Monitoring report form

(Version 04.0)

Complete this form in accordance with the Attachment "Instructions for filling out the monitoring report form" at the end of this form.

MONITORING REPORT	
Title of the project activity	Zhumadian Zhongyuan Gas-Steam Combined Cycle Power Project in Henan China
Reference number of the project activity	2344
Version number of the monitoring report	01
Completion date of the monitoring report	21/07/2014
Registration date of the project activity	25/08/2009
Monitoring period number and duration of this monitoring period	6th periodic monitoring period 01/12/2011 - 30/06/2013(both days included)
Project participant(s)	Huaneng Henan Zhongyuan Gas Power Company Ltd. Carbon Asset Management Sweden AB Carbon Asset Management Sweden AB
Host Party(ies)	P.R.China. Sweden Switzerland
Sectoral scope and selected methodology(ies), and where applicable, applied standardized baseline(s)	Sectoral Scope: 1 Energy industries (non-renewable sources) AM0029, Version 03: "Baseline Methodology for Grid Connected Electricity Generation Plants using Natural Gas"
Estimated amount of GHG emission reductions or net anthropogenic GHG removals by sinks for this monitoring period in the registered PDD	1,358,957
Actual GHG emission reductions or net anthropogenic GHG removals by sinks achieved in this monitoring period	396,122
Actual GHG emission reductions or net anthropogenic GHG removals by sinks achieved during the period up to 31 December 2012(if applicable)	263,665
Actual GHG emission reductions or net anthropogenic GHG removals by sinks achieved during the period from 1 January 2013 onwards (if applicable).	132,457

SECTION A. Description of project activity

A.1. Purpose and general description of project activity

>>

As described in PDD, the Zhumadian Zhongyuan Gas-Steam Combined Cycle Power Project in Henan China (hereinafter referred as the Project) is located at the southeast corner of the Zhumadian City, Henan Province, China. The designed installed capacity of the proposed project is 2×377.2MW, which is aimed to deliver 2,584.4235GWh electricity per year to the Central China Power Grid (CCPG). The Central China Power Grid is dominated by coal-fired power plants. By displace equal amount of electricity generated by coal-fired thermal power plants which would have been built otherwise, greenhouse gas (GHG) emission reductions could be achieved. The estimated annual GHG emission reductions are 858,165 tCO_2e.

The NGCC technology adopted in the project consists of two phases of combined dynamic cycles for electricity generation: Gas Cycle and Steam Cycle. Two phases of the cycles are combined to generate electricity with quite high efficiency.

The construction staring date of the project is 10/08/2005; the commenced electricity generation of the gas turbine #1 is in June 2007, and the commenced electricity generation of the gas turbine #2 is in December 2007. The commenced electricity generation of the steam turbine #1 is in August 2007 and the steam turbine #2 is in January 2008.

The current monitoring period is the 6th period that covers 01/12/2011-30/06/2013 including 578 days.

The total Emission Reductions achieved by the project in this period is 396,122 tCO_2e.

A.2. Location of project activity

>>

The proposed project is located at the planned industrial zone in the southeast corner of the Zhumadian City, Henan Province, China.

The geographic coordinate of the project site is situated as:

North-west corner: East longitude 114°03’39” North latitude 32°57’31”

South-west corner: East longitude 114°03’39” North latitude 32°57’22”

South-east corner: East longitude 114°03’52” North latitude 32°57’22”

North-east corner: East longitude 114°03’52” North latitude 32°57’31”

The geographic coordinate of the mark points within the project site are situated as

1＃Cooling tower: East longitude 114°03’41” North latitude 32°57’24”

2＃Cooling tower: East longitude 114°03’46” North latitude 32°57’24”

1＃Boiler stack: East longitude 114°03’48” North latitude 32°57’27”

2＃Boiler stack: East longitude 114°03’48” North latitude 32°57’29”

A.3. Parties and project participant(s)

Party involved ((host) indicates a host Party)	Private and/or public entity(ies) project participants (as applicable)	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
P.R.China.	Huaneng Henan Zhongyuan Gas Power Company Ltd.	No
Sweden	Carbon Asset Management Sweden AB	No
Switzerland	Carbon Asset Management Sweden AB	No

A.4. Reference of applied methodology and standardized baseline

>>

The approved baseline methodology AM0029, Version 03: “Baseline Methodology for Grid Connected Electricity Generation Plants using Natural Gas” and the approved monitoring methodology AM0029, Version 03: “Grid Connected Electricity Generation Plants using Non-Renewable and Less GHG Intensive Fuel” are applied to the project activity. The AM0029 also uses the “Tool to Calculate the Emission Factor for an Electricity System”, Version 01 and “Tool for the Demonstration and Assessment of Additionality”, Version 05 agreed by CDM EB.
More information about the methodology and the methodological tools can be found on the website: http://cdm.unfccc.int/methodologies/approved.

A.5. Crediting period of project activity

>>
The proposed project activity applies the renewable crediting period (7years×3). The starting date of the first crediting period is 25/08/2009 (i.e. the registration date of the proposed project). The first crediting period of the proposed project is 25/08/2009-24/08/2016 (7years).

A.6. Contact information of responsible persons/ entities

>>
Mr. Zhiqiang Chen

Henan Zhongyuan Gas Power Company Ltd.
Address: Zhongyuan Building, No. 68, Jiefang Road, Zhumadian, Henan Province, P.R. China.
Tel: +86 (0)0396-3802227
Fax: +86 (0)0396-3802226
Email: chenzhiqiangzydl@126.com

Ms. Xiaochao Lai
Mr. Ruihong Zhao
Beijing MD Energy Technology Co. Ltd.
Address: Room 17-F, International Metro Cetro,A No.3, Chaoyang District, Beijing, P.R. China.
Tel: +86 (0) 10-65566632
Fax: +86 (0)10-65583298
Email: amy.lai@mdenergy.cn

SECTION B. Implementation of project activity

B.1. Description of implemented registered project activity

>>

The NGCC technology adopted in the project consists of two phases of combined dynamic cycles: the first phase takes place in the gas turbine where the high temperature gas with about 1400°C generated by the natural gas combustion can power to rotate a coupled AC power generator to generate electricity - this is the Gas Cycle. In the second phase, the exhausted gas discharged from the gas turbine with about 600 °C can generate steam with 540°C temperature and 10.67MPa pressure in a heat recovery boiler, which then expands in the followed up steam turbine to generate electric power in the AC power generator again - this is the Steam Cycle. Two phases of the cycles is combined to generate electricity with quite high efficiency. The electricity generated by the project is delivered to the Central China Power Grid through 500 kV transmission line.

The technical performance indicators of the advanced technologies employed in the project are listed in the table below.

Table B.1 Technical Performance Indicators

Gas Turbine	
Manufacturer and Country of origin	Siemens Co. in Germany

Type	V94.3A	
Rated speed	rpm	3000
Flow rate of flue gas at the gas turbine	t/h	2396.5
Temperature of flue gas at the gas turbine	°C	586.5
Gas turbine output	MW	243.4
Steam Turbine		
Manufacturer and Country of origin	Shanghai Steam Turbine Co., Ltd.	
Type	TCF-1	
Rated Speed	rpm	3000
Steam turbine output	MW	133.8
HRSG in Combined Cycle		
Manufacturer and Country of origin	Wuhan Boiler Manufacture Co.	
Feed water temperature of HRSG	°C	55
Output of generator	MVA	478
Generator		
Manufacturer and country of origin	Shanghai Elec. Group Co.	
Rated voltage	KV	21
Rated current	A	13142
Rated frequency	Hz	50
Rated speed	rpm	3000
Total output for one set	MW	377.2

The technology process was shown in the diagram below:

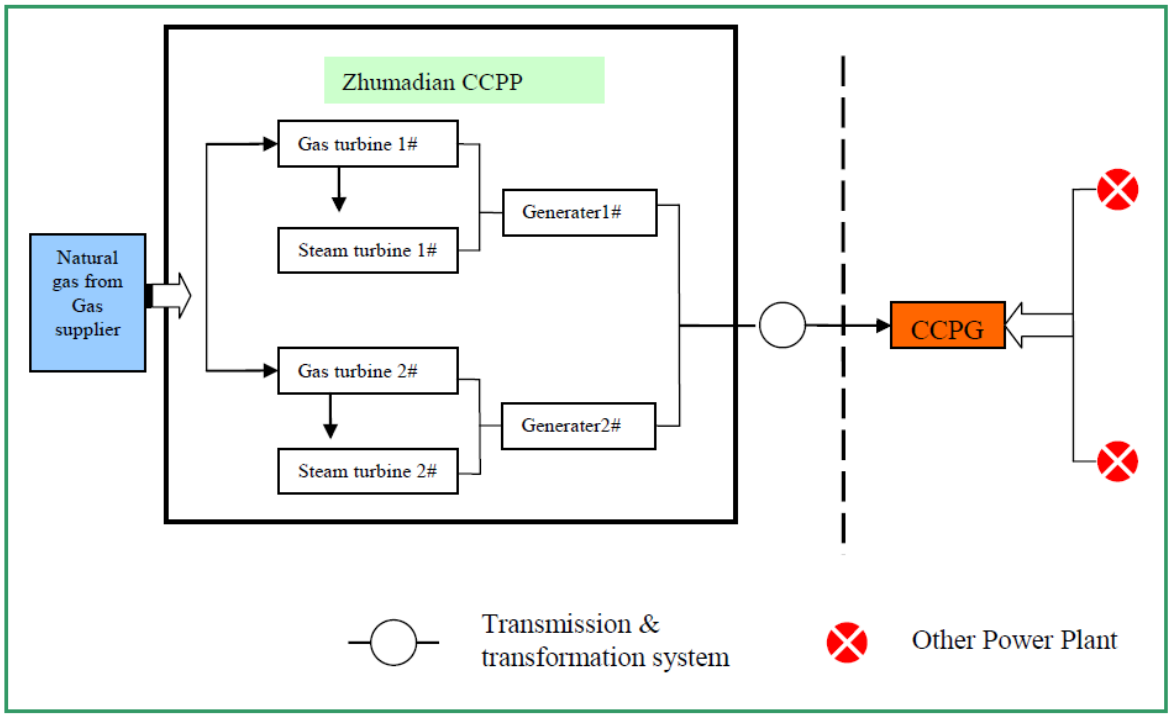

Diagram B.1 Technology Process

B.2. Post registration changes

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

>>
There is no temporary deviation from registered monitoring plan or applied methodology.

B.2.2. Corrections

>>
There is no correction.

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

>>
There is no permanent change from registered monitoring plan or applied methodology.

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

>>
There is no change to project design of registered project activity.

B.2.5. Changes to start date of crediting period

>>
There is no change to start date of crediting period.

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

>>
Not applicable.

SECTION C. Description of monitoring system

>>
C.1 Metering System
As described in PDD, two bidirectional meter No.1 and meter No.2 (Backup meter to meter No.1) were installed as gateway meters at 500kV Chaya substation for automatically measuring the exported and imported electricity by the proposed project. The meter No.3 was installed at the high voltage side of the 110KV/6KV transformer at the project site is used for measuring the import-grid electricity purchased. The total net electricity delivered to the grid is calculated based on readings from meter No.1 and meter No.3.
As described in PDD, the main gas metering point is set up in front of the natural gas delivery point, where two gas flow meters are installed (#1 and #2). Meanwhile, behind the natural gas delivery point, two cross-check ultrasonic flow meters (#3 and #5) are installed before the gas inlet for unit 1# and 2# at the project site. Ultrasonic Meter #4 and #6 has also been installed before #3 and #5 as their further backup meters.

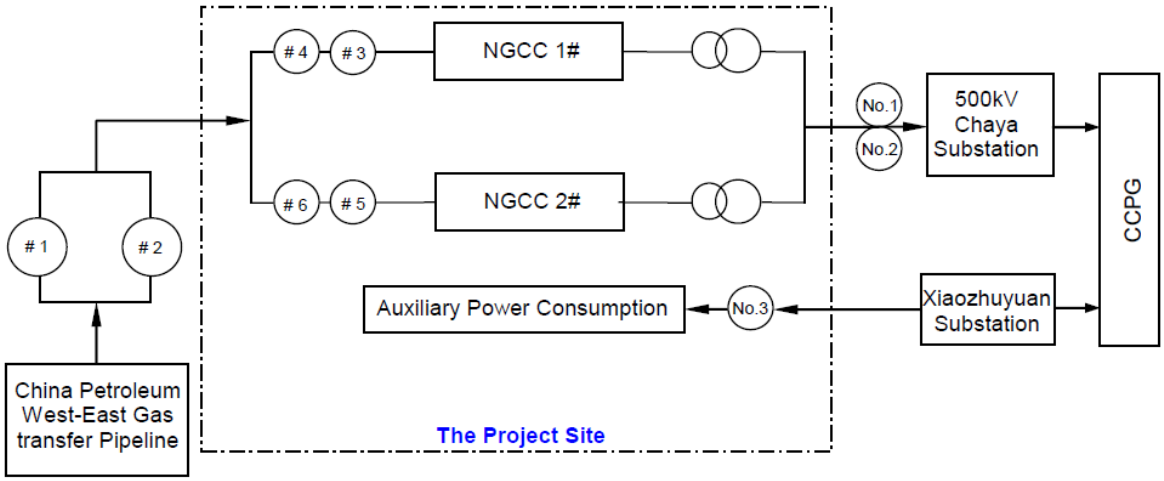

Diagram C.1 Electric and Nature Gas Monitoring System

The value of natural gas NCV is measured by an on-line gas chromatography analyzer.

C.2 Data Collection

The representatives from the project owner and the grid company have read the gateway meter meter No.1 and the meter No.3 on the last day of every month and the data has been recorded by the hard & soft means for monitoring, verifying, billing and cross checking. During this monitoring period, no abnormal difference has been found regarding calculation of emission reduction.

According to “GBT 18603-2001(Technical requirements of measuring systems for natural)”, natural gas is measured by volume under the normal condition of 20°C (293.15K) and absolute pressure 101.325KPa (one standard atmospheric pressure). The gas supplier and the project owner have verified the amount of natural gas supplied and consumed based on the reading from Gas meter #1 and #2 currently installed at the Zhumadian gas supply terminal, which are approved by both sides. The natural gas consumption has been recorded daily and cross-checked with receipt.

The measurement of NCV is conducted by an on-line gas chromatography analyzer by China Petroleum West-East Gas Transfer Pipeline Company Henan Province Xuedian Branch Station (GB/T-13610-2003), the value of NCV is recorded every ten days.

Everything worked fine during this monitoring period.

C.3 Monitoring Group & QA/QC

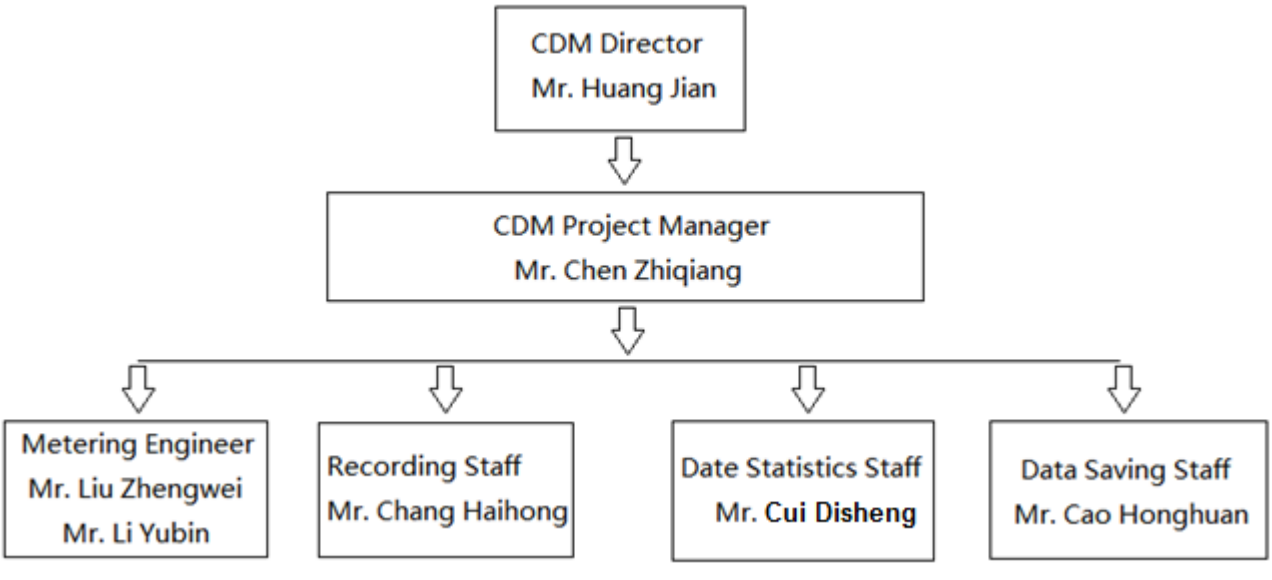

Figure C.2 Monitoring Group

Mr. Huang Jian, the Director of the proposed project exercised oversight on behalf of the Chairman. The CDM Project Manager is Mr. Chen Zhiqiang who is responsible for monitoring plan implementation.
Mr. Liu Zhengwei and Mr. Li Yubin is responsible for Meters' operation and calibration.
Mr. Chang Haihong is in charge of the data recording.
Mr. Cui Disheng is in charge of data statistics.
Mr. Cao Honghuan is responsible for data saving.
All electricity meters installed have been calibrated by certified Parties quarterly in accordance with manufacturer's recommendations and National Regulations (SD109-83 & JJG569-1999) for ensuring reliability of the system. Calibrations have been evidenced with certificates of calibration for the relevant meters issued by the qualified third party.
The calibration and testing for the natural gas metering devices and the on-line gas chromatography was conducted periodically according to the national measurement standard and regulation (JJG1029-2007, JJG1037-2008, JG-700 1999) by the qualified measurement technology verification institution authorized by the Chinese government.
In summary, during this monitoring period, all meters and devices have been working normally and calibrated according to the registered monitoring plan and relevant national standards.

C.4 Emergency & Trouble Solving Procedure
Once error or emergency issue occurred during the operation and monitoring of the project, regulations on the Project Operation Manual and the CDM Monitoring Manual will be followed. All data of the monitoring of the project will be stored for more than two years after the end of the crediting period. Once an error occurred, these stored data will be the backup information for monitoring. No error occurred during this monitoring period.

SECTION D. Data and parameters

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

Data / Parameter:	**$EF_{Coal,upstream,CH4}$**
Unit:	t CH_4/kt coal
Description:	Emission Factor for upstream fugitive methane emissions from coal production, transportation, distribution.
Source of data:	Revised 1996 IPCC Guideline Vol.3, default value, as required by AM0029, version 03.
Value(s) applied):	13.4

Purpose of data:	Data used for Leakage Emission Calculation
Additional comment:	

Data / Parameter:	**$EF_{oil,upstream,CH4}$**
Unit:	t CH_4/PJ
Description:	Emission Factor for upstream fugitive methane emissions from crude oil production, transportation, refining and storage processes.
Source of data:	Revised IPCC 1996 Guidance default value, Tables 1-60 to 1-64, p.1.129 - 1.131
Value(s) applied):	4.1
Purpose of data:	Data used for Leakage Emission Calculation
Additional comment:	

Data / Parameter:	**$EF_{NG,upstream,CH4}$**
Unit:	t CH_4/PJ
Description:	Emission Factor for upstream fugitive methane emissions of natural gas from production, transportation, distribution, and, in the case of LNG, liquefaction, transportation, re-gasification and compression into a transmission or distribution system.
Source of data:	Revised IPCC 1996 Guidance default value, Tables 1-63 to 1-64, p.1.130 - 1.131
Value(s) applied):	296
Purpose of data:	Data used for Leakage Emission Calculation
Additional comment:	

Data / Parameter:	**GWP_{CH4}**
Unit:	t CO_2e/tCH_4
Description:	Global Warming Potential for methane
Source of data:	IPCC Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories
Value(s) applied):	21
Purpose of data:	Data used for Leakage Emission Calculation
Additional comment:	

D.2. Data and parameters monitored

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

Data / Parameter:	**$FC_{NG,y}$**
Unit:	Nm^3 (Volume unit Nm^3 measured under the normal condition of 20°C (293.15K) and absolute pressure 101.325KPa (one standard atmospheric pressure).
Description:	Quantity of natural gas consumed in project activity
Measured/ Calculated / Default:	Measured.
Source of data:	NG flow meter reading at the power supplier terminal

Value(s) of monitored parameter:	809,496,405		
Monitoring equipment:	Gas flow meter	1#	2#
	Type	TRZ-IFSG14000DN300ANSI600	
	Accuracy class	1.0	
	Serial number	83034891	83034059
	Calibration frequency	every 1yr	
	Calibration date	29/11/2011 26/11/2012	09/10/2011 28/09/2012
	Validity	28/11/2012 25/11/2013	08/10/2012 27/09/2013
	Calibration entity	Nanjing Branch of National Station of Petroleum &Natural Gas Flow Meter	
Measuring/ Reading/ Recording frequency:	The monitoring data of the NG consumption was aggregated and recorded daily.		
Calculation method (if applicable):	Meter Reading		
QA/QC procedures:	The total NG consumption was monitored both by Gas supplier and project owner. The monitoring readings were cross-checked with the receipts provided by the gas supply company. All the Gas Flow Meters have been calibrated once a year by a qualified third party. All the electronic and paper documents will be archived during the crediting period and two years after the end of the crediting period or the last issuance of CERs for this project activity.		
Purpose of data:	Data used for Project Emission calculation.		
Additional comment:			

Data / Parameter:	**$NCV_{NG,y}$**
Unit:	MJ/Nm^3
Description:	Net Calorific Value of NG
Measured/ Calculated / Default:	Weighted average value calculated was applied for emission reduction calculation.
Source of data:	Specific value on natural gas resource, provided by the Petro China Company Ltd.
Value(s) of monitored parameter:	33.5209
Monitoring equipment:	On-line Gas Chromatograph of Petro China Company. Type：BTU-8000 Serial number: 100839 Calibration frequency: every 1yr Last calibration date: 26/05/2011, 22/05/2012,and 20/05/2013 Validity: 25/05/2012, 21/05/2013, and 19/05/2014 Calibration entity: National Institute of Metrology of P. R. China
Measuring/ Reading/ Recording frequen y:	The NCV value were measured continuously, read daily, and recorded every ten days.
Calculation method (if applicable):	Weighted average value of every ten days NCV values

QA/QC procedures:	The value of NCV was measured by the gas chromatography analyzer on-line, which has been record by the China National Petroleum Corporation (Gas supplier), and then provided to the project owner. The calibration and testing for on-line gas chromatography analyer was carried out once a year by the qualified measurement technology verification institution authorized by National Institute of Metrology of P.R. China. The calibration results showed that the Gas Chromatograph runs OK. All the electronic and paper documents will be archived during the crediting period and two years after the end of the crediting period or the last issuance of CERs for this project activity.
Purpose of data:	Data used for Project Emission calculation.
Additional comment:	

Data / Parameter:	**$OXID_{NG}$**
Unit:	None
Description:	Oxidation factor of the Natural gas
Measured/ Calculated / Default:	Default
Source of data:	"2006 IPCC Guidelines for National Greenhouse Gas Inventories" Volume 2 Energy, Chapter 1, Table 1.4, Page 1.24
Value(s) of monitored parameter:	1.00 for gas
Monitoring equipment:	-
Measuring/ Reading/ Recording frequency:	-
Calculation method (if applicable):	-
QA/QC procedures:	-
Purpose of data:	Data used for Project Emission calculation.
Additional comment:	

Data / Parameter:	**$EF_{CO2,NG,y}$**
Unit:	tCO_2/GJ
Description:	CO_2 emission factor per unit of energy of natural gas
Measured/ Calculated / Default:	Default
Source of data:	Determined by National data which is cited from 2006 IPCC Guidelines for National Greenhouse Gas Inventories" Volume 2 Energy, Chapter I, Table1.4 in Page 1.24.[1]
Value(s) of monitored parameter:	0.0561

[1] The project owner had sent a letter to the Gas supplier (China National Petroleum Corporation) on 12/02/2010 requiring them to provide the $EF_{CO2,NG}$ value, and the Gas supplier had replied this letter. But according to the letter from supplier, the value is unavailable and cannot be provided by gas supplier. Therefore, according to PDD, the country value of 15.3tC/TJ (i.e. 0.0561tCO2/GJ)[6] which sourced from IPCC default value has been applied here.

Monitoring equipment:	-
Measuring/ Reading/ Recording frequency:	-
Calculation method (if applicable):	Unit conversion: $EF_{CO2,NG,y}$ = 15.30tC/TJ×44/12/1000 = 0.0561 tCO_2/GJ
QA/QC procedures:	During implementing verification period for the project, the latest IPCC-value is applied.
Purpose of data:	Data used for $COEF_{NG,y}$, calculation
Additional comment:	

Data / Parameter:	**$COEF_{NG,y,}$**
Unit:	tCO_2/Nm^3
Description:	CO_2 emission coefficient in year y for natural gas
Measured/ Calculated / Default:	Calculated
Source of data:	Calculated by $COEF_{NG,\,y} = NCV_{NG,\,y} * EF_{CO2,\,NG,\,y} * OXID_{NG}$
Value(s) of monitored parameter:	See ER Calculation Excel Table
Monitoring equipment:	-
Measuring/ Reading/ Recording frequency:	-
Calculation method (if applicable):	$COEF_{NG,\,y} = NCV_{NG,\,y} * EF_{CO2,\,NG,\,y} * OXID_{NG}$
QA/QC procedures:	-
Purpose of data:	Data used for Project Emission calculation.
Additional comment:	

Data / Parameter:	**PE_y**
Unit:	tCO_2e
Description:	CO_2 emissions from the power plant of the project due to combustion of natural gas fuel in y year.
Measured/ Calculated / Default:	Calculated
Source of data:	Calculated by $PE_y = FC_{NG,\,y} * COEF_{NG,\,y}$
Value(s) of monitored parameter:	1,522,276
Monitoring equipment:	-
Measuring/ Reading/ Recording frequency:	-
Calculation method (if applicable):	$PE_y = FC_{NG,\,y} * COEF_{NG,\,y}$ $COEF_{NG,\,y} = NCV_{NG,\,y} * EF_{CO2,\,NG,\,y} * OXID_{NG}$
QA/QC procedures:	-
Purpose of data:	Data used for Project Emission calculation.
Additional comment:	

Data / Parameter:	**$EG_{pj,y}$ (Gateway meter No.1 and meter No.3)**		
Unit:	MWh		
Description:	The net electricity delivered by the project activity, measured by the meter No.1 and meter No.3.		
Measured/ Calculated / Default:	Measured		
Source of data:	Reading at project boundary by electricity energy meter with bidirectional reading function, and the electricity purchase receipt from the power grid company		
Value(s) of monitored parameter:	4,041,292.00		
Monitoring equipment:			
		Electricity meter No.1	Electricity meter No.3
	Type	WU.TE432S	SL7000
	Accuracy class	0.2s	
	Serial number	18450580	33049113
	Calibration frequency	Every 3 months	
	Calibration date	06/10/2011 05/01/2012 03/04/2012 02/07/2012 28/09/2012 27/12/2012 25/03/2013 21/06/2013	06/10/2011 05/01/2012 03/04/2012 02/07/2012 28/09/2012 27/12/2012 25/03/2013 21/06/2013
	Validity	05/10/2012 04/01/2013 02/04/2013 02/07/2013 27/09/2013 26/12/2013 24/03/2014 20/06/2014	05/10/2012 04/01/2013 02/04/2013 02/07/2013 27/09/2013 26/12/2013 24/03/2014 20/06/2014
	Calibration entity	Henan Province Research Institute	
Measuring/ Reading/ Recording frequency:	Measuring frequency: continuously Recording frequency: daily and monthly record.		
Calculation method (if applicable):	Net electricity supplied is calculated as exported electricity measured by meter No.1 minus imported electricity measured by meter No.1, then minus the imported electricity measured by meter No.3		
QA/QC procedures:	The electricity output was monitored and recorded at the on-site computer control centre. The record of electricity delivered and the receipt of the electricity purchase was cross-checked by both the project owner and the power grid company. All the electricity meters (meter No.1, meter No.2 and meter No.3) have been calibrated once a year by a qualified third party. All the electronic and paper documents will be archived during the crediting period and two years after the end of the crediting period or the last issuance of CERs for this project activity.		

Purpose of data:	Data used for Baseline Emission calculation.
Additional comment:	

Data / Parameter:	**m**
Unit:	
Description:	A sample group m including recent capacity additions in the CCPG that comprise 20% of the total installed capacity in year 2011 and 2012.
Measured/ Calculated / Default:	Default
Source of data:	China's DNA CDM official Website: http://cdm.ccchina.gov.cn/Detail.aspx?newsId=3545&TId=3 http://cdm.ccchina.gov.cn/Detail.aspx?newsId=3553&TId=3
Value(s) of monitored parameter:	See ER Calculation Table
Monitoring equipment:	-
Measuring/ Reading/ Recording frequency:	-
Calculation method (if applicable):	-
QA/QC procedures:	According to registered PDD, the latest value available at the DNA website of the crediting year has been used for the calculation.
Purpose of data:	Data used for Baseline Emission calculation.
Additional comment:	

Data / Parameter:	**$F_{i,j,y}$**
Unit:	t or Nm^3
Description:	Fossil fuel i consumption in year y for electricity generation in province j which is covered under CCPG. Used for calculation of λ_i and $EF_{BM,y}$
Measured/ Calculated / Default:	Default
Source of data:	China's DNA CDM official Website: http://cdm.ccchina.gov.cn/Detail.aspx?newsId=3545&TId=3 http://cdm.ccchina.gov.cn/Detail.aspx?newsId=3553&TId=3
Value(s) of monitored parameter:	See ER Calculation Table
Monitoring equipment:	-
Measuring/ Reading/ Recording frequency:	-
Calculation method (if applicable):	-
QA/QC procedures:	According to registered PDD, the latest value available at the DNA website of the crediting year has been used for the calculation.
Purpose of data:	Data used for Baseline Emission calculation.
Additional comment:	

Data / Parameter:	**$COEF_{i,j}$**
Unit:	tCO_2/t or Nm_3
Description:	The CO_2 emission factor for fuel type i in Province j, taking into account the carbon content of the fuels used and the percent oxidation of the fuel. Used for calculation of λ_i and $EF_{BM,y}$
Measured/ Calculated / Default:	Default
Source of data:	China's DNA CDM official Website: http://cdm.ccchina.gov.cn/Detail.aspx?newsId=3545&TId=3 http://cdm.ccchina.gov.cn/Detail.aspx?newsId=3553&TId=3
Value(s) of monitored parameter:	See ER Calculation Table
Monitoring equipment:	-
Measuring/ Reading/ Recording frequency:	-
Calculation method (if applicable):	-
QA/QC procedures:	According to registered PDD, the latest value available at the DNA website of the crediting year has been used for the calculation.
Purpose of data:	Data used for Baseline Emission calculation.
Additional comment:	

Data / Parameter:	**λ_{Coal}, λ_{Oil}, λ_{Gas}**
Unit:	-
Description:	The ratio λ_i of the CO_2 emissions from solid (coal), liquid (oil) and gas fuels consumed for power generation to the CO_2 emissions from total thermal power generation under CCPG.
Measured/ Calculated / Default:	Default
Source of data:	China's DNA CDM official Website: http://cdm.ccchina.gov.cn/Detail.aspx?newsId=3545&TId=3 http://cdm.ccchina.gov.cn/Detail.aspx?newsId=3553&TId=3
Value(s) of monitored parameter:	See ER Calculation Table
Monitoring equipment:	-
Measuring/ Reading/ Recording frequency:	-
Calculation method (if applicable):	-
QA/QC procedures:	According to registered PDD, the latest value available at the DNA website of the crediting year has been used for the calculation.
Purpose of data:	Data used for Baseline Emission calculation.
Additional comment:	

Data / Parameter:	**$EF_{Coal,Adv}$, $EF_{Oil,Adv}$, $EF_{Gas,Adv}$**
Unit:	tCO_2/MWh

Description:	The emission factors in line with the efficiency level of the best technology commercially available in China's power grid for each fuel type as coal, oil and gas respectively.
Measured/ Calculated / Default:	Default
Source of data:	China's DNA CDM official Website: http://cdm.ccchina.gov.cn/Detail.aspx?newsId=3545&TId=3 http://cdm.ccchina.gov.cn/Detail.aspx?newsId=3553&TId=3
Value(s) of monitored parameter:	See ER Calculation Table
Monitoring equipment:	-
Measuring/ Reading/ Recording frequency:	-
Calculation method (if applicable):	-
QA/QC procedures:	According to registered PDD, the latest value available at the DNA website of the crediting year has been used for the calculation.
Purpose of data:	Data used for Baseline Emission calculation.
Additional comment:	

Data / Parameter:	**$EF_{Thermal}$**
Unit:	tCO_2/MWh
Description:	The weighted averaged emission factor $EF_{Thermal}$ of the thermal power capacity under CCPG.
Measured/ Calculated / Default:	Default
Source of data:	China's DNA CDM official Website: http://cdm.ccchina.gov.cn/Detail.aspx?newsId=3545&TId=3 http://cdm.ccchina.gov.cn/Detail.aspx?newsId=3553&TId=3
Value(s) of monitored parameter:	See ER Calculation Table
Monitoring equipment:	-
Measuring/ Reading/ Recording frequency:	-
Calculation method (if applicable):	-
QA/QC procedures:	According to registered PDD, the latest value available at the DNA website of the crediting year has been used for the calculation.
Purpose of data:	Data used for Baseline Emission calculation.
Additional comment:	

Data / Parameter:	**CAP_{Total}**
Unit:	MW
Description:	The total capacity addition of CCPG in year 2007, 2008, 2009 and 2010.
Measured/ Calculated / Default:	Default

Source of data:	China's DNA CDM official Website: http://cdm.ccchina.gov.cn/Detail.aspx?newsId=3545&TId=3 http://cdm.ccchina.gov.cn/Detail.aspx?newsId=3553&TId=3
Value(s) of monitored parameter:	See ER Calculation Table
Monitoring equipment:	-
Measuring/ Reading/ Recording frequency:	-
Calculation method (if applicable):	-
QA/QC procedures:	According to registered PDD, the latest value available at the DNA website of the crediting year has been used for the calculation.
Purpose of data:	Data used for Baseline Emission calculation.
Additional comment:	

Data / Parameter:	**$CAP_{Thermal}$**
Unit:	MW
Description:	The capacity addition by thermal power of CCPG in year 2007, 2008, 2009 and 2010.
Measured/ Calculated / Default:	Default
Source of data:	China's DNA CDM official Website: http://cdm.ccchina.gov.cn/Detail.aspx?newsId=3545&TId=3 http://cdm.ccchina.gov.cn/Detail.aspx?newsId=3553&TId=3
Value(s) of monitored parameter:	See ER Calculation Table
Monitoring equipment:	-
Measuring/ Reading/ Recording frequency:	-
Calculation method (if applicable):	-
QA/QC procedures:	According to registered PDD, the latest value available at the DNA website of the crediting year has been used for the calculation.
Purpose of data:	Data used for Baseline Emission calculation.
Additional comment:	

Data / Parameter:	**$EF_{grid,BM,y}$**
Unit:	tCO_2e/MWh
Description:	Build marginal emission factor of the CCPG during the project operation period
Measured/ Calculated / Default:	Default
Source of data:	China's DNA CDM official Website: http://cdm.ccchina.gov.cn/Detail.aspx?newsId=3545&TId=3 http://cdm.ccchina.gov.cn/Detail.aspx?newsId=3553&TId=3
Value(s) of monitored parameter:	See ER Calculation Table

Monitoring equipment:	-
Measuring/ Reading/ Recording frequency:	-
Calculation method (if applicable):	-
QA/QC procedures:	According to registered PDD, the latest value available at the DNA website of the crediting year has been used for the calculation.
Purpose of data:	Data used for Baseline Emission calculation.
Additional comment:	

D.3. Implementation of sampling plan

>>

Not applicable.

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

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

>>

Baseline Emissions

According to the registered PDD, Baseline emissions are given as:

$BE_y = EG_{pj,y} * EF_{BL,CO2,y}$

Where:

$EG_{pj,y}$: Net amount of electricity generated by the project and sold into CCPG (MWh). The monitored data is listed in Section Annex 1 of this monitoring report.

$EF_{BL,CO2,y}$: As mentioned in PDD, $EF_{BL,CO2} = \min(EF_{grid,BM,y}, EF_{grid,CM,y}, EF_{BL,CO2,Option3\ EF})$

$EF_{grid,BM,y}$ is selected as the baseline emission factor of CCPG, which is ex-post calculated and updated.

Calculation of $EF_{BL,CO2,y}$ of CCPG in this monitoring period.

Step a: calculate the proportion λ_i of the CO_2 emissions of solid, liquid and gas fuel type consumed for

power generation to the total CO_2 emissions from the total thermal power generation.

$$\lambda_{Coal} = \frac{\sum_{i \in coal,j} F_{i,j,y} \times COEF_{i,j}}{\sum_{i,j} F_{i,j,y} \times COEF_{i,j}}$$

$$\lambda_{oil} = \frac{\sum_{i \in oil,j} F_{i,j,y} \times COEF_{i,j}}{\sum_{i,j} F_{i,j,y} \times COEF_{i,j}}$$

$$\lambda_{Gas} = \frac{\sum_{i \in GAS,j} F_{i,j,y} \times COEF_{i,j}}{\sum_{i,j} F_{i,j,y} \times COEF_{i,j}}$$

Where:

$F_{i,j,y}$	= the amount of fuel i (in unit t or Nm^3) consumed by relevant power sources in provincial grid j in year y;
$COEF_{i,j,y}$	= the CO_2 emission coefficient of fuel i (tCO_2 /t or Nm^3), taking into account

the carbon content of the fuels used by relevant power sources j and the percent oxidation of the fuel in year(s) y.

In this monitoring period, the details are as follow:

Parameter	Value	Value	Value
Monitoring period	01/12/2011-31/12/2011	01/01/2012-30/06/2013	01/01/2012-30/06/2013
λ_{Coal}	97.66%	93.28%	93.28%
λ_{Oil}	0.13%	0.31%	0.10%
λ_{Gas}	2.21%	6.41%	6.41%

For the detailed information, please see the 2344 6th CER Calculation Sheet.xls.

Step b: calculate the emission factor $EF_{Thermal}$ of the corresponding thermal power:

According to the formula: $EF_{Thermal}= \lambda_{Coal} \times EF_{CH4,Coal,Adv} + \lambda_{Oil} \times EF_{CH4,Oil,Adv} + \lambda_{Gas} \times EF_{CH4,Gas,Adv}$

For 01/12/2011-31/12/2011: $EF_{Thermal}$ = 0.7870 tCO_2e/MWh

For 01/01/2012-31/12/2012: $EF_{Thermal}$ = 0.7651 tCO_2e/MWh

For 01/01/2013-30/06/2013: $EF_{Thermal}$ =0.7635 tCO_2e/MWh

Step c: calculate the $EF_{grid,BM,y}$ of the grid:

$$EF_{Grid,BM,y} = \frac{CAP_{Thermal}}{CAP_{Total}} \times EF_{Thermal}$$

Where:

CAP_{Total} is the total new capacity addition (MW),

$CAP_{Thermal}$ is the new capacity addition of thermal power plants (MW).

The share of thermal power of recent capacity addition is 53.25% (See 2344 6th CER Calculation Sheet.xls for details), thus, the

Build Margin emission factor ($EF_{grid,BM,y}$) of this monitoring period is calculated as:

$$EF_{Grid,BM,2011} = \frac{CAP_{Thermal}}{CAP_{Total}} \times EF_{Thermal} = 53.25\% \times 0.7870 = 0.4191 tCO_2e / MWh$$

$$EF_{Grid,BM,2012} = \frac{CAP_{Thermal}}{CAP_{Total}} \times EF_{Thermal} = 61.85\% \times 0.7651 = 0.4733 tCO_2e / MWh$$

$$EF_{Grid,BM,2013} = \frac{CAP_{Thermal}}{CAP_{Total}} \times EF_{Thermal} = 65.36\% \times 0.7635 = 0.4990 tCO_2e / MWh$$

Thus, BE_y is calculated as:

Period	EG (From Project to Grid)	EG (From Grid to Project)	$EG_{pj,y}$	$EG_{pj,201x}$
Unit	Mwh	Mwh	Mwh	Mwh
01/12/2011-31/12/2011	410575.5	13.794	410561.706	410561.706
01/01/2012-31/01/2012	318165.75	294.888	317870.862	2544831.27
01/02/2012-29/02/2012	188583	398.016	188184.984	
01/03/2012-31/03/2012	196633.5	386.178	196247.322	
01/04/2012-30/04/2012	181792.5	393.132	181399.368	
01/05/2012-31/05/2012	250080.75	143.55	249937.2	
01/06/2012-30/06/2012	364006.5	270.936	363735.564	
01/07/2012-31/07/2012	295206.75	404.976	294801.774	
01/08/2012-31/08/2012	190548	599.526	189948.474	

01/09/2012-30/09/2012	148752	660.9	148091.1	
01/10/2012-31/10/2012	162682.5	589.68	162092.82	
01/11/2012-30/11/2012	218100.75	574.134	217526.616	
01/12/2012-31/12/2012	35820.75	825.564	34995.186	
01/01/2013-31/01/2013	21245.25	606.804	20638.446	1085899.03
01/02/2013-28/02/2013	199740	550.5	199189.5	
01/03/2013-31/03/2013	222962.25	389.166	222573.084	
01/04/2013-30/04/2013	199950.75	132.642	199818.108	
01/05/2013-31/05/2013	197859.75	324.714	197535.036	
01/06/2013-30/06/2013	246277.5	132.648	246144.852	
Sum	4048983.75	7691.748	4041292.002	

$BE_{2011} = EG_{pj,\ 2011} * EF_{BL,\ CO2,\ 2011} = EG_{pj,\ 2011} * EF_{grid,BM,2011}$= 410,561.71 * 0.4191= 172,066.41 (tCO_2e)

$BE_{2012} = EG_{pj,\ 2012} * EF_{BL,\ CO2,\ 2012} = EG_{pj,\ 2012} * EF_{grid,BM,2012}$= 2,544,831.27 * 0.4733= 1,204,468.64 (tCO_2e).

$BE_{2013} = EG_{pj,\ 2013} * EF_{BL,\ CO2,\ 2013} = EG_{pj,\ 2013} * EF_{grid,BM,2013}$= 1,085,899.03 * 0.4990= 541,863.61 (tCO_2e).

$BE = BE_{2011} + BE_{2012} + BE_{2013}$=1,918,399 ($tCO_2e$)

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

>>

Project Emissions

According to section 6.1 of the registered PDD, Project Emissions are given as:

$PE_y = FC_{NG,y} * COEF_{NG,y}$

Where

$FC_{NG,y}$: the total volume of NG combusted (Nm^3) during this monitoring period. The monitored data is listed in Annex 1 of this monitoring report.

$COEF_{NG,y}$: the CO_2 emission coefficient (tCO_2/Nm^3) during this monitoring period for NG, which is calculated as follows:

$COEF_{NG,y} = NCV_{NG,y} * EF_{CO2,NG,y} * OXID_{NG}$

Where:

$NCV_{NG,y}$: the net calorific value (energy content) per volume unit of NG during this monitoring period (GJ/Nm^3) as provided by the fuel supplier.

$EF_{CO2,NG,y}$: the CO_2 emission factor per unit of energy value of NG in this monitoring period . It was determined by national data which is cited from the updated edition of IPCC 2006, page 24 according to the registered PDD. The $EF_{CO2,NG,y}$ is 0.0561tCO_2e/GJ

$OXID_{NG}$: the IPCC default value 100% is used according to the registered PDD.

The every month's weighted averaged $NCV_{NG,y}$ value of this monitoring period are listed as follow:

Period	01/12/2011 - 31/12/2011	01/01/2012-31/01/2012	01/02/2012 - 29/02/2012	01/03/2012 - 31/03/2012	01/04/2012-30/04/2012	01/05/2012 - 31/05/2012
$NCV_{NG,y}$ (MJ/Nm^3)	33.80	33.68	33.72	33.56	33.29	33.25
Period	01/06/2012 - 30/06/2012	01/07/2012-31/07/2012	01/08/2012 - 31/08/2012	01/09/2012 - 30/09/2012	01/10/2012-31/10/2012	01/11/2012 - 30/11/2012
$NCV_{NG,y}$	33.32	33.32	33.34	33.34	33.37	33.36

(MJ/Nm^3)						
Period	01/12/2012 - 31/12/2012	01/01/2013- 31/01/2013	01/02/2013 - 28/02/2013	01/03/2013 - 31/03/2013	01/04/2013- 30/04/2013	01/05/2013 - 31/05/2013
$NCV_{NG,y}$ (MJ/Nm^3)	33.40	33.54	33.48	33.80	33.39	33.55
Period	01/06/2013 - 30/06/2013					
$NCV_{NG,y}$ (MJ/Nm^3)	34.03					

For the every month's Project Emission and the total Project Emission during this monitoring period, please refer to the table below.

Period	$NCV_{NG,y}$	$EF_{CO2,NG,Y}$	$OXID_{NG}$	$COEF_{NG,y}$	$PE_y=FC_{NG,y}$ *$COEF_{NG,y}$
	MJ/Nm^3	tCO_2e/GJ		tCO_2/Nm^3	tCO_2e
01/12/2011-31/12/2011	33.80	0.0561	1	0.00190	155,785
01/01/2012-31/01/2012	33.68	0.0561	1	0.00189	118,969
01/02/2012-29/02/2012	33.72	0.0561	1	0.00189	72,705
01/03/2012-31/03/2012	33.56	0.0561	1	0 00188	73,821
01/04/2012-30/04/2012	33.29	0.0561	1	0.00187	69,676
01/05/2012-31/05/2012	33.25	0.0561	1	0.00187	89,596
01/06/2012-30/06/2012	33.32	0.0561	1	0.00187	135,053
01/07/2012-31/07/2012	33.32	0.0561	1	0.00187	112,777
01/08/2012-31/08/2012	33.34	0.0561	1	0.00187	72,179
01/09/2012-30/09/2012	33.34	0.0561	1	0.00187	56,249
01/10/2012-31/10/2012	33.37	0.0561	1	0.00187	59,082
01/11/2012-30/11/2012	33.36	0.0561	1	0.00187	82,747
01/12/2012-31/12/2012	33.40	0.0561	1	0.00187	14,232
01/01/2013-31/01/2013	33.54	0.0561	1	0.00188	7,582
01/02/2013-28/02/2013	33.48	0.0561	1	0.00188	74,864
01/03/2013-31/03/2013	33.80	0.0561	1	0.00190	85,964
01/04/2013-30/04/2013	33.39	0.0561	1	0.00187	71,836
01/05/2013-31/05/2013	33.55	0.0561	1	0.00188	75,745
01/06/2013-30/06/2013	34.03	0.0561	1	0.00191	93,416
Total					1,522,276

E.3. Calculation of leakage

>>

As mentioned in PDD, Leakage may result from upstream processes of fossil fuels outside of the project boundary. This includes mainly fugitive CH_4 emissions and CO_2 emissions from associated fuel combustion and flaring. In line with AM0029 version 03, as no LNG is used in the project plant,

only leakage emissions from using natural gas ($LE_{CH4,y}$) are considered, which can be calculated based on following steps as mentioned in the PDD:

$Step_{CH4}$ a): calculate the weight proportion $\lambda_{k,CH4}$ which is defined as the ratio of the upstream CH_4 emissions associated with solid, liquid and gas fuel type consumed for power generation respectively to the total upstream CH_4 emissions for the total thermal power generation in the grid.

$$\lambda_{Coal,CH4} = \frac{\sum_{k \in coal,j} F_{k,j,y} \times COEF_{k,j,CH4}}{\sum_{k,j} F_{k,j,y} \times COEF_{k,j,CH4}}$$

$$\lambda_{Oil,CH4} = \frac{\sum_{k \in Oil,j} F_{k,j,y} \times COEF_{k,j,CH4}}{\sum_{k,j} F_{k,j,y} \times COEF_{k,j,CH4}}$$

$$\lambda_{GAS,CH4} = \frac{\sum_{k \in GAS,j} F_{k,j,y} \times COEF_{k,j,CH4}}{\sum_{k,j} F_{k,j,y} \times COEF_{k,j,CH4}}$$

where:

$F_{k,j,y}$: the amount of k type fuel (in unit t or Nm^3) consumed by relevant electric power sources in provincial grid j in year y,

$COEF_{k,j,CH4}$: the upstream fugitive CH_4 emission coefficient of k type fuel (tCH_4/TJ) used by relevant power sources in provincial grid j

For **01/12/2011-31/12/2012** monitoring period, $\lambda_{Coal,CH4}$ =97.37%, $\lambda_{Oil,CH4}$ =0.00%, $\lambda_{Gas,CH4}$ =2.62%.

$Step_{CH4}$ b: calculate the weighted averaged upstream fugitive CH_4 emission factor for the thermal electric power (tCH_4/MWh), $EF_{Thermal,Upstream,CH4}$:

$EF_{Thermal,Upstream,CH4} = \lambda_{Coal,CH4} * EF_{Coal,Adv,CH4} + \lambda_{Oil,CH4} * EF_{Oil,Adv,CH4} + \lambda_{Gas,CH4} * EF_{Gas,Adv,CH4}$

Where:

$EF_{Coal,Adv,CH4}$, $EF_{Oil,Adv,CH4}$ and $EF_{Gas,Adv,CH4}$ are the upstream fugitive CH_4 emission factors in line with the efficiency level of the best power technology commercially available (tCO_2/MWh) in China's power grid for each fuel type respectively.

The $EF_{Coal,Adv,CH4}$, $EF_{Oil,Adv,CH4}$ and $EF_{Gas,Adv,CH4}$ value for this monitoring period are listed as follow:

Type of Power Plant	Variable	Oxidation	Efficiency of Power Supply	Fugitive Methane Emission Factor of the Fuel (tCH_4/TJ)	Fugitive Methane Emission Factor (tCO_2/MWh)
Coal-Fired Power Plant	$EF_{Coal,Adv,CH4}$	1	39.45%	0.6462	0.0059
Oil-Fired Power Plant	$EF_{Oil,Adv,CH4}$	1	51.77%	0.0041	0.0000
Gas-Fired Power Plant	$EF_{Gas,Adv,CH4}$	1	51.77%	0.2960	0.0021

So, $EF_{Thermal,\ Upstream,CH4}$=97.37%×0.0059+0.00%×0.0000 +2.62%×0.0021=0.00579576 tCH_4/MWh

$Step_{CH4}$ c: Calculate the $EF_{BL,upstream,CH4}$ in the context of CCPG grid BM (tCH_4/MWh):

$$EF_{BL,Upstream,CH4} = \frac{CAP_{Thermal}}{CAP_{Total}} \times EF_{Thermal,Upstream,CH4}$$

Here CAP_{Total} is the total recent capacity addition (MW); $CAP_{Thermal}$ is the recent capacity addition of thermal power plants within the CCPG grid BM sample group m (MW).

For this monitoring period,

$EF_{BL,upstream,CH4}$ = 53.25%×0.00579576 tCH_4/MWh =0.003086 tCH_4/MWh

To estimate the fugitive methane emissions, one can multiply the NG quantity consumed by the project in year y with an emission factor for fugitive CH_4 emissions ($EF_{NG,upstream,CH4}$) due to NG consumption and subtract the fugitive CH_4 emissions occurring from fossil fuels used in the selected baseline power plant in the absence of the project activity, as follows:

$$LE_{CH4,y} = \left[FC_y \times NCV_{NG,y} \times EF_{NG,upstream,CH4} - EG_{PJ,y} \times EF_{BL,upstream,CH4} \right] \times GWP_{CH4}$$

Where:

$LE_{CH4,y}$: Leakage emissions due to fugitive upstream CH_4 emissions in the year y in tCO_2e.

FC_y: Total volume of NG combusted (Nm^3) during this monitoring period.

$NCV_{NG,y}$: Net calorific value of NG (GJ/ Nm^3), which is determined by the fuel supplier.

$EF_{NG,upstream,CH4}$: Emission factor for upstream fugitive methane emissions of natural gas from production, transportation, distribution, in tCH^4/ GJ.

$EG_{PJ,y}$: Electricity generation in the project plant during this monitoring period in MWh.

$EF_{BL,upstream,CH4}$: The emission factor determined in $step_{CH4}$ c above for upstream fugitive methane emission occurring in the absence of the project activity in tCH_4/MWh.

GWP_{CH4}： Global warming potential of methane valid for the relevant commitment period, and the value is 21 tCO_2e/tCH_4.

The $EF_{NG,upstream,CH4}$, $EF_{BL,upstream,CH4}$, and GWP_{CH4} values for calculation the parameter $LE_{CH4,y}$ in this monitoring period are listed as follow:

$EF_{NG,upstream,CH4}$ = 0.000296 tCH_4/ GJ

$EF_{BL,upstream,CH4}$ = 0.00309 tCH_4/MWh

GWP_{CH4} = 21 tCO_2e/tCH_4

For this monitoring period, $LE_{CH4,y}$= -9,520.14(tCO_2e), which is a negative value.

For **01/01/2012-31/12/2012** monitoring period, $\lambda_{Coal,CH4}$ =96.76%, $\lambda_{Oil,CH4}$ =0.00%, $\lambda_{Gas,CH4}$ =3.24%.

$Step_{CH4}$ b: calculate the weighted averaged upstream fugitive CH_4 emission factor for the thermal electric power (tCH_4/MWh), $EF_{Thermal,Upstream,CH4}$:

$EF_{Thermal,Upstream,CH4} = \lambda_{Coal,CH4} * EF_{Coal,Adv,CH4} + \lambda_{Oil,CH4} * EF_{Oil,Adv,CH4} + \lambda_{Gas,CH4} * EF_{Gas,Adv,CH4}$

Where:

$EF_{Coal,Adv,CH4}$, $EF_{Oil,Adv,CH4}$ and $EF_{Gas,Adv,CH4}$ are the upstream fugitive CH_4 emission factors in line with the efficiency level of the best power technology commercially available (tCO_2/MWh) in China's power grid for each fuel type respectively.

The $EF_{Coal,Adv,CH4}$, $EF_{Oil,Adv,CH4}$ and $EF_{Gas,Adv,CH4}$ value for this monitoring period are listed as follow:

Type of Power Plant	Variable	Oxidation	Efficiency of Power Supply	Fugitive Methane Emission Factor of the Fuel (tCH_4/TJ)	Fugitive Methane Emission Factor (tCO_2/MWh)
Coal-Fired Power Plant	$EF_{Coal,Adv,CH4}$	1	39.65%	0.6564	0.0060
Oil-Fired Power Plant	$EF_{Oil,Adv,CH4}$	1	51.93%	0.0041	0.0000
Gas-Fired Power Plant	$EF_{Gas,Adv,CH4}$	1	51.93%	0.2960	0.0021

So, $EF_{Thermal,\ Upstream,CH4}$=96.76%×0.0060+0.00%×0.0000 +3.24%×0.0021=0.00583265 tCH_4/MWh

$Step_{CH4}$ c: Calculate the $EF_{BL,upstream,CH4}$ in the context of CCPG grid BM (tCH_4/MWh):

$$EF_{BL,Upstream,CH4} = \frac{CAP_{Thermal}}{CAP_{Total}} \times EF_{Thermal,Upstream,CH4}$$

Here CAP_{Total} is the total recent capacity addition (MW); $CAP_{Thermal}$ is the recent capacity addition of thermal power plants within the CCPG grid BM sample group m (MW).

For this monitoring period,

$EF_{BL,upstream,CH4}$ = 61.85%×0.00583265 tCH_4/MWh =0.00361 tCH_4/MWh

To estimate the fugitive methane emissions, one can multiply the NG quantity consumed by the project in year y with an emission factor for fugitive CH_4 emissions ($EF_{NG,upstream,CH4}$) due to NG consumption and subtract the fugitive CH_4 emissions occurring from fossil fuels used in the selected baseline power plant in the absence of the project activity, as follows:

$$LE_{CH4,y} = \left[FC_y \times NCV_{NG,y} \times EF_{NG,upstream,CH4} - EG_{PJ,y} \times EF_{BL,upstream,CH4}\right] \times GWP_{CH4}$$

Where:

$LE_{CH4,y}$: Leakage emissions due to fugitive upstream CH_4 emissions in the year y in tCO_2e.

FC_y: Total volume of NG combusted (Nm^3) during this monitoring period.

$NCV_{NG,y}$: Net calorific value of NG (GJ/ Nm^3), which is determined by the fuel supplier.

$EF_{NG,upstream,CH4}$: Emission factor for upstream fugitive methane emissions of natural gas from production, transportation, distribution, in tCH^4/ GJ.

$EG_{PJ,y}$: Electricity generation in the project plant during this monitoring period in MWh.

$EF_{BL,upstream,CH4}$: The emission factor determined in $step_{CH4}$ c above for upstream fugitive methane emission occurring in the absence of the project activity in tCH_4/MWh.

GWP_{CH4}： Global warming potential of methane valid for the relevant commitment period, and the value is 21 tCO_2e/tCH_4.

The $EF_{NG,upstream,CH4}$, $EF_{BL,upstream,CH4}$, and GWP_{CH4} values for calculation the parameter $LE_{CH4,y}$ in this monitoring period are listed as follow:

$EF_{NG,upstream,CH4}$ = 0.000296 tCH_4/ GJ

$EF_{BL,upstream,CH4}$ = 0.00361 tCH_4/MWh

GWP_{CH4} = 21 tCO_2e/tCH_4

For this monitoring period, $LE_{CH4,y}$= - 86,535.73(tCO_2e), which is a negative value.

For **01/01/2013-30/06/2013** monitoring period, $\lambda_{Coal,CH4}$ =96.93%, $\lambda_{Oil,CH4}$ =0.00%, $\lambda_{Gas,CH4}$ =3.07%.

$Step_{CH4}$ b: calculate the weighted averaged upstream fugitive CH_4 emission factor for the thermal electric power (tCH_4/MWh), $EF_{Thermal,Upstream,CH4}$:

$EF_{Thermal,Upstream,CH4} = \lambda_{Coal,CH4} * EF_{Coal,Adv,CH4} + \lambda_{Oil,CH4} * EF_{Oil,Adv,CH4} + \lambda_{Gas,CH4} * EF_{Gas,Adv,CH4}$

Where:

$EF_{Coal,Adv,CH4}$, $EF_{Oil,Adv,CH4}$ and $EF_{Gas,Adv,CH4}$ are the upstream fugitive CH_4 emission factors in line with the efficiency level of the best power technology commercially available (tCO_2/MWh) in China's power grid for each fuel type respectively.

The $EF_{Coal,Adv,CH4}$, $EF_{Oil,Adv,CH4}$ and $EF_{Gas,Adv,CH4}$ value for this monitoring period are listed as follow:

Type of Power Plant	Variable	Oxidation	Efficiency of Power Supply	Fugitive Methane Emission Factor of the Fuel (tCH_4/TJ)	Fugitive Methane Emission Factor (tCO_2/MWh)
Coal-Fired Power Plant	$EF_{Coal,Adv,CH4}$	1	39.84%	0.6568	0.0059
Oil-Fired Power Plant	$EF_{Oil,Adv,CH4}$	1	52.50%	0.0041	0.0000

Gas-Fired Power Plant	$EF_{Gas,Adv,CH4}$	1	52.50%	0.2960	0.0020

So, $EF_{Thermal,\ Upstream,CH4}$=96.93%×0.0059+0.00%×0.0000 +3.07%×0.0020=0.00581466 tCH_4/MWh

$Step_{CH4}$ c: Calculate the $EF_{BL,upstream,CH4}$ in the context of CCPG grid BM (tCH_4/MWh):

$$EF_{BL,Upstream,CH4} = \frac{CAP_{Thermal}}{CAP_{Total}} \times EF_{Thermal,Upstream,CH4}$$

Here CAP_{Total} is the total recent capacity addition (MW); $CAP_{Thermal}$ is the recent capacity addition of thermal power plants within the CCPG grid BM sample group m (MW).

For this monitoring period,

$EF_{BL,upstream,CH4}$ = 65.36%×0.00581466 tCH_4/MWh =0.00380 tCH_4/MWh

To estimate the fugitive methane emissions, one can multiply the NG quantity consumed by the project in year y with an emission factor for fugitive CH_4 emissions ($EF_{NG,upstream,CH4}$) due to NG consumption and subtract the fugitive CH_4 emissions occurring from fossil fuels used in the selected baseline power plant in the absence of the project activity, as follows:

$$LE_{CH4,y} = \left[FC_y \times NCV_{NG,y} \times EF_{NG,upstream,CH4} - EG_{PJ,y} \times EF_{BL,upstream,CH4} \right] \times GWP_{CH4}$$

Where:

$LE_{CH4,y}$: Leakage emissions due to fugitive upstream CH_4 emissions in the year y in tCO_2e.

FC_y: Total volume of NG combusted (Nm^3) during this monitoring period.

$NCV_{NG,y}$: Net calorific value of NG (GJ/ Nm^3), which is determined by the fuel supplier.

$EF_{NG,upstream,CH4}$: Emission factor for upstream fugitive methane emissions of natural gas from production, transportation, distribution, in tCH^4/ GJ.

$EG_{PJ,y}$: Electricity generation in the project plant during this monitoring period in MWh.

$EF_{BL,upstream,CH4}$: The emission factor determined in $step_{CH4}$ c above for upstream fugitive methane emission occurring in the absence of the project activity in tCH_4/MWh.

GWP_{CH4}： Global warming potential of methane valid for the relevant commitment period, and the value is 21 tCO_2e/tCH_4.

The $EF_{NG,upstream,CH4}$, $EF_{BL,upstream,CH4}$, and GWP_{CH4} values for calculation the parameter $LE_{CH4,y}$ in this monitoring period are listed as follow:

$EF_{NG,upstream,CH4}$ = 0.000296 tCH_4/ GJ

$EF_{BL,upstream,CH4}$ = 0.00380 tCH_4/MWh

GWP_{CH4} = 21 tCO_2e/tCH_4

For this monitoring period, $LE_{CH4,y}$= -41,492.43 (tCO_2e), which is a negative value.

According to AM0029 version 3, the value of leakage is assumed as 0, i.e., **LE_y = 0.**

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

Item	Baseline emissions or baseline net GHG removals by sinks (t CO_2e)	Project emissions or actual net GHG removals by sinks (t CO_2e)	Leakage (t CO_2e)	Emission reductions or net anthropogenic GHG removals by sinks (t CO_2e)
Total	1,918,399	1,522,276	0	396,122

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

Item	Values estimated in ex-ante calculation of registered PDD	Actual values achieved during this monitoring period
Emission reductions or GHG removals by sinks (t CO_2e)	1,358,957	396,122

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

>>

The emission reduction during this monitoring period is lower than estimated in the PDD. No increase occurred. So no remarks are needed.

E.7. Actual emission reductions or net anthropogenic GHG removals by sinks during the first commitment period and the period from 1 January 2013 onwards

Item	Actual values achieved up to 31 December 2012	Actual values achieved from 1 January 2013 onwards
Emission reductions or GHG removals by sinks (t CO_2e)	263,665	132,457

- - - - -

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

Project participant and/or responsible person/ entity	☐ Project participant
Organization name	Henan Zhongyuan Gas Power Company Ltd.
Street/P.O. Box	No. 68, Jiefang Road
Building	Zhongyuan Building
City	Zhumadian
State/Region	Henan Province
Postcode	463000
Country	People's Republic of China
Telephone	+86 (0)396-3802227
Fax	+86 (0)396-3802226
E-mail	-
Website	-
Contact person	Chen Zhiqiang
Title	Project Manager
Salutation	Mr
Last name	Chen
Middle name	Zhi
First name	qiang
Department	Administration Department
Mobile	13839939108
Direct fax	+86 (0)0396-3802226
Direct tel.	+86 (0)0396-3802227
Personal e-mail	chenzhiqiangzydl@126.com

Project participant and/or responsible person/ entity	☐ Project participant
Organization name	Carbon Asset Management Sweden AB
Street/P.O. Box	Kungsgatan 32
Building	
City	Stockholm
State/Region	
Postcode	111 35
Country	Sweden
Telephone	+46 8 506 885 00
Fax	+46 8 34 60 80
E-mail	co2@tricorona.se
Website	www.tricorona.se
Contact person	von Zweigbergk
Title	President & CEO
Salutation	Mr

Last name	von Zweigbergk
Middle name	-
First name	Niels
Department	Administration Department
Mobile	+46 708 59 35 00
Direct fax	+46 8 34 60 80
Direct tel.	+46 8 506 885 51
Personal e-mail	nvz@tricorona.se

Project participant and/or responsible person/ entity	☐ Responsible person/ entity for completing the CDM-MR-FORM
Organization name	Beijing MD Energy Technology Co. Ltd.
Street/P.O. Box	Chaoyang
Building	International Metro Cetro building
City	Beijing
State/Region	Chaoyang
Postcode	100025
Country	P.R.C
Telephone	+86 (0) 10-65566632
Fax	+86 (0)10-65583298
E-mail	amy.lai@mdenergy.cn
Website	
Contact person	Amy .Lai
Title	Project Manager
Salutation	Ms
Last name	Lai
Middle name	Xiao
First name	Chao
Department	project department
Mobile	18910481561
Direct fax	+86 (0) 10-65583298
Direct tel.	+86 (0)10-65566632
Personal e-mail	amy.lai@mdenergy.cn

- - - - -

Document information

Version	*Date*	*Description*
04.0	25 June 2014	Revisions to: • Include the Attachment: Instructions for filling out the monitoring report form (these instructions supersede the "Guideline: Completing the monitoring report form" (Version 04.0)); • Include provisions related to standardized baselines; • Add contact information on a responsible person(s)/ entity(ies) for completing the CDM-MR-FORM in A.6 and Appendix 1; • Change the reference number from *F-CDM-MR* to *CDM-MR-FORM*; • Editorial improvement.
03.2	5 November 2013	Editorial revision to correct table in page 1.
03.1	2 January 2013	Editorial revision to correct table in section E.5.
03.0	3 December 2012	Revision required to introduce a provision on reporting actual emission reductions or net anthropogenic GHG removals by sinks for the period up to 31 December 2012 and the period from 1 January 2013 onwards (EB70, Annex 11).
02.0	13 March 2012	Revision required to ensure consistency with the "Guidelines for completing the monitoring report form" (EB 66, Annex 20).
01	28 May 2010	EB 54, Annex 34. Initial adoption.

Decision Class: Regulatory
Document Type: Form
Business Function: Issuance
Keywords: monitoring report