



Voluntary Carbon Standard
Monitoring Report

Sulige Natural Gas based Power Generation Project
Monitoring period (01/01/2008¹~20/07/2008)
(Version 01 finalized on 09/07/2009)

Sulige Fuel Gas Power Generation Co., Ltd.
of Inner Mongolia

¹ The date format in this report is DD/MM/YYYY.

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SECTION A. General description of the project activity**A.1. Title of the project activity:**

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Sulige Natural Gas based Power Generation Project

A.2. Short description of the project activity:

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Sulige Natural Gas based Power Generation Project (hereinafter referred to as the Project) is sited within Dabuchake Town², Wushen Banner, Erdos City, Inner Mongolia Autonomous Region, P.R.China. The Project is a peak load balancing power plant including installation of two sets of air-cooling gas-steam combined cycle power generation equipments which use natural gas to generate electricity and then, deliver the electricity to North China Grid via two 220 kV outlet circuits. Key technical parameters of the key equipments used in the Project are listed in Table 1.

Table 1. Key technical parameters of the key equipments of the Project

	Equipment	Type	Manufacture
1	Gas turbine	PG9171E, air-cooling	GE, United States
2	Gas turbine generator	QFR-135-2, air-cooling, (GE and Brush technology)	Nanjing Turbine and Electric Machinery (Group) Co., Ltd.
3	Steam turbine	LZN60-5.7/0.58	
4	Steam turbine generator	QFW-60-2, air-cooling	

In the absence of the Project, equivalent amount of annual power output to the Project will be generated and supplied by North China Grid which the Project is connected to. North China Grid is dominated by coal fired power plants. It is expected that the Project as a clean energy source with less carbon content will generate emission reductions of about 593,981 tCO₂e annually by avoiding CO₂ emissions from the same amount of power generation from coal fired power plants which would have been built otherwise within North China Grid.

A.3. Status of the project activity:

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This Monitoring Report refers to the Project which has been registered as a CDM project on 21/07/2008 (Ref. No. 1243). Timeline of the Project prior to CDM registration is summarized in Table 2.

² The Dabuchake Town has been incorporated with the Galutu Town in 2006. (<http://www.ordosagri.gov.cn/news/about.asp?id=4731>).

Table 2. Timeline of the Project

Date	Process
18/11/2004	Approval of Environmental Impact Assessment Report
10/12/2004	Approval of Feasibility Study Report
18/04/2005	Construction Started
08/11/2006	CDM GSP
01/01/2007	Put into operation
22/05/2007	LOA issued by China's Designated National Authority
18/06/2007	LOA issued by Japan's Designated National Authority
31/07/2007	CDM request for registration
21/07/2008	CDM registration

As per *Policy Announcement from the VCS Association* published on 19/03/2008, “projects registered under other VCS Program approved GHG Programs (such as the CDM) are eligible to create Voluntary Carbon Units (VCUs) for the emissions reductions or removals not registered under that GHG Program”. As per CDM rules, emission reduction credits generated by the Project prior to 21/07/2008 can not be claimed as CERs. The Project Owner expects to claim emission reduction credits generated from 01/01/2007 to 20/07/2008 as VCUs and has not applied for other environmental credits.

As described in Section 1.6 of the VCS PD of the Project, the VCS project crediting period for the Project is 01/01/2007 to 20/07/2008. From 21/07/2008 to the date when CDM crediting period of the Project was closed, the Project Owner expects to claim the emission reductions generated by the Project as CERs. The Project Owner takes the responsibility to ensure no double counting to occur for the GHG emission reductions generated by the Project.

A.4. Monitoring period:

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This Monitoring Report focuses on the emission reductions generated by the Project from 01/01/2008 to 20/07/2008.

A.5. Methodology applied to the project activity:

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AM0029.ver 01 - “Baseline Methodology for Grid Connected Electricity Generation Plants using Natural Gas” and “Grid Connected Electricity Generation Plants using Non-Renewable and Less GHG Intensive Fuel”.

A.6. Person(s)/entity(ies) responsible for preparation and submission of the monitoring report:

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SECTION B. General description of monitoring activities

B.1. Monitoring equipment:

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Information on the equipments used in the Project is summarized in Table 3 and Table 4.

Table 3. Equipments for monitoring the net electricity delivered to the grid

Parameter	Location	No.	Type	S/N	Precision	Manufacturer
$EG_{PJ,y}$	The point connecting the Project to the grid system through 220 kV transmission line (I)	84532928 (Main)	ZMU202c.4c-1r441r41z	433918870	0.2s	Landis & Gyr Metering (Zhuhai) Co., Ltd.
$EG_{PJ,y}$	The point connecting the Project to the grid system through 220 kV transmission line (I)	84532929 (Backup)	Ditto	Ditto	0.2s	Ditto
$EG_{PJ,y}$	The point connecting the Project to the grid system through 220 kV transmission line (II)	84532927 (Main)	Ditto	Ditto	0.2s	Ditto
$EG_{PJ,y}$	The point connecting the Project to the grid system through 220 kV transmission line (II)	84532930 (Backup)	Ditto	Ditto	0.2s	Ditto
$EG_{gen,y}$	Outlet of No.1 gas turbine	84532931	ZMU205c.4c-1r441r41z	Ditto	0.5s	Ditto
$EG_{gen,y}$	Outlet of No.2 gas turbine	84532932	Ditto	Ditto	0.5s	Ditto
$EG_{gen,y}$	Outlet of No.1 steam turbine	84532934	Ditto	Ditto	0.5s	Ditto
$EG_{gen,y}$	Outlet of No.2 steam turbine	84532935	Ditto	Ditto	0.5s	Ditto

Table 4. Equipments for monitoring the natural gas consumed

Parameter	Location	No.	Type	S/N	Precision	Manufacturer
Natural gas consumption	The point connecting the Project to the natural gas transmission line #1	1	3400-DN250	06-490268	1.0	DANIEL
Natural gas consumption	The point connecting the Project to the natural gas transmission line #2	2	3400-DN250	06-490271	1.0	DANIEL
Natural gas consumption	Gas Pressure Regulating Station within the project site	-	FLOWSIC-600	05398850	0.2 (0.5 without regular calibration)	SICK MAIHAK

The metering points are given in Figure 1.

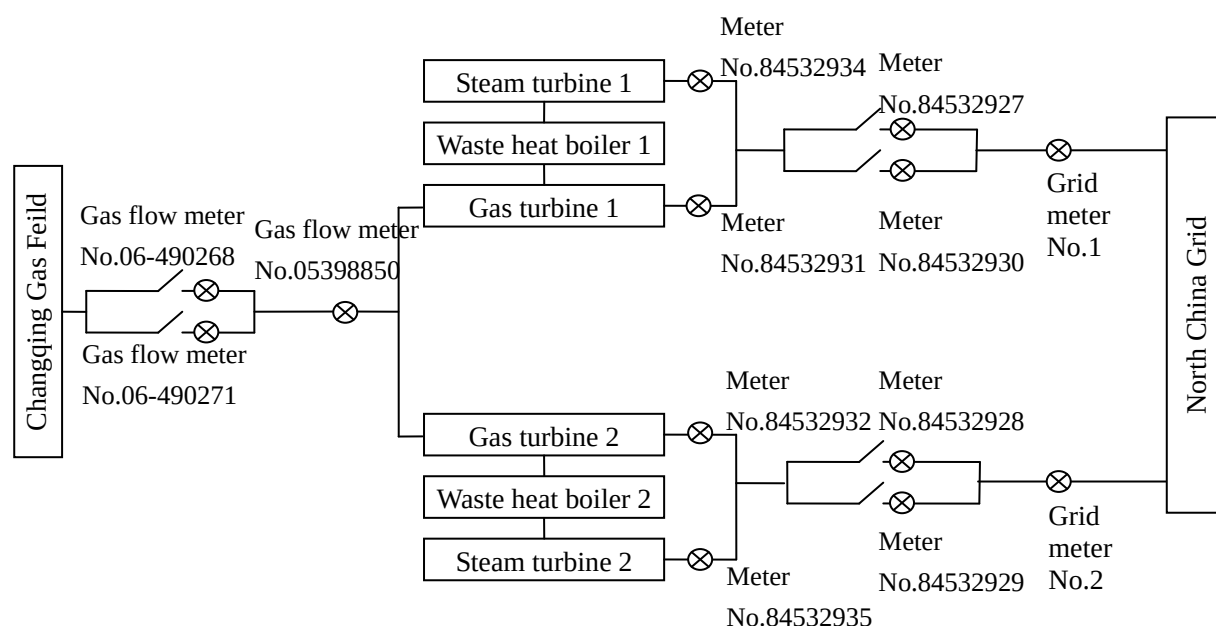


Figure 1. Metering points in the Project

B.2. Data collection:

B.2.1. Data and parameters that are fixed during the given monitoring period:

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The following data and parameters are fixed for the Project during the monitoring period as per the registered PDD of the Project.

Data/Parameter:	$EF_{NG,upstream,CH4}$
Data unit:	tCH ₄ /PJ
Description:	The emission factor for upstream fugitive CH ₄ emissions of natural gas from production, transportation, distribution, in t CH ₄ per GJ fuel supplied to final consumers.
Source of data used:	“Other oil exporting countries/rest of world” provided in Table 2 of the methodology AM0029.
Value applied:	296
Justification of the choice of data or description of measurement methods and procedures actually applied :	Considering data availability, use defaults provided by the methodology AM0029.
Any comment:	-

Data/Parameter:	$EF_{coal, upstream, CH_4}$
Data unit:	tCH ₄ /kt
Description:	The emission factor for fugitive upstream emissions of coal
Source of data used:	“Underground coal production” provided in Table 2 of the methodology AM0029.
Value applied:	13.4
Justification of the choice of data or description of measurement methods and procedures actually applied :	Considering data availability, use defaults provided by the methodology AM0029.
Any comment:	-

Data/Parameter:	GWP_{CH_4}
Data unit:	tCO ₂ e/tCH ₄
Description:	The Global Warming Potential (GWP) of CH ₄ , valid for the relevant commitment period.
Source of data used:	Kyoto Protocol
Value applied:	21
Justification of the choice of data or description of measurement methods and procedures actually applied :	Kyoto Protocol is a reliable data source.
Any comment:	-

B.2.2. Data and parameters that are monitored during the given monitoring period:

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The following data and parameters were monitored for the Project during the monitoring period as per the registered PDD.

Data/Parameter:	$EG_{PJ,y}$
Data unit:	MWh
Description:	The net electricity delivered to the grid by the Project from 01/01/2008 to 20/07/2008
Source of data to be used:	Measurement record and electricity sales receipts/records to the grid.
Value of data applied for the purpose of calculating emission reductions:	334,062
Description of measurement methods and procedures applied:	Measured continuously by meters and monthly recorded by the Project Owner.
QA/QC procedures:	Sales receipts/records to the grid are used to ensure the consistency.
Any comment:	Electricity delivered by the Project to grid and electricity imported from grid to the Project were measured continuously by meters and monthly recorded. The data were cross-checked with relevant receipts.

Data/Parameter:	$EF_{BM,y}$
Data unit:	tCO ₂ /MWh
Description:	build margin emission factor of North China Grid
Source of data used:	Calculated over recently built power plants as defined in the baseline methodology
Value applied:	0.7802
Justification of the choice of data or description of measurement methods and procedures actually applied :	Calculated based on data published by <i>China Electric Power Yearbook</i> and <i>China Energy Statistical Yearbook</i> , see Annex 3 for details. Update the data with the latest public available edition of <i>China Electric Power Yearbook</i> and <i>China Energy Statistical Yearbook</i> .
QA/QC procedures to be applied:	-
Any comment:	-

Data/Parameter:	$F_{i,m,y}$
Data unit:	mass or volume unit
Description:	Total amount of fuel i consumed by province m in year y
Source of data to be used:	<i>China Energy Statistical Yearbook</i> from 2006 to 2008
Value of data applied for the purpose of calculating emission reductions:	See Annex 1 for details.
Description of measurement methods and procedures applied:	As per the registered PDD, the data is obtained from the latest publicly available edition of <i>China Energy Statistical Yearbook</i> .
QA/QC procedures:	-
Any comment:	Used to calculate $EF_{BM,y}$.

Data/Parameter:	$GEN_{m,y}$
Data unit:	MWh
Description:	Electricity generated by province m in year y
Source of data to be used:	<i>China Power Electric Yearbook</i> from 2006 to 2008
Value of data applied for the purpose of calculating emission reductions:	See Annex 1 for details
Description of measurement methods and procedures applied:	As per the registered PDD, the data is obtained from the latest publicly available edition of <i>China Power Electric Yearbook</i> .
QA/QC procedures:	-
Any comment:	For calculation of electricity output to the grid by province m in year y.

Data/Parameter:	$r_{m,y}$
Data unit:	%
Description:	Auxiliary electricity consumption rate of province m in year y
Source of data to be used:	<i>China Power Electric Yearbook</i> from 2006 to 2008
Value of data applied for the purpose of calculating emission reductions:	See Annex 1 for details.
Description of measurement methods and procedures applied:	As per the registered PDD, the data is obtained from the latest publicly available edition of <i>China Power Electric Yearbook</i> .
QA/QC procedures:	-
Any comment:	For calculation of the electricity output to the grid by province m in year y.

Data/Parameter:	NCV_i
Data unit:	MJ/t or 1000 m ³
Description:	Net calorific value of fuel i
Source of data to be used:	<i>China Energy Statistical Yearbook</i> from 2006 to 2008
Value of data applied for the purpose of calculating emission reductions:	See Annex 1 for details.
Description of measurement methods and procedures applied:	As per the registered PDD, the data is obtained from the latest publicly available edition of <i>China Energy Statistical Yearbook</i> .
QA/QC procedures:	-
Any comment:	Used to calculate $EF_{BM,y}$.

Data/Parameter:	$OXID_i$
Data unit:	%
Description:	Oxidation factor of the fuel i.
Source of data to be used:	<i>2006 IPCC Guidelines for National Greenhouse Gas Inventories</i>
Value of data applied for the purpose of calculating emission reductions:	100
Description of measurement methods and procedures applied:	As per the registered PDD, the data is obtained from the latest publicly available edition of <i>IPCC Guideline for National Greenhouse Gas Inventories</i> .
QA/QC procedures:	-
Any comment:	Used to calculate $EF_{BM,y}$.

Data/Parameter:	$EF_{CO_2,i}$
Data unit:	kgCO ₂ /TJ
Description:	CO ₂ emission factor of the fuel i
Source of data to be used:	<i>2006 IPCC Guidelines for National Greenhouse Gas Inventories</i>
Value of data applied for the purpose of calculating emission reductions:	See Annex 1 for details.
Description of measurement methods and procedures applied:	As per the registered PDD, the data is obtained from the latest publicly available edition of <i>IPCC Guideline for National Greenhouse Gas Inventories</i> .
QA/QC procedures:	-
Any comment:	Used to calculate $EF_{BM,y}$.

Data / Parameter:	$COEF_y$
Data unit:	tCO ₂ /m ³
Description:	CO ₂ emission coefficient of the Project in year 'y'
Source of data to be used:	Calculated under project activity
Value of data applied for the purpose of calculating emission reductions:	0.00194658
Description of measurement methods and procedures applied:	Annually calculated with $NCV_{NG,y}$, $OXID_{NG}$ and $EF_{CO2,NG,y}$.
QA/QC procedures to be applied:	-
Any comment:	-

Data/Parameter:	-
Data unit:	-
Description:	Fuel consumption per kwh electricity supplied to grid of best technology commercially available in China
Source of data to be used:	<i>Announcement to Publish 2009 Baseline Emission Factors for Regional Power Grids in China (published on 02/07/2009)</i>
Value of data applied for the purpose of calculating emission reductions:	(See Annex 1 for detail)
Description of measurement methods and procedures applied:	As per the registered PDD, the data obtained from China's DNA are reliable. Therefore, the data are obtained from the latest version of <i>Announcement to Publish 2009 Baseline Emission Factors for Regional Power Grids in China (published on 02/07/2009)</i> .
QA/QC procedures:	-
Any comment:	Used to calculate $EF_{BM,y}$.

Data/Parameter:	$FC_{NG,y}$
Data unit:	Nm ³
Description:	The total volume of natural gas combusted in the Project Plant from 01/01/2008 to 20/07/2008
Source of data to be used:	Measured continuously by natural gas flow meter(s) and daily recording by the Project Owner.
Value of data applied for the purpose of calculating emission reductions:	71,909,005
Description of measurement methods and procedures applied:	Measured continuously by natural gas flow meter(s) and daily recording by the Project Owner.
QA/QC procedures:	The total volume of natural gas combusted in the Project Plant in year(s) 'y' will be measured by the natural gas flow meter(s) installed at the Changqing Gas Field, and cross checked against the monitoring results of the natural gas flow meter(s) installed at the Gas Pressure Regulating Station. Precision of the gas flow meter(s) used in the Project shall not be lower than 1.0. The gas flow meter(s) will be maintained and tested in accordance with stipulation of the meter supplier to ensure accuracy.
Any comment:	-

Data/Parameter:	$FC_{diesel,y}$
Data unit:	t
Description:	The total volume of diesel combusted in the Project Plant for backup start off from 01/01/2008 to 20/07/2008
Source of data used:	Measurement record and receipts.
Value applied:	0
Justification of the choice of data or description of measurement methods and procedures actually applied :	As per the registered PDD, the data measured by the Project Owner is used to determine $FC_{diesel,y}$.
QA/QC procedures to be applied:	The total volume of diesel combusted in the project plant in year(s) 'y' will be monitored by flow meter and double checked against the diesel purchase receipts and storage record. Only one flow meter is employed by the Project. The flow meter is a liquid level meter.
Any comment:	According to the Feasibility Study Report, diesel is only used for start off when HV accident was taken place. As per operation record of the Project, no HV accident was taken place from 01/01/2008 to 20/07/2008.

Data/Parameter:	$NCV_{NG,y}$
Data unit:	GJ/Nm ³
Description:	The net calorific value per volume unit of natural gas
Source of data to be used:	Gas component analysis reports provided by the natural gas supplier.
Value of data applied for the purpose of calculating emission reductions:	0.03469842 (weighted average from 01/01/2008 to 20/07/2008)
Description of measurement methods and procedures applied:	The net calorific value per volume unit of natural gas is measured by CGFPC periodically.
QA/QC procedures:	-
Any comment:	-

Data/Parameter:	$EG_{gen,y}$
Data unit:	MWh
Description:	The amount of electricity generated by the Project from 01/01/2008 to 20/07/2008
Source of data to be used:	Measurement record.
Value of data applied for the purpose of calculating emission reductions:	344,256
Description of measurement methods and procedures applied:	Measured continuously by meters and monthly recorded by the Project Owner.
QA/QC procedures:	Cross-checked with fuel consumption of the Project.
Any comment:	Used to calculate the auxiliary electricity consumption of the Project with the amount of net electricity delivered to the grid.

Data/Parameter:	φ_{coal}
Data unit:	-
Description:	The share of coal fired generation in build margin generation
Source of data to be used:	<i>China Electric Power Yearbook</i> 2008
Value of data applied for the purpose of calculating emission reductions:	0.9395
Description of measurement methods and procedures applied:	As per the registered PDD, the data are obtained from the latest publicly available edition of <i>China Power Electric Yearbook</i> .
QA/QC procedures:	-
Any comment:	-

B.2.3. Monitored data and parameters:

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The total volume of the natural gas combusted in the Project is measured by the natural gas flow meter(s) installed at the Changqing Gas Field of PetroChina Co., Ltd. (hereinafter referred to as CGFPC). The readings were cross-checked by the monitoring results of the natural gas flow meter(s) installed at Gas Pressure Regulating Station. The natural gas flow meter(s) in CGFPC measured the volume of the natural gas combusted in the Project Plant and clear reading to zero on daily basis. Reading of the natural gas flow meter(s) at CGFPC were read and recorded every two hours by the staff of CGFPC and confirmed by the staff of the Project Owner on daily basis. The natural gas flow meter(s) installed at the Gas Pressure Regulating Station measured the volume of natural gas combusted in the Project Plant in accumulation. Reading of the natural gas flow meter(s) at the Gas Pressure Regulating Station were read and recorded every two hours by the staff of the Project Owner. The readings of the natural gas flow meter(s) at the Gas Pressure Regulating Station were used to crosscheck the readings of the natural gas flow meter(s) at CGFPC.

The net electricity delivered to the grid by the Project is obtained based on the supplied electricity of the Project to the grid and the imported electricity from the grid to the Project. The supplied electricity and the imported electricity are measured continuously by the meters and monthly recorded. Sales receipts were received from the local authorities of taxation and used for crosscheck.

The net calorific value per volume unit of the natural gas was a weighted average one calculated based on the net calorific value of the nature gas in the gas component analysis reports provided by the natural gas supplier within each two weeks and the volume of the natural gas combusted in the Project Plant.

Table 5 below summarizes the monitored data and data for crosscheck of the Project from 01/01/2008 to 20/07/2008.

Table 5. Monitored data and data for crosscheck from 01/01/2008 to 20/07/2008

Item	Monitored data	Data for crosscheck
Gas consumption (Nm³)	71,909,005 (measured by flow meter installed at Changqing Gas Field of PetroChina Co., Ltd.)	71,281,000 (measured by flow meter installed at the Gas Pressure Regulating Station)
Net electricity delivered (MWh)	334,142 (measured by meters installed at the Project)	334,062 (obtained from records of electricity sales)
Weighted net calorific value (GJ/Nm³)	0.03469842	-

Comparison of monitored data and data for crosscheck regarding gas consumption and net electricity delivered from 01/01/2008 to 20/07/2008 has been made for the Project. For the

gas consumption, the readings of the natural gas flow meter(s) at the Gas Pressure Regulating Station are used to cross check with daily recorded data, and the relative difference between them is 0.87%.

For the net electricity delivered, the invoiced data are used to cross check with daily recorded data, and the difference between records and invoices is 0.02%. Both of these differences satisfied the requirement of the precision of meters.

To be conservative, the higher data of gas consumption and the lower data of net electricity delivered have been adopted for determination of emission reductions of the Project.

B.3. Data processing and archiving system:

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Electricity generated and supplied electricity:

The Project employs PDM2000 electricity metering and billing system and PSM-ID electricity remote terminal to process and archive the data relevant to the electricity generated and the supplied electricity, and to communicate with the grid company regarding them. The system is developed by China Electric Power Research Institute. By using state-of-art IT, the system can ensure the integrity, accuracy, uniqueness, security and reliability of the data of electricity.

Imported electricity:

Imported electricity of the Project from grid is measured by the grid company at the grid side and by the Project Owner at the receipt side. The data is recorded monthly. Relevant records and receipts will be provided to the Project Owner. The records are achieved by the Accounting Department of the Project Owner along with relevant receipts.

Natural gas consumption and net calorific value of natural gas:

The natural gas consumption and the net calorific value of natural gas are monitored, recorded and archived as per the clauses of *Natural Gas Purchase Agreement* signed between the Project Owner and CGFPC. Daily records of natural gas consumption of the Project are achieved by the Accounting Department of the Project Owner along with receipts relevant to the natural gas consumption. Reports of the net calorific value of natural gas provided by CGFPC are achieved by the Planning Department of the Project Owner.

B.4. Special event log:

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

SECTION C. Quality assurance and quality control**C.1. Operation, maintenance and calibration:**

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An Operation Manual has been developed by the Project Owner which guides the daily operation of the Project. The Operation Manual incorporates natural gas-turbine technical standard guidelines with data recording and managing process. The on-duty (in shift) staff in the Operation Department, are responsible for data monitoring and recording in *Daily Production Report* and *Record of Natural Gas Usage*, especially the electricity generated, the net electricity delivered to North China Grid and the natural gas consumption.

The Project Owner has signed *Equipment Calibration and Maintenance Contract* with Inner Mongolia No.1 Electric Power Engineering Co., Ltd. According to the clauses of the contract, Inner Mongolia No.1 Electric Power Construction Engineering Co., Ltd. will take charge of daily calibration and maintenance of the equipments, including meters, of the Project. The objectives of the contract include well performance, stable operation and safety of the Project.

Additional to daily calibration and maintenance of the Project, an Emission Reduction Monitoring Team has been set up internally by Sulige Fuel Gas Power Generation Co., Ltd. of Inner Mongolia (hereinafter referred to as the Project Owner). The Emission Reduction Monitoring Team is in charge, inter alia, of the implementation and management of the whole monitoring plan, including monitoring and management of the data relevant to the determination of GHG emission reductions.

The general manager of the Project Owner is the leader of the Emission Reduction Monitoring Team and is responsible for all the relevant activities during the operating and the maintaining period. Mr. Cui Jinbao, Director of the Planning Department of the Project Owner of Inner Mongolia is responsible for the supervision of the Emission Reduction Monitoring Team. The Director of the Production Department and the Director of the Maintenance Department are responsible for organizing and managing reading and recording of data. The Director of the Accounting Department is responsible for collecting and archiving the invoices.

As per the record of the Technological Department of the Project Owner, equipment calibration and maintenance activities from 01/01/2007 to 20/07/2008 have been summarized in Table 6.

Table 6. Equipment calibration and maintenance activities from 01/01/2007 to 20/07/2008

Date	Responsible party(ies)	Conclusion
07/04/2007~09/04/2007	Inner Mongolia No.1 Electric Power Engineering Co., Ltd.	Ok.
22/06/2007~24/06/2007	Inner Mongolia No.1 Electric Power Engineering Co., Ltd., supported by relevant equipments suppliers	Ok.
27/08/2007~07/09/2007	Inner Mongolia No.1 Electric Power Engineering Co., Ltd. and Daqing Feihong Gas Turbine Technology Development Co., Ltd.	Ok.

The Project Owner has signed an agreement with the gas supplier for the periodical calibration and testing of the precision of the gas metering devices, in order to ensure the monitoring accuracy of the natural gas consumption and its component analysis. The calibration and testing of the gas metering devices installed by the gas supplier have been outsourced by the gas supplier to be conducted by the National Metering Station for Crude Oil with High Flow Rate according to national measurement standards and regulations. Calibration Report No.GM20070291 and Calibration Report No.20070290 have been issued to confirm the precision of the gas metering devices from 09/06/2007 to 08/06/2009. Calibration report dated on 17/10/2005 has been provided by SICK MAIHAK to confirm the precision of the gas flow meter installed by the project owner for five to ten years. The calibration and testing of the gas component analysis devices have been accomplished by Shaanxi Institute of Metrology Science in line with national measurement standards and regulations. Calibration Report No.HX30061378J has been issued to confirm the precision of the gas component analysis devices from 01/11/2006 to 31/10/2008.

The calibration and testing procedure regarding the precision of the meters is and will be periodically implemented. The calibration report for the meters had been conducted by the Inner Mongolia Electric Power Research Institute according to national measurement standards and regulations such as JJG596-1999. Calibration Report No.2005 L-284, No.2005 L-286, No.2005 L-287, No.2005 L-288, No.2005 L-291, No.2005 L-292, No.2005 L-293 and No.2005 L-294 have been issued to confirm the precision of the meters from 11/11/2005 to 11/11/2010.

C. 2. Training:

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Relevant staff of the Project Owner, including the Emission Reduction Monitoring Team, had been trained on correct operation and maintenance by the equipment manufacturing company, according to the training contract included in the equipment procurement contract. In addition, the Monitoring Manual has been provided to the Project Owner with training on the emission reduction monitoring procedures.

As per the record of the Operation Department of the Project Owner, training activities from 01/01/2008 to 20/07/2008 have been summarized in Table 7.

Table 7. Training activities from 01/01/2008 to 20/07/2008

Date	Training content
01/01/2008~31/03/2008	All-duty training
01/04/2008~30/04/2008	Training for operation staff on the knowledge of the equipments, systems and monitoring points which are beyond their own responsibility for a sufficient understanding of the whole
20/04/2008~30/05/2008	Anti-accident exercises

C.3. Internal audits:

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The statistical staff in the Planning Department are in charge of verification and confirmation of the monitoring data records, which will be monthly aggregated and reported to the leader of the Emission Reduction Monitoring Team. After checking and ensuring no material mistakes, these data are archived and also sent to the Director of the Accounting Department which makes the financial clearance with the grid and the natural gas supplier on sale of electricity and purchase of gas respectively. The invoices are archived and managed by the Director of the Accounting Department.

C.4. Troubleshooting procedures:

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Possibly unexpected cases and relevant emergency responses are summarized in Table 8.

Table 8. Possibly unexpected cases and relevant emergency responses

No.	Unexpected case	Emergency response measure
1	Voltage loss of power supply at the data acquiring device	Measuring the power supply voltage, trying to find out the cause, removing the troubles, resuming power supply as soon as possible, reducing the loss of electricity.
2	Voltage loss of power supply at the meter	Measuring the power supply voltage at the meter and the electric circuit, trying to find out the cause, removing the troubles.
3	Strike of light at the electric current terminal	Shorting the current circuit, trying to find out the cause, removing the troubles.
4	Short circuit of the voltage loop	Turning off the small switch at the voltage transformer.
5	Malfunction of the communication system	Measuring the voltage at the communication terminals, trying to find out the cause, removing the troubles.

None of the unexpected cases listed above occurred during the given monitoring period. From 01/01/2008 to 20/07/2008, the operation of the Project stopped once from 09/04/2008 to 19/07/2008. The reason for this stop is the poor financing indicators of the Project without CERs sales revenues.

SECTION D. Calculation of emission reductions**D.1. Emission reductions:****D.1.1. Baseline emissions:**

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Baseline emissions are calculated by multiplying the net electricity delivered by the Project ($EG_{PJ,y}$) with a baseline emission factor ($EF_{BL,CO_2,y}$), as follows:

$$BE_y = EG_{PJ,y} \cdot EF_{BL,CO_2,y} \quad (1)$$

where:

BE_y is the baseline emissions due to displacement of electricity in year(s) y (tCO₂e),

$EG_{PJ,y}$ is the net electricity delivered by the Project in year(s) y (MWh);

$EF_{BL,CO_2,y}$ is the baseline emission factor in year(s) y (tCO₂/MWh).

As per the methodology AM0029, in order to address this uncertainty in a conservative manner, Project Participants use for $EF_{BL,CO_2,y}$ the lowest emission factor among the following three options:

Option 1. The build margin, calculated according to *Tool to Calculate the Emission Factor for an Electricity System*;

Option 2. The combined margin, calculated according to the methodology ACM0002, using a 50/50 OM/BM weight; or

Option 3. The emission factor of the technology (and fuel) identified as the most likely baseline scenario.

As analyzed in the registered PDD of the Project, Option 1 among the three options is adopted to determine the baseline emission factor ($EF_{BL,CO_2,y}$).

Option 1. The build margin, calculated according to the methodology ACM0002

Calculate the build margin emission factor ($EF_{BM,y}$) according to the methodology ACM0002 using equation (2):

$$EF_{BM,y} = \frac{\sum_{i,m} F_{i,m,y} \cdot COEF_{i,m}}{\sum_m GEN_{m,y}} \quad (2)$$

where:

$EF_{BM,y}$ is the build margin emission factor in year y (tCO₂/MWh);

$F_{i,m,y}$ is the amount of fuel i consumed by relevant power source m in year(s) y (tCe);

$COEF_{i,m,y}$ is the CO₂ emission coefficient of fuel i, taking into account the carbon content of the fuels used by relevant power source m and the percent oxidation of the fuel in year(s) y (tCO₂/tCe); and

$GEN_{m,y}$ is the electricity delivered to the grid by source m (MWh).

According to the methodology ACM0002, Project Participants choose between one of the two options to calculate the build margin emission factor ($EF_{BM,y}$). Option 1 provided in the

methodology ACM0002 (calculate the build margin emission factor ($EF_{BM,y}$) ex-ante based on the most recent information available on plants already built for sample group m at the time of PDD submission) was selected for the Project in the registered PDD.

According to the methodology ACM0002, the sample group m consists of either (1) the five power plants that have been built most recently, or (2) the power plant capacity additions in the electricity system that comprise 20% of the system generation (in MWh) and that have been built most recently. It is suggested that the sample group that comprises the larger annual generation should be used.

Considering data availability, EB accepts the following deviation in application of methodology³:

- 1) Use of capacity additions during the last 1~3 years for estimating the build margin emission factor for grid electricity.
- 2) Use of weights estimated using installed capacity in place of annual electricity generation.

And it is suggested to use the efficiency level of the best technology commercially available in the provincial/regional or national grid of China, as a conservative proxy.

Therefore for the Project: First, calculate the share of different power generation technology in recent capacity additions. Second, calculate the weight for capacity additions of each power generation technology. And finally calculate the emission factor using the efficiency level of the best technology commercially available in China.

Since the data of installed capacity can not be separated to coal based, oil based and gas based currently, the build margin emission factor is calculated with the following steps and formula:

Step a. Calculate the power generation emissions for solid, liquid and gas fuel and each share of total emissions based on *Energy Balance Table* of the most recent year.

$$\lambda_{Coal} = \frac{\sum_{i \in COAL, j} F_{i,j,y} \times COEF_{i,j}}{\sum_{i,j} F_{i,j,y} \times COEF_{i,j}} \quad (3)$$

$$\lambda_{Oil} = \frac{\sum_{i \in OIL, j} F_{i,j,y} \times COEF_{i,j}}{\sum_{i,j} F_{i,j,y} \times COEF_{i,j}} \quad (4)$$

$$\lambda_{Gas} = \frac{\sum_{i \in GAS, j} F_{i,j,y} \times COEF_{i,j}}{\sum_{i,j} F_{i,j,y} \times COEF_{i,j}} \quad (5)$$

where:

$F_{i,j,y}$ is the amount of fuel i consumed by power plant j in year(s) y (in a mass or volume unit);

$COEF_{i,j,y}$ is the CO₂ emission coefficient of fuel i, taking into account the carbon content of the fuels used by power plant j and the percent oxidation of the fuel in year(s) y (tCO₂/tCe); and

COAL, OIL and GAS are footnote group for solid fuels, liquid fuels and gas fuels.

Step b. Calculate the emission factor of thermal power generation in the grid based on the

³ [Http://cdm.unfccc.int/Projects/Deviations](http://cdm.unfccc.int/Projects/Deviations).

result of Step a and the efficiency level of the best technology commercially available in China.

$$EF_{Thermal} = \lambda_{Coal} \times EF_{Coal,Adv} + \lambda_{Oil} \times EF_{Oil,Adv} + \lambda_{Gas} \times EF_{Gas,Adv} \quad (6)$$

Where $EF_{Coal,Adv}$, $EF_{Oil,Adv}$ and $EF_{Gas,Adv}$ are emission factor proxies of efficiency level of the best coal based, oil based and gas based power generation technology commercially available in China.

Step c. Calculate the build margin emission factor of the grid based on the result of Step b and the share of thermal power of recent 20% capacity additions.

$$EF_{BM,y} = \frac{CAP_{Thermal}}{CAP_{Total}} \times EF_{Thermal} \quad (7)$$

Where CAP_{Total} is total capacity additions while $CAP_{Thermal}$ is capacity additions of thermal power.

The data on different fuel consumptions for power generation and the net calorific values of the fuels are updated with the data obtained from *China Energy Statistical Yearbook* from 2006 to 2008. The emission factors and oxidation factors are updated with the data obtained from *2006 IPCC Guidelines for National Greenhouse Gas Inventories*.

Referring to *China's Regional Grid Baseline Emission Factors*, the weighted average fuel consumption for power generation of top 30 sets of 600 MW coal fired power generation units built in 2007 (322.5 gce/kWh) and the 200 MW oil/gas fired combined cycle power generation units (246 gce/kWh) are taken as the efficiency level of the best technology commercially available in China.

Referring to *Announcement to Publish 2009 Baseline Emission Factors for Regional Power Grids in China* (published on 02/07/2009) and *China Energy Statistical Yearbook 2008* and *China Electric Power Yearbook 2008*, the build margin emission factor ($EF_{BM,y}$) of the North China Grid is calculated as 0.7802 tCO₂e/MWh (see Annex 1 for details). Therefore the baseline emission factor ($EF_{BL,CO_2,y}$) is 0.7802 tCO₂e/MWh.

Baseline emissions of the Project from 01/01/2008 to 20/07/2008 are summarized in Table 9.

Table 9. Baseline emissions of the Project from 01/01/2008 to 20/07/2008

Parameter	$EG_{PJ,y}$ (MWh)	$EF_{BL,CO_2,y}$ (tCO ₂ /MWh)	BE_y (tCO ₂ e)
Data	334,062	0.7802	260,635

D.1.2. Project emissions:

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According to the methodology AM0029, the Project Activity is on-site combustion of natural gas to generate electricity. Since there is no auxiliary fuel used in the Project besides natural gas, the project emissions are those emissions from on-site combustion of natural gas. The CO₂ emissions from electricity generation (PE_y) are calculated as follows:

$$PE_y = FC_{NG,y} * COEF_{NG,y} \quad (8)$$

where:

PE_y is the project emissions in year(s) y (tCO₂e);

$FC_{NG,y}$ is the total volume of natural gas combusted in the Project Plant in year(s) y (m³);

$COEF_{NG,y}$ is the CO₂ emission coefficient (tCO₂/m³) in year(s) for natural gas and is obtained

as:

$$COEF_{NG,y} = NCV_{NG,y} * EF_{CO_2,NG,y} * OXID_{NG} \quad (8a)$$

where:

$NCV_{NG,y}$ is the net calorific value (energy content) per volume unit of natural gas in year y (GJ/Nm³) as determined from the fuel supplier, wherever possible;

$EF_{CO_2,NG,y}$ is the CO₂ emission factor per unit of energy of natural gas in year y (tCO₂/GJ);

$OXID_{NG}$ is the oxidation factor of natural gas.

For the Project, the net calorific value (energy content) per volume unit of natural gas in year y (GJ/Nm³) is obtained by the natural gas supplier and other parameters are obtained from *2006 IPCC Guidelines for National Greenhouse Gas Inventories*.

The project emissions of the Project from 01/01/2008 to 20/07/2008 are summarized in Table 10.

Table 10. Project emissions from 01/01/2008 to 20/07/2008

Parameter	$FC_{NG,y}$ (Nm ³)	$NCV_{NG,y}$ (GJ/Nm ³)	$EF_{CO_2,NG,y}$ (tCO ₂ /GJ)	$OXID_{NG}$	$COEF_y$ (tCO ₂ /Nm ³)	PE_y (tCO ₂ e)
Data	71,909,005	0.03469842	0.0561	100%	0.00194658	139,977

D.1.3. Leakage:

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Natural gas used in the Project is not liquid natural gas. According to the methodology AM0029, leakage emission (LE_y) sources considered in the Project include the fugitive CH₄ emissions ($LE_{CH_4,y}$) associated with fuel extraction, processing, transportation and distribution of natural gas used in the Project Plant and fossil fuels used in the grid in the absence of the Project Activity.

For the purpose of estimating fugitive CH₄ emissions, Project Participants multiply the quantity of natural gas consumed by the Project in year y with an emission factor for fugitive CH₄ emissions ($EF_{NG,upstream,CH_4}$) from natural gas consumption and subtract the emissions occurring from fossil fuels used in the absence of the Project Activity, as follows:

$$LE_{CH_4,y} = [FC_y \cdot NCV_y \cdot EF_{NG,upstream,CH_4} - EG_{PJ,y} \cdot EF_{BL,upstream,CH_4}] \cdot GWP_{CH_4} \quad (9)$$

where:

$LE_{CH_4,y}$ is the leakage due to fugitive upstream CH_4 emissions in year y (t CO_2e);

FC_y is the quantity of natural gas combusted in the Project Plant in year y (m^3);

$NCV_{NG,y}$ is the average net calorific value of the natural gas combusted in year y (GJ/ m^3);

$EF_{NG,upstream,CH_4}$ is the emission factor for upstream fugitive CH_4 emissions of natural gas from production, transportation, distribution, in t CH_4 per GJ fuel supplied to final consumers;

$EG_{PJ,y}$ is the electricity generation in the Project Plant in year y (MWh), replaced by

$EG_{gen,y}$ as $EG_{gen,y}$ is the exact value of electricity generation in the project plant in year y ;

$EF_{BL,upstream,CH_4}$ is the emission factor for upstream fugitive CH_4 emissions occurring in the absence of the Project Activity in t CH_4 per MWh electricity generation in the Project Plant;

GWP_{CH_4} is the global warming potential of CH_4 valid for the relevant commitment period.

The emission factor for fugitive upstream emissions of natural gas ($EF_{NG,upstream,CH_4}$) including fugitive emissions from production, processing, transport and distribution of natural gas, is obtained from Table 2 “other oil exporting countries/rest of world” provided in the methodology AM0029.

According to the methodology AM0029, the emission factor for upstream fugitive CH_4 emissions occurring in the absence of the Project Activity ($EF_{NG,upstream,CH_4}$) should be calculated consistent with the baseline emission factor ($EF_{BL,CO_2,y}$) used above.

Since Option 1 (the build margin, calculated according to the methodology ACM0002) is selected for the calculation of the baseline emission factor, relevant emission factor for upstream fugitive CH_4 emissions ($EF_{BL,upstream,CH_4}$) is calculated as follows:

$$EF_{BL,upstream,CH_4} = \frac{\sum_j FF_{j,k} \cdot EF_{k,upstream,CH_4}}{\sum_j EG_j} \quad (10)$$

where:

$EF_{BL,upstream,CH_4}$ is the emission factor for upstream fugitive CH_4 emissions occurring in the absence of the Project Activity in t CH_4 per MWh electricity generation in the Project Plant;

j is the plants included in the build margin;

$FF_{j,k}$ is the quantity of fuel type k (a coal or oil type) combusted in power plant j included in the build margin;

$EF_{k,upstream,CH_4}$ is the emission factor for upstream fugitive CH_4 emissions from production of the fuel type k (a coal or oil type) in t CH_4 per MJ fuel produced;

EG_j is the electricity generation in the plant j included in the build margin (MWh/yr).

The emission factor for fugitive upstream emissions of coal ($EF_{k,upstream,CH_4}$) including fugitive emissions from underground coal production, is obtained from Table 2 provided in the methodology AM0029.

In China, it is very difficult to obtain the data of the plant j . Therefore, according to the deviation in application of the methodology AM0005⁴ approved by CDM EB, recent 20%

4 <http://cdm.unfccc.int/Projects/Deviations>.

capacity additions of North China Grid during 2005~2007⁵ were used for estimating the build margin emission factor for grid electricity and the 600 MW sub-critical coal fired power generation unit was used as the proxy of efficiency level of the best technology in China⁶. Based on these data, formula (10) can be conservatively converted into formula (11)⁷:

$$EF_{BL,upstream,CH4} = \varphi_{coal} \times PGCC_{coal,best} \times EF_{coal,upstream,CH4} \times \frac{NCV_{coal}}{NCV_{Rawcoal}} \quad (11)$$

where,

φ_{coal} is the share of coal fired generation in BM generation (0.9395, see Annex 1 for details).

$PGCC_{coal,best}$ is the power generation standard coal equivalent consumption of the 600 MW sub critical coal fired power generation technology within the grid boundary.

$NCV_{Rawcoal}$ is the net calorific value of raw coal which is used for power generation in GJ/tCe.

Since all the natural gas used in the Project is from the local area and no natural gas imported from other countries is used in the Project, upstream emissions occurring in Annex I countries that have ratified the Kyoto Protocol are not necessary to be excluded.

Leakage of the Project from 01/01/2008 to 20/07/2008 are summarized in Table 11.

Table 11. Leakage from 01/01/2008 to 20/07/2008

Parameter	$EG_{PJ,y}$ (MWh)	$FC_{NG,y}$ (Nm ³)	$NCV_{NG,y}$ (GJ/Nm ³)	φ_{coal}	$PGCC_{best}$ (gce/kWh)
Data	334,062	71,909,005	0.03469842	0.9395	320

Table 11. Leakage from 01/01/2008 to 20/07/2008 (continued)

Parameter	$EF_{coal,upstream,CH4}$ (tCH ₄ /kt)	$\frac{NCV_{coal}}{NCV_{Rawcoal}}$	$EF_{NG,upstream,CH4}$ (tCH ₄ /PJ)	Auxiliary electricity consumption rate (%)	GWP_{CH4} (tCO ₂ e/tCH ₄)	$LE_{CH4,y}$ (tCO ₂ e)
Data	13.4	1.4	296	2.96	21	-25,264

Since the total net leakage are negative ($LE_{CH4,y} < 0$), $LE_y = 0$ is assumed in the Project.

D.1.4. Summary of the emissions reductions during the given monitoring period:

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To calculate the emission reductions, the following equation is applied:

$$ER_y = BE_y - PE_y - LE_y \quad (12)$$

where:

ER_y is the emissions reductions of the Project Activity in year y (tCO₂e),

BE_y is the baseline emissions due to displacement of electricity in year y (tCO₂e),

PE_y is the project emissions in year y (tCO₂e),

⁵ Capacity additions during 2005~2007 are greater than and most close to 20% of the electricity system. See Annex 3 for details.

⁶ <http://www.ccchina.gov.cn/source/fa/fa2002082803.html>.

⁷ The conservativeness of such switch has been demonstrated in Annex 3.

LE_y is the leakage in year y (tCO₂e).

Emission reductions of the Project from 01/01/2008 to 20/07/2008 are summarized in Table 12. An excel spreadsheet summarizing the calculation of emission reductions is prepared for verification.

Table 12. Emission reductions from 01/01/2008 to 20/07/2008

Parameter	BE_y (tCO ₂ e)	PE_y (tCO ₂ e)	LE_y (tCO ₂ e)	ER_y (tCO ₂ e)
Data	260,635	139,977	0	120,658

In summary, the actual emission reductions claimed for the Project is 120,658 tCO₂e in the monitoring period from 01/01/2008 to 20/07/2008. Compared to the annual emission reductions of 593,981 tCO₂e estimated in the registered PDD, there is no significant increase in emission reductions for the Project from 01/01/2008 to 20/07/2008.

D.2. Description and consideration of measurement uncertainties

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Recorded data of different natural gas flow meter(s) have been cross-checked with each other for gas consumption. Recorded data and invoiced data have been cross-checked with each other for power generation. No significant differences in both gas consumption and power generation between the two sets of data were observed.

Annex 1 - Calculation of the build margin emission factor

Table A1. Data and results of Step a.

Fuel	Unit	Beijing A	Tianjin B	Hebei C	Shanxi D	Inner Mongolia E	Shandong F	Total G= A+B+...+F	Emission factor (kgCO ₂ /TJ) H	NCV (MJ/t or 1000m ³) I	CO ₂ emission (tCO ₂ e) J
Raw coal	10 ⁴ t	816.17	1,753.99	7,716.13	7,510.06	10,434.25	11,884.83	40,115.43	87,300	20,908	732,214,267
Washed coal	10 ⁴ t	0.00	0.00	0.00	0.00	0.00	18.43	18.43	87,300	26,344	423,859
Other washed coal	10 ⁴ t	5.76	0.00	156.89	478.81	48.57	756.84	1,446.87	87,300	8,363	10,563,452
Briquette	10 ⁴ t	7.93	0.00	0.00	0.00	0.00	42.86	50.79	87,300	20,908	927,054
Coke	10 ⁴ t	0.00	0.00	0.02	0.00	0.00	4.09	4.11	95,700	28,435	111,843
Other coking products	10 ⁴ t	4.74	0.00	0.00	0.00	0.00	0.00	4.74	95,700	28,435	128,986
Sub-total of solid fuel											744,369,461
Crude oil	10 ⁴ t	0.00	0.00	0.00	0.00	0.00	0.00	0.00	71,100	41,816	0
Gasoline	10 ⁴ t	0.00	0.00	0.01	0.00	0.00	0.00	0.01	67,500	43,070	291
Diesel	10 ⁴ t	0.33	0.00	2.35	0.00	0.62	5.08	8.38	72,600	42,652	259,490
Fuel oil	10 ⁴ t	4.74	0.00	0.18	0.00	0.00	2.35	7.27	75,500	41,816	229,522
Other oil products	10 ⁴ t	1.72	0.00	0.00	0.00	0.00	0.00	1.72	75,500	41,816	54,302
Sub-total of liquid fuel											543,604
Nature gas	10 ⁸ m ³	5.03	0.73	0.00	0.54	4.22	0.01	10.53	54,300	38,931	2,225,993
Coke oven gas	10 ⁸ m ³	0.07	0.72	3.13	25.46	2.58	13.61	45.57	37,300	16,726	2,843,020
Other gas	10 ⁴ t	11.80	7.60	88.38	72.80	28.17	29.64	238.39	37,300	5,227	4,647,821
LPG	10 ⁴ t	0.00	0.00	0.00	0.00	0.00	0.00	0.00	61,600	50,179	0
Refinery gas	10 ⁸ m ³	0.06	0.00	2.85	0.00	0.00	1.65	4.56	48,200	46,055	101,225
Sub-total of gas fuel											9,818,059
Total											754,731,124

Data source: China Energy Statistical Yearbook 2008.

Calculated with the data provided in Table A1 and formula (3)~(5), the value of λ_{Coal} is 98.63%, the value of λ_{Oil} is 0.07% and the value of λ_{Gas} is 1.30%.

Table A2. Emission factor of best technology

	Variable	Electricity supply efficiency	Emission factor of fuel (kgCO ₂ /TJ)	Oxidation Rate (%)	Emission factor (tCO ₂ /MWh)
		A	B	C	D=3.6/A/10 ⁶ *B*C
Coal-based power plants	$EF_{Coal,Adv,y}$	38.10%	87,300	100	0.8249
Gas-based power plants	$EF_{Gas,Adv,y}$	49.99%	75,500	100	0.5437
Oil-based power plants	$EF_{Oil,Adv,y}$	49.99%	54,300	100	0.3910

Therefore, $EF_{Thermal,y} = \lambda_{Coal,y} \times EF_{Coal,Adv,y} + \lambda_{Oil,y} \times EF_{Oil,Adv,y} + \lambda_{Gas,y} \times EF_{Gas,Adv,y} = 0.8191 \text{ tCO}_2\text{e/MWh}$.

Table A3. Installed capacity of North China Grid in 2007

	Beijing	Tianjin	Hebei	Shanxi	Inner Mongolia	Shandong	Total
Thermal power (MW)	3,900.0	6,920.0	29,020.0	30,950.0	39,870.0	54,140.0	164,800.0
Hydro power (MW)	1,050.0	10.0	780.0	790.0	830.0	1,050.0	4,510.0
Wind power and Others (MW)	2.7	0.0	410.0	0.0	1,096.5	210.0	1,719.2
Total (MW)	4,952.7	6,930.0	30,210.0	31,740.0	41,796.5	55,400.0	171,029.2

Data source: China Electric Power Yearbook 2008.

Table A4. Installed capacity of North China Grid in 2006

	Beijing	Tianjin	Hebei	Shanxi	Inner Mongolia	Shandong	Total
Thermal power (MW)	3,984.0	6,512.0	26,087.0	26,661.0	28,899.0	49,395.0	141,538.0
Hydro power (MW)	1,053.0	5.0	785.0	790.0	818.0	553.0	4,004.0
Wind power and Others (MW)	24.0	24.0	218.0	0.0	565.0	106.0	937.0
Total (MW)	5,061.0	6,541.0	27,090.0	27,451.0	30,282.0	50,054.0	146,479.0

Data source: China Electric Power Yearbook 2007.

Table A5. Installed capacity of North China Grid in 2005

	Beijing	Tianjin	Hebei	Shanxi	Inner Mongolia	Shandong	Total
Thermal power (MW)	3,833.5	6,149.9	22,333.2	22,246.8	19,173.3	37,332.0	111,068.7
Hydro power (MW)	1,025.0	5.0	784.5	783.0	567.9	50.8	3,216.2
Wind power and Others (MW)	24.0	24.0	48.0	0.0	208.9	30.6	335.5
Total (MW)	4,882.5	6,178.9	23,165.7	23,029.8	19,950.1	37,413.4	114,620.4

Data source: China Electric Power Yearbook 2006.

Table A6. Calculation of the build margin emission factor of North China Grid

	Installed capacity in 2005 (MW) A	Installed capacity in 2006 (MW) B	Installed capacity in 2007 (MW) C	Capacity additions from 2005 to 2007 (MW) D=C- A	Share in total capacity additions
Thermal power	111,068.7	141,538.0	164,800.0	53,731.3	95.25%
Hydro power	3,216.2	4,004.0	4,510.0	1,293.8	2.29%
Wind power and Others	335.5	937.0	1,719.2	1,383.7	2.45%
Total	114,620.4	146,479.0	171,029.2	56,408.8	100.00%
Share in the total installed capacity of 2007	67.02%	85.65%	100%		

Therefore, $EF_{grid,BM,y} = 0.8191 \times 95.25\% = 0.7802 \text{ tCO}_2\text{e/MWh}$.

As per Table A1, $\lambda_{Coal} = 98.63\%$. As per Table A6, $\frac{CAP_{Thermal}}{CAP_{Total}} = 95.25\%$. Therefore, $\varphi_{coal} = \frac{CAP_{Thermal}}{CAP_{Total}} \times \lambda_{Coal} = 98.63\% \times 95.25\% = 93.95\%$.

ANNEX 2 - Summary of the monitored data and the data for cross check

Table A.7 Difference between the monitored data and the data for cross check of net electricity delivered to the grid

Month	Monitored data of supplied electricity (MWh)	Invoice data of supplied electricity (MWh)	Monitored data of imported electricity (MWh)	Invoice data of imported electricity (MWh)	Difference
01/01/2008~31/01/2008	112,794	112,793	0	-	-
01/02/2008~28/02/2008	96,076	96,608	0	-	-
01/03/2008~31/03/2008	100,452	100,461	0	-	-
01/04/2008~30/04/2008	21,520	21,520	116	-	-
01/05/2008~31/05/2008	0	0	297	-	-
01/06/2008~30/06/2008	0	0	322	-	-
01/07/2008~20/07/2008	4,372	4,372	337	-	-
Total (MWh)	335,213	335,213	1,071	1,151	-
Net electricity delivered to the grid (MWh)	334,142	334,062	-	-	0.02%

Table A.8 Difference between the monitored data and the data for cross check of natural gas consumption

Month	Monitored data (Nm ³)	Data for cross check (Nm ³)	Difference
01/01/2008~31/01/2008	23,600,971	Totally 540,184,000 until 0:00 01/01/2008	-
01/02/2008~28/02/2008	20,872,070	-	-
01/03/2008~31/03/2008	21,367,605	-	-
01/04/2008~30/04/2008	5,075,920	-	-
01/05/2008~31/05/2008	0	-	-
01/06/2008~30/06/2008	0	-	-
01/07/2008~20/07/2008	992,439	Totally 611,465,000 until 24:00 20/07/2008	-
Total natural gas consumption (Nm³)	71,909,005	71,281,000	0.87%

Table A.9 The monitored data of net caloric value

Period	Monitored data (GJ/m ³)
01/01/2008 - 10/01/2008 (10 day)	0.03457
11/02/2008 - 23/01/2008 (13 day)	0.03457
24/01/2008 - 02/02/2008 (10 day)	0.03451
03/02/2008 - 08/02/2008(6 day)	0.03479
09/02/2008 - 19/02/2008(11 day)	0.03479
20/02/2008 - 03/03/2008(13 day)	0.03468
04/03/2008 - 16/03/2008(13 day)	0.03469
17/03/2008 - 25/03/2008(9 day)	0.03491
26/03/2008 - 01/04/2008(7 day)	0.03491
02/04/2008 - 12/04/2008(11 day)	0.03477
13/04/2008 - 25/04/2008(13 day)	0.03483
26/04/2008 - 07/05/2008(12 day)	0.03509
08/05/2008 - 20/05/2008(13 day)	0.03524
21/05/2008 - 03/06/2008(14 day)	0.03279
04/06/2008 - 17/06/2008(14 day)	0.03530
18/06/2008 - 30/06/2008(13 day)	0.03530
01/07/2008 - 10/07/2008(10 day)	0.03464
11/07/2008 - 20/07/2008(10 day)	0.03484
Weighted average of NCV (GJ/m³)	0.03469842