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

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SECTION A. General description of project activity

A.1 Title of the project activity:

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China Guangdong Huizhou LNG generation project.
Version 01
Completed on 10 September, 2006.

A.2. Description of the project activity:

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Huizhou LNG Generation Project (HLGP) is to construct a high efficient LNG (liquefied nature gas) CCGT(combined-cycle gas turbine) plant. The proposed project has a capacity of 1170 MW (3×390 MW) with annual output of 4361.2 GWh. The first unit will be put into commercial operation in November 2006. The proposed project will consume 560 thousand tons of LNG per annum[1].

Electricity to be generated by HLGP will subsequently displace power generation by coal-fired thermal plants and reduce CO_2 emission in Guangdong Province, then Southern China Power Grid (SCPG), which is dominated by coal-fired generation technology. The estimated annual greenhouse gas (GHG) emission reductions will be 1,270,421 tCO_2e.

By using LNG and CCGT, the HLGP will offer the least environmental damaging form of fossil-fuelled electricity generation, produce positive environmental and economic benefits and contribute to the local sustainable development. The specific sustainable development benefits of the proposed project include:

- Consistence with China's national energy policy aiming at optimization of energy structure, improvement of energy security and diversification of energy mix.
- Supply of less GHG-intensive electricity to the Guangdong Provincial Power Grid (GPPG) and SCPG.
- Improvement of reliability of power supply in local grid and GPPG.
- Successful demonstration to other planned or scheduled LNG CCGT plants in other province of China.
- Promote and strengthen technology and knowledge transfer of CCGT.

A.3. Project participants:

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Name of Party involved (*) ((host) indicates a host Party)	Private and/or public entity(ies) project participants (*) (as applicable)	Kindly indicate if the Party involved wishes to be considered as project participant (Yes/No)

[1]The estimation is from Feasibility Assessment Report of HLGP, which is based on 3*372.75MW generation capacity, 3900h operation hours and 56.59% generation efficiency.

P.R. China (Host)	Guangdong Huizhou LNG Power Co., Ltd.	No

CER buyer: to be determined.

A.4. Technical description of the project activity:

A.4.1. Location of the project activity:

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A.4.1.1. Host Party(ies):

>>
P.R. China

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

>>
Guangdong Province.

A.4.1.3. City/Town/Community etc:

>>
Daya Bay Economic and Technical Development Zone, Huizhou City.

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

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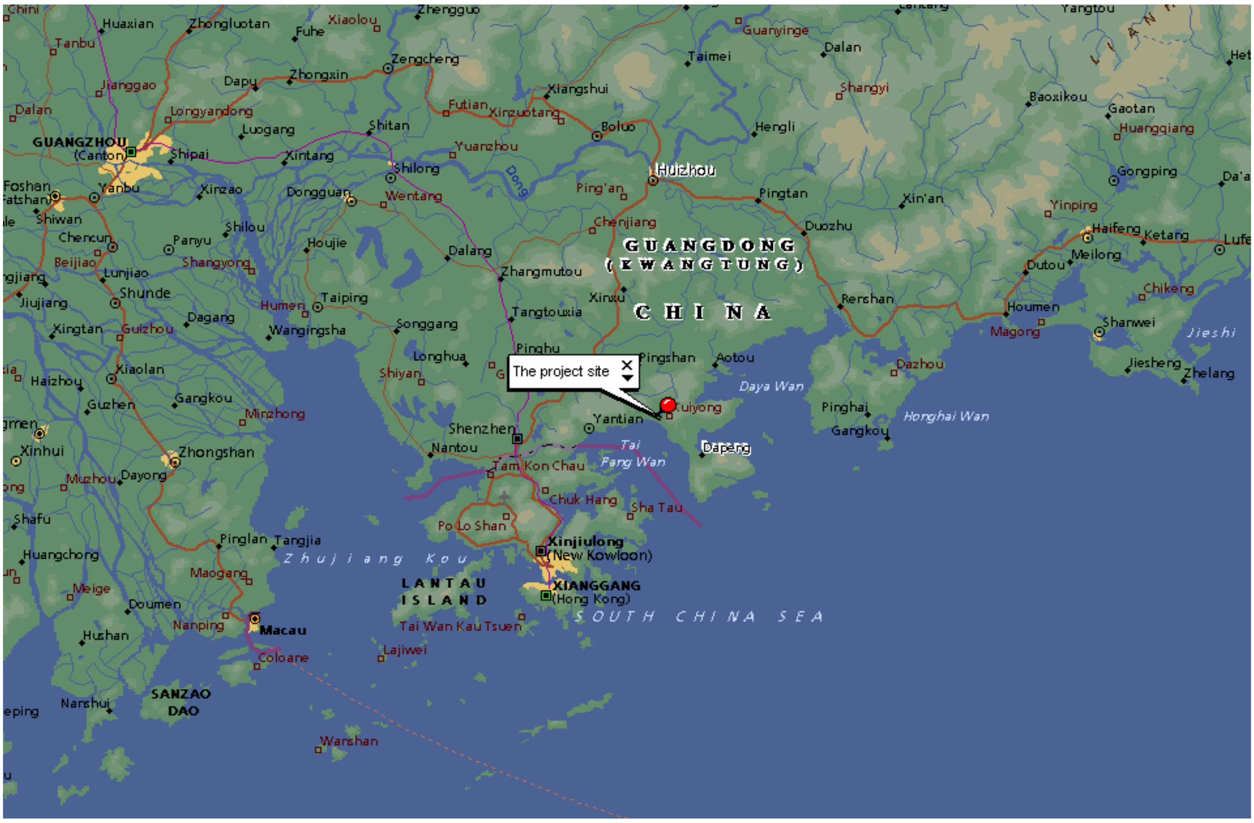
The proposed project is located in the Daya Bay Economic and Technical Development Zone, Huizhou City, Guangdong Province. The project site has distance of 214 km to Guangzhou, 48 km to Huizhou and 4 km east to Kuiyong Town. The map below shows the location of the proposed project.



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

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\Sectoral Scope: 1 Energy industries : non-renewable resources

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

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LNG is natural gas that has been processed to remove impurities and heavy hydrocarbons and then compress to liquid. LNG is about 1/600th the volume of natural gas at STP (standard temperature and pressure), making it more convenient to ship. The LNG will be liquefied (-163℃) and imported from Australia's Northwest shelf gas development project by LNG tankers. In receiving terminal, the imported LNG will be heated to convert it to its initial gaseous form and supplied to the users in Pearl River Delta region and Hong Kong (including the proposed CCGT power plant). A LNG terminal has been ready near Shenzhen to receive the LNG from Australia and the first shipment has landed in China in 28 June.

The CCGT process includes two parts: the first phase of the process takes place in the gas turbine which burns natural gas to rotate a coupled AC generator to generate electricity. After the fuel is burnt and passes through the gas turbine, the second phase will utilises the additional heat remaining in the exhausted gas through a heat recovery steam to produce steam to power a steam turbine. These "combined cycle" will results in cycle thermal efficiencies of over 50% when used with the most recent gas turbine technology.

The gas turbines and steam turbines in the HLGP are produced jointly by Dongfang Steam Turbine Works (DSTW) and MITSUBISHI Heavy Industries. These gas turbines are the first domestic made F-class gas turbine in China by local turbine producers. The heat recovery boilers are produced by

Hangzhou Boiler Group. Therefore, the successful implementation the proposed project will greatly contribute to transfer of advanced clean generation technology to China.

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

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The HLGP is estimated to reduce 1,231,549 tCO_2e annually. The renewable crediting period is selected for the proposed project. The first crediting period is of 7 years and this may be renewed for a maximum of two further periods of 7 years each. The total emission reduction of the project will be 8,620,843 tCO_2e during the first crediting period.

Years	**Annual estimation of emission reductions in tonnes of CO_2 e**
2007	1,246,424
2008	1,246,424
2009	1,246,424
2010	1,246,424
2011	1,246,424
2012	1,246,424
2013	1,246,424
Total estimated reductions (tonnes of CO_2e)	8,724,968
Total number of crediting years	7
Annual average over the crediting period of estimated reductions (tonnes of CO_2e)	1,246,424

A.4.5. Public funding of the project activity:

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No public funding is involved in this project activity.

SECTION B. Application of a baseline methodology

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

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Version 01 of AM0029: "Baseline Methodology for Grid Connected Electricity Generation Plants using Natural Gas" (referred as The Methodology). More information about The Methodology can be found on the website:
http://cdm.unfccc.int/methodologies/PAmethodologies/approved.html

The AM0029 also uses the version 06 of ACM0002: "Consolidated Methodology for Grid-connected Electricity Generation from Renewable Sources" and Version 02 of "Tool for the Demonstration and Assessment of Additionality".

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

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The version 01 of AM0029: "Baseline Methodology for Grid Connected Electricity Generation Plants using Natural Gas" is applicable under the following conditions:

- The project activity is the construction and operation of a new natural gas fired grid-connected electricity generation plant.
- The geographical/physical boundaries of the baseline grid can be clearly identified and information pertaining to the grid and estimating baseline emissions is publicly available.
- Natural gas is sufficiently available in the region or country, e.g. future natural gas based power capacity additions, comparable in size to the project activity, are not constrained by the use of natural gas in the project activity.

The Methodology is applicable for the proposed project for the following reasons:

- The proposed project is a new natural gas fired plant and will be connected to the Huizhou ocal grid, then GPPG and SCPG. The primary fuel in the proposed project will be LNG imported from Australia.
- The power grid (the SCPG) which the proposed project is to be connected to is clearly identified and information on the characteristics of this grid is publicly available.
- The LNG used in the proposed project will be imported from Australia and supplied by the first LNG terminal in China. The terminal will annually import about 3.7 million tons of LNG from Australia's Northwest Shelf gas development project over the next 25 years and mainly supply gas to Shenzhen, Dongguan, Guangzhou, Foshan and Hong Kong and five power plants. The second phase is expected to raise the capacity of the project to 6.2 million tons a year. Gas has some special features which distinguish it from other commodities, it is delivered through a long fixed chain (from exploration to final users) capacity-bound investment. The specific features of natural gas means the natural gas project had to be protected by long-term contracts with strict supply and off-take obligations. To hedge the risk, The Guangdong Dapeng LNG, operator of the LNG project also signed take-or-pay (ToP) long-term contracts with potential demand consumers. Such long-term contract along the LNG chain make sure that there is no supply constrain (all LNG demand have been contracted), thus no possible leakage. Additionally, in the LNG supply contract, there is clause to ensure that the LNG

will be supplied preferentially to household user once there is supply constrain. Such clause also makes sure that the proposed project couldn't lead to fuel switch activity thus no possible leakage.

To conclude, the Methodology is applicable to the proposed project.

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

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According to the version 01 of AM0029, in the calculation of project emissions, only CO_2 emissions from fossil fuel combustion at the project plant are considered. In the calculation of baseline emission, only CO_2 emissions from fossil fuel combustion in power plants in the baseline are considered.

The GHGs 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 from simplification. This is conservative
		N_2O	No	Excluded from 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 from simplification.
		N_2O	No	Excluded from simplification.

The project boundary of the proposed project includes the HLGP project site and all power plants connected physically to the baseline grid. According to ACM0002, the China South Power Grid which the proposed project is connected to is defined as baseline grid.

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

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According to the version 01 of AM0029, the following steps are used to define the baseline scenario:

Step 1: Identify plausible baseline scenarios.

In this step, all possible realistic and credible alternatives that provide outputs or services comparable with the proposed CDM project will be identified. The existing and planned generation technologies within SCPG are listed as follows:

Fuel	Technology	Output and Service
Natural Gas	CCGT	Generation, full-year peak regulation capacity
Natural Gas	GT	Generation, full-year peak regulating capacity
Light Oil	CCGT	Generation, full-year peak regulating capacity
Coal	Sub critical	Generation, full-year peak regulating capacity
Coal	Supercritical	Generation, full-year peak regulating capacity
Wind		Generation
Nuclear	PWR	Generation
Hydro	Run-of-river	Generation
Hydro	Daily regulating	Generation, Daily peak regulating capacity
Hydro	Monthly regulating	Generation, monthly peak regulating capacity
Hydro	Seasonal regulating	Generation, seasonal peak regulating capacity
Hydro	Yearly regulating	Generation, partly peak regulation capacity

Hydro	Multi year regulating	Generation, full-year peak regulating capacity
Import	Import from Three Gorgers	Generation

The major objective of the proposed project is not only to supply electricity but also full-year peak regulation capacity to GPPG within the coming 3-5 years (Source: FSR of proposed project). The possible new full-year peak regulation capacity of GPPG can come from the newly fossil fuel fired power plant within SCPG, or newly added hydro power with yearly regulation or multi-year regulation reservoir.

The newly hydro power with yearly regulation or multi-year regulation reservoir within SCPG mainly comes from Yunnan Provincial Power Grid, a province with rich water resource in China. There are several large hydro projects with yearly peak or multi-year reservoir are in the process of construction or planned. Generally, the construction period of hydro project with yearly or multi-year regulating capacity is almost 8-12 years in Yunnan province. The long construction period of hydro power makes it impossible to supply peak regulation capacity to meet the peak load of GPPG within 3-5 years.

Then the alternatives that provide comparable output and service with the proposed CDM project activity can be listed as follows:

Fuel	Technology	Output and Service
Natural Gas	CCGT	Generation, full-year peak regulation capacity
Light Oil	CCGT	Generation, full-year peak regulating capacity
Coal	Sub critical	Generation, full-year peak regulating capacity
Coal	Supercritical	Generation, full-year peak regulating capacity

The efficiency and technical life time of the previous technologies are listed in the next step.

Step 2: Identify the economically most attractive baseline scenario alternative.
According to the version 01 of AM0029, the economically most attractive baseline scenario alternative is identified using levelised cost as a financial indicator. The basic levelised cost methodology used in this PDD is based on Annex 10 of "Projected Costs of Generation Electricity" published by IEA. The formula applied to calculate the levelised electricity generation cost (EGC) is the following:

$$EGC = \frac{\sum_t \left[\left(I_t + M_t + F_t \right) \left(1 + r \right)^{-t} \right]}{\sum_t \left[E_t \left(1 + r \right)^{-t} \right]} \quad (1)$$

With:

- EGC: Average lifetime levelised electricity generation cost per kWh.
- I_t: Capital expenditure in the year t.
- M_t: Operation and maintenance expenditures in the year t.
- F_t: Fuel expenditure in the year t.
- E_t: Electricity generation in the year t.
- r: Discount rate.

The relevant assumptions and parameters are listed as following:

Table 1 Parameters for O&M Cost for Coal-fired Power Project

Item	Unit	Sub critical	Super critical	Source

Material Expenditure	RMB/MWh	7	7.49	FSR of typical 600MW sub critical power plant
Other O&M Expenditure	RMB/MWh	15	13.59	FSR of typical 600MW sub critical power plant
Water Expenditure	RMB/MWh	1	0.24	FSR of typical 600MW sub critical power plant
Desulfuration Expenditure	RMB/MWh	1.5	1.53	FSR of typical 600MW sub critical power plant
Employee	Person/MW	0.38	0.3	FSR of typical 600MW sub critical power plant
Power generation coal consumption (PGCC) (600MW, 300MW, 135MW)	gce/kWh (Design value)	310 320 330	299[2]	FSR of typical 600MW sub critical power plant
Load factor		0.63	0.65	FSR of typical power plant

Table 2 Parameters for O&M Cost for CCGT

Item	Unit	Quantity	Source
Material Expenditure	RMB/MWh	6.51	FSR of the proposed project
Other O&M Expenditure	RMB/MW	48600	FSR
Water Expenditure	RMB/MWh	0.02	FSR
Power generation gas consumption	g/kWh	217	FSR
Power generation oil consumption	g/kWh	180	Expert Estimation
Load factor		0.45	FSR
Employee	Person/MW	0.15	FSR

Table 3 Capital expenditure for different technologies:

Technology	Investment expenditure (RMB/kW)	Source
Sub critical coal fired plant	3623 for 600 MW 3589 for 300 MW unit 2863 for unit below 300 MW	SERC[3]
Super critical coal fired plant	4235	FSR of typical power plant
LNG CCGT	3655	FSR of the proposed project
CCGT (light oil)	3056	Shenzhen Energy Corporation

Table 4 Fuel expenditure for different technologies:

Fuel	Fuel Cost (RMB/ton)	Source

[2] The super critical unit is generally over 600 MW.

[3] State Electricity Regulation Committee (www.serc.gov.cn)

Coal	260	National bureau of statistics of China
LNG	1220	FSR of the proposed project
Fuel oil	3450	CINIC

Table 5 Construction period and technical lifetime

Technology	Construction	Life time	Source
Sub critical coal fired plant	3 years	30 Years	IEA
Super critical coal fired plant	3 years	30 Years	IEA
LNG CCGT	3 years	20 Years	FSR of HLGP
CCGT (light oil)	1 year	20 Years	Expert estimation

Based on the above parameters and levelised cost calculation formula, the levelised cost of corresponding generation technology can be calculated and listed in the following table.

Table 6 Result and sensitive analysis of Levelised cost

Fuel	Levelised Cost	Load Factor		Fuel Cost	
	RMB/kWh	+10%	-10%	+10%	-10%
135 MW Subcritical	0.1735	0.1677	0.1805	0.1820	0.1649
300 MW Subcritical	0.1860	0.1789	0.1947	0.1943	0.1776
600 MW Subcritical	0.1841	0.1769	0.1928	0.1921	0.1760
600 MW Supercritical	0.1914	0.1831	0.2015	0.1992	0.1836
CCGT with LNG	0.4034	0.3913	0.4180	0.4298	0.3769
CCGT with fuel oil	0.7328	0.7232	0.7445	0.7949	0.6707

According to the version 01 of AM0029, the baseline alternatives with the best financial indicator, i.e. the lowest levelised cost, can be preselected as the most plausible scenario. Then the 135 MW subcritical coal-fired power plant has the lowest levelised cost, then the most plausible scenario. The sensitive analysis in the previous table confirms and supports that the 135 MW subcritical coal-fired power plant is always the least levelised cost alternatives within reasonable variations in the critical assumptions.

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):

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According to the version 01 of AM0029, the assessment of additionality comprises the following three steps:

Step 1: Benchmark investment analysis.

According to the *"Interim Rules on Economic Assessment of Electrical Engineering Retrofit Projects"*, the Financial benchmark rate of return (after tax) of Chinese Power Industries is 8% of the total investment IRR. This benchmark is widely used for power project investments in China and it can be assumed that a rational business developer, will not accept projects with benchmarks with a negative NPV if the project cash flow is discounted by the threshold IRR (8%). In line with that, the feasibility study of the proposed project and the benchmark investment analysis in this PDD adopt 8% as benchmark FIRR.

Sub-step 2c. Calculation and comparison of financial indicators.

Table 7 Main parameters for calculation of financial indicators

Items	Unit	Amount	Source
Capacity	MW	1170	Feasibility Study
Total Investment	Million Yuan	3887.13	Feasibility Study
Annual generating hours	Hour	3900	Feasibility Study
O&M Cost			See Tables in Section B 4
Electricity Tariff (Including VAT)	Yuan/kWh	0.430	Feasibility Study
Value Added Tax (VAT)	%	17	Feasibility Study
Income tax	%	33	Feasibility Study
Expected CERs Price	$/tCO_2$	12	
Project life time	Year	25	Feasibility Study
CERs crediting time	Year	21	

The financial indicators (FIRR) with and without income from CERs sales are listed below. Without income from CERs sales, the FIRR of the proposed project is lower than the benchmark FIRR then the proposed project is financially unacceptable because of its low profitability. With income from CERs sales, the financial acceptance will be dramatically improved, the FIRR of the proposed project is close to the benchmark than financially acceptable.

Table 8 Comparison of financial indicators with and without income from CERs

Items	Unit	Without income from CERs	Benchmark	With income from CERS
Electricity Tariff (Including VAT)	Yuan/kWh	0.430	0.430	0.430
FIRR on total investment	%	6.59	8	9.10

Sub-step 2d. Sensitivity analysis.

Three factors are considered in the following sensitivity analysis:

1) Total investment.
2) Annual operation and maintenance cost.
3) Annual output.

The tariff is not considered in the sensitivity analysis because the tariff is regulated by the regulating entities. Assuming the above three factors vary in the range of -10%-+10%, the FIRR of the proposed project (without income from CERs sales) varies to different extent, as shown in Figure 1. The change of annual output is the most important factor affecting the financial attractiveness of the proposed project. The next important factor for financial attractiveness is the total investment. The impact of the annual O&M cost is the slightest. Within the reasonable range of annual output, investment and annual O&M cost, the FIRR of proposed project is always lower than the investment benchmark, then lack of financial attractiveness.

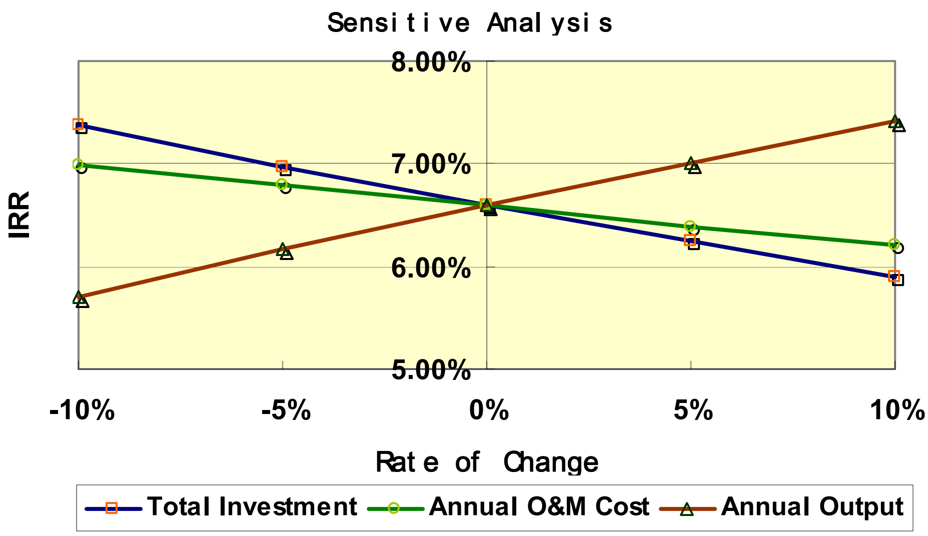


Figure 1. Sensitivity analysis of the Project

To conclude, without the income from CERs sales, the project sponsor would not invest to develop this project because of its poor financial attractiveness.

Step 2: Common practice analysis.
Sub-step 4a. Analyze other activities similar to the proposed project activity.
The HLGP is one of the first LNG CCGT power plants in SCPG. Other three similar project: Shenzhen Qianwan LNG power plant, Shenzhen Dongbu LNG power plant and Zhujiang LNG power plant are all in the process of applying as a CDM project.

Sub-step 4b. Discuss any similar options that accruing.
There is no similar project observed in SCPG, the grid boundary in this PDD, then the proposed project is additional.

Step 3: Impact of CDM registration.
If the proposed project could be approved and registered successfully, the following positive benefits can be predicted:
1. The income from CERs sales would greatly improve the financial indicators of the proposed project and overcome the investment benchmark. The project owner would be more confident in successful implementation of the proposed project.

In fact, the project owner has been aware of the challenges mentioned above at the early stage of the proposed project. Several suggestions have been presented in the FAR to address such challenges, meanwhile, considering the huge emission reduction that the proposed project could realize, the project owner recognized CDM could be an effective means to improve the financial attractiveness of the proposed project and planed to start CDM application process at appropriate time.

In conclusion, the proposed project is additional.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

Step 1 Calculate Baseline Emission

Sub-step 1a Calculate Baseline Emission Factor ($EF_{BL,CO2}$)
According to the version 01 of AM0029, the baseline emission factor $EF_{BL,CO2}$, is the lowest emission factor among the following three options:

Option 1. The build margin ($EF_{BL,BM}$), calculated according to ACM0002; and
Option 2. The combined margin ($EF_{BL,CM}$), calculated according to ACM0002, using a 50/50 OM/BM weight, then $EF_{BL,CM}=0.5EF_{BL,BM}+0.5EF_{BL,OM}$, where $EF_{BL,OM}$ is the operational margin calculated according to ACM0002.
Option 3. The emission factor of the technology (and fuel) identified as the most likely baseline scenario under Section B 4, step 2 "Identification of the baseline scenario" and calculated as follows:

$$EF_{BL,CO_2,Option3} = \frac{COEF_{BL}}{\eta_{BL}} \times 3.6 GJ / MWh \qquad (1)$$

Where,
$COEF_{BL}$ is the fuel emission coefficient (tCO_2e/GJ), based on national average fuel data, if available, otherwise IPCC defaults can be used.

As described in Section B5, the 135 MW subcritical coal-fired plant has been identified as the most likely baseline, then emission coefficients of coal can be calculated as follows:

$$COEF_{Coal} = NCV_{Coal} \times EF_{CO_2,Coal,y} \times OXID_{Coal} \qquad (2)$$

Where:
$COEF_{Coal}$: is the emission coefficient of coal in tCO_2/tce.
NCV_{Coal}: is the net calorific value of coal (GJ/tce), the IPCC default value has been adopted.
$EF_{CO2,Gas,y}$: is the CO_2 emission factor per unit of energy of coal in year y (tCO_2/GJ), which is determined by IPCC default value.
$OXID_{Coal}$: is the oxidation factor of coal, the IPCC default value will be used.

Then the formula (1) can be translated into the following one:

$$EF_{BL,CO_2,Option3} = COEF_{Coal} \times PSCC_{BL} \qquad (3)$$

Where:
$COEF_{Coal}$: is the emission coefficient of coal in tCO_2/tce.
$PSCC_{BL}$: is the power supply coal consumption of the most likely baseline technology identified in previous step, 135 MW subcritical coal-fired plant in the PDD, in tce/MWh.

Sub-step 1a1: Calculate the Operating Margin emission factor ($EF_{BL,OM}$)

According to The Methodology, four alternatives could be used to calculate the OM:
a) Simple OM
b) Simple adjusted OM, or

c) Dispatch Data Analysis OM, or
d) Average OM.

Dispatch data analysis should be the first methodological choice. Where this option is not selected project participants shall justify why and may use the simple OM, the simple adjusted OM or the average emission rate method taking into account the provisions outlined hereafter.

The Simple OM method (a) can only be used where low-cost/must run resources constitute less than 50% of total grid generation in: 1) average of the five most recent years, or 2) based on long-term normals for hydroelectricity production.

The average emission rate method (d) can only be used where low-cost/must run resources constitute more than 50% of total grid generation and detailed data to apply option (b) is not available, and where detailed data to apply option (c) above is unavailable.

The Simple OM, simple-adjusted OM, and average OM emission factors 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.

For The Project, the simple Operating Margin emission factor was chosen based on the following two reasons:

1. In China, the State Grid Corporation run the interregional dispatch system and each regional grid corporation run the intraregional dispatch system. The dispatch information is regarded as business secrets and not available to the public.
2. For the most recent 5 years (2000-2004), the low-cost/must run resources constitute less than 50% of total: 34.23%, 33.72%, 32.98%, 30.59% and 29.71% for 2000, 2001, 2002, 2003 and 2004.

As a result, the simple OM method can be used.

The OM in this PDD is also calculated ex-ante based on the most recent 3 years data.

The Simple OM emission factor is calculated as the generation-weighted average emissions per electricity unit (tCO_2/MWh) of all generating sources serving the system, not including low-operating cost and must-run power plants:

$$EF_{BL,OM} = \frac{\sum_{i,j} F_{i,j,y} \times COEF_{i,j}}{\sum_{j} GEN_{j,y}} \quad (4)$$

Where,

$F_{i,j,y}$ is the amount of fuel i consumed (ton for solid and liquid fuel, m^3 for gas fuel) by relevant power sources j in years y,

j refers to the power sources delivering electricity to the grid, not including low-operating cost and must-run power plants, and including imports to the grid.

$COEF_{i,j,y}$ is the CO_2 emission coefficient of fuel *i* (tCO_2/t for solid and liquid fuel, tCO_2/m^3 for gas fuel), taking into account the carbon content of the fuels used by relevant power sources *j* and the percent oxidation of the fuel in years *y*, and

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

The fuel consumption data for generation is extracted from energy balance table in China Energy Statistical Yearbook. The generation data is extracted from China Electric Power Yearbook. In the China Electric Power Year Book and other data resources, only generation data by fuel type is available. The generation from source *j* can be translated into electricity delivered to the grid by source *j* by excluding the plant self consumption part.

Sub-step 1a2. Calculate the Build Margin emission factor ($EF_{BL,BM}$)

According to The Methodology, the BM is calculated as the generation-weighted average emission factor of a sample of power plants *m*, as follows:

$$EF_{BL,BM} = \frac{\sum_{i,m} F_{i,m,y} \times COEF_{i,m,y}}{\sum_{m} GEN_{m,y}} \tag{5}$$

Where

$F_{i,m,y}$ is the amount of fuel *i* (tce) consumed by plant *m* in year *y*.

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

$GEN_{m,y}$ is the electricity (MWh) delivered to the grid by plant *m*, equals to generation minus plant self consumption:

Project participants shall choose the sample of power plants *m* between one of the following two options. The choice among the two options should be specified in the PDD, and cannot be changed during the crediting period.

Option 1. Calculate the Build Margin emission factor $EF_{BL,BM}$ *ex-ante* based on the most recent information available on plants already built for sample group *m* at the time of PDD submission. The sample group *m* consists of either the five power plants that have been built most recently, or the power plant capacity additions in the electricity system that comprise 20% of the system generation (in MWh) and that have been built most recently. Project participants should use from these two options that sample group that comprises the larger annual generation.

Option 2. For the first crediting period, the Build Margin emission factor $EF_{BL,BM}$ must be updated annually *ex-post* for the year in which actual project generation and associated emissions reductions occur. For subsequent crediting periods, $EF_{BL,BM}$ should be calculated *ex-ante*, as described in option 1 above. The sample group *m* consists of either the five power plants that have been built most recently, or the power plant capacity additions in the electricity system that comprise 20% of the system generation (in MWh) and that have been built most recently. Project participants should use from these two options that sample group that comprises the larger annual generation.

In this PDD, the option 1 is selected to calculate the BM ex-ante. Since the detailed information regarding construction and generation of individual power plant is not publicly available, the aggregated data of new installed capacity by fuel types are used to identify and represent the build margin. Meanwhile, the average operation times of installed capacity by fuel types are used to calculate the generation of build margin.

The detailed information of BM and OM calculation is listed in Annex 3 of this PDD.

Sub-step 1a3: Calculate the Combine Margin emission factor ($EF_{BL,CM}$)
The combined margin ($EF_{BL,CM}$) is calculated according to ACM0002, using a 50/50 OM/BM weight:

$$EF_{BL,CM} = 0.5 \times EF_{BL,BM} + 0.5 \times EF_{BL,CM} \quad (6)$$

Sub-step 1a4: Calculate the Baseline Emission Factor ($EF_{BL,CO2}$)
Then the baseline emission factor can be calculated as follows:

$$EF_{BL,CO_2} = \min(EF_{BL,BM}, EF_{BL,CM}, EF_{BL,CO_2,Option3}) \quad (7)$$

Sub-step 1b Calculate Baseline Emission (BE_y)

Once the baseline emission factor is determined, the baseline emissions can be calculated by multiplying the electricity generated in the project plant (EG_y) with the baseline emission factor $EF_{BL,CO2}$:

$$BE_y = EG_y \times EF_{BL,CO_2} \quad (8)$$

Step 2 Calculate Project Emission (PE_y)

According to the Methodology, the project activity is on-site combustion of natural gas to generate electricity, then the CO_2 emissions from electricity generation are calculated as follows:

$$PE_y = FC_{LNG,y} \times COEF_{LNG,y} + FC_{Diesel,y} \times COEF_{Diesel,y} \quad (9)$$

Where
$FC_{LNG,y}$: is the total volume of LNG combusted in the project plant (tons) in year y.
$FC_{Diesel,y}$: is the total volume of diesel combusted in the project plant (tons) for start-up fuel in year y.
$COEF_{LNG,y}$: is the CO_2 emission coefficient (tCO_2/tons) in year y for LNG.
$COEF_{Diesel,y}$: is the CO_2 emission coefficient (tCO_2/tons) in year y for diesel.

The emission coefficients of LNG and diesel are calculated as follows:

$$COEF_{LNG,y} = NCV_{LNG,y} \times EF_{CO_2,Gas,y} \times OXID_{Gas} \quad (10)$$

$$COEF_{Diesel,y} = NCV_{Diesel,y} \times EF_{CO_2,Diesel,y} \times OXID_{Diesel} \quad (11)$$

Where:
$NCV_{LNG,y}$: is the net calorific value of LNG (GJ/ton), which is determined from the fuel supplier.
$NCV_{Diesel,y}$: is the net calorific value of diesel (GJ/ton), which is determined from the most recent "Chinese Energy Statistics Yearbook" available when the verification begins.
$EF_{CO2,Gas,y}$: is the CO_2 emission factor per unit of energy of LNG in year y (tCO_2/GJ), which is determined from the fuel supplier.
$EF_{CO2,Diesel,y}$: is the CO_2 emission factor per unit of energy of diesel in year y (tCO_2/GJ), the IPCC default value will be used.
$OXID_{Gas}$: is the oxidation factor of LNG, the IPCC default value will be used.
$OXID_{Diesel}$: is the oxidation factor of diesel, the IPCC default value will be used.

Step 3 Calculate Leakage (LE_y)

According to the Methodology, the following leakage emission sources are considered:

- Fugitive CH_4 emissions associated with fuel extraction, processing, liquefaction, transportation, regasification and distribution of natural gas used in the project plant and fossil fuels used in the grid in the absence of the project activity.

- In the case LNG is used in the project plant: CO_2 emission from fuel combustion/electricity consumption associated with the liquefaction, transportation, re-gasification and compression into a natural gas transmission or distribution system.

Thus, the leakage can be calculated based on following steps:

Sub step 3a Calculate the Upstream fugitive CH_4 emission factor ($EF_{BL,upstream,CH4}$)

According to the Methodology, the emission factor for upstream fugitive CH_4 emissions occurring in the absence of the project activity should be consistent with the baseline emission factor ($EF_{BL,CO2}$) in step 1 of this section. As described in Section B 6.3, the BM will be selected as the baseline emission factor, then the corresponding upstream fugitive CH_4 emission factor can be calculated as follows:

$$EF_{BL,upstream,CH_4} = \frac{FF_{Coal} \times EF_{Coal,upstream,CH_4} + FF_{Gas} \times EF_{Gas,upstream,CH_4} + FF_{Oil} \times EF_{Oil,upstream,CH_4}}{GEN_y} \quad (12)$$

Where:
$EF_{BL,upstream,CH4}$: is the emission factor for upstream fugitive methane emissions occurring in the absence of the project activity in tCH_4/MWh.
FF_{Coal}: Total quantity of coal type fuel combusted (tons raw coal) in power plants included in the build margin.
FF_{Gas}: Total quantity of gas type fuel combusted (GJ) in power plants included in the build margin.
FF_{Diesel}: Total quantity of diesel type fuel combusted (GJ) in power plants included in the build margin.
$EF_{Coal,upstream,CH4}$: Emission factor for upstream fugitive methane emissions from production of coal in tCH_4/t coal. The Methodology suggested two default fugitive CH_4 associated with different source: underground mining and surface mining. Because 95% of the coal production in China are produced by underground mining, so the default value for underground mining 13.4 tCH_4/kt coal is used in this PDD.
$EF_{Gas,upstream,CH4}$: Emission factor for upstream fugitive methane emissions from production of gas in tCH_4/GJ. The Methodology suggested several default fugitive CH_4 associated with different regions. In this PDD, the default value for USA and Canada is adopted because the new gas terminal and transmission and distribution network of this project is construed and operated by advance technology.
$EF_{Oil,upstream,CH4}$: Emission factor for upstream fugitive methane emissions from production of oil in tCH_4/GJ. The default value suggested in the Methodology is used in this PDD.
GEN_y: Electricity generation in the plants included in the build margin in MWh/a.

For the BM is calculated based on a conservative way, we also use the following formula to estimate the upstream fugitive methane emissions as follows:

$$EF_{BL,upstream,CH_4} = \lambda_{Coal} \times PGCC_{Adv} \times EF_{Coal,upstream,CH_4} \times \frac{NCV_{Coal}}{NCV_{Rawcoal}} < \frac{FF_{Coal} \times EF_{Coal,upstream,CH_4} + FF_{Gas} \times EF_{Gas,upstream,CH_4} + FF_{Oil} \times EF_{Oil,upstream,CH_4}}{GEN_y} \quad (13)$$

Where,

λ_{Coal}: is the share of coal-fired generation in BM generation.

$PGCC_{Adv}$: is the power supply coal consumption of the most advance coal-fired generation technology within the grid boundary, which is estimated as 327 gce/kWh in this PDD.
NCV_{Coal}: is the net caloric value of standard coal equivalent in GJ/tce.
$NCV_{Rawcoal}$: is the net caloric value of raw coal which is used for power generation in GJ/tce.

Sub step 3b Calculate Fugitive Methane Emissions ($LE_{CH4,y}$)

To estimated the fugitive methane emissions, one can multiply the quantity of LNG consumed by the project in year y with an emission factor for fugitive CH_4 emissions ($EF_{Gas,upstream,CH4}$) for LNG consumption and subtract the emissions occurring from fossil fuels used in the absence of the project activity, as follows:

$$LE_{CH_4,y} = \left[FC_{LNG,y} \times NCV_{LNG,y} \times EF_{Gas,upstream,CH_4} - EG_y \times EF_{BL,upstream,CH_4}\right] \times GWP_{CH_4} \quad (14)$$

Where:
$LE_{CH4,y}$: Leakage emissions due to fugitive upstream CH_4 emissions in the year y in tCO_2e.
$FC_{LNG,y}$: Total volume of LNG combusted in the project plant (tons) in year y.
$NCV_{LNG,y}$: Net calorific value of LNG (GJ/ton), which is determined from the fuel supplier.
$EF_{Gas,upstream,CH4}$: Emission factor for upstream fugitive methane emissions from production of gas in tCH_4/GJ. The Methodology suggested several default fugitive CH_4 associated with different regions. In this PDD, the default value for USA and Canada is adopted.
EG_y: Electricity generation in the project plant during year y in MWh.
$EF_{BL,upstream,CH4}$: is the emission factor determined in sub step 3a for upstream fugitive methane emissions occurring in the absence of the project activity in tCH_4/MWh.
GWP_{CH4}: Global warming potential of methane valid for the relevant commitment period.

Sub step 3c Calculate CO_2 from LNG ($LE_{LNG,CO2,y}$)

CO_2 emission from LNG combustion/electricity consumption associated with the liquefaction, transportation, re-gasification and compression of LNG into a natural gas transmission or distribution system is estimated by multiplying the quantity of natural gas combusted in the project with an appropriate emission factor, as follows:

$$LE_{LNG,CO_2,y} = FC_{LNG,y} \times NCV_{LNG,y} \times EF_{CO_2,upstream,LNG} \quad (15)$$

Where,
$LE_{LNG,CO2,y}$: Leakage emissions due to LNG combustion/electricity consumption associated with the liquefaction, transportation, re-gasification and compression of LNG into a natural gas transmission or distribution system in tCO_2e.
$FC_{LNG,y}$: Total volume of LNG combusted in the project plant (tons) in year y.
$NCV_{LNG,y}$: Net calorific value of LNG (GJ/ton), which is determined from the fuel supplier.

$EF_{CO2,upstream,LNG}$: Emission factor for upstream CO_2 emission due to LNG combustion/electricity consumption associated with the liquefaction, transportation, re-gasification and compression of LNG into a natural gas transmission or distribution system in tCO_2/GJ. Because such data is unavailable in this project, the default value of 6 tCO_2/TJ suggested in the Methodology is adopted as a rough approximation.

Sub step 3d Calculate Leakage (LE_y)

Thus the leakage can be calculated as follows:

$$LE_y = LE_{CH_4,y} + LE_{LNG,CO_2,y} \tag{16}$$

Where:
LE_y: leakage emission during the year y in tCO_2e.
$LE_{CH4,y}$: leakage emission due to fugitive upstream CH_4 emissions in year y in tCO_2e.
$LE_{LNG,CO2,y}$: leakage emission due to fossil fuel combustion/electricity consumption associated with the liquefaction, transportation, re-gasification and compression of LNG into a natural gas transmission or distribution system during the year y in tCO_2e.

Step 4 Calculate Emission Reduction (ER_y)

The emission reduction of the proposed project can be calculated as follows:

$$ER_y = BE_y - PE_y - LE_y \tag{17}$$

Where:
ER_y: emission reduction in year y in tCO_2e.
BE_y: emission in the baseline scenario in year y in tCO_2e.
PE_y: emission in the project scenario in year y in tCO_2e.
LE_y: emission in the year y in tCO_2e.

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

Data / Parameter:	**$EF_{BL,BM}$**
Data unit:	tCO_2/MWh
Description:	The build margin emission factor calculated according to ACM0002
Source of data used:	Calculated
Value applied:	0.6402 tCO_2/MWh
Justification of the choice of data or description of measurement methods and procedures actually applied :	This data is calculated based on version 06 of ACM0002, relevant steps and parameters used for calculation are listed in Annex 3 of this PDD.
Any comment:	

Data / Parameter:	**$EF_{BL,OM}$**
Data unit:	tCO_2/MWh
Description:	The operational margin emission factor calculated according to ACM0002
Source of data used:	Calculated
Value applied:	0.9966 tCO_2/MWh

Justification of the choice of data or description of measurement methods and procedures actually applied :	This data is calculated based on version 06 of ACM0002, relevant steps and parameters used for calculation are listed in Annex 3 of this PDD.
Any comment:	

Data / Parameter:	**$F_{i,y}$**
Data unit:	t/m^3
Description:	Amount of fuel *i* consumed in year(s) *y* for generation
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:	**$GEN_{i,y}$**
Data unit:	MWh
Description:	Electricity (MWh) delivered to the grid excluding low operation 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:	GJ/t(ce)
Description:	Net caloric value of fuel i
Source of data used:	China Energy Statistics Yearbook 2004, p535.
Value applied:	See Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	This data comes from an official statistics.
Any comment:	

Data / Parameter:	$OXID_i$
Data unit:	
Description:	The oxidation factor of fuel i
Source of data used:	IPCC default value in revised 1996 IPCC Guideline 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 :	This data is based on IPCC default value because the national specific value is unavailable.
Any comment:	

Data / Parameter:	$EF_{CO2,i}$
Data unit:	tCO_2/GJ
Description:	The emission factor of fuel i
Source of data used:	IPCC default value in revised 1996 IPCC Guideline 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 :	This data is based on IPCC default value because the national specific value is unavailable.
Any comment:	

Data / Parameter:	$COEF_i$
Data unit:	$tCO_2/t\ (m^3)$
Description:	CO_2 emission coefficient of fuel *i*
Source of data used:	Calculated
Value applied:	See Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	Calculated according to the formula suggested by ACM0002.
Any comment:	

Data / Parameter:	$PGCC_{Adv}$
Data unit:	kgce/MWh
Description:	Fuel consumption per kWh electricity delivered of best available technologies in China
Source of data used:	Expert estimated and relevant statistics
Value applied:	327

Justification of the choice of data or description of measurement methods and procedures actually applied :	According to EB guidance, the efficiency level of the best technology commercially available in the provincial/regional or national grid of China can be used as a conservative proxy for each fuel type in estimating the fuel consumption to estimate the build margin (BM).
Any comment:	

Data / Parameter:	**$PSCC_{BL}$**
Data unit:	tce/MWh
Description:	Power supply coal consumption per MWh delivered by the most likely baseline technology identified in Section B5.
Source of data used:	Expert estimated and relevant statistics
Value applied:	0.330
Justification of the choice of data or description of measurement methods and procedures actually applied :	This data is based on identification of most likely baseline scenario in section B5.
Any comment:	

Data / Parameter:	**$EF_{Coal,upstream,CH4}$**
Data unit:	t CH_4/kt coal
Description:	Fugitive CH_4 upstream emission of coal mining
Source of data used:	IPCC default value
Value applied:	13.4
Justification of the choice of data or description of measurement methods and procedures actually applied :	Since 95% of the coal production in China are produced by underground mining, so the default value for underground mining 13.4 tCH_4/kt coal is used.
Any comment:	

Data / Parameter:	**$EF_{Gas,upstream,CH4}$**
Data unit:	t CH_4/PJ
Description:	Fugitive CH_4 upstream emission of natural gas production
Source of data used:	IPCC default value
Value applied:	160
Justification of the choice of data or description of measurement methods and procedures actually applied :	The default value for USA and Canada is adopted because the new gas terminal and transmission and distribution network of this project is construed and operated by advance technology.
Any comment:	

Data / Parameter:	$EF_{CO2,upstream,LNG}$
Data unit:	t CO_2e/TJ
Description:	Emission factor for upstream CO_2 emission due to energy consumption associated with LNG process
Source of data used:	IPCC default value
Value applied:	6
Justification of the choice of data or description of measurement methods and procedures actually applied :	Since there is no country or local specific value available, the IPCC default value recommended by the methodology AM0029 is adopted.
Any comment:	

Data / Parameter:	$EF_{BL,upstream,CH4}$
Data unit:	T CH_4/MWh
Description:	Fugitive CH_4 upstream emission associated with per electricity generated
Source of data used:	Calculated according to formula (13) presented above
Value applied:	0.003987
Justification of the choice of data or description of measurement methods and procedures actually applied :	To be conservative, only fugitive CH_4 emission by coal mining which will be avoided by the proposed project is considered.
Any comment:	

Data / Parameter:	λ_i
Data unit:	%
Description:	Share of generation by fuel type i in BM generation mix.
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 information regarding construction and generation of individual power plant is not publicly available, the aggregated data of installed capacity by fuel types are used to identify and represent the build margin. Meanwhile, the average operation times of installed capacity by fuel types are used to calculate the generation of build margin.
Any comment:	

B.6.3 Ex-ante calculation of emission reductions:

According to the Methodology and calculation steps described in section B 6.1, the emission reductions can be ex-ante calculated as follows:

Step 1 Calculated baseline emission

Sub-step 1a Calculate base line emission factor ($EF_{BL,CO2}$)

$EF_{BL,BM}$=0.6402 tCO_2/MWh, see also Section B.6.2

$EF_{BL,OM}$=0.9966 tCO_2/MWh, see also Section B.6.2

$EF_{BL,CM}$=0.5×$EF_{BL,BM}$ +0.5×$EF_{BL,OM}$=0.8184 tCO_2/MWh

$EF_{BL,CO_2,Option3} = COEF_{Coal} \times PSCC_{BL}$ =2.714×0.33=0.8956 tCO_2/MWh.

Then $EF_{BL,CO_2} = \min(EF_{BL,BM}, EF_{BL,CM}, EF_{BL,CO_2,Option3})$ =0.6402 tCO_2/MWh. The build margin (Option 1) is selected as the baseline emission factor.

Sub-step 1b Calculate baseline emission (BE_y)

BE_y=EG_y×$EF_{BL,CO2}$=4361175×0.6402=2,792,024 tCO_2

Step 2 Calculate Project Emission (PE_y)

$COEF_{LNG,y} = NCV_{LNG,y} \times EF_{CO_2,Gas,y} \times OXID_{Gas}$ =49.39×15.3×99.5%×44/12/1000=2.76 tCO_2/t

$PE_y = FC_{LNG,y} \times COEF_{LNG,y} + FC_{Diesel,y} \times COEF_{Diesel,y}$ =560000×2.76=1,545,600 tCO_2

Step 3 Calculate Leakage (LE_y)

$EF_{BL,upstream,CH_4} = \lambda_{Coal} \times PGCC_{Adv} \times EF_{Coal,upstream,CH_4} = 0.65 \times 327 \times 13.4 \times 29.27/20.91/10^6$=0.003987t CH_4/MWh

$LE_{CH_4,y} = \left[FC_{LNG,y} \times NCV_{LNG,y} \times EF_{Gas,upstream,CH_4} - EG_y \times EF_{BL,upstream,CH_4}\right] \times GWP_{CH_4}$

= [560000×49.39×160/10^6-4361175×0.003987] ×21=--272,216 tCO_2

$LE_{LNG,CO_2,y} = FC_{LNG,y} \times NCV_{LNG,y} \times EF_{CO_2,upstream,LNG}$ =560000×49.39×6/1000=165,950 tCO_2

$LE_y = LE_{CH_4,y} + LE_{LNG,CO_2,y}$ =165,950-272,216=--106,266 tCO_2

According to the methodology AM0029, since the leakage is negative, the leakage of the proposed project is considered to be zero, i.e. LE_y=0.

Step 4 Calculate Emission Reduction

$ER_y = BE_y - PE_y - LE_y$ =2,792,024-1,545,600=1,246,424 tCO_2

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

Year	Estimation of project activity emissions (tonnes of CO_2e)	Estimation of baseline emissions (tonnes of CO_2e)	Estimation of leakage (tonnes of CO_2e)	Estimation of overall emission reductions (tonnes of CO_2e)
2007	1,545,600	2,792,024	0	1,246,424
2008	1,545,600	2,792,024	0	1,246,424
2009	1,545,600	2,792,024	0	1,246,424
2010	1,545,600	2,792,024	0	1,246,424

2011	1,545,600	2,792,024	0	1,246,424
2012	1,545,600	2,792,024	0	1,246,424
2013	1,545,600	2,792,024	0	1,246,424
Total (tonnes of CO_2e)	10,819,200	19,544,168	0	8,724,968

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

B.7.1 Data and parameters monitored:

(Copy this table for each data and parameter)

Data / Parameter:	$FC_{LNG,y}$
Data unit:	t
Description:	Annual quantity of LNG consumed in project activity
Source of data to be used:	LNG flow meter reading at project boundary
Value of data applied for the purpose of calculating expected emission reductions in section B.5	560000
Description of measurement methods and procedures to be applied:	The LNG flow rate will be monitored continuously both by supplier and project owner. The LNG consumption will be aggregated automatically and recorded daily.
QA/QC procedures to be applied:	The total LNG consumption will be monitored both at supplier and project end for cross-verification. Natural gas supply metering to the project will be subject to regular (in accordance with stipulation of the meter supplier) maintenance and testing to ensure accuracy. The readings will be double checked by the gas supply company
Any comment:	

Data / Parameter:	$NCV_{f,y}$
Data unit:	GJ/t
Description:	Net Calorific Value of LNG
Source of data to be used:	Country specific
Value of data applied for the purpose of calculating expected emission reductions in section B.5	49.39
Description of measurement methods and procedures to be applied:	The NCV of natural gas available at Chinese Energy Statistical Yearbook (annually published) will be used country specific value.
QA/QC procedures to be applied:	No additional QA/QC procedures may need to be planned.

Any comment:	Supplier-provided data will be used if available.

Data / Parameter:	$EF_{CO2,LNG,y}$
Data unit:	tCO_2/GJ
Description:	Emission factor for LNG consumed in the project activity
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	15.3
Description of measurement methods and procedures to be applied:	The IPCC default value
QA/QC procedures to be applied:	No additional QA/QC procedures may need to be planned.
Any comment:	

Data / Parameter:	$FC_{Diesel,y}$
Data unit:	t
Description:	Annual quantity of Diesel as startup fuel consumed in project activity
Source of data to be used:	Diesel flow meter reading for startup usage
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:	The diesel used for startup fuel will be recorded daily.
QA/QC procedures to be applied:	No additional QA/QC procedures may need to be planned.
Any comment:	

Data / Parameter:	$NCV_{Diesel,y}$
Data unit:	GJ/t
Description:	Net Calorific Value of Diesel
Source of data to be used:	Country specific
Value of data applied for the purpose of	42.65

calculating expected emission reductions in section B.5	
Description of measurement methods and procedures to be applied:	The NCV of diesel available at Chinese Energy Statistical Yearbook (annually published) will be used country specific value.
QA/QC procedures to be applied:	No additional QA/QC procedures may need to be planned.
Any comment:	Supplier-provided data will be used if available.

Data / Parameter:	$EF_{CO2,Diesel,y}$
Data unit:	tCO_2/GJ
Description:	Emission factor for diesel consumed as startup fuel in the project activity
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	20.2
Description of measurement methods and procedures to be applied:	The IPCC default value
QA/QC procedures to be applied:	No additional QA/QC procedures may need to be planned.
Any comment:	

Data / Parameter:	EG_y
Data unit:	MWh
Description:	Electricity supplied to the grid by the project
Source of data to be used:	Electricity meter reading at project boundary
Value of data applied for the purpose of calculating expected emission reductions in section B.5	4361175
Description of measurement methods and procedures to be applied:	The readings of electricity meter will be hourly measured and monthly recorded. Data will be archived for 2 years following the end of the crediting period by means of electronic and paper backup.
QA/QC procedures to be applied:	The electricity output from each turbine will be monitored and recorded at the on-site control centre using a computer system. The project operator is

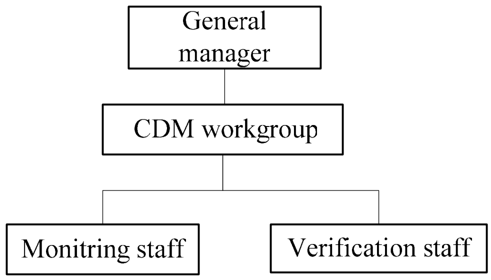
	responsible for recording this set of data. Electricity sales invoices will also be obtained for double check.
Any comment:	Electricity supplied by the project activity to the grid. Double check by receipt of sales.

B.7.2 Description of the monitoring plan:

The following steps will be taken to ensure accurate and consistent data is collected for monitoring and verification purposes:

Establish CDM workgroup

A CDM workgroup will be established to carry out the monitoring activity of the proposed project and other relevant tasks. The organization of the CDM workgroup is shown in the following chart. The monitoring staff is responsible for recording and archiving the monitoring data in line with the monitoring manual. The verification staff is responsible for rechecking the data and completing verification report for DOE.



Formulate CDM Monitoring Manual

A monitoring manual will be formulated as guidance for regular monitoring activity. The manual will cover the following contents:

1. Parameter to be monitored
2. Recording Frequency
3. Recording Format
4. Archive
5. Meter Calibration

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 application of the baseline and monitoring methodology was completed on 10 September, 2006 by Global Climate Change Institute (GCCI) of Tsinghua University and Upper Horn Investments Ltd., Guangdong Yudean Group Co.,Ltd.

The persons involved in baseline study are listed as follows:

Dr. Xiaohua ZHANG, Global Climate Change Institute, Tsinghua University.
Address: Room C501, Energy Science Building, Tsinghua University, 100084, Beijing, China

Telephone: +8610-62772757
Email: zhang_xh@tsinghua.edu.cn。
(Not the project participants listed in Annex 1)

Dr. Fei TENG, Global Climate Change Institute, Tsinghua University.
Address: Room C402, Energy Science Building, Tsinghua University, 100084, Beijing, China
Telephone: +8610-62784805
Email: tengfei@tsinghua.edu.cn
(Not the project participants listed in Annex 1)

Ms. Qing TONG, Global Climate Change Institute, Tsinghua University.
Address: Room C402, Energy Science Building, Tsinghua University, 100084, Beijing, China
Telephone: +8610-62772753
Email: tongqing@tsinghua.org.cn
(Not the project participants listed in Annex 1)

Mr. Hui Wang, Upper Horn Investments Ltd..
Address: Room 4801,48/F Office Tower, Convention Plaza, 1 Harbour Road, Wanchai, Hong Kong
Telephone: +852-2588 1668
Email: wanghui@upperhorn.com .

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:

>>

1/10/2006

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

>>

25

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:

>>

1/1/2007

C.2.1.2. Length of the first crediting period:

>>

7 years

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

>>

Not applicable.

C.2.2.2. Length:

>>

Not applicable.

SECTION D. Environmental impacts

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

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The Environmental Assessment Report of the proposed project has been approved by the State Environmental Protection Administration of China.

The main environmental protection objectives of the proposed project are: marine environment, air environment, sound environment, and terrestrial and marine environment.

The impacts on the marine environment: During the construction period, the use and release of water will have temporary impacts on the marine environment, which will disappear after the completion of the construction. During the operation period, the waste water will be treated and reused, and only small amount (about $43m^3/d$) will be released, which will not have large effect on the marine environment.

The impacts on the air environment: Since the proposed project is a NG power plant, there will be no SO_2 emissions. The NOx emissions of the proposed project will meet the requirement of China Air Environment Standard (GB3095-1996), which will not have large effect on the marine environment.

The impacts on the sound environment: The noise source during the construction and operation period of the proposed project will meet the requirement of Environmental Noise Standard (GB3096-93).

The impacts on the terrestrial and marine environment: The proposed project will not have large effect on the terrestrial environment. The water pump will lead to some amount of fish loss and the cooling water release will lead to slight temperature increase of the sea. If strict control measure was taken, the impacts on marine environment would be minimized.

In conclusion, the proposed project has no significant impacts on the environment.

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

>>

Not applicable, since the construction and operation of the proposed project have no significant environmental impacts.

SECTION E. Stakeholders' comments

>>

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

>>

The stakeholder comments were acquired through questionnaire investigation during the period of environment impact assessment for the proposed project. Totally 200 questionnaires were delivered, and 178 were received.

E.2. Summary of the comments received:

>>

No opposite comment was received. The summary of the comments is as follows:

Most people know the proposed project, and more than 92% people agree with the proposed project, while the remaining people have no comments on construction of the proposed project. To conclude, the public think that the construction of the proposed project is in line with the sustainable development strategy of China, while reasonable measures should be taken to protect the local environment, and economic compensate and career opportunities should be provided to the local residents. The detailed information could be found on the EIA report of the proposed project[4].

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

>>

There is no negative comment on development of the proposed project, therefore it doesn't need to make any adjustment on design, construction and operation of the proposed project.

[4] Chapter 12, EIA report of Guangdong Huizhou LNG Generation Project, May 1st ,2001.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Organization:	GuangDong Huizhou LNG Power Co.,Ltd
Street/P.O.Box:	Petrochemical Industrial Park of Daya Bay E & T Development Zone, Huizhou, PRC
Building:	Huizhou LNG Power Plant administration building
City:	Huizhou
State/Region:	Daya Bay
Postfix/ZIP:	516082
Country:	China
Telephone:	0752-5598928
FAX:	0752-5598907
E-Mail:	clq@lngphz.cn
URL:	http://www.lngphz.cn
Represented by:	Chen LianQing
Title:	General Engineer
Salutation:	Mr.
Last Name:	Chen
Middle Name:	/
First Name:	LianQing
Department:	/
Mobile:	13927370868
Direct FAX:	0752-5598987
Direct tel:	0752-5598928
Personal E-Mail:	clq@lngphz.cn

Organization:	Upper Horn Investments Ltd.
Street/P.O.Box:	1 Harbour Road, Wanchai
Building:	Room 4801,48/F Office Tower, Convention Plaza
City:	Hong Kong
State/Region:	/
Postfix/ZIP:	/
Country:	China
Telephone:	00852-2588 1668
FAX:	00852-2588 1663
E-Mail:	wanghui@upperhorn.com
URL:	/
Represented by:	Wang Hui
Title:	Project Trading Dept.Manager
Salutation:	Mr.
Last Name:	Wang
Middle Name:	/
First Name:	Hui
Department:	Project Trading Dept

Mobile:	13926463311
Direct FAX:	020-85138201
Direct tel:	020-85138202
Personal E-Mail:	wanghui@upperhorn.com

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

There is no public fund involved in the proposed project.

Annex 3

BASELINE INFORMATION

Table A 3-1 Calculate the OM of Southern China Grid in 2002

Fuel Type	Unit	NCV	Unit for NCV	EF (tc/TJ)	OXID	Guangdong	Guangxi	Guizhou	yunnan	CO2 Emission
		A		B	C	D	E	F	G	J=(D+E+F+G)* A*B*C*44/12
Raw Coal	Mt	20908	MJ/t	25.8	0.98	41.2106	7.1135	14.3068	11.4439	143582063.68
Clean Coal	Mt	26344	MJ/t	25.8	0.98					0.00
Other washed	Mt	8363	MJ/t	25.8	0.98			0.3526	0.1358	378664.82
Coke	Mt	28435	MJ/t	29.50	0.98				0.0644	194114.79
Crude Oil	Mt	41816	MJ/t	20.00	0.99	0.058				176078.81
Gasoline	Mt	43070	MJ/t	18.90	0.99	0.0001				295.49
Kerosene	Mt	43070	MJ/t	19.60	0.99					0.00
Diesel	Mt	42652	MJ/t	20.20	0.99	0.7307	0.0067		0.005	2321856.41
Fuel Oil	Mt	41816	MJ/t	21.10	0.99	7.0141	0.002			22471255.50
LPG	Mt	50179	MJ/t	17.20	0.99	0.0009				2819.68
Refinery Gas	Mt	46055	MJ/t	18.20	0.99	0.0142				43205.91
Other petroleum products	Mt	41816	MJ/t	20.00	0.99	0.0791				240135.07
Natural Gas	Mm^3	38931	kJ/m^3	15.30	0.995					0.00
Coke Oven Gas	Mm^3	17354	kJ/m^3	13.00	0.995					0.00
Other Coal Gas	Mm^3	16970	kJ/m^3	13.00	0.995	263				211677.87
Total		***a***								**169622168.04**
Generation	GWh	***b***				123081	13069	32559	16396	185105
Self Consumption		***c***				5.58%	8.31%	7.90%	8.21%	

rate										
Electricity delivered to Grid	GWh	***d=b*(1-c)***				116213	11983	29987	15050	173233

The Calculation of OM:
a : The total emissions of SCPG: **169622168.04 tCO_2**
d: The electricity delivered to SCPG by thermal power plants: 173233 **GWh**
$OM=a/d*10^{-6}=0.9792$

Data Sources:
China Energy Statistical Yearbook 2000-2002, China Statistics Press, 2003.
China Electric Power Yearbook 2003, China Electric Power Press, 2003
Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories: Workbook, 1.6, Table 1-2, 1.8, Table 1-4

Table A 3-2 Calculate the OM of Southern China Grid in 2003

Fuel Type	**Unit**	**NCV**	**Unit for NCV**	**EF (tc/TJ)**	**OXID**	**Guangdong**	**Guangxi**	**Guizhou**	**yunnan**	**CO2 Emission**
		A		**B**	**C**	**D**	**E**	**F**	**G**	**J=(D+E+F+G)*A*B*C*44/12**
Raw Coal	Mt	20908	MJ/t	25.8	0.98	44.9179	8.3184	21.6911	14.0527	172473585.95
Clean Coal	Mt	26344	MJ/t	25.8	0.98	0.0005				1221.15
Other washed	Mt	8363	MJ/t	25.8	0.98			0.3638	0.2037	439992.40
Coke	Mt	28435	MJ/t	29.50	0.98				0.005	15071.02
Crude Oil	Mt	41816	MJ/t	20.00	0.99	0.0685				207955.15
Gasoline	Mt	43070	MJ/t	18.90	0.99	0.0002				590.98
Kerosene	Mt	43070	MJ/t	19.60	0.99					0.00
Diesel	Mt	42652	MJ/t	20.20	0.99	0.319			0.0076	1021441.68
Fuel Oil	Mt	41816	MJ/t	21.10	0.99	6.2722	0.003			20098291.43
LPG	Mt	50179	MJ/t	17.20	0.99					0.00
Refinery Gas	Mt	46055	MJ/t	18.20	0.99	0.0285				86716.08
Other petroleum products	Mt	41816	MJ/t	20.00	0.99	0.1135				344568.02

Natural Gas	Mm3	38931	kJ/m3	15.30	0.995					0.00
Coke Oven Gas	Mm3	17354	kJ/m3	13.00	0.995				4	3292.29
Other Coal Gas	Mm3	16970	kJ/m3	13.00	0.995	321			1127	1165435.57
Total		***a***								**195858161.73**
Generation	GWh	***b***				141738	17028	43273	19390	221429
Self Consumption rate		***c***				5.50%	8.43%	7.40%	8.01%	
Electricity delivered to Grid	GWh	***d=b*(1-c)***				133942	15593	40071	17837	207443

The Calculation of OM:
a : The total emissions of SCPG: **195858161.73 tCO_2**
d: The electricity delivered to SCPG by thermal power plants: 207443 **GWh**
OM=a/d*10^{-6}=0.9442

Data Sources:
China Energy Statistical Yearbook 2004, China Statistics Press, 2005.
China Electric Power Yearbook 2004, China Electric Power Press, 2004
Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories: Workbook, 1.6, Table 1-2, 1.8, Table 1-4

Table A 3-3 Calculate the OM of Southern China Grid in 2004

Fuel Type	**Unit**	**NCV**	**Unit for NCV**	**EF (tc/TJ)**	**OXID**	**Guangdong**	**Guangxi**	**Guizhou**	**Yunnan**	**CO2 Emission**
		A		**B**	**C**	**D**	**E**	**F**	**G**	**J=(D+E+F+G)*A*B*C*44/12**
Raw Coal	Mt	20908	MJ/t	25.8	0.98	60.1770	13.05	26.4392	17.5128	227132609.74
Clean Coal	Mt	26344	MJ/t	25.8	0.98	0.0021				5128.83
Other washed	Mt	8363	MJ/t	25.8	0.98					0.00
Coke	Mt	28435	MJ/t	29.50	0.98					0.00
Crude Oil	Mt	41816	MJ/t	20.00	0.99	0.1689				512753.65
Gasoline	Mt	43070	MJ/t	18.90	0.99					0.00
Kerosene	Mt	43070	MJ/t	19.60	0.99					0.00

Diesel	Mt	42652	MJ/t	20.20	0.99	0.4888				1528722.27
Fuel Oil	Mt	41816	MJ/t	21.10	0.99	9.5771				30673659.31
LPG	Mt	50179	MJ/t	17.20	0.99					0.00
Refinery Gas	Mt	46055	MJ/t	18.20	0.99	0.286				87020.35
Other petroleum products	Mt	41816	MJ/t	20.00	0.99	0.166				50394.97
Natural Gas	Mm^3	38931	kJ/m^3	15.30	0.995	48				104309.23
Coke Oven Gas	Mm^3	17354	kJ/m^3	13.00	0.995					0.00
Other Coal Gas	Mm^3	16970	kJ/m^3	13.00	0.995	258				207653.57
Total		***a***								**260302251.93**
Generation	GWh	***b***				169300	20143	49679	24322	263444
Self Consumption rate		***c***				5.42%	8.33%	7.06%	7.56%	
Electricity delivered to Grid	GWh	***d=b*(1-c)***				160124	18465	46172	22483	247244

The Calculation of OM:
a : The total emissions of SCPG: **260302251.93 tCO_2**
d: The electricity delivered to SCPG by thermal power plants: 247244 **GWh**
OM=a/d*10^{-6}=1.0528

Data Sources:
China Energy Statistical Yearbook 2004, China Statistics Press, 2006.
China Electric Power Yearbook 2005, China Electric Power Press, 2005
Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories: Workbook, 1.6, Table 1-2, 1.8, Table 1-4

Table A3-4 Calculate the Simple OM (3 year generation weighted average)

	Year 2002	Year 2003	Year 2004	OM
OM(tCO_2/MWh)	0.9792	0.9442	1.0528	0.9966
Electricity delivered (GWh)	173233	207443	247244	

Table A3-5 Installed Capacity and generation of SCPG in 2004

		Guangdong	Guangxi	Guizhou	Yunan	Total
		A	B	C	D	G=A+B+C+D
1	Coal-fired Capacity (MW)	18625	4378.1	4306.9	7801.8	35111.8
2	Oil-fired Capacity (MW)	11427	0	0	0	11427
3	Hydro Capacity (MW)	8584.6	7560.4	7058.6	4417.2	27620.8
4	Nuclear Capacity (MW)	3780	0	0	0	3780
5	Other Capacity (MW)	204.3				204.3
6	Total Capacity (MW)	42620.9	11938.5	11365.5	12219	78143.9
7	Coal-fired Generation (GWh)	123632	20143	24322	4972	173069
8	Oil-fired Generation (GWh)	45309				45309
9	Hydro Generation (GWh)	14113	27405	29350	13204	84072
10	Nuclear Generation (GWh)	28481				28481
11	Other Generation (GWh)	597				597

Data Sources:
China Electric Power Yearbook 2004, China Electric Power Press, 2005

Table A3-6 Installed Capacity and generation of SCPG in 2003

	Guangdong	Guangxi	Guizhou	Yunan	Total
	A	B	C	D	G=A+B+C+D
Coal-fired Capacity (MW)	17057.8	3184.7	3556.8	6465.8	30265.1
Oil-fired Capacity (MW)	10162.7	5.4	0	0	10168.1
Hydro Capacity (MW)	5707.2	4525.2	6543.2	3713.7	20489.3
Nuclear Capacity (MW)	3780	0	0	0	3780
Other Capacity (MW)	2494.9				2494.9
Total Capacity (MW)	39202.6	7715.3	10100	10179.5	67197.4

Data Sources:
China Electric Power Yearbook 2003, China Electric Power Press, 2004

Table A3-7 Installed Capacity and generation of SCPG in 2002

	Guangdong	Guangxi	Guizhou	Yunan	Total
	A	B	C	D	G=A+B+C+D
Coal-fired Capacity (MW)	15603.8	3156.2	4642.5	2932.7	26335.2
Oil-fired Capacity (MW)	9634	0	0	0	9634
Hydro Capacity (MW)	7775.3	4363.3	2426.1	5836.4	20401.1
Nuclear Capacity (MW)	2790	0	0	0	2790
Other Capacity (MW)	76.8				76.8
Total Capacity (MW)	35879.9	7519.5	7068.6	8769.1	59237.1

Data Sources:
China Electric Power Yearbook 2002, China Electric Power Press, 2003

Table A3-8 Calculation of $COEF_{Coal}$

	A	B	C	D	A*B*C*D/1000
Variable	NCV	EF	OXID	Conversion Factor	$COEF_{Coal}$
Unit	GJ/t	tC/TJ			tCO_2/tce
Coal	29.27	25.8	0.98	44/12	2.714
Fuel Oil	41.816	21.1	0.99	44/12	3.206
Natural Gas	49.39	15.3	0.995	44/12	2.76

Data Source: Revised 1996 IPCC guidelines for National GHG Inventories.
China Energy Statistical Yearbook 2004, China Statistics Press, 2006.

Table A3-9 Calculation of BM in SCPG

	Installed Capacity in year 2002 (MW)	Installed Capacity in year 2003 (MW)	Installed Capacity in year 2004 (MW)	Generation in Year 2004 (GWh)	Newly added capacity from 2002-2004 (**Build Margin**) (MW)	Average Generation hour (Hours)	Generation from newly added capacity (MWh)	
	A	B	C	D	E=C-A	F=D/C*1000	G=E*F	Weight
Coal-fired Capacity	26335.2	30265.1	35111.8	173069	8776.6	6204	54445875	65.05%
Oil-fired Capacity	9634	10168.1	11427	45309	1793	3965	7109393	8.49%
Gas-fired Capacity	0	0	0		0	0	0	0.00%
Hydro Capacity	22921	25409.3	27620.8	84072	4699.8	3044	14305219	17.09%

Nuclear Capacity	2790	3780	3780	28481	990	7535	7459310	8.91%
Other Capacity	76.8	94.4	204.3	597	127.5	2922	372577.1	0.45%
Total Capacity	61757.1	69716.9	78144		16386.9		83692374	100.00%
Percentage as installed capacity in 2004	79.03%	89.22%	100%					

The advanced technology of Coal-fired power plant in SCPG is 600MW subcritical power plant, and the corresponding PSCC is 327g/kWh. The thermal efficiency of fuel-oil fired power plant in SCPG is 46% (Source: Yudean Group). Then the BM can be calculated as follows:
$EF_{BL,BM}$=0.6505*0.327*2.714+0.0849*3.6/0.46*21.1*44/12*0.99=0.6402 tCO_2/MWh.

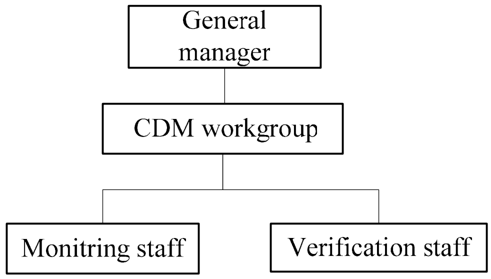
Annex 4

MONITORING INFORMATION

The following steps will be taken to ensure accurate and consistent data is collected for monitoring and verification purposes:

Establish CDM workgroup

A CDM workgroup will be established to carry out the monitoring activity of the proposed project and other relevant tasks. The organization of the CDM workgroup is shown in the following chart. The monitoring staff is responsible for recording and archiving the monitoring data in line with the monitoring manual. The verification staff is responsible for rechecking the data and completing verification report for DOE.



Formulate CDM Monitoring Manual

A monitoring manual will be formulated as guidance for regular monitoring activity. The manual will cover the following contents:

6. Parameter to be monitored
7. Recording Frequency
8. Recording Format
9. Archive
10. Meter Calibration

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