The affected scope will be small, and it is in accordance to the requirement of GradeIII sea water of *Sea Water Quality Standard*.

◆ **Noise**

The noises of gas-steam combined cycle units mainly come from the running of facilities such as gas turbine, steam turbine, generator, water-feeding pump, cycle water pump and cooling tower. In order to mitigate the impact of noises, equipment with fewer noises will be selected to put into use. Besides, silencers will also be installed to solve the noise problem. According to the estimating result of the model, noises within the noise-sensitive zone will all meet could the requirement of III class standard in GB12348-90 *Standard of Noise at Boundary of Industrial Enterprises*. Noises surpassed standard within the plant boundary will be far from sensitive places, thus bring no significant environment impact on the local areas.

As stated above, the environment impacts due to the proposed project are 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:

According to the EIA report of the project, the impacts on the environment are not significant. Multiple measurement, such as environmental monitoring and mitigation measures to deal with various environmental impacts during the construction and operation phase of the project activity will be carried out strictly by the project owner.

SECTION E. Stakeholders' comments

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

During the Environmental Impact Analysis period, a stakeholder consultation has been carried out. Totally 60 questionnaires including the project instruction and comments inviting were sent out to the residents in nearby towns and villages. 53 questionnaires were returned back. 92% of the respondents thought the project would promote the local economic development and 96% of the respondents thought it was very necessary to construct the proposed project. No negative comment was received. The detailed information is included in the EIA.

In July of 2006, the project owner carried out another stakeholder consultation. They gave questionnaires to the residents around the power plant for their opinions on the proposed project. The summary of the investigation result is in the section E.2. Moreover, the project owner also got ideas and suggestions from the experts in National Environment Protection Bureau Environment Project Assessment Centre. A summary of their answers were shown in the section E.2.

Questions in this investigation are as follows

1. Do you satisfy for the current living condition or environment condition?

(1) Content (2) Not very content (3) Discontent

2. How much do you know about the natural gas power generation technique?

(1) Know much information (2) Know some information (3) Never hear about

3. How much do you know about the proposed project?

(1) Know much information (2) Know some information (3) Never hear about

4. Which positive aspects do you think will be brought by the proposed project (multi- selection also could be accepted)?

(1) Economic Development (2) Fall of Electricity Price (3) Increase of Income (4) Increase of Employment Chance (5) Improvement of Living Standard (6) Other

5. Which negative aspects do you think will be brought by the proposed project (multi- selection also could be accepted)?

(1) Noise Pollution (2) Land Occupation (3) Destruction of vegetation and ecologic environment (4) Atmosphere environmental pollution (5) Hidden trouble on safety (6) Others

6. How much will the negative aspects of the proposed project's construction impact on the daily life?

(1) Severe (2) Part of impacts, which could be solved by environmental protection measure (3) No influence

7. Which methods do you think could avoid or mitigate the above impacts?

8. General influence on the construction and implementation of the proposed project:

(1) Positive aspects more than negative aspects (2) No influence (3) Positive aspects less than negative aspects

(8) Do you support the development of the proposed project?

(1) Support (2) Against (3) Neither support or against

E.2. Summary of the comments received:

30 pieces of questionnaire paper have been handed out and taken back, and the summary of the investigation result is as following:

- In these respondents, male occupies 73.3% and female occupies 26.7%
- The distribution of the respondents' age: respondents below 30 occupy 13.3%, respondents between 30~40 occupy 30%, respondents between 40~50 occupy 36.7%, respondents above 20%.
- The education background of the respondents: no respondents with primary school background occupy(0%), with junior middle school occupy 40%, with senior middle school occupy 26.7%, respondents with education background above senior middle school occupy 33.3%.
- 66.7% respondents are content on the current living condition and ecologic environment; other 23.3% respondents are not satisfied.
- 96.7% respondents know some information about natural gas power generation technique and 1 person knows about natural gas power generation technique very much.
- All of the respondents know some information about the proposed project (100%).
- 76.7% respondents believe that the proposed project will promote the economic development of local place; 43.3% respondents deem that the employment opportunities will increase; 23.3% respondents think the construction of the proposed project could increase their income and improve the living standard.
- 43.3% respondents think that the negative impact of the project is noise, 23.3% respondents believe the negative is potential safety and 16.7% think it will occupy a lot of land.
- 50% respondents think that the construction of the proposed project will have negative impacts, but the environmental protection measures can be taken to eliminate it; other 50% respondents consider that the proposed project has no negative impacts.
- 13.3% respondents believe that the positive aspects are much more than the negative aspects; other 86.7% respondents consider that the proposed project has no negative impacts.
- All of the respondents support the construction of the proposed project (100%).

Conclusion:

The investigation suggests that all the respondents support the proposed project, which has direct relation with that most of them know some information on natural gas power generation technique. Most of the respondents consider that the proposed project will bring a lot of positive aspects for their daily life. They deem the proposed project would promote the economic development of the local areas. Besides, all of the respondents think that the negative aspects brought by the proposed project can be eliminated by appropriate measures.

Local government and experts proposed some pieces of suggestion on environmental effect, water and soil erosion and biologic resource, and both of them are positive on the problem. They consider that the proposed project will promote the economic development in local place, and they provide the letter of support. The letter of support could be rechecked by DOE.

To conclude, the public investigation shows that all respondents support the construction of the project, and an overwhelming majority of them insist that this project is benefit to the livelihoods and local development. Authorities confirm its social and environmental benefits as well.

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

The local residents and government all support the proposed project. According to the received stakeholders' comments, no adjustment on design, construction or operation is necessary at present.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Project owner:

Organization:	Zhejiang Provincial Energy Group Zhenhai Natural Gas Power Generation Co., Ltd.
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Building:	
City:	Ningbo
State/Region:	Zhejiang
Postfix/ZIP:	315208
Country:	China
Telephone:	(86)0574-86332378
FAX:	(86)0574-86263873
E-Mail:	huqiaoen@126.com
URL:	
Represented by:	Cao Lu
Title:	Legal Representitive
Salutation:	Mr
Last Name:	Cao
Middle Name:	
First Name:	Lu
Department:	
Mobile:	
Direct FAX:	(86)0571-85270110
Direct tel:	(86)0571-86669668
Personal E-Mail:	

CERs buyer:

Organization:	Trading Emissions PLC
Street/P.O.Box:	54/62 Athol Street
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City:	Douglas
State/Region:	Isle of Man
Postfix/ZIP:	IM1 1JD
Country:	UK
Telephone:	+44 (0) 16 2468 1200
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E-Mail:	info@tradingemissionsplc.com
URL:	http://www.tradingemissionsplc.com
Represented by:	Philip Peter Scales
Title:	Director
Salutation:	Mr.
Last Name:	Scales
Middle Name:	Peter
First Name:	Philip
Department:	
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Direct FAX:	+44 (0) 16 2468 1392
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Personal E-Mail:	philips@iomafim.co.im

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

There is no public funding for the proposed project.

Annex 3

BASELINE INFORMATION

According to AM0029, the baseline emission factor ($EF_{BL, co2, y}$) is the lowest one among the build margin emission factor (BM), the combined margin emission factor (CM) and the emission factor of the technology identified as the most likely baseline scenario ($EF_{BL, co2, option3}$). The operating margin emission factor ($EF_{OM,y}$) and the build margin emission factor ($EF_{BM,y}$) are calculated 、 according to ACM0002. The emission factor for upstream fugitive CH_4 emissions occurring in the absence of the project activity ($EF_{BL,upstream,CH4}$) should be calculated consistent with the baseline emission factor ($EF_{BL, co2, y}$) used in equation as follow step 3.

Table A3-1 Installed capacities of 5 provinces (2001)

		Installed Capacity(2001)			
2001	Hydro	Coal	Nuclear	Other	Total
JiangSu	33.7	19667.8	0	0	19701.5
Shanghai	0	11232.7	0	0	11232.7
Anhui	608.8	8960.3	0	0	9569.1
Zhejiang	5732.5	12736.2	300	0	18768.7
Fujian	6180	6424	0	0	12604
Total	12555	59021	300	0	71876
%	0.175	0.821	0.004	0.000	1.000

Source: China Electric Power Yearbook 2002, page 616

Table A3-2 Installed capacities of 5 provinces (2002)

		Installed Capacity(2002)			
2002	Hydro	Coal	Nuclear	Other	Total
JiangSu	137.2	20599	0	0	20736.2
Shanghai	0	11382.6	0	0	11382.6
Anhui	649.1	9056.3	0	0	9705.4
Zhejiang	5866.8	13082.4	1678	50.2	20677.4
Fujian	6394.2	6999.9	0	12	13406.1
Total	13047.3	61120.2	1678	62.2	75907.7
%	0.172	0.805	0.022	0.001	1.000

Source: China Electric Power Yearbook 2003, page 593

Table A3-3 Installed capacities of 5 provinces (2003)

		Installed Capacity(2003)			
2003	Hydro	Coal	Nuclear	Other	Total
JiangSu	137.8	22245	0	0	22382.8
Shanghai	0	11092.6	0	0	11092.6
Anhui	649.1	9284.9	0	0	9934
Zhejiang	6054.5	15321.2	2406	39.7	23821.4
Fujian	6761.1	7092.8	0	12	13865.9

Total	13602.5	65036.5	2406	51.7	81096.7
%	0.168	0.802	0.030	0.001	1.000

Source：China Electric Power Yearbook 2004, page 708

Table A3-4 Installed capacities of 5 provinces (2004)

		Installed Capacity(2004)			
2004	Hydro	Coal	Nuclear	Other	Total
JiangSu	126.5	28289.5	0	17.5	28433.5
Shanghai	0	12014.9	0	3.4	12018.3
Anhui	692.8	9364.5	0	0	10057.3
Zhejiang	6418.4	21439.8	3056	39.7	30953.9
Fujian	7180.1	8315.4	0	12	15507.5
Total	14417.8	79424.1	3056	72.6	96970.5
%	0.149	0.819	0.032	0.001	1.000

Data source: China Electric Power Yearbook 2005, page 473

Table A3-5 Calculation of simple OM emission factor of the East China Power Grid (in 2002)

Fuel types	unit	Provinces in the Regional Grid					Subtotal	Effective CO2 Emission Factor	average low Caloric value	CO_2 emisson
		Jiangsu	Shanghai	Anhui	Zhejiang	Fujian		(tCO2/TJ)	(MJ/t,m^3,tce)	(tCO_2e)
		A	B	C	D	E	F	G	H	=F*G*H
Raw coal	Mtons	56.7469	23.86	20.2505	29.2366	13.3649	143.4589	94.6	20908	283746899.2
Cleaned coal	Mtons	0	0	0	0	0	0	94.6	26344	0
Other washed coal	Mtons	0	0	0	0	0	0	94.6	8363	0
Coke	Mtons	0	0	0	0	0	0	94.6	28435	0
Coke oven gas	$10^{10}m^3$	0.0002	0.0223	0	0	0	0.0225	44.4	16726	16709.274
Other coal gas	$10^{10}m^3$	0	0.6682	0	0	0	0.6682	44.4	5227	155075.0542
Crude oil	Mtons	0	0	0	0	0	0	73.3	41816	0
Gasoline	Mtons	0.0007	0	0	0	0	0.0007	69.3	43070	2089.3257
Kerosene	Mtons	0	0	0	0	0	0	71.5	43070	0
Diesel oil	Mtons	0.1345	0.0121	0	0.3	0	0.4466	74.1	42652	1411485.195
Fuel oil	Mtons	0.0119	0.532	0.0109	0.9138	0.126	1.5946	77.4	41816	5161016.025
LPG	Mtons	0	0	0	0	0	0	63.1	50179	0
Refinery gas	Mtons	0	0.0084	0	0	0	0.0084	57.6	46055	22283.2512
Natural gas	$10^{10}m^3$	0	0	0	0	0	0	56.1	38931	0
Other petroleum products	Mtons	0.0347	0.1	0	0	0	0.1347	73.3	41816	412870.6942
Other Coking Products	Mtons	0	0	0	0	0	0	107	29271.2	
Fired electricity generated	TWh	109.607996	58.2943488	42.7962892	65.1644235	28.78922	304.652277			
Electricity imported	TWh						7.38		Total tCO2e Emission	290928428.1
	a. Total CO2 emission in East China Grid(tCO2e)							290928428.1		
Result	b. Total generation in East China Grid(TWh)							312.0322771		
	c. OM emission factor (tCO2/MWh)	($a/b/10^6$)						0.932366455		

Table A3-6 Calculation of simple OM emission factor of the East China Power Grid (in 2003)

Fuel types	unit	Provinces in the Regional Grid					Subtotal	Effective CO2 Emission Factor	average low Caloric value	CO_2 emisson
		Jiangsu	Shanghai	Anhui	Zhejiang	Fujian		(tCO2/TJ)	(MJ/t,m^3,tce)	(tCO_2e)
		A	B	C	D	E	F	G	H	=F*G*H
Raw coal	Mtons	64.1774	26.18	26.6967	34.424	17.54	169.0181	94.6	20908	334300359.1
Cleaned coal	Mtons	0	0	0	0	0	0	94.6	26344	0
Other washed coal	Mtons	0	0	0	0	0	0	94.6	8363	0
Coke	Mtons	0	0	0	0	0	0	94.6	28435	0
Coke oven gas	$10^{10}m^3$	0.0006	0.0199	0	0	0	0.0205	44.4	16726	15224.0052
Other coal gas	$10^{10}m^3$	0	0.6634	0	0	0	0.6634	44.4	5227	153961.0759
Crude oil	Mtons	0	0	0	0	0	0	73.3	41816	0
Gasoline	Mtons	0	0	0	0	0	0	69.3	43070	0
Kerosene	Mtons	0	0	0	0	0	0	71.5	43070	0
Diesel oil	Mtons	0.1471	0.0126	0	0.1399	0	0.2996	74.1	42652	946889.7547
Fuel oil	Mtons	0.0076	0.9549	0	1.7448	0.1889	2.8962	77.4	41816	9373720.438
LPG	Mtons	0	0	0	0	0	0	63.1	50179	0
Refinery gas	Mtons	0.0096	0.0049	0	0	0	0.0145	57.6	46055	38465.136
Natural gas	$10^{10}m^3$	0	0	0	0	0	0	56.1	38931	0
Other petroleum products	Mtons	0.053	0.1891	0	0.1504	0	0.3925	73.3	41816	1203056.774
Other Coking Products	Mtons	0	0	0	0	0	0	107	29271.2	0
Fired electricity generated	TWh	125.413657	65.8745784	50.8741464	78.6769741	40.0091978	360.8485537		Total	346031676.3
Electricity imported	TWh						16.2			
Result	a. Total CO2 emission in East China Grid(tCO2e)							346031676		
	b. Total generation in East China Grid(TWh)							377.048554		
	c. OM emission factor (tCO2/MWh)		$(a/b/10^6)$					0.91773771		

Table A3-7 Calculation of simple OM emission factor of the East China Power Grid (in 2004)

Fuel types	unit	Provinces in the Regional Grid					Subtotal	Effective CO2 Emission Factor	average low Caloric value	CO_2 emisson
		Jiangsu	Shanghai	Anhui	Zhejiang	Fujian		(tCO2/TJ)	(MJ/t,m^3,tce)	(tCO_2e)
		A	B	C	D	E	F	G	H	=F*G*H
Raw coal	Mtons	76.019	27.796	29.062	40.089	21.837	194.803	94.6	20908	385300230.3
Cleaned coal	Mtons	0	0	0	0	0	0	94.6	26344	0
Other washed coal	Mtons	0.0546	0	0	0	0.0463	0.1009	94.6	8363	79826.00582
Coke	Mtons	0	0	0	0	0	0	94.6	28435	0
Coke oven gas	$10^{10}m^3$	0	0.0259	0	0	0	0.0259	44.4	16726	19234.23096
Other gas	$10^{10}m^3$	0	0.7246	0	0	0	0.7246	44.4	5227	168164.2985
Crude oil	Mtons	0	0	0	0	0	0	73.3	41816	0
Gasoline	Mtons	0	0	0	0	0	0	69.3	43070	0
Kerosene	Mtons	0	0	0	0	0	0	71.5	43070	0
Diesel Oil	Mtons	0.2717	0.0269	0	0.0623	0	0.3609	74.1	42652	1140629.214
Fuel oil	Mtons	0.5507	0.5852	0	2.0289	0.2326	3.3974	77.4	41816	10995883.51
LPG	Mtons	0	0	0	0	0	0	63.1	50179	0
Refinery gas	Mtons	0.0055	0.0077	0	0	0	0.0132	57.6	46055	35016.5376
Natural gas	$10^{10}m^3$	0.0014	0	0	0	0	0.0014	56.1	38931	3057.64074
Other Petroleum Products	Mtons	0.0137	0.2122	0	0.2489	0	0.4748	73.3	41816	1455315.557
Other Coking Products	Mtons	0	0	0	0	0	0	107	29271.2	0
Fired electricity generated	TWh	153.846782	67.4141706	56.2645375	89.844516	47.425257	414.7952626		Total	399197357.3
Electricity imported	TWh						25.688			
	a. Total CO2 emission in East China Grid(tCO2e)							399197357.3		
Result	b. Total generation in East China Grid(TWh)							440.4832626		
	c. OM emission factor (tCO2/MWh)		$(a/b/10^6)$					0.906271342		

Data Source: Effective CO2 Emission Factor: 2006 IPCC Guidelines for National Greenhouse Gas Inventories
Fuel Consumption, Fire Generated Electricity Data and Average Low Caloric Value: China Energy Statistical Yearbook
Electricity Imported: China Electric Power Yearbook

Table A3-8 Calculation of generation-weighted average simple OM emission factor of the East China Power Grid

OM 2002	0.932 tCO_2/MWh	312 TWh
OM 2003	0.918 tCO_2/MWh	377 TWh
OM2004	0.906 tCO_2/MWh	440 TWh
		0.917

Table A3-9 Calculation of emission rate

A	B	C	D	E	F
CO_2 Emission Factor tCO_2/GJ	Fuel Energy Value GJ/tSCE	CO_2 Emission Factor tCO_2/tSCE	Coservative efficiency factor (gce/kWh)	Coservative efficiency factor (tce/MWh)	Emissions Rate tCO_2/MWh
2006 IPCC GuideDlines for National Greenhouse Gas Inventories	The General Code for Comprehensive Energy Consumption Calculation (Chinese National Standard GB2589-81)	A x B	Average fuel consumption for best technology commercially available for coal fired power plants in the system	=D/1000; g->ton; kWh->MWh;	=C*E
0.094600	29.270000	2.768942	320.000000	0.320000	0.886061

Table A3-10 Calculation of BM emission factor of the East China Grid

A	B	C	D	E	F	G	H	I	J	K	L
Installed Capacity 2001	Installed Capacity 2002	Installed Capacity 2003	Installed Capacity 2004	New Capacity Additions 2004-2003	Split of New Capacity	New Capacity Additions 2004-2002	Split of New Capacity	New Capacity Additions 2004-2001	Split of New Capacity	Emissions Factor	Weighted Average Build Margin Emissions Factor
MW	MW	MW	MW	MW	%	MW	%	MW	%	tCO2/MWh	tCO2/MWh
				=D-C		*=D-B*		*=D-A*		*From Table A3-9*	*=H *K*
12555.0	13047.3	13,602.5	14,417.8	815.3	5.14%	1,370.5	6.51%	1,862.8	7.42%	0.000	0.000
59021.0	61120.2	65,036.5	79,424.1	14,387.6	90.64%	18,303.9	86.90%	20,403.1	81.31%	0.886	0.770
300.0	1678.0	2,406.0	3,056.0	650.0	4.09%	1,378.0	6.54%	2,756.0	10.98%	0.000	0.000
0.0	62.2	51.7	72.6	20.9	0.13%	10.4	0.05%	72.6	0.29%	0.000	0.000
71876.0	75907.7	81096.7	96970.5	15,873.8	**16.4%**	21,062.8	**21.7%**	25,094.5	**25.9%**		**0.770**

Table A3-11 Calculation of Baseline emission factor of the East China Grid

		Units	Equation or Source	
A	Operating Margin emissions factor	tCO_2/MWh	Table A3-8	0.917
B	Build Margin emissions factor	tCO_2/MWh	Table A3-10	0.770
C	Baseline emissions factor	tCO_2/MWh	0.5*A+0.5*B	**0.844**

Table A3-12 Calculation of emission factor for option 3

$COEF_{BL}$	**Energy Efficiency of Technology**	**$EF_{BL, CO2}$ (tCO2/Mwh)**
0.0946	36.53%	0.932274843

Table A3-13 Calculation of COEFf,y

EF	$NCV_{f,y}$	$COEF_{f,y}$
(tCO2/GJ)	GJ/m3	tCO2/m3
0.0561	0.033656	0.001888102

Table A3-14 Fire Electricity Generated in East China Power Grid (TWh)

	Jiangsu	Shanghai	Anhui	Zhejiang	Fujian	Total
2002	116.716	61.648	45.703	69.287	30.85	324.204
2003	133.277	69.444	54.156	83.089	42.146	382.112
2004	163.545	71.134	59.988	95.255	50.49	440.412

Data Source：China Electric Power Yearbook 2005，P585

Data Source：China Electric Power Yearbook 2005，P709

Data Source：China Electric Power Yearbook 2005，P474

Table A3-15 Calculation of EFBL, upstream,CH4

ΣFFj,k	$EF_{k, upstream,CH4}$	ΣEG_j	$EF_{BL, upstream,CH4}$
Kt	tCH4/kt coal or tCH4/PJ	TWh	tCH4/MWh
32315.69761	13.4	116.208	0.003726339

Table A3-16 Calculation Sheet of Levelised Cost for 300MW Coal-fired

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Capital expenditure(RMB)		764280000	1273800000	509520000												
Operation and maintenance expenditure (RMB)	Material	0	3750156	15750655	15750655	15750655	15750655	15750655	15750655	15750655	15750655	15750655	15750655	15750655	15750655	15750655
	Manpower	0	18720000	18720000	18720000	18720000	18720000	18720000	18720000	18720000	18720000	18720000	18720000	18720000	18720000	18720000
	Water	0	625026	2625109	2625109	2625109	2625109	2625109	2625109	2625109	2625109	2625109	2625109	2625109	2625109	2625109
	Desulfidation	0	732580	3076838	3076838	3076838	3076838	3076838	3076838	3076838	3076838	3076838	3076838	3076838	3076838	3076838
	Fee for Discharging Waste	0	6260000	6260000	6260000	6260000	6260000	6260000	6260000	6260000	6260000	6260000	6260000	6260000	6260000	6260000
	Repair	0	2196207	2196207	2196207	2196207	2196207	2196207	2196207	2196207	2196207	2196207	2196207	2196207	2196207	2196207
	Insurance	212300	212300	212300	212300	212300	212300	212300	212300	212300	212300	212300	212300	212300	212300	212300
	Others	0	7500312	31501310	31501310	31501310	31501310	31501310	31501310	31501310	31501310	31501310	31501310	31501310	31501310	31501310
Fuel expenditure		0	86541100	363472620	363472620	363472620	363472620	363472620	363472620	363472620	363472620	363472620	363472620	363472620	363472620	363472620
Total		764492300	1400337681	953335040	443815040	443815040	443815040	443815040	443815040	443815040	443815040	443815040	443815040	443815040	443815040	443815040
NPV of Cost		7609306527														
Electricity generation(MWh)		0	625026	2625109	3000125	3000125	3000125	3000125	3000125	3000125	3000125	3000125	3000125	3000125	3000125	3000125
NPV of generation(MWh)		35521369														
LCOE(RMB/kWh)	**0.214**															

		16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Capital expenditure(RMB)																
Operation and maintenance expenditure (RMB)	Material	15750655	15750655	15750655	15750655	15750655	15750655	15750655	15750655	15750655	15750655	15750655	15750655	15750655	15750655	15750655
	Manpower	18720000	18720000	18720000	18720000	18720000	18720000	18720000	18720000	18720000	18720000	18720000	18720000	18720000	18720000	18720000
	Water	2625109	2625109	2625109	2625109	2625109	2625109	2625109	2625109	2625109	2625109	2625109	2625109	2625109	2625109	2625109
	Desulfidation	3076838	3076838	3076838	3076838	3076838	3076838	3076838	3076838	3076838	3076838	3076838	3076838	3076838	3076838	3076838
	Fee for Discharging Waste	6260000	6260000	6260000	6260000	6260000	6260000	6260000	6260000	6260000	6260000	6260000	6260000	6260000	6260000	6260000
	Repair	2196207	2196207	2196207	2196207	2196207	2196207	2196207	2196207	2196207	2196207	2196207	2196207	2196207	2196207	2196207
	Insurance	212300	212300	212300	212300	212300	212300	212300	212300	212300	212300	212300	212300	212300	212300	212300
	Others	31501310	31501310	31501310	31501310	31501310	31501310	31501310	31501310	31501310	31501310	31501310	31501310	31501310	31501310	31501310
Fuel expenditure		363472620	363472620	363472620	363472620	363472620	363472620	363472620	363472620	363472620	363472620	363472620	363472620	363472620	363472620	363472620
Total		443815040	443815040	443815040	443815040	443815040	443815040	443815040	443815040	443815040	443815040	443815040	443815040	443815040	443815040	443815040
NPV of Cost																
Electricity generation(MWh)		3000125	3000125	3000125	3000125	3000125	3000125	3000125	3000125	3000125	3000125	3000125	3000125	3000125	3000125	3000125

Unit: RMB Yuan

Table A3-17 Calculation Sheet of Levelised Cost for 600MW Coal-fired

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Capital expenditure(RMB)		1284300000	1798020000	1284300000	770580000											
Operation and maintenance expenditure (RMB)	Material	0	0	5000208	5000208	5000208	5000208	5000208	5000208	5000208	5000208	5000208	5000208	5000208	5000208	5000208
	Manpower	0	19760000	19760000	19760000	19760000	19760000	19760000	19760000	19760000	19760000	19760000	19760000	19760000	19760000	19760000
	Water	0	0	1000042	1000042	1000042	1000042	1000042	1000042	1000042	1000042	1000042	1000042	1000042	1000042	1000042
	Desulfidation	0	0	1143008	1143008	1143008	1143008	1143008	1143008	1143008	1143008	1143008	1143008	1143008	1143008	1143008
	Fee for Discharging Waste	0	11360000	11360000	11360000	11360000	11360000	11360000	11360000	11360000	11360000	11360000	11360000	11360000	11360000	11360000
	Repair	0	4428621	4428621	4428621	4428621	4428621	4428621	4428621	4428621	4428621	4428621	4428621	4428621	4428621	4428621
	Insurance	428100	428100	428100	428100	428100	428100	428100	428100	428100	428100	428100	428100	428100	428100	428100
	Others	0	0	10000416	10000416	10000416	10000416	10000416	10000416	10000416	10000416	10000416	10000416	10000416	10000416	10000416
Fuel expenditure		0	0	135025617	540102467	540102467	540102467	540102467	540102467	540102467	540102467	540102467	540102467	540102467	540102467	540102467
Total		1284728100	1833996721	1472446011	1363802861	593222861	593222861	593222861	593222861	593222861	593222861	593222861	593222861	593222861	593222861	593222861
NPV of Cost		11158566895														
Electricity generation(MWh)		0	0	1000042	4000166	6000250	6000250	6000250	6000250	6000250	6000250	6000250	6000250	6000250	6000250	6000250
NPV of generation(MWh)		64799173														
LCOE(RMB/kWh)	0.172															

16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
5000208	5000208	5000208	5000208	5000208	5000208	5000208	5000208	5000208	5000208	5000208	5000208	5000208	5000208	5000208
19760000	19760000	19760000	19760000	19760000	19760000	19760000	19760000	19760000	19760000	19760000	19760000	19760000	19760000	19760000
1000042	1000042	1000042	1000042	1000042	1000042	1000042	1000042	1000042	1000042	1000042	1000042	1000042	1000042	1000042
1143008	1143008	1143008	1143008	1143008	1143008	1143008	1143008	1143008	1143008	1143008	1143008	1143008	1143008	1143008
11360000	11360000	11360000	11360000	11360000	11360000	11360000	11360000	11360000	11360000	11360000	11360000	11360000	11360000	11360000
4428621	4428621	4428621	4428621	4428621	4428621	4428621	4428621	4428621	4428621	4428621	4428621	4428621	4428621	4428621
428100	428100	428100	428100	428100	428100	428100	428100	428100	428100	428100	428100	428100	428100	428100
10000416	10000416	10000416	10000416	10000416	10000416	10000416	10000416	10000416	10000416	10000416	10000416	10000416	10000416	10000416
540102467	540102467	540102467	540102467	540102467	540102467	540102467	540102467	540102467	540102467	540102467	540102467	540102467	540102467	540102467
593222861	593222861	593222861	593222861	593222861	593222861	593222861	593222861	593222861	593222861	593222861	593222861	593222861	593222861	593222861
6000250	6000250	6000250	6000250	6000250	6000250	6000250	6000250	6000250	6000250	6000250	6000250	6000250	6000250	6000250

Unit: RMB Yuan

Table A3-18 Calculation Sheet of Levelised Cost for the proposed project

		1	2	3	4	5	6	7	8	9	10	11
Capital expenditure(RMB)		328020000	496610000	1304250000	526690000							
Operation and maintenance expenditure (RMB)	Material	0	0	2754000	20179000	22012610	22012610	22012610	22012610	22012610	22012610	22012610
	Manpower	0	0	8139600	8139600	8139600	8139600	8139600	8139600	8139600	8139600	8139600
	Water	0	0	12960	94960	103589	103589	103589	103589	103589	103589	103589
	Repair	0	0	3161393	3161393	3161393	3161393	3161393	3161393	3161393	3161393	3161393
	Insurance	0	0	288649	288649	288649	288649	288649	288649	288649	288649	288649
	Others	0	0	4860000	35610000	38845782	38845782	38845782	38845782	38845782	38845782	38845782
Fuel expenditure		0	0	87434640	640647640	698861515	698861515	698861515	698861515	698861515	698861515	698861515
Total		328020000	496610000	1410901242	1234811242	771413138	771413138	771413138	771413138	771413138	771413138	771413138
NPV of Cost		9813735544										
Electricity generation(MWh)		0	0	324000	2374000	2589719	2589719	2589719	2589719	2589719	2589719	2589719
NPV of generation(MWh)		25338587										
LCOE(RMB/kWh)	**0.387**											

12	13	14	15	16	17	18	19	20	21	22	23	24
22012610	22012610	22012610	22012610	22012610	22012610	22012610	22012610	22012610	22012610	22012610	22012610	22012610
8139600	8139600	8139600	8139600	8139600	8139600	8139600	8139600	8139600	8139600	8139600	8139600	8139600
103589	103589	103589	103589	103589	103589	103589	103589	103589	103589	103589	103589	103589
3161393	3161393	3161393	3161393	3161393	3161393	3161393	3161393	3161393	3161393	3161393	3161393	3161393
288649	288649	288649	288649	288649	288649	288649	288649	288649	288649	288649	288649	288649
38845782	38845782	38845782	38845782	38845782	38845782	38845782	38845782	38845782	38845782	38845782	38845782	38845782
698861515	698861515	698861515	698861515	698861515	698861515	698861515	698861515	698861515	698861515	698861515	698861515	698861515
771413138	771413138	771413138	771413138	771413138	771413138	771413138	771413138	771413138	771413138	771413138	771413138	771413138
2589719	2589719	2589719	2589719	2589719	2589719	2589719	2589719	2589719	2589719	2589719	2589719	2589719

Unit: RMB Yuan

Annex 4

MONITORING PLAN

No additional information.

Annex 5
IRR Analysis of the Proposed Project

Key Indicators	unit	Value
Project IRR(Without CERs)	%	6.53%
IRR (including sales revenue of CERs)	%	9.85%

Series	Account Title	Total	1	2	3	4	5	6	7	8	9
1	Net cash inflow	2033251			12592.80	92269.47	103228.67	102667.67	102038.67	101334.67	100664.67
1.1	Sales revenue	2013279			12592.80	92269.47	100664.67	100664.67	100664.67	100664.67	100664.67
1.2	Disposal of assets	12329									
1.3	Return of floating capital	1032									
1.4	Short term loan	6611					2564.00	2003.00	1374.00	670.00	
2	Net cash outflow	1834148	12527.00	75968.00	114688.18	134974.90	76374.65	76335.65	76296.65	76257.65	76218.65
2.1	Investment on construction	250547	12527.00	75164.00	100219.00	62637.00					
2.2	floating capital	1025		804.00	4091.00	445.00	-7.00	-7.00	-7.00	-7.00	-7.00
2.3	Operating Costs	1497783			10267.37	69214.13	75495.80	75456.80	75417.80	75378.80	75339.80
2.7	Additional tax on city building and education	17717			110.82	811.97	885.85	885.85	885.85	885.85	885.85
2.8	Income tax	51418			0.00	1431.00	0.00	0.00	0.00	0.00	0.00
2.9	Legal reserve	15659			0.00	435.81	0.00	0.00	0.00	0.00	0.00
3	Net cash flow(Without CERs revenue)	199103	-12527.00	-75968.00	-102095.38	-42705.44	26854.01	26332.01	25742.01	25077.01	24446.01
4	Net cash flow(With CERs revenue)		-12527.00	-75968.00	-101300.43	-36880.68	33208.74	32686.74	32096.74	31431.74	30800.74

10	11	12	13	14	15	16	17	18	19	20	21	22	23	24

100664.67	100664.67	100664.67	100664.67	100664.67	100664.67	100664.67	100664.67	100664.67	100664.67	100664.67	100664.67	100664.67	88057.91	21756.20
100664.67	100664.67	100664.67	100664.67	100664.67	100664.67	100664.67	100664.67	100664.67	100664.67	100664.67	100664.67	100664.67	88057.91	8395.20
														12329.00
														1032.00
76179.65	76139.65	76100.65	76061.65	76022.65	75983.65	76284.25	79231.70	80020.94	86463.38	86463.38	86463.38	85896.42	64477.20	12718.55
-7.00	-7.00	-7.00	-7.00	-7.00	-7.00	-7.00	-7.00					-576.00	-3648.00	
75300.80	75260.80	75221.80	75182.80	75143.80	75104.80	75065.80	75026.80	74989.80	74989.80	74989.80	74989.80	74989.80	52311.36	12644.67
885.85	885.85	885.85	885.85	885.85	885.85	885.85	885.85	885.85	885.85	885.85	885.85	885.85	774.91	73.88
0.00	0.00	0.00	0.00	0.00	0.00	260.32	2549.58	3177.57	8116.02	8116.02	8116.02	8122.95	11528.10	0.00
0.00	0.00	0.00	0.00	0.00	0.00	79.28	776.46	967.72	2471.70	2471.70	2471.70	2473.81	3510.83	0.00
24485.01	24525.01	24564.01	24603.01	24642.01	24681.01	24380.42	21432.96	20643.72	14201.29	14201.29	14201.29	14768.25	23580.71	9037.65
30839.74	30879.74	30918.74	30957.74	30996.74	31035.74	30735.14	27787.69	26998.45	20556.02	20556.02	20556.02	21122.98	29139.60	9567.62

Unit: 10000RMB Yuan