



Voluntary Carbon Standard Monitoring Report

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2 Description of Project:

2.1 Project title

Guizhou Qingshuihe Gelibridge Hydropower Project

2.2 Brief description of the project activity

The Guizhou Qingshuihe Gelibridge Hydropower Project (hereafter referred to as the “Project”) is designed and constructed to generate renewable electricity that is supplied to the South China Power Grid, which is coal dominated. The greenhouse gas emissions (GHG) emissions (specifically, carbon dioxide (CO₂)) will be reduced by replacing the coal-dominated grid electricity with the renewable (hydro) electricity produced by the project activity. Two sets of 75MW turbine generator sets are installed (total installed capacity of 150MW) and the project activity is expected to produce 508GWh of electricity annually. The project includes a reservoir with a power density of 70.10W/m². Partial operation of the project (1 of 2 turbines) commenced on 09/02/2010 and full operation (2 of 2 turbines) started on 12/03/2010. Prior to partial operation of the project, the engine underwent a commissioning test from 06/02/2010 to 08/02/2010, during which electricity was generated and supplied to the local power grid. The total emission reductions achieved in this monitoring period (06/02/2010 to 03/10/2010 (inclusive of both days)) are 235,894 tCO₂e.

2.3 Project participants

The project participants are:

Guizhou Wujiang Qingshuihe Hydropower Development Co., Ltd., a private company which was established under the laws of the People's Republic of China and having its registered office at No. 9 Xinhua Street, Guiyang city, Guizhou province, People's Republic of China (hereinafter referred to as "GWQHD").

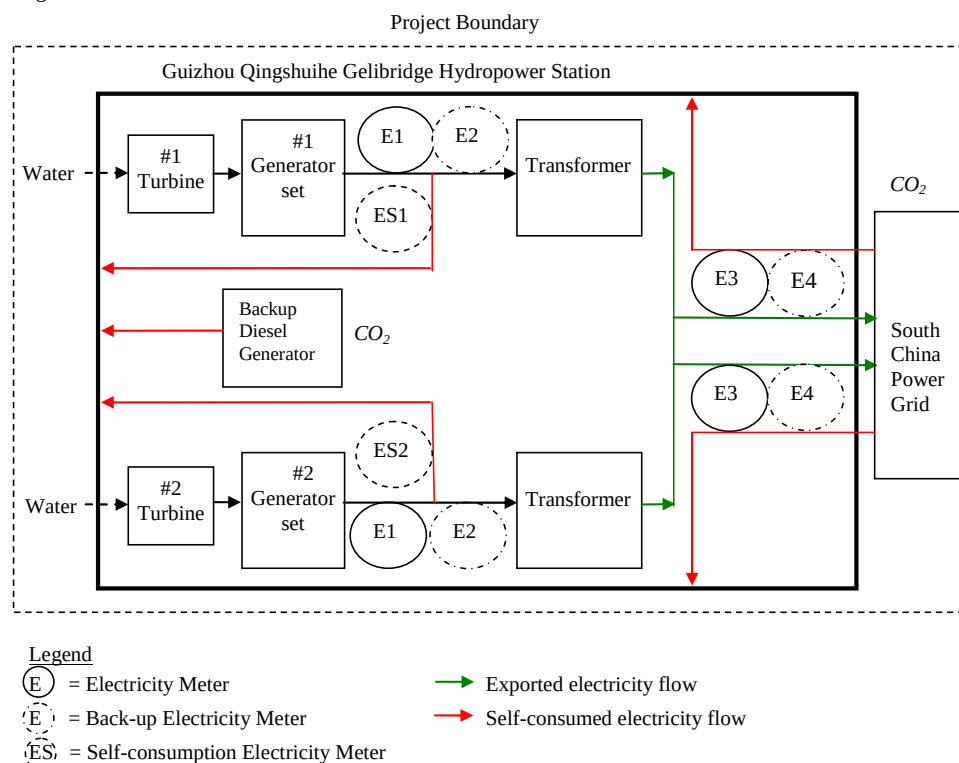
Sindicatum Carbon Capital Ltd., a private company incorporated under the laws of the United Kingdom of Great Britain and Northern Ireland and having its registered office at 33 Duke Street, London, W1U 1JY, United Kingdom (hereinafter referred to as "SCC").

2.4 Location of the project activity

The location of the project activity is: Maoyun village in Kaiyang county of Guizhou province, the People's Republic of China. The dam is located at 27°0'30"N and 107°12'22"E (Google Earth coordinates 27.008333 and 107.206111) and the powerhouse is located at 27°0'33"N and 107°12'2"E (Google Earth coordinates 27.009167 and 107.200556).

2.5 Technical description of the project

The boundary of this project includes all of the equipment and instruments installed in the system from the reservoir immediately leading up to the hydropower station to the power output at the power station, as well as the power plants that are connected to the South China Power Grid. Detailed information is shown in Figure 1:



Remark: E1, E2, ES1 and ES2 metering equipment is used for operational purposes and serve as back-up in case of irregularities/failure in the E3 (back-up E4) export readings.¹

Figure 1. Diagram of project boundary and monitoring points

¹ Meters ES1 and ES2 are non-CDM related meters as they do not measure exported electricity (i.e., these meters do not measure a CDM monitoring parameter), but have merely been shown in the figure in order to comprehensively reflect the energy flows of the power station.

Two sets of hydro turbine generator sets with an individual capacity of 75MW (total installed capacity of 150MW) are installed in the Project. The main equipment, such as the turbines, generators and transformers, are all made in China. One backup diesel generator is installed for emergency uses only. The power generation technology used by the Project is commonly used in China and has proven to be reliable and unlikely to be replaced during the project lifetime.

The key technical specifications for the Guizhou Qingshuihe Gelibridge Hydropower Project per the Feasibility Study Report (FSR) and Equipment Procurement and Construction contract are shown as follows:

Table 1. Key Project Technical Specifications^{2,3}

Items	Parameter
Total installed capacity	150 MW
Model for the turbines (FSR)	HL234-LJ-335
Model for the turbines (EPC/installed)	HL233-LJ-328
Model for the generators (FSR)	SF75-28/6740
Model for the generators (EPC/installed)*	SF75-28/7300
Estimated amount of electricity uploaded to the grid annually	497.3GWh
Normal water level	719m
Reservoir size under normal water level	2.13km ²
Rated water head	84m
Average flow rate over years	82.3m ³ /s

* The capacity of each generator is 75MW as indicated by the SF75 rating.

2.6 Title, reference and version of the baseline and monitoring methodology applied to the project activity:

The project activity is a registered CDM project (UNFCCC Reference No. 3351) that applies the following CDM methodology and tools, which are approved by the VCS Board:

- Approved consolidated baseline methodology ACM0002 “Consolidated baseline methodology for grid-connected electricity generation from renewable sources” (version 09)
- Methodological tool “Tool for the Demonstration and Assessment of Additionality” (version 5.2)
- Methodological tool “Tool to calculate the emission factor for an electricity system” (version 01.1)
- Methodological tool “Tool to calculate project or leakage CO2 emissions from fossil fuel combustion” (version 02)

For more information regarding the methodologies, please refer to:
<http://cdm.unfccc.int/methodologies/PAmethodologies/approved.html>.

2.7 Crediting period of the project activity and related information (start date and choice of crediting period)

- Project start date: 06 February 2010
- Crediting period start date: 06 February 2010, which is the on which the first monitoring period commences. Engine No.1 underwent a commissioning test from 06 to 08 February 2010, during which power was generated and supplied to the local power grid. Since power generation and

² Refer to registered PDD for more details:

<http://cdm.unfccc.int/filestorage/M/Q/2/MQ251V03EJKS4XGO97FPCBUYH6Z8WT/Geliqiao%20PDD%20%28Ver.%2010%29?t=Ulh8MTMwMjU4MzE2OS4wMw==ZGfD4TqqlwNoQjPLJ7XHrTln2k>. PDD version 10 dated 25 February 2011 was accepted on 07 April 2011 following approval of the notification of a project activity change due to the difference in turbine and generator equipment model numbers.

³ Although not a requirement under the VCS, there has been one notification of changes in the project activity as described in the CDM-PDD in accordance with CDM guidance from the Executive Board (Annex 66 of the EB’s 48th Meeting Report). The generator and turbine equipment model numbers referenced in the FSR and version 9 of the PDD (registered on 04 October 2010) differed from the actual installed equipment. A validation opinion on the project activity change, revised PDD (version 10 dated 25 February 2011) and revised CER and IRR calculations spreadsheet (version 9 dated 25 February 2011) was submitted to the UNFCCC. The validation opinion concluded that the change in equipment model numbers had no impact on the scale of the project activity, the project’s additionality, or the application of the methodology. The validation opinion and notification on project activity changes for the project was accepted on 07 April 2011 by the EB (refer to <http://cdm.unfccc.int/Projects/DB/TUEV-SUED1265278332.26/view> for details).

corresponding emission reductions started on 06 February 2010 with the start of the commissioning test prior to operation, the crediting period start date is taken as this date.

- VCS project crediting period: renewable crediting period of 10 years $\times$ 3 periods (total 30 years) is selected for the project activity (06 February 2010 to 05 February 2040)

2.8 Name of responsible person(s)/entity(ies):

Salutation and Name: Mr. Gareth Phillips
Title: Chief Climate Change Officer

Salutation and Name: Mr. Sven JP Starckx
Title: Senior Technical Advisor Monitoring and Issuance

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3 Implementation of the project activity:

3.1 Implementation status of the project activity

Generator No. 1 at the Guizhou Qingshuihe Gelibridge Hydropower Plant commenced operation on 09/02/2010 and Generator No. 2 commenced operation on 12/03/2010. Prior to partial operation of the project, the engine underwent a commissioning test from 06/02/2010 to 08/02/2010, during which electricity was generated and supplied to the local power grid.

No special events or situations, such as overhaul times, downtimes of equipment, exchange of equipment, etc., which may impact the applicability of the methodology occurred during this monitoring period.

4 Description of the monitoring system:

In order to ensure the quality of the data and data collection system, a detailed monitoring manual has been developed and implemented. This detailed monitoring manual for internal use (available for verification by the DOE) is based upon the requirements set out in the monitoring section of the registered CDM-PDD.

The locations of all CDM-relevant monitoring points are indicated in Figure 1.

The data to be monitored includes the following:

1. Electricity supplied by the project activity to the grid (parameter $EG_{out,y}$) (MWh)
2. Electricity consumed by the plant from the grid (parameter $E_{in,y}$) (MWh)
3. Total electricity produced by the project activity (parameter TEG_y) (MWh)
4. Installed capacity of the plant after the project activity (parameter Cap_{PJ}) (W)
5. Area of the reservoir after the project activity (parameter A_{PJ}) (m^2)
6. Quantity of diesel fuel consumed (parameter $FC_{i,j,y}$) (mass or volume unit per year (t/yr or m^3 /yr))
7. Weighted average net calorific value of diesel fuel (parameter $NCV_{i,y}$) (GJ/tce)
8. Weighted average CO_2 emission factor for diesel fuel ($EF_{CO_2,i,y}$) (tCO_2 /GJ)

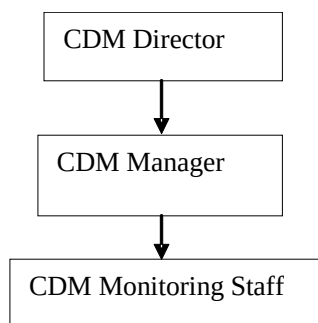
Meters are installed in the system and data from those meters are monitored by the staff from the project owner as part of their routine check in order to monitor the proper operation of the system. Two-way meters E3 (and back-up E4) installed in the two grid connection lines as shown in Figure 1 measure the amount of electricity exported to ($EG_{out,y}$) and imported from ($E_{in,y}$) the grid. Meters E3 and E4 are owned by the power grid company. The net recordings from the E3 (and/or E4) meters are used for CDM purposes. Data from meters E3 (and E4) are manually recorded daily at 00:00 hours by the duty operators. The daily data are transferred to a spreadsheet on a weekly basis. Every month a data report with detailed daily

readings from meters E3 and/or E4 is prepared. The monthly data report is checked with the weekly spreadsheet to guarantee consistency in the electricity meter readings.

The amount of electricity read from the E3 (and/or E4) meters can be cross-checked with the amount of electricity exported listed on electricity sale invoices.

In order to process monitored data, the project owner has established a monitoring management structure which identifies the relevant staff for data collection, recording, reporting and archiving. In addition, the project owner designates a CDM monitoring director to supervise the process. The CDM director is end responsible for the checks of monitoring and recording tasks (such as meter readings and sales receipts), emission reductions calculations and the preparation of monitoring reports.

The detailed structure is as follows:



5 Data and parameters:

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

Data / Parameter:	EF_{Res}
Data unit:	kgCO ₂ e/MWh
Description:	Default emission factor for emissions from reservoirs
Source of data used:	EB23
Value(s):	90 kgCO ₂ e/MWh.
Indicate what the are used for (Baseline/Project/Leakage emission calculations):	This data is used for the project emissions calculations for reservoirs with a power density greater than 4 W/m ² and less than 10W/m ² , which does not apply to this project since the power density is greater than 10W/m ² .
Any comment:	No comment

Data / Parameter:	Cap_{BL}
Data unit:	W
Description:	Installed capacity of the hydro power plant before the implementation of the project activity. For new hydro power plants, this value is zero.
Source of data used:	Project site.
Value(s):	0 The proposed hydro power plant is a new plant.
Indicate what the are used for (Baseline/Project/Leakage emission calculations):	This data is used for the project emissions calculations. Specifically, it is used to calculate the power density of the reservoir.
Any comment:	No comment

Data / Parameter:	<i>A_{BL}</i>
Data unit:	m ²
Description:	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.
Source of data used:	Project site.
Value(s):	0 The proposed reservoir is new.
Indicate what the are used for (Baseline/Project/Leakage emission calculations):	This data is used for the project emissions calculations. Specifically, it is used to calculate the power density of the reservoir.
Any comment:	No comment

Data / Parameter:	<i>Amount of electricity generated</i>
Data unit:	kWh
Description:	Electricity generated by individual province of the South China Power Grid
Source of data used:	China electricity power year book (2002-2004)
Value(s):	See annex 3 of the registered CDM-PDD
Indicate what the are used for (Baseline/Project/Leakage emission calculations):	This data is used for the baseline emissions calculations. Specifically, it is used to calculate the electricity grid emission factor.
Any comment:	Reliable

Data / Parameter:	<i>Amount of electricity consumed by the plant</i>
Data unit:	%
Description:	Electricity consumed by individual power plant of the South China Power Grid
Source of data used:	China Electricity Power Year Book (2002-2004)
Value(s):	See annex 3 of the registered CDM-PDD
Indicate what the are used for (Baseline/Project/Leakage emission calculations):	This data is used for the baseline emissions calculations. Specifically, it is used to calculate the electricity grid emission factor.
Any comment:	No comment

Data / Parameter:	<i>Installed capacity</i>
Data unit:	kW
Description:	Installed capacity for individual provinces in the South China Power Grid
Source of data used:	China electricity power year book (2002-2004)
Value(s):	See annex 3 of the registered CDM-PDD
Indicate what the are used for (Baseline/Project/Leakage emission calculations):	This data is used for the baseline emissions calculations. Specifically, it is used to calculate the grid emission factor.
Any comment:	No comment

Data / Parameter:	$EF_{grid,BM,y}$
Data unit:	tCO ₂ /MWh
Description:	Build margin CO ₂ emission factor for grid connected power generation in the first crediting period calculated using the “Tool to calculate the emission factor for an electricity system” (version 1.1), Option 1 is chosen: for the first crediting period, calculate the $EF_{grid,BM,y}$ <i>ex ante</i> based on the most recent information available on units already built for sample group <i>m</i> at the time of CDM-PDD submission to the DOE for validation. For the second crediting period, the $EF_{grid,BM,y}$ should be updated based on the most recent information available on units already built at the time of submission of the request for renewal of the crediting period to the DOE. For the third crediting period, the $EF_{grid,BM,y}$ calculated for the second crediting period should be used. This option does not require monitoring the emission factor during the crediting period.
Source of data used:	Calculated based on “China’s Regional Grid Baseline Emission Factors”, published and updated by the Chinese DNA on 15/12/2006: http://cdm.ccchina.gov.cn/web/main.asp?ColumnID=3
Value(s):	0.5714
Indicate what the are used for (Baseline/Project/Leakage emission calculations):	This data is used for the baseline emissions calculations. Specifically, it is used to calculate the combined margin CO ₂ emission factor for grid connected power generation (parameter $EF_{grid,CM,y}$).
Any comment:	No comment

Data / Parameter:	$EF_{grid,OM,y}$
Data unit:	tCO ₂ /MWh
Description:	Operating margin CO ₂ emission factor for grid connected power generation for the entire crediting period calculated using the “Tool to calculate the emission factor for an electricity system” (version 1.1). The <i>ex ante</i> option is chosen: the emission factor is determined based on the most recent data available at the time of submission of the CDM-PDD to the DOE for validation. No monitoring and recalculation of the emission factor during the crediting period is required.
Source of data used:	Calculated based on “China’s Regional Grid Baseline Emission Factors”, published and updated by the Chinese DNA on 15/12/2006: http://cdm.ccchina.gov.cn/web/main.asp?ColumnID=3 .
Value(s):	0.9873
Indicate what the are used for (Baseline/Project/Leakage emission calculations):	This data is used for the baseline emissions calculations. Specifically, it is used to calculate the combined margin CO ₂ emission factor for grid connected power generation (parameter $EF_{grid,CM,y}$).
Any comment:	No comment

Data / Parameter:	$EF_{grid,CM,v}$
Data unit:	tCO ₂ /MWh
Description:	Combined margin CO ₂ emission factor for grid connected power generation in the first crediting period calculated using the “Tool to calculate the emission factor for an electricity system” (version 1.1).
Source of data used:	Calculated based on “China’s Regional Grid Baseline Emission Factors”, published and updated by the Chinese DNA on 15/12/2006: http://cdm.ccchina.gov.cn/web/main.asp?ColumnID=3 .
Value(s):	0.7794
Indicate what the are used for (Baseline/Project/Leakage emission calculations):	This data is used for the baseline emissions calculations.
Any comment:	No comment

Data / Parameter:	$FC_{Adv, coal}$
Data unit:	gce/kWh
Description:	Coal consuming rate by power plants with commercially maximum efficiency technology is utilized.
Source of data used:	“Notice on determining china grid baseline emission factor” http://cdm.ccchina.gov.cn/website/CDM/Upfile/File1374.pdf
Value(s):	343.33
Indicate what the are used for (Baseline/Project/Leakage emission calculations):	This data is used for the baseline emissions calculations. Specifically, it is used to calculate the combined margin CO ₂ emission factor for grid connected power generation.
Any comment:	No comment

Data / Parameter:	$FC_{Adv, Oil}$, $FC_{Adv, Gas}$
Data unit:	gce/kWh
Description:	Maximum efficiency of electricity from gas and oil fired power plants
Source of data used:	“notice on determining china grid baseline emission factor” http://cdm.ccchina.gov.cn/website/CDM/Upfile/File1374.pdf
Value(s):	258
Indicate what the are used for (Baseline/Project/Leakage emission calculations):	This data is used for the baseline emissions calculations. Specifically, it is used to calculate the combined margin CO ₂ emission factor for grid connected power generation (parameter $EF_{grid,CM,v}$).
Any comment:	No comment

Data / Parameter:	NCV_i
Data unit:	GJ/tce
Description:	Net caloric value for fuel i
Source of data used:	China Energy Statistical Yearbook 2007
Value(s):	42.652
Indicate what the are used for (Baseline/Project/Leakage emission calculations):	This data is used for the baseline emissions calculations. Specifically, it is used to calculate the combined margin CO ₂ emission factor for grid connected power generation (parameter $EF_{grid,CM,v}$).
Any comment:	No comment

Data / Parameter:	$F_{i,j}$
Data unit:	t or m ³
Description:	Mass or volume of fuel i consumed by province j within the South China Power Grid.
Source of data used:	China Energy Statistical Year book
Value(s):	See annex 3 of the registered CDM-PDD
Indicate what the are used for (Baseline/Project/Leakage emission calculations):	This data is used for the baseline emissions calculations. Specifically, it is used to calculate the combined margin CO ₂ emission factor for grid connected power generation (parameter $EF_{grid,CM,v}$).
Any comment:	No comment

Data / Parameter:	$EF_{CO_2,i}$
Data unit:	tCO ₂ /GJ
Description:	CO ₂ emission factor per unit of energy for fuel i
Source of data used:	IPCC 2006 default value as provided in table 1.4 of Chapter 1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories
Value(s):	0.0748
Indicate what the are used for (Baseline/Project/Leakage emission calculations):	This data is used for the baseline emissions calculations. Specifically, it is used to calculate the combined margin CO ₂ emission factor for grid connected power generation (parameter $EF_{grid,CM,v}$).
Any comment:	No comment

Data / Parameter:	$OXID_i$
Data unit:	%
Description:	Oxidation factor of fuel i
Source of data used:	Official data is not available, “2006 IPCC Guidelines for National Greenhouse Gas Inventories” Volume 2, energy, Chapter one, page 1.21-1.24, table 1.3 and 1.4 is used.
Value(s):	See annex 3 of the registered CDM-PDD
Indicate what the are used for (Baseline/Project/Leakage emission calculations):	This data is used for the baseline emissions calculations. Specifically, it is used to calculate the combined margin CO ₂ emission factor for grid connected power generation (parameter $EF_{grid,CM,v}$).
Any comment:	No comment

5.2 Data and parameters monitored

Data / Parameter:	$EG_{out, v}$
Data unit:	MWh
Description:	Electricity supplied by the project activity to the grid
Measured /Calculated /Default:	Continuous measurements manually recorded on a daily basis.
Source of data:	Directly measured by the transaction electricity meters E3 and/or E4 installed in each of the 2 grid connection lines (E4 is used as a backup meter).
Value(s) of monitored parameter:	See values in table 2 and VER calculation spreadsheet.
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	This data is used for the baseline emissions calculations.
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Continuously measured by two-way transaction electricity meters E3 and/or E4 (back-up) installed on Lines 1 and 2, as shown in Figure 1: Model number: EDM1 MK6E for E3 and E4 meters Accuracy class: 0.2S for E3 and E4 meters Serial numbers: 208368562 (meter E3 on Line 1 (E3L1)); 208368563 (E3L2); 208368565 (E4L1); and 208368572 (E4L2). The meters are calibrated at least once per year. The date of the first calibration for the E3 and E4 meters was on 12/10/2009 The date of the last calibration for the E3 and E4 meters was on 15/10/2010.
Measuring/ Reading/ Recording frequency:	Continuous measurements manually recorded on a daily basis
Calculation method (if applicable):	N/A
QA/QC procedures applied:	Calibration by an institute under the Guizhou Power Grid Company at least once per year for the E3 and E4 transaction kWh meters (national calibration standard code JJG596-1999). Guizhou Qingshuihe Gelibridge Hydropower Plant operator checks the daily recorded data and inserts the daily into weekly/monthly spreadsheets. If there is an unexpected variation, he/she investigates. Before the weekly spreadsheet is sent electronically to the SCC Project Officer, a Guizhou Qingshuihe Gelibridge Hydropower Plant Team Leader checks the spreadsheet for consistency. Final CDM data checks by the SCC Project Officer. SCC Project Manager performs a data consistency check of the CDM Monitoring spreadsheet by assessing previous months and operational data. All relevant staff active in CDM data collection have been trained and implementation of the monitoring plan/procedures has been checked by means of an independent internal audit.

Data / Parameter:	$E_{in,v}$
Data unit:	MWh
Description:	The amount of electricity received from the South China Power Grid, which is consumed by the project activity
Measured /Calculated /Default:	Continuous measurements manually recorded on a daily basis.
Source of data:	Directly measured by the (two-way) transaction electricity meters E3 and/or E4 installed in each of the 2 grid connection lines (E4 is used as a backup meter).
Value(s) of monitored parameter:	Refer to the VER calculation spreadsheet. The net electricity supplied to the grid is included in table 2.
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	The net data is used for the baseline emissions calculations.
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Continuously measured by two-way transaction electricity meters E3 and/or E4 (back-up) installed on Lines 1 and 2, as shown in Figure 1: Model number: EDM1 MK6E for E3 and E4 meters Accuracy class: 0.2S for E3 and E4 meters Serial numbers: 208368562 (meter E3 on Line 1 (E3L1)); 208368563 (E3L2); 208368565 (E4L1); and 208368572 (E4L2). The meters are calibrated at least once per year. The date of the first calibration for the E3 and E4 meters was on 12/10/2009. The date of the last calibration for the E3 and E4 meters was on 15/10/2010.
Measuring/ Reading/ Recording frequency:	Continuous measurement manually recorded on a daily basis
Calculation method (if applicable):	N/A
QA/QC procedures applied:	Calibration by an institute under the Guizhou Power Grid Company at least once per year for the E3 and E4 transaction kWh meters (per national calibration standard code JJG596-1999). Guizhou Qingshuihe Gelibridge Hydropower Plant operator checks the daily recorded data and inserts the daily into weekly/monthly spreadsheets. If there is an unexpected variation, he/she investigates. Before the weekly spreadsheet is sent electronically to the SCC Project Officer, a Guizhou Qingshuihe Gelibridge Hydropower Plant Team Leader checks the spreadsheet for consistency. Final CDM data checks by the SCC Project Officer. SCC Project Manager performs a data consistency check of the CDM Monitoring spreadsheet by assessing previous months and operational data. All relevant staff active in CDM data collection have been trained and implementation of the monitoring plan/procedures has been checked by means of an independent internal audit.

Data / Parameter:	TEG_y
Data unit:	MWh
Description:	Total electricity produced by the project activity, including the electricity supplied to the grid and the electricity supplied to internal loads, in year y
Measured /Calculated /Default:	Measurements are based on continuous electricity readings from meters E1 (E2 as back-up).
Source of data:	Measurements are based on continuous electricity readings from meters E1 (E2 as back-up).
Value(s) of monitored parameter:	Refer to the VER calculation spreadsheet
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	This data is not used for baseline, project, or leakage emissions calculations. It is used to check the credibility of EGY. The data used for the calculation of the baseline emissions are directly derived from the electricity readings from meters E1 (E2 as back-up).
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Continuously measured by two-way transaction electricity meters E3 and/or E4 (back-up) installed on Lines 1 and 2, as shown in Figure 1: Model number: EDM1 2000-0600 for E1 and E2 meters Accuracy class: 0.5S for E1 and E2 meters Serial numbers: 207502248 (meter E1 on Line 1 (E1L1)); 207502246 (E1L2); 207502257 (E2L1); and 207502242 (E2L2). The meters are calibrated at least once per year. The date of the first calibration for the E1 and E2 meters was on 13/10/2009. The date of the last calibration for the E1 and E2 meters was on 15/10/2010.
Measuring/ Reading/ Recording frequency:	Calculations: performed on a daily basis. Input data: continuous measurements manually recorded on a daily basis.
Calculation method (if applicable):	Not used for the emission reduction calculations.
QA/QC procedures applied:	TEGy (readings from meters E1 (E2 as back-up)) can be cross-checked using the sum of net electricity readings from two-way meters E3 (E4 as back-up) and self-consumption electricity meters ES1 and ES2. E3, E4, ES1, and ES2 can be used as back up for E1 (E2 as back-up) meters in case of E1 (E2 as back-up) malfunctioning. Model number: EDM1 MK6E for E3 and E4 meters Accuracy class: 0.2S for E3 and E4 meters Serial numbers: 208368562 (meter E3 on Line 1 (E3L1)); 208368563 (E3L2); 208368565 (E4L1); and 208368572 (E4L2). The meters are calibrated at least once per year. The date of the first calibration for the E3 and E4 meters was on 12/10/2009. The date of the last calibration for the E3 and E4 meters was on 15/10/2010. Model number: EDM1 2000-0600 for ES1 and ES2 meters Accuracy class: 0.5S for ES1 and ES2 meters Serial numbers: 207502244 (ES1) and 207502243 (ES2). The meters are calibrated at least once per year. The date of the first calibration for the ES1 and ES2 meters was on 13/10/2009. The date of the last calibration for the ES1 and ES2 meters is on 15/10/2010.

Data / Parameter:	CAP_{PI}
Data unit:	W
Description:	Installed capacity of the hydro power plant after the implementation of the project activity
Measured /Calculated /Default:	Calculated
Source of data:	Equipment purchase, installation records, equipment name plate, and/or inspection sheets
Value(s) of monitored parameter:	150,000,000
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	This data is not used for the baseline, project, or leakage emissions calculations. It is used to calculate the power density of the reservoir.
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	N/A
Measuring/ Reading/ Recording frequency:	Annually
Calculation method (if applicable):	N/A
QA/QC procedures applied:	Guizhou Qingshuihe Gelibridge Hydropower Plant Team Leader checks the nameplate of the equipment for the total installed capacity. If there is an unexpected variation, he/she investigates. In case changes will be made, the SCC staff will be informed. Regular independent internal audits will capture changes and follow up actions will be initiated.

Data / Parameter:	A_{PI}
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
Measured /Calculated /Default:	Measured
Source of data:	The “Validation of the Stage, Capacity and Area Curve of Qingshuihe Gelibridge Hydropower Plant” report prepared by a third party entity, the Planning and Design Branch of the Guiyang Hydroelectric Investigation, Design & Research Institute of China Hydropower Engineering Consulting Group, dated 20/08/2010.
Value(s) of monitored parameter:	2,133,000
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	This data is not used for the baseline, project, or leakage emissions calculations. It is used to calculate the power density of the reservoir.
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Measurement taken from topographical maps (1/10,000) by a reputable organization.
Measuring/ Reading/ Recording frequency:	Annually (date on which this value was determined: 20/08/2010)
Calculation method (if applicable):	N/A
QA/QC procedures applied:	The area of the reservoir is measured annually and recorded in an inspection sheet produced by a reputable organization or institution. The value determined in this monitoring period was by the Planning and Design Branch of the Guiyang Hydroelectric Investigation, Design & Research Institute of China Hydropower Engineering Consulting Group on 20/08/2010. The document is archived by the Guizhou Qingshuihe Gelibridge Hydropower Plant staff. The consistency with the previous annual values is checked. All relevant staff active in CDM data collection have been trained and implementation of the monitoring plan/procedures has been checked by means of an independent internal audit.

Data / Parameter:	$FC_{i,y}$
Data unit:	t or m ³
Description:	Quantity of fuel type <i>i</i> (diesel) combusted in process <i>j</i> (backup diesel generator) during the year <i>y</i>
Measured /Calculated /Default:	Measured. Data recorded at the beginning/end of each reporting period.
Source of data:	Fuel purchase receipts and stock taking
Value(s) of monitored parameter:	Quantity of diesel consumed during this monitoring period: 3.726 tons
Indicate what the data are used for (Baseline/Project/ Leakage emission calculations)	This data is used for the project emissions calculations.
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Fuel consumption will be monitored by means of fuel purchase receipts and stock taking at the beginning and end of each monitoring period.
Measuring/ Reading/ Recording frequency:	Recorded at the beginning and end of each monitoring period
Calculation method (if applicable):	Difference between opening and closing stock (adding purchased amount if applicable)
QA/QC procedures applied:	Guizhou Qingshuihe Gelibridge Hydropower Plant operator checks the fuel purchase receipts and stock taking inventory sheets. If there is an unexpected variation, he/she investigates. Before the fuel purchase receipts and stock taking inventory sheets are sent electronically to the SCC Project Officer, a Guizhou Qingshuihe Gelibridge Hydropower Plant Team Leader or GWQHD Planning Department team member(s) checks the sheet for consistency. Final CDM data checks by the SCC Project Officer. SCC Project Manager performs a data consistency check of the fuel purchase receipts and stock taking inventory sheets by assessing data from previous years. All relevant staff active in CDM data collection have been trained and implementation of the monitoring plan/procedures has been checked by means of an independent internal audit.

Data / Parameter:	$NCV_{i,y}$
Data unit:	GJ/t
Description:	Net caloric value of fuel <i>i</i> (diesel) in year <i>y</i>
Measured /Calculated /Default:	Default
Source of data:	China Energy Statistical Yearbook
Value(s) of monitored parameter:	42.652 (China Energy Statistical Yearbook 2008)
Indicate what the data are used for (Baseline/Project/ Leakage emission calculations)	This data is used for the project emissions calculations.
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	N/A
Measuring/ Reading/ Recording frequency:	Review appropriateness of the value annually.
Calculation method (if applicable):	N/A
QA/QC procedures applied:	Value provided by the China Energy Statistical Yearbook is collected and the consistency of the data with the range of IPCC default values will be checked. The data value should fall in the range of the IPCC default values provided in Table 1.2 of Chapter 1, Volume 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories.

Data / Parameter:	$EF_{CO_2,i,y}$
Data unit:	tCO ₂ /GJ
Description:	CO ₂ emission factor of fuel <i>i</i> (diesel) in year <i>y</i>
Measured /Calculated /Default:	Default
Source of data:	IPCC default value as provided in Table 1.4 of Chapter 1, Volume 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories.
Value(s) of monitored parameter:	0.0748
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	This data is used for the project emissions calculations.
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	N/A
Measuring/ Reading/ Recording frequency:	Review appropriateness of any future revision to the value in the IPCC Guidelines.
Calculation method (if applicable):	N/A
QA/QC procedures applied:	Value provided by the IPCC Guidelines is collected and review the appropriateness of any future revision to the value in the IPCC Guidelines.

6 Emission reductions calculation:

6.1 Baseline emissions calculations

Baseline emissions include only CO₂ emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity, calculated as follows:

$$BE_y = (EG_y - EG_{baseline}) \times EF_{grid, CM, y} \quad (1)$$

Where:

BE_y	=	Baseline emissions in year <i>y</i> (tCO ₂ /yr).
EG_y	=	Electricity supplied by the project activity to the grid (MWh)
$EG_{baseline}$	=	Baseline electricity supplied to the grid in the case of modified or retrofit facilities (MWh). For new power plants this value is taken as zero;
$EF_{grid, CM, y}$	=	Combined margin CO ₂ emission factor for grid connected power generation in year <i>y</i> calculated using the latest version of the “Tool to calculate the emission factor for an electricity system”.

Since this project installs a new grid-connected renewable power plant/unit, $EG_{baseline} = 0$; therefore, $BE_y = EG_y \times EF_{grid, CM, y}$.

In accordance with the above stated monitoring parameters in section D, for the project activity:

$$EG_y = EG_{out,y} - E_{in,y} \quad (2)$$

The baseline emissions calculations are shown below in Table 2.

Table 2. Baseline emissions calculations

Date	Net Electricity Supplied to the Grid (Electricity Meter Readings) (EG _y) (MWh)	Grid Emission Factor ($EF_{grid,CM,y}$) (tCO ₂ /MWh)	Baseline Emissions (BE_y) (tCO ₂) $BE_y = EG_y \times EF_{grid,CM,y}$
February 6-28, 2010	10,349.6	0.7794	8,066.5
March 2010	30,219.2	0.7794	23,552.8
April 2010	15,994.0	0.7794	12,465.7
May 2010	24,272.5	0.7794	18,917.2
June 2010	67,113.2	0.7794	52,308.0
July 2010	91,385.8	0.7794	71,226.1
August 2010	35,655.4	0.7794	27,789.8
September 2010	21,386.2	0.7794	16,668.4
October 1-3, 2010	6,301.9	0.7794	4,911.7
Total (February 6 to October 3, 2010, both days included)	302,676.8	-	235,906.3

6.2 Project emissions calculations

Per ACM0002 version 9, project emissions, PE_y , equal the sum of emissions from the reservoir and emissions from backup power.

Reservoir project emissions

Because the power density of the project is 70.32 W/m² based on the August 2010 reservoir area study, which is above the threshold of 10 W/m², as per the methodology, ACM0002 version 9, the emissions from the reservoir are neglected.⁴

Backup power project emissions

One backup diesel generator is installed at the Guizhou Qingshuihe Gelibridge Hydropower Project for use for emergency purposes only. Backup power project emissions ($PE_{FC,j,y}$) are calculated for the on-site backup diesel generator. Methodology ACM0002 version 9 states that $PE_{FC,j,y}$ should be calculated using the “Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion”. In accordance with this Tool (version 1.1), CO₂ emissions from fossil fuel combustion are calculated based on the quantity of fuel combusted (i.e., the amount of diesel combusted by the backup generator in the proposed project activity) and the CO₂ emission coefficient of those fuels, as follows:

$$PE_{FC,j,y} = \sum_i FC_{i,j,y} \times COEF_{i,y} \quad (2)$$

Where:

- $PE_{FC,j,y}$: CO₂ emissions from fossil fuel combustion in process j during the year y (tCO₂/yr)
- $FC_{i,j,y}$: quantity of fuel type i combusted in process j during the year y (mass or volume unit/yr);
- $COEF_{i,y}$: CO₂ emission coefficient of fuel type i in year y (tCO₂/mass or volume unit); i are the fuel types combusted in process j during the year y .

The CO₂ emission coefficient $COEF_{i,y}$ can be calculated using one of two options depending on the availability of data. We have opted to calculate $COEF_{i,y}$ based on Option B as public data is available:

$$COEF_{i,y} = NCV_{i,y} \times EF_{CO2,i,y} \quad (3)$$

Where:

- $COEF_{i,y}$: CO₂ emission coefficient of fuel type i in year y (tCO₂/tonnes);

⁴ The registered CDM-PDD references a reservoir area per the FSR of 2.13 million m², which yields a power density of 70.42 W/m² given an installed capacity of 150MW.

$NCV_{i,y}$: weighted average net calorific value of the fuel type i in year y (GJ/tonnes);
 $EF_{CO_2,i,y}$: weighted average CO₂ emission factor of fuel type i in year y (tCO₂/GJ); i are the fuel types combusted in process j during the year y .

The project emissions calculations are shown below in Table 3.

Table 3. Project emissions calculations

Date	Quantity of diesel fuel consumed by the backup generator ($FC_{i,i,y}$) (tons)	CO ₂ emission factor for diesel fuel ($COEF_{i,y}$) (tCO ₂ /ton)	Project Emissions from Diesel consumption (PE_y) (tCO ₂)
February 6-28, 2010	0.00	3.19	0.0000
March 2010	0.00	3.19	0.0000
April 2010	0.71	3.19	2.2802
May 2010	0.67	3.19	2.1346
June 2010	1.05	3.19	3.3475
July 2010	0.58	3.19	1.8435
August 2010	0.50	3.19	1.6010
September 2010	0.21	3.19	0.6792
October 1-3, 2010	0.00	3.19	0.0000
Total (February 6 to October 3, 2010, both days included)	3.73	-	11.8860

6.3 Leakage emissions calculations

No leakage is considered in accordance with ACM0002 version 09.

6.4 Emission reduction calculation / table

Emissions reductions are calculated as follows:

$$ER_y = BE_y - PE_y - LE_y \quad (4)$$

Where:

ER_y = Emission reductions in year y (t CO₂e/yr).
 BE_y = Baseline emissions in year y (t CO₂e/yr).
 PE_y = Project emissions in year y (t CO₂/yr).
 LE_y = Leakage emissions in year y (t CO₂/yr).

As $LE_y = 0$, therefore:

$$ER_y = BE_y - PE_y$$

The emission reductions calculations are shown below in Table 4.

Table 4. Emission reductions calculations

Date	Baseline Emissions (BE _y) (tCO ₂)	Project Emissions from Diesel consumption (PE _y) (tCO ₂)	Emission Reductions (ER _y) (tCO ₂)
February 6-28, 2010	8,066.5	0.0000	8,066.5
March 2010	23,552.8	0.0000	23,552.8
April 2010	12,465.7	2.2802	12,463.4
May 2010	18,917.2	2.1346	18,915.1
June 2010	52,308.0	3.3475	52,304.7
July 2010	71,226.1	1.8435	71,224.2
August 2010	27,789.8	1.6010	27,788.2
September 2010	16,668.4	0.6792	16,667.7
October 1-3, 2010	4,911.7	0.0000	4,911.7
Total (February 6 to October 3, 2010, both days included)	235,906.3	11.8860	235,894.4

6.5 Comparison of actual emission reductions with estimates in the VCS PD

Item	Values applied in ex-ante calculation of the VCS PD*	Actual values reached during the monitoring period
Emission reductions (tCO₂e)	254,840	235,894

* The value applied in the *ex ante* calculation of the VCS PD provided here is calculated by pro-rating the annual estimated emission reductions: Values Applied in the Ex-ante Calculation of the VCS PD for the Monitoring Period 06/02/2010 to 03/10/2010 = Annual Estimation of Emission reductions in the VCS PD × Number of Days in the Monitoring Period / Number of Days per Year = 387,570tCO₂e/year × 240 Days in the Monitoring Period / 365 days per year = approximately 254,840tCO₂e.

6.6 Remarks on difference from estimated value in VCS PD

Not applicable as the actual emission reductions are lower than those estimated in the VCS PD.