ZIQIANG 18MW HYDROPOWER PROJECT IN GUIZHOU PROVINCE CHINA

Document Prepared By Guizhou Honor Carbon Asset Management Co., Ltd

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Monitoring Period	20/12/2010 to 22/10/2012
Prepared By	Guizhou Honor Carbon Asset Management Co., Ltd
Contact	Address：8F Keji Building A, Jinyang District, Guiyang City, Guizhou Province, China(550001) Telephone No:+86 851 7990160 Email:hycdm@vip.163.com

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1 PROJECT DETAILS

1.1 Summary Description of Project

The proposed Ziqiang 18MW Hydropower Project in Guizhou Province China (hereafter referred to as "the project") is an 18MW hydropower project developed by Guizhou Zhijin Ouhua Development Co.Ltd.(hereafter referred to as "the Project Owner") and is located in Ziqiang Town, Zhijin County,Guizhou Province of People's Republic of China.

The project activity includes the gravity dam and the hydropower generating system which includes intake tower, pressure tunnel, steel penstock and powerhouse of hydropower station. The total capacity is 18MW (3×6MW). The estimated annual operation time of the proposed project is 3992h and the average electricity generated is 71,856MWh and the expected annual feed-in electricity to the grid is 60,955MWh. The electricity generated by proposed project will meet the electricity dam and of industrial and agricultural production and local people's life, and assume the task to adjust the peak in the local grid, finally connected to China Southern Power Grid(CSPG).

Electricity generated by the proposed project will displace part of the electricity generated by China Southern Power Grid (CSPG) which is dominated by fossil fuel-fired power plants, and thus greenhouse gas (GHG) emission reductions could be achieved. The estimated annual GHG emission reductions are 43,486 tCO_2e.The proposed project has been registered as a CDM project on 23/10/2012, for which a renewable crediting period of 3×7years will be used under the CDM GHG Program. The first crediting period of the project under CDM Program is 7 years from 01/11/2012 to 31/10/2019.The commissioning date of the project is 20/12/2010. Thus, the monitoring period under VCS is from 20/12/2010 to 22/10/2012. The total emission reductions achieved during this monitoring period is 62,780tCO_2e.

The parameters of turbines and generators of the project are listed as following:

Table 1 Parameters of turbines and generators of the project

Parameter		Unit	Value
Turbine	Model	---	HLA351-WJ-93
	Quantity	unit	3
	Rated water head	m	207
	Rated flow rate	m^3/s	3.34
	Manufacturer	Fujian Nanping Nandian Hydropower Equipment Manufacturing Co., Ltd	

Generator	Model	---	SFW6000-6/1730
	Quantity	unit	3
	Rated power	MW	6.0
	Rated voltage	V	6300
	Manufacturer	Fujian Nanping Nandian Hydropower Equipment Manufacturing Co., Ltd	

1.2 Sectoral Scope and Project Type

The project falls into: Sectoral Scope 1: energy industries (renewable sources)

Subclass: hydro power

The Project is not a Grouped project.

1.3 Project Proponent

Project Participants	Guizhou Zhijin Ouhua Development Co.Ltd.
Role	Project owner
Contact Information	Mr.Nie Zhilin Tel: +86-858-8226778 Fax: +86-858-8226518 Address : No.16 Shuangyan Road, Chengguan town Zhijin county Guizhou Province, China
Responsibilities	Be responsible for the management of the proposed project.

1.4 Other Entities Involved in the Project

There is no any other Project Participant(s)

1.5 Project Start Date

The project started commissioning on 20/12/2010.

1.6 Project Crediting Period

The crediting period: 20/12/2010-22/10/2012.In total 673 days, covering 1 year and 308 days.

1.7 Project Location

The proposed project is located in Ziqiang Town ,Zhijin County, Bijie City, Guizhou Province, P.R.China, 74km away from Zhijin county and 94km away from Guiyang City. The geographical coordinates of the dam are east longitude +106.0839° and north Latitude +26.6778°, and the geographical coordinates of the powerhouse are east longitude +106.1219° and north Latitude +26.6661°.

1.8 Title and Reference of Methodology

Approved baseline and monitoring methodology:
ACM0002: Consolidated methodology for grid-connected electricity generation from renewable resources
Version 12.3.0 (Valid from 17 Sep 10 to 10 May 12
Requests for registration can be submitted until 11 Jan 2013 23:59:59 GMT)
Refer to:
http://cdm.unfccc.int/methodologies/DB/UB3431UT9I5KN2MUL2FGZXZ6CV71LT
Tools referenced in this methodology:
Tool to calculate the emission factor for an electricity system
Version 02.2.1 (EB 63 Annex 19)
Refer to:
http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v2.2.1.pdf/history_view

Tool for the demonstration and assessment of additionally
Version 06.1.0 (EB 69 Annex 20)
Refer to:
http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v6.1.0.pdf/history_view

2 IMPLEMENTATION STATUS

2.1 Implementation Status of the Project Activity

The implementation timeline of the proposed project activity is show as follow:

Table 2 key timeline of the proposed project

Events	timeline
Construction Staring	26/06/2007
Commissioning of the project	20/12/2010
Registered CDM of the project	23/10/2012

There is no event occurred during this monitoring period, which may have impact on the applicability of the methodology as well as emission reduction.

The main meter (SN:1006000001) was changed by a new meter(SN: 208368946) on 17/04/2012.

2.2 Project Description Deviations

Not applicable

2.3 Grouped Project

This project is not a grouped project; this section is therefore not applicable.

3 DATA AND PARAMETERS

3.1 Data and Parameters Available at Validation

Data Unit / Parameter:	$EF_{CO2,l,y}$
Data unit:	tCO_2/MWh
Description:	The grid CO_2 emission factor of the CSPG where the Project connected to.
Source of data:	Registered CDM PDD
Value applied:	0.7134
Purpose of the data :	Baseline emission calculation.
Any comment:	-

3.2 Data and Parameters Monitored

Data Unit / Parameter:	$EG_{delivery, y}$
Data unit:	MWh
Description:	Electricity delivered by the Project to CSPG from 20/12/2010 to 22/10/2012.
Source of data:	The Gateway meter data.
Description of measurement methods and procedures to be applied:	Continuous measurement by meters installed and at least monthly recording.
Frequency of monitoring/recording:	Continuous measurement and monthly recording.
Value monitored:	88,168.050
Monitoring equipment:	Detail information of meters is listed in table 1 of section 3.3.
QA/QC procedures to be applied:	The meters have been calibrated once a year by Guizhou Electric Test&Research institute & Anshun electricity supplying Bureau. Calibration dated on 23/08/3011 for M1 (Old)(1006000001) was

	implemented by Anshun electricity supplying Bureau.
Calculation method:	Not applicable.
Any comment:	/

Data Unit / Parameter:	$EG_{import, y}$
Data unit:	MWh
Description:	Electricity imported by the Project from CSPG from 20/12/2010 to 22/10/2012..
Source of data:	The Gateway meter data.
Description of measurement methods and procedures to be applied:	Continuous measurement by meters installed and at least monthly recording.
Frequency of monitoring/recording:	Continuous measurement and daily recording.
Value monitored:	165.900
Monitoring equipment:	Detail information of meters is listed in table 1 of section 3.3.
QA/QC procedures to be applied:	The meters have been calibrated once a year by Guizhou Electric Test&Research institute & Anshun electricity supplying Bureau. Calibration dated on 23/08/3011 for M1 (Old)(1006000001) was implemented by Anshun electricity supplying Bureau.
Calculation method:	Not applicable.
Any comment:	/

Data Unit / Parameter:	$EG_{facility, y}$
Data unit:	MWh

Description:	Quantity of net electricity generation supplied by the project plant/unit to the grid from 20/12/2010 to 22/10/2012.
Source of data:	Project activity site.
Description of measurement methods and procedures to be applied:	Continuous measurement by meters installed and at least monthly recording. The data will be calculated by subtracting electricity imported by the Project from CSPG from electricity delivered by the Project to CSPG and settled by power grid company monthly.
Frequency of monitoring/recording:	Continuous measurement and daily recording.
Value monitored:	88,002.15
Monitoring equipment:	Detail information of meters is listed in table 1 of section 3.3.
QA/QC procedures to be applied:	Double checked by receipt of sales and settling accounts sheet.
Calculation method:	The $EG_{facility, y}$ is a measured and calculated parameter and it is calculated as : $EG_{facility, y} = EG_{delivery, y} - EG_{import, y}$
Any comment:	/

Data Unit / Parameter:	Cap_{PJ}
Data unit:	W
Description:	Installed capacity of the hydro power plant after the implementation of the project activity.
Source of data:	Project site.
Description of measurement methods and procedures to be applied:	Monitored annually through reading the Nameplate Capacity which states the maximum output of the hydro turbines.
Frequency of monitoring/recording:	Yearly
Value monitored:	18,000,000
Monitoring equipment:	/

QA/QC procedures to be applied:	/
Calculation method:	Not applicable.
Any comment:	/

Data Unit / Parameter:	A_{PJ}
Data unit:	m^2
Description:	Area of the reservoir measured in the surface of the water, after the Implementation of the project activity, when the reservoir is full.
Source of data:	Project site.
Description of measurement methods and procedures to be applied:	Yearly measured from topographical surveys and maps.
Frequency of monitoring/recording:	Yearly
Value monitored:	868,346(measured on June 2011) 849,667(measured on May 2012)
Monitoring equipment:	/
QA/QC procedures to be applied:	/
Calculation method:	Not applicable.
Any comment:	/

Data Unit /	$FC_{diesel,\ y}$

Parameter:	
Data unit:	Ton
Description:	Quantity of diesel combusted by diesel generator from 20/12/2010 to 22/10/2012.
Source of data:	The data recorded by staff onsite.
Value applied:	0.0966
Description of measurement methods and procedures to be applied:	Monthly recording.
QA/QC procedures to be applied:	The consistency of metered fuel consumption quantities should be crosschecked by an annual energy balance that is based on purchased quantities and stock changes.
Any comment:	The data will only be monitored if there is a diesel generator installed at project site.

Data Unit / Parameter:	$NCV_{diesel,\ y}$
Data unit:	GJ/ton
Description:	Weighted average net calorific value of diesel from 20/12/2010 to 22/10/2012.
Source of data to be used:	IPCC default values at the upper limit of the uncertainty at a 95% confidence interval as provided in Table 1.2 of Chapter 1 of Vol.2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories.
Value applied:	43.0
measurement procedures(if any) :	/
QA/QC procedures to be applied:	Any future revision of the IPCC Guidelines should be taken into account
Any comment:	/

Data Unit / Parameter:	$EF_{co2,diesel,y}$
Data unit:	tCO2/GJ
Description:	Weighted average CO2 emission factor of diesel from 20/12/2010 to 22/10/2012.
Source of data to be used:	IPCC default values at the upper limit of the uncertainty at a 95% confidence interval as provided in Table 1.2 of Chapter 1 of Vol.2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories.

Value applied:	0.0741
measurement procedures(if any) :	/
QA/QC procedures to be applied:	Any future revision of the IPCC Guidelines should be taken into account
Any comment:	/

3.3 Description of the Monitoring Plan

Baseline emission factor of the Project is determined ex ante. Therefore, the electricity delivered by the Project to the South China Power Grid ($EG_{facility,y}$), the installed capacity of the hydro power plant after the implementation of the Project (Cap_{PJ}) and surface area of the reservoir after the implementation of the Project activity when the reservoir is full (AP_J) are defined as the key data to be monitored. Meanwhile the electricity delivered to the grid by the Project in year y ($EG_{facility,y)}$ is calculated as subtract the electricity import from the grid in year y ($EG_{import,y}$) from the electricity exported to the grid in year y ($EG_{delivery,y}$), therefore the electricity import from the grid in year y ($EG_{import,y}$) and the electricity exported to the grid in year y ($EG_{delivery,y}$) are also the key parameters to be monitored. Besides, the diesel consumed for electricity produces also needs to be monitored. The monitoring plan is drafted to focus on monitoring the parameters mentioned above.

1. Monitoring Structure

The Project owner has assigned the person in charge of VCS operation with assistance of technological departments and financial department. The structure shows as the following Figure 1.

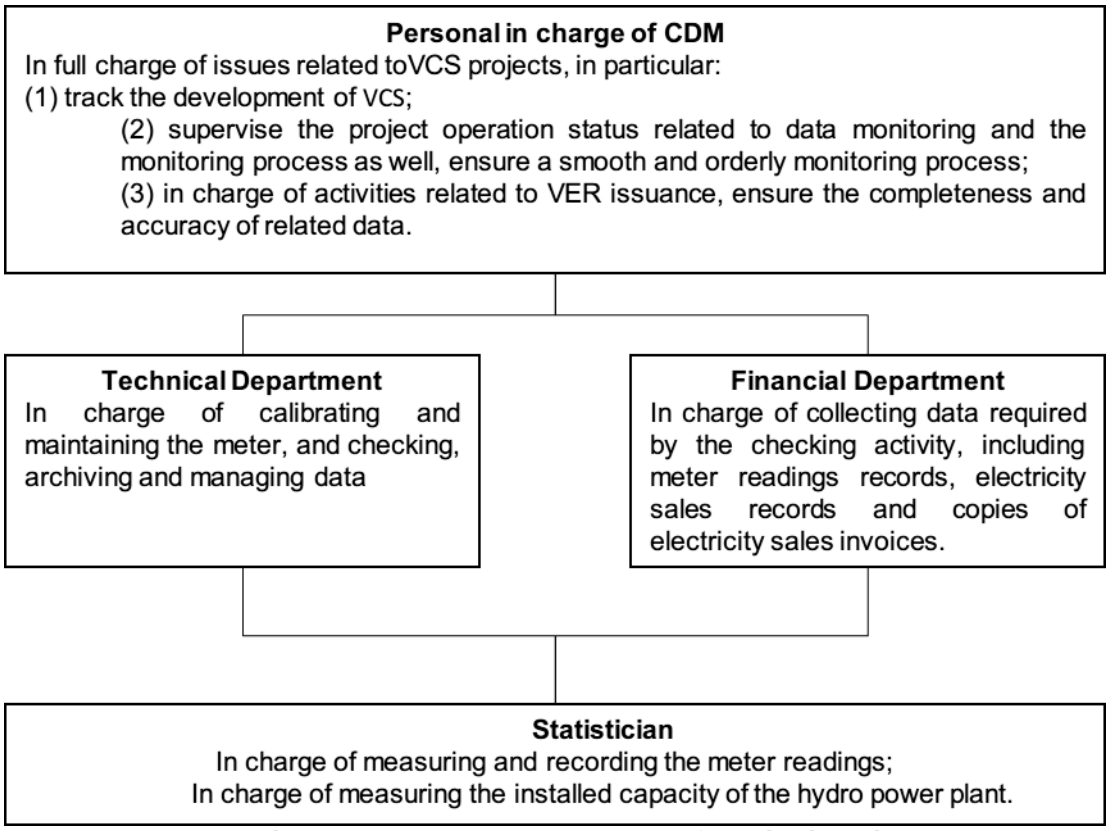

Figure 1 Management Structure of Monitoring Plan

2. Monitoring apparatus and installation

The meters have been installed in accordance with “Technology & Management Regulations for Power Metering Devices” (DL/T448-2000). One main meter and one back-up meter have been installed at the connection point to the grid to measure net electricity delivered to CSPG, and further backup meters have been installed to measure on-site electricity consumption and gross electricity generation. The accuracy of the meters is 0.2S meeting the national standard, and the

meters have been calibrated at least once a year.

The Location of the metering system of the above mentioned two stages are shown in Figure 2.

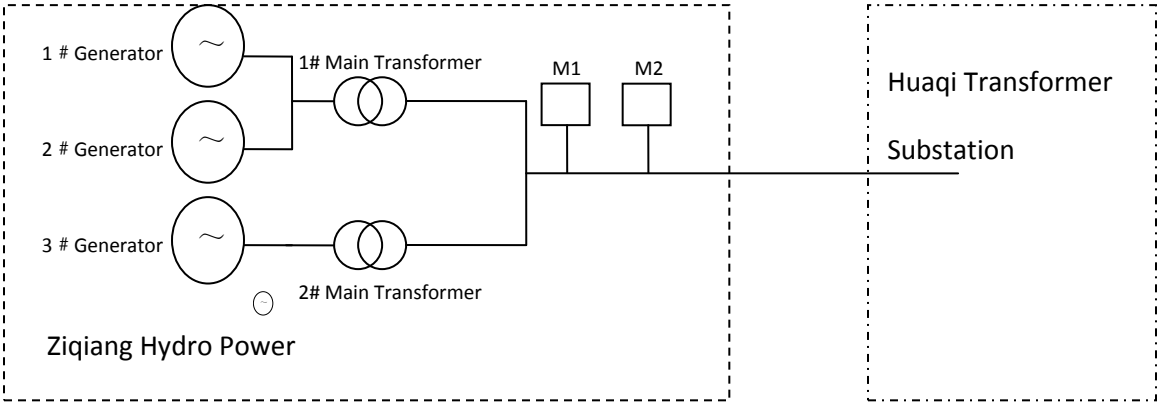

Figure 2 Electricity system of the project activity

3. Data monitoring

Electricity supplied to the grid and electricity generated by the Project.

To ensure the collection of reliable and accurate data, the project will adopt real-time continuous monitoring as well as manual recording. The electricity consumed by the project and the electricity delivered to and from CSPG will be read and recorded monthly.

The readings of the Gateway meter are used for calculating the emission reductions when the Gateway meter is in normal operation state. The monitoring processes are as follows:

(1) The designated persons from the grid company and the project company co-read and record the readings of the Gateway meter for the electricity delivered to and from CSPG on the same day every month;

(2) The power grid company provides the project owner with a settling accounts sheet to confirm the net electricity supplied to CSPG monthly;

(3) The power grid company pays for the power after the project owner provides the power grid company with a sale receipt.

Surface area of the reservoir.

The Project owner assigned given statistician to monitor the surface area of the reservoir with GPS or maps according with the request of precision when the reservoir is full every year.

Installed capacity

VCS operators will read and record the nameplate data of each generator every year. This record will be checked by the VCS team leader and provided to VVB during the verification period.

Actual diesel conscription

When the generators operate in normal condition, the auxiliary power will be from the electricity generated by the generators directly. When the generators shut down, the auxiliary power will be imported from the grid, and the electricity will be monitored by the check meter as well as the main meter (bi-directional).If station is shut down and at the same time the electricity of the grid is

unavailable, an independent diesel generator will be used to produce electricity at the emergency situation.

The actual diesel consumption will be recorded by the pointed staff once it is used for power generation at the emergency situation. The value will be accumulated per year.

4. Quality control

(1) Calibration of meters

The main meter and back-up meter at the connection point to the grid have been calibrated once per year. Calibration has been carried out by staff of a qualified measurement and inspection organization. (Guizhou Electric Power Test & Research institute and Anshun electricity supplying Bureau. Calibration dated on 23/08/3011 for M1 (Old)(1006000001) was implemented by Anshun electricity supplying Bureau)

When the main meter or back-up meter have a breakdown, the party finding the breakdown should tell another party and inform the qualified calibration organization to check, calibrate, test and treat the meter so as to recover the normal monitoring state.

(2) Emergency treatment

When the main meter or back-up meter have a breakdown, the electricity generation difference will be treated as follows:

a. When Main Meter has a breakdown, the readings of Backup Meter will be adopted;

b. If both of the Main Meter and Backup Meter have breakdowns, the project owner should notice the power grid company immediately and solve the problem with a conservative calculation method.

After handling of the emergencies, the project owner must prepare a report regarding the emergency to explain to VVB/DOE that the handling method is reasonable.

In case of erroneous measurements, it will be reported to the Manager immediately and the Manager will initiate the corrective actions.

(3) Information of meters

Table 3 Information of the meters[1]

	M1(Old)	M1(New)	M2(New)
Type	DTSD876	MK6E	MK6E
SN	1006000001	208368946	208368951

[1] The old meter M1 was replaced by new meter on 17/04/2012.

Location		In the project station	In the project station	In the project station
Accuracy		0.2s	0.2s	0.2s
On-sit Calibration data		24/08/2010 23/08/2011	16/04/2012	16/04/2012
Validity until		23/08/2015 22/08/2012	15/04/2017	15/04/2017
Calibration information	Data monitoring	From 20/12/2010 to 17/04/2012	From 17/04/2012 to 22/10/2012	From 17/04/2012 to 22/10/2012
	Calibration Entity	Guizhou Electric Power Test&Research institute （Certificate No:2007040193D & No:2010240168D） Calibration dated on 23/08/3011 for M1 (Old)(1006000001) was implemented by Anshun electricity supplying Bureau		

5. Data management

All monitoring data and records will be archived electronically and be kept in the designated storage room at least for 2 years after the end of the last crediting period. Receipts of electricity sales and settling accounts sheet will be used as a final double-check to ensure that measurements are correct. The project owner will ensure that all required documentation is made available to the verifier.

6. Training program

The project developer and the CDM Consulting Company have trained all the related staffs before the registration of the project activity. The training contains CDM knowledge, operational regulations, quality control (QC), data monitoring requirements and data management regulations, etc.

4 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

4.1 Baseline Emissions

According the ACM0002(Version12.3.0), the baseline emissions(BEy) is calculated as follows:

$BE_y = EG_{PJ,y} * EF_{grid,CM,y} = (EG_{delivery,y} - EG_{import,y}) \times EF_{grid,CM,y}$

$EG_{PJ,y} = EG_{facility,y} = EG_{delivery,y} - EG_{import,y}$

Where:

BE_y is Baseline emission in year y (tCO2/yr)

$EG_{PJ,y}$ is Net electricity supplied to the grid (MWh)

$EF_{grid,CM,y}$ is the emission factor in year y, calculated according to the registered PDD（under CDM）

The emission factor in registered PDD has been determined as 0.7134tCO2e/MWh.

$EG_{delivery,y}$ is Electricity exported to the grid by the proposed project (MWh)

$EG_{import,y}$ is Electricity imported by the proposed project bought from the power grid (MWh)

The detailed calculation procedure is described below:

According to the detail data of the two tables below, the BEy could be calculated as follows:

$BEy = EG_{facility,y} \times EF_{grid,CM,y} = (EG_{delivery,y} - EG_{import,y}) \times EF_{grid,CM,y}$ = (88,168.050 – 165.900)MWh × 0.7134tCO_2e/MWh = 62,780tCO_2e

Net electricity supplied to the grid

Period	Exported electricity (MWh)	Electricity Transaction Note (ETN) (MWh)	$EG_{delivery,y}$ （MWh）	Imported electricity (MWh)	Electricity Transaction Note (ETN) (MWh)	$EG_{import,y}$ （MWh）	$EG_{facility,y}$ （MWh）
	A	B	C=MIN(A,B)	D	E	F=MAX(D,E)	G=C-F
20/12/2010-31/12/2010	2,220.750	2,190.000	2,190.000	3.150	3.150	3.150	2,186.850
01/01/2011-31/01/2011	1,339.800	1,340.000	1,339.800	14.175	14.175	14.175	1,325.625
01/02/2011-28/02/2011	1,920.450	1,920.000	1,920.000	14.700	14.700	14.700	1,905.300
01/03/2011-31/03/2011	1,169.700	1,170.000	1,169.700	13.650	13.650	13.650	1,156.050
01/04/2011-30/04/2011	1,030.050	1,030.000	1,030.000	12.075	12.075	12.075	1,017.925
01/05/2011-31/05/2011	1,929.900	1,930.000	1,929.900	8.925	8.925	8.925	1,920.975
01/06/2011-30/06/2011	7,029.750	7,030.000	7,029.750	7.875	7.875	7.875	7,021.875
01/07/2011-31/07/2011	3,220.350	3,220.000	3,220.000	5.775	5.775	5.775	3,214.225
01/08/2011-31/08/2011	3,799.950	3,800.000	3,799.950	5.775	5.775	5.775	3,794.175
01/09/2011-30/09/2011	1,210.125	1,210.000	1,210.000	8.400	8.400	8.400	1,201.600

01/10/2011-31/10/2011	5,359.725	5,360.000	5,359.725	6.300	6.300	6.300	5,353.425
01/11/2011-30/11/2011	2,940.525	2,940.000	2,940.000	7.350	7.350	7.350	2,932.650
01/12/2011-31/12/2011	1,569.750	1,570.000	1,569.750	11.550	11.550	11.550	1,558.200
01/01/2012-31/01/2012	1,529.850	1,530.000	1,529.850	12.600	12.600	12.600	1,517.250
01/02/2012-29/02/2012	1,220.100	1,220.000	1,220.000	8.400	8.400	8.400	1,211.600
01/03/2012-31/03/2012	1,240.050	1,240.000	1,240.000	9.975	9.975	9.975	1,230.025
01/04/2012-17/04/2012[2]	1,168.650	1,400.000	1,399.650	7.350	8.400	8.400	1,391.250
17/04/2012-30/04/2012	231.000			1.050			
01/05/2012-31/05/2012	6,620.250	6,620.000	6,620.000	1.050	1.050	1.050	6,618.950
01/06/2012-30/06/2012	12,619.950	12,620.000	12,619.950	1.050	1.050	1.050	12,618.900
01/07/2012-31/07/2012	13,109.775	13,110.000	13,109.775	0.525	0.525	0.525	13,109.250
01/08/2012-31/08/2012	8,920.275	8,920.000	8,920.000	1.575	1.575	1.575	8,918.425
01/09/2012-30/09/2012	2,280.075	2,280.000	2,280.000	1.575	1.575	1.575	2,278.425
01/10/2012-22/10/2012	4,520.250	4,520.250	4,520.250	1.050	1.050	1.050	4,519.200
Total	88,201.050	88,170.250	88,168.050	165.900	165.900	165.900	88,002.150

4.2 Project Emissions

[2] The old meter M1 was replaced by new meter on 17/04/2012.

According to the methodology, the project emissions shall be accounted for as project emissions by using the following equation:

$$PE_y = PE_{FF,y} + PE_{GP,y} + PE_{HP,y}$$

Where：

PE_y	is the project emissions in year *y* (tCO_2e/yr)
$PE_{FF,y}$	is project emissions from fossil fuel consumption in year *y* (tCO_2/yr)
$PE_{GP,y}$	is project emissions from the operation of geothermal power plants due to the release of non-condensable gases in year *y* (tCO_2e/yr)
$PE_{HP,y}$	is project emissions from water reservoirs of hydro power plants in year *y* (tCO_2e/yr)

Fossil Fuel Combustion ($PE_{FF,y}$)

Diesel generator will be used to produce power in the case of emergency, hence the project emission from diesel consumption should be calculated. As per ACM0002(ver.12.3.0), $PE_{FF,y}$ shall be calculated as per the latest version of the "Tool to calculate project or leakage CO_2 emission from fossil fuel combustion". As per the version (ver.2) of the Tool mentioned above, CO_2 emission from fossil fuel combustion are calculated based on the quantity of fuels combusted and CO_2 emission coefficient of those fuels, as follows:

$$PE_{FF,y} = FC_{i,j,y} * COEF_{i,y}$$

Where:

$PE_{FF,y}$= are the CO_2 emission from fossil fuel combustion in process j during the year y(tCO_2/yr)

$FC_{i,j,y}$=Is the quantity of fuel type I combusted in process j during the year y (mass or volume unit/yr)

$COEF_{i,y}$=Is the CO_2 emission coefficient of fuel type i in year y

i=are the fuel types combusted in process j during the year y

$$COEF_{i,y} = NCV_{i,y} * EF_{CO2,i,y}$$

$NCV_{i,y}$=is the weighted average net calorific value of the fuel type i in year y (GJ/mass or volume unit)

$EF_{co2,i,y}$= Is the weighted average CO_2 emission factor of fuel type i in year y (tCO_2/GJ)

i=Are the fuel types combusted in process j during the year y

According to the operation records of the diesel generator, the actual diesel consumption amount is 0.0966t during this monitoring peirod. The weighted average net calorific value of diesel oil is 42.652GJ/ton, and the weighted average CO_2 emission factor of diesel oil is 0.0748 tCO_2/GJ[3].

Therefore, the actual CO_2 emission from diesel oil combustion can be calculated as follows:

$PE_{FF,y}$ =0.0966×42.652×0.0748=0.31tCO_2.

Considering that the actual project emissions from diesel oil combustion is 0.31tCO_2 ,which is far less than 1% of the expected average annual emission reduction. Based on the 77th paragraph of VVM(ver.1.2), the actual CO_2 emissions from diesel oil consumption is negligible.

Thus, $PE_{FF,y}$=0(tCO_2e).

Emissions of non-condensable gases from the operation of geothermal power plants ($PE_{GP,y}$)

As the Project is hydropower project activities, no emissions of non-condensable gases from the operation of geothermal power plant should be considered, i.e., the $PE_{GP,y}$ is zero.

Emissions from water reservoirs of hydro power plants $PE_{HP,y}$

The project is a new hydropower plant resulting in new reservoir, the installed capacity of the proposed project is 18MW, the area of the reservoir on May 2012 was 849,667m^2, and on June 2011 was 868,346 m^2, based on the report of water surface area at the full reservoir level after operation. According to ACM0002 (Version 12.3.0), the power density of the project activity is calculated as follows:

$$PD=(Cap_{PJ}-Cap_{BL})/(A_{PJ}-A_{BL})$$

Where:

PD＝Power density of the project activity(W/m^2).

Cap_{PJ}＝Installed capacity of the hydropower plant after the implementation of the project activity (W).

Cap_{BL}＝Installed capacity of the hydropower plant before the implementation of the project activity (W). For new hydropower plants, this value is zero.

[3] According to IPCC default value at the upper limit of the uncertainty at a 95% confidence interval as provided in Table 1.2 of Chapter 1 of Vol.2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories, the NCV of diesel oil is 42.652 GJ/ton, the upper value of CO2 emission factor for diesel is 0.0748 tCO_2/GJ

A_{PJ}=Area of the reservoir measured in the surface of the water, after the implementation of the project activity, when the reservoir is full (m^2).

A_{BL}=Area of the reservoir measured in the surface of the water, before the implementation of the project activity, when the reservoir is full (m^2). For new reservoirs, this value is zero.

Then the power density equals to:

$PD = Cap_{PJ} / A_{PJ} = 18\ MW/868{,}346 m^2 = 20.7\ W/m^2$

Note: The reservoir is 868,346 m^2 measured in 06/2011.

$PD = Cap_{PJ} / A_{PJ} = 18\ MW/849{,}667 m^2 = 21.2\ W/m^2$

Note: The reservoir is 868,346 m^2 measured in 05/2012.

The power density of project is 21.2W/m^2 or 20.7 W/m^2, which is greater than 10 W/m^2, the project emissions by the project activity are zero.

Thus, PE_y=0(tCO_2e)

4.3 Leakage

According to ACM0002 (Version12.3.0), there is no need for the project to consider leakage.

4.4 Summary of GHG Emission Reductions and Removals

$ER_y = BE_y – PE_y$
BE_y = Baseline Emissions=62,780(tCO_2e)
PE_y = Project emissions = 0(tCO_2e)
$ER_y = BE_y$=62,780 (tCO_2e)

The total Emission Reductions (ER_y) is calculated as follow:
$ER_y = BE_y – PE_y$ =62,780-0=62,780(tCO_2e)

Emission reductions generated in this monitoring period (20/12/2010-22/10/2012):62,780(tCO_2e).

5 ADDITIONAL INFORMATION

Item	Values of ex-ante calculation	Actual values reached during the monitoring period
Emission reductions (tCO_2e)	43,486 (per year); 80,181 (673days)	62,780 (673 days);

The annually expected emission reduction of the project is 43,486 tCO_2e. This monitoring period covers 20/12/2010-22/10/2012 which is 673 days in total. Then the estimated emission reduction for this monitoring period should be: 80,181 tCO_2e

The actual GHG emission reduction of this monitoring period (62,780 tCO_2e) is 22% less than the estimation (80,181 tCO_2e).