Qinghai Ge-ermu Gas Turbine Power Plant Project

(CDM Registration Reference Number: 1368)

Monitoring Report

(Version 01)

(Date: 22nd Oct 2009)

1st Monitoring Period

Monitoring Period: 20th July-31st December, 2008

Section A. General Project Activity and Monitoring Information

A.1 Title of the project activity:

Qinghai Ge-ermu Gas Turbine Power Plants Project

A.2.CDM registration number:

Reference No. 1368

A.3. Short description of the project activity:

Qinghai Ge-ermu Gas Turbine Power Plant Project (hereafter referred to as the Project) has been registered as a CDM project by the UNFCCC on 20th July. 2008 under reference number 1368. Further background on the Ge-ermu project can be found in the Project Design Document (PDD) and associated documents, which are available on the UNFCCC website:
http://cdm.unfccc.int/Projects/DB/BVQI1191062063.0/view

Parties involved are China (Host County) and Netherlands (other Party). Project participants are Huanghe Hydropower Development Co., Ltd. (project owner) and Energy Systems International B.V. (ESI) (carbon buyer).

Two sets of 150MW level gas-stream combined cycle power generation equipments which use natural gas from gas field started formal operation from 19th July, 2008. Power generated, deducting the self use of the power plant, are supplied to the Northwest China Power Grid via two 110 kV outlet circuits.

In this monitoring period, the power supplied by the proposed project was **687728.976**MWH, which consumed **153,587,084**Nm3 natural gas. It is reduced **154,437**tCO2e of greenhouse gas (GHG) emission.

A.4. Monitoring Period:

The Project adopts 7*3 years' renewable crediting period with the starting date of 20h July. 2008 (date of registration). This is the 1st monitoring report covering the period from 20h July. 2008 to 31st December. 2008.

A.5. Methodology applied to the project activity (incl. version number):

A.5.1.Baseline methodology:

The Approved baseline methodology AM0029 (Version 01.1, dated on 19th May, 2006)-"Baseline Methodology for Grid Connected Electricity Generation Plants using Natural Gas" is applied to the Project.

A.5.2. Monitoring methodology:

The Approved monitoring methodology AM0029 (Version 01.1, dated on 19th May, 2006)-"Grid Connected Electricity Generation Plants using Non-Renewable and Less GHG Intensive Fuel" is applied to the Project.

A.6. Changes since last verification:

This is the first verification of the project.

A.7.Person(s) responsible for the preparation and submission of the monitoring report:

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Section B. Monitoring Data and Calculations of Emission Reductions

B.1. Monitored parameters

No.	Parameter	Unit	Description	Monitoring Instrument used/Data source	Measurement **Frequency**
1	$EG_{PJ,y}$	MWh	Electricity delivered to the grid by the Project	Ammeter	Continuous measurement
2	$FC_{NG,}$	Nm^3	The total volume of natural gas combusted in the project plant	Flow meter	Continuous measurement
3	NCV_{NG}	GJ/ m^3	The net calorific value per volume	Gas supplier	Fortnightly

			unit of natural gas		
4	$F_{i,m}$	Mass or volume unit	Total amount of fuel I consumed by the province m in the year y	*China Energy Statistical Yearbook 2008*	Annually
5	NCV_i	MJ/t or 1000 m^3	Net calorific value of fuel i	*China Energy Statistical Yearbook 2008*	Annually
6	$OXID_i$	%	Oxidation factor of the fuel i	*2006 IPCC Guidelines for National Greenhouse Gas Inventories*	Annually
7	$EF_{CO2,i}$	$kgCO_2$/TJ	CO_2 emission factor of the fuel i	*2006 IPCC Guidelines for National Greenhouse Gas Inventories*	Annually
8	$COEF_y$	tCO_2/m^3	CO_2 emission coefficient of the Project	Calculated with NCV_f, $OXID_f$ and $EF_{CO2,f}$.	Annually
9	φ_{COAL}	-	The share of coal-fired generation in BM generation	*China Electric Power Yearbook 2006, 2007,2008*	Annually
10	-	MWh	Electricity generated by province m	*China Power Electric Yearbook,2006,2007,2008*	Annually
11	-	%	Auxiliary electricity consumption rate of province m	*China Power Electric Yearbook,2006,2007,2008*	Annually
12	-	-	Fuel consumption per kWh electricity supplied to grid of best technology commercially available in China	China's DNA	Annually

B.2. Project Monitoring

B.2.1 Electricity delivered

Electricity delivered to the Grid is continuously monitored by two ammeters installed at the point connecting the Project to the grid system and cross checked by the electricity sales receipts which are confirmed by the Grid Company and the Project Owner. Two other backup ammeters are connected as well.

B.2.2 Consumption of natural gas by the Project:

Consumption of natural gas is continuously monitored by natural gas flow meters at the inlet of gas turbine and daily recorded. Besides, gas flow meters are installed at the endpoint of the gas transmission pipeline of the Project at the supplier's site. Total gas consumption by the plant is continuously monitored and monthly settled by the supplier and the project owner. Natural gas metering handover receipt between the gas supplier and the plant could cross check the total natural gas consumption.

B.2.3 Net calorific value of natural gas

NCV of natural gas report is provided by the gas supplier at least every two weeks.

B.2.4 Baseline emission factor:

The latest BM emission factor of the Northwest China Power Grid is calculated based on the latest public statistics.

B.2.5 Leakage:

Parameters for leakage calculation are from the latest China DNA and the latest edition of China Energy Statistical Yearbook.

B.3. Instrument Calibration

All the monitoring instruments are annually calibrated by the third authorized parties. Calibration details can be referred to the following table:

Parameters	Instruments	Serial No.	Calibration/Test date
EG_{PJ}	Ammeters (circuit I)	02078273 (master) 02078275 (backup)	29th Jun, 2008
	Ammeters (circuit II)	02078276 (master) 02078274 (backup)	29th Jun, 2008
FC_{NG}	NG flow meter (distribution station)	07-160392	23rd May, 2008
	NG flow meter (distribution station)	8M 739330	28th Mar, 2008
	NG flow meters (1# gas engine)	8049664	18th Jun, 2008
	NG flow meters (2# gas engine)	8213547	18th Jun, 2008
NCV_{NG}	-	-	At least every two weeks from 18th Jul,

			2008 to 2nd Jan, 2009.

B.4. Calculation of Emission Reductions

B.4.1 Project Emission

(1) Data concerning GHG emissions by sources of the project activity

In the project only natural gas is combusted as the fuel to generate electricity without any other auxiliary fuels. CO_2 emissions due to the project activity are calculated as follows:

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

where:

$FC_{NG,y}$: is the total volume of natural gas combusted in the project plant (m^3) in year(s) 'y';

$COEF_{NG,y}$: is the CO_2 emission coefficient (tCO_2/m^3) in year(s) for natural gas and is obtained as:

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

where:

$NCV_{NG,y}$: is the net calorific value (energy content) per volume unit of natural gas in year 'y' (GJ/m^3) as determined from the fuel supplier;

$EF_{CO2,NG,y}$: is the CO_2 emission factor per unit of energy of natural gas in year 'y' (tCO_2/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/m^3) is obtained from the natural gas supplier and other parameters are obtained from the 2006 IPCC Guidelines for National Greenhouse Gas Inventories.

(2) Project emissions calculation

Natural gas consumption is continuously monitored by the flow meters installed at the distribution station. The cumulated gas consumption in this monitoring period is summarized in the following table:

Date	FC_{NG} (Nm3)
2008.07.19-2008.08.20*	21,654,824
2008.08.20-2008.09.20	29,125,468
2008.09.20-2008.10.20	33,420,336

2008.10.20-2008.11.20	27,618,640
2008.11.20-2008.12.31	41,767,816
Total FC_{NG} (Nm3)	**153,587,084**

*: Natural gas supply is monitored at 20:22 of 19th July when power is connected to the grid. Gas consumption from 20:22 of 19th to 0:00 of 20th is included in PE calculation. This is conservative

Net calorific value of natural gas is provided by gas supplier in the form of NCV test report. The detailed data are shown in the following table:

Date	**NCV_{NG} (MJ/M^3)**
2008.07.18	33.42
2008.07.21	33.42
2008.08.04	33.43
2008.08.18	33.43
2008.08.29	33.42
2008.09.12	33.44
2008.09.26	33.42
2008.10.10	33.43
2008.10.24	33.41
2008.11.07	33.41
2008.11.21	33.41
2008.12.05	33.44
2008.12.19	33.41
2009.01.02	33.43
Average NCV_f (MJ/M^3)	**33.423**

Item	$FC_{f,y}$ **(Nm^3)**	$NCV_{f,y}$ **(MJ/Nm^3)**	$COEF_{f,y}$ **($kgCO_2/TJ$)**	$OXID_f$	PE_y **(tCO_2e)**
I.D.	A	B	C	D	E
Data	153,587,084	33.423	56,100	1	**287,979**
Data source or calculation formula	*Monitored*	*Monitored*	*2006 IPCC Guidelines for National Greenhouse Gas Inventories*	*2006 IPCC Guidelines for National Greenhouse Gas Inventories*	$E=A\times B\times C\times D/10^9$

B.4.2 Baseline Emission

(1) Data concerning GHG emissions by sources of the baseline:

Baseline emissions are calculated by multiplying the electricity generated in the project plant ($EG_{PJ,y}$) with a baseline CO_2 emission factor ($EF_{BL,CO2,y}$), as follows:

$$BE_y = EG_{PJ,y} \cdot EF_{BL,CO2,y}$$

where:

$EG_{PJ,y}$: is the electricity delivered to the grid by the project in year(s) 'y';

$EF_{BL,CO2,y}$: is the baseline CO_2 emission factor.

According to the PDD, EF_{BM} is adopted as the baseline emission factor ($EF_{BL,CO2,y}$) for the Project. It is determined ex-post.

(2) Baseline emission calculation

Electricity delivered to the grid by the Project in this monitoring period is shown in the following table:

Date	$EG_{PJ,}$ (MWh)
2008.07.20-2008.07.30	30945.024
2008.07.30-2008.08.31	112746.48
2008.09.01-2008.09.30	121868.736
2008.10.01-2008.10.31	174131.76
2008.11.01-2008.11.30	98034.288
2008.12.01-2008.12.31	150002.688
Total	**687728.976**

Baseline CO_2 emission factor ($EF_{BL,CO2,y}$) calculation can be referred to the Excel spreadsheet.

Item	$EG_{PJ,y}$ (MWh)	$EF_{BL,CO2,y}$ (tCO_2e/MWh)	BE_y (tCO_2e)
I.D.	F	G	H
Data	687,728.976	0.6433	442,416
Data source or calculation formula	*Monitored*	*See excel spreadsheet*	H=F×G

B.4.3 Leakage

(1) Data concerning GHG emissions by sources of the leakage:

Natural gas used in the Project is not LNG. According to methodology AM0029, leakage emission (LE_y) sources considered in the Project includes the fugitive CH_4 emissions ($LE_{CH4,y}$) 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 CH_4 emissions, project participants should multiply the quantity of natural gas consumed by the project in year y with an emission factor for fugitive CH_4 emissions ($EF_{NG,upstream,CH4}$) from natural gas consumption and subtract the emissions occurring from fossil fuels used in the absence of the project activity, as follows:

$$LE_{CH4,y} = \left[FC_y \cdot NCV_y \cdot EF_{NG,upstream,CH4} - EG_{PJ,y} \cdot EF_{BL,upstream,CH4}\right] \cdot GWP_{CH4} \qquad (10)$$

where:

$LE_{CH4,y}$ is the leakage emissions due to fugitive upstream CH_4 emissions in the year y in tCO_2e;

FC_y is the quantity of natural gas combusted in the project plant during the year *y* in m^3;

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

$EF_{NG,upstream,CH4}$ is the emission factor for upstream fugitive methane emissions of natural gas from production, transportation, distribution, in tCH_4 per GJ fuel supplied to final consumers;

$EF_{BL,upstream,CH4}$ is the emission factor for upstream fugitive methane emissions occurring in the absence of the project activity in tCH_4 per MWh electricity generation in the project plant;

GWP_{CH4} is the global warming potential of methane valid for the relevant commitment period.

The emission factor for fugitive upstream emissions for natural gas ($EF_{NG,upstream,CH4}$) include 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 methodology AM0029.

For $EF_{BL,upstream,CH4}$, the following formula is adopted:

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

where,

φ_{coal} is the share of coal-fired generation in BM generation.

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

NCV_{coal} is the net caloric value of standard coal equivalent in GJ/tCe.

$NCV_{Rawcoal}$ is the net caloric value of raw coal which is used for power generation in GJ/tCe[1].

(2)Leakage calculation

The emission factor for fugitive upstream emissions for the Project is estimated as 0.004675 tCH_4/MWh as shown in table below.

Item	φ_{coal}	$PGCC_{best}$ **(gCe/kWh)**	$EF_{coal,upstream,CH4}$ **(tCH_4/kt)**	$\frac{NCV_{coal}}{NCV_{Rawcoal}}$	$EF_{BL,upstream,CH4}$ **(tCH_4/MWh)**
I.D.	I	J	K	L	M
Data	0.7728	322.5	13.4	1.4	0.004675
Data source or calculation formula	See excel spreadsheet for details	China's DNA	AM0029	*China Energy Statistical Yearbook* 2008 edition, P284	$M=I\times J\times K\times L/10^6$

The annual total net leakage effects for the Project is estimated as -35,613 tCO_2e as shown in table below.

Item	$EF_{NG,upstream,CH4}$ **(tCH_4/PJ)**	$EG_{PJ.y}$ **(MWh)**	GWP_{CH4} **(tCO_2e/tCH_4)**	$LE_{CH4,y}$ **(tCO_2e)**
I.D.	N	O	P	Q
Data	296	687,728.976	21	-35,613
Data source or calculation formula	AM0029	*Feasibility Study Report*	IPCC default	$Q=[A\times B\times N/10^9-O\times M]\times P$

B.4.4 Emission Reduction

To calculate the emission reductions the project participant shall apply the following equation:

$$ER_y = BE_y - PE_y - LE_y$$

where:

1 As per the data on P284 of C*hina Energy Statistical Yearbook* (2008 Edition), caloric value of raw coal is 5000 kcal/kg and that of standard coal is 7000 kcal/kg.

ER_y is the emissions reductions of the project activity during the year y (tCO_2e),

BE_y is the baseline emissions due to displacement of electricity during the year y (tCO_2e),

PE_y is the project emissions during the year y (tCO_2e),

LE_y is the leakage in year y (tCO_2e).

Since the total net leakage effects are negative ($LE_y < 0$), it is assumed that $LE_y = 0$ for conservativeness.

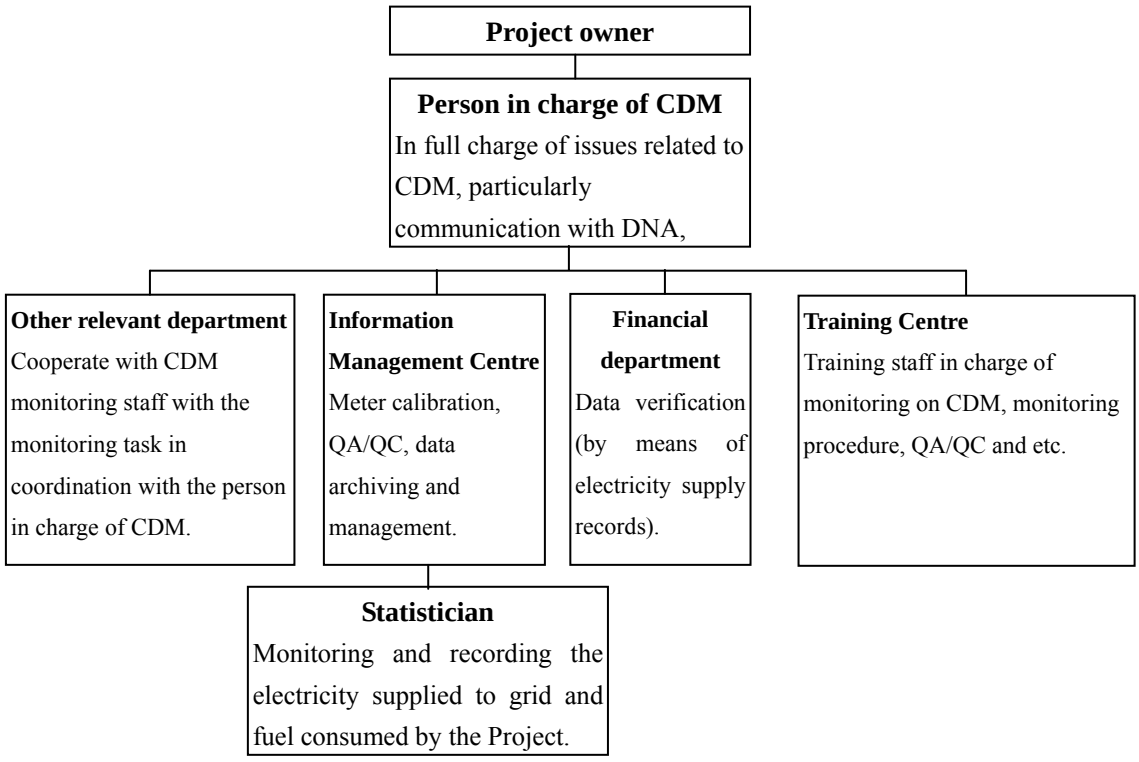
Item	BE_y **(tCO_2e)**	PE_y **(tCO_2e)**	LE_y **(tCO_2e)**	ER_y **(tCO_2e)**
I.D.	H	E	R	S
Data	442,416	287,979	0	154,437

The emission reductions of this monitoring period are **154,437** tCO_2e.

Section C. Project Management and QA/QC

C.1. Management Structure

Please refer to the following figure:



C.2. Training

The personnel in the project had been well trained on the following aspects:

- CDM related knowledge and how this project meets the requirements of CDM
- Daily management system, operation specification and equipment maintenance
- CDM monitoring instrument introduction
- Data monitoring, recording and storage
- Troubleshooting

C.3. Data Management Systems

- Specific staff will be appointed by the project owner to take the overall responsibility for monitoring greenhouse gas emission reductions and keeping all the data and information of emission reductions for verification.
- Electronic data and documents, including readings from electric meters connected into the computer central control system, will be regularly copied and archived via optical discs, and kept at least two years after the end of the crediting period.
- Written data and documents, including receipts for cross-checking of data, will be copied and archived with an explanation of the department or company where the original copy is kept, and kept at least two years after the end of the crediting period

C.4. Maintenance and calibration of Meter & Metering

Flow meters and ammeters used in the Project are annually calibrated according to the Measuring Rules, relevant national and local standards and rules. All the records are documented and maintained by the project owner for DOE's verification.

C.5. Quality Assurance and Quality Control

The monitored data are stored both electronically and manually. The recorded data were double checked by at least two staffs. The operations and recorded data are examined by the team leader on a daily base and the accumulated monthly data were examined by project manager. In addition, the power supplied and gas consumption could be double checked by receipt of sales.

There are backup ammeters for power supply measurement. In case of accidents such as ammeters shut off, which would affect data output, the emissions reductions in this period are not accounted for as a conservative way.

The default values and ex-ante data are stored by the project consultant. These data are sourced clearly in the Excel sheet for calculation of emission reductions. The ERs calculation sheet that can be easy tracked will be provided to DOE for verification.

Section D. Comparison of Emission reductions between the data in this monitoring period and the data in the PDD

The comparison of the actual emission reductions in this monitoring period with that estimated in the registered PDD is shown in the following table:

	Actual Data	**Estimate in the registered PDD**
Duration	165 days	365 days
Power delivered	687,728.976MWh	1,559,151 MWh
Daily power delivered	4168.05MWh/d	4271.66MWh/d

The power delivered per day is slightly lower than PDD designed.