

MONITORING REPORT FORM (CDM-MR)
Version 01 - in effect as of: 28/09/2010

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MONITORING REPORT
Version 01 29/02/2012
Jincheng Sihe Coal Mine CMM Generation Project
Reference No. 1896
Monitoring Period #6 (01/07/2011 – 20/12/2011¹)

SECTION A. General description of the project activity

A.1. Brief description of the project activity: >>

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Jincheng Sihe Coal Mine CMM Generation Project (hereafter 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 sixth monitoring period described in this monitoring report is 01/07/2011 and the end date is 20/12/2011. In this monitoring period, the achieved emission reductions of the project are 1,710,995 tCO₂e.

A.2. Project Participants

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Name of Party involved	Project participants	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	No

¹ The monitoring period is from 0:00 July 1 to 12:00 Dec. 20, 2011

	Electric Power Company, Incorporated ; Tohoku Electric Power Co., Inc. ; The Tokyo Electric Power Co., Inc; Mitsui & Co., Ltd.	
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.3. Location of the 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:

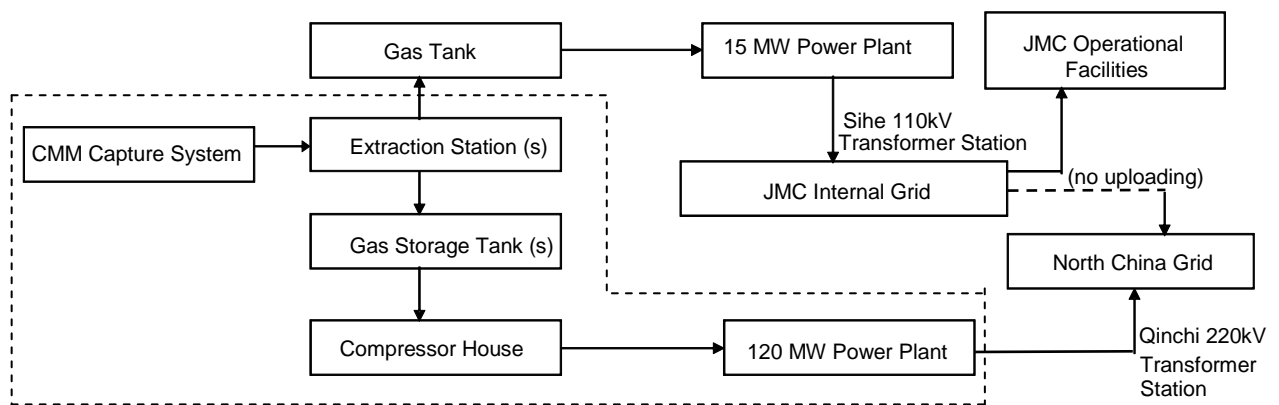
- Longitude: +112.5194 (112° 31'10" E);
- Latitude: +35.5875 (35° 35'15" N)

A.4. Technical description of the project

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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).² 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.



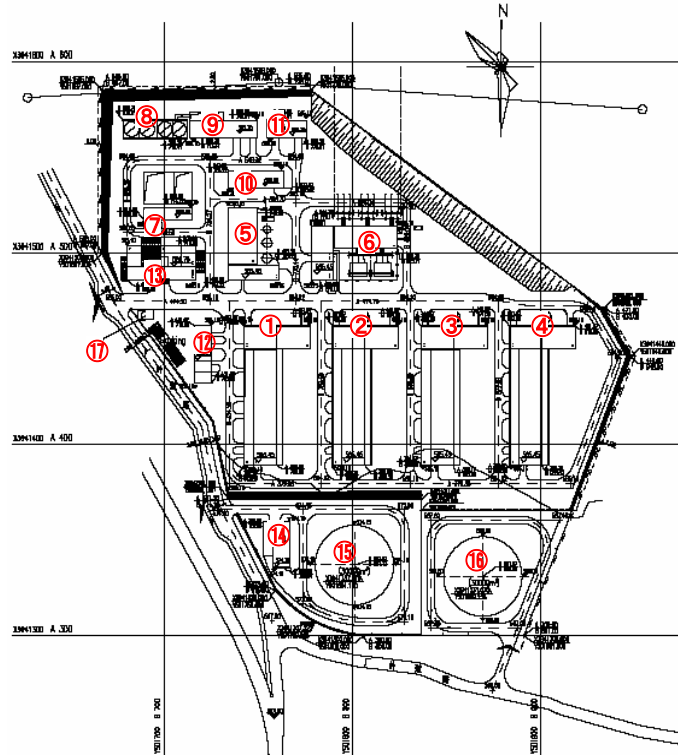
----- Flow diagram of the project activity

² For detailed information of equipments, please refer to PDD page 5-7.

The CMM is captured by the capture system³. 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.

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		

A.5. Title, reference and version of the baseline and monitoring methodology applied to the project activity:

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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.

³ Capture system in general refers to the drilling system as well as the gas collection pipeline.

A.6. Registration date of the project activity:

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The project has been registered by the CDM Executive Board since 22/04/09.

A.7. Crediting period of the project activity and related information (start date and choice of crediting period):

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

A.8. Name of responsible person(s)/entity(ies):

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Ms. Sun Biao
Project Manager
CDM Project Management Office
Shanxi Jincheng Anthracite Mining Group Co., Ltd (JMC)
Beishidian, Jincheng City, Shanxi, China, Postal Code 048006
Telephone: 86-356-3669562
Email: jmjtdm@163.com

SECTION B. Implementation of the project activity**B.1. Implementation status of the project activity**

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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.

During this monitoring period (01/07/2011 to 20/12/2011), the 120MW power plant operated well and the main equipments and monitoring instruments had no malfunctions. The 120MW power plant had 2 scheduled outages. The whole power plant was shut down for regular maintenance from 2:50 August 12 to 20:44 August 13, 2011. In addition, the whole power plant was shut down due to the maintenance of No.2 main transformer gas relay from 8:00 to 10:00 on October 27, 2011. During the scheduled outages, the whole power plant was shut down and the volume of gas consumption and power generation reduced to zero.

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

B.2. Revision of the monitoring plan

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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 weblink below for further details on the approved revision to the monitoring plan.

<http://cdm.unfccc.int/Projects/DB/DNV-CUK1214826895.32/view>

B.3. Request for deviation applied to this monitoring period

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Not applicable.

B.4. Notification or request of approval of changes

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Not applicable.

SECTION C. Description of the 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

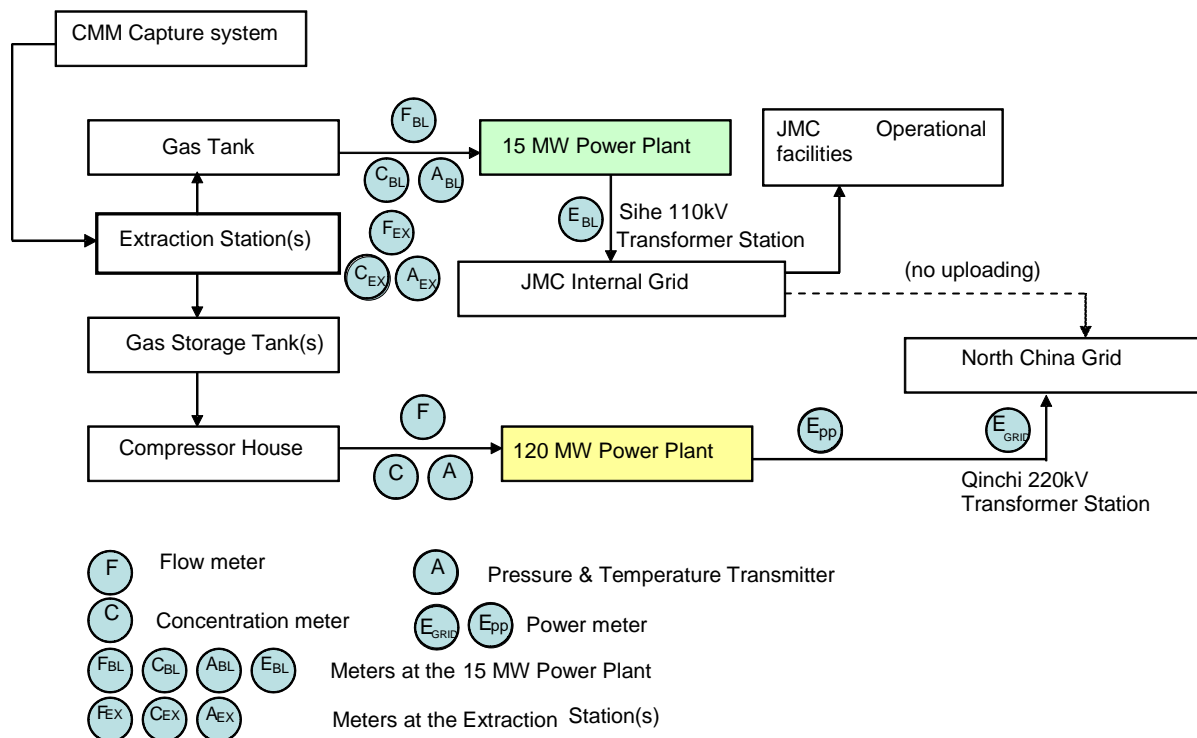


Table 1: Monitoring meters and parameters.

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 transmitter)	0~6.0KPa	0.20%	Annual	4
Pressure Transmitter	0~100KPa	0.20%	Annual	4
Temperature Transmitter	-200-500°C	±(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
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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 at 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}

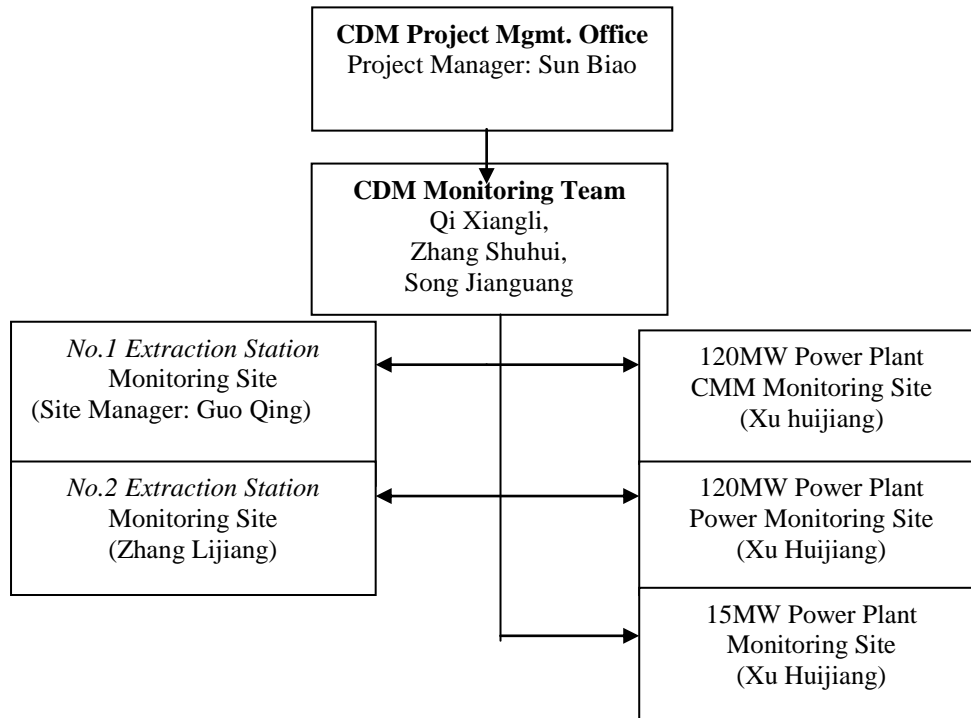
Samples of coal mine gas are taken annually, and analysed at a qualified laboratory. The testing result of NMHC is kept both in the 120MW power plant and the CDM Office. $PC_{NMHC,y}$ will not be used in the Emission reductions calculation if the NMHC concentration is less than 1%. CEF_{NMHC} will be 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 Qi Xiangli, Zhang Shuhui and Song Jianguang 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 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 Xu Huijiang.

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 determined at registration and not monitored during the monitoring period, including default values and factors

Data / Parameter:	$F_{i,j,y}$
Data 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 used:	China Energy Statistical Yearbook (2000~2005)
Value(s) :	See Annex 3 of PDD for details
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Official statistical data
Additional comment:	

Data / Parameter:	NCV_i
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Data unit:	$TJ/\text{mass or volume unit of a fuel}$
Description:	the net calorific value (energy content) per mass or volume unit of a fuel i
Source of data used:	China Energy Statistical Yearbook (2005)
Value(s) :	See Annex 3 of PDD for details
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	National and official data
Additional comment:	

Data / Parameter:	$OXID_i$
Data unit:	%
Description:	the oxidation factor of the fuel i
Source of data used:	<i>Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories</i>
Value(s) :	see Annex 3 of PDD for details
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	National data not available, so IPCC default values are used.
Additional comment:	

Data / Parameter:	$EF_{CO_2,i}$
Data unit:	tCO ₂ e/TJ
Description:	the CO ₂ emission factor per unit of energy of the fuel i
Source of data used:	<i>Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories</i>
Value(s) :	see Annex 3 of PDD for details
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	National data not available, so IPCC default values are used.
Additional comment:	

Data / Parameter:	$G_{j,y}$
Data unit:	MWh
Description:	the amount of electricity generation by source j in year y
Source of data used:	China Electric Power Yearbook (2000~2005)
Value(s) :	See Annex 3 of PDD for details
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Official statistical data
Additional comment:	

Data / Parameter:	$e_{i,y}$
Data unit:	%
Description:	station service power consumption rate of source j in year y
Source of data used:	See Annex 3 for details
Value(s) :	Official statistical data
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	China Energy Statistical Yearbook (2000~2005)

Leakage emission calculations)	
Additional comment:	

Data / Parameter:	$EE_{coal,adv}$
Data unit:	%
Description:	Efficiency of most advanced coal-fired power technology that is commercially available
Source of data used:	Notice on the determination of emission factors of regional power grids by Chinese CDM DNA
Value(s) :	36.53
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Official statistics of state power authority
Additional comment:	

Data / Parameter:	$EE_{oil,adv}$
Data unit:	%
Description:	Efficiency of most advanced oil-fired power technology that is commercially available
Source of data used:	Notice on the determination of emission factors of regional power grids by Chinese CDM DNA
Value(s) :	45.87
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Official statistics of state power authority
Additional comment:	

Data / Parameter:	$EE_{gas,adv}$
Data unit:	%
Description:	Efficiency of most advanced gas-fired power technology that is commercially available
Source of data used:	Notice on the determination of emission factors of regional power grids by Chinese CDM DNA
Value(s) :	45.87
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Official statistics of state power authority
Additional comment:	

Data / Parameter:	$CAP_{j,y}$
Data unit:	MW
Description:	Installed capacity of source j in year y in Northwest Power Grid
Source of data used:	China Energy Statistical Yearbook (2000~2005)
Value(s) :	See Annex 3 of PDD for details
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Official statistical data
Additional comment:	

Data / Parameter:	EF_{ELEC}
Data unit:	tCO ₂ e/MWh
Description:	Emissions factor of North China Grid
Source of data used:	Calculated according to ACM0002 (Version 6). The calculation details are provided in Annex 3 of the PDD.
Value(s) :	0.98255
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	The data are used to calculate the baseline emissions from power generation replaced by the project.
Additional comment:	

Data / Parameter:	CEF_{ELEC}
Data unit:	tCO ₂ e/MWh
Description:	Carbon emission factor of electricity used by coal mine (= EF_{ELEC})
Source of data used:	See EF_{ELEC}
Value(s) :	0.98255
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	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}
Data unit:	tCO ₂ e / tCH ₄
Description:	Global Warming Potential (GWP) of methane, valid for the relevant commitment period
Source of data used:	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) :	21
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	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}
Data unit:	%
Description:	Efficiency of methane destruction/oxidation in power plant
Source of data used:	IPCC default value
Value(s) :	99.5
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	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}
Data unit:	tCO ₂ e/tCH ₄
Description:	Carbon emission factor for combusted methane
Source of data used:	According to the applied methodology
Value(s) :	2.75
Indicate what the data are	The data are used for calculation of project emissions from methane

used for (Baseline/ Project/ Leakage emission calculations)	destroyed through power generation.
Additional comment:	Please also refer to the section B.6.1 of the registered PDD.

Data / Parameter:	ρ
Data unit:	t/m ³
Description:	Density of CH ₄ under normal conditions
Source of data used:	IPCC default value
Value(s) :	0.00067
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	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:	MM_{BL}
Data unit:	tCH ₄
Description:	Amount of methane consumed by the 15MW power plant
Source of data used:	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) :	24,139.73
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Maximum annual value of the four years period prior to project implementation (year 2005-2008) is taken.
Additional comment:	

Data / Parameter:	GEN_{BL}
Data unit:	MWh
Description:	Electricity generated by the 15MW power plant
Source of data used:	Measured
Value(s) :	86,089.234
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	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

Data / Parameter:	MM_{ELEC}
Data 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 & pressure transmitters and gas concentration meters.
Value(s) of monitored parameter:	73,274.89
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project emissions: - from methane destroyed MD_{ELEC} (Formula 3 & 5 in the PDD); - from un-combusted methane P_{UM} (Formula 6 in the PDD);

calculations)	<p>Baseline emissions: - for release of methane into atmosphere that is voided by the project BE_{MR} (Formula 10 in the PDD)</p>																																																																																																														
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	<p><u>Gas flow meters (differential pressure transmitter)</u> Accuracy class: 0.20%</p> <table border="1"> <thead> <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> </thead> <tbody> <tr> <td rowspan="2">No.1 power house</td><td>09052891</td><td>July 1-Oct. 27, 2011</td><td>15/11/2010</td><td>14/11/2011</td></tr> <tr> <td>01A0716337</td><td>Oct. 27-Dec.20, 2011</td><td>25/08/2011</td><td>24/08/2012</td></tr> <tr> <td rowspan="2">No.2 power house</td><td>09052892</td><td>July 1-Oct. 27, 2011</td><td>15/11/2010</td><td>14/11/2011</td></tr> <tr> <td>01A0716336</td><td>Oct. 27-Dec.20, 2011</td><td>25/08/2011</td><td>24/08/2012</td></tr> <tr> <td>No.3 power house</td><td>01A0716338</td><td>July 1-Dec. 20, 2011</td><td>08/04/2011</td><td>07/04/2012</td></tr> <tr> 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	<p>Model: WZP-24SA Location: refer to meter A in Figure 3 Note: The interim replacement of temperature transmitters corresponding to all 4 power houses is due to the calibration activities which require the meters to be delivered to the certified inspection institution.</p> <p><u>Concentration meters (methane concentration analyzer)</u> Accuracy class: $\pm 2.0\%$ Serial numbers: 29562; 30105; 25940; 29559 Calibration frequency: annual Date of last calibration: 08/04/2011 Validity of calibration: 07/04/2012 Model: 97460 Location: refer to meter C in Figure 3</p>
Measuring/ Reading/ Recording frequency:	<p>Continuous/Continuous/Continuous (system) + Hourly (manual)</p> <p>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 digital control system.</p>
Calculation method (if applicable):	Not applicable
QA/QC procedures applied:	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.

Data / Parameter:	$GEN_{l,y}$
Data unit:	MWh
Description:	Electricity supplied by project activity to North China Grid during the monitoring period
Measured /Calculated /Default:	Measured
Source of data:	<ol style="list-style-type: none"> 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); 2. Manually recorded by JMC hourly for cross-checking and backup.
Value(s) of monitored parameter:	<p>442,179.883 (settlement notice for ER calculation)</p> <p>444,418.128 (manual record for cross-check)</p>
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emissions from power generation replaced by the project $BE_{Use,y}$ (Formula 11 in the PDD)
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	<p><u>Bidirectional electricity meters</u> (JMC, used for cross-checking and backup) Accuracy class: 0.2S Serial numbers: 86384895; 86384896 Calibration frequency: annual Date of last calibration: 06/06/2011 Validity of calibration: 05/06/2012 Model: ZMQ202C Location: refer to meter E_{pp} in figure 3</p>

	<u>Bidirectional electricity meters</u> (Grid, used for emission reduction calculations) Accuracy class: 0.2S Serial numbers: 507003703; 507003731 Calibration frequency: annual Date of last calibration: 10/05/2011 Validity of calibration: 09/05/2012 Model: DTSD718 Location: refer to meter E _{GRID} in figure 3
Measuring/ Reading/ Recording frequency:	Continuous/Continuous/Hourly
Calculation method (if applicable):	Not applicable
QA/QC procedures applied:	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.

Data / Parameter:	GEN _{2,y}
Data 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 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.
Value(s) of monitored parameter:	5.808 (settlement notice for ER calculation) 5.808 (manual record for cross-check)
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emissions from power generation replaced by the project BE _{Use,y} (Formula 11 in the PDD)
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	<u>Bidirectional electricity meters</u> (JMC, used for cross-checking and backup) Accuracy class: 0.2S Serial numbers: 86384895; 86384896 Calibration frequency: annual Date of last calibration: 06/06/2011 Validity of calibration: 05/06/2012 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 Serial numbers: 507003703; 507003731

	Calibration frequency: annual Date of last calibration: 10/05/2011 Validity of calibration: 09/05/2012 Model: DTSD718 Location: refer to meter E _{GRID} in figure 3
Measuring/ Reading/ Recording frequency:	Continuous/Continuous/Hourly
Calculation method (if applicable):	Nor applicable
QA/QC procedures applied:	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.

Data / Parameter:	PC _{CH4,y}																																							
Data unit:	%																																							
Description:	Concentration of methane (in mass) in extracted gas (%), measured on wet basis																																							
Measured /Calculated /Default:	Measured																																							
Source of data:	Daily monitoring by JMC. Meter readings transferred through digital (DCS) system and recorded automatically.																																							
Value(s) of monitored parameter:	<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>1/7/2011 11:00AM</td><td>45.58</td><td>46.27</td><td>45.83</td><td>45.59</td></tr><tr><td>1/8/2011 11:00AM</td><td>44.53</td><td>43.68</td><td>44.78</td><td>44.11</td></tr><tr><td>1/9/2011 11:00AM</td><td>47.53</td><td>47.80</td><td>47.78</td><td>47.06</td></tr><tr><td>1/10/2011 11:00AM</td><td>48.54</td><td>47.49</td><td>48.79</td><td>48.07</td></tr><tr><td>1/11/2011 11:00AM</td><td>50.75</td><td>50.93</td><td>49.09</td><td>51.35</td></tr><tr><td>1/12/2011 11:00AM</td><td>47.06</td><td>46.96</td><td>46.68</td><td>46.58</td></tr></table> <p>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.</p>					Date and time	No.1 Power House	No.2 Power House	No.3 Power House	No.4 Power House	1/7/2011 11:00AM	45.58	46.27	45.83	45.59	1/8/2011 11:00AM	44.53	43.68	44.78	44.11	1/9/2011 11:00AM	47.53	47.80	47.78	47.06	1/10/2011 11:00AM	48.54	47.49	48.79	48.07	1/11/2011 11:00AM	50.75	50.93	49.09	51.35	1/12/2011 11:00AM	47.06	46.96	46.68	46.58
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1/12/2011 11:00AM	47.06	46.96	46.68	46.58																																				
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Integrated with the monitoring of MM _{ELEC} (methane delivered to the power plant)																																							
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Concentration meters (methane concentration analyzer) Accuracy class: ±2.0% Serial numbers: 29562; 30105; 25940; 29559 Calibration frequency: annual Date of last calibration: 08/04/2011 Validity of calibration: 07/04/2012 Model: 97460 Location: refer to meter C in figure 3																																							

Measuring/ Reading/ Recording frequency:	Continuous/Continuous/Continuous (system) + Hourly (manual) Concentration meters, optical and calorific, with accuracy in compliance with relevant national standards.
Calculation method (if applicable):	Not applicable
QA/QC procedures applied:	Concentration meters are checked monthly and calibrated annually to ensure accuracy.

Data / Parameter:	PC _{NMHC,y}
Data 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 May 19, 2011
Value(s) of monitored parameter:	0 (C ₂ H ₆ =0.00%, C ₃ H ₈ =0.00%, C ₄ H ₁₀ (N- butane)=0.00%, C ₄ H ₁₀ (Isobutane)=0.00%)
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Verifying whether PC _{NMHC,y} is below 1%
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	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 applied:	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.

Data / Parameter:	CEF _{NMHC}
Data unit:	tCO ₂ e/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 May 19, 2011
Value(s) of monitored parameter:	Not applicable since the PC _{NMHC,y} = 0
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project emissions from combustion of NMHC (Formula 3 in the PDD)
Monitoring equipment (type,	Owned and operated by Shanxi Coal Industry Bureau Comprehensive

accuracy class, serial number, calibration frequency, date of last calibration, validity)	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 applied:	In the gas composition test report issued by Shanxi Coal Industry Bureau Comprehensive Testing Center on May 19, 2011, the concentration of non methane hydrocarbons was 0, therefore, it is not required to measure CEF_{NMHC} .

Data / Parameter:	$MM_{BL,y}$
Data 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:	10,253.58
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	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 ($MM_{BL,y} \geq MM_{BL}$). 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 deduction is taken from the total emission reductions during the monitoring period (please refer to section E.3 for more details).
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	<p><u>Gas flow meters</u> Accuracy class: $\pm 0.5\%$ Serial numbers: 9050705; 10060801 Calibration frequency: annual Date of last calibration: 28/04/2011(9050705); 20/02/2011(10060801) Validity of calibration: 27/04/2012(9050705); 19/02/2012(10060801) Model: KVS08 II KC23FSN ,KVS08 II KF23FSN Location: refer to meter F_{BL} in figure 3</p> <p><u>Pressure transmitters</u> Accuracy class: 0.1 grade Serial numbers: 1794993; 5570927 Calibration frequency: annual Date of last calibration: 26/04/2011(1794993); 15/11/2010(5570927) Validity of calibration: 25/04/2012(1794993); 14/11/2011(5570927)* Model: 3051TG3A2B21AB4E5Q4M5; 3051TG3A2B21AB4E5M5 Location: refer to meter A_{BL} in figure 3</p> <p><u>Temperature transmitters</u> Accuracy class: 0.5 Serial numbers: 30757178-001; b119045737</p>

	<p>Calibration frequency: annual Date of last calibration: 03/05/2011(30757178-001); 14/03/2011 (b119045737) Validity of calibration: 02/05/2012(30757178-001); 13/03/2012 (b119045737) Model: STT25M Location: refer to meter A_{BL} in figure 3</p> <p><u>Heat resistance</u> Accuracy class: B Serial numbers: 2009062417; 0811383 Calibration frequency: annual Date of last calibration: 03/05/2011 (2009062417); 14/03/2011 (0811383) Validity of calibration: 02/05/2012 (2009062417); 13/03/2012 (0811383) Model: N-WZPK-210/Pt100 Location: refer to meter A_{BL} in figure 3</p> <p><u>Methane concentration analyzer</u> Accuracy class: $\pm 2.0\%$ Serial numbers: 29561; 29554 Calibration frequency: annual Date of last calibration: 11/02/2011 Validity of calibration: 10/02/2012 Model: 97460 Location: refer to meter C_{BL} in figure 3</p> <p>*Note: The pipelines which supply methane to the 15MW power plant were closed and the production was shut down due to the upgrade program of the 15MW power plant since Oct. 24, 2011. As a result, all the associated gas flow meters, pressure transmitters, temperature transmitters, heat resistances and methane concentration analyzers were not in use since Oct. 24, 2011.</p>
Measuring/ Reading/ Recording frequency:	<p>Continuous/Continuous/Hourly</p> <p>Continuous monitoring, flow meters in compliance with relevant standards and requirements are used. Gas volumes, pressure, temperature and concentration are read and consolidated by a digital control system</p>
Calculation method (if applicable):	Not applicable
QA/QC procedures applied:	All the meters/sensors are checked monthly and calibrated annually to ensure accuracy.

Data / Parameter:	GEN _{BL,y}
Data 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:	30,424.02
Indicate what the data are used for (Baseline/ Project/	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

Leakage emission calculations)	ensure no leakage ($GEN_{BL,y} \geq GEN_{BL}$). 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 deduction is taken from the total emission reductions during the monitoring period (please refer to section E.3 for more details).
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	<u>Electricity meter</u> Accuracy class: 0.5S Serial number: 200301428A0117 Calibration frequency: every 5 years Date of last calibration: 10/03/2010 Validity of calibration: 09/03/2015 Model: DSSD331 Location: refer to meter E_{BL} in figure 3
Measuring/ Reading/ Recording frequency:	Continuous/Continuous/Hourly
Calculation method (if applicable):	Not applicable
QA/QC procedures applied:	The power meter is calibrated in accordance with relevant national standard.

Monitored parameters that are not used for calculation of ER

Data / Parameter:	$MM_{total,y}$
Data 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:	147,604.11
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	For cross-checking
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	<p>Extraction station No.1</p> <p><u>Pipe flow sensors</u> Accuracy class: $\pm 0.4m/s$ Serial numbers: L1011069; L1011084; L1011089; L1011098 ; L1011070; L1011080 Calibration frequency: annual Date of last calibration: 25/03/2011 Validity of calibration: 24/03/2012 Model: GLY30 Location: refer to meter F_{EX} in figure 3</p> <p><u>Temperature sensors</u> Accuracy class: $\leq 1^{\circ}C$ Serial numbers: W1011378; W1011365; W1011368; W1011364; W1011369; W1011371 Calibration frequency: annual Date of last calibration: 25/03/2011</p>

	<p>Validity of calibration: 24/03/2012 Model: GWD100(A) Location: refer to meter A_{EX} in figure 3</p> <p><u>Pressure sensors</u> Accuracy class: $\pm 1\%$ Serial numbers: Y1011122; Y1011139; Y1011141; Y1011135; Y1011129; Y1011125 Calibration frequency: annual Date of last calibration: 25/03/2011 Validity of calibration: Model: GPD100 Location: refer to meter A_{EX} in figure 3</p> <p><u>Methane sensors</u> Accuracy class: $< \pm 10\%$ of true value Serial numbers: 21011881; 21011887; 21011883; 21011853; 21011860; 21011888 Calibration frequency: annual Date of last calibration: 25/03/2011 Validity of calibration: 24/03/2012 Model: GJC100(A) Location: refer to meter C_{EX} in figure 3</p> <p>Extraction station No.2 <u>V cone gas flow sensors</u> Accuracy class: $\pm 1.5\%$ for pressure and flow; $\pm 2.5\%$ for temperature; Serial numbers: 09225; 09224 Calibration frequency: annual Date of last calibration: 13/06/2011 Validity of calibration: 12/06/2012 Model: GLY500 Location: refer to meter F_{EX} in figure 3</p> <p><u>Methane concentration sensors</u> Accuracy class: $\leq \pm 7\%$ of true value Serial numbers: 1429; 3423 Calibration frequency: annual Date of last calibration: 18/06/2011 Validity of calibration: 17/06/2012 Model: GJG100H(B) Location: refer to meter C_{EX} in figure 3</p>
Measuring/ Reading/ Recording frequency:	<p>Continuous/Continuous/Hourly</p> <p>Continuous monitoring, flow meters in compliance with relevant standards and requirements are used. Gas volumes, pressure, temperature and concentration are read and consolidated by a digital control system (DCS).</p>
Calculation method (if applicable):	Not applicable
QA/QC procedures applied:	All the meters/sensors are checked monthly and calibrated annually to ensure accuracy.

Data / Parameter:	MM _{release,y}
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Data 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:	11,216.07
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	For cross-checking
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	<p>Extraction station No.1 <u>V cone gas flow sensor</u> Accuracy class: $\pm 1.5\%$ for pressure and flow; $\pm 2.5\%$ for temperature; Serial number: 09096 Calibration frequency: annual Date of last calibration: 15/05/2011 Validity of calibration: 14/05/2012 Model: GLY500 Location: refer to meter F_{EX} in figure 3</p> <p><u>Methane concentration sensors</u> Accuracy class: $\leq \pm 7\%$ of true value Serial number: 2890 Calibration frequency: annual Date of last calibration: 15/05/2011 Validity of calibration: 14/05/2012 Model: GJG100H(B) Location: refer to meter C_{EX} in figure 3</p> <p>Extraction station No.2 <u>V cone gas flow sensor</u> Accuracy class: $\pm 1.5\%$ for pressure and flow; $\pm 2.5\%$ for temperature; Serial numbers: 09226; 09227; 09173 Calibration frequency: annual Date of last calibration: 07/06/2011(09226&09173); 19/06/2011(09227) Validity of calibration: 06/06/2012(09226&09173); 18/06/2012(09227) Model: GLY500 Location: refer to meter F_{EX} in figure 3</p> <p><u>Methane concentration sensors</u> Accuracy class: $\leq \pm 7\%$ of true value Serial numbers: 3430; 2855; 1398 Calibration frequency: annual Date of last calibration: 18/06/2011 Validity of calibration: 17/06/2012 Model: GJG100H(B) Location: refer to meter C_{EX} in figure 3</p>
Measuring/ Reading/	Continuous/Continuous/ Hourly

Recording frequency:	Continuous monitoring, flow meters in compliance with relevant standards and requirements are used. Gas volumes, pressure, temperature and concentration are read and consolidated by a digital control system (DCS).
Calculation method (if applicable):	Not applicable
QA/QC procedures applied:	All the meters/sensors are checked monthly and calibrated annually to ensure accuracy.

SECTION E. Emission reductions calculation

E.1. Baseline emissions calculation

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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 ₂ e)
BE _{MD}	Baseline emissions from destruction of methane in the baseline scenario (tCO ₂ e)
BE _{MR}	Baseline emissions from release of methane into the atmosphere that is avoided by the project activity (tCO ₂ e)
BE _{Use}	Baseline emissions from power generation replaced by this project (tCO ₂ e)

And:

$$BE_{MD}^4 = 0$$

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

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

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)
EF _{ELEC}	Emission factors of North China Grid (0.98255 tCO ₂ e/MWh)

GEN₁ and GEN₂ 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,y} (MWh)	GEN _{2,y} (MWh)	BE _{MD} (tCO ₂ e)	BE _{MR} (tCO ₂ e)	BE _{Use} (tCO ₂ e)	BE (tCO ₂ e)
	Measured values			A	B	C	D = A+B+C

⁴ See PDD page 25-26.

01/07/2011-31/07/2011	12,980.94	78,406.416	0	0	272,599.74	77,038.22	349,637.96
01/08/2011-31/08/2011	12,617.56	75,663.984	4.752	0	264,968.76	74,338.98	339,307.73
01/09/2011-30/09/2011	13,267.05	79,556.928	0	0	278,608.05	78,168.66	356,776.70
01/10/2011-31/10/2011	13,438.48	82,030.608	1.056	0	282,208.08	80,598.14	362,806.21
01/11/2011-30/11/2011	12,604.22	78,259.104	0	0	264,688.62	76,893.48	341,582.10
01/12/2011-20/12/2011	8,366.64	48,262.843	0	0	175,699.44	47,420.66	223,120.09
Total	73,274.89	442,179.883	5.808	0	1,538,772.69	434,458.14	1,973,230.79

Therefore, the total baseline emissions during the monitoring period are **1,973,230.79** tCO₂e.

E.2. Project emissions calculation

>>

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 ₂ e)
PE _{ME}	Project emissions from energy use to capture and use methane (tCO ₂ e)
PE _{MD}	Project emissions from methane destroyed (tCO ₂ e)
PE _{UM}	Project emissions from un-combusted methane (tCO ₂ e)

And:

$$PE_{ME} = CONS_{ELEC,PJ} \times CEF_{ELEC} = 0 \quad (2)^5$$

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

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 ignored⁶ (r=0).

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)

⁵ When calculating the ER, the net electricity delivered to the grid is used (as per PDD, page 22).

⁶ 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.

MM_{ELEC}	Methane measured delivered to power plant (tCH ₄)
CEF_{CH_4}	Carbon emission factor for combusted methane (tCO ₂ e/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 ₂ e)	PE_{MD} (tCO ₂ e)	PE_{UM} (tCO ₂ e)	PE (tCO ₂ e)
	A	B	C	D=A+B+C
01/07/2011-31/07/2011	0	35,519.10	1,363.00	36,882.10
01/08/2011-31/08/2011	0	34,524.80	1,324.84	35,849.65
01/09/2011-30/09/2011	0	36,301.97	1,393.04	37,695.01
01/10/2011-31/10/2011	0	36,771.04	1,411.04	38,182.09
01/11/2011-30/11/2011	0	34,488.30	1,323.44	35,811.75
01/12/2011-20/12/2011	0	22,893.22	878.50	23,771.72
Total	0	200,498.42	7,693.86	208,192.32

Therefore, the total project emissions during the monitoring period are **208,192.32 tCO₂e**.

E.3. Leakage calculation

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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 30,424.02 MWh. The monthly average is 5,024.36 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 10,253.58 tCH₄. The monthly average is 1,708.93 tCH₄.

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 2008⁷, respectively. The decrease in both electricity generation and methane consumption is mainly due to the production shutdown starting from Oct. 24, 2011 for the upgrade program of the 15 MW power plant.

Table 5: Experimental 15MW power plant data comparison

Parameter	$MM_{BL,y}$ (tCH ₄)	MM_{BL} (tCH ₄)	$GEN_{BL,y}$ (MWh)	GEN_{BL} (MWh)
Period	01/07/2011-20/12/2011	01/01/2008-31/12/2008	01/07/2011-20/12/2011	01/01/2008-31/12/2008
Total	10,253.58	24,139.73	30,424.02	86,089.23
Monthly Average	1,708.93	2,011.64	5,024.36	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

⁷ 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.

reductions. 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. 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 ₂ e)	*BE _{MR} (tCO ₂ e)	*BE _{Use} (tCO ₂ e)	*BE (tCO ₂ e)
	Measured values	Monthly Average in year 2008	Measured values	Monthly Average in year 2008	A	B	C	D = A+B+C
01/07/2011-31/07/2011	2,028.71	2,011.64	5,226.270	7,174.10	0	0.00	1,913.84	1,913.84
01/08/2011-31/08/2011	2,379.59	2,011.64	6,940.080	7,174.10	0	0.00	229.94	229.94
01/09/2011-30/09/2011	2,405.23	2,011.64	7,170.000	7,174.10	0	0.00	4.03	4.03
01/10/2011-31/10/2011	2,512.40	2,011.64	8,082.370	7,174.10	0	0.00	0.00	0.00
01/11/2011-30/11/2011	927.65	2,011.64	3,005.300	7,174.10	0	22,763.88	4,096.06	26,859.93
01/12/2011-31/12/2011	0.00	2,011.64	0.000	7,174.10	0	27,254.53	4,547.69	31,802.22
Total	10,253.58		30,424.020		0	50,018.41	10,791.56	60,809.97

Table 7: Calculation of contributing Project Emissions

Monitoring Period	*PE _{ME} (tCO ₂ e)	*PE _{MD} (tCO ₂ e)	*PE _{UM} (tCO ₂ e)	*PE (tCO ₂ e)
	A	B	C	D=A+B+C
01/07/2011-31/07/2011	0	0.00	0.00	0.00
01/08/2011-31/08/2011	0	0.00	0.00	0.00
01/09/2011-30/09/2011	0	0.00	0.00	0.00
01/10/2011-31/10/2011	0	0.00	0.00	0.00
01/11/2011-30/11/2011	0	2,966.08	113.82	3,079.90
01/12/2011-20/12/2011	0	3,551.20	136.27	3,687.47
Total	0	6,517.28	250.09	6,767.37

Table 8: Calculation of total contributing Emission Reductions

Monitoring Period	*PE (tCO ₂ e)	*BE (tCO ₂ e)	*ER (tCO ₂ e)
	A	B	D = B-A
01/07/2011-31/07/2011	0.00	1,913.84	1,913.85
01/08/2011-31/08/2011	0.00	229.94	229.94
01/09/2011-30/09/2011	0.00	4.03	4.04
01/10/2011-31/10/2011	0.00	0.00	0.00
01/11/2011-30/11/2011	3,079.90	26,859.93	23,780.04
01/12/2011-20/12/2011	3,687.47	31,802.22	28,114.75

Total	6,767.37	60,809.97	54,042.62
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For details of calculation of contributing ERs, please see the worksheet “Project Leakage” in the CER calculation spreadsheet.

E.4. Emission reductions calculation / table

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Total emission reductions are calculated as:

$$ER = BE - PE \quad (16)$$

Where:

ER	Emissions reductions of the project activity (tCO ₂ e)
BE	Baseline emissions (tCO ₂ e)
PE	Project emissions (tCO ₂ e)

In addition, the total contributing emission reductions which have been calculated in section E.3 should be deducted as leakage from the total emission reductions as per the description of section D.2. Therefore, the formulae for total emission reductions is further modified as:

$$ER = BE - PE - LE \quad (17)$$

Where:

ER	Emissions reductions of the project activity (tCO ₂ e)
BE	Baseline emissions (tCO ₂ e)
PE	Project emissions (tCO ₂ e)
LE	Leakage (tCO ₂ e)

The results of emission reduction calculation for the monitoring period are shown in the Table 9.

Table 9: Total Emission Reductions

Monitoring Period	PE (tCO₂e)	BE (tCO₂e)	LE (tCO₂e)	ER (tCO₂e)
	A	B	C	D = B-A-C
01/07/2011-31/07/2011	36,882.10	349,637.96	1,913.85	310,842
01/08/2011-31/08/2011	35,849.65	339,307.73	229.94	303,228
01/09/2011-30/09/2011	37,695.01	356,776.70	4.04	319,078
01/10/2011-31/10/2011	38,182.09	362,806.21	0.00	324,624
01/11/2011-30/11/2011	35,811.75	341,582.10	23,780.04	281,990
01/12/2011-20/12/2011	23,771.72	223,120.09	28,114.75	171,234
Total	208,192.32	1,973,230.79	54,042.62	1,710,995

Therefore, the emission reductions resulting from the actually measured values are 1,710,995tCO₂e.

E.5. Comparison of actual emission reductions with estimates in the CDM-PDD

>>

Item	Values applied in ex-ante calculation of the registered CDM-PDD	Actual values reached during the monitoring period
Emission reductions ⁸ (tCO ₂ e)	1,429,840	1,710,995

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

>>

The ER volume based on the actual monitored values is 1,710,995 tCO₂e, or 19.66% higher than the ex-ante estimate according to the 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 10 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 10: Comparison of actual result with ex ante PDD estimate

	ER Volume (tCO ₂ e) (173 days) ⁹	Power Generation (MWh) (173 days)	Gas Consumption (tCH ₄) (173 days)
Actual	1,710,995	442,174.08	73,274.89
PDD Estimate	1,429,840	390,174.25	57,629.38
% increase	19.66%	13.33%	27.15%

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 factor¹⁰ of 80% was adopted in the feasibility study report (FSR) and PDD¹¹ 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 88.7% and operating hour reached 3,685 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

⁸ The ex ante amount is calculated taking into account the number of days covered by the monitoring period (173) as follows: [3,016,714 tCO₂e * 173 days/ 365 days], assuming that the ER generation is evenly distributed throughout the year. (3,016,714 is the estimated annual ER amount as per the PDD).

⁹ The PDD estimated ER Volume, Power Generation and Gas Consumption values shown in Table 10 have already been proportionate to the number of days for the fifth monitoring period (173days).

¹⁰ Plant Load factor = Power Generation (MWh) / (Install Capacity (120 MW) * Total hours per year (8760 hrs)).

¹¹ 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.

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/MWh¹². It is quite close to the actual gas consumption ratio: 0.166 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.

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%¹³. 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%¹⁴ 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 10 above, the project's actual annual electricity delivered to the grid is 13.3% 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 China¹⁵ 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 project¹⁶.

The actual project operation during this monitoring period (01/07/2011-20/12/2011) 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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¹² Gas consumption ratio (tCH₄/MWh) = Heat consumption (MJ/MWh) / lower heat value of CH₄ (35.16 MJ/m³)* density of CH₄ 0.67 kg/m³

¹³ 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.

¹⁴ Please refer to page 22 of the registered PDD of the project dated 20/04/2009.

¹⁵ Please refer to page 23 of the registered PDD of the project dated 20/04/2009.

¹⁶ Please refer to page 7 of the Validation Report by DNV dated 22/10/2006.

Revision History of Monitoring Report

Version	Date	Nature of revision
01	29/02/2012	For publishing