



MONITORING REPORT
Version 01 – in effect as of: 28 May 2010
Jincheng Sihe Coal Mine CMM Generation Project
Reference No. 1896
Monitoring Period #2 (01/09/2009 – 31/12/2009)

SECTION A. General description of the project activity

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

>>

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 is 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 second monitoring period described in this monitoring report is 01/09/09 and the end date is 31/12/09. In this 4-month monitoring period, the achieved emission reductions of the project are 1,011,347 tCO₂e.

A.2. Project Participants

>>

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 and the Trustee of the IBRD-Netherlands Clean Development Mechanism Facility	Yes
Japan	Japan Carbon Finance, Ltd.	No
UK	ICECAP Carbon Trading Ltd.	No

A.3. Location of the project activity:

>>

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:

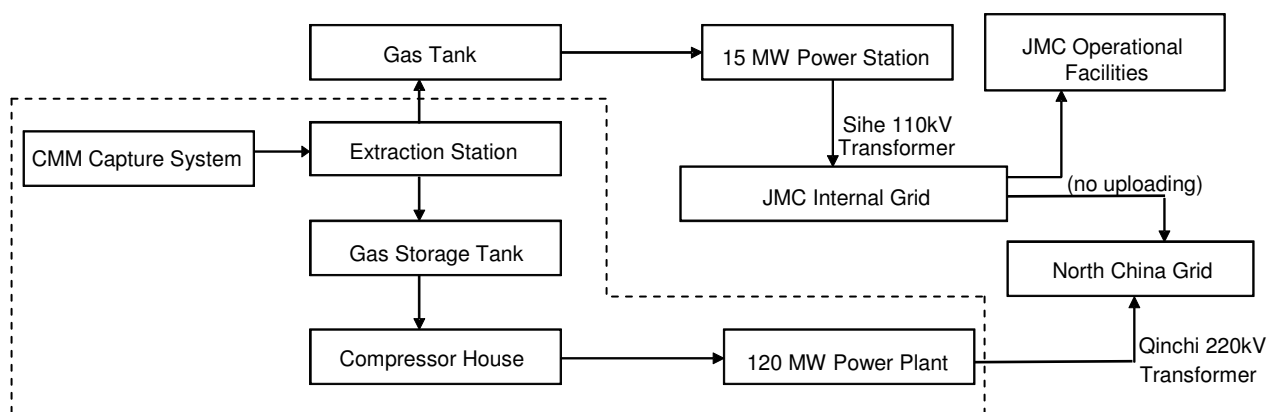
- East longitude: $112^{\circ}31'10''$;
- North latitude: $35^{\circ}35'15''$.

A.4. Technical description of the project

>>

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).¹ The flow diagram of the project activity is shown in Figure 1.

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



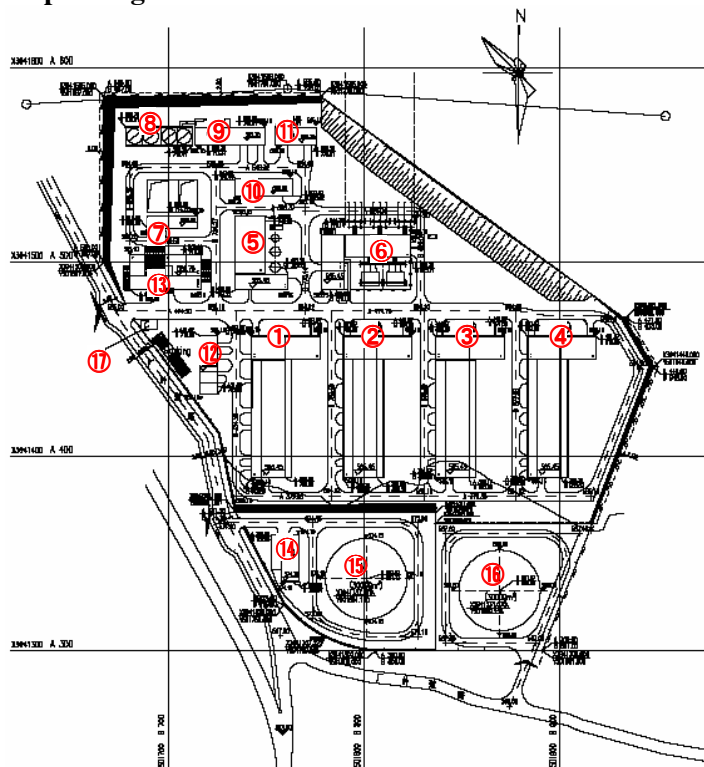
----- Flow diagram of the project activity

The CMM will be captured by capture system. The captured CMM then will be pumped to gas storage tank where it will be mixed, stirred, and dehydrated. After that the gas will be delivered to the compressing station for compression and then injected to the gas engines for power generation. The waste heat from the gas engines will be lead into the waste heat boiler to heat the steam which will drive the steam turbine to generate electricity.

The Figure 2 below represents the project layout and the technical diagram of the project activity.

¹ For detailed information of equipments, please refer to PDD page 5-7.

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:

>>

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 power generation from renewable energy*” is adopted to calculate the emission factor of the North China Grid.

A.6. Registration date of the project activity:

>>

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):**

>>

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):

>>

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**

>>

The project was fully commissioned on February 16, 2009. The power plant has been operated normally and consistently with the project design. No special event has taken place during this second monitoring period.

The Monitoring Plan and the “CDM Project Management and Operations Manual” for this project have 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.

B.2. Revision of the monitoring plan

>>

Not applicable.

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

>>

Not applicable.

B.4. Notification or request of approval of changes

>>

Not applicable.

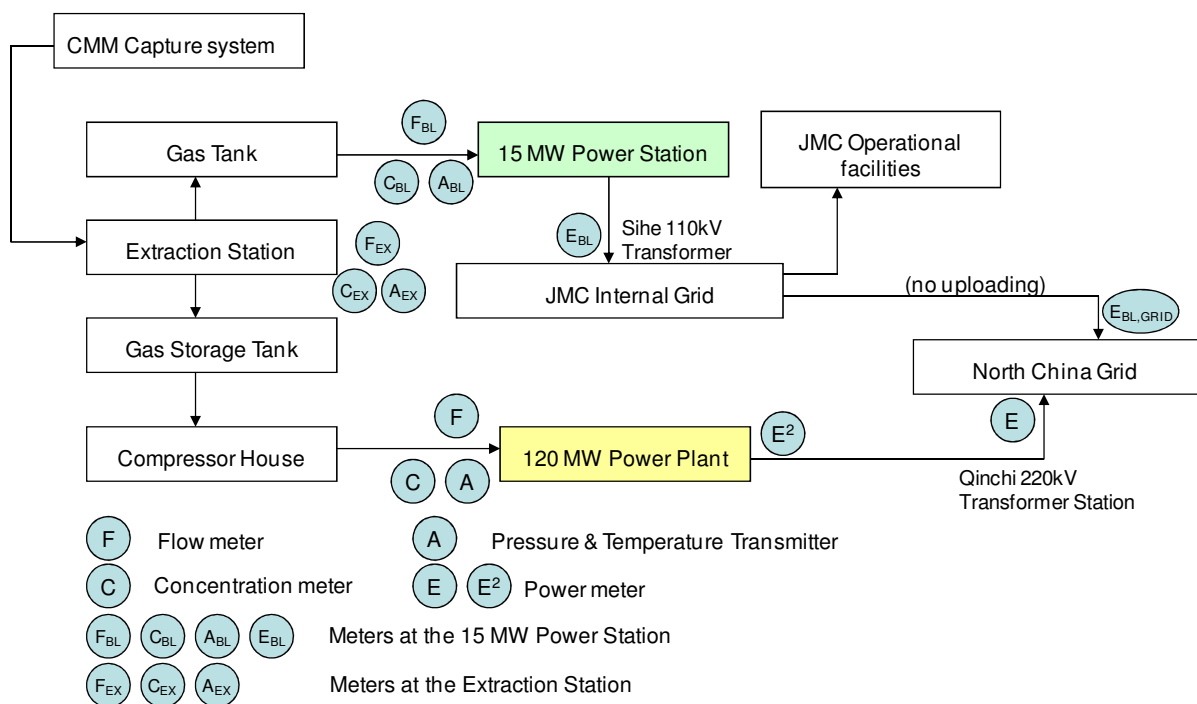
SECTION C. Description of the monitoring system

>>

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 and the monitored parameters in accordance with the requirements of the PDD, and in particular the parameters used for the calculation of emission reductions by the project activity.

Figure 3: Flow diagram and monitoring points within the project boundary.

**Table 1: Monitoring meters and parameters.**

Symbol	Description	Monitored parameter	Installed location
Main meters used for calculation of emission reductions			
F	Gas Flow Meter	MM _{ELEC}	120MW power plant
A	Pressure & Temperature Transmitter	MM _{ELEC}	120MW power plant
C	Concentration Meter	PC _{CH4}	120MW power plant
E	Power Meter	GEN ₁ , GEN ₂	Grid company
Monitoring meters not used for calculation of emission reductions			
E ²	Power Meter (used for cross-checking)	GEN ₁ , GEN ₂	120MW power plant
F _{EX} , C _{EX} , A _{EX}	Gas Flow Meter, Concentration Meter, Pressure & Temperature Transmitter	MM _{total} , MM _{release}	Extraction Station
F _{BL} , C _{BL} , A _{BL}	Gas Flow Meter, Concentration Meter, Pressure & Temperature Transmitter	MM _{BL}	15MW Power Station
E _{BL}	Power Meter	GEN _{BL}	15MW Power Station

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 Station

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. The Monitoring Meter List providing the latest information on the performed and scheduled calibrations for the metering equipment will be provided to the DOE during the site visit and be added to this report upon verification. 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 equipment that is 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 spare (back-up) meters. More detailed information on the metering equipment listed in the Table 1 is provided in the Section D. A complete list of meters installed within the project boundary will be provided to the DOE during the site visit and be added to this report upon verification.

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	$\pm(0.30+0.005 t)$	Annual	4
Concentration Meter (methane concentration analyzer)	0-100%	$\pm 2.0\%$	Annual	4
Power Meter	0-99999.999	0.2S	Annual	2

As indicated in the Table 2, the accuracy level of the installed concentration meters is of 2% (2S) as compared to the accuracy level of the meter required in the monitoring plan of the PDD of 1.5% (1.5S). In fact, it can be demonstrated that the concentration meter with the accuracy level of 1.5% (1.5S) cannot be purchased and properly maintained in the local conditions. The impact of 0.5% downgrade of the meter accuracy level results in the impact on the emission reduction calculations of less than 1% which can be neglected². However, to ensure conservativeness of the emission reductions calculations and compliance with the registered PDD, a corrective factor of 0.5% is suggested to be applied to the emission reduction calculations. Please see calculation details in section E.4.

² In line with the following requirement on the CDM Validation and Verification Manual (Version 01.1, EB 51, Annex 3, page 14), the impact of the lower accuracy of the gas concentration meter can be neglected as it will systematically contribute to less than 1% of the calculated emission reductions: "The validation report shall contain information regarding greenhouse gas emissions occurring within the proposed CDM project activity boundary as a result of the implementation of the proposed CDM project activity which are expected to contribute more than 1% of the overall expected average annual emissions reductions, which are not address by the applied methodology".

Data collection and storage

The data are monitored, recorded, and archived according to the monitoring methodology and monitoring plan described in the PDD. At each monitoring site, all data recorded must be stored in a spreadsheet format on the hard disk.

The following backups of monitored data will be available:

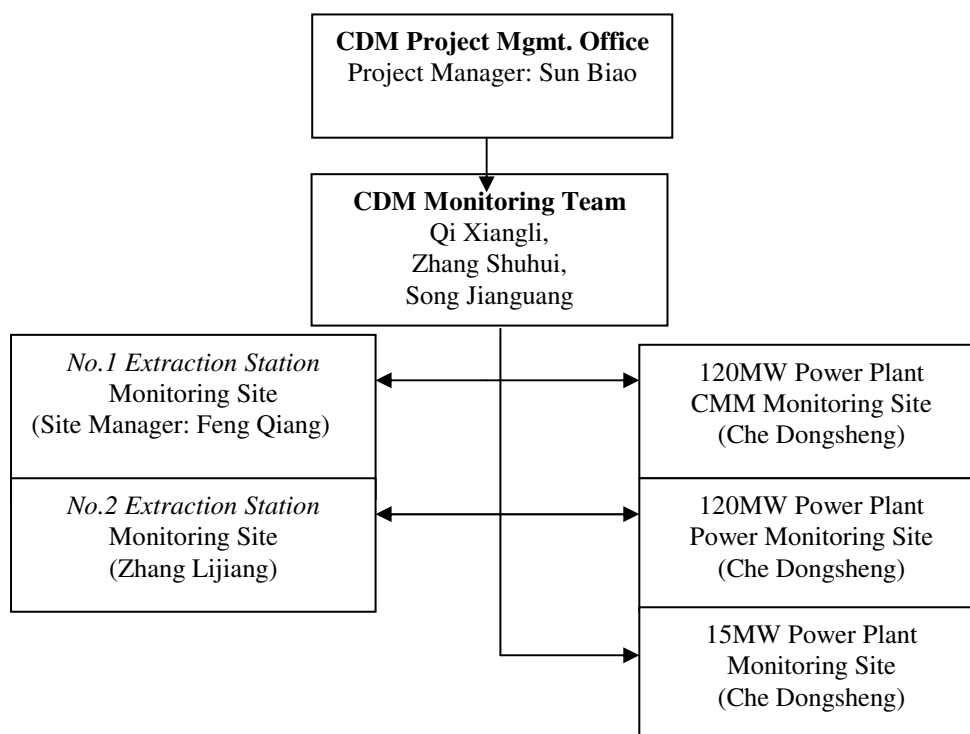
- **Paper backup:** the data is printed in the form of daily report and the site manager keeps the paper hard copy and forwards a copy to the CDM Monitoring Team periodically;
- **Electronic backup:** at least once a month, electronic copies of the daily reports must be stored into an electronic storage device (mobile hard drive or memory stick), and sent to the CDM Project Management Office.

The data are properly kept in the CDM Project Management Office. Both paper back up and electronic back up 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 Feng Qiang;
- 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 Che Dongsheng.

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, spare 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:	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_{CH_4}
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:	



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:	

Data / Parameter:	CEF_{CH_4}
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 used for (Baseline/ Project/ Leakage emission calculations)	The data are used for calculation of project emissions from methane destroyed through power generation.
Additional comment:	

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:	

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:	Meter readings transferred through digital (DCS) system and recorded automatically.
Value(s) of monitored parameter:	43,553.71
Indicate what the data are	Project emissions:



used for (Baseline/ Project/ Leakage emission calculations)	<p>- from methane destroyed MD_{ELEC} (Formula 3 & 5 in the PDD);</p> <p>- from un-combusted methane P_{UM} (Formula 6 in the PDD);</p> <p>Baseline emissions:</p> <p>- 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></p> <p>Accuracy class: 0.20%</p> <p>Serial numbers: 01A0716338; 01A0716339; 01A0716337; 01A0716336 (not including spare meters)</p> <p>Calibration frequency: annual</p> <p>Date of last calibration: 28/03/09</p> <p>Validity of calibration: 27/03/10</p> <p><u>Pressure Transmitters</u></p> <p>Accuracy class: 0.20%</p> <p>Serial numbers: 01A0643194; 01A0643195; 01A0643193; 01A0643196 (not including spare meters)</p> <p>Calibration frequency: annual</p> <p>Date of last calibration: 28/03/09</p> <p>Validity of calibration: 27/03/10</p> <p><u>Temperature Transmitters</u></p> <p>Accuracy class: $\pm(0.30+0.005 t)$</p> <p>Serial numbers: 7040214; 7040213; 7040216; 7040215 (not including spare meters)</p> <p>Calibration frequency: annual</p> <p>Date of last calibration: 28/03/09</p> <p>Validity of calibration: 27/03/10</p>
Measuring/ Reading/ Recording frequency:	Continuous/Continuous/Continuous
Calculation method (if applicable):	Not applicable
QA/QC procedures applied:	Flow meter, pressure transmitter and temperature transmitter are 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_1
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"> Settlement Notice issued by the Grid Company (monthly); Manually recorded by JMC hourly for cross-checking and backup.
Value(s) of monitored parameter:	229,666.8
Indicate what the data are	Baseline emissions from power generation replaced by the project



used for (Baseline/ Project/ Leakage emission calculations)	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: 19/06/09 Validity: 18/06/10</p> <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: 17/06/09 Validity: 16/06/10</p>
Measuring/ Reading/ Recording frequency:	Continuous/Continuous/Continuous
Calculation method (if applicable):	Not applicable
QA/QC procedures applied:	The power meters are calibrated annually. The electricity generation data from the JMC meters is aggregated monthly by the CDM Office and is used for cross-checks.

Data / Parameter:	GEN ₂
Data unit:	MWh
Description:	Electricity consumed by the project during the monitoring period
Measured /Calculated /Default:	Measured
Source of data:	<ol style="list-style-type: none"> Settlement Notice issued by the Grid Company (monthly); Manually recorded by JMC hourly for cross-checking and backup.
Value(s) of monitored parameter:	0
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: 19/06/09 Validity: 18/06/10</p> <p><u>Bidirectional electricity meters</u> (Grid, used for emission reduction calculations) Accuracy class: 0.2S</p>



	Serial numbers: 507003703; 507003731 Calibration frequency: annual Date of last calibration: 17/06/09 Validity: 16/06/10
Measuring/ Reading/ Recording frequency:	Continuous/Continuous/Continuous
Calculation method (if applicable):	Nor applicable
QA/QC procedures applied:	The meters are calibrated annually. The electricity generation data from the JMC meters is aggregated monthly by the CDM Office and is used for cross-check.

Data / Parameter:	PC _{CH4}										
Data unit:	%										
Description:	Concentration of methane (in mass) in extracted gas sent to the 120 MW power plant										
Measured /Calculated /Default:	Measured										
Source of data:	Meter readings transferred through digital (DCS) system and recorded automatically.										
Value(s) of monitored parameter:	<table border="1"> <thead> <tr> <th>Period</th><th>Monthly Average PC_{CH4}(%)</th></tr> </thead> <tbody> <tr> <td>9/1/2009-9/30/2009</td><td>46.93</td></tr> <tr> <td>10/1/2009-10/31/2009</td><td>44.50</td></tr> <tr> <td>11/1/2009-11/30/2009</td><td>45.76</td></tr> <tr> <td>12/1/2009-12/31/2009</td><td>41.79</td></tr> </tbody> </table>	Period	Monthly Average PC _{CH4} (%)	9/1/2009-9/30/2009	46.93	10/1/2009-10/31/2009	44.50	11/1/2009-11/30/2009	45.76	12/1/2009-12/31/2009	41.79
Period	Monthly Average PC _{CH4} (%)										
9/1/2009-9/30/2009	46.93										
10/1/2009-10/31/2009	44.50										
11/1/2009-11/30/2009	45.76										
12/1/2009-12/31/2009	41.79										
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: 29557; 29562; 29558; 29559 Calibration frequency: annual Date of last calibration: 07/01/09 Validity: 06/01/10										
Measuring/ Reading/ Recording frequency:	Continuous/Continuous/Continuous										
Calculation method (if applicable):	Not applicable										
QA/QC procedures applied:											

Data / Parameter:	PC _{NMHC}
Data unit:	%
Description:	Concentration of non methane hydrocarbon in extracted gas
Measured /Calculated	Measured



/Default:	
Source of data:	Testing report by Shanxi Coal Geology Institute on May 15, 2009
Value(s) of monitored parameter:	0
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Verifying whether PC_{NMHC} is below 1%
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Owned and operated by the Shanxi Coal Geology Institute
Measuring/ Reading/ Recording frequency:	Annual sampling
Calculation method (if applicable):	Not applicable
QA/QC procedures applied:	The test is implemented by Shanxi Coal Geology Institute

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 $PC_{NMHC} > 1\%$)
Source of data:	Testing report by Shanxi Coal Geology Institute on May 15, 2009
Value(s) of monitored parameter:	Not applicable since the $PC_{NMHC} = 0$
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, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Owned and operated by the Shanxi Coal Geology Institute
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 CMM Composition Test report issued by Shanxi Coal Geology Institute on May 15, 2009, the concentration of C2-C8 =0, therefore, it is not required to measure CEF_{NMHC} .

Monitored parameters that are not used for calculation of ER

Data / Parameter:	MM_{total}
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:	Digital and manual recording
Value(s) of monitored parameter:	90,989.83
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>Wind velocity sensors</u> Accuracy class: $\pm 0.3\text{m/s}$ Serial numbers: 509040163; 509030197; 509040186; 509030226; 509040213; 509040155 Calibration frequency: annual Date of last calibration: 16/04/09 Validity: 15/04/10</p> <p><u>Temperature transmitters</u> Accuracy class: 1 grade Serial numbers: 30511213; 30612158; 30903026; 30903030; 30905048; 30905049 Calibration frequency: annual Date of last calibration: 16/04/09 Validity: 15/04/10</p> <p><u>Pressure transmitters</u> Accuracy class: 0.5 grade Serial numbers: 40903013; 40903011; 40903009; 40905069; 40905065; 40905067 Calibration frequency: annual Date of last calibration: 16/04/09 Validity: 15/04/10</p> <p><u>Methane sensors</u> Accuracy class: $< \pm 10\%$ of true value Serial numbers: 209030285; 209030288; 209030310; 209030286; 209030284; 209030309 Calibration frequency: annual Date of last calibration: 16/04/09 Validity: 15/04/10</p> <p>Extraction station No.2</p> <p><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: 04/06/09 Validity: 03/06/10</p>



	<u>Methane concentration sensors</u> Accuracy class: $\leq \pm 7\%$ of true value Serial numbers: 2810; 2812 Calibration frequency: annual Date of last calibration: 04/06/09 Validity: 03/06/10
Measuring/ Reading/ Recording frequency:	Continuous/Continuous/Continuous
Calculation method (if applicable):	Not applicable
QA/QC procedures applied:	Not applicable

Data / Parameter:	MM _{release}
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:	Digital and manual recording
Value(s) of monitored parameter:	12,372.29
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 numbers: 09096 Calibration frequency: annual Date of last calibration: 04/06/09 Validity: 03/06/10</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: 19/06/09 Validity: 18/06/10</p> <p><u>Methane concentration sensors</u> Accuracy class: $\leq \pm 7\%$ of true value Serial numbers: 2814; 2854; 2716 Calibration frequency: annual</p>



	Date of last calibration: 24/06/09 Validity: 23/06/10
Measuring/ Reading/ Recording frequency:	Continuous/Continuous/Continuous
Calculation method (if applicable):	Not applicable
QA/QC procedures applied:	Not applicable

Data / Parameter:	MM _{BL}
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
Value(s) of monitored parameter:	10,782.285
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><u>Gas flow meters</u> Accuracy class: $\pm 0.5\%$ Serial numbers: 9050704; 9050705 Calibration frequency: annual Date of last calibration: 03/06/09 Validity: 02/06/10</p> <p><u>Pressure transmitters</u> Accuracy class: 0.05 Serial numbers: 1784993; 1784992 Calibration frequency: annual Date of last calibration: 20/06/09 Validity: 19/06/10</p> <p><u>Temperature transmitters</u> Accuracy class: 0.5 Serial numbers: 4005; 4018 Calibration frequency: annual Date of last calibration: 20/06/09 Validity: 19/06/10</p> <p><u>Heat resistance</u> Accuracy class: B Serial numbers: 2009062416; 2009062417 Calibration frequency: annual Date of last calibration: 22/06/09 Validity: 21/06/10</p> <p><u>Methane concentration analyzer</u> Accuracy class: $\pm 0.2\%$</p>



	Serial numbers: 29554; 29561 Calibration frequency: annual Date of last calibration: 02/07/09 Validity: 01/07/10
Measuring/ Reading/ Recording frequency:	Continuous/Continuous/Continuous
Calculation method (if applicable):	Not applicable
QA/QC procedures applied:	Not applicable

Data / Parameter:	GEN _{BL}
Data unit:	MWh
Description:	Electricity supplied by the 15MW power plant to JMC Internal Grid 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:	33,276.28
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)	Electricity meter Accuracy class: 0.5S Serial number: 200212419A0154 (not including spare meter) Calibration frequency: every 5 years Date of last calibration: 03/12/08 Validity: 02/12/13
Measuring/ Reading/ Recording frequency:	Continuous/Continuous/Continuous
Calculation method (if applicable):	Not applicable
QA/QC procedures applied:	Data are manually recorded hourly for cross checking and used as backup.

SECTION E. Emission reductions calculation

E.1. Baseline emissions calculation

>>

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 (tCO₂e)

BE_{MD} Baseline emissions from destruction of methane in the baseline scenario (tCO₂e)

BE_{MR} Baseline emissions from release of methane into the atmosphere that is avoided by the project activity (tCO₂e)

BE_{Use} Baseline emissions from power generation replaced by this project (tCO₂e)

And:

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

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

$$BE_{Use} = (GEN_1 - GEN_2) \times EF_{ELEC} \quad (11)$$

Where:

GEN_1 Electricity supplied by project activity to North China Grid (MWh)

GEN_2 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 tCO₂e/MWh)

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

Table 4: Calculation of baseline emissions.

Monitoring Period	MM_{ELEC} (tCH ₄)	GEN_1 (MWh)	GEN_2 (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
01/09/09-30/09/09	8,194.38	42,614.88	0	0	172,081.98	41,871.25	213,953.23
01/10/09-31/10/09	10,211.17	53,478.48	0	0	214,434.57	52,545.28	266,979.85
01/11/09-30/11/09	12,643.84	66,130.42	0	0	265,520.64	64,976.44	330,497.08
01/12/09-31/12/09	12,504.32	67,443.02	0	0	262,590.72	66,266.14	328,856.86
Total	43,553.71	229,666.80	0	0	914,627.91	225,659.11	1,140,287.02

Therefore, the total baseline emissions during the monitoring period are 1,140,287.02 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 (tCO₂e)

³ See PDD page 24.

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:

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

$$PE_{MD} = MD_{ELEC} \times (CEF_{CH_4} + r \times CEF_{NMHC}) \quad (3)$$

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 ignored⁵ (r=0).

Therefore,

$$PE_{MD} = MD_{ELEC} \times CEF_{CH_4} = (MM_{ELEC} \times Eff_{ELEC}) \times CEF_{CH_4} = (MM_{ELEC} \times 0.995) \times 2.75$$

$$PE_{UM} = GWP_{CH_4} \times MM_{ELEC} \times (1 - Eff_{ELEC}) = 21 \times MM_{ELEC} \times (1 - 0.995) \quad (6)$$

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_{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 5.

Table 5: 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
01/09/09-30/09/09	0	22,421.87	860.41	23,282.28
01/10/09-31/10/09	0	27,940.31	1,072.17	29,012.48
01/11/09-30/11/09	0	34,596.71	1,327.60	35,924.31
01/12/09-31/12/09	0	34,214.95	1,312.95	35,527.90
Total	0	119,173.84	4,573.13	123,746.97

Therefore, the total project emissions during the monitoring period are 123,746.97 tCO₂e.

E.3. Leakage calculation

>>

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

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.

As described in the PDD (page 28), the leakage of this project is 0.

In addition, for the experimental 15MW power plant, GEN_{BL} , the electricity supplied to the internal power grid, has been monitored and the volume during this monitoring period is 33,276.28 MWh. The monthly average is 8,319.07 MWh. MM_{BL} , the volume of methane sent to the 15MW power plant has been monitored and the value for this monitoring period is 10,782.285 tCH₄. The monthly average is 2,695.57 tCH₄.

Table 6 shows that the monthly average values of both the electricity and methane for this monitoring period are slightly higher than the monthly average in year 2008. Therefore, it can be concluded that the experimental 15MW power plant continues to be operational and maintain similar levels of CMM gas consumption and electricity supply to the internal grid as historically. Therefore, there is no emission reduction leakage in this regard.

Table 6: Experimental 15MW power plant data comparison

Parameter Period	MM_{BL} (tCH ₄) 1/09/09-31/12/09	MM_{BL} (tCH ₄) 01/01/08-31/12/08	GEN_{BL} (MWh) 1/09/09-31/12/09	GEN_{BL} (MWh) 01/01/08-31/12/08
Total	10,782.29	24,139.73	33,276.28	80,605.35
Monthly Average	2,695.57	2,011.64	8,319.07	6,717.11

E.4. Emission reductions calculation / table

>>

Total emission reductions are calculated as:

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

Where:

- ER Emissions reductions of the project activity (tCO₂e)
- BE Baseline emissions (tCO₂e)
- PE Project emissions (tCO₂e)

The results of emission reduction calculation for the monitoring period are shown in the Table 7.

Table 7: Total Emission Reductions.

Monitoring Period	PE (tCO ₂ e)	BE (tCO ₂ e)	Leakage	ER (tCO ₂ e)
	A	B	C	D = B-A-C
01/09/09-30/09/09	23,282.28	213,953.23	0	190,670
01/10/09-31/10/09	29,012.48	266,979.85	0	237,967
01/11/09-30/11/09	35,924.31	330,497.08	0	294,572
01/12/09-31/12/09	35,527.90	328,856.86	0	293,328
Total	123,746.97	1,140,287.02	0	1,016,537

The emission reductions resulting from the actually measured values are 1,016,537 tCO₂e.

However, as described in the section C above, to take into account the impact of 0.5% downgrade of the methane concentration meter accuracy, and in line with the conservativeness principles reflected in the CDM EB *Guidelines for assessing compliance with the calibration frequency requirements (version 01, EB 52, Annex 60, paragraph 4)*, the following discounting approach is suggested: “*The [corrective factor] shall be applied in a conservative manner such that the adjusted measured valued shall result in lower baseline emissions and higher project emissions / leakage*”.

The corrective factor of 0.5% (difference in the accuracy level of the installed meter (2%) compared to the PDD requirement of 1.5%) is applied during the monitoring period to the variables impacted by the accuracy level of the concentration meters:

- 1) The project emissions are increased by the corrective factor 1.005 (1+0.5%).

The formula (6) is modified as follows:

$$PE_{MD} = (MM_{ELEC} \times 1.005 \times Eff_{ELEC}) \times CEF_{CH_4} = (MM_{ELEC} \times 1.005 \times 0.995) \times 2.75$$

$$PE_{UM} = GWP_{CH_4} \times (MM_{ELEC} \times 1.005) \times (1 - Eff_{ELEC}) = 21 \times MM_{ELEC} \times 1.005 \times (1 - 0.995) \quad (6)$$

- 2) The baseline emissions are adjusted downward by the corrective factor 0.995 (1-0.5%).

The formula (10) will be modified as follows:

$$BE_{MR} = 21 \times MM_{ELEC} \times 0.995 \quad (10)$$

The use of the adjustments in the formulas for the calculation of the emission reductions during this monitoring period results in the overall reduction of the emission reductions amount by 0.51% (5,190 tCO₂e). The detailed calculation is provided in the “Emission Reduction Calculation Sheet for Jincheng Sihe Coal Mine CMM Generation Project (1896)”.

Therefore, the total emission reductions for the monitoring period 01/09/09 - 31/12/09 are 1,011,347 tCO₂e.

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 ⁶ (tCO ₂ e)	1,008,326	1,011,347

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

>>

⁶ The ex ante amount is calculated taking into account the number of days covered by the monitoring period (122) as follows: [3,016,714 tCO₂e * 122 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).



The ER volume based on the actual monitored values (before adjustment) is 1,016,537 tCO₂e, or 0.81% higher than the ex-ante estimate according to the PDD. Therefore, the increase in ER volume is insignificant. Further, the amount of the ER is adjusted downward to **1,011,347** tCO₂e which is **0.3%** higher than the estimate in PDD.

History of the document

Version	Date	Nature of revision
01	July 20, 2010	First submission of the Monitoring Report