Project design document form for CDM project activities

(Version 06.0)

Complete this form in accordance with the Attachment "Instructions for filling out the project design document form for CDM project activities" at the end of this form.

PROJECT DESIGN DOCUMENT (PDD)	
Title of the project activity	China Fujian Putian LNG Generation Project
Version number of the PDD	08
Completion date of the PDD	03/08/2015
Project participant(s)	China: CNOOC Fujian Gas Power Co., Ltd Japan: Mitsubishi Corporation
Host Party	People's Republic of China
Sectoral scope and selected methodology(ies), and where applicable, selected standardized baseline(s)	Sectoral Scope: 1 Energy industries (renewable/ non-renewable sources) Methodology: ACM0025 "Construction of a new natural gas power plant " (Version 01.0)
Estimated amount of annual average GHG emission reductions	1,689,632 t CO_2e

SECTION A. Description of project activity

A.1. Purpose and general description of project activity

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Fujian Putian LNG Power Plant is a grid connected natural-gas based combined cycle gas turbine power plant with total installed capacity of 1,528 MW (4×382MW) located on the north of the Meizhou Bay Xiuyu Peninsula Xiuyu District, Putian city, Fujian Province.

The project is connected to East China Power Grid (ECPG). The project consists of four generating blocks, each of which composes of a single-axis gas turbine, a heat recovery steam generator, a steam turbine, a generator with all hydrogen cooling and self-parallel-excitation system, and 500KV transmission lines for power evacuation. The project uses the natural gas imported from Indonesian Tangguh Gas Field. No other start-up fuels or auxiliary fuel is applied by the project activity.

The Project supplies strong and stable electricity to support Fujian power grid, and provides peak regulation function. The annual output of the Project is expected at 6,112GWh when all the generating units putting into operation since 2010, which can mitigate the high pressure of Fujian power grid regarding to power shortage incurred by the greatly increased power demand and balance the grid peak loads. As a clean fuel power project, the Project can reduce Green House Gases emissions compared with conventional thermal power plants, thus be considered as an environmental-friendly project, which substitutes part of thermal power in ECPG. Thus, the Project provides a combination of positive environmental, economic, and sustainable development benefits.

- Supply reliable power to Fujian province, help satisfy the increasing demand for electricity;
- Provide better service for smoother balancing of grid peak loads;
- Consist with Fujian's energy policy aiming at optimisation of energy structure, and diversification of energy mix;
- Contribute to environment protection of Fujian Province by improving electricity efficiency and mitigating GHG emission;
- Encourage and promote the technique (combined cycle gas turbine) progress.
- Create 180 permanent staff positions during the operation period.

In terms of environmental and power benefits, the proposed project is in line with the choice of China's energy industry's prior area and support China's policy of harnessing zero-impact energy resource. The social, economic and environmental benefits contribute to sustainable development of the country and region.

A.2. Location of project activity

A.2.1. Host Party

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People's Republic of China

A.2.2. Region/State/Province etc.

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Fujian Province

A.2.3. City/Town/Community etc.

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Qianyun Village, Dongzhuang Town, Xiuyu District, Putian City

A.2.4. Physical/Geographical location

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The Project is located on Qianyun Village, Dongzhuang Town, Xiuyu District, Putian City, Fujian Province, P. R. China, where the Project has the geographical coordinates of 119°00'10"E and 25°13'17"N. Geographically, the project is situated on the Xiuyu Peninsula, close to the Meizhou Bay in the north. It's 35km away from the downtown of Putian city and 130km away from Fuzhou city the capital of Fujian Province. The figures below show the location of Fujian Province, Putian City and the Project site.

Figure 1 Location of Putian City in Fujian Province

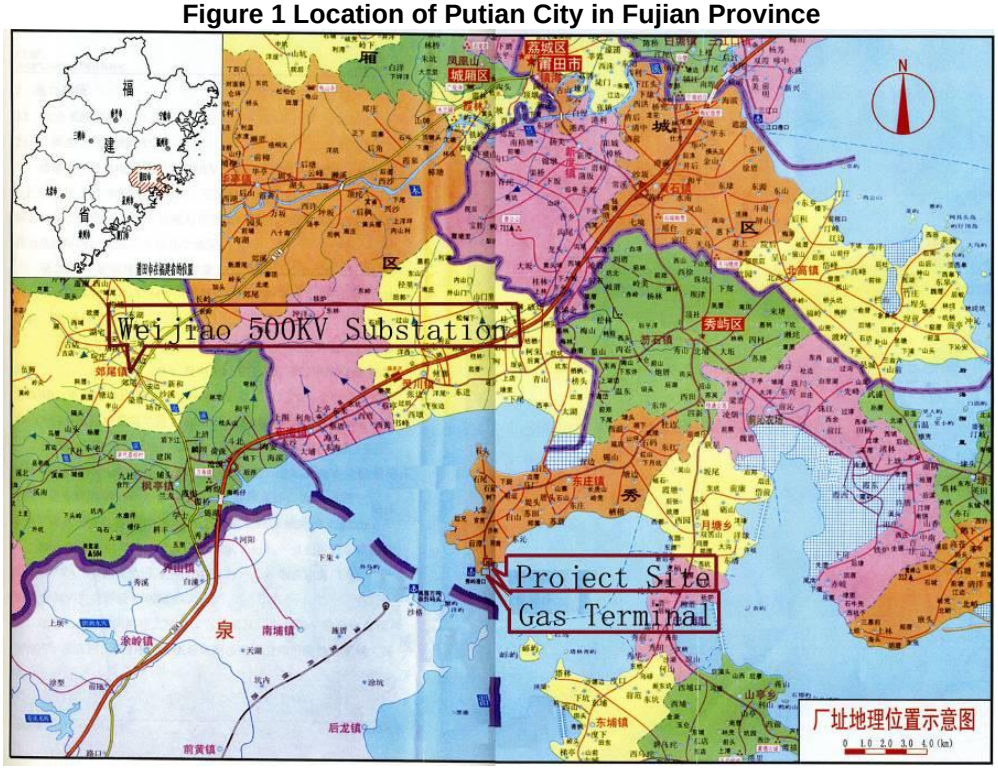

Figure 2 Location of the project site

A.3. Technologies and/or measures

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The Project is a grid-connected natural gas based combined cycle power plant, with total installed capacity of 1,528 MW, which is constructed 4 sets of 382 MW single-axis M701F combined cycle blocks. Each combined cycle comprises one M701F gas turbine, one heat recovery steam generator, one steam turbine and one power generator. The designed annual operation hours is 4,000h and expected to provide electricity of 6,112 GWh annually. Based on the preliminary design, the main equipments of each configuration comprises as the following:

- One combined cycle;
- One gas turbine;
- One matching triple pressure heat recovery steam generator;
- One steam turbine; and
- One common generator.

The gas turbine and the steam turbine are on the same axis. Both of them are consolidated to drive the generator. The specific details for the main equipment are as the following:

Table 1 Technique Index of the Main Equipment

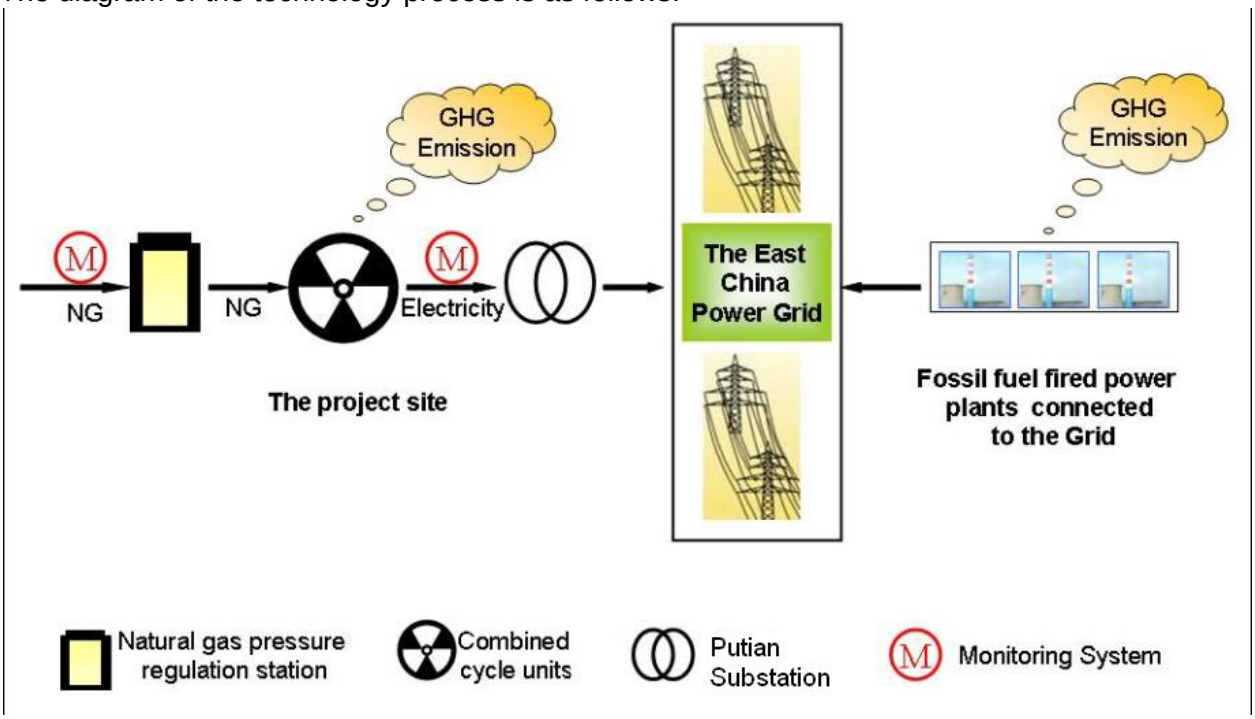
Equipment	Key Index		Type	Manufacture
Combined Cycle	Rated Power (MW)	385.88	MPCP1	DFSTW/MHI (Dong Fang Steam turbine Works and MITSUBISHI Heavy Industry)
	Rated Speed (r/min)	3,000		
Gas turbine	Concentration of NOx emission (ppmV)	< 25	M701F	DFSTW/MHI (Dong Fang Steam turbine Works and MITSUBISHI Heavy Industry)
Heat recovery steam generator	Outlet flow of high-pressure steam (t/h)	276.9	UG-M701F-R	Wuxi Boiler Factory
Steam turbine	Rated Power (MW)	138.7	TC2F-30	DFSTW (Dong Fang Steam turbine Works)
	Rated Speed (r/min)	3,000		
Power generator	Rated Power (MW)	409.7	QFR-400-2-20	DFSTW (Dong Fang Steam turbine Works)
	Rated Speed (r/min)	3,000		

The main process of power generation within the project is as below:

Firstly, the natural gas is fired in the gas combustion chamber and then expanded in the gas turbine that to drives the power generator to convert the heat energy into the electricity energy. Secondly, the hot exhaust gas passes through the gas turbine to the matching triple pressure heat recovery system generator where it is utilized to produce steam. Then, the produced steam is introduced to and expanded in steam turbine to drive the power generator for generating electricity.

After being boosted up, the electricity generated by 4 units are transmitted to 500kV Putian Substation by using two sets of transmission lines, and then supplied to the ECPG via Fujian Power Grid. The full demand of natural gas by the project activity is dedicatedly met by imported gas. No other start-up fuels or auxiliary fuel is applied by the project.

The diagram of the technology process is as follows:



A.4. Parties and project participants

Party involved (host) indicates host Party	Private and/or public entity(ies) project participants (as applicable)	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
People's Republic of China (host)	Private entity: CNOOC Fujian Gas Power Co., Ltd	No
Japan	Private entity: Mitsubishi Corporation	No

A.5. Public funding of project activity

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No public funding from Annex I countries is provided for this project.

SECTION B. Application of selected approved baseline and monitoring methodology and standardized baseline

B.1. Reference of methodology and standardized baseline

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The approved large-scale consolidated methodology applied in the project:
ACM0025 “Construction of a new natural gas power plant” (Version 01.0)

The project activity also refers to:
“Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period” (Version 03.0.1).
“Tool to calculate the emission factor for an electricity system” (version 04.0.0).
“Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion” (Version 02)
“Upstream leakage emissions associated with fossil fuel use” (version 02)

For more information regarding the methodology, please refer to the link:
http://cdm.unfccc.int/methodologies/PAmethodologies/approved

B.2. Applicability of methodology and standardized baseline

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The project activity meets all the applicability conditions defined in the approved methodology ACM0025 “Construction of a new natural gas power plant” (Version 01.0):

Applicability conditions	Assessment
(a) The project activity is the construction and operation of a new natural gas fired power plant that supplies electricity: (i) to the electric power grid; or (ii) to the electric power grid and to an electricity consuming facility(ies);	(a) The project activity is the construction and operation of a new natural gas fired power plant that supplies electricity to the electric power grid;
(b) If the project activity power plant co-generates heat, no emission reductions can be claimed for the generated heat;	(b) The project activity power plant does not co-generate heat, and no emission reductions is claimed for the generated heat;
(c) Natural gas is used as main fuel in the project power plant. Small amounts of other start-up or auxiliary fuels can be used, but they shall not comprise more than one per cent of total fuel used annually, on an energy basis	(c) Natural gas is used as main fuel in the project power plant. No other start-up fuels or auxiliary fuel is applied by the project activity;
(d) 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.	(d) Natural gas is sufficiently available in the region where the project is located, which can be demonstrated as the following:
In the case that the project plant supplies electricity to an existing electricity consuming facility(ies), the sources of electricity as well as average historical energy consumption should be presented in the CDM-PDD.	The project activity supplies electricity to the electric power grid, do not involve in supplies electricity to an existing electricity consuming facility(ies).
In the case the project plant supplies electricity to an electricity consuming facility(ies) electricity should be supplied through a dedicated transmission line(s) which is not used for other purposes.	The project activity supplies electricity to the electric power grid, do not involve in supplies electricity to an existing electricity consuming facility(ies).

Electricity consuming facility(ies) shall be clearly identified in the CDM-PDD prior to the implementation of the project activity.	The project activity supplies electricity to the electric power grid, do not involve in supplies electricity to an existing electricity consuming facility(ies).

(d)

1. Data of the exploitable amount in the Indonesia Tangguh Gas Field

The natural gas for the proposed project will be supplied via Fujian LNG Terminal, which will import natural gas from the Tangguh gas field. The Tangguh Liquefied Natural Gas (LNG) Project is a major greenfield development to extract natural gas from gas fields in the Berau and Bintuni bay area of Papua, Indonesia, and to liquefy it into LNG for shipping to export markets. Tangguh gas field has proven reserves of 14.4 trillion cubic feet (tcf), and together with probable and possible reserves, Tangguh has the potential to yield a total of 23.7 tcf of gas, and to support more than the two trains in the current plan and the Project may be expanded in the future.

Initial development of the Project will comprise two LNG trains (equipment units that purify and liquefy gas), with the capacity to produce a total of 7.6 million tons annually (mtpa) of LNG. In addition to LNG, the Project is expected to produce condensate at the rate of 9,000 barrels per day (bpd), representing more than 3 million barrels per year. So the natural gas supply for Fujian Province is abundant. A commitment to supply 2.6 mtpa of LNG to Fujian, People's Republic of China, was signed in 2002[1].

2. Illustration of the use of natural gas in Fujian Province

China National Offshore Oil Corp Fujian Natural Gas Co., Ltd. is responsible for construction of Fujian LNG Terminal with the capacity to provide 2.6 mtpa natural gas in Fujian Province in the first stage for 25 years. In September 2004 and August 2005, China National Offshore Oil Corp Fujian Natural Gas Co., Ltd. with five urban gas companies (including Fuzhou, Putian, Quanzhou, Xiamen and Zhangzhou) and three gas power plants (including Putian, Jinjiang and Xiamen) signed the long-term "Take or pay" natural gas purchase and sales contract[2] respectively to ensure the LNG supply to the five consumers. The distribution of the contract gas is listed in the following tables:

2.1 The total urban gas consumption: 0.51 mtpa.

The Urban Gas Customers	**Fuzhou**	**Putian**	**Quanzhou**	**Xiamen**	**Zhangzhou**
Annual Gas Consumption (million tons)	0.14	0.05	0.2	0.08	0.04

2.2 The total power plants gas consumption: 2.02 mtpa.

Gas Power Plants	**Putian**	**Jinjiang**	**East of Xiamen**
Installed Capacity (MWh)	4×350	4×350	2×350

[1] The evidence has been provided to DOE.

[2] http://www.china5e.com/news/oil/200409/200409200306.html

Owner	CNOOC Fujian Gas Power Co., Ltd	Fujian Jinjiang Gas Power Generation Co., Ltd.	East Asia Power Xiamen Co., Ltd.
Annual Gas Consumption (million tons)	0.81	0.81	0.4

In the near future, the LNG Terminal will be expanded capacity to supply 7 mtpa natural gas to Fujian Province[3]. And the natural gas consumed by the proposed project just accounts for small part of the total natural gas supply. Therefore, the project activity doesn't constrain the future capacity additions of other LNG power plants comparable in size to the project activity.

Based on above data, the natural gas source is sufficient to satisfy the natural gas consumption requirement of the project activity[4]; meanwhile, the project will not cause any impact on other LNG customers[5].

To conclude, as a new grid-connected power generation using natural gas, the project applies the methodology ACM0025 (Version 01.0) to determine the project baseline and calculate GHG emission reductions resulting from the project activity.

B.3. Project boundary

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According to ACM0025, the spatial extent of the project boundary includes the project power plant, all power plants connected physically to the project electricity system as defined in the "Tool to calculate the emission factor for an electricity system" and the electricity consuming facility in the case that the project activity power plant exports electricity to a consuming facility. The Project is located in Fujian Province and will be connected to ECPG. Thus, ECPG is justified as project boundary of the Project, which covers the provinces of Jiangsu, Zhejiang, Anhui, and Fujian and Shanghai City. There is clearly defined spatial and geographical extent of the power plants and transmission system within ECPG, all electricity can be dispatched without significant transmission constraints. Moreover, ECPG is also defined as a regional grid in accordance with the "Explain of confirming baseline emission factors of regional power grid in China" issued by China's DNA. Therefore, the ECPG is considered as the grid boundary for determining the build margin (BM) and operating margin (OM) emission factors. The greenhouse gases included in or excluded from the project boundary are listed as follows:

[3] Page 47, *Volume 1, General Report*, *Feasibility Study of Putian LNG Power Plant*

[4] *The Reply of the Letter regarding the Request to Supply Official Data and Information of the Natural Gas Source and Consumption in the Fujian LNG Project.* The evidence has been provided to DOE.

[5] *Clarification of LNG supply and sequence in Fujian Province*. The evidence has been provided to DOE.

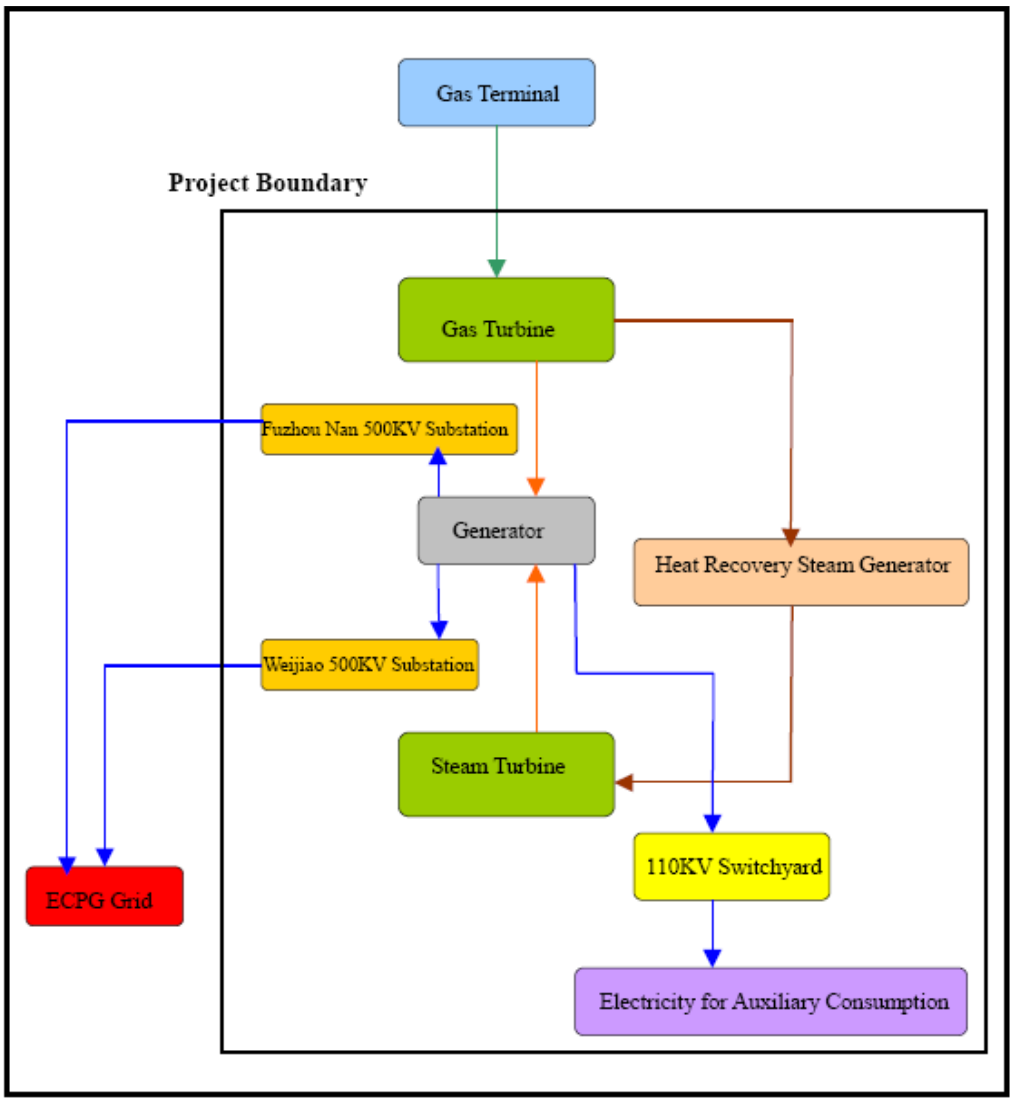

Figure 1. Project boundary

In the calculation of project emissions, only CO_2 emissions from fossil fuel combustion in the project power plant are considered. In the calculation of baseline emissions, only CO_2 emissions from fossil fuel combustion in power plant in the baseline are considered. The greenhouse gases included in or excluded from the project boundary are shown in Table 2.

Table 2. Emission sources included in or excluded from the project boundary

Source		GHGs	Included?	Justification/Explanation
Baseline scenario	Power generation in baseline grid (East China Power Grid)	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 scenario	On-site natural gas 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. Establishment and description of baseline scenario

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For the second crediting period, the continued validity of the original baseline should be assessed. According to AM0029 Version 01, the most economically attractive baseline scenario alternative out of all the plausible baseline scenarios can be considered as the most plausible baseline scenario, using the levelized generating cost analysis plus the sensitivity analysis. Thus “Power generation using sub critical coal-fired power technology with installed capacity of 2× 600 MW” is selected as the most plausible baseline scenario.

According to the Tool *“Assessment of the validity of the original/current baseline and update the baseline at the renewal of the crediting period”* (version 03.0.1), the stepwise procedure as follows should be adopted to assess the continued validity of the baseline and to update the baseline:

Step 1: Assess the validity of the current baseline for the next crediting period

Step 1.1: Assess compliance of the current baseline with relevant mandatory national and/or sectoral policies

There are no new national and/or sectoral policies in the electricity generation sector applicable to the Project Activity, in comparison to the time of the submission of the project activity for validation, which would affect the compliance of the current baseline scenario.

Step 1.2: Assess the impact of circumstances

There are no new relevant national and/or sectoral policies and/or circumstances in the electricity sector applicable to the Project Activity, in comparison to the time of the submission of the project activity for validation, which could impact the validity of the current baseline for the next crediting period. Therefore, the current baseline scenario does not need to be updated for this crediting period.

Step 1.3: Assess whether the continuation of the use of current baseline equipment(s)or an investment is the most likely scenario for the crediting period for which the renewal is requested

The current baseline scenario is the original baseline scenario, it is an economically most attractive baseline scenario to the project activity, as what is directed by AM0029 version 1. And it will not request an investment by the project proponent or third party. So this step is not applicable.

Step 1.4: Assessment of the validity of the data and parameters

Since some parameters for emission factor calculation were determined at the start of the first crediting period and not monitored during the first crediting period, are not valid anymore, so, the current baseline needs to be updated for the second crediting period according to “Tool to calculate the emission factor for an electricity system” (version 04.0.0). Also due to the 2nd crediting period belongs to the second commitment period, the GWP_{CH4} of 21 is not valid and needs to be updated.

Application of Steps 1.1, 1.2, 1.3 and 1.4 confirmed that the current baseline is valid for the second crediting period but data and parameters needs to be updated. Therefore step 2 is used

Step 2: Update the current baseline and the data and parameters

Step 2.1: Update the current baseline

The baseline emissions for the second crediting period have been updated, without reassessing the baseline scenario, based on the latest approved version of the methodology ACM0025. More details for the updated baseline emissions for the second crediting period can be seen in section B.6.

Step 2.2: Update the data and parameters

As mentioned in step 1.4 above, all parameters regarding the grid emission factor calculation have been updated for this second crediting period. More details can be seen in section B.6. and B.7.

B.5. Demonstration of additionality

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Not applicable for the second crediting period.

B.6. Emission reductions

B.6.1. Explanation of methodological choices

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According to the methodology of ACM0025 (Version 01.0), the following steps are employed to calculate the emission reductions generated by the proposed project.

Step 1. Calculation of Baseline emissions

Due to the project activity do not involved in supplied electricity by the project power plant to the electricity consuming facility(ies), hence according to the methodology, Baseline emissions (BE_y) are calculated by multiplying the amount of electricity ($EG_{PJ,grid,y}$) with a respective baseline emission factor ($EF_{BL,grid,CO2,y}$).

$$BE_y = EG_{PJ,grid,y} \times EF_{BL,grid,CO2,y} \quad \text{Equation (1)}$$

Where:

BE_y	=	Baseline emissions in year *y* (t CO_2)
$EG_{PJ,grid,y}$	=	Quantity of electricity generated in the project power plant and supplied to the grid in year *y* (MWh)
$EF_{BL,grid,CO2,y}$	=	Baseline CO_2 emission factor for electricity supplied to the grid in the year *y* (t CO_2/MWh)

Sub-step 1a: Determination of baseline CO_2 emission factors $EF_{BL,grid,CO2,y}$

According Methodology ACM0025, in order to address the uncertainty relating to which type of other power generation is substituted by the power generation of the proposed project in a conservative manner, project participants shall use for $EF_{BL,grid,CO2,y}$ the lowest emission factor among the following three options:

(a) EF1: The build margin, calculated according to the latest version of the "Tool to calculate the emission factor for an electricity system" ($EF_{BL,grid,CO2,y} = EF_{grid,BM,y}$);

(b) EF2: The combined margin, calculated according to the latest version of the "Tool to calculate the emission factor for an electricity system", using a 50/50 OM/BM weight ($EF_{BL,grid,CO2,y} = EF_{grid,CM,y}$) for the first crediting period and 25/75 for the subsequent ones;

(c) EF3: The emission factor of the technology and fuel ($EF_{BL,Tech,CO2}$), identified as a most attractive baseline scenario among alternatives P1 to P4. The emission factor EF3 is be calculated as follows:

$$EF_{BL,Tech,CO2} = \frac{EF_{BL}}{\eta_{BL}} \times 3.6 \qquad \text{Equation (2)}$$

Where:

$EF_{BL,Tech,CO2}$	=	Emission factor of the baseline technology and fuel (t CO_2/MWh)
EF_{BL}	=	CO_2 emission factor of the baseline fuel(t CO_2/GJ)
η_{BL}	=	The efficiency of the baseline technology (ratio)
3.6	=	Conversion factor from GJ to MWh (GJ/MWh)

(d) EF4: If applicable, the emission factor of the existing electricity source at the site of the existing electricity consuming facility(ies). If the existing electricity source is the power grid, the combined margin emission factor of the respective power grid shall be used. If the existing electricity source is a captive power plant, the emission factor shall be determined using equation (2). If multiple sources are used, the minimum emission factor among these sources shall be used.

According to "*The value of China's Regional Grid Baseline Emission Factors Determination in 2014*" published by DNA[6] on 11/05/2015, the emission factors are calculated as follows. (For details please refer to the Table A1 and Table A2 in Annex 3.)

Option (a)

As the proposed project is connect to Fujian Power Grid, which is a part of ECPG (regional grid), the Build Margin of ECPG are used for determining the $EF_{BL,grid,CO2,y}$.

$EF_{BL,grid,CO2,y} = EF_{grid,BM,y}$=0.6861 t$CO_2$/MWh

Option (b)

As the proposed project is connect to Fujian Power Grid, which is a part of ECPG (regional grid), the Combine Margin of ECPG using a 25/75 OM/BM weight ($EF_{BL,grid,CO2,y} = EF_{grid,CM,y}$) for the second crediting period.

$$EF_{BL,grid,CO2,y} = EF_{grid,CM,y} = EF_{grid,OM,y} \times 0.25 + EF_{grid,BM,y} \times 0.75$$
$$= 0.8095 \times 0.25 + 0.6861 \times 0.75$$
$$= 0.71695 \text{ tCO}_2\text{/MWh}$$

Option (c)

The emission factor of the technology and fuel ($EF_{BL,Tech,CO2}$), identified as a most attractive baseline scenario is coal.

The carbon emission factor of coal is taken the default value of IPCC 2006 as 25.8 tC/TJ. The OXID of coal is 1.00, which is the default value of IPCC 2006. Thus, CO_2 emission factor of the baseline fuel coal (EF_{BL}) is 0.0946 tCO_2e/GJ.

The most advanced business technology efficiency level of coal-fired plant in China is used for determine the $_{BL}$, which is taken as 307 gce/KWh, corresponding to efficiency level of 40.03%.

[6] http://cdm.ccchina.gov.cn/zyDetail.aspx?newsId=52505&TId=161

Therefore, the emission factor of the technology and fuel ($EF_{BL,Tech,CO2}$) calculated as 0.8508 tCO_2/MWh.

Option (d)

Not Applicable

According to ACM0025, the minimum emission factor among the three options above shall be used as the baseline CO_2 emission factor ($EF_{BL,grid,CO2,y}$), thus option(a) the Build Margin (0.6861 tCO_2/MWh) is used, and will be ex-post calculated annually.

Sub-step 2a: Baseline CO_2 Emission

Once the baseline emission factor is determined, the baseline emission can be calculated based on the Equation (1) above.

Step 2. Calculation of Project emissions

According to the feasibility study, Fujian Putian LNG project is not designed to apply other start-up fuels or auxiliary fuel for electricity generation. Thus, the Project emissions only result from the combustion of natural gas for the generation of electricity in the project power plant.

According to the "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion" (Version 02), the parameter PE_y corresponds to $PE_{FC,j,y}$, where j is the combustion of natural gas in the project activity power plant.

CO_2 emissions from natural gas combustion in power generation are calculated based on the quantity of fuels combusted and the CO_2 emission coefficient of those fuels, as follows:

$$PE_{FC,j,y} = \sum_j FC_{i,j,y} \times COEF_{i,y} \qquad \text{Equation (3)}$$

Where:

- $PE_{FC,j,y}$ = Are the CO_2 emissions from natural gas combustion in process j during the year y (tCO_2/yr);
- $FC_{i,j,y}$ = Is the quantity of fuel type i combusted in process j during the year y (mass or volume unit/yr);
- $COEF_{i,y}$ = Is the CO_2 emission coefficient of fuel type i in year y (tCO_2/mass or volume unit)
- i = Are the fuel types combusted in process j during the year y

The CO_2 emission coefficient $COEF_{i,y}$ is calculated based on net calorific value and CO_2 emission factor of the fuel type i, as follows:

$$COEF_{i,y} = NCV_{i,y} \times EF_{CO2,i,y} \qquad \text{Equation (4)}$$

Where:

- $COEF_{i,y}$ = Is the CO_2 emission coefficient of fuel type i in year y (tCO_2/mass or volume unit)
- $NCV_{i,y}$ = Is the weighted average net calorific value of the fuel type i in year y (GJ/mass or volume unit)
- $EF_{CO2,i,y}$ = Is the weighted average CO_2 emission factor of fuel type i in year y (tCO_2/GJ)
- i = Are the fuel types combusted in process j during the year y

According to the feasibility study, the natural gas consumption rate of the proposed project is at 0.1938 m^3/KWh. Based on the annual electricity generated by the proposed project ($EG_{PJ,drid,y}$), the amount of annual natural gas combustion ($FC_{NG,y}$) by the proposed project can be calculated. The net fuel calorific value ($NCV_{Natural\ gas}$) of natural gas used by the project is at 34,402 KJ/m^3 [7].

The carbon emission factor of natural gas ($EF_{CO2,\ natural\ gas,\ y}$) is taken the default value of *2006 IPCC Guidelines for National Greenhouse Gas Inventories* (IPCC 2006) as 15.30 tC/TJ. And the $OXID_{Natural\ gas}$ is taken as 1.00, which is also taken from IPCC 2006.

The proposed project consists of 4 generator units. The first unit was put into operation from 13/12/2008 and the Project was put into full operation from 06/07/2010. The annual output (exclude the last operation year 2028) of the proposed project is expected at 6,112GWh when all the generating units putting into operation.

Step 3. Calculation of Leakage emissions

Leakage may result from fuel extraction, processing, liquefaction, transportation, re-gasification and distribution of fossil fuels outside of the project boundary.

For the purpose of estimating leakage, project participants should multiply the quantity of natural gas consumed by the project power plant in year *y* with an emission factor for upstream emissions ($EF_{NG,upstream}$) from natural gas consumption and subtract the emissions occurring from fossil fuels used in the baseline (i.e. due to electricity supplied to the grid and/or to the electricity consuming facility(ies)), as follows:

$$LE_y = \left[FC_{NG,y} \times NCV_{NG,y} \times EF_{NG,upstream} - EG_{PJ,grid,y} \times EF_{BL,us,grid,y} - \sum_i EG_{PJ,facility,i,y} \times EF_{BL,us,facility,i,y} \right] \quad \text{Equation (5)}$$

Where:

LE_y	=	Leakage emissions in year *y* (t CO_2e)
$FC_{NG,y}$	=	Quantity of natural gas combusted in the project plant in year *y* (m^3)
$NCV_{NG,y}$	=	Average net calorific value of the natural gas combusted during the year *y* (GJ/m^3)
$EF_{NG,upstream}$	=	Emission factor for upstream emissions of natural gas (t CO_2/GJ)
$EG_{PJ,grid,y}$	=	Quantity of electricity generated in the project power plant and supplied to the grid in year *y* (MWh)
$EF_{BL,us,grid,y}$	=	Emission factor for upstream emissions occurring in the baseline due to electricity supplied to the grid (t CO_2/MWh)
$EG_{PJ,facility,i,y}$	=	Quantity of electricity generated in the project power plant and supplied to the electricity consuming facility(ies) *i* in year *y* (MWh)
$EF_{BL,us,facility,i,y}$	=	Emission factor for upstream emissions occurring in the baseline due to electricity supplied to the consuming facility (t CO_2/MWh)

The emission factor for upstream emissions from natural gas ($EF_{NG,upstream}$) shall be determined using the latest version of the tool "Upstream leakage emissions associated with fossil fuel use".

[7] Data source from Togguh Gas Field of Indonesia, provided by the Executive office of Fujian LNG Terminal Station.

Determination of emissions occurring from fossil fuels used in the baseline is optional, i.e. the project participants can decide whether to include this source for leakage determination. In case emissions occurring from fossil fuels used in the baseline are included, the following guidance shall be used.

The emission factor for upstream emissions occurring in the baseline ($EF_{BL,us,grid,y}$ or $EF_{BL,us,facility,i,y}$) shall be calculated consistent with the baseline emission factor (i.e. *EF1, EF2, EF3*) selected above, as follows:

EF1 $$EF_{BL,us,grid,y}, or EF_{BL,us,facility,y} = \frac{\sum_j \sum_k FF_{j,k,y} \times NCV_{j,k,y} \times EF_{k,upstream,CH4}}{\sum_j EG_{j,y}} \times GWP_{CH4}$$ Equation (6)

EF2 $$EF_{BL,us,grid,y} = \left[0.5 \times \frac{\sum_j \sum_k FF_{j,k,y} \times NCV_{j,k,y} \times EF_{k,upstream,CH4}}{\sum_j EG_{j,y}} + 0.5 \times \frac{\sum_i \sum_k FF_{i,k,y} \times NCV_{i,k,y} \times EF_{k,upstream,CH4}}{\sum_i EG_{i,y}} \right] \times GWP_{CH4}$$ Equation (7)

EF3 $$EF_{BL,us,grid,y}, or EF_{BL,us,facility,y} = \frac{EF_{k,upstream,CH4}}{\eta_{BL}} \times 3.6 \times GWP_{CH4}$$ Equation (8)

Where:

$EF_{BL,us,grid,y}$	=	Emission factor for upstream emissions occurring in the baseline due to electricity supplied to the grid (t CO_2/MWh)
$EF_{BL,us,facility,y}$	=	Emission factor for upstream emissions occurring in the baseline due to electricity supplied to the consuming facility (t CO_2/MWh)
j	=	Plants included in the build margin
$FF_{j,k,y}$	=	Quantity of fuel type *k* (a coal or oil type) combusted in power plant *j* included in the build margin in year *y* (mass or volume units)
$NCV_{j,k,y}$	=	Average net calorific value of fuel type *k* (a coal or oil type) combusted in power plant *j* included in the build margin in year *y* (GJ/mass or volume units)
$EF_{k,upstream,CH4}$	=	Emission factor for upstream fugitive methane emissions from production of the fuel type *k* (a coal or oil type) (tCH_4/GJ)
$EG_{j,y}$	=	Electricity generation in the plant *j* included in the build margin in year *y* (MWh)
i	=	Plants included in the operating margin
$FF_{i,k,y}$	=	Quantity of fuel type *k* (a coal or oil type) combusted in power plant *i* included in the operating margin in year *y* (mass or volume units)
$NCV_{i,k,y}$	=	Average net calorific value of fuel type *k* (a coal or oil type) combusted in power plant *i* included in the operating margin in year *y* (GJ/mass or volume units)
$EG_{i,y}$	=	Electricity generation in the plant *i* included in the operating margin in year *y* (MWh)
η_{BL}	=	The energy efficiency of the baseline technology (ratio)
GWP_{CH4}	=	Global warming potential of methane (t CO_2e/t CH_4)

The determination of $EF_{BL,us,grid,y}$ and $EF_{BL,us,facility,i,y}$ shall be based on the source of baseline emission factor (e.g. for EF1 - technology and fuel used by power plants included in the build margin) and is to be made once at the validation stage based on an ex ante assessment and shall be determined using the latest version of the tool “Upstream leakage emissions associated with fossil fuel use”.

Where the baseline emission factors $EF_{BL,grid,CO2,y}$ and/or $EF_{BL,facility,CO2,i,y}$ are/is determined as EF1 or EF2 the calculation should be consistent with the calculation of CO_2 emissions in the build margin and the combined margin, i.e. the same cohort of plants and data on fuel combustion and electricity

generation should be used, and the values for *FF* and *EG* should be those already determined through the application of "Tool to calculate the emission factor for an electricity system".

Where total net leakage effects are negative (LE_y<0), project participants should assume LE_y= 0.

Step 4: Calculation of Emission Reductions

Annual emission reductions are calculated as follows:

$$ER_y = BE_y - PE_y - LE_y$$ Equation (9)

Where:

ER_y = Emissions reductions in year *y* (t CO_2e)

BE_y = Baseline emissions in year *y* (t CO_2)

PE_y = Project emissions in year *y* (t CO_2)

LE_y = Leakage emissions in year *y* (t CO_2e)

B.6.2. Data and parameters fixed ex ante

Data/Parameter	$F_{i,j,\ 2010\sim2012}$
Unit	Ton or m^3
Description	The total amount of fuel *i* (in a mass or volume unit) consumed by Province j in ECPG for power generation in year 2010, 2011 and 2012.
Source of data	China Electric Power Yearbook
Value(s) applied	See A3 in Annex 3.
Choice of data or Measurement methods and procedures	The data selected comply with the ACM0025.
Purpose of data	For OM calculation.
Additional comment	-

Data/Parameter	$EG_{j\ 2010\sim2012}$
Unit	MWh
Description	The electricity generation by the Province *j* in ECPG in year 2010, 2011 and 2012.
Source of data	China Electric Power Yearbook
Value(s) applied	See table A3 in Annex 3
Choice of data or Measurement methods and procedures	The data selected comply with the ACM0025.
Purpose of data	For GEN calculation.
Additional comment	

Data/Parameter	$CPR_{j\ 2010\sim2012}$
Unit	%

Description	The captive power rate by the Province *j* in ECPG in year 2010, 2011 and 2012.
Source of data	China Electric Power Yearbook
Value(s) applied	See table A3 in Annex 3
Choice of data or Measurement methods and procedures	The data selected comply with the ACM0025
Purpose of data	For GEN calculation.
Additional comment	

Data/Parameter	$GEN_{j\ 2010\sim2012}$
Unit	MWh
Description	The electricity output (MWh) supplied to the grid by the Province *j* in ECPG in year 2010, 2011 and 2012.
Source of data	Official website of China DNA: http://cdm.ccchina.gov.cn/Detail.aspx?newsId=51651&TId=3
Value(s) applied	See table A3 in Annex 3
Choice of data or Measurement methods and procedures	The data selected comply with the ACM0025
Purpose of data	For OM calculation.
Additional comment	

Data/Parameter	NCV_i
Unit	kj/Kg or kj/m^3
Description	The net calorific value (energy content) per mass or volume unit of a fuel *i*
Source of data	China Energy Statistical Yearbook 2013
Value(s) applied	See table A3 in Annex 3
Choice of data or Measurement methods and procedures	According to ACM0025, the national value is used.
Purpose of data	For OM and BM calculation.
Additional comment	

Data/Parameter	$EF_{co2,\ i}$
Unit	tC/Tj
Description	CO_2 emission factor per energy unit of fuel i.
Source of data	2006 IPCC Guidelines for National Greenhouse Gas Inventories
Value(s) applied	See table A3 in Annex.
Choice of data or Measurement methods and procedures	According to ACM0025, when the national value is unavailable, IPCC default is used.

Purpose of data	For OM and BM calculation.
Additional comment	

Data/Parameter	$OXID_i$
Unit	
Description	The oxidation factor of the fuel.
Source of data	2006 IPCC Guidelines for National Greenhouse Gas Inventories
Value(s) applied	See table A3 in Annex 3.
Choice of data or Measurement methods and procedures	This data is based on IPCC default value because the national specific value is unavailable.
Purpose of data	
Additional comment	

Data/Parameter	Installed Capacity $_{j\ 2010, 2011, 2012}$
Unit	MW
Description	The installed capacity of Province j in ECPG in year 2010, 2011 and 2012.
Source of data	China Electric Power Yearbook
Value(s) applied	See table A1 in Annex 3.
Choice of data or Measurement methods and procedures	The data selected comply with ACM0025
Purpose of data	For BM calculation.
Additional comment	

Data/Parameter	$\eta_{Adv, i}$
Unit	%
Description	The efficiency level of the best technology for each fuel type commercially available in China.
Source of data	Official website of China DNA: http://cdm.ccchina.gov.cn/Detail.aspx?newsId=51651&TId=3
Value(s) applied	See table A2-1.1 and A4-2 in Annex 3.
Choice of data or Measurement methods and procedures	The data selected comply with ACM0025
Purpose of data	For BM calculation.
Additional comment	

Data/Parameter	$EF_{NG,upstream}$
Unit	t CO_2/TJ
Description	Emission factor for upstream emissions of natural gas
Source of data	Table 3 of the Methodological Tool "Upstream leakage emissions associated with fossil fuel use"(version 02)

Value(s) applied	2.9
Choice of data or Measurement methods and procedures	The default value for Natural Gas is adopted.
Purpose of data	Leakage calculation
Additional comment	

Data/Parameter	$EF_{coal, upstream,CH4}$
Unit	t CO_2/TJ
Description	Emission factor for upstream fugitive methane emissions from production of coal by underground mining.
Source of data	Table 3 of the Methodological Tool "Upstream leakage emissions associated with fossil fuel use"(version 02)
Value(s) applied	10.4
Choice of data or Measurement methods and procedures	The default value for Coal is adopted.
Purpose of data	Leakage calculation
Additional comment	

Data/Parameter	$EF_{oil, ,upstream,CH4}$
Unit	t CO_2/TJ
Description	Emission factor for upstream fugitive methane emissions from production of oil.
Source of data	Table 3 of the Methodological Tool "Upstream leakage emissions associated with fossil fuel use"(version 02)
Value(s) applied	9.4
Choice of data or Measurement methods and procedures	The default value for Coal is adopted.
Purpose of data	
Additional comment	

B.6.3. Ex ante calculation of emission reductions

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According to Section B. 6.1, the annual emissions reduction are calculated as the following:

Step 1 Calculation of Baseline Emissions

$EG_{PJ,grid,y}$	$EF_{BL,grid,CO2,y}$	BE
MWh	**tCO_2e/MWh**	**tCO_2e**
6,112,000	0.6861	**4,193,622**

Step 2 Calculation of Project Emissions

$FC_{NG,y}$	$NCV_{Natural,Gas}$	$EF_{CO2,Natural\ gas,y}$	$OXID_{NG}$	PE
(m^3)	**(MJ/km^3)**	**tCO_2e/TJ**	**%**	**tCO_2e**
1,184,505.60	38,931	54.3	100%	**2,503,990**

Step 3 Calculation of Leakage

$FC_{NG,y}$	$NCV_{NG,y}$	$EF_{NG,\ upstream}$	$EG_{PJ,grid,y}$	$EF_{BL,us,grid,\ y}$	GWP_{CH4}	LE
(m^3)	**(MJ/km^3)**	**(tCO_2/TJ)**	**(MWh)**	**(tCH_4/MWh)**	**(tCO_2e/tCH_4)**	**(tCO2e)**
1,184,505.60	38,931	2.9	6,112,000	0.0032	25	**-494,322**

Where total net leakage effects are negative (*LEy* < 0), LEy should be assumed at 0.

4.ER Calculation

Period	BE	PE	LE	ER
	tCO_2e	**tCO_2e**	**(tCO2e)**	**(tCO2e)**
1 year	**4,193,622**	**2,503,990**	**0**	**1,689,632**

B.6.4. Summary of ex ante estimates of emission reductions

Year	Baseline emissions (t CO_2e)	Project emissions (t CO_2e)	Leakage (t CO_2e)	Emission reductions (t CO_2e)

14/01/2016~31/12/2016	4,044,260	2,414,807	0	1,629,453
01/01/2017~31/12/2017	4,193,622	2,503,990	0	1,689,632
01/01/2018~31/12/2018	4,193,622	2,503,990	0	1,689,632
01/01/2019~31/12/2019	4,193,622	2,503,990	0	1,689,632
01/01/2020~31/12/2020	4,193,622	2,503,990	0	1,689,632
01/01/2021~31/12/2021	4,193,622	2,503,990	0	1,689,632
01/01/2022~31/12/2022	4,193,622	2,503,990	0	1,689,632
01/01/2023~13/01/2023	149,362	89,183	0	60,179
Total	29,355,354	17,527,930	0	11,827,424
Total number of crediting years	11,827,424			
Annual average over the crediting period	4,193,622	2,503,990	0	1,689,632

B.7. Monitoring plan

B.7.1. Data and parameters to be monitored

Data/Parameter	$FC_{NG, y}$
Unit	m^3
Description	Annual quantity of NG consumed in the project activity
Source of data	NG flow meter reading at the project boundary
Value(s) applied	1,184,505.60
Measurement methods and procedures	The data will be monitored and recorded monthly both by supplier and the project owner. The meter records from LNG terminal are used for settlement and the meter records from project owner are used for cross-check. The precision of the monitoring devices are in line with the National Standards. The LNG consumption is aggregated automatically, recorded daily and reported to power plant weekly.
Monitoring frequency	The LNG consumption is aggregated automatically, recorded daily and reported to power plant weekly.
QA/QC procedures	The total NG consumption will be monitored both by the supplier and the project owner for cross-verification. Natural gas supply metering to the project will be subjected to regular (in accordance with stipulation of the meter supplier) maintenance and testing to ensure accuracy. The reading will be double checked by the gas supply company.
Purpose of data	For PE calculation
Additional comment	-

Data/Parameter	$NCV_{Natural\ gas}$
Unit	KJ/m^3
Description	Net Calorific Value of natural gas consumed by the proposed project.
Source of data	Fuel supplier
Value(s) applied	34,402
Measurement methods and procedures	Measure Report of LNG character as determined from the fuel supplier
Monitoring frequency	Every Ship

QA/QC procedures	The calorific value of fuel consumed in the Project Activity would be provided by supplier and recorded and verified.
Purpose of data	For PE calculation
Additional comment	

Data/Parameter	$EF_{CO2, Natural\ gas, y}$
Unit	tCO2/GJ
Description	Emission factor of LNG consumed in the project activity
Source of data	Fuel supplier
Value(s) applied	56.1
Measurement methods and procedures	Measure Report of NG character as determined from the fuel supplier
Monitoring frequency	Every Ship
QA/QC procedures	It is preferential to use the data provided by fuel supplier. Otherwise, the data will be determined from IPCC guideline and will be updated according to its latest version.
Purpose of data	For PE calculation
Additional comment	

Data/Parameter	$EG_{PJ,grid,y}$
Unit	MWh
Description	Quantity of electricity generated in the project power plant and supplied to the grid in year *y*
Source of data	Electricity meter reading at project boundary
Value(s) applied	6,112,000
Measurement methods and procedures	The net electricity supplied to grid by the project is continuously measured and monthly reported. Data will be archived for 2 years following the end of crediting period by the means of electronic and paper backup.
Monitoring frequency	continuously measurement and monthly report
QA/QC procedures	The electricity supplied by the project is monitored by the main meters installed at the substation for the transmission lines and there are back-up meters installed at the same point with the same scale and accuracy. The readings of the meters are recorded by the project owner and the grid company both. The grid company issues reading records to project owner monthly and electricity sales invoice will also be obtained for double check.
Purpose of data	For BE calculation
Additional comment	-

Data/Parameter	$F_{i,j,\ y}$
Unit	Ton or m^3
Description	The total amount of fuel *i* (in a mass or volume unit) consumed by Province j in ECPG for power generation in the year y in which actual project generation and associated emissions reductions occur.
Source of data	China Energy Statistical Yearbook
Value(s) applied	See Table in Annex 3.

Measurement methods and procedures	The data is available from the China Energy Statistical Yearbook which will be update annually.
Monitoring frequency	annually
QA/QC procedures	The data will be updated annually according to China Energy Statistical Yearbook.
Purpose of data	For EF calculation
Additional comment	

Data/Parameter	$EF_{co2,i}$
Unit	tC/Tj
Description	CO_2 emission factor per energy unit of fuel i.
Source of data	IPCC Guideline for National Greenhouse Gas Inventories
Value(s) applied	See Table in Annex 3.
Measurement methods and procedures	The data is available from IPCC Guidelines and will be updated with its latest edition.
Monitoring frequency	annually
QA/QC procedures	The data is available from the *China Energy Statistical Yearbook* which will be update annually.
Purpose of data	For EF calculation
Additional comment	

Data/Parameter	NCV_i
Unit	kj/Kg or kj/m^3
Description	The net calorific value (energy content) per mass or volume unit of a fuel *i*
Source of data	China Energy Statistical Yearbook
Value(s) applied	See Table in Annex 3.
Measurement methods and procedures	The data is available from the China Energy Statistical Yearbook which will be update annually.
Monitoring frequency	annually
QA/QC procedures	
Purpose of data	For EF calculation
Additional comment	

Data/Parameter	$OXID_i$
Unit	
Description	The oxidation factor of the fuel.
Source of data	2006 IPCC Guidelines for National Greenhouse Gas Inventories
Value(s) applied	See Table in Annex 3.
Measurement methods and procedures	The data is available from IPCC Guidelines and will be updated with its latest edition.
Monitoring frequency	annually
QA/QC procedures	
Purpose of data	For EF calculation
Additional comment	

Data/Parameter	$\eta_{Coal, Adv}$
Unit	%
Description	The efficiency level of the best technology for coal fired power plant commercially available in China.
Source of data	The data is issued by Chinese DNA by website: http://cdm.ccchina.gov.cn/zyDetail.aspx?newsId=52505&TId=161
Value(s) applied	See Table A4-2 in Annex 3.
Measurement methods and procedures	Chinese DNA will issue the latest data annually.
Monitoring frequency	annually
QA/QC procedures	
Purpose of data	For EF calculation
Additional comment	

Data/Parameter	$\eta_{Oil, Adv}$
Unit	%
Description	The efficiency level of the best technology for oil fired power plant commercially available in China.
Source of data	The data is issued by Chinese DNA by website: http://cdm.ccchina.gov.cn/zyDetail.aspx?newsId=52505&TId=161
Value(s) applied	See Table in Annex 3.
Measurement methods and procedures	Chinese DNA will issue the latest data annually.
Monitoring frequency	annually
QA/QC procedures	
Purpose of data	For EF calculation
Additional comment	

Data/Parameter	$\eta_{Gas,Adv}$
Unit	%
Description	The efficiency level of the best technology for gas fired power plant commercially available in China.
Source of data	The data is issued by Chinese DNA by website: http://cdm.ccchina.gov.cn/zyDetail.aspx?newsId=52505&TId=161
Value(s) applied	See Table in Annex 3.
Measurement methods and procedures	Chinese DNA will issue the latest data annually.
Monitoring frequency	annually
QA/QC procedures	
Purpose of data	For EF calculation
Additional comment	

Data/Parameter	Installed Capacity $_{thermal\ power, y}$
Unit	MW
Description	The installed capacity of thermal power in ECPG in year y in which actual project generation and associated emissions reductions occur.
Source of data	China Electric Power Yearbook

Value(s) applied	See Table in Annex 3.
Measurement methods and procedures	The data is available from the China Electric Power Yearbook which will be update annually.
Monitoring frequency	annually
QA/QC procedures	
Purpose of data	For EF Calculation
Additional comment	

Data/Parameter	Installed Capacity$_{total, y}$
Unit	MW
Description	The total installed capacity of ECPG in year y in which actual project generation and associated emissions reductions occur.
Source of data	China Electric Power Yearbook
Value(s) applied	See Table in Annex 3.
Measurement methods and procedures	The data is available from the China Electric Power Yearbook which will be update annually.
Monitoring frequency	annually
QA/QC procedures	
Purpose of data	For EF Calculation
Additional comment	

Data/Parameter	GWP_{CH4}
Unit	tCO_{2e}/tCH_4
Description	Global warming potential of methane valid for the relevant commitment period.
Source of data	COP/MOP decision: “Standard for application of the global warming potentials to CDM project activities and PoAs for the second commitment period of the Kyoto Protocol” (a value of 25 is to be applied for the second commitment period of the Kyoto Protocol)
Value(s) applied	25
Measurement methods and procedures	Value of 25 is to be applied for the second commitment period of the Kyoto Protocol.
Monitoring frequency	-
QA/QC procedures	
Purpose of data	For leakage Calculation
Additional comment	

B.7.2. Sampling plan

>>
N/A

B.7.3. Other elements of monitoring plan

>>
Objective of Monitoring Plan
The project owner is the user of this monitoring plan and has set up a CDM Team responsible for project registration, monitoring and other CDM activities. The project owner must maintain credible, transparent, and adequate data estimation, measurement, collection, and tracking systems to maintain the information required for an audit of an emission reduction project. These records and

monitoring systems are needed to allow the selected DOE to verify project performance as part of the verification and certification process. This process also reinforces that CO_2 reductions are real and credible to the buyers of the Certified Emissions Reductions (CERs).

Emission reductions will be achieved through due to the operation of the proposed project. The grid-connected output and natural gas consumption are therefore defined as the key data to be monitored.

Operational and Management Structure for Monitoring

The project owner has assigned a CDM Team to carry out the whole monitoring process according to the figure below.

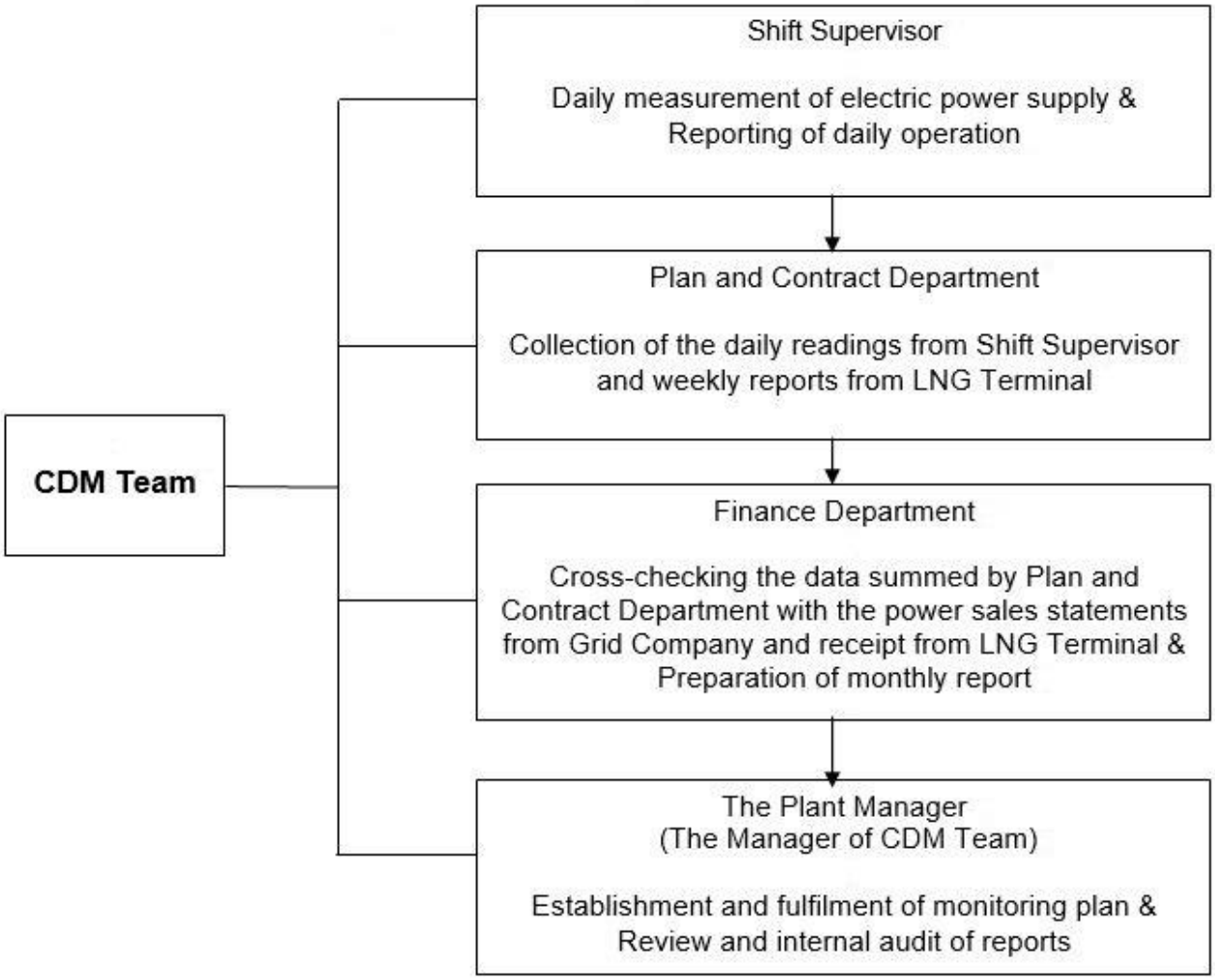

Figure of Monitoring and Management Structure

The plant manager of the proposed project established the monitoring plan, and hold the overall responsibility for the monitoring process. The first step is the measurement of the daily electrical energy supplied to the grid and reporting of daily operation, which will be carried out by shift supervisor. On the other side, the LNG Terminal continuously measures the LNG supply amount and NCV value and weekly reports to LNG power plant. Secondly, the Plan and Contract Department will collect and statistic the daily readings and weekly LNG reports. Then, the data will be submitted to the Finance Department which will be responsible for cross-checking the data with the sales statements or recipients from Grid company and LNG terminal and preparation of monthly report. Finally, the plant manager will review the internal audit and monitoring reports.

Monitoring Plan

The approved monitoring methodology ACM0025 is used for developing the monitoring plan.

Monitoring plan is a diversion and schedule of a series of monitoring task. Monitoring task must be implemented according to the monitoring plan in order to ensure that the real, measurable, and long-term greenhouse gas emission reduction for the project is monitored and reported.

1. The user of the monitoring plan

The project owner, is the user of this plan and will adhere to the guidelines set out in the monitoring plan. This plan should be modified according to actual condition and requirements of DOE in order to ensure that the monitoring is credible, transparent and comprehensive.

Overall responsibility for daily monitoring and reporting lies with the project owner. A CDM workgroup has been established by the project owner to carry out the monitoring tasks.

2. Personnel training

The personnel involved in the CDM team have received sufficient training regarding to monitoring before the project operation and after the operation. The manager of the CDM team is responsible for organizing the training. The training consists of two sections as follows:

- Training on project operation, which includes reading and calibration of meters, recording, adjustment and reporting of the readings, and corresponding solving methods; and
- Training on validation, registration and verification regarding to CDM to ensure the emission reductions generated by the project can be monitored, recorded and reported accurately.

3. Installation of meters

Installation of electricity metering equipment

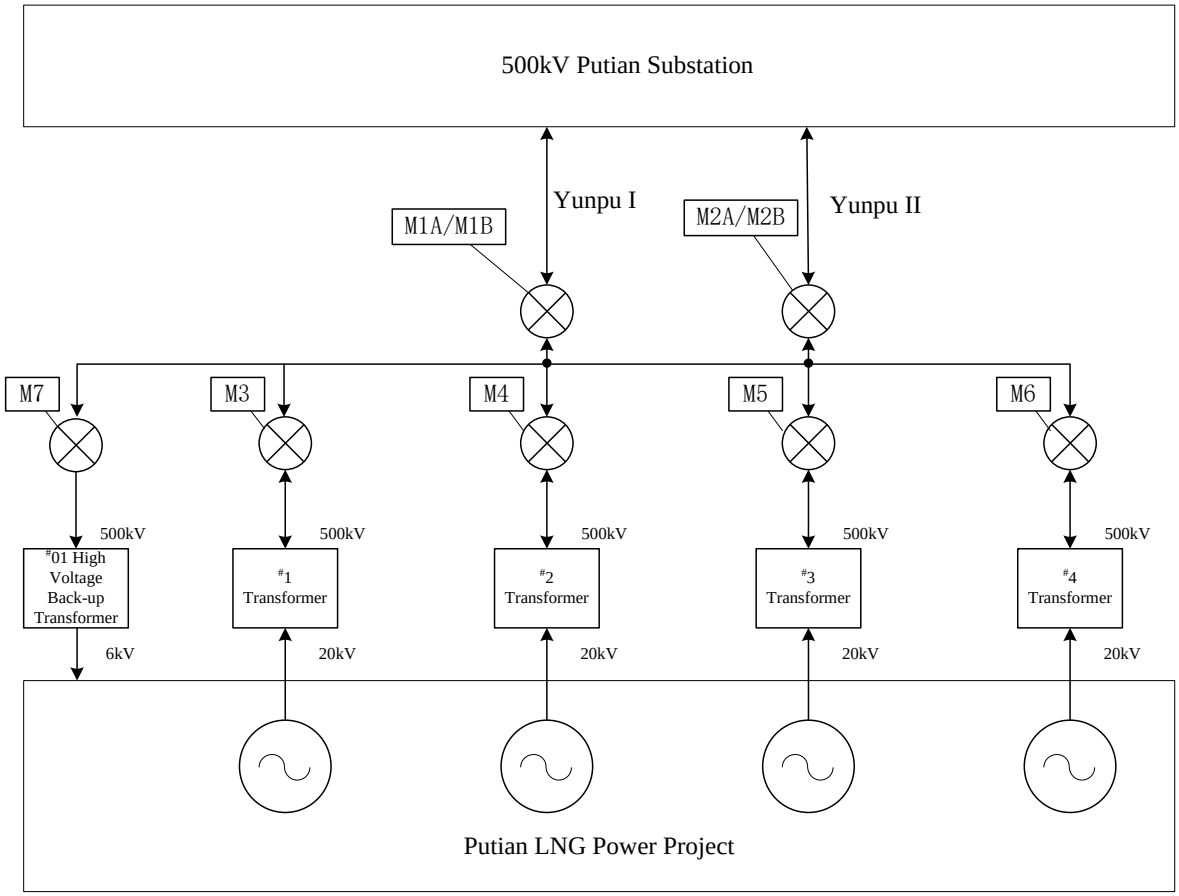

Figure of Power Supply Diagram

Two main meters (M1A and M2A) have been installed at the substation for the transmission lines connected to ECPG, Yunpu I and Yunpu II to monitor the grid-connected electricity supply of the project. And two backup meters (M1B and M2B) have been installed in the same measurement

points as its main meter. When the main meter is out of order, the readings from its backup meter will be used for reference. The main and back-up meters are controlled, operated and maintained by the Fujian Grid. All electricity meters have the accuracy of 0.2s. The grid company and project owner reads the main meters and records at 24:00 on every 27th, and the grid company issues the power transaction statement to project owner on the electricity amount supplied and purchased by the project; after confirmation, the project owner sends the invoices to grid company. The meters installed for electricity monitoring (M1A/M1B and M2A/M2B) are all bidirectional, and could measure the electricity uploaded to the grid and downloaded from the grid simultaneously, thereby monitoring the net electricity supplied to the grid by the project ($EG_{PJ,grid,y}$).

In addition, project owner has installed four meters (M3, M4, M5 and M6) at each generator site to monitor the electricity generation. Another meter (M7) has been installed at the project site to measure the auxiliary power of the project. Data from the five meters can be used to cross check the data measured by the main meter.

Installation of the NG metering equipment

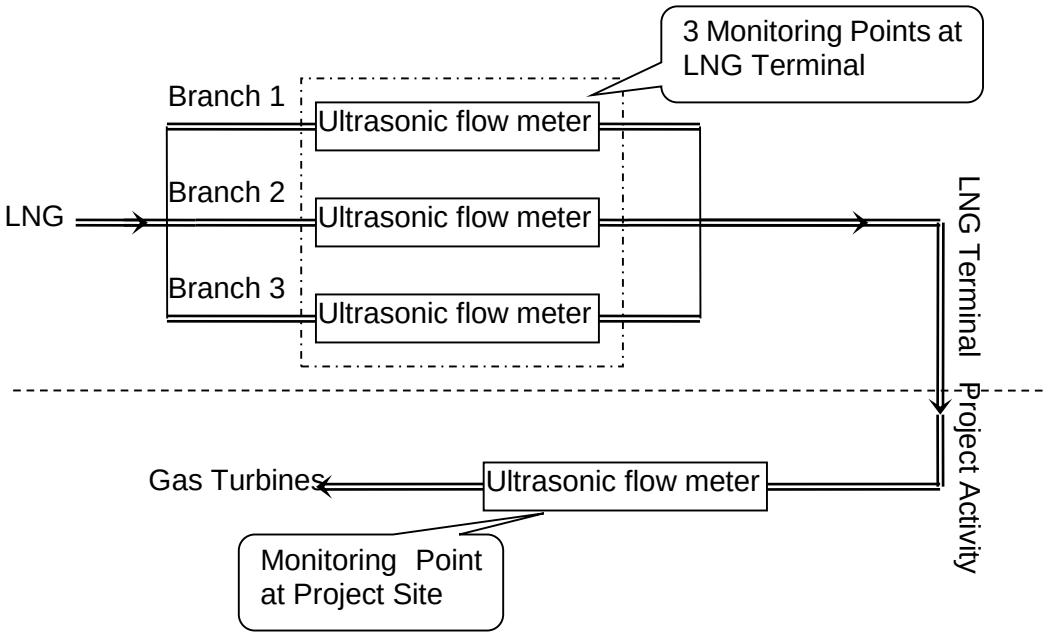

Figure of LNG System

According to the LNG system information offered by the LNG supplier, there are three branches of the LNG delivery pipeline before the outlet of the LNG supplier, and each installed measurement equipment for monitoring LNG consumption. The instruments are Ultrasonic flow meters with same scale and the error resulting from the flow meters will not exceed 1% of full-scale rating, which is in line with national standards. For daily operation, the LNG Terminal selects one or two of the three branches randomly for LNG transportation and the spare one is used as back-up line. The $FC_{NG,y}$ was measured by the flow meters installed on the branch in use. If the metering equipment of the branch in use were out of order, the back-up branch is switched into use to ensure the accuracy of the measurement. The sum of the readings from these three sets of the flow meters are the amount of LNG consumption of proposed project. The flow of LNG delivered to power plant is recorded automatically and instantly by the computer system.

There is another LNG flow meter installed at the inlet point of the LNG pipeline at the project side and error resulting from the flow meters will not exceed 1% of full-scale rating, the LNG consumption data from this meter is daily recorded and monthly reported; the reading records from this meter is only used for cross-check with data from LNG terminal.

The NCV of LNG was from the LNG supplier and recorded by the project owner. All the data above are metered at the LNG terminal side and statistics is recorded and faxed to the power plant weekly.

4. Calibration of meters

Calibration of electricity meters
An agreement has been signed between the project owner and the grid company, which defines the arrangements and the required quality control procedures to ensure the accuracy:
(a) The metering equipment will be properly calibrated and checked at least annually for accuracy.
(b) The metering equipment shall have sufficient accuracy of 0.2s.
(c) Calibration is carried out by the grid company with the records being supplied to the project owner, and these records will be maintained by the project owner and the appointed third party.
(d) All meters shall be jointly inspected and sealed on behalf of the parties concerned and shall not be interfered with by either party except in the presence of the other party or its accredited representatives.

All the meters installed shall be tested by a third party within 10 days after:
(a) Detection of a difference larger than the allowable error in the readings of both meters;
(b) The repair of all or part of meter caused by the failure of one or more parts to operate in accordance with the specifications.

Calibration of NG metering equipment
The national authority department of quality and measuring will properly calibrate NG metering equipment annually and issue the certification. Therefore, the uncertainty of the NG metering system shall be out of consideration. The NG supplier should notice the project owner 10 days prior to the calibration in order that the project owner can appoint a delegate for participation. Both parties shall keep all original materials and documents of testing, calibrating, certification, reports and records, etc.

5. Monitoring
Data that will be monitored include:

Monitoring of the Grid-connected electricity generated by the Project
The on-grid electricity can be monitored by main meters installed at the substation for the transmission lines at project/grid boundary. The specific steps for data collection and reporting are listed below:

(a) Grid company, together with the project owner reads the main meter and records data at 24 o'clock on a determined day of every month. Then, Grid company supplies readings to the project owner and provides invoice.
(b) Project owner reads the meters installed at the project site and records data everyday, and prepare monthly data report for cross-check.

Should any previous months reading of the main meters be inaccurate by more than the allowable error, or otherwise functioned improperly, the grid-connected electricity generated by the proposed project shall be determined by reading the backup meter, unless a test by either party reveals it is inaccurate:
1. If the backup system is not with acceptable limits of accuracy or is otherwise performing improperly the proposed project owner and grid company shall jointly prepare an estimate of the correct reading; and
2. If the proposed project owner and the grid company fail to agree the estimate of the correct reading, then the matter will be referred for arbitration according to agreed procedures.

The monthly on-grid electricity data from the main meters and daily data regarding electricity generation and auxiliary power measured by on-site meters will be recorded well by project owner by using a computer system at the on-site control centre. Project owner will provide meters' readings and photocopies of invoices to DOE for verification.

The data will be archived for 2 years following the end of crediting period by the means of electronic and paper backup. Detailed monitoring procedures will be established in accordance with the Grid Connect Agreement. The meter reading will be already accessible for the DOE. Calibration tests records will be maintained for verification.

Monitoring of the quantity of the NG combusted

The NG flow rate will be measured by flow meters installed at LNG Terminal. The NG consumption will be aggregated automatically by NG supplier and reported to project owner weekly; and project owner will record the NG consumption daily and report monthly. All the data will be recorded by a computer system at the on-site control centre by the project owner. The recordings from project owner are only used for references.

Detail monitoring procedures will be established in accordance with the Purchasing Agreement. The meter reading will be already accessible for the DOE. Calibration tests records will be maintained for verification.

Monitoring of NCV

NCV of the NG was used during the calculation of the CO2 emission coefficient, so the report of NG Character must be obtained from the NG supplier.

Monitoring of the data needed to calculate the baseline emission factor

The baseline emission factors for the ECPG are obtained according to China's Regional Grid Baseline Emission Factors Determined published by DNA. The project owner should check the data and summit the revised ex-post calculation to the DOE on an annual basis. If data for determining the baseline emission factors is no longer or delay provided by the DNA, the project owner should calculate the conservative baseline emission factor of the project boundary by using the available and annually update publications such as China Energy Statistical Yearbook and China Electric Power Yearbook.

The emission reduction of the project is calculated on the basic of ACM0025 agreed by EB. The CDM project developer should advise the project owner that when the data is available, the calculation of emission factor should be strictly in accordance with the methodology and be validated by the DOE.

6. Quality assurance and quality control

The quality assurance and quality control procedures for recording, maintaining and archiving data shall be improved as part of this CDM project activity. This is an on-going process, which will be ensured through the CDM mechanism in terms of the need for verification of the emission on an annual basic according to the Project Designed Document and the CDM manual.

7. Emergency Disposal

The NG Distributed Control System (DSC) installed with leakage detector, alarm system and safety shut off valve. In the event of emergency, the detector can immediately check out the leakage point, and the alarm system issues alarm signal and reports to control center. Meanwhile, NG supply can be automatically shut off by safety shut off valve. After receiving the alarm, operators will immediately arrive, and check the reason and make the solution.

The operators responsible for DSC should make daily inspection and repair, record daily operation, and find out and deal with hidden troubles in time. The emergency of leakage will be almost unlikely occur.

8. Data Management System

The CDM manual set out the procedures for checking information from the primary source to the end-data calculation in physical document. If the data and information is from the Internet, the website must be provided. Moreover, the credibility and reliability of the data and information must be confirmed by the project developer or other qualified entities. The project owner is responsible for providing additional data and information for validation and verification requirements of the DOE.

Physical document such as paper-based maps, diagrams and environmental assessments will be collected in a central place, together with this monitoring plan. In order to facilitate auditors' reference of relevant literature relating to the project, the project material and monitoring results will be indexed. All paper-based information will be kept on the technology department of the project owner and all the material will have a copy for backup. And all data including calibration records is kept until 2 years after the end of the total credit time of the CDM project.

9. Verification and Monitoring Result

The project owner will sign a verification agreement with the specific DOE and agree to a timeframe work set by the EB for carrying out the verification while considering the buyer's schedule. The project owner will make the time arrangement for the verification and will prepare for the audit verification to the best of itself. The project owner will facilitate the verification by providing the DOE with all required necessary information before, during and, in the event of queries, after verification.

If the project owner deems that the requirement from the DOE is not within the verification, they should refer to the CDM developer or other qualified entities to confirm whether the requirements are reasonable. If considered unreasonable, a rejection letter in written form should be provided to the DOE with justifiable reasons. If the project owner and the DOE cannot reach an agreement, they can go to the EB or UNFCCC for arbitration.

B.8. Date of completion of application of methodology and standardized baseline and contact information of responsible persons/ entities

>>

Date of completion of baseline and monitoring study

03/08/2015

Name of persons/entities determining the baseline and monitoring methodology

Ms. Jiayuan Guo
Unit: Beijing Changjiang River International Holdings
E-mail: yongheng_0306@163.com

SECTION C. Duration and crediting period

C.1. Duration of project activity

C.1.1. Start date of project activity

>>
15/03/2006

C.1.2. Expected operational lifetime of project activity

>>
21 years and 0 month

C.2. Crediting period of project activity

C.2.1. Type of crediting period

>>
Renewable crediting period

C.2.2. Start date of crediting period

>>
14/01/2016 (2nd crediting period)

C.2.3. Length of crediting period

7 years 0 month for 2nd crediting period

SECTION D. Environmental impacts

D.1. Analysis of environmental impacts

>>

According to the Environmental Protection Law of the People's Republic of China which statements that the Environment Impact Assessment (EIA) must be approved by competent department of environmental protection administration before project construction, the project owner delegated China Global Engineering Company to conduct the required EIA. This Company has qualification for EIA consultancy services certified by State Environmental Protection Administration (SEPA) in 2002 and is independent from the project owner. And the State Environmental Protection Administration of China approved the EIA report in Dec. 2004.

According to the EIA report, the impacts rising from the proposed project were identified, and the mitigation measures were suggested and defined in the following two phrases.

Construction Phase

Ecosystem impact

According to the characteristic of the proposed project, the possible impacts on the vegetation and animals during the construction period will mainly concentrate on the construction area. The area is the first stage engineering of Putian LNG Power Plant. At present, there is mainly wasteland in this area. In addition, neither cultural relics, nor mineral resources were identified during the EIA survey. Even no buildings were found there. Thus the proposed project will not lead to pulling down of the original residence and displacement of local population. So the adverse impact on the vegetation and animals inhabiting there can be considered minimal.

Wastewater

In order to protect the water of sea area from being polluted, the wastewater from vehicles cooling, and washing, concrete mixing and equipments test is not allowed to discharge into Meizhou Bay directly. Instead the wastewater will be retained in the sedimentation tank before discharged. The oil water from vehicles will be collected and delivered to the local oil water treatment site, which will be treated with the specific treatment equipments before recycled. The domestic sewage generated from labour forces must be treated in septic tank and then will be discharged into the sea in accordance with Sea Water Quality Standard (GB3097-1997). The disposed water mentioned above must meet Integrated Wastewater Discharge Standard (GB8978-1996) grade I.

Dust

The major air pollutant is dust during the construction period. Several dustproof measures such as watering, wet operation method and selection and proper conservation of construction equipments and vehicles etc in accordance with Environment Air Quality Standard (GB3095-1996) grade II.

Noise

The noise is mainly generated from construction equipments and vehicles during the construction period will be strictly controlled in accordance with Standard of Noise at Boundary of Industrial Enterprises (GB12348-90) III and Standard of Environmental Noise of Urban Area (GB3096-1993) III using these measures: setting noise barrier around the construction site, arranging the construction time and plan reasonably etc. Thus the impact on local area will be mitigated as possible.

Solid waste

The solid waste generated from earth-rock excavation will be collected and delivered to the designated dumpsites or recycled. The domestic garbage from construction and livelihood area will be disposed by the local department of environment and sanitary every day.

Operation phase

Air pollution

Since the proposed project is a LNG power plant, the emission of SO_2 and TSP is very slight and negligible compared with the conventional coal fired power plant. And its major air pollutant is NO_X. The proposed project will adopt dry-type low NO_X emission combustion system, which could drastically reduce NO_X. Emission. The NO_X. Emission of the proposed project is expected to 0.0083mg per cubic meter at maximum, which could meet the requirement of Emission Standard of Air pollutants for fossil power plant (GB13223-1996) and Emission Standard of Air pollutants coal-burning oil-burning gas fired boilers (GB13271-2001).

Wastewater

The wastewater generated from the generation progress, which is mainly comprised of acidic and basic wastewater will be disposed in the neutralization tank before discharged into the sea in accordance with Integrated Wastewater Discharge Standard（GB8978-1996）and Sea Water Standard (GB3097-1997). The domestic sewage mainly generated from the permanent staff during the operation period, whose main pollutants are COD and BOD, will be retained in a sedimentation tank and then will be used for virescence or irrigation purpose when it can meet the requirement of Integrated Wastewater Discharge Standard (GB3097-1997). The oil water will be collected and delivered to the local oil water treatment site. The wastewater from the cooling system will be treated before recycled.

Noise

Noise mainly resulted from machines and vehicles during the operation. In accordance with Standard of Noise at boundary of industrial enterprises (GB12348-90), several measures will be taken to mitigate the negative impacts: the pumps, turbines and generators will be installed inside; sound absorption material will be used; sound insulation workroom will be set up; Doors and windows of controlling and office building will avoid to face the residential area；Heat Recovery Turbine will be equipped with 30dB sound insulator; Green Belts will be built between project site and neighbourhood areas to minimize the noise effectively.

D.2. Environmental impact assessment

>>

The environmental impacts of the proposed project are not considered to be significant.

SECTION E. Local stakeholder consultation

E.1. Solicitation of comments from local stakeholders

>>

To understand the attitudes of local stakeholders toward to the proposed project, the project owner conducted a survey in accordance with the national laws and regulations. The project owner put up notice around project site to invite local people to participate in a project specified survey starting from 18/02/2005. The survey distributing 50 copies of questionnaires to the local residents who might be affected by the project activity (See Table 10 below) to the individuals. The result shows that local stakeholders give their supports to the proposed project.

Table 10 Spot Check Questionnaires for the Public on the Environment Impact Assessment of Putian Natural Gas（LNG） Power Plant Project

Name		**Gender**		**Age**		**Education**	
Company				**Vocation**			

Project Introduction:

Fujian Putian LNG Power Plant is designed to construct a grid connected natural-gas based combined cycle gas turbine power plant with total installed capacity of 1,528MW (4×382MW) located on the north of the Mayzhou Bay Xuyu Penisular Xiuyu District, Putian city, Fujian Province. The proposed project will be connected to Fujian power Grid, which is a major part of ECPG. The Power Plant will be installed 4 generating blocks, each of which consists of a combine cycle, a single-axis gas turbine, a heat recovery steam generator, a steam turbine, and a common generator.500KV transmission lines will be constructed for power evacuation.

The proposed project will supply strong and stable electricity to support Fujian power grid. The annual output of the proposed project is expected at 6,112GWh when all the generating units putting into operation, which can mitigate the high pressure of Fujian power grid regarding to power shortage incurred by the greatly increased power demand and balance the grid peak loads.

As a clean fuel power project, the proposed project can reduce GHGs emission reductions compared with conventional thermal power plants, thus be considered as an environmental-friendly project. Also, the proposed project will contribute more social and economic social benefits to local area such as providing job opportunities, improving standard of living of local people, supporting the construction of local schools and infrastructure, and etc. Thus, the proposed project provides a combination of positive environmental, economic, and sustainable development benefits

1. Are you familiar with the proposed project?	A. Yes	B. No	C. Indifferent	
2. Do you support the construction of the proposed project?	A. Yes	B. No		
3. Do you support the proposed project develop CDM?	A. Yes	B. No		
4 .How much the proposed project do you think will impact on your daily life?	A. Positive	B. Negative	C. No idea	
5. Which benefits do you think will be brought by the proposed project?	A. More job opportunities	B. Increase of Income	C. Economic development	
	D. Improvement of local infrastructure	E. Others		
6. To what extent the negative impacts could influence on local environment?	A. Severe	B. Partial	C. Little	D. No

E.2. Summary of comments received

>>

During the survey, 50 responses have been received at 100% rate of return. The following is a summary of the key findings:

Composing of the respondents:

Item	Gender		Age			Education Level			
	Male	Female	Below 30	30~59	Above 60	Primary school	Junior high school	Senior High school	College
Percentage	50%	50%	12%	78%	10%	20%	56%	16%	8%

1) The average age of the sample group is at 42;
2) 16% and 56% are at high and middle education level, respectively;
3) 100% know the construction of the proposed project;
4) 100% agree with its construction;
5) 100% agree that the proposed project develops as CDM project;
6) 100% deeply believe that the project will bring positive impacts to their daily life.
7) Most of the respondents consider the project will contribute to local development. In one way, 80% believe the project can promote local economic development, 70% consider the project can increase the local job opportunities, 74% think it can increase local income, 66% consider the project will contribute to local infrastructure construction.
8) 92% of the respondents consider the negative impacts of the project on local environment are little.

E.3. Report on consideration of comments received

>>

The survey shows that the proposed project receives strong support from local people. The respondents generally deemed that the project generate reliable electricity, accelerate the economic development, and induce some other multiple benefits relating to their livelihoods.

SECTION F. Approval and authorization

>>

The letters of approval for the Project Activity are available and had been uploaded with the registration.

- - - - -

Appendix 1. Contact information of project participants and responsible persons/ entities

Project participant and/or responsible person/ entity	☒ Project participant ☐ Responsible person/ entity for application of the selected methodology (ies) and, where applicable, the selected standardized baselines to the project activity
Organization name	CNOOC Fujian Gas Power Co., LTd
Street/P.O. Box	No. 159, Wusi Rd.
Building	28/F Jinlong Building
City	Fuzhou
State/Region	Fujian
Postcode	350001
Country	P.R. China
Telephone	+86 0591 8801 6195
Fax	+86 0591 8787 7147
E-mail	gaj931@sohu.com
Website	
Contact person	
Title	
Salutation	Ms.
Last name	Qin
Middle name	
First name	Aijie
Department	Plan and Contract Department
Mobile	
Direct fax	
Direct tel.	
Personal e-mail	

Project participant and/or responsible person/ entity	☒ Project participant ☐ Responsible person/ entity for application of the selected methodology (ies) and, where applicable, the selected standardized baselines to the project activity
Organization name	Mitsubishi Corporation
Street/P.O. Box	16-3, Konan 2-Chome
Building	
City	Minato-ku
State/Region	Tokyo
Postcode	100-8228
Country	Japan
Telephone	+81-3-3210-7309
Fax	+81-3-3210-7557
E-mail	ryutaro.nishio@mitsubishicorp.com
Website	http://www.mitsubishicorp.com/en/
Contact person	
Title	Assistant Manager
Salutation	Mr.
Last name	Nishio
Middle name	
First name	Ryutaro
Department	New Energy & Environment Business Division
Mobile	
Direct fax	
Direct tel.	
Personal e-mail	

Appendix 2. Affirmation regarding public funding

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

Appendix 3. Applicability of methodology and standardized baseline

No further information

Appendix 4. Further background information on ex ante calculation of emission reductions

For calculation of OM and BM of ECPG, please refer to:
http://cdm.ccchina.gov.cn/Detail.aspx?newsId=51651&TId=3

Table A1-1 OM Calculation of ECPG in 2010

Fuel types	unit	Provinces in the Regional Grid					Subtotal	Carbon Fctor	Effective Carbon Emission Factor	Carbon Oxidation Rate	NCV	CO_2 Emission (tCO_2e)
	U	Shanghai	Jiangsu	Zhejiang	Anhui	Fujian	$FC_{i,y}$	tC/TJ	$EF_{co2,i,y}$ (tCO2/TJ)	%	MJ/t,km^3 ,tce	K=F*G*H*I/ 100000(mass unit) 10000(volume unit)
	U	*A*	*B*	*C*	*D*	*E*	*F=A+B+C+D+E*	*G*	*H*	*I*	J	*K*
Raw Coal	10^4t	3,421.20	12,612.92	8,254.08	5,230.09	3,371.11	32889.40	25.80	87,300	1	20,908	600,319,825
Cleaned Coal	10^4t						0	25.80	87,300	1	26,344	0
Other Washed Coal	10^4t		230.14	2.25	1301.82		1534.21	25.80	87,300	1	8,363	11,201,112
Coke	10^4t						0	29.2	95,700	1	28,435	0
Gangue	10^4t		20.69	1.04	236.33	34.67	292.73	25.8	87,300	1	8,363	2,137,192
Coke Oven Gas	10^8m^3	0.67	10.8	0.26	5.28	0.19	17.2	12.1	37,300	1	16,726	1,073,073
Blast furnace gas	10^8m^3	106.03	108.95	14.19	76.22	6.21	311.6	70.8	219,000	1	3,763	25,678,863
Converter gas	10^8m^3	12.19	4.31	0.95	1.09	0.46	19	46.9	145,000	1	7,945	2,188,848
Other Coal Gas	10^8m^3						0	12.1	37,300	1	5,227	0
Crude Oil	10^4t			3.23			3.23	20	71,100	1	41,816	96,032
Gasoline	10^4t						0	18.9	67,500	1	43,070	0
Diesel Oil	10^4t	0.9	1.98	1.04		3.19	7.11	20.2	72,600	1	42,652	220,164
Fuel Oil	10^4t	17.53	0.06	5.14		0.73	23.46	21.1	75,500	1	41,816	740,658
Naphtha	10^4t						0	20.2	72,600	1	43,906	0
Lubricating oil	10^4t						0	20	71,900	1	41,398	0
Paraffin wax	10^4t						0	20	72,200	1	39,934	0
Solvent oil	10^4t						0	20	72,200	1	42,945	0
Petroleum pitch	10^4t						0	21	69,300	1	38,931	0
Petroleum coke	10^4t	23.49		37.5			60.99	26.6	82,900	1	31,947	1,615,263
LPG	10^4t						0	17.2	61,600	1	50,179	0
Refinery Gas	10^4t	0.76	0.16		1.18	42.17	44.27	15.7	48,200	1	46,055	982,728
LNG	10^4t			2.76			2.76	15.3	54,300	1	51,434	77,083
Natural Gas	10^8m^3	7.47	24.39	17.53		19.09	68.48	15.3	54,300	1	38,931	14,476,352
Other Petroleum Products	10^4t	0.05	1.22				1.27	20	72,200	1	41,816	38,343
Other Coke Products	10^4t						0	25.8	95,700	1	28,435	0
Other Energy	10^4t	15.59	112.68	49.33	28.77	1.1	207.47	0	0	0	0	0
Total of solid, liquid and gas fuels												660,845,535

Data Source:China Energy Statistical Yearbook 2011

Table A1-2 ECPG Installed Capacity in 2010

Province	Power Generation (10^8kWh)	Power Generation (MWh)	Self-comsumption Rate (%)	Net Power Supply (MWh)
Shanghai	942	94,200,000	4.98	89,508,840
Jiangsu	3,305	330,500,000	5.27	313,082,650
Zhejiang	2,082	208,200,000	5.34	197,082,120
Anhui	1,426	142,600,000	5.37	134,942,380
Fujian	891	89,100,000	5.17	84,493,530
Total		864,600,000		819,109,520

Data source: China Electric Power Yearbook 2011

Power Transaction in 2010

From NCPG to ECPG	16,547,520
OM of NCPG	1.0333
From CCPG to ECPG	40,113,670
OM of CCPG	0.9923
Total Emission of CO2	717,748,882
Total Power Supply	875,770,710
OM	0.8196

Table A2-1 OM Calculation of ECPG in 2011

Fuel types	unit	Provinces in the Regional Grid					Subtotal	Carbon Fctor	Effective Carbon Emission Factor	Carbon Oxidation Rate	NCV	CO_2 Emission (tCO_2e)
	U	Shanghai	Jiangsu	Zhejiang	Anhui	Fujian	$FC_{i,y}$	tC/TJ	$EF_{co2,i,y}$ (tCO2/TJ)	%	MJ/t,km^3 ,tce	K=F*G*H*I/ 100000(mass unit) 10000(volume unit)
	U	*A*	*B*	*C*	*D*	*E*	*F=A+B+C+D+E*	*G*	*H*	*I*	J	*K*
Raw Coal	10^4t	3,667.60	15,074.21	9,033.56	5,690.22	5,160.00	38625.59	25.80	87,300	1	20,908	705,020,689
Cleaned Coal	10^4t						0	25.80	87,300	1	26,344	0
Other Washed Coal	10^4t		192.29		1555.03		1747.32	25.80	87,300	1	8,363	12,757,007
Coke	10^4t						0	29.2	95,700	1	28,435	0
Gangue	10^4t		186.46	1	185.19		372.65	25.8	87,300	1	8,363	2,720,680
Coke Oven Gas	10^8m^3	0.77	10.49	0.34	5.73	0.19	17.52	12.1	37,300	1	16,726	1,093,037
Blast furnace gas	10^8m^3			25.32		7.29	32.61	70.8	219,000	1	3,763	2,687,380
Converter gas	10^8m^3			1.16		0.44	1.6	46.9	145,000	1	7,945	184,324
Other Coal Gas	10^8m^3	32.18					32.18	12.1	37,300	1	5,227	627,404
Crude Oil	10^4t			2.03			2.03	20	71,100	1	41,816	60,354
Gasoline	10^4t						0	18.9	67,500	1	43,070	0
Diesel Oil	10^4t	0.87	2.2	1.01	0.31	1.28	5.67	20.2	72,600	1	42,652	175,574
Fuel Oil	10^4t	14.15	0.2	7.05		0.44	21.84	21.1	75,500	1	41,816	689,512
Naphtha	10^4t						0	20.2	72,600	1	43,906	0
Lubricating oil	10^4t						0	20	71,900	1	41,398	0
Paraffin wax	10^4t						0	20	72,200	1	39,934	0
Solvent oil	10^4t						0	20	72,200	1	42,945	0
Petroleum pitch	10^4t						0	21	69,300	1	38,931	0
Petroleum coke	10^4t	21.22	1.29	40.77			63.28	26.6	82,900	1	31,947	1,675,912
LNG	10^4t			1.65			1.65	15.3	54,300	1	51,434	46,082
LPG	10^4t						0	17.2	61,600	1	50,179	0
Refinery Gas	10^4t	0.46	0.21		1.2	41.55	43.42	15.7	48,200	1	46,055	963,859
Natural Gas	10^8m^3	10.24	35.96	25.49		22.39	94.08	15.3	54,300	1	38,931	19,888,073
Other Petroleum Products	10^4t	0.05	1.14				1.19	20	72,200	1	41,816	35,927
Other Coke Products	10^4t						0	25.8	95,700	1	28,435	0
Other Energy	10^4t	16.34	122.66	74.06	213.74	1.28	428.08	0	0	0	0	0
Total of solid, liquid and gas fuels												748,625,815

Data Source:China Energy Statistical Yearbook 2012

Table A2-2 ECPG Installed Capacity in 2011

Province	Power Generation (10^8kWh)	Power Generation (MWh)	Self-comsumption Rate (%)	Net Power Supply (MWh)
Shanghai	1,022	102,200,000	4.60	97,498,800
Jiangsu	3,731	373,100,000	5.10	354,071,900
Zhejiang	2,343	234,300,000	4.90	222,819,300
Anhui	1,624	162,400,000	5.00	154,280,000
Fujian	1,272	127,200,000	4.70	121,221,600
Total		999,200,000		949,891,600

Data source: China Electric Power Yearbook 2012

Power Transaction in 2011

From Shanxi to ECPG	15,769,540
OM of NCPG	1.0798
From CCPG to ECPG	33,792,550
OM of CCPG	0.9827
Total Emission of CO2	798,861,703
Total Power Supply	999,453,690
OM	0.7993

Table A3-1 OM Calculation of ECPG in 2012

Fuel types	unit	Provinces in the Regional Grid					Subtotal	Carbon Fctor	Effective Carbon Emission Factor	Carbon Oxidation Rate	NCV	CO_2 Emission (tCO_2e)
	U	Shanghai	Jiangsu	Zhejiang	Anhui	Fujian	$FC_{i,y}$	tC/TJ	$EF_{co2,i,y}$ (tCO2/TJ)	%	MJ/t,km^3 ,tce	K=F*G*H*I/ 100000(mass unit) 10000(volume unit)
	U	*A*	*B*	*C*	*D*	*E*	*F=A+B+C+D+E*	*G*	*H*	*I*	J	*K*
Raw Coal	10^4t	3,397.31	15,723.65	8,633.73	7,539.89	4,501.98	39796.56	25.80	87,300	1	20,908	726,394,034
Cleaned Coal	10^4t						0	25.80	87,300	1	26,344	0
Other Washed Coal	10^4t		242.09		298.74		540.83	25.80	87,300	1	8,363	3,948,545
Briquettes	10^4t						0	26.60	87,300	1	20,908	0
Gangue	10^4t		22.08	0.8	297.08		319.96	25.8	87,300	1	8,363	2,335,996
Coke	10^4t						0	29.2	95,700	1	28,435	0
Coke Oven Gas	10^8m^3	1.18	10.38	0.69	5.56	0.28	18.09	12.1	37,300	1	16,726	1,128,599
Blast furnace gas	10^8m^3			33.19	18.24	9.67	61.1	70.8	219,000	1	3,763	5,035,233
Converter gas	10^8m^3			1.52	3.47	1.11	6.1	46.9	145,000	1	7,945	702,735
Other Coal Gas	10^8m^3	25.7					25.7	12.1	37,300	1	5,227	501,065
Other Coking Products	10^4t						0	25.8	95,700	1	28,435	0
Crude Oil	10^4t			2.25			2.25	20	71,100	1	41,816	66,895
Gasoline	10^4t						0	18.9	67,500	1	43,070	0
Kerosene	10^4t	0	0	0	0	0	0	19.6	71,900	1	43,070	0
Diesel Oil	10^4t	0.75	1.7	0.86	0.41	1.02	4.74	20.2	72,600	1	42,652	146,776
Fuel Oil	10^4t	7.58	0.19	1.29		0.62	9.68	21.1	75,500	1	41,816	305,608
Naphtha	10^4t						0	20.2	72,600	1	43,906	0
Lubricating oil	10^4t						0	20	71,900	1	41,398	0
Paraffin wax	10^4t						0	20	72,200	1	39,934	0
Solvent oil	10^4t						0	20	72,200	1	42,945	0
Petroleum pitch	10^4t						0	21	69,300	1	38,931	0
Petroleum coke	10^4t	17.84	0.27	36.15			54.26	26.6	82,900	1	31,947	1,437,025
LPG	10^4t						0	17.2	61,600	1	50,179	0
Refinery Gas	10^4t	0.44	0.44		0.99	42.02	43.89	15.7	48,200	1	46,055	974,293
Other Petroleum Products	10^4t	0.02	1.11				1.13	20	72,200	1	41,816	34,116
Natural Gas	10^8m^3	14.54	43.95	25.31		21.41	105.21	15.3	54,300	1	38,931	22,240,903
LNG	10^4t			0.03			0.03	15.3	54,300	1	51,434	838
Other Energy	10^4t	18.97	185.58	60.95	210.58	0.67	476.75	0	0	0	0	0
Total of solid, liquid and gas fuels												765,252,660

Data Source:China Energy Statistical Yearbook 2013

Table A3-2 ECPG Installed Capacity in 2012

Province	Power Generation (10^8kWh)	Power Generation (MWh)	Self-comsumption Rate (%)	Net Power Supply (MWh)
Shanghai	967	96,700,000	4.5	92,348,500
Jiangsu	3,943	394,300,000	5.0	374,585,000
Zhejiang	2,273	227,300,000	4.9	216,162,300
Anhui	1,767	176,700,000	4.9	168,041,700
Fujian	1,118	111,800,000	4.7	106,545,400
Total		1,006,800,000		957,682,900

Data source: China Electric Power Yearbook 2013

Power Transaction in 2012

From NCPG to ECPG	16,980,330
OM of NCPG	1.0583
From CCPG to ECPG	52,287,240
OM of CCPG	0.9437
Total Emission of CO2	832,566,412
Total Power Supply	1,026,950,470
OM	0.8107
Averaged OM	0.8095

Table B1-1 Calculation sheet for λCoal, λOil, λGas of ECPG in 2012

Fuel types	unit	Provinces in the Regional Grid					Subtotal	Effective Carbon Emission Factor	Carbon Oxidation Rate	NCV	CO_2 Emission (tCO_2e)
	U	Shanghai	Jiangsu	Zhejiang	Anhui	Fujian	$FC_{i,y}$	$EF_{co2,i,y}$ (tCO2/TJ)	%	MJ/t,km^3,tce	K=F*G*H*I/ 100000(mass unit)
	U	*A*	*B*	*C*	*D*	*E*	*F=A+B+C+D+E*	*G*	*H*	I	K
Raw Coal	10^4t	3,397.31	15,723.65	8,633.73	7,539.89	4,501.98	39796.56	87,300	1	20,908	726,394,034
Cleaned Coal	10^4t	0	0	0	0	0	0	87,300	1	26,344	0
Other Washed Coal	10^4t	0	242.09	0	298.74	0	540.83	87,300	1	8,363	3,948,545
Briquettes	10^4t	0	0	0	0	0	0	87,300	1	20,908	0
Gangue	10^4t	0	22.08	0.8	297.08	0	319.96	87,300	1	8,363	2,335,996
Coke	10^4t	0	0	0	0	0	0	95,700	1	28,435	0
Other Coking Products	10^4t	0	0	0	0	0	0	95,700	1	28,435	0
Total of solid fuels											732,678,575
Crude Oil	10^4t	0	0	2.25	0	0	2.25	71,100	1	41,816	66,895
Gasoline	10^4t	0	0	0	0	0	0	67,500	1	43,070	0
Diesel Oil	10^4t	0.75	1.7	0.86	0.41	1.02	4.74	72,600	1	42,652	146,776
Kerosene	10^4t	0	0	0	0	0	0	71,900	1	43,070	0
Fuel Oil	10^4t	7.58	0.19	1.29	0	0.62	9.68	75,500	1	41,816	305,608
Petroleum coke	10^4t	17.84	0.27	36.15	0	0	54.26	82,900	1	31,947	1,437,025
Other Petroleum Product	10^4t	0.02	1.11	0	0	0	1.13	72,200	1	41,816	34,116
Total of liquid fuels											1,990,420
Natural Gas	10^7m^3	145.4	439.5	253.1	0	214.1	1052.1	54,300	1	38,931	22,240,903
LNG	10^4t	0	0	0.03	0	0	0.03	54,300	1	51,434	838
Coke Oven Gas	10^7m^3	11.8	103.8	6.9	55.6	2.8	180.9	37,300	1	16,726	1,128,599
Blast furnace gas	10^7m^3	0	0	331.9	182.4	96.7	611	219,000	1	3,763	5,035,233
Converter gas	10^7m^3	0	0	15.2	34.7	11.1	61	145,000	1	7,945	702,735
Other Coal Gas	10^7m^3	257	0	0	0	0	257	37,300	1	5,227	501,065
LPG	10^4t	0	0	0	0	0	0	61,600	1	50,179	0
Refinery Gas	10^4t	0.44	0.44	0	0.99	42.02	43.89	48,200	1	46,055	974,293
Total of gas fuels											30,583,665
Other Energy	10^4t	18.97	185.57	60.95	210.58	0.67	476.74	0	0	0	0
Total of solid, liquid and gas fuels											765,252,660

Data Source:China Energy Statistical Yearbook 2013

λCoal	95.74%
λOil	0.26%
λGas	4.00%

Table B1-2 Efficiency Level of the Best Power Generation Technology Commercially

	Variable	Efficiency of Power Supply A	Emission Factor of Fuel (kgCO2/TJ) B	Oxidation Factor C	Emission Factor (tCO2/MWh) D=3.6/A/1000000*B*
Coal	$EF_{Coal.Adv}$	40.03%	87300	1	0.7851
Oil	$EF_{Oil,Adv}$	52.90%	75500	1	0.5138
Gas	$EF_{Gas,Adv}$	52.90%	54300	1	0.3695

	EF_{Adv}	$\lambda*EF_{Adv}$
Coal	0.7851	0.7517
Oil	0.5138	0.0013
Gas	0.3695	0.0148
	$EF_{Thermal}$	0.76780

Table B1-3 ECPG Installed Capacity in 2012

Installed Capacity	unit	Shanghai	Jiangsu	Zhejiang	Anhui	Fujian	total
thermal power	MW	21,180	69,820	47,050	32,230	26,320	196,600
hydro	MW	0	1,140	9,840	2,780	11,400	25,160
nuclear	MW	0	2,120	4,330	0	0	6,450
wind farm and other	MW	285	2,360	412	319	1,131	4,507
total	MW	21,465	75,440	61,632	35,329	38,851	232,717

Data source: China Electric Power Yearbook 2013

Table B1-4 ECPG Installed Capacity in 2011

Installed Capacity	unit	Shanghai	Jiangsu	Zhejiang	Anhui	Fujian	total
thermal power	MW	19,430	64,800	46,260	29,590	25,100	185,180
hydro	MW	0	1,140	9,710	2,000	11,250	24,100
nuclear	MW	0	2,120	4,330	0	0	6,450
wind farm and other	MW	224	1,976	328	204	820	3,552
total	MW	19,654	70,036	60,628	31,794	37,170	219,282

Data source: China Electric Power Yearbook 2012

Table B1-5 ECPG Installed Capacity in 2010

Installed Capacity	unit	Shanghai	Jiangsu	Zhejiang	Anhui	Fujian	total
thermal power	MW	18,430	59,980	43,600	27,630	23,070	172,710
hydro	MW	0	1,140	9,690	1,690	11,110	23,630
nuclear	MW	0	2,120	3,670	0	0	5,790
wind farm and other	MW	154	1,460	257	0	550	2,421
total	MW	18,584	64,700	57,217	29,320	34,730	204,551

Data source: China Electric Power Yearbook 2011

Table B1-6 ECPG Installed Capacity in 2009

Installed Capacity	unit	Shanghai	Jiangsu	Zhejiang	Anhui	Fujian	total
thermal power	MW	16,540	52,420	43,300	26,790	18,920	157,970
hydro	MW	0	1140	9,560	1,620	10,980	23,300
nuclear	MW	0	2,120	3,010	0	0	5,130
wind farm and other	MW	42.1	952.5	233.9	0	460	1,689
total	MW	16,582	56,633	56,104	28,410	30,360	188,089

Data source: China Electric Power Yearbook 2010

Table B1-7 ECPG BM calculation

	Installed Capacity 2009	Installed Capacity 2010	Installed Capacity 2011	Installed Capacity 2012	2009-2012 New Capacity Additions*	2010-2012 New Capacity Additions*	2009-2010 New Capacity Additions*	Addition share
	MW	MW	MW	MW	MW	MW	MW	%
	A	B	C	D	E	F	G	H
Thermal Power	157,970	172,710	185,180	196,600	48,292	27,732	11,420	89.36%
Hydro	23,300	23,630	24,100	25,160	1,610	1,280	1,060	2.98%
Nuclear	5,130	5,790	6,450	6,450	1,320	660	0	2.44%
Other (wind)	1,689	2,421	3,552	4,507	2,818	2,086	955	5.21%
Total	188,089	204,551	219,282	232,717	54,040	31,758	13,435	100.00%
Percentage of the installed capacity in 2012					23.22%	13.65%	5.77%	

$EF_{BM,y}$ 0.6861 tCO_2e/MWh

*: In the calculation of capacity addtion of thermal power and hydro power, the shut-down thermal power capacity and the pumped storage hydropower capacity have been considered as well to reflect the actual capacity addtions value. The values are all sourced from the data published by China's DNA, in which the data of the shut-down thermal power capacity and the pumped storage hydropower capacity are also not specified.

Appendix 5. Further background information on monitoring plan

N/A

Appendix 6. Summary of post registration changes

Monitoring plan has been revised and got approved on 23/09/2011

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Document information

Version	*Date*	*Description*
06.0	9 March 2015	Revisions to: • Include provisions related to statement on erroneous inclusion of a CPA; • Include provisions related to delayed submission of a monitoring plan; • Provisions related to local stakeholder consultation; • Provisions related to the Host Party; • Editorial improvement.
05.0	25 June 2014	Revisions to: • Include the Attachment: Instructions for filling out the project design document form for CDM project activities (these instructions supersede the "Guidelines for completing the project design document form" (Version 01.0)); • Include provisions related to standardized baselines; • Add contact information on a responsible person(s)/ entity(ies) for the application of the methodology (ies) to the project activity in B.7.4 and Appendix 1; • Change the reference number from *F-CDM-PDD* to *CDM-PDD-FORM;* • Editorial improvement.
04.1	11 April 2012	Editorial revision to change version 02 line in history box from Annex 06 to Annex 06b
04.0	13 March 2012	Revision required to ensure consistency with the “Guidelines for completing the project design document form for CDM project activities” (EB 66, Annex 8).
03.0	26 July 2006	EB 25, Annex 15
02.0	14 June 2004	EB 14, Annex 06b
01.0	03 August 2002	EB 05, Paragraph 12 Initial adoption.

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