VCS MONITORING REPORT

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VCS MONITORING REPORT
Version 02-in effect as of 25/07/2011

65MW Dagushan hydropower Project in China
UNFCCC Registration Reference Number: 3045
Monitoring Period: 22/07/2009-08/05/2010

SECTION A. General description of the project activity

A.1. Introduction

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This document reports the emission reductions generated by 65MW Dagushan Hydropower Project in Gansu Province, China whose CDM registration reference number is 3045 during the following monitoring period: 22/07/2009 (Start date of the VCS crediting period) to 08/05/2010.

A.2. Brief description of the project activity:

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The 65MW Dagushan hydropower project, a newly built run-of-river hydropower project with a total installed capacity of 65MW (2×26 + 1×13 MW), is located in Su'nan Yugu Autonomous County and about 102 km far from Zhangye City in Gansu Province, China. The project is constructed and operated by Gansu Zhangye Dagushan Hydropower Co. Ltd. The implementation of the project will achieve CO_2 emission reduction by replacing electricity generated by fossil fuel fired power plants. The project was commissioned in July 26, 2009. The emission reductions generated in this monitoring period is estimated to be 172,015 tCO2e.

A.3. Location of the project activity:

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This project activity is located in the territory of Su'nan Yugu Autonomous County of Zhangye City in Gansu Province, China. The geographical coordinates of the project is 100°01′29″ east longitude and 38°37′21″ north latitude.

A.4. Technical description of the project

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This project has a total install capacity of 65MW (2×26 + 1×13 MW) and a designed operation life of 30 years. The main construction of the project consists of a diversion weir, a tunnel, a penstock, high pressure pipelines, a power station and a transfer station. Through the penstock, the water head is formed taking advantage of the natural height drop through tunnel, which then enters into the pressure adjustment well. The hydraulic pressure of the water is increased through high pressure pipeline, and then the water flows into the turbines and drives the generator to produce electricity. Finally, the voltage of the generated electricity is increased to 330 kV and the electricity generation is delivered to the NWPG.

The technical diagram shown in table 1 and the information on key equipments are as follows:

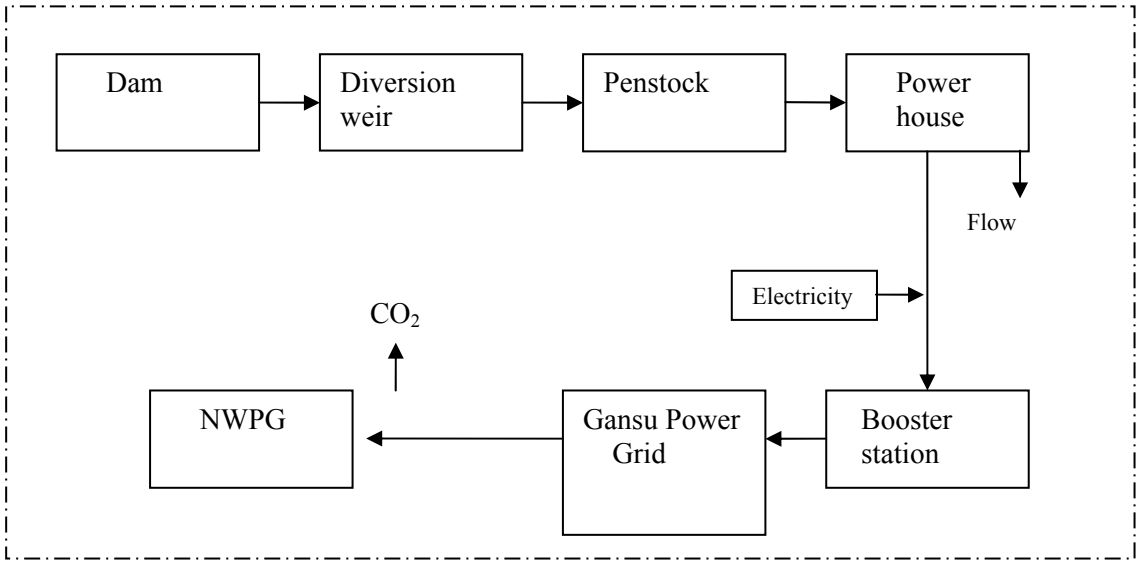

Fig. 1 Technical diagram

Table 1 Summary of key equipments in the proposed project[1]

Equipment	Parameter	Unit	Amount
Turbine	Units(large/small)	-	3（2*large/1*small）
	Model(large/small)	-	HL （257） -LJ-225/ HL（257）-LJ-160
	Rated Header	m	73
	Rated Flow(large/small)	m^3/s	40/21
	Rated Rotation Speed(large/small)	r/min	300/428.6
	Rated Power(large/small)	MW	27.3/13.6
	Annual operation time	h	3094
Generator	Model(large/small)	-	SF-J26-20/4800/ SF-J13-14/3400
	Rated Power	MW	26/13
	Rated Voltage	kV	10.5
	Rated Rotation Speed	r/min	300/428.6

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

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Version 10 of the approved methodology ACM0002 "Consolidated methodology for grid-connected electricity generation from renewable source" and "Consolidated monitoring methodology for grid-connected electricity generation from renewable source" were adopted.

http://cdm.unfccc.int/UserManagement/FileStorage/NF9EDAOV5K382HW0JR14GS7XYQUMCP

A.6. Registration date of the project activity:

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09/05/2010

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

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22/07/2009-08/05/2010

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

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The monitoring report form (CDM-MR) was completed on 25/07/ 2011 by Pu Jincheng; Ding Yu.
Organization: S.D.F. (Beijing) Consulting Co. Ltd.
Address: Cross at Qingnian East Street, Zhangye City, Gansu Province, P. R. China
Tel/fax: ＋86-(0) 936-8225763
Email: hhsdyinlongxing@vip.163.com
The entity is not one of the Project Participants.

SECTION B. Implementation of the project activity

B.1. Implementation status of the project activity

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The project started the construction in September 2007, and in July 22, 2009, the first unit of the project was commissioned. After commissioning, the project was operating in good conditions. In this monitoring period, the project is also running orderly without any overhauling and downtimes of equipment

B.2. Revision of the monitoring plan

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The monitoring plan has been revised for one time.

The revised monitoring plan was approved on 03/03/2011 and the present monitoring report has been prepared as per the latest approved monitoring plan. Please refer to http://cdm.unfccc.int/Projects/DB/RWTUV1256040897.46/view for further details on the approved revision to the monitoring plan.

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

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There is no Request for deviation applied to this monitoring period or before.

B.4. Notification or request of approval of changes

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There is no any notification or request of approval involving no changes from the project activity as described in accordance with the registered CDM-PDD.

SECTION C. Description of the monitoring system

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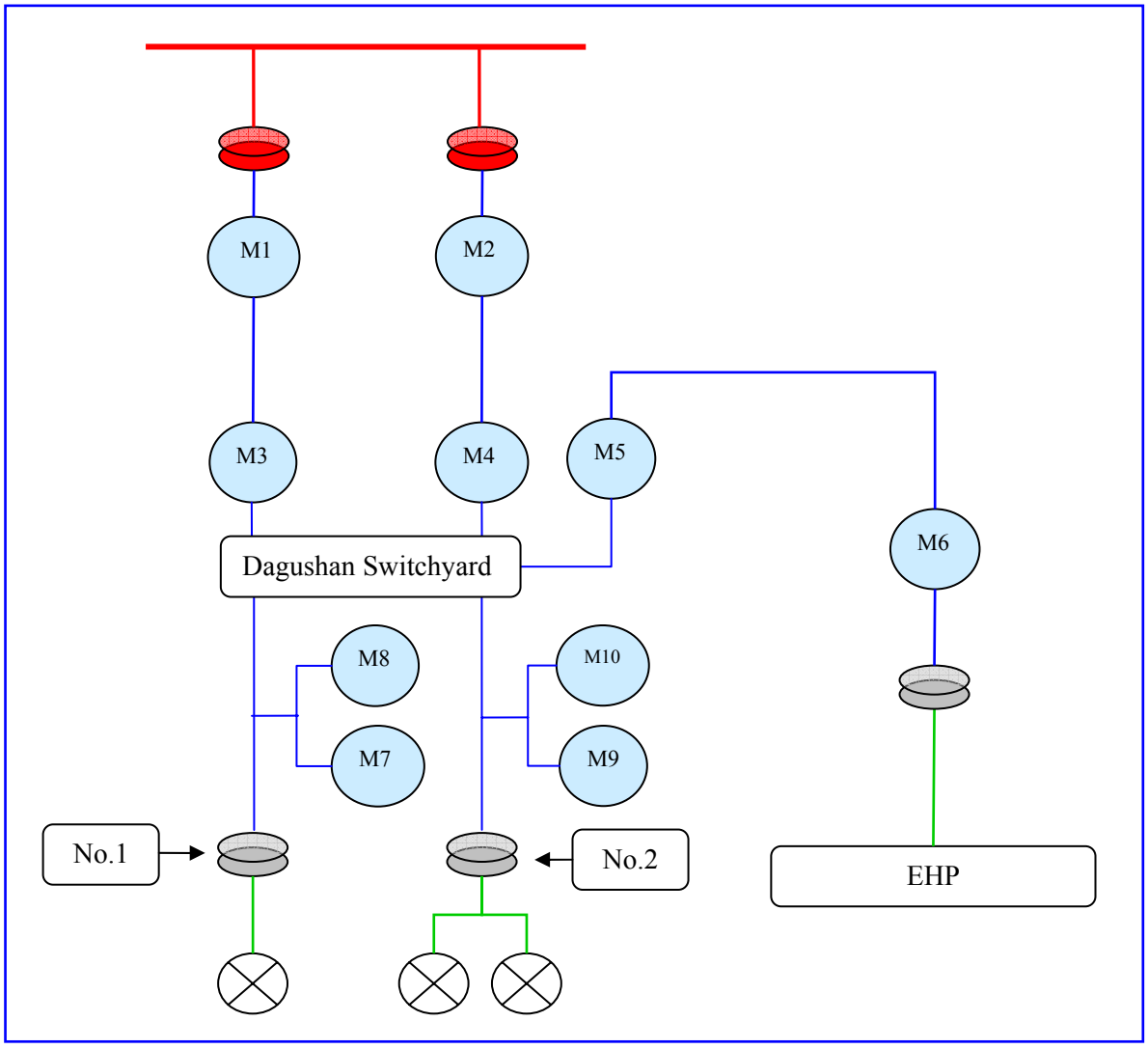
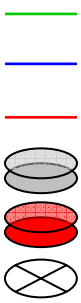
1**. Main interface:**

The electricity generation will be metered by the grid company and the project owner. An agreement has been signed between the project owner and the grid company that defines the metering arrangements and the required quality control procedures to ensure accuracy.

The power generated by the proposed project will be transmitted to Heihe Substation (330kV) together with the electricity of Erlongshan Hydropower Plant (hereinafter "EHP", a CDM project, located in the upper reaches of the proposed project), and then to Gansu Power Grid and finally to NWPG.

The simple diagram of grid connection is as figure 2 below:





10.5KV transmission line

110KV transmission line

330KV transmission line

110KV main transformer

330KV main transformer

Dagushan's generator units

10 meters will be required, of which:

Meter M1, M2 (0.2S, bi-directional): Owned by the grid company. M1 and M2 will be installed at the Heihe Substation (330kV) of the Grid Company, measures the net electricity generation supplied to the grid by the DHP and EHP (M1+M2).

Meter M3 and M4 (0.2S, **bi-directional):** Owned by the project owner, which are located at the exit of booster station of DHP, as the backup meter of M1 and M2.

According to PPA, once M1 and M2 are breakdown, the electricity will be measured and settlement the price by M3 and M4.The line loss produced will be negotiated and settled by project owner and the grid company.

Meter M5 and M6 (0.2S, single-directional): M5 is owned by the grid company, which are located at the inlet of booster station of DHP on the transmission line from EHP to DHP, M6 is owned by the project owner, which is located in the booster station of EHP; the reading on M5 is employed to record the net electricity generation supplied by EHP, M6 is the backup meter of M5.

Meter M7 and M9 (0.2S, bi-directional): Owned by the grid company, which are located at the powerhouse of DHP. M7 and M9 measured the electricity exported from No.1 and No.2 main transformer respectively of DHP.

Meter M8 and M10 (0.2S, bi-directional): Owned by the grid company, which are located at the powerhouse of DHP, they are used as the backup meters of M7 and M9 correspondently.

According to Power Purchasing Agreement, the net electricity generation supplied to the grid by the proposed project will be calculated as:

$$EG_y = [(M1 + M2)] \times \left[\frac{(M7 + M9)}{(M5 + M7 + M9)} \right]$$

Where:

M1-M9 represents the reading on meter 1 to meter 9.

The readings on M1 plus M2 which are employed to measure the net electricity generation supplied by both DHP and EHP;

The reading on M7 plus M9 are employed to measure the electricity produced by DHP; the meters M8 and M10 will be taken as backup meter for M7 and M9 only used when there is any malfunction situation of M7 and M9.

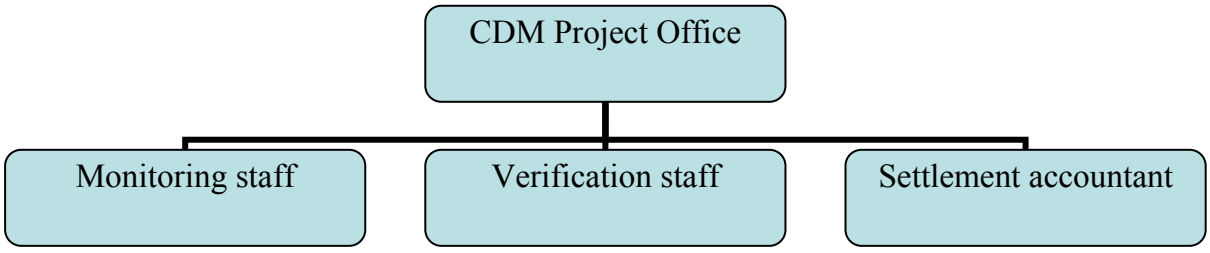
The reading on M5 is employed to measure the electricity generation supplied by EHP;

Monitoring of reservoir surface area

The project owner will monitor the surface area of the reservoir by collecting photographic evidence of the surface level when the project becomes operational. This photographic evidence will be compared with the design reservoir dimensions to confirm whether the actual surface area substantially deviates from the design surface area or not.

2. Monitoring management structure

The management structure for monitoring of emission reductions are displayed as following chart:



Firstly, the automatic monitoring system which monitors all the meters related will collect the data every 15 minutes and at 24:00 o'clock of the day at the end of each month, it will collect the readings on M1, M2, M7, M9 and M5. The collected data will be delivered to Gansu provincial power trading center (hereunder abbreviated as GPPTC) and local grid company by the same system.

Secondly, GPPTC will issue a monthly power settlement notice to inform the monthly generation amount for settlement.

After that, Gansu Zhangye Dagushan Hydropower Co., Ltd will give corresponding receipt and Gansu Provincial Power Grid Company will pay to Gansu Zhangye Dagushan Hydropower Co., Ltd within a certain period.

The collection sources of the data will not be in any case the Project's own records but the final client records of monthly production to keep the highest transparency and accuracy of the data. The Project staff designated will confirm these data with own records and own records will be double checked with sales receipts. Electricity supply to the Gansu power grid will be measured continuously by watt-hour meter. Below please find a summary list of the monitoring meters, which indicates clearly the parameters to monitor, the categories they belong to according to the technical administrative code of electric energy metering (DL/T 448-2000), the meter accuracy, and calibration frequency.

3. Monitoring Procedure

Firstly, checking meter on schedule. According to the requirement of the Power Measurement Centre of Gansu province power Company, checking on both main meter and reference meter will be done at regular intervals.

Secondly, the meter reading of electricity supply at Heihe 330kV substation, Erlongshan hydropower

station and Dagushan switchyard will take place on the same day. A three-person team with representatives from the Gansu Power Company, its Zhangye branch, and Dagushan will record the electricity supply by reading the same record on the watt-hour meter. Dagushan Company will read the meter in its station for double-checking purpose. Staff responsible for monitoring will be trained for using the meters.

The company has a detailed generator maintenance schedule set according to the variance of water flow for different seasons. This document can be presented to the validator on request.

The net electricity generation (EG_y), this is calculated subject to following equation:

$$EG_{y,Dagushan}=(M1+M2)\times[(M7+M9)/(M5+M7+M9)]$$

The issued power settlement notice will cross checked by the verification staff of DHP with the data from backup meters, if there are significant discrepancies, then Dagushan hydropower company will submit a request to GPPTC via local power grid company, then all three parties will negotiate and finally identify the electricity amount, then GPPTC will issue a notice to make up for or deduct the differences based on identified amount.

4. Calibration

Inspection and calibration on meters is carried out according to national standard. The routine check and calibration activities for electricity monitoring apparatus are being done by the national authorized duly accepted power metering authority – Gansu provincial power metering centre. The meters installed at the Heihe substation and the power plant is checked, sealed by the authority calibration entity.

Table 2 Calibration of Meters

5. Emergency Procedures

Meter	Serial number	Accuracy	Calibration frequency/y	Calibration time	Carried out by
M1	36061122	0.2S	4	04/09/2009; 03/12/2009 02/03/2010; 01/06/2010	Electric energy measurement centre of Gansu electric power corporation
M2	36085837				
M3	0850060011	0.2S	1	18/07/2009; 17/06/2010	
M4	0850060012				
M5	53033805	0.2S	4	22/09/2009; 20/12/2009 18/03/2010; 17/06/2010	
M6	934603	0.2S	1	25/08/2009; 24/08/2010	
M7	53033804	0.2S	4	22/09/2009; 20/12/2009 19/03/2010; 17/06/2010	
M8	53033803	0.2S	1	20/07/2009; 17/06/2010	
M9	53033801	0.2S	4	22/09/2009; 20/12/2009 18/03/2010; 17/06/2010	
M10	53033802	0.2S	1	20/07/2009; 17/062010	

The management and recording system at main metering spot are including 2 transmission lines and a set of computer system. Under normal circumstances, 2 transmission lines will undertake mutually the transmission activities, in the case that there is trouble on 1 transmission line, another 1 will undertake all transmission activities. The computer system will carry out the record and storage of those data, and prepare the backup copy for those data periodically.

The computer monitoring system for Dagushan hydropower plant includes the function of collection and storage for generation. The monitoring system consists of 2 sets of computer system, which are mutual back-up system. While one set is working, the other set is tracking. Both systems are able to undertake the function of recording and storing data.

There is the function for reporting in both the recording and management system at main metering spot and the computer monitoring system of Dagushan hydropower plant, which enables the function of collect the data at fixed time and processing the generation data and forming a written report form.

Moreover, either party which find abnormality on electricity metering apparatus or find trouble impacting the metering of generation amount should inform the other party and metering apparatus inspection organization accepted by both parties immediately to examine problems together in order to resume normal metering as soon as possible. If after verification by trading centre of Gansu power grid

company (hereunder abbreviated as PGTC), the data and record on main meter was found to be wrong, then the data and record on auxiliary meter would be taken as finalized one for calculation. The data monitored and recorded in auxiliary metering spot will be printed by Dagushan Hydropower Project in fixed format and delivered to PGTC, subject to written confirmation given by PGTC, and then the following process will proceed in compliance with the normal cases. For other abnormal cases, the generation during abnormal period will be confirmed based on the record provided by the equipment for voltage missing record and voltage missing timing and on the basis of fully negotiation.

SECTION D. Data and parameters

D.1. Data and parameters determined at registration and not monitored during the monitoring period, including default values and factors

Data / Parameter:	A_{PJ}
Data unit:	m^2
Description:	Surface area of the reservoir at full level
Source of data used:	Reservoir map/on-site measurement
Value(s) :	138,047
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	The data is used for Leakage emission calculation.
Additional comment:	

D.2. Data and parameters monitored

Data / Parameter:	EG_y
Data unit:	MWh
Description:	Annual electricity delivered to the grid by the proposed project, measured at Heihe Electric Substation.
Measured /Calculated /Default:	measured
Source of data:	Gansu power grid
Value(s) of monitored parameter:	For this monitoring period, it's 197,447.777 MWh.
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	The data is used for Baseline emission calculations.
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	This parameter will be hourly measured and monthly recorded. The relevant data will be kept during the crediting period and two years after. The electricity meter will be operated by the power distribution company and adjusted according to relevant national standard including "Technical administrative code of electric energy metering"

	DL/T 448-2000, "Verification regulation of electric energy metering appliance" SD 109-83, "Electricity Law", "Metrology law of the PR China". The accuracy of the electric meter is 0.2s and will be calibrate quarterly.
Measuring/ Reading/ Recording frequency:	This parameter will be hourly measured，monthly recorded and
Calculation method (if applicable):	Re-checked by comparing with the electricity sales receipt from power corporation. Calculated through the equation: $EG_{y,\ Dagushan}=(M1+M2)\times[(M7+M9)/(M5+M7+M9)]$
QA/QC procedures applied:	This data is monitored through the ammeter, and re-checked by comparing with the electricity sales receipt from power corporation.

SECTION E. Emission reductions calculation

E.1. Baseline emissions calculation

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The baseline emissions (BE_y) are calculated by multiplying the Baseline Emission factor $EF_{,y}$ by annual power generation $EG_{,y}$ to the grid:

Calculated as:

$BE_y = EG_y \times EF_y$ (Tool Eq.)

Among which, EG_y is net electricity. It is available after the deduction of electricity imported from electricity exported.

The figures shown in Table 3 and Table 4 are available from the figure in invoices. The Electricity exported and imported is measured on the same meters. The data as noted below are available from the invoices submitted to DOE.

Step I . VCU from 22/07/2009 to 31/12/2009

Table 3. VCU (22/07/2009-31/12/2009)

Period	Monthly power sold to the grid EGy (MWh)	Emission factor (tCO2/MWh)	Emission Reduction (tCO2)
22-31 July,2009	8,113.487	0.8712	7,068.47
1-31 August,2009	43,847.266	0.8712	38,199.74
1-30 September ,2009	47,826.532	0.8712	41,666.47
1-31 October ,2009	32,388.970	0.8712	28,217.27

1-30 November,2009	16,798.723	0.8712	14,635.05
1-31 December,2009	11,028.311	0.8712	9,607.86
TOTAL	160,003.289	0.8712	139,394

Data sources: the data are available from the invoice of power charges and power settlement notice, which are submitted to DOE.

Thus the baseline emissions are:
$BE_y=EG_y \times EF_{grid,CM,y=}$ 160,003.289 × 0.8712= 139,394 tCO_2e

Step II . **VCU from** 01/01/2010 to 08/05/2010

Table 4. **VCU (01/01/2010-05/08/2010)**

Period	**Monthly power sold to the grid EGy (MWh)**	**Emission factor (tCO2/MWh)**	**Emission Reduction (tCO2)**
1-31 January,2010	7,019.443	0.8712	6,115.34
1-28 February,2010	7,810.571	0.8712	6,804.57
1-31 March,2010	10,207.086	0.8712	8,892.41
1-30 April,2010	12,407.388	0.8712	10,809.32
1-8 May, 2010	0.000	0.8712	0.00
TOTAL	37,444.488	0.8712	32,621

Data sources: the data are available from the invoice of power charges and power settlement notice, which are submitted to DOE.

Thus the baseline emissions are:
$BE_y=EG_y \times EF_{grid,CM,y=}$ 37,444.488 × 0.8712= 32,621 tCO_2e

E.2. Project emissions calculation

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The power intensity of this project is 470 W/m^2, much greater than 10 W/m_2, so PEy=0 tCO_2 e.

E.3. Leakage calculation

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According to methodology ACM0002 (ver.10), there is no indirect emission from this project. Ly=0

E.4. Emission reductions calculation / table

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Step I**. Emission reductions calculation from** 22/07/2009 to 31/12/2009

The emission factor was determined ex-ante in the registered PDD and is fixed for the entire crediting period.

$$EF_y = 0.8712\ tCO_2/MWh$$

Then the annual net electricity exported to the grid is

$$EGy = 160{,}003.289\ \ MWh$$

Then the Baseline Emissions are

$$BE_y = EG_y \times EF_y = 160{,}003.289 \times 0.8712 = \ 139{,}394\ tCO_2e$$

The emission reduction for the monitoring period is shown in Table 5.

Table 5. CER produced in crediting period from 22/07/2009 to 31/12/2009

Period	EGy	Emission factor	ER generated (tCO_2e)
22-31 July,2009	8,113.487	0.8712	7,068.47
1-31 August,2009	43,847.266	0.8712	38,199.74
1-30 September ,2009	47,826.532	0.8712	41,666.47
1-31 October ,2009	32,388.970	0.8712	28,217.27
1-30 November,2009	16,798.723	0.8712	14,635.05
1-31 December,2009	11,028.311	0.8712	9,607.86
TOTAL	160,003.289	0.8712	139,394

Total baseline emission:

Total project emissions: PEy=0 tCO_2.

Total leakage: Ly=0

The Emission Reduction for the first monitoring period from 22/07/2009 – 31/12/2009 is 139,394 tCO2e.

According to the equation: $ER_y = BE_y - PE_y - L_y$ = 139,394 tCO2e.

The result of the calculation is summarized in below table:

Monitoring Period	Emission reductions (tCO_2e)
22/07/2009-31/12/2009	139,394

StepII. Emission reductions calculation from 01/01/2010 to 08/05/2010

The emission factor was determined ex-ante in the registered PDD and is fixed for the entire crediting period.

$$EF_y = 0.8712\ tCO_2/MWh$$

Then the annual net electricity exported to the grid is:

$$EGy = 37,444.488\ MWh$$

Then the Baseline Emissions are

$$BE_y = EG_y \times EF_y = 37,444.488 \times 0.8712 = 32,621\ tCO_2e$$

The emission reduction for the monitoring period is shown in Table 6.

Table 6. CER produced in whole crediting period from 01/01/2010 to 08/05/2010

Period	EGy	Emission factor	ER generated (tCO2 e)
1-31 January,2010	7,019.443	0.8712	6,115.34
1-28 February,2010	7,810.571	0.8712	6,804.57
1-31 March,2010	10,207.086	0.8712	8,892.41
1-30 April,2010	12,407.388	0.8712	10,809.32
1-8 May, 2010	0.000	0.8712	0.00
TOTAL	37,444.488	0.8712	32,621

Total baseline emission:

Total project emissions: PEy=0 tCO_2.

Total leakage: Ly=0

The Emission Reduction for the first monitoring period from 01/01/2010 – 08/05/2010 is 32,621 tCO2e.

According to the equation: $ER_y = BE_y - PE_y - L_y$ = 32,621 tCO2e.

The result of the calculation is summarized in below table:

Monitoring Period	Emission reductions (tCO_2e)
01/01/2010 – 08/05/2010	32,621