MONITORING REPORT FORM (F-CDM-MR)
Version 02.0

MONITORING REPORT

Title of the project activity	Jincheng Sihe Coal Mine CMM Generation Project
Reference number of the project activity	1896
Version number of the monitoring report	02.0
Completion date of the monitoring report	15 October 2012
Registration date of the project activity	22 April 2009
Monitoring period number and duration of this monitoring period	Monitoring period 8# (01/07/2012-30/09/2012[1])
Project participant(s)	Shanxi Jincheng Anthracite Mining Group Co.,Ltd.; International Bank for Reconstruction and Development as the Trustee of the Prototype Carbon Fund (PCF) and the Trustee of the IBRD-Netherlands Clean Development Mechanism Facility (NCDMF); Netherlands' Ministry of Infrastructure and the Environment (IenM) ; Electrabel S.A; Netherlands' Ministry of Economic Affairs, Agriculture and Innovation (EL&I); Japan Carbon Finance, Ltd.; Kyushu Electric Power Co., Inc. ; Japan International Cooperation Agency (JICA) ; The Chugoku Electric Power Co., Inc. ; Chubu Electric Power Co., Inc. ; Mitsubishi Corporation ; MIT Carbon Fund Co., Ltd. ; Shikoku Electric Power Company, Incorporated ; Tohoku Electric Power Co., Inc. ; The Tokyo Electric Power Co., Inc; Mitsui & Co., Ltd.; BP Alternative Energy International Ltd. ; Deutsche Bank AG ; ICECAP Carbon Trading Ltd.; Government of Sweden - Swedish Energy Agency; Norsk Hydro ASA ; Government of Norway - Ministry of Foreign Affairs ; Statoil ASA; Fortum Corporation ; Government of Finland - Ministry of Foreign Affairs; GDF SUEZ; Government of Canada - Ministry of Foreign Affairs and International Trade; RWE Power AG
Host Party(ies)	China

[1] Both the starting and end dates are included in this monitoring period.

Sectoral scope(s) and applied methodology(ies)	Sectoral scopes 8: Mining/mineral production Sectoral scopes 10: Fugitive emissions from fuels (solid, oil and gas) Methodology: ACM0008 (Version 03)
Estimated amount of GHG emission reductions or net anthropogenic GHG removals by sinks for this monitoring period in the registered PDD	760,377tCO_2e
Actual GHG emission reductions or net anthropogenic GHG removals by sinks achieved in this monitoring period	770,293tCO_2e

SECTION A. Description of project activity

A.1. Purpose and general description of project activity

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Jincheng Sihe Coal Mine CMM Generation Project (hereafter the project) is utilizing the coal mine methane (CMM), that otherwise would be released to the atmosphere, to generate electricity and displace the electricity generated by North China power grid.

The project comprises of internal combined cycle combustion engines using the CMM as a fuel, as well as waste heat boilers and steam turbines for power generation. The gas extracted is pumped to the gas tank at the power plant and mixed, stirred, and dehydrated. The gas is delivered to the compressing station for compression and then injected to the gas engines for power generation. The waste heat from the gas engines is directed into the waste heat boiler to heat the steam which is driving the steam turbine to generate electricity. There are 4 power houses in the power plant. Each power house consists of 15 gas engines (of 1.8 MW each), 3 waste heat boilers (6 t/h), and 1 steam turbine (3 MW each). Thus, the total installed capacity of the power plant is 120 MW.

The project has been registered by the CDM Executive Board since 22/04/09. The crediting period started on 22/04/09 and is a fixed period of 10 years. The project started construction on 25/01/07. After the completion of construction, the project started commissioning and received the inspection approval on 16/02/09. The expected operational lifetime of the project activity is 25 years.

The start date of the eighth monitoring period described in this monitoring report is 01/07/2012 and the end date is 30/09/2012. In this monitoring period, the achieved emission reductions of the project are 770,293tCO_2e.

A.2. Location of project activity

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This project is located within Sihe Coal Mine, located in Jiafeng Town, Qinshui County, Jincheng City, Shanxi Province of the People's Republic of China.

GPS coordinates of the project activity are as follows:

Longitude: +112.5194 (112° 31'10" E);
Latitude: +35.5875 (35° 35'15" N)

A.3. Parties and project participant(s)

Party involved ((host) indicates a 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)
China (host)	Shanxi Jincheng Anthracite Mining Group Co., Ltd.	No

Netherlands	International Bank for Reconstruction and Development as the Trustee of the Prototype Carbon Fund (PCF) and the Trustee of the IBRD-Netherlands Clean Development Mechanism Facility (NCDMF); Netherlands' Ministry of Infrastructure and the Environment (IenM) ; Electrabel S.A; Netherlands' Ministry of Economic Affairs, Agriculture and Innovation (EL&I)	Yes
Japan	Japan Carbon Finance, Ltd.; Kyushu Electric Power Co., Inc. ; Japan International Cooperation Agency (JICA) ; The Chugoku Electric Power Co., Inc. ; Chubu Electric Power Co., Inc. ; Mitsubishi Corporation ; MIT Carbon Fund Co., Ltd. ; Shikoku Electric Power Company, Incorporated ; Tohoku Electric Power Co., Inc. ; The Tokyo Electric Power Co., Inc; Mitsui & Co., Ltd.	No
UK	BP Alternative Energy International Ltd. ; Deutsche Bank AG ; ICECAP Carbon Trading Ltd.	No
Sweden	Government of Sweden - Swedish Energy Agency	Yes
Norway	Norsk Hydro ASA ; Government of Norway - Ministry of Foreign Affairs ; Statoil ASA	Yes
Finland	Fortum Corporation ; Government of Finland - Ministry of Foreign Affairs	Yes
France	GDF SUEZ	No
Canada	Government of Canada - Ministry of Foreign Affairs and International Trade	Yes
Germany	RWE Power AG	No

A.4. Reference of applied methodology

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The approved consolidated methodology ACM0008 (Version 03): "*Consolidated methodology for coal bed methane and coal mine methane capture and use for power (electrical or motive) and heat and/or destruction by flaring"* is applied to the Project.

In accordance with the ACM0008 (Version 03), approved consolidated methodology ACM0002 (Version 06*) "Consolidated methodology for grid-connected electricity generation from renewable sources"* is adopted to calculate the emission factor of the North China Grid.

A.5. Crediting period of project activity

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The crediting period started on 22/04/09 and a 10-year fixed crediting period is adopted.

SECTION B. Implementation of project activity

B.1. Description of implemented registered project activity

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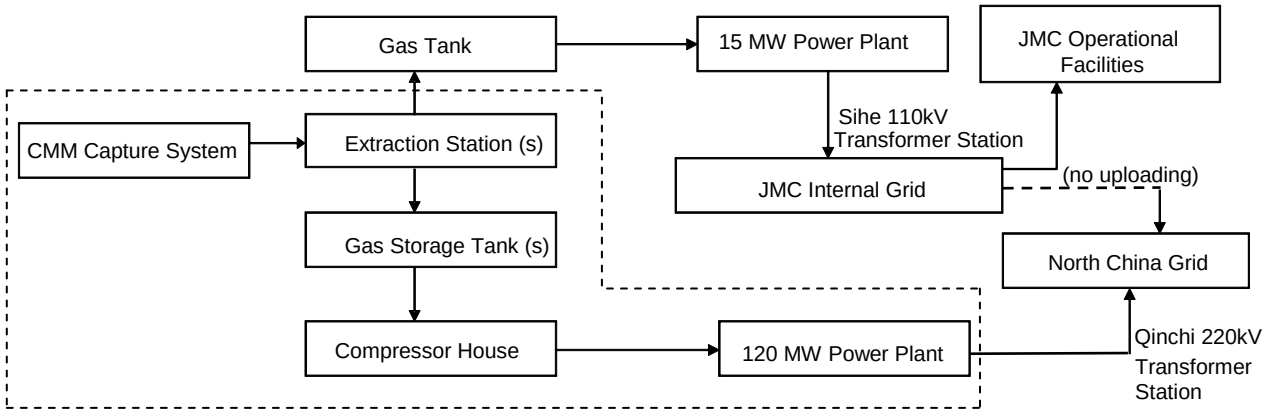
Combined cycle power generation technology is employed in the project which is composed of internal combustion engines using the CMM as fuel, waste heat boilers and steam turbines. There are four power houses in the power plant. Each power house consists of 15 gas engines (of 1.8 MW each), 3 waste heat boilers (6 t/h), and 1 steam turbine (3 MW). The flow diagram of the project activity is shown in Figure 1. (JMC is the acronym of Shanxi Jincheng Anthracite Mining Group Co., Ltd.)

Figure 1: Flow diagram of the power generation by the project.

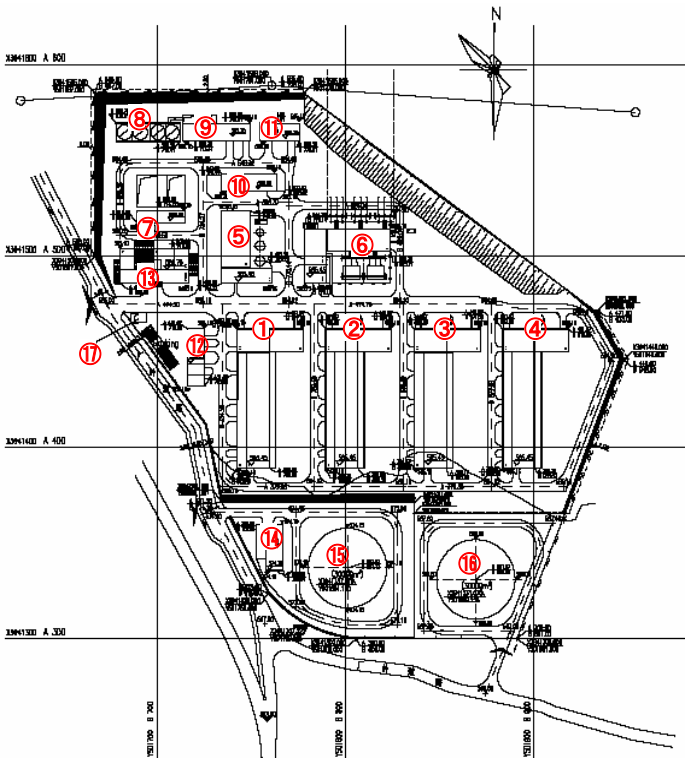


The CMM is captured by the capture system[2]. The captured CMM is then pumped through the extraction stations to the gas storage tanks where it is mixed, stirred, and dehydrated. After that the gas is delivered to the compressing station for compression and then injected to the gas engines for power generation. The waste heat from the gas engines is led into the waste heat boiler to heat the steam which will drive the steam turbine to generate electricity.

[2] Capture system in general refers to the drilling system as well as the gas collection pipeline.

The Figure 2 below illustrates the surface layout of the power generation part of this project activity.

Figure 2. Layout of the power generation facilities.



1	No.1 power house	10	Maintenance room
2	No.2 power house	11	Material storage
3	No.3 power house	12	Heat supply station
4	No.4 power house	13	Administration building
5	Chemical water treating	14	CMM compressing station
6	220KV substation	15	No.1 gas storage tank
7	Comprehensive pump house	16	No.2 gas storage tank
8	Mechanical draft cooling tower	17	Gate office
9	Circulation water pump room		

The project was fully commissioned on February 16, 2009. All the four power houses were put into operation at the same time. The 120MW power plant has been operated normally and consistently with the project design. The power plant was operated by the Qinshui Jinmei Methane Power Generation Co., Ltd., a full investment subsidiary company of JMC. The previous name of the company was Sihe Coal Mine Methane Power Plant and the name changed to Qinshui Jinmei Methane Power Generation Co., Ltd. in January 2010. Despite the change in name, the company remains owned by Shanxi Jincheng Anthracite Mining Group Co., Ltd (JMC).

The Monitoring Plan and the "CDM Project Management and Operations Manual" for this project has been developed based on which the monitoring activities are carried out. The on-site assessment of the initial verification was conducted on August 5-7, 2009 and received positive outcome. The on-site

assessment of the first periodic verification was conducted on January 9-10, 2010. The on-site assessment of the second periodic verification was conducted on August 11-13, 2010. The on-site assessment of the third and fourth periodic verification was conducted jointly on October 19-21, 2011. The on-site assessment of the fifth and sixth periodic verification was conducted jointly on April 11-13, 2012.

During this monitoring period (01/07/2012 to 30/09/2012), the 120MW power plant operated well and all the equipments and monitoring instruments had no malfunctions. The power plant had no scheduled outage.

No special event which may impact the applicability of the methodology occurred during the monitoring period.

B.2. Post registration changes

B.2.1. Temporary deviations from registered monitoring plan or applied methodology

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Not applicable.

B.2.2. Corrections

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Not applicable.

B.2.3. Permanent changes from registered monitoring plan or applied methodology

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The monitoring plan has been revised once. The revised monitoring plan was approved on 15/03/2011 and the present monitoring report has been prepared as per the approved monitoring plan.

Please refer to the web-link below for further details on the approved revision to the monitoring plan.
http://cdm.unfccc.int/Projects/DB/DNV-CUK1214826895.32/view

B.2.4. Changes to project design of registered project activity

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Not applicable.

B.2.5. Changes to start date of crediting period

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Not applicable.

B.2.6. Types of changes specific to afforestation or reforestation project activity

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Not applicable.

SECTION C. Description of monitoring system

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The Figure 3 below represents the diagram of flows and monitoring points of the new 120MW power plant and the existing 15MW experimental power plant. The Table 1 delineates all the monitoring meters, the

corresponding parameters measured and the installed location in accordance with the requirements of the latest approved monitoring plan as of 15/03/2011. The Table 1 separately indicates the meters providing data used for calculation of emission reductions and other meters providing data not used for emission reduction calculation (e.g. used for cross-checking purposes).

Figure 3: Flow diagram and monitoring points at Sihe mining site

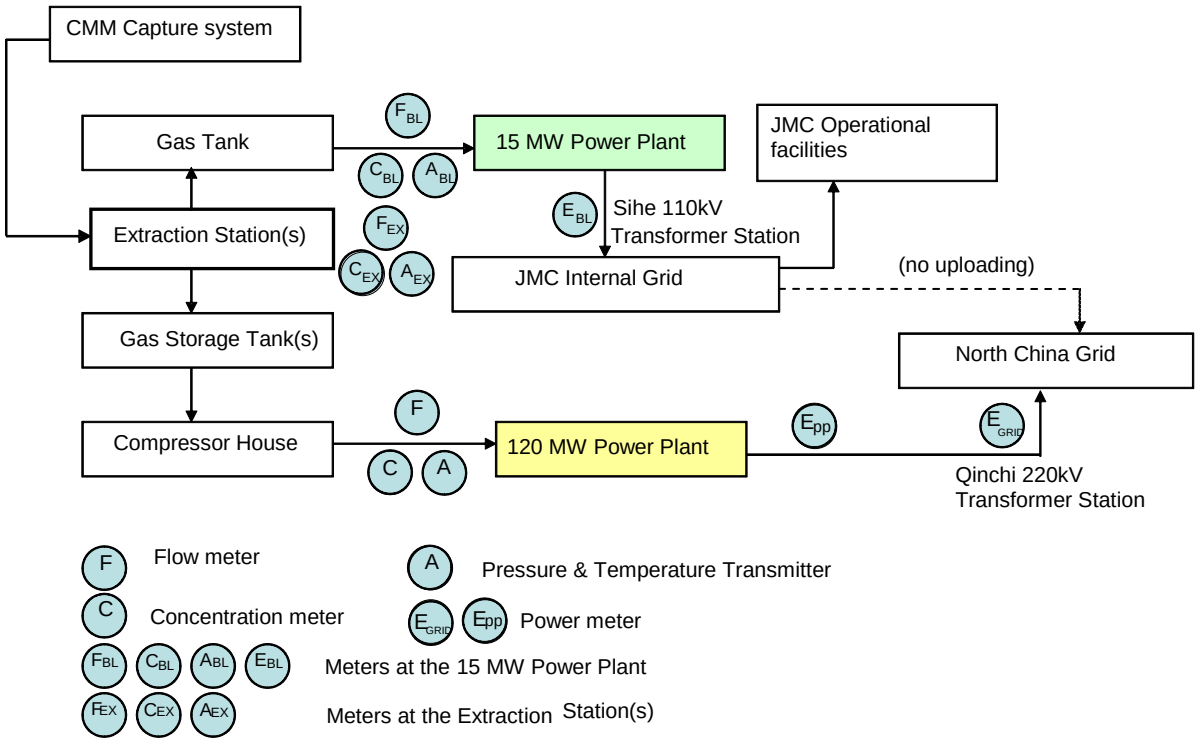


Table 1: Monitoring meters and parameters.

Symbol	Description	Monitored parameter	Installed location
Main meters used for calculation of emission reductions			
F	Gas Flow Meters	MM_{ELEC}	120MW power plant
A	Pressure & Temperature Transmitters	MM_{ELEC}	120MW power plant
C	Concentration Meters	MM_{ELEC} & $PC_{CH4,y}$	120MW power plant
E_{GRID}	Power Meters (main and backup meter)	$GEN_{1,y}$ $GEN_{2,y}$	Grid Company Qinchi 220kv transformer station
Monitoring meters not used for calculation of emission reductions			
E_{PP}	Power Meters (main and backup meter) (used for cross-checking)	$GEN_{1,y}$ $GEN_{2,y}$	120MW power plant
F_{EX}, C_{EX}, A_{EX}	Gas Flow Meters, Concentration Meters, Pressure & Temperature Transmitters	$MM_{total,y}$ $MM_{release,y}$	Extraction Station (s)
F_{BL}, C_{BL}, A_{BL}	Gas Flow Meters, Concentration Meters, Pressure & Temperature Transmitters	$MM_{BL,y}$	15MW Power Plant
E_{BL}	Power Meters	$GEN_{BL,y}$	15MW Power Plant

Monitoring equipments have been installed on all monitoring sites, including:

- No.1 and No.2 CMM Extraction Stations
- Compressor House of 120MW CMM Power Plant
- Central Controlling Room of 120MW CMM Power Plant
- 15MW CMM Power Plant

All instruments installed are in compliance with relevant national/sectoral standards and are calibrated and maintained in accordance with the manufacturers' instructions and relevant national/sectoral standards by the accredited third party and by the trained monitoring staff at each site, supervised by the site manager. The electricity meters are calibrated by authorized entities and inspected by the local grid company. All relevant records have been archived and will be kept for the longer of two years longer than the crediting period or two years after the last issuance of CERs.

The Table 2 indicates the main metering equipments that are used for calculation of emission reductions from the project (e.g., the meters installed at the 120MW power plant only). The number of installed meters is not including backup meters. More detailed information on the metering equipment listed in the Table 1 is provided in the Section D.

Table 2: Meters Installed at the Jincheng Sihe 120MW CMM Power Plant.

Type of metering equipment	Range	Accuracy level	Calibration frequency	No. of installed meters
Gas Flow Meter (differential pressure	0～6.0KPa	0.20%	Annual	4

transmitter)				
Pressure Transmitter	0～100KPa	0.20%	Annual	4
Temperature Transmitter	-200-500℃	±(0.30+0.005|t|)	Annual	4
Concentration Meter (methane concentration analyzer)	0-100%	±2.0%	Annual	4
Power Meter	0-99999.999	0.2S	Annual	2

Data collection

Each monitoring spot is equipped with the monitoring system including all kinds of instruments (as listed in the tables above) and computer system, and also the 120MW power plant is equipped with DCS (distributed control system). The data of the monitoring instruments are generated, collected and archived automatically by DCS. A spreadsheet with the data of each hour is generated automatically and can be printed out daily. The operators on duty will record the data manually per hour for cross-checking.

Data collection procedures for MM_{ELEC}, $MM_{total,y}$, $MM_{release,y}$, $MM_{BL,y}$ and $PC_{CH4,y}$

The data collection procedures for MM_{ELEC}, $MM_{total,y}$, $MM_{release,y}$ and $MM_{BL,y}$ are almost identical. The monitoring of $PC_{CH4,y}$ is integrated in the monitoring of $MM_{ELEC.}$

Gas mixture flow, methane concentration, gas pressure and gas temperature are continuously measured at each CMM monitoring spot using electronic equipment and archived in computer. Mass of methane is then calculated from those measurements. A spreadsheet is generated automatically to record the amount of methane, methane concentration, gas pressure and temperature values per hour. Also, these values are recorded manually per hour. The daily aggregation of methane can be obtained by the spreadsheet record or the manual record. These records are checked by the shift leader or the site manager and then copied for the CDM Office of JMC periodically. The Monitoring Team of the CDM Office check the records, sum up the amount of methane ($MM_{ELEC,}$ $MM_{total,y}$ $MM_{release,y,}$ $MM_{BL,y}$) respectively. $PC_{CH4,y}$, the concentration of methane in extracted gas is measured, read and recorded continuously. The concentration data recorded at 11AM of the first day of each month has been presented on section D.2 for illustration purpose only. MM_{ELEC} is used in the emission reductions calculation. $MM_{total,y,}$ $MM_{release,y}$ and $MM_{BL,y}$ are not used in the emission reductions calculation.

Data collection procedures for $GEN_{1,y}$ $GEN_{2,y}$ and $GEN_{BL,y}$

$GEN_{1,y}$ and $GEN_{2,y}$ are continuously measured both in 120MW Power Plant and Grid Company by bidirectional electricity meters. The Power Plant's personnel on duty record the readings hourly and sum up the daily electricity amount. The record is then checked by the shift leader or site manager and copied for the CDM Office periodically. The settlement notices are issued by the Grid Company monthly. The Monitoring Team of the CDM Office check and sum up the electricity amount data from the Power Plant monthly to crosscheck the electricity amount from the settlement notices. The differences between them are mostly small line loss. The electricity amount from the settlement notices is more conservative and therefore used in the emission reductions calculation.

$GEN_{BL,y}$ is continuously measured in 15MW power station by electricity meter. The 15MW Power Station's personnel on duty record the electricity amount hourly and sum up the daily electricity amount. The record is then checked by the shift leader or site manager and copied for the CDM Office periodically. The Monitoring Team of the CDM Office checks and sum up the electricity data monthly. $GEN_{BL,y}$ is not used in the emission reductions calculation.

Data collection procedures for $PC_{NMHC,y}$ and CEF_{NMHC}

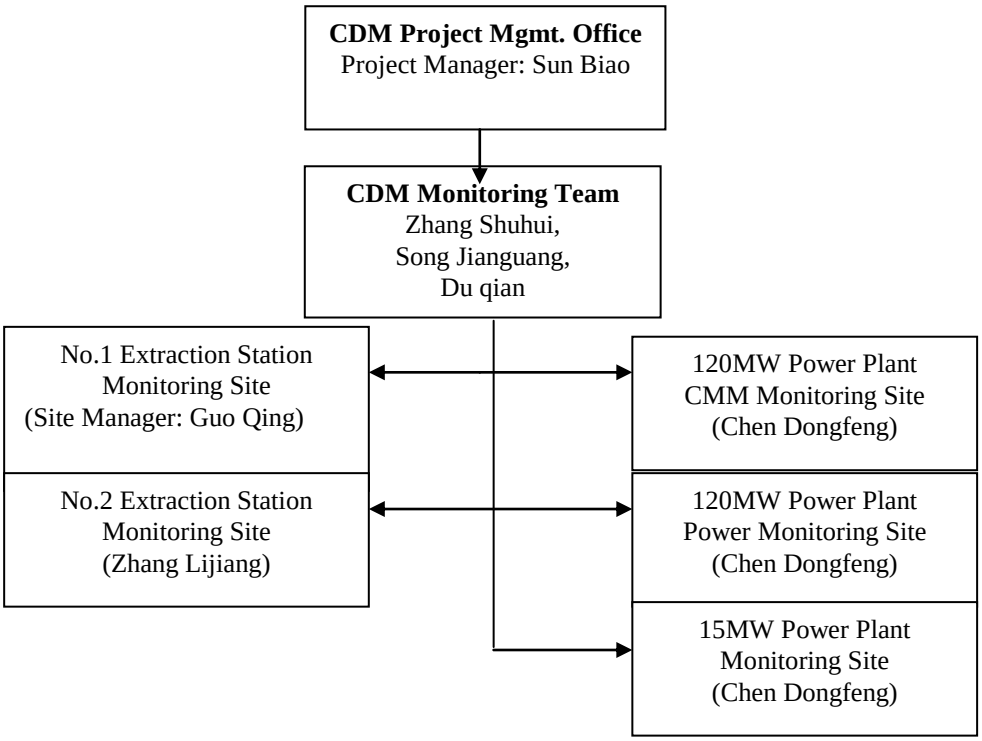
Samples of coal mine gas are taken annually, and analysed at a qualified laboratory. The testing result of NMHC is kept both in the 120MW power plant and the CDM Office. **$PC_{NMHC,y}$** will not be used in the Emission reductions calculation if the NMHC concentration is less than 1%. **CEF_{NMHC}** will be monitored only if $PC_{NMHC,y}$ >1% (PDD, page 35).

All the data are properly kept by the site managers and the CDM Office and will be kept for at least 2 years after the end of the crediting period.

Organizational structure, roles and responsibilities

The JMC has established a CDM Project Management Office and appointed Ms. Sun Biao as the project manager, who oversees the Office and is responsible for the overall CDM monitoring activities at JMC, supervising the implementation of the Monitoring Plan, checking and reviewing related data, reviewing and issuing the monitoring report. The organization structure of the monitoring is presented in Figure 4 with indication of the names of the personnel responsible for monitoring activities.

Figure 4: Organizational Structure of Monitoring.



Under the CDM Project Management Office, a Monitoring Team, consisting of Zhang Shuhui, Song Jianguang and Du Qian has been established. The Monitoring team is responsible for coordinating the monitoring issues of each monitoring site, supervising the regular checking and maintenance of the related meters, data recording, data handling and report preparations. The monitoring staffs have all received specific technical training before assuming their responsibilities.

At each monitoring site, a monitoring group has been established, including a site manager and several monitoring staffs (see Figure 4):

- For the No.1 CMM Extraction Station, the site manager is Guo Qing;
- For the No.2 CMM Extraction Station, the site manager is Zhang Lijiang; and
- For the 120MW CMM Power Plant and the experimental 15MW CMM Power Plant, the site manager is Chen Dongfeng.

The monitoring group is responsible for operations, maintenance and calibration of the monitoring meters and timely and accurately recording the data in accordance with the "CDM Project Management and Operating Manual" for this project. Each site manager is responsible for regular checks of the data recorded in order to verify if the values are accurate and complete.

The CDM Project Management Office also checks and verifies the data values when reviewing and consolidating the data collected from each site. In case there is a potential data issue, the site manager should inform the CDM Project Manager and attempt to solve the problem. If the issue relates to the equipment, the site manager should immediately contact the supplier and inform the CDM Project Manager. The site manager and monitoring staffs have all received necessary training.

Training

The training and professional education provided to the staffs includes:

1) The monitoring equipment suppliers provide training to the site managers and staff on how to operate the equipment and read meters so that the staff can undertake the tasks of data recording and equipment maintenance required by the monitoring plan;

2) The CDM experts provide specific CDM training to all personnel involved in the monitoring tasks;

3) Internal trainings are conducted periodically on how to comply with the rules and requirements in the "CDM Project Management and Operating Manual" for this project.

Emergency procedures for the monitoring system

In case of the malfunction of on-site digital systems or significant difference between automatic and manual records, site manager should analyze the discrepancy with the assistance of technical staffs based on historic records, technical standard of the equipment and the operational parameters. The site manager should contact the CDM Project Manager and make record of any malfunction or significant discrepancy.

In case of instrument malfunction, and after verification by the CDM Project Manager, the emissions reductions generated during the period of malfunction would not be counted in order to ensure integrity and quality of the emission reductions.

The monitoring team is responsible for the timely replacement of the failed equipment. All the measures taken to address the problem and correct the error should be reported to the CDM Project Manager. The CDM Project Manager needs to validate and sign on the report. The report should be archived according to the "CDM Project Management and Operating Manual".

In addition, backup meters are prepared, calibrated and ready for use in case of malfunction. Manual records are undertaken for crosschecking and backup.

SECTION D. Data and parameters

D.1. Data and parameters fixed ex ante or at renewal of crediting period

(Copy this table for each piece of data and parameter.)

Data/Parameter	$F_{i,j,y}$
Unit	Mt, Mm^3
Description	the amount of fuel *i* (in a mass or volume unit) consumed by relevant power sources j in year(s) *y*
Source of data	China Energy Statistical Yearbook (2000~2005)
Value(s) applied	See Annex 3 of PDD for details
Purpose of data	Official statistical data
Additional comment	

Data/Parameter	NCV_i
Unit	*TJ/ mass or volume unit of a fuel*
Description	the net calorific value (energy content) per mass or volume unit of a fuel *i*
Source of data	China Energy Statistical Yearbook (2005)
Value(s) applied	See Annex 3 of PDD for details
Purpose of data	National and official data
Additional comment	

Data/Parameter	$OXID_i$
Unit	%
Description	the oxidation factor of the fuel *i*
Source of data	*Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*
Value(s) applied	see Annex 3 of PDD for details
Purpose of data	National data not available, so IPCC default values are used.
Additional comment	

Data/Parameter	$EF_{CO2,i}$
Unit	tCO_2e/TJ
Description	the CO_2 emission factor per unit of energy of the fuel *i*
Source of data	*Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*
Value(s) applied	see Annex 3 of PDD for details
Purpose of data	National data not available, so IPCC default values are used.
Additional comment	

Data/Parameter	$G_{j,y}$
Unit	MWh
Description	the amount of electricity generation by source *j* in year *y*
Source of data	China Electric Power Yearbook (2000~2005)
Value(s) applied	See Annex 3 of PDD for details
Purpose of data	Official statistical data
Additional comment	

Data/Parameter	$e_{j,y}$
Unit	%
Description	station service power consumption rate of source *j* in year *y*
Source of data	See Annex 3 for details
Value(s) applied	Official statistical data
Purpose of data	China Energy Statistical Yearbook (2000~2005)
Additional comment	

Data/Parameter	$EE_{coal,adv}$
Unit	%
Description	Efficiency of most advanced coal-fired power technology that is commercially available
Source of data	Notice on the determination of emission factors of regional power grids by Chinese CDM DNA
Value(s) applied	36.53
Purpose of data	Official statistics of state power authority
Additional comment	

Data/Parameter	$EE_{oil,adv}$
Unit	%
Description	Efficiency of most advanced oil-fired power technology that is commercially available
Source of data	Notice on the determination of emission factors of regional power grids by Chinese CDM DNA
Value(s) applied	45.87
Purpose of data	Official statistics of state power authority
Additional comment	

Data/Parameter	$EE_{gas,adv}$
Unit	%
Description	Efficiency of most advanced gas-fired power technology that is commercially available
Source of data	Notice on the determination of emission factors of regional power grids by Chinese CDM DNA
Value(s) applied	45.87
Purpose of data	Official statistics of state power authority
Additional comment	

Data/Parameter	$CAP_{,i,y}$
Unit	MW
Description	Installed capacity of source *j* in year *y* in Northwest Power Grid
Source of data	China Energy Statistical Yearbook (2000~2005)
Value(s) applied	See Annex 3 of PDD for details
Purpose of data	Official statistical data

Additional comment	

Data/Parameter	EF_{ELEC}
Unit	tCO_2e/MWh
Description	Emissions factor of North China Grid
Source of data	Calculated according to ACM0002 (Version 6). The calculation details are provided in Annex 3 of the PDD.
Value(s) applied	0.98255
Purpose of data	The data are used to calculate the baseline emissions from power generation replaced by the project.
Additional comment	

Data/Parameter	CEF_{ELEC}
Unit	tCO_2e/MWh
Description	Carbon emission factor of electricity used by coal mine (= EF_{ELEC})
Source of data	See EF_{ELEC}
Value(s) applied	0.98255
Purpose of data	The data are used to calculate the project emissions due to the power consumption by the project.
Additional comment	Not applicable since the net electricity delivered to the grid is used for the calculation of emission reductions.

Data/Parameter	GWP_{CH4}
Unit	tCO_2e / tCH_4
Description	Global Warming Potential (GWP) of methane, valid for the relevant commitment period.
Source of data	Decisions under UNFCCC and the Kyoto Protocol (a value of 21 is to be applied for the first commitment period of the Kyoto Protocol)
Value(s) applied	21
Purpose of data	The data are used for the calculation of the project emissions from un-combusted methane.
Additional comment	Please also refer to the section B.6.1 of the registered PDD.

Data/Parameter	Eff_{ELEC}
Unit	%
Description	Efficiency of methane destruction/oxidation in power plant
Source of data	IPCC default value
Value(s) applied	99.5
Purpose of data	The data are used for calculation of project emissions from methane destroyed through power generation.
Additional comment	Please also refer to the section B.6.1 of the registered PDD.

Data/Parameter	CEF_{CH4}
Unit	tCO_2e/tCH_4
Description	Carbon emission factor for combusted methane

Source of data	According to the applied methodology
Value(s) applied	2.75
Purpose of data	The data are used for calculation of project emissions from methane destroyed through power generation.
Additional comment	Please also refer to the section B.6.1 of the registered PDD.

Data/Parameter	ρ
Unit	t/m^3
Description	Density of CH_4 under normal conditions
Source of data	IPCC default value
Value(s) applied	0.00067
Purpose of data	The data are used for calculation of project emissions from methane delivered to the power plant.
Additional comment	Please also refer to the section B.6.1 of the registered PDD.

Data/Parameter	$\mathbf{MM_{BL}}$
Unit	tCH_4
Description	Amount of methane consumed by the 15MW power plant
Source of data	Measured in m^3 and recorded in the log sheets and converted into tCH_4 using IPCC value of $0.00067t/m^3$
Value(s) applied	24,139.73
Purpose of data	Maximum annual value of the four years period prior to project implementation (year 2005-2008) is taken.
Additional comment	

Data/Parameter	$\mathbf{GEN_{BL}}$
Unit	MWh
Description	Electricity generated by the 15MW power plant
Source of data	Measured
Value(s) applied	86,089.234
Purpose of data	Maximum annual value of the four years period prior to project implementation (year 2005-2008) is taken.
Additional comment	

D.2. Data and parameters monitored

(Copy this table for each piece of data and parameter.)

Data/Parameter	MM_{ELEC}
Unit	tCH_4
Description	Methane measured delivered to the 120MW power plant during the monitoring period
Measured/Calculated /Default	Measured
Source of data	Measurements by project participants using gas flow meters, temperature &

<table>
<tr><td></td><td>pressure transmitters and gas concentration meters.</td></tr>
<tr><td>Value(s) of monitored parameter</td><td>37,586.04</td></tr>
<tr><td>Monitoring equipment</td><td>
<u>Gas flow meters (differential pressure transmitter)</u>
Accuracy class: 0.20%
<table>
<tr><th colspan="2">Serial numbers</th><th>Service time in this monitoring period</th><th>Date of last calibration</th><th>Validity of calibration</th></tr>
<tr><td rowspan="2">No.1 power house</td><td>01A0716337</td><td>July 1-August 15, 2012</td><td>25/08/2011</td><td>24/08/2012</td></tr>
<tr><td>09052891</td><td>August 15-Sep. 30, 2012</td><td>28/11/2011</td><td>27/11/2012</td></tr>
<tr><td rowspan="2">No.2 power house</td><td>01A0716336</td><td>July 1-August 15, 2012</td><td>25/08/2011</td><td>24/08/2012</td></tr>
<tr><td>632</td><td>August 15-Sep. 30, 2012</td><td>20/03/2012</td><td>19/03/2013</td></tr>
<tr><td>No.3 power house</td><td>634</td><td>July 1- Sep. 30, 2012</td><td>20/03/2012</td><td>19/03/2013</td></tr>
<tr><td>No.4 power house</td><td>633</td><td>July 1- Sep. 30, 2012</td><td>20/03/2012</td><td>19/03/2013</td></tr>
</table>
Calibration frequency: annual
Model: 1151DP3E22M1B1ED; 1151DP3E22M1B1D(632, 634&633)
Location: refer to meter F in Figure 3
Note: The interim replacement of gas flow meters corresponding to No.1 and No.2 power house is due to the calibration activities which require the meters to be delivered to the certified inspection institution.

<u>Pressure Transmitters</u>
Accuracy class: 0.20%
<table>
<tr><th colspan="2">Serial numbers</th><th>Service time in this monitoring period</th><th>Date of last calibration</th><th>Validity of calibration</th></tr>
<tr><td rowspan="2">No.1 power house</td><td>01A0643196</td><td>July 1-August 15, 2012</td><td>25/08/2011</td><td>24/08/2012</td></tr>
<tr><td>09052889</td><td>August 15-Sep. 30, 2012</td><td>28/11/2011</td><td>27/11/2012</td></tr>
<tr><td rowspan="2">No.2 power house</td><td>01A0643193</td><td>Dec. 21, 2011-June 30, 2012</td><td>25/08/2011</td><td>24/08/2012</td></tr>
<tr><td>09052890</td><td>August 15-Sep. 30, 2012</td><td>28/11/2011</td><td>27/11/2012</td></tr>
<tr><td>No.3 power house</td><td>635</td><td>July 1- Sep. 30, 2012</td><td>20/03/2012</td><td>19/03/2013</td></tr>
<tr><td>No.4 power house</td><td>637</td><td>July 1- Sep. 30, 2012</td><td>20/03/2012</td><td>19/03/2013</td></tr>
</table>
Calibration frequency: annual
Model: 1151GP5E22M1B1ED; 1151GP5E22M1B1D(635&637)
Location: refer to meter A in Figure 3
Note: The interim replacement of pressure transmitters corresponding to No.1 and No.2 power house is due to the calibration activities which require the meters to be delivered to the certified inspection institution.

<u>Temperature Transmitters</u>
Accuracy class: ±(0.30+0.005|t|)
<table>
<tr><th colspan="2">Serial numbers</th><th>Service time in this monitoring period</th><th>Date of last calibration</th><th>Validity of calibration</th></tr>
<tr><td>No.1 power house</td><td>7040214</td><td>July 1- Sep. 30, 2012</td><td>02/11/2011</td><td>01/11/2012</td></tr>
<tr><td>No.2 power house</td><td>7040213</td><td>July 1- Sep. 30, 2012</td><td>02/11/2011</td><td>01/11/2012</td></tr>
<tr><td>No.3 power house</td><td>7040216</td><td>July 1- Sep. 30, 2012</td><td>02/11/2011</td><td>01/11/2012</td></tr>
<tr><td>No.4 power house</td><td>7040215</td><td>July 1- Sep. 30, 2012</td><td>02/11/2011</td><td>01/11/2012</td></tr>
</table>
</td></tr>
</table>

<table>
<tr><td></td><td>Calibration frequency: annual
Model: Pt100
Location: refer to meter A in Figure 3

<u>Concentration meters (methane concentration analyzer)</u>
Accuracy class: ±2.0%
<table>
<tr><th colspan="2">Serial numbers</th><th>Service time in this monitoring period</th><th>Date of last calibration</th><th>Validity of calibration</th></tr>
<tr><td>No.1 power house</td><td>30105</td><td>July 1- Sep. 30, 2012</td><td>08/03/2012</td><td>07/03/2013</td></tr>
<tr><td>No.2 power house</td><td>25940</td><td>July 1- Sep. 30, 2012</td><td>08/03/2012</td><td>07/03/2013</td></tr>
<tr><td>No.3 power house</td><td>30106</td><td>July 1- Sep. 30, 2012</td><td>08/03/2012</td><td>07/03/2013</td></tr>
<tr><td>No.4 power house</td><td>29557</td><td>July 1- Sep. 30, 2012</td><td>08/03/2012</td><td>07/03/2013</td></tr>
</table>
Calibration frequency: annual
Model: 97460
Location: refer to meter C in Figure 3</td></tr>
<tr><td>Measuring/Reading/ Recording frequency</td><td>Continuous/Continuous/Continuous (system) + Hourly (manual)

Continuous monitoring, meters in compliance with relevant standards and requirements are used, and gas volumes, pressure, temperature and methane concentration are read and consolidated by a distributed control system.</td></tr>
<tr><td>Calculation method (if applicable)</td><td>Not applicable</td></tr>
<tr><td>QA/QC procedures</td><td>Flow meters, pressure & temperature transmitters and gas concentration meters are checked monthly and calibrated annually. Data are manually recorded hourly (on the hour ±5 minutes) for cross-checking and used as a backup in case the automatic recording system is under abnormal condition.</td></tr>
<tr><td>Purpose of data</td><td>Project emissions:
- from methane destroyed MD_{ELEC} (Formula 3 & 5 in the PDD);
- from un-combusted methane P_{UM} (Formula 6 in the PDD);

Baseline emissions:
- for release of methane into atmosphere that is voided by the project BE_{MR} (Formula 10 in the PDD)</td></tr>
<tr><td>Additional comment</td><td></td></tr>
</table>

Data/Parameter	$GEN_{1,y}$
Unit	MWh
Description	Electricity supplied by project activity to North China Grid during the monitoring period
Measured/Calculated /Default	Measured
Source of data	1. Monitored with power meter installed by the electric grid company and recorded in the form of Settlement Notice issued by the electric grid company (monthly);

<table>
<tr><td></td><td>2. Manually recorded by JMC hourly for cross-checking and backup.</td></tr>
<tr><td>Value(s) of monitored parameter</td><td>222,392.016 (settlement notice for ER calculation)
223,285.128 (manual record for cross-check)</td></tr>
<tr><td>Monitoring equipment</td><td><u>Bidirectional electricity meters</u> (JMC, used for cross-checking and backup)
Accuracy class: 0.2S
<table>
<tr><th>Serial numbers</th><th>Date of calibration</th><th>Validity of calibration</th></tr>
<tr><td>86384895 (Main)</td><td>03/06/2012</td><td>02/06/2013</td></tr>
<tr><td>86384896 (Back up)</td><td>03/06/2012</td><td>02/06/2013</td></tr>
</table>
Calibration frequency: annual
Model: ZMQ202C
Location: refer to meter E_{pp} in figure 3

<u>Bidirectional electricity meters</u> (Grid, used for emission reduction calculations)
Accuracy class: 0.2S
<table>
<tr><th>Serial numbers</th><th>Date of calibration</th><th>Validity of calibration</th></tr>
<tr><td>507003703 (Main)</td><td>07/05/2012</td><td>06/05/2013</td></tr>
<tr><td>507003731 (Back up)</td><td>07/05/2012</td><td>06/05/2013</td></tr>
</table>
Calibration frequency: annual
Model: DTSD718
Location: refer to meter E_{GRID} in figure 3</td></tr>
<tr><td>Measuring/Reading/ Recording frequency</td><td>Continuous/Continuous/Hourly</td></tr>
<tr><td>Calculation method (if applicable)</td><td>Not applicable</td></tr>
<tr><td>QA/QC procedures</td><td>The electricity delivered to the grid are recorded in the power settlement notice issued by the grid company based on the readings of the power meters installed at the Qinchi transformer station in accordance with relevant national and sectoral standards (indicated as point E_{GRID} on Figure 3). The amount of electricity delivered to the grid is double-checked by the readings of the power meters installed at the project 120MW power plant (indicated as point E_{PP} on Figure 3). All the power meters are calibrated annually.</td></tr>
<tr><td>Purpose of data</td><td>Baseline emissions from power generation replaced by the project $BE_{Use,y}$ (Formula 11 in the PDD)</td></tr>
<tr><td>Additional comment</td><td></td></tr>
</table>

Data/Parameter	$GEN_{2,y}$
Unit	MWh
Description	Electricity consumed by the project during the monitoring period which is supplied by North China Grid in case of emergency.
Measured/Calculated /Default	Measured
Source of data	1. Monitored with power meter installed by the electric grid company

<table>
<tr><td></td><td>and recorded in the form of Settlement Notice issued by the electric grid company (monthly);
2. Manually recorded by JMC hourly for cross-checking and backup.</td></tr>
<tr><td>Value(s) of monitored parameter</td><td>0 (settlement notice for ER calculation)
0 (manual record for cross-check)</td></tr>
<tr><td>Monitoring equipment</td><td>Bidirectional electricity meters (JMC, used for cross-checking and backup)
Accuracy class: 0.2S
<table>
<tr><th>Serial numbers</th><th>Date of calibration</th><th>Validity of calibration</th></tr>
<tr><td>86384895 (Main)</td><td>03/06/2012</td><td>02/06/2013</td></tr>
<tr><td>86384896 (Back up)</td><td>03/06/2012</td><td>02/06/2013</td></tr>
</table>
Calibration frequency: annual
Model: ZMQ202C
Location: refer to meter E_{pp} in figure 3

Bidirectional electricity meters (Grid, used for emission reduction calculations)
Accuracy class: 0.2S
<table>
<tr><th>Serial numbers</th><th>Date of calibration</th><th>Validity of calibration</th></tr>
<tr><td>507003703 (Main)</td><td>07/05/2012</td><td>06/05/2013</td></tr>
<tr><td>507003731 (Back up)</td><td>07/05/2012</td><td>06/05/2013</td></tr>
</table>
Calibration frequency: annual
Model: DTSD718
Location: refer to meter E_{GRID} in figure 3</td></tr>
<tr><td>Measuring/Reading/ Recording frequency</td><td>Continuous/Continuous/Hourly</td></tr>
<tr><td>Calculation method (if applicable)</td><td>Not applicable</td></tr>
<tr><td>QA/QC procedures</td><td>The electricity imported from the grid are recorded in the power settlement notice issued by the grid company based on the readings of the power meters installed at the Qinchi transformer station in accordance with relevant national and sectoral standards (indicated as point E_{GRID} on Figure 3). The amount of electricity imported from the grid is double-checked by the readings of the power meters installed at the project 120 MW power plant (indicated as point E_{PP} on Figure 3). All the power meters are calibrated annually.</td></tr>
<tr><td>Purpose of data</td><td>Baseline emissions from power generation replaced by the project $BE_{Use,y}$ (Formula 11 in the PDD)</td></tr>
<tr><td>Additional comment</td><td></td></tr>
</table>

Data/Parameter	$PC_{CH4,y}$
Unit	**%**
Description	Concentration of methane (in mass) in extracted gas (%), measured on wet basis
Measured/Calculated	Measured

<table>
<tr><td>/Default</td><td></td></tr>
<tr><td>Source of data</td><td>Daily monitoring by JMC. Meter readings transferred through digital (DCS) system and recorded automatically.</td></tr>
<tr><td>Value(s) of monitored parameter</td><td>
<table>
<tr><th>Date and time</th><th>No.1 Power House</th><th>No.2 Power House</th><th>No.3 Power House</th><th>No.4 Power House</th></tr>
<tr><td>1/7/2012 11:00AM</td><td>48.31</td><td>47.48</td><td>44.66</td><td>45.30</td></tr>
<tr><td>1/8/2012 11:00AM</td><td>47.06</td><td>47.16</td><td>46.28</td><td>48.07</td></tr>
<tr><td>1/9/2012 11:00AM</td><td>47.11</td><td>46.72</td><td>48.00</td><td>49.05</td></tr>
</table>
Note: The concentration of methane in extracted gas is measured, read and recorded continuously in compliance with the monitoring requirement. The data recorded at 11AM of the first day of each month has been presented above for illustration purpose only.</td></tr>
<tr><td>Monitoring equipment</td><td>Concentration meters (methane concentration analyzer)
Accuracy class: ±2.0%
<table>
<tr><th colspan="2">Serial numbers</th><th>Service time in this monitoring period</th><th>Date of last calibration</th><th>Validity of calibration</th></tr>
<tr><td>No.1 power house</td><td>30105</td><td>July 1- Sep. 30, 2012</td><td>08/03/2012</td><td>07/03/2013</td></tr>
<tr><td>No.2 power house</td><td>25940</td><td>July 1- Sep. 30, 2012</td><td>08/03/2012</td><td>07/03/2013</td></tr>
<tr><td>No.3 power house</td><td>30106</td><td>July 1- Sep. 30, 2012</td><td>08/03/2012</td><td>07/03/2013</td></tr>
<tr><td>No.4 power house</td><td>29557</td><td>July 1- Sep. 30, 2012</td><td>08/03/2012</td><td>07/03/2013</td></tr>
</table>
Calibration frequency: annual
Model: 97460
Location: refer to meter C in figure 3</td></tr>
<tr><td>Measuring/Reading/ Recording frequency</td><td>Continuous/Continuous/Continuous (system) + Hourly (manual)

Concentration meters, optical and calorific, with accuracy in compliance with relevant national standards.</td></tr>
<tr><td>Calculation method (if applicable)</td><td>Not applicable</td></tr>
<tr><td>QA/QC procedures</td><td>Concentration meters are checked monthly and calibrated annually to ensure accuracy.</td></tr>
<tr><td>Purpose of data</td><td>Integrated with the monitoring of MM_{ELEC} (methane delivered to the power plant)</td></tr>
<tr><td>Additional comment</td><td></td></tr>
</table>

Data/Parameter	$PC_{NMHC,y}$
Unit	%
Description	NMHC concentration in coal mine gas
Measured/Calculated /Default	Measured
Source of data	Testing report by Shanxi Coal Industry Bureau Comprehensive Testing Center on 23 April, 2012

Value(s) of monitored parameter	0 (C_2H_6=0.00%, C_3H_8=0.00%, C_4H_{10} (N- butane)=0.00%, C_4H_{10} (Isobutane)=0.00%)
Monitoring equipment	Owned and operated by Shanxi Coal Industry Bureau Comprehensive Testing Center
Measuring/Reading/ Recording frequency	Annual sampling The gas to be tested is sampled on site annually in accordance with relevant industry standards and procedures. The samples are analyzed by a qualified laboratory.
Calculation method (if applicable)	Not applicable
QA/QC procedures	The test is implemented by Shanxi Coal Industry Bureau Comprehensive Testing Center. A minimum of 3 samples is collected in secure gas sample vessels, suitable for storage and transport to the laboratory. If one sample is found to be faulty (i.e. gas leakage), the replacement sample will be taken.
Purpose of data	Verifying whether $PC_{NMHC,y}$ is below 1%
Additional comment	

Data/Parameter	CEF_{NMHC}
Unit	tCO_2e/t NMHC
Description	Carbon emission factor for combusted non methane hydrocarbons
Measured/Calculated /Default	Measured (only if $PC_{NMHC,y}$ >1%)
Source of data	Testing report by Shanxi Coal Industry Bureau Comprehensive Testing Center on April 23, 2012
Value(s) of monitored parameter	Not applicable since the $PC_{NMHC,y}$ =0
Monitoring equipment	Owned and operated by Shanxi Coal Industry Bureau Comprehensive Testing Center
Measuring/Reading/ Recording frequency	To be measured only when NMHC concentration (in mass) in coal mine gas is higher than 1%
Calculation method (if applicable)	Not applicable
QA/QC procedures	In the gas composition test report issued by Shanxi Coal Industry Bureau Comprehensive Testing Center on 23 April, 2012, the concentration of non methane hydrocarbons was 0, therefore, it is not required to measure $CEF_{NMHC.}$
Purpose of data	Project emissions from combustion of NMHC (Formula 3 in the PDD)
Additional comment	

Data/Parameter	$MM_{BL,y}$
Unit	tCH_4
Description	Amount of methane consumed by the 15MW power plant during the monitoring period.
Measured/Calculated /Default	Measured
Source of data	Digital and manual recording in log sheets

Value(s) of monitored parameter	0
Monitoring equipment	The meters for monitoring were not in use for the entire monitoring period due to the upgrade of the 15 MW power plant. During the upgrade, the 15 MW power plant was completely shut down and there was no methane consumed.
Measuring/Reading/ Recording frequency	Continuous/Continuous/Hourly Continuous monitoring, flow meters in compliance with relevant standards and requirement s are used. Gas volumes, pressure, temperature and concentration are read and consolidated by a distributed control system
Calculation method (if applicable)	Not applicable
QA/QC procedures	All the meters/sensors are checked monthly and calibrated annually to ensure accuracy.
Purpose of data	The readings of these meters are not used for ER calculation, but for crosschecking only. $MM_{BL,y}$ value are compared against MM_{BL} to ensure no leakage ($MM_{BL,y} >= MM_{BL}$). In case $MM_{BL,y} < MM_{BL}$, the difference will be calculated in terms of the contributing emission reductions, which will be deducted from the total claimed emission reductions. $MM_{BL,y}$ is lower than MM_{BL} in terms of monthly average , therefore the leakage is deducted from the total claimed ERs (please refer to section E.3 and CER calculation sheet).
Additional comment	The value of $MM_{BL,y}$ is zero due to the equipment upgrade of the 15 MW power plant. During the upgrade, the entire 15 MW power plant was shut down and the methane was not consumed.

Data/Parameter	$GEN_{BL,y}$
Unit	MWh
Description	Electricity generated by the 15MW power plant during the monitoring period.
Measured/Calculated /Default	Measured
Source of data	Meter readings and manual records (hourly) for cross-checking
Value(s) of monitored parameter	0
Monitoring equipment	The meters for monitoring were not in use for the entire monitoring period due to the upgrade of the 15 MW power plant. During the upgrade, the 15 MW power plant was completely shut down and there was no electricity generated.
Measuring/Reading/ Recording frequency	Continuous/Continuous/Hourly
Calculation method (if applicable)	Not applicable
QA/QC procedures	The power meter is calibrated in accordance with relevant national standard.
Purpose of data	The readings of the meter are not used for ER calculation, but for reference only. $GEN_{BL,y}$ value will be compared against GEN_{BL} to ensure no leakage

	($GEN_{BL,y}$>= GEN_{BL}). In case $GEN_{BL,y}$< GEN_{BL}, the difference will be calculated in terms of the contributing emission reductions, which will be deducted from the total claimed emission reductions. $GEN_{BL,y}$ is lower than GEN_{BL} in terms of monthly average , therefore the leakage is deducted from the total claimed ER for the monitoring period (details please refer to section E.3 and CER calculation sheet).
Additional comment	The value of $GEN_{BL,y}$ is zero due to the equipment upgrading of the 15 MW power plant. During the upgrade, the entire 15 MW power plant was shut down and there was no electricity generated.

Monitored parameters that are not used for calculation of ER

Data/Parameter	$MM_{total,y}$
Unit	tCH_4
Description	Total amount of methane extracted in Sihe Coal Mine during the monitoring period.
Measured/Calculated /Default	Measured
Source of data	Measurements by project participants using gas flow meters, temperature & pressure transmitters and gas concentration meters.
Value(s) of monitored parameter	65,479.57
Monitoring equipment	**Extraction station No.1** Pipe flow sensors Accuracy class: ±0.4m/s

Serial numbers		Service time in this monitoring period	Date of last calibration	Validity of calibration
720 system	L11102021	July 1- Sep. 30, 2012	23/03/2012	22/03/2013
1m system	L11102035	July 1- Sep. 30, 2012	23/03/2012	22/03/2013
530 system	L11102054	July 1- Sep. 30, 2012	23/03/2012	22/03/2013
Pre-extraction system	L11102031	July 1- Sep. 30, 2012	23/03/2012	22/03/2013
mined-area system	L11102032	July 1- Sep. 30, 2012	23/03/2012	22/03/2013
Xiao dong shan	L11102020	July 1- Sep. 30, 2012	23/03/2012	22/03/2013

Calibration frequency: annual
Model: GLY30
Location: refer to meter F_{EX} in figure 3

Temperature sensors
Accuracy class: ≤1°C

Serial numbers		Service time in t is monitoring period	Date of last calibration	Validity of calibration
720 system	W1109816	July 1- Sep. 30, 2012	15/03/2012	14/03/2013
1m system	W11091162	July 1- Sep. 30, 2012	15/03/2012	14/03/2013

530 system	W1109915	July 1- Sep. 30, 2012	15/03/2012	14/03/2013
Pre-extraction system	W11091052	July 1- Sep. 30, 2012	15/03/2012	14/03/2013
mined-area system	W11091135	July 1- Sep. 30, 2012	15/03/2012	14/03/2013
Xiao dong shan	W11091146	July 1- Sep. 30, 2012	15/03/2012	14/03/2013

Calibration frequency: annual
Model: GWD100(A)
Location: refer to meter A_{EX} in figure 3

Pressure sensors
Accuracy class: ±1%

Serial numbers		Service time in this monitoring period	Date of last calibration	Validity of calibration
720 system	Y1109684	July 1- Sep. 30, 2012	23/03/2012	22/03/2013
1m system	Y1109692	July 1- Sep. 30, 2012	23/03/2012	22/03/2013
530 system	Y1109698	July 1- Sep. 30, 2012	23/03/2012	22/03/2013
Pre-extraction system	Y1109718	July 1- Sep. 30, 2012	23/03/2012	22/03/2013
mined-area system	Y1109709	July 1- Sep. 30, 2012	23/03/2012	22/03/2013
Xiao dong shan	Y1109672	July 1- Sep. 30, 2012	23/03/2012	22/03/2013

Calibration frequency: annual
Model: GPD100
Location: refer to meter A_{EX} in figure 3

Methane sensors
Accuracy class: ＜±10% of true value

Serial numbers		Service time in this monitoring period	Date of last calibration	Validity of calibration
720 system	11091536	July 1- Sep. 30, 2012	23/03/2012	22/03/2013
1m system	11091516	July 1- Sep. 30, 2012	23/03/2012	22/03/2013
530 system	11091569	July 1- Sep. 30, 2012	23/03/2012	22/03/2013
Pre-extraction system	11091573	July 1- Sep. 30, 2012	23/03/2012	22/03/2013
mined-area system	11091483	July 1- Sep. 30, 2012	23/03/2012	22/03/2013
Xiao dong shan	11091524	Mar. 24-June 30, 2012	23/03/2012	22/03/2013

Calibration frequency: annual
Model: GJC100(A)
Location: refer to meter C_{EX} in figure 3

Extraction station No.2
V cone gas flow sensors
Accuracy class: ±1.5% for pressure and flow;
±2.5% for temperature;

Serial numbers	Service time in this monitoring period	Date of last calibration	Validity of calibration

	<table><tr><td>Intake pipe (Upper)</td><td>09225</td><td>July 1- Sep. 30, 2012</td><td>13/06/2012</td><td>12/06/2013</td></tr><tr><td>Intake pipe (Lower)</td><td>09224</td><td>July 1- Sep. 30, 2012</td><td>13/06/2012</td><td>12/06/2013</td></tr></table> Calibration frequency: annual Model: GLY500 Location: refer to meter F_{EX} in figure 3 <u>Methane concentration sensors</u> Accuracy class: ≤±7% of true value <table><tr><th colspan="2">Serial numbers</th><th>Service time in this monitoring period</th><th>Date of last calibration</th><th>Validity of calibration</th></tr><tr><td>Intake pipe (Upper)</td><td>3435</td><td>July 1- Sep. 30, 2012</td><td>17/06/2012</td><td>16/06/2013</td></tr><tr><td>Intake pipe (Lower)</td><td>2852</td><td>July 1- Sep. 30, 2012</td><td>17/06/2012</td><td>16/06/2013</td></tr></table> Calibration frequency: annual Model: GJG100H(B) Location: refer to meter C_{EX} in figure 3
Measuring/Reading/ Recording frequency	Continuous/Continuous/Hourly Continuous monitoring, flow meters in compliance with relevant standards and requirement s are used. Gas volumes, pressure, temperature and concentration are read and consolidated by a distributed control system (DCS).
Calculation method (if applicable)	Not applicable
QA/QC procedures	All the meters/sensors are checked monthly and calibrated annually to ensure accuracy.
Purpose of data	For cross-checking
Additional comment	

Data/Parameter	$MM_{release,y}$
Unit	tCH_4
Description	Total amount of methane still released to the atmosphere during the monitoring period.
Measured/Calculated /Default	Measured
Source of data	Measurements by project participants using gas flow meters, temperature & pressure transmitters and gas concentration meters.
Value(s) of monitored parameter	4,558.46
Monitoring equipment	**Extraction station No.1** <u>V cone gas flow sensor</u>

Accuracy class: ±1.5% for pressure and flow;
±2.5% for temperature;

Serial number	Service time in this monitoring period	Date of last calibration	Validity of calibration
10980	July 1- Sep. 30, 2012	09/05/2012	08/05/2012

Calibration frequency: annual
Model: GLY500
Location: refer to meter F_{EX} in figure 3

Methane concentration sensors
Accuracy class: ≤±7% of true value

Serial number	Service time in this monitoring period	Date of last calibration	Validity of calibration
2877	July 1- Sep. 30, 2012	09/05/2012	08/05/2012

Calibration frequency: annual
Model: GJG100H(B)
Location: refer to meter C_{EX} in figure 3

Extraction station No.2
V cone gas flow sensor
Accuracy class: ±1.5% for pressure and flow;
±2.5% for temperature;

Serial numbers		Service time in this monitoring period	Date of last calibration	Validity of calibration
Venting pipe (Left)	09226	July 1- Sep. 30, 2012	07/06/2012	06/06/2013
Venting pipe (Right)	09227	July 1- Sep. 30, 2012	19/06/2012	18/06/2013
Pressuring pump venting pipe	09173	July 1- Sep. 30, 2012	07/06/2012	06/06/2013

Calibration frequency: annual
Model: GLY500
Location: refer to meter F_{EX} in figure 3

Methane concentration sensors
Accuracy class: ≤±7% of true value

Serial numbers		Service time in this monitoring period	Date of last calibration	Validity of calibration
Venting pipe (left)	2838	July 1- Sep. 30, 2012	17/06/2012	16/06/2013
Venting pipe (right)	2826	July 1- Sep. 30, 2012	17/06/2012	16/06/2013
Pressuring pump venting pipe	3417	July 1- Sep. 30, 2012	17/06/2012	16/06/2013

Calibration frequency: annual
Model: GJG100H(B)

	Location: refer to meter C_{EX} in figure 3
Measuring/Reading/ Recording frequency	Continuous/Continuous/ Hourly Continuous monitoring, flow meters in compliance with relevant standards and requirement s are used. Gas volumes, pressure, temperature and concentration are read and consolidated by a distributed control system (DCS).
Calculation method (if applicable)	Not applicable
QA/QC procedures	All the meters/sensors are checked monthly and calibrated annually to ensure accuracy.
Purpose of data	For cross-checking
Additional comment	

D.3. Implementation of sampling plan

>>

Not applicable. Sampling plan is not required for the parameters in the project activity.

SECTION E. Calculation of emission reductions or GHG removals by sinks

E.1. Calculation of baseline emissions or baseline net GHG removals by sinks

>>

Baseline emissions can be calculated using the formulae below in accordance with the registered PDD:

$$BE = BE_{MD} + BE_{MR} + BE_{Use} \quad (7)$$

Where:

BE	Baseline emissions (tCO_2e)
BE_{MD}	Baseline emissions from destruction of methane in the baseline scenario (tCO_2e)
BE_{MR}	Baseline emissions from release of methane into the atmosphere that is avoided by the project activity (tCO_2e)
BE_{Use}	Baseline emissions from power generation replaced by this project (tCO_2e)

And:

$$BE_{MD}^{3} = 0$$

$$BE_{MR} = 21 \times MM_{ELEC} \quad (10)$$

$$BE_{Use} = (GEN_{1,y} - GEN_{2,y}) \times EF_{ELEC} \quad (11)$$

Where:

$GEN_{1,y}$	Electricity supplied by project activity to North China Grid (MWh)
$GEN_{2,y}$	Electricity consumed by project activity which is supplied by North China Grid in case of emergency (MWh)

[3] See PDD page 25-26.

EF_{ELEC} Emission factors of North China Grid (0.98255 tCO_2e/MWh)

GEN_1 and GEN_2 are continuously measured both in 120MW Power Plant and Grid Company by bidirectional electricity meters. The recordings in the form of Settlement Notice issued by the Grid Company (monthly) are used for calculation and the data manually recorded by JMC hourly are used for cross-checking and backup.

Using the measured data, the results of baseline emissions during monitoring period are shown below:

Table 3: Calculation of baseline emissions

Monitoring Period	MM_{ELEC} (tCH_4)	GEN_1 (MWh)	GEN_2 (MWh)	BE_{MD} (tCO_2e)	BE_{MR} (tCO_2e)	BE_{Use} (tCO_2e)	BE (tCO_2e)
	Measured values			A	B	C	D = A+B+C
01/07/2012-31/07/2012	12,437.62	73,039.824	0	0	261,190.02	71,765.28	332,955.29
01/08/2012-31/08/2012	12,142.04	71,658.576	0	0	254,990.04	70,408.13	325,398.53
01/09/2012-30/09/2012	13,006.02	77,693.616	0	0	273,126.42	76,337.86	349,464.28
Total	**37,586.04**	**222,392.016**	**0**	**0**	**789,306.84**	**218,511.28**	**1,007,818.10**

Therefore, the total baseline emissions during the monitoring period are **1,007,818.10** tCO_2e.

E.2. Calculation of project emissions or actual net GHG removals by sinks

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Project emissions are calculated with formulae below in accordance with the registered PDD.

$$PE = PE_{ME} + PE_{MD} + PE_{UM} \quad (1)$$

Where:

PE Project emissions (tCO_2e)

PE_{ME} Project emissions from energy use to capture and use methane (tCO_2e)

PE_{MD} Project emissions from methane destroyed (tCO_2e)

PE_{UM} Project emissions from un-combusted methane (tCO_2e)

And:

$$PE_{ME}=CONS_{ELEC,PJ}\times CEF_{ELEC} = 0 \quad (2)^4$$

$$PE_{MD}= MD_{ELEC}\times (CEF_{CH4} + r\times CEF_{NMHC}) \quad (3)$$

As the NMHC concentration is less than 1% of the coalmine gas throughout the monitoring period, thus the combustion emissions from non-methane hydrocarbons can be ignored[5] (r=0).

[4] When calculating the ER, the net electricity delivered to the grid is used (as per PDD, page 22).

Therefore,

$$PE_{MD}=MD_{ELEC}\times CEF_{CH4}=(MM_{ELEC}\times Eff_{ELEC})\times CEF_{CH4}=(MM_{ELEC}\times 0.995)\times 2.75$$

$$PE_{UM}=GWP_{CH4}\times MM_{ELEC}\times (1-Eff_{ELEC})= 21\times MM_{ELEC}\times (1-0.995) \quad (6)$$

Where:

$CONS_{ELEC}$	Additional electricity consumption for use of methane (MWh)
MD_{ELEC}	Methane destroyed through power generation (tCH_4)
MM_{ELEC}	Methane measured delivered to power plant (tCH_4)
CEF_{CH4}	Carbon emission factor for combusted methane (tCO_2e/tCH_4)
Eff_{ELEC}	Efficiency of methane destruction /oxidation in power plant

The results of project emissions calculation during monitoring period are shown in the Table 4.

Table 4: Calculation of project emissions

Monitoring Period	PE_{ME} (tCO_2e)	PE_{MD} (tCO_2e)	PE_{UM} (tCO_2e)	PE (tCO_2e)
	A	B	C	D=A+B+C
01/07/2012-31/07/2012	0	34,032.44	1,305.95	35,338.39
01/08/2012-31/08/2012	0	33,224.64	1,274.95	34,499.60
01/09/2012-30/09/2012	0	35,587.72	1,365.63	36,953.36
Total	**0**	**102,844.81**	**3,946.53**	**106,791.35**

Therefore, the total project emissions during the monitoring period are **106,791.35** tCO_2e.

E.3. Calculation of leakage

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As described in the PDD (page 29), the leakage of this project is 0.

In addition, for the experimental 15MW power plant, $GEN_{BL,y}$, the electricity generated by the 15MW power plant has been monitored and the volume during this monitoring period is 0 MWh. $MM_{BL,y}$, the volume of methane sent to the 15MW power plant has been monitored and the value for this monitoring period is 0 tCH_4. The monthly average is 0 tCH_4.

Table 5 shows that the monthly average values of both the electricity generation and methane consumption of 15 MW power plant for this monitoring period are lower than the monthly average values in year 2008[6], respectively. The decrease in both electricity generation and methane consumption is mainly due to the production shutdown for the upgrade program of the 15 MW power plant.

[5] The NMHC concentration will continue being monitored annually to check whether its concentration is below or above 1% to determine if the NMHC combustion be included in the project emissions.

[6] Year 2008 was the year with the highest annual values for both MM_{BL} and GEN_{BL} during the period (year 2005-2008) before this project activity was commissioned in 2009. Applying the highest annual values for both MM_{BL} and GEN_{BL} ensure the conservativeness of the CER results. Please also refer to section D.2 of the MR.

Part of the 15 MW power plant was shut down from Oct. 24, 2011 and the entire power plant was shut down from Nov.18, 2011 for the upgrade program. The gas turbine of 15MW power plant, utilizing decommissioned aircraft engine, had lower thermal efficiency and its performance and operational reliability reduced after high-intensity running in air. Its high frequency maintenance needed high maintenance costs which were difficult to bear by the 15MW power plant. After upgrade, the 15MW power plant will use high-efficiency gas engine which has low frequency maintenance. The total capacity of 15MW power plant is still 15MW after upgrade. The 15MW power plant will reduce the methane consumption per kWh and water consumption per kWh, ensure the reliability of power supply and save the maintenance costs after upgrade.

Table 5: Experimental 15MW power plant data comparison

Parameter **Period**	**$MM_{BL,y}$ (tCH_4)** **01/07/2012-30/09/2012**	**MM_{BL} (tCH_4)** **01/01/2008-31/12/2008**	**$GEN_{BL,y}$ (MWh)** **01/07/2012-30/09/2012**	**GEN_{BL} (MWh)** **01/01/2008-31/12/2008**
Total	0	24,139.73	0	86,089.23
Monthly Average	0	2,011.64	0	7,174.10

According to the description of section D.2, in case $MM_{BL,y} < MM_{BL}$, the difference will be calculated in terms of the contributing emission reductions, which will be deducted from the total claimed emission reductions. In case $GEN_{BL,y} < GEN_{BL}$, the difference will be calculated in terms of the contributing emission reductions that are not attributable to the project activity and would have been generated in the business as usual scenario by the 15MW power plant. The contributing emission reductions will be deducted from the total claimed emission reductions. The contributing emission reductions can be calculated through the same formula adopted in section E.1, E.2 and E.4 for regular emission reductions calculations. There are only 2 differences: Where MM_{ELEC} appears in the formulae, it is replaced by (MM_{BL}-$MM_{BL,y}$); where ($GEN_{1,y} - GEN_{2,y}$) appears, it is replaced by (GEN_{BL}-$GEN_{BL,y}$). To differentiate, the replaced variables in formula in section E.1 E.2 and E.4 were asterisked in the following Table 6, 7 and 8.

Table 6: Calculation of contributing Baseline Emissions

Monitoring Period	**$MM_{BL,y}$ (tCH_4)**	**MM_{BL} (tCH_4)**	**$GEN_{BL,y}$ (MWh)**	**GEN_{BL} (MWh)**	***BE_{MD} (tCO_2e)**	***BE_{MR} (tCO_2e)**	***BE_{Use} (tCO_2e)**	***BE (tCO_2e)**
	Measured values	Monthly Average in year 2008	Measured values	Monthly Average in year 2008	**A**	**B**	**C**	**D = A+B+C**
01/07/2012-31/07/2012	0.00	2,011.64	0.000	7,174.10	0	42,244.53	7,048.91	49,293.44
01/08/2012-31/08/2012	0.00	2,011.64	0.000	7,174.10	0	42,244.53	7,048.91	49,293.44
01/09/2012-30/09/2012	0.00	2,011.64	0.000	7,174.10	0	42,244.53	7,048.91	49,293.44
Total	**0.00**		**0.000**		**0**	**126,733.58**	**21,146.74**	**147,880.33**

Table 7: Calculation of contributing Project Emissions

Monitoring Period	*PE_{ME} (tCO_2e)	*PE_{MD} (tCO_2e)	*PE_{UM} (tCO_2e)	*PE (tCO_2e)
	A	B	C	D=A+B+C
01/07/2012-31/07/2012	0	5,504.36	211.22	5,715.58
01/08/2012-31/08/2012	0	5,504.36	211.22	5,715.58
01/09/2012-30/09/2012	0	5,504.36	211.22	5,715.58
Total	**0**	**16,513.08**	**633.67**	**17,146.75**

Table 8: Total contributing Emission Reductions

Monitoring Period	*PE (tCO_2e)	*BE (tCO_2e)	*ER (tCO_2e)
	A	B	D = B-A
01/07/2012-31/07/2012	5,715.58	49,293.44	43,577.86
01/08/2012-31/08/2012	5,715.58	49,293.44	43,577.86
01/09/2012-30/09/2012	5,715.58	49,293.44	43,577.86
Total	**17,146.75**	**147,880.33**	130,733.58

For details of calculation of contributing ERs, please see the worksheet "CER Calculation (PL Calculation)" in the CER calculation spreadsheet.

E.4. Summary of calculation of emission reductions or net anthropogenic GHG removals by sinks

Time Period 21/12/2011-30/06/2012	Baseline emissions or baseline net GHG removals by sinks (tCO_2e)	Project emissions or actual net GHG removals by sinks (tCO_{2e})	Leakage (tCO_2e)	Emission reductions or net anthropogenic GHG removals by sinks (tCO_2e)
Total	1,007,818.10	106,791.35	130,733.58	770,293

Therefore, the emission reductions resulting from the actually measured values are 770,293 tCO_2e.

E.5. Comparison of actual emission reductions or net anthropogenic GHG removals by sinks with estimates in registered PDD

Item	Values estimated in ex-ante calculation of registered PDD	Actual values achieved during this monitoring period
Emission reductions or GHG removals by sinks (tCO_2e)	760,377	770,293

E.6. Remarks on difference from estimated value in registered PDD

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The ER volume based on the actual monitored values is 770,293 tCO_2e, or 1.30% higher than the ex-ante estimation according to the registered PDD. The major factors which lead to the increase in the actual emission reductions during the current monitoring period is the increase of power generation and the gas consumption. The table 9 below shows that the actual project operation resulted in higher power

generation and higher gas consumption when compared to the PDD estimate. Consequently, it results in the increase of ER volume.

Table 9: Comparison of actual result with ex ante PDD estimate

	ER Volume (tCO2e) (92 days) [7]	Power Generation (MWh) (92 days)	Gas Consumption (tCH4) (92 days)
Actual	770,293	222,392.02	37,586.04
PDD Estimate	760,377	207,491.51	30,646.84
% increase	1.30%	7.18%	22.64%

a. Increased power generation
The main reason for the increased power generation is due to the underestimate of the load factor of the 120 MW power plant in the registered PDD. A load factor[8] of 80% was adopted in the feasibility study report (FSR) and PDD[9] of the project. At the time of project design, there were no other projects that employed the same advanced and imported technology as the project did in China. The load factor for conventional coal-fired power plant was 5500-6500 operating hours in a year. With the understanding that the gas fired power plant can be 15% more efficient than the coal fired power plant, the operating hours was estimated to be 7000 and adopted in the FSR and PDD. However, in reality, the new advanced technology turned out to be even more efficient than estimated (even longer operating hours). The actual load factor reached 83.9% and operating hour reached 1,853 during this monitoring period.

b. Increased gas consumption
On the other hand, the increase of the gas consumption also contributes to the increase of the ERs. This is mainly because the gas consumption ratio adopted in the registered PDD was underestimated. Similar to the reason mentioned above, at the time of project design, there were no other projects that employed the same advanced and imported technology. The gas consumption is estimated based on the experimental data provided by the equipment supplier, Caterpillar.

In reality, according to the data from Caterpillar's technical specification provided years later (which was not available at the time of project design, the gas consumption ratio is 0.175tCH4/MWh[10]. It is quite close to the actual gas consumption ratio: 0.169 tCH4/MWh during this monitoring period. It has demonstrated that the value in the PDD (0.148 tCH4/MWh) was significantly underestimated.

In spite of the increase of power generation and gas consumption, both factors have no impact on the additionality of the project and the applicability of the methodology as demonstrated below.

[7] The PDD estimated ER Volume, Power Generation and Gas Consumption values shown in Table 9 have already been proportionate to the number of days for the eighth monitoring period (92 days).
[8] Plant Load factor = Power Generation (MWh) / (Install Capacity (120 MW) * Total hours per year (8760 hrs)).
[9] The annual power generation is 840,000 MWh and the generation net of self-consumption is 823,200 MWh. Therefore, the load factor is 80%. In the PDD, for simplification, the net generation figure was used as the value of GEN1,y and GEN2,y was 0.
[10] Gas consumption ratio (tCH_4/MWh) = Heat consumption (MJ/MWh) / lower heat value of CH_4 (35.16 MJ/m^3)* density of CH_4 0.67 kg/m^3)

1. Impact on the project additionality

In the registered PDD, the project additionality was justified mainly based on the investment analysis. In the investment analysis, the calculated project IRR was used to compare with the benchmark project IRR of 15%[11]. In the subsequent sensitivity analysis in the PDD, Annual amount of electricity delivered to the grid was identified as a sensitive parameter to the result of project IRR. According to the sensitivity analysis, only when the annual amount of electricity delivered to the grid increases over 17.9%[12] of its base case, the project IRR would come across the benchmark project IRR which is 15%, hence causing the project not additional. As clearly indicated in Table 9 above, the project's actual annual electricity delivered to the grid is 7.18% higher than the PDD estimation. The increase rate does not exceed 17.9% (the breakeven point). As a result, the financial additionality of project does not change. On the other hand, provided that the gas consumption was not included as a component in the project IRR calculation, the increase of gas consumption will not influence the financial additionality. Therefore, the additionality of the project stands.

Besides the financial aspect, the conclusion from common practice analysis in the PDD still holds as the project's size remains 120 MW power plant fuelled by coal mine methane (The largest CMM power generation project in China[13] at the time of submission for registration).

In conclusion, the increase of power generation and CMM gas consumption does not affect the project's additionality upon reassessing the investment analysis and common practice analysis.

2. Impact on the applicability of the methodology

The project has been validated that it met all the applicability criteria of the baseline methodologies ACM0008-version 3 as the project a) extracts CMM by ventilation, pre-mining and post-mining b) utilizes the captured CMM to generate and export electricity c) The extracted CMM is from an underground working coal mine and there is no CBM drainage involved in the project[14].

The actual project operation during this monitoring period (01/07/2012-30/09/2012) does not change any of the aforementioned dimensions and therefore still meets all the applicability criteria of the baseline methodology. As a result, the baseline methodology remains applicable.

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History of the document

Version	Date	Nature of revision
02.0	EB 66 13 March 2012	Revision required to ensure consistency with the "Guidelines for completing the monitoring report form" (EB 66, Annex 20).
01	EB 54, Annex 34 28 May 2010	Initial adoption.
Decision Class: Regulatory **Document Type**: Form **Business Function**: Issuance		

[11] Source: "Methods and Parameters for Economic Evaluation of Construction Project (Edition 2)", published by the China National Planning Commission and Ministry of Construction, China Planning Press, July 1993.
[12] Please refer to page 22 of the registered PDD of the project dated 20/04/2009.
[13] Please refer to page 23 of the registered PDD of the project dated 20/04/2009.
[14] Please refer to page 7 of the Validation Report by DNV dated 22/10/2006.