Beijing No.3 Thermal Power Plant Gas-Steam Combined Cycle Project Using Natural Gas

CDM Registration Ref. N. 1373

CDM MONITORING REPORT 1

Monitoring period: 15 February 2008 – 30 June 2008

Project participants:

Jingfeng Gas Fired Power Co. Ltd

RWE Power AG

Monitoring Report prepared by the CDM Consultant:

Enecore Carbon Ltd

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Annexes and Appendixes

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Initial remark (referring to Decision 17/CP.7, Annex H, paragraph 54, 56, 58 and 60)

The monitoring plan contained in the registered project design document is to be implemented by the project participants and the monitoring report shall be written in accordance with this registered monitoring plan. The monitoring plan shall be based on a previously approved monitoring methodology or a new methodology. The implementation of the registered monitoring plan and its revision, as applicable, shall be a condition for verification, certification and issuance of CERs.

SECTION A. General project activity information

A.1 Title of the project activity:

Beijing No.3 Thermal Power Plant Gas-Steam Combined Cycle Project Using Natural Gas

A.2. CDM registration number:

This CDM Monitoring Report refers to the CDM Project titled "Beijing No.3 Thermal Power Plant Gas-Steam Combined Cycle Project Using Natural Gas" registered by the UNFCCC on February 15, 2008 (Ref. N. 1373).

A.3. Short description of the project activity:

Beijing No.3 Thermal Power Plant Gas-Steam Combined Cycle Project Using Natural Gas is located in Yungang area, Fengtai District of Beijing, China and is a natural gas-steam combined cycle power plant with rated capacity of 1×400MW. The rated annual electricity generation is 1400GWh with 3500 hours of designed annual operation hour, by consuming about 300 million Nm^3 of natural gas annually. The generated electricity is delivered to the North China Power Grid. The gas turbine power unit was put into operation in November, 2005.

The proposed project is covered by and connected to the North China Power Grid (NCPG), which is dominated by coal-fired power plants. The electricity generated by using natural gas which is clean energy with less carbon content, in the project site, can displace electricity generated by coal-fired thermal plants which would have been built otherwise. Thus the proposed project activity can reduce CO_2 emission accrued from the NCPG. The estimated annual GHG emission reductions over the chosen crediting period (7 years, renewable twice) are 623,788 tCO_2e.

A.4. Monitoring period:

This Monitoring Report covers a period of 4.5 months, from February 15, 2008 to June 30, 2008.

A.5. Methodology applied to the project activity (incl. version number):

A.5.1. Baseline methodology:

The approved CDM baseline methodology AM0029, Version 01: "Baseline Methodology for Grid Connected Electricity Generation Plants using Natural Gas" is applied to the project activity. The proposed project also uses the approved CDM baseline methodology ACM0002 (version 06): "Consolidated Methodology for Grid-connected Electricity Generation from Renewable Sources".

A.5.2 Monitoring methodology:

The approved CDM monitoring methodology AM0029 (version 01) "Grid Connected Electricity Generation Plants using Non-Renewable and Less GHG Intensive Fuel" is used by the project, in conjunction with approved CDM monitoring methodology ACM0002 (version 06): "Consolidated Methodology for Grid-connected Electricity Generation from Renewable Sources".

A.6. Status of implementation including time table for major project parts:

PROJECT TIME TABLE	
20 October 2000	EIA Approved
28 November 2003	FSR approved
March 2004	Construction Started
November 2005	Construction Completed (Including trial test)
01 December 2005	Started operation
22 May 2007	CDM ERPA Signed by both parties
08 June 2007	Revised draft PDD; prepared for project validation
26 June 2007	CDM GSP Started
02 July 2007	DOE On-Site audit
13 July 2007	Chinese DNA CDM Approval
30 August 2007	CDM Final Validation Report
07 December 2007	CDM request for registration
15 February 2008	CDM registration

A.7. Intended deviations, revisions and clarifications to the registered PDD:

Two (2) deviations from the registered PDD are reported.

Deviations:

A) According to the monitoring plan set out in the registered PDD, the value to be used for the parameter $EF_{CO2,\ GAS,y}$ is derived from the IPCC default values. This is not in line with the requirements of AM0029. As per AM0029 this parameter has to be determined on the basis of supplier-provided data, local data, country specific values, that order of preference. No use of IPCC default value is envisaged but for start-up fuel.

This Monitoring Report calculates a value of $EF_{CO2,\ GAS,y}$ in line with methodology AM0029, using supplier-provided data. This is a deviation from the registered PDD. It is anyhow underlined that the value of $EF_{CO2,\ GAS,y}$ as derived from the data supplied by the gas supplier is higher than the IPCC default value, hence more conservative as the parameter is used for project emission determination.

Correspondingly the PDD is subject to a request for revision.

According to the monitoring plan set out in the registered PDD, the NCV value is to be monitored fortnightly, in line with methodology AM0029. However reality shows that the data is measured continuously by the gas supplier, but reported only once a month to the Project Entity. This is a deviation from the registered PDD, which requires fortnightly reporting. It is anyhow underlined that, since the NCV is monitored continuously by the gas supplier, the monitoring requirement of AM0029 is not lowered.

Correspondingly the PDD is subject to a request for revision.

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Clarification:

The parameters $COEF_{coal}$ is listed in section B.7.1 of the registered PDD among data and parameters to be monitored, since its calculation needs to be re-made at the start of each subsequent crediting period (if applicable). However, to the purpose of this Monitoring Report, this parameter is not to be monitored since it is considered a fixed value over the first 7-years crediting period. Therefore this Monitoring Report does not list $COEF_{coal}$ under section B.2.2 among the parameters to be monitored. This is not a deviation from the registered PDD, but a revision of the registered PDD it might be necessary for clarification.

A.8. Intended deviations or revisions to the registered monitoring plan (Decision 17/CP.7, Annex H, paragraph 57 to be considered):

As stated above under A.7 two deviations from and one clarification to the registered monitoring plan have been applied to this Monitoring Report.

Correspondingly the monitoring plan is subject to a request for revision.

A.9. Changes since last verification:

This monitoring report refers to the initial CDM verification of the project. Therefore, there is no change since last verification.

A.10. Person(s) responsible for the preparation and submission of the monitoring report:

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SECTION B. Key monitoring activities according to the monitoring plan for the monitoring period stated in A.4. (referring to Decision 17/CP.7, Annex H, paragraph 53 (a) – (d) on data collection and archiving)

B.1. Monitoring equipment:

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B.1.2. Table providing Information on the equipment used (incl. manufacturer, type, serial number, date of installation, date of last calibration, information to specific uncertainty, need for changes and replacements):

Table B.1 – Equipment for monitoring electricity delivered to the grid

No.	Line Name	Switch No.	Type	S/N	Accuracy	Error Range	Manufacturer
1	Lucheng I line (M)	2201	SL7000	36011671	0.2S	±0.2%	Actaris
2	Lucheng I line (B)	2201	SL7000	36013901	0.2S	±0.2%	Actaris
3	Start Backup Transformer (M)	100 B	SL7000	36013778	0.2S	±0.2%	Actaris
4	Start Backup Transformer (B)	100 B	SL7000	36013848	0.2S	±0.2%	Actaris
5	1# Generator	01	SL7000	36005323	0.5S	±0.5%	Actaris
6	1# HV self service transformer	1# transformer	SL7000	36005315	0.5S	±0.5%	Actaris

Table B.2 - Equipment for monitoring the natural gas consumed

Name of equipment	Type and specification	Accuracy
4 Channel Advanced Ultrasonic Flow Meter CUI data processing software	DN300 (12”), ANSI #600, 3400-3700-451-2 Speed range: 1m/s to 30m/s. Repeating rate: <5mm/s (better than +/-0.2%). Resolution: <1.0mm/s.	Non-demarcated ±0.5% Demarcated ±0.1%
Flow computer	Daniel S600 type	
Gas Chromatography	EMERSON 2350 A	
Pressure transmitter	ROSEMOUNT, 3051S2TG4A2E	0.1s
Temperature transmitter	ROSEMOUNT, 3144PD1A1E1M5T1	0.2s

Monitoring equipment’s positioning is given in Annex 3 to this Monitoring Report.

B.1.3. Calibration procedures

Calibration of meters

An agreement has been signed between the project owner and the North China Power Grid Co. regarding the on site calibration of gateway site meter, in compliance with “Technical administrative code of electric energy metering device” (DL/T448-2000), in order to ensure the quality of the meter calibration and the accuracy of electricity measurement. The project owner has commissioned the Electricity Energy Measurement Center of the North China Power Grid Co. to conduct a field test under real load to check the measurement error of the meters at the gateway site metering points on a regular basis. Meters n. 1, 2, 3 and 4 are calibrated, four times a year, with each calibration arranged every three months at the beginning of the each season. Meters n. 5 and 6 are calibrated once a year, every twelve months.

Details on calibration procedure are given in Table C below.

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Table B.3 - Calibration Procedure for energy meters

No.	Content of Procedure	Responsible Party	Implementing Party
01	Sign meter calibration contract with NCEPRI	NCPGC, PP	NCEPRI
02	Establish calibration plan for the electricity meters	PP, NCEPRI	NCEPRI
03	Notice the NCEPRI on the schedule for calibration	PP	PP
04	NCEPRI staffs start the calibration work under the supervising by the power plant persons	PP, NCEPRI	PP, NCEPRI
05	Establish and implement security measure	PP, NCEPRI	PP, NCEPRI
06	Enter working field with special permission pass	PP, NCEPRI	PP, NCEPRI
07	At least two persons working together, one of them acting as supervisor	PP, NCEPRI	PP, NCEPRI
08	Set up marker plate or guardrail in the working area	PP	PP
09	Stand on well insulated mat, while working, and use on well insulated tool.	PP	PP
10	Inspect the working condition on site	NCEPRI	NCEPRI
11	Check environmental temperature (0 – 35)°C	NCEPRI	NCEPRI
12	Check voltage deviation against the rated value (not exceed ±10%)	NCEPRI	NCEPRI
13	Check frequency deviation against the rated value (not exceed ± 2%)	NCEPRI	NCEPRI
14	Check current load (not less than 10% of demar-cated current of the meter under calibration)	NCEPRI	NCEPRI
15	Check relative load stability	NCEPRI	NCEPRI
16	Dustproof and shockproof measure for the standard electricity energy meter	NCEPRI	NCEPRI
17	Check phase sequence and phase name mark for the standard meter	NCEPRI	NCEPRI
18	Check the insulation performance of the connecting lines between the standard meter and the testing terminal	NCEPRI	NCEPRI
19	Check poles and phase name mark of the standard meter and the testing terminal	NCEPRI	NCEPRI
20	Check the self-lock function between the standard meter and the testing terminal	NCEPRI	NCEPRI
21	Contacting check of the connecting lines with touch points between the standard meter and the testing terminal	NCEPRI	NCEPRI
22	Check the electric potential difference between the standard meter and the corresponding electric pressure terminal of the meter under testing	NCEPRI	NCEPRI
23	Inspect the equipment on-site, standard instrument and testing electric wires as a whole	NCEPRI	NCEPRI
24	Testing connection with measuring device	NCEPRI	NCEPRI
25	Connecting the electric pressure and current loop with monitoring instrument	NCEPRI	NCEPRI
26	Check the connection with the electricity energy meter charged	NCEPRI	NCEPRI

No.	Content of Procedure	Responsible Party	Implementing Party
27	Preheating the standard meter by connecting to the electric loop (not less than 15 minutes)	NCEPRI	NCEPRI
28	Measuring the error of the electricity energy meter under the real loading	NCEPRI	NCEPRI
29	Short circuit forbidden for electric pressure mutual inductor, and open circuit forbidden for electric current mutual inductor	NCEPRI	NCEPRI
30	Backout testing connection	NCEPRI	NCEPRI
31	Internal clock calibration of the electricity energy meter	NCEPRI	NCEPRI
32	Battery check	NCEPRI	NCEPRI
33	Examine voltage lose event record	NCEPRI	NCEPRI
34	Check whether the sum of electricity with respective tariff rate is equal to the total electricity amount	NCEPRI	NCEPRI
35	Internal calendar clock in electricity energy meter	NCEPRI	NCEPRI
36	Check correctness of time period setting corresponding to the given tariff rate	NCEPRI	NCEPRI
37	Check the accessing authority setting for the electricity energy meter and the number of recent coding as well as the time of the latest coding	NCEPRI	NCEPRI
38	Check the load curve of the electricity energy meter	NCEPRI	NCEPRI
39	Check correctness of max. demand register setting	NCEPRI	NCEPRI
40	Check correctness of clearance date setting for the electricity energy meter	NCEPRI	NCEPRI
41	Acquiring device: comparison of electricity energy meter data with data acquired at the main station	NCEPRI	NCEPRI
42	On-site verification of the original record of the electricity energy meter	NCEPRI	NCEPRI
43	Calibration results treatment	NCEPRI	NCEPRI
44	Resuming the calibration equipment to the working status before the calibration	NCEPRI, PP	NCEPRI, PP
45	End the calibration, expiring the special permission pass and leaving.	PP	PP

Calibrations of natural gas metering devices

The project owners has signed agreement with the gas supplier for periodic calibration and testing on the precision of the gas metering devices, in order to ensure the monitoring accuracy on the natural gas consumption and its content analysis. The calibration and testing for the two natural gas metering devices has been conducted by the gas supplier once every two year, according to the national measurement standard and regulation.

B.1.4. Involvement of Third Parties

The following third-parties are involved:

- Enecore Carbon Limited, as consultancy firm in charge for the Monitoring Report drafting and emission reduction calculation;
- The North China Electric Power Research Institute (NCEPRI), as responsible for calibration procedure;

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- The North China Power Grid Co. (NCPGC), in its role of controller of the electricity delivered to the grid by the project owner;
- The Beijing Gas Group Co. Ltd, in its role of controller of the natural gas supplied to the project owner.

B.2. Data collection (recorded data for the whole monitoring period and data from invoices in the respective period):

B.2.1. List of fixed default values:

Data / Parameter:	***$EF_{BL,CO2}$* – Baseline Emission Factor**
Value applied:	0.8823387 tCO_2e/MWh
Source:	As per registered PDD

Data / Parameter:	***$EF_{BL,upstream,CH4}$* - Fugitive CH_4 upstream emission of a 600MW sub-critical coal-fired plant**
Value applied:	5.7208×10^{-6} tCH_4/MWh
Source:	As per registered PDD

Data / Parameter:	**GWP_{CH4} – Global Warming Potential of Methane**
Value applied:	21
Source:	IPCC default value

Data / Parameter:	***$EF_{NG,upstream,CH4}$* - Fugitive CH_4 upstream emission of natural gas**
Value applied:	296 t CH_4/PJ
Source:	IPCC default value

B.2.2. List of variables:

Data / Parameter:	***$NCV_{NG,y}$* – Net calorific value**
Data unit:	MJ/Nm^3
Source:	Gas supplier
Value of data applied for the purpose of calculating emission reductions	34.7697 (weighted average)
Any comment:	NCV value is monitored continuously by the gas supplier and reported monthly to the Project Entity. The value used is the weighted average of the values monthly provided from February to June 2008.

Data / Parameter:	***$FC_{NG,y}$* – Quantity of natural gas consumed in the monitoring period**
Data unit:	Nm^3
Source:	Meter readings
Value of data applied for the purpose of calculating emission reductions	167,169,370.00
Any comment:	Recorded data have been cross-checked against invoice data and no significant different has been observed

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Data / Parameter:	$EG_{pj,y}$ - Electricity supplied to the grid in the monitoring period
Data unit:	MWh
Source:	Meter readings
Value of data applied for the purpose of calculating emission reductions	849,565.92
Any comment:	Recorded data have been cross-checked against invoice data and no significant different has been observed

Data / Parameter:	$OXID_{NG}$ - Oxidation rate of NG
Data unit:	%
Source:	2006 IPCC default value
Value of data applied for the purpose of calculating emission reductions	100
Any comment:	

Data / Parameter:	$EF_{CO2,NG,y}$ - CO_2 emission factor per unit of heat value of NG in year y
Data unit:	tC/GJ
Source:	Calculation
Value of data applied for the purpose of calculating emission reductions	15.3416 (
Any comment:	Data provided by the gas supplier have been used in line with methodology AM0029

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Data / Parameter:	$COEF_{NG}$ - Emission coefficient of natural gas as fuel per unit of volume
Data unit:	tCO_2/Nm^3
Source:	Calculated value
Value of data applied for the purpose of calculating emission reductions	0.0019559
Any comment:	Calculated based on the following formula according to the methodology: $COEF_{NG,y} = NCV_{NG,y} \times EF_{CO2,NG,y} \times OXID_{NG}$

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Data / Parameter:	$EF_{OM,y}$ - Operation marginal emission factor of the grid in the project operation period
Data unit:	tCO_2e/MWh
Source:	CDM website of China DNA, http://cdm.ccchina.gov.cn/website/cdm/ (The part of the North China power grid)
Value of data applied for the purpose of calculating emission reductions	1.0585
Any comment:	Data is from China DNA and an official national electricity statistic data source with low uncertainty. As per registered PDD

Data / Parameter:	$EF_{BM,y}$ - Build marginal emission factor of the grid in the project

	operation period
Data unit:	tCO_2e/MWh
Source:	CDM website of China DNA, http://cdm.ccchina.gov.cn/website/cdm/ (The part of the North China power grid)
Value of data applied for the purpose of calculating emission reductions	0.9066
Any comment:	Data is from China DNA and an official national electricity statistic data source with low uncertainty. As per registered PDD

Data / Parameter:	***EF_y* - Combined marginal emission factor of the grid in the project period**
Data unit:	tCO_2e/MWh
Source:	CDM website of China DNA, http://cdm.ccchina.gov.cn/website/cdm/ (The part of the North China power grid)
Value of data applied for the purpose of calculating emission reductions	0.98255
Any comment:	Data is from China DNA and an official national electricity statistic data source with low uncertainty. As per registered PDD

B.2.3. Data concerning GHG emissions by sources of the project activity (referring to paragraph 53(a)):

Table B.4 and B.5 below show all collected data from February 15, 2008 to June 30, 2008. All relevant data are also reported in Appendix B to this Monitoring Report.

Table B.4 - Recorded and invoice data of natural gas consumption and power generation

	RECORDED DATA		INVOICE DATA	
Month Year	**Gas Consumption (Nm^3)**	**Power Supplied to the Grid (MWh)**	**Gas Consumption (Nm^3)**	**Power Supplied to the Grid (MWh)**
February 2008	7,261,600.00	33,888.49	8,014,540.00	33,943.80
March 2008	26,117,770.00	122,757.16	26,117,770.00	122,769.90
April 2008	45,524,000.00	235,459.36	45,524,000.00	235,471.50
May 2008	44,252,000.00	232,214.53	44,252,000.00	232,250.70
June 2008	44,014,000.00	225,246.38	44,014,000.00	225,258.00
TOTAL	**167,169,370.00**	**849,565.92**	**167,922,310.00**	**849,693.90**

Table B.5 – NCV net values of NG as reported by the gas supplier

Month	**NCV Value** MJ/Nm^3

February 2008	35.0279
March 2008	34.8745
April 2008	34.8500
May 2008	34.7658
June 2008	34.5857
Weighted Average	**34.7697***

*weighted on gas consumption 'recorded' data

B.2.4. Data concerning GHG emissions by sources of the baseline (referring to paragraph 53(b)):

Table B.4 above shows all monthly aggregated data from February 15, 2008 to June 30, 2008. All relevant data are also reported in Appendix B to this Monitoring Report, and detailed in Appendixes C and D.

B.2.5. Data concerning leakage (referring to paragraph 53(c)):

Table B.4 above shows all monthly aggregated data from February 15, 2008 to June 30, 2008. All relevant data are also reported in Appendix B to this Monitoring Report, and detailed in Appendixes C and D.

B.2.6.Data concerning environmental impact (referring to paragraph 53(d)):

No environmental impact recorded during the given monitoring period.

B.3. Data processing and archiving (incl. software used):

The electricity energy data acquiring subsystem mainly consists of electricity energy data management system 2001 (EDMS2001), which is a software installed at the main station terminal of the MPTMS2001 electricity auto-billing system. EDMS2001 is a Windows 2000 and ORACLE large commercial database based DBMS. This system also includes multiple communication protocol data communication software (MPDCS). The system is designed as distributive network architecture, in which the database, communication software and database management software are separated, so that it can take the advantage of good compatibility and adaptation capability with environment, and direct connection with SL7000 meters for acquiring data from the multiple function electricity energy meters. Also the system can transmit the acquired electricity energy data to the main station of the power grid system via multiple communication channels, and the whole electricity billing system's clock time is unified by using Global Positioning System (GPS). The system by using state-of-art IT can ensure the integrity, accuracy, uniqueness, security and reliability for the electricity energy data, based on which the multiple functions can be realized, such as statistic analysis, load analysis, line loss analysis, electricity balance analysis, checking electricity generated by the plant and data complementary between the primary and the backup meters.

The amount of NG consumed by the project activity is monitored by the natural gas measuring system (3400 type ultrasonic gas flow meter and Daniel S600 flow computer system, manufactured by DANIEL Measurement and Control Co.). The natural gas measure system is configured and installed according to "Technical requirements of measuring systems for natural gas"(GB/T18603-2001). The real-flow testing and checking has been carried out by the qualified measurement technology verification institution authorized by Chinese government, in accordance with the provisions of the national metrology specification JJG198 "The Rules for Speed-flow Meter Verification".
The metering point is installed in front of the natural gas delivery point, using two ultrasonic gas flow meters, one of which is for reserve. In case the working ultrasonic gas flow meter is

detected in fault, the system will alarm automatically, then the system prompt start up the standby ultrasonic gas flow meter and close the faulted ultrasonic gas flow meter.
The project owner has signed an urban gas supply contract with the Beijing Gas Group Co. ltd., under which the natural gas supply monitoring will be implemented in detail.

B.4. Special event log:

No special event log occurred during the given monitoring period of this Monitoring Report.

SECTION C. Quality assurance and quality control measures

C.1. Documented procedures and management plan:

C.1.1. Roles and responsibilities:

A CDM Group has been set up internally by Beijing Jingfeng Gas Fired Power Co. The CDM Group is in charge, *inter alia*, of the implementation and management of the whole monitoring plan, including monitoring and management of CDM data.

The vice general manager of Beijing Jingfeng Gas Fired Power Co. (i.e Mr. Tian Jianmin) is the leader of the CDM group responsible for all the relevant activities during project operations and maintaining period. Mr. Zhou Fusheng, Chief Engineer of the Beijing Jingfeng Gas Turbine Power Co. is responsible for the supervision and correct work of the CDM monitoring group. The leader of the Maintenance Department (i.e. Mr. Cao Mansheng) and the vice leader of the Safety Department (i.e. Mr. Li Xiaobin) are responsible for organizing and managing the data reading.

An Operation Manual developed by the Safety Department describes all process responsibilities and data processing system. The Manual incorporates natural gas-turbine technical standard guidelines with CDM process management. The Operational Manual is made available to verifying DOE.

C.1.2. Trainings:

The staff, including the CDM Group, has been be trained about correct operation and maintenance of Beijing Jingfeng natural gas plant by the equipment manufacturing company, according to the training contract included in the equipment procurement contract. In addition, the CDM consultants (i.e. Enecore Carbon Limited and Beijing Huajinhao Company) provided training on CDM procedures and methodologies.

C.2. Involvement of Third Parties:

There is no involvement of third parties, but the CDM consultants (i.e. Enecore Carbon Limited and Beijing Huajinhao Company).

C.3. Internal audits and control measures:

Data Reading: the on-duty (in shift) staffs in the Operation Department, are responsible for the data monitoring and recording in the log book daily, especially the electricity generated, electricity delivered to the grid and the quantity of natural gas consumed every day.

Data Verification: the statistical staffs in the Planning & Finance Department are in charge of verification and confirmation for the monitoring data records, which will be aggregated and reported to CDM Group leader monthly. After checking and ensuring without material mistake, this data are archived and also sent to the Director of the Finance Department which makes financial clearance with the power Grid Company and natural gas Supply Company on the electricity sale and the gas payment respectively. The invoices are archived and managed by the Director of Finance Department.

Meter Supervision: technicians specialised in electric measuring/thermal engineering, are responsible for the daily maintenance and supervision of the electricity energy meters and the natural gas flow meters, including their periodic calibration.

C.4. Troubleshooting procedures:

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Possible unexpected cases and relevant emergency responses are listed in the table below.

No.	Unexpected case	Emergency response measure
01	Voltage loss of power supply at data acquiring device	Measuring the power supply voltage, try to find out the cause, remove the troubles, resume electricity supply ASAP, reducing the loss of electricity.
02	Voltage loss of power supply at the electricity energy meter	Measuring the power supply voltage at the electricity energy meter and the electric circuit, try to find out the cause, and remove the troubles
03	Strike of light at electric current terminal	Shorting the current circuit, try to find out the cause, and remove the troubles
04	Short circuit of the voltage loop	Turn off the small switch at the electric pressure mutual inductor
05	Fault in communication system	Measuring the voltage at the communication terminals, try to find out the cause, and remove the troubles

None of the unexpected cases listed above occurred during the given monitoring period.

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SECTION D. Calculation of GHG emission reductions (referring to Decision 17/CP.7, Annex H, paragraph 53 (f) and 59)

D.1. Table providing the formulas used:

CO_2 emission coefficient of natural gas per unit	$COEF_{NG,y} = NCV_{NG,y} \times EF_{CO2,NG,y} \times OXID_{NG}$
Project Emissions	$PE_y = FC_{NG,y} \times COEF_{NG,y}$
Baseline Emissions	$BE_y = EG_{pj,y} \times EF_{BL,CO2,y}$
Leakage	$LE_y = LE_{CH_4,y}$
Fugitive CH_4 emissions	$LE_{CH_4,y} = \left[FC_y \times NCV_y \times EF_{NG,upstream,CH4} - EG_{PJ,y} \times EF_{BL,upstream,CH4}\right] \times GWP_{CH_4}$

D.2. Description and consideration of measurement uncertainties and error propagation

Various capacity values are mentioned in the project documentation (e.g. PDD, Validation Report, etc.). To the purpose of this first Monitoring Report and for any future Monitoring Report and other documentation the capacity value of 406.83 MW is chosen. This value resulted from the performance test of the natural gas plant carried out by the technology provider and installer (i.e. Mitsubishi Heavy Industries Dongfang Gas Turbine Co., Ltd), and is considered fully reliable.

Recorded data have been used and cross-checked with invoice data. Non significant differences in both volume of gas consumption and power generation between the two set of data (i.e. recorded and invoice data) were observed:

1. the amount of gas consumed in February 2008 is different if we use recorded data (i.e. 7,261, 600 Nm^3) or invoice data (i.e. 8,014,540 Nm^3). This is because relevant invoices aggregate the gas consumed both in January and February 2008. The NGCC plant gradually resumed energy production in January 17, 2008 after a one month period of maintenance.

2. Volumes of power generation are higher when considering invoice data. This is because relevant invoice data do not deduct the electricity volume imported from the grid as measured by the gateway meter N. 3, but only the portion of imported electricity as measured by meter N. 1. On the contrary, recorded data are the result of deduction of the total imported electricity (as measured by meter N. 3) from the power supplied to the grid (as measured by meter N. 1).

The above explanation also fully justifies the choice of the recorded data as most reliable one, with a lower margin of error.

D.3. GHG emission reductions (referring to B.2. of this document):

D.3.1. Project emissions:

According to the AM0029 version 01, GHG project emissions consist only in emission of CO_2 from on-site consumption of natural gas to generate electricity. Since the project does not use auxiliary fuels for operating (i.e. the starting fuel for gas turbine is natural gas itself), no other CO_2 emissions are considered. Therefore Project emissions are calculated as follows:

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First we calculate the emission coefficient of NG using the formula below:

$$COEF_{NG,y} = NCV_{NG,y} \times EF_{CO2,NG,y} \times OXID_{NG} \quad (1)$$

Where:

$NCV_{NG,y}$: the net calorific value of NG (MJ/Nm^3), 34.7697 MJ/Nm^3 (weighted average of the NCV values monthly provided by the gas supplier).

$EF_{CO2,NG,y}$: the CO_2 emission factor per unit of heat value of NG in year y, 15.3416 tC/TJ, measured using supplier-provided data in line with AM0029. See Appendix B for detail on calculation.

$OXID_{NG}$: the oxidation rate of NG, the 2006 IPCC default value 100% is used.

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$COEF_{NG,y}$ = 34.7697 MJ/Nm^3 × 1 × 15.3416 tC/TJ×44/12/1000000 = 0.0019559 tCO$_2$e/Nm^3

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Then, project emissions are calculated applying the below formula, where the quantity of natural gas consumed by the project activity during the monitoring period ($FG_{NG,y}$) is multiplied by the calculated emission coefficient of NG ($COEF_{NG,y}$).

$$PE_y = FG_{NG,y} \times COEF_{NG,y} \quad (2)$$

PE = 167,169,370.00 Nm^3 × 0.0019559 tCO$_2$e/Nm^3 = **326,963.85 tCO$_2$e**

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D.3.2. Baseline emissions:

According to the below formula, baseline emissions are calculated as the electricity supplied to the grid by the project ($EG_{pj,y}$) multiplied by the baseline CO_2 emission factor ($EF_{BL,CO2,y}$).

$$BE_y = EG_{pj,y} \times EF_{BL,CO2,y} \quad (3)$$

As stated in the registered PDD, project participants chose Option 3 among the options offered by methodology AM0029 version 01 for selection of the baseline emission factor ($EF_{BL,CO2,y}$). Option 3 is the emission factor of the technology (and fuel) identified as the most likely baseline scenario.

As per explanation in Section B.6.1 of the registered PDD, a 600 MW sub-critical coal-fired power plant has been identified as the most likely baseline scenario. The calculated emission factor for this technology ($EF_{BL,CO2,Option3}$) is

$EF_{BL,CO2,y} = EF_{BL,CO2,Option3}$ = **0.8823387 tCO$_2$e/MWh**.

Subsequently, baseline emissions are calculated as electricity supplied to the grid by the project ($EG_{pj,y}$) during the monitoring period multiplied by the calculated baseline CO_2 emission factor:

BE = 849,565.92 MWh × 0.8823387 tCO$_2$e/MWh = **749,604.89 tCO$_2$e**

D.3.3. Leakage:

Leakage may result from upstream processes of fossil fuels outside of the project boundary. This includes mainly fugitive CH_4 emissions and CO_2 emissions from associated fuel combustion and flaring. In according to the AM0029 version 01, the following leakage emission sources are considered:

- ***LE$_{CH4,y}$***: Fugitive CH_4 emissions associated with fuel extraction, processing, liquefaction, transportation, re-gasification and distribution of natural gas used in the project plant and fossil fuels used in the grid in the absence of the project activity.

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- ***$LE_{NG,CO2,y}$***: In the case NG is used in the project plant: CO_2 emission from fuel combustion/ electricity consumption associated with the liquefaction, transportation, re-gasification and compression into a natural gas transmission or distribution system.

In the case of the proposed project, no LNG consumption is used as fuel in the project activity. Therefore, Project leakage is calculated only as fugitive CH_4 emissions ($LE_{CH4,y}$), as per following formula:

$$LE_y = LE_{CH_4,y} \quad (4)$$

Fugitive CH_4 emissions ($LE_{CH4,y}$) are calculated multiplying the NG quantity consumed by the project in year y with the emission factor for fugitive CH_4 emissions ($EF_{NG,upstream,CH4}$) due to NG consumption and subtract the fugitive CH_4 emissions occurring from fossil fuels used in the selected baseline power plant in the absence of the project activity, according to the following formula:

$$LE_{CH_4,y} = \left[FC_y \times NCV_y \times EF_{NG,upstream,CH_4} - EG_{PJ,y} \times EF_{BL,upstream,CH_4}\right] \times GWP_{CH_4} \quad (5)$$

A default value of **296 tCH_4/PJ** is used for $EF_{NG,upstream,CH4}$.

As per Section B 6.3 of the registered PDD, the emission factor of a 600 MW sub-critical coal-fired power plant with the lowest levelised unit generation cost is selected as baseline emission factor. Thus the corresponding upstream fugitive CH_4 emission factor is:

$EF_{BL,upstream,CH4}$ = **5.7208×10^{-6} tCH_4/MWh**

Then, project fugitive CH_4 emissions ($LE_{CH4,y}$) are calculated for the given monitoring period.

LE = [(167,169,370 × 34.7697 × 2.96×10^{-7}) – 849,565.92 × 5.7208 x 10^{-6}] × 21 = **36,027.99 tCO_2e**

D.2.4. Summary of the emissions reductions during the monitoring period:

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

$$ER_y = BE_y - PE_y - LE_y \quad (6)$$

ER_y = 749,604.89 tCO_2e – 326,963.85 tCO_2e – 36,027.99 tCO_2e = **386,613.05 tCO_2e**

An excel spreadsheet summurising calculation of emission reductions is given in Appendix B to this Monitoring Report.

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Annex 1 – Definition and Acronyms

Acronyms

CER – Certified Emission Reductions
CDM – Clean Development Mechanism
DNA – Designated National Authority
DOE – Designated Operational Entity
EIA – Environmental Impact Assessment
ERPA – Emission Reduction Purchase Agreement
FSR – Feasibility Study Report
GHG – Greenhouse Gases
GPS – Global Positioning System
IPCC – Intergovernmental Panel on Climate Change
LNG – Liquefied Natural Gas
MPDCS - Communication Protocol Data Communication Software
NCEPRI - North China Electric Power Research Institute
NCPG – North China Power Grid
NCPGC – North China Power Grid Company
PDD – Project Designed Document
PP – Project Participants
UNFCCC – United Nation Framework Convention on Climate Change

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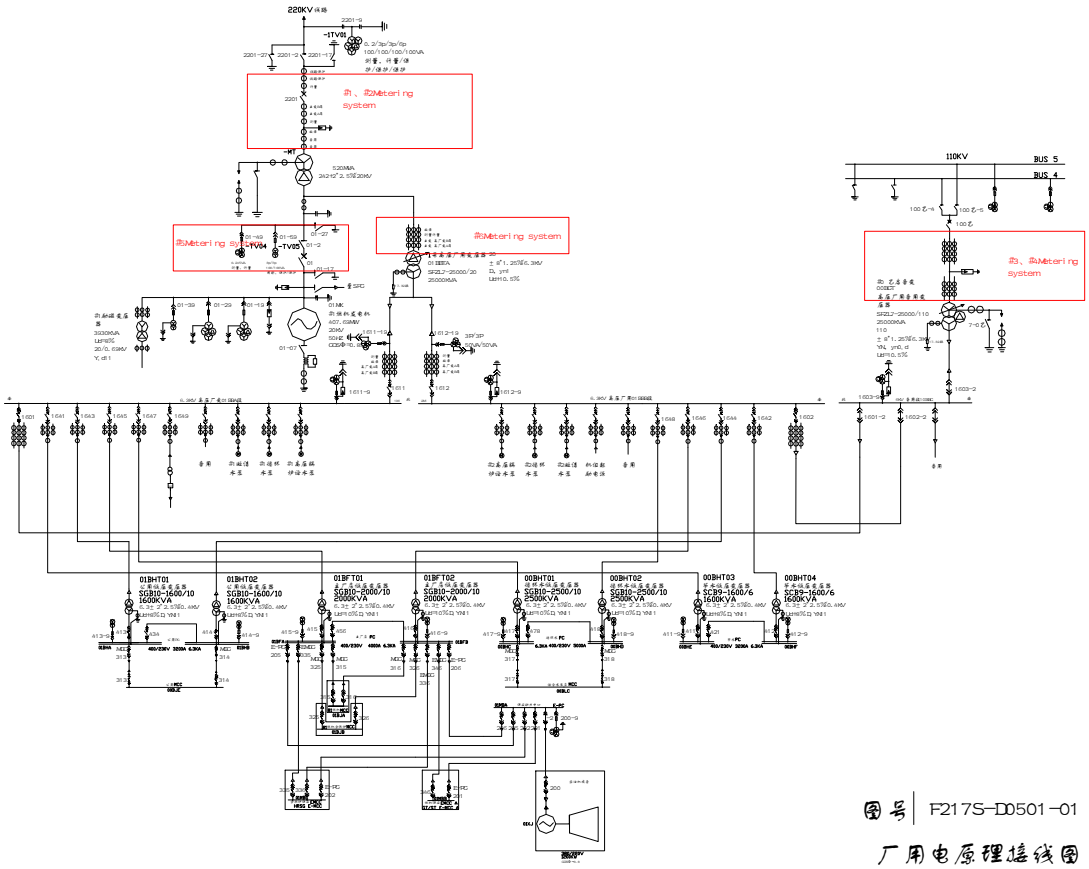
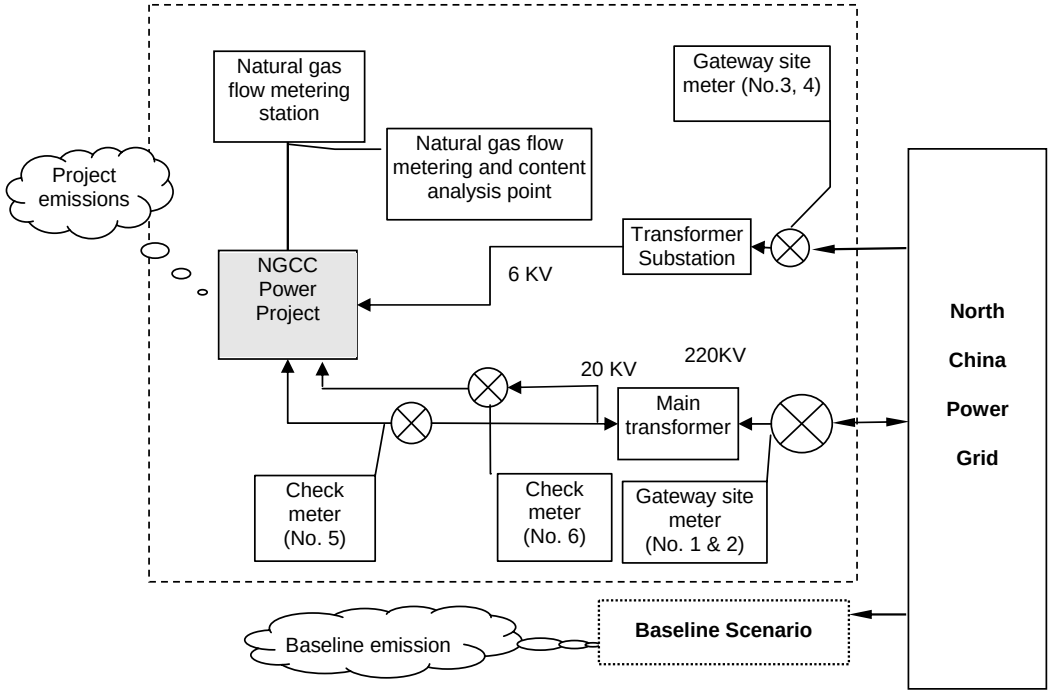
Annex 2 - Technical drawing – Primary line configuration diagram



Annex 3 – Energy and material flowchart including metering position

Figure 1 - Sketch map of the metering points



Note:
Meter N. 1 and N.3 are main meters
Meter N. 2 and N. 4 are back-up meters
Meter N. 5 and N. 6 are check meters

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Figure 2 – Flow gas diagram and flow gas meter position

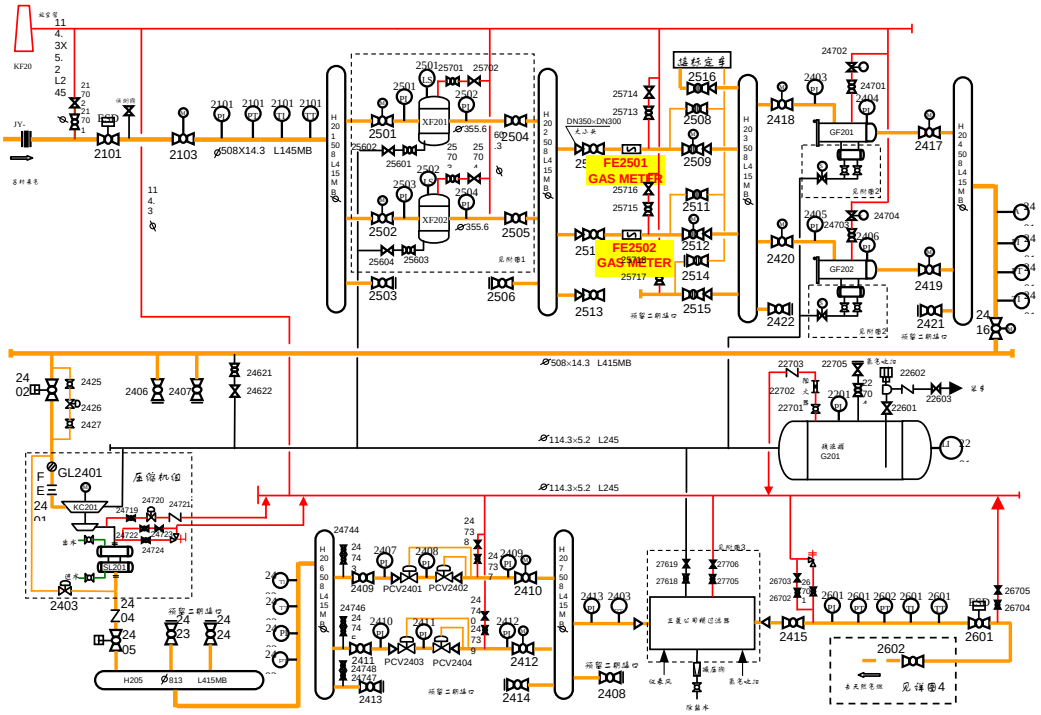

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Figure 3 - Structure Diagram of the Remote Electricity Billing System