



**Verified Carbon
Standard**

ZHOUBAI HYDROELECTRIC PROJECT

Document Prepared by Climate Bridge (Shanghai) Ltd.

Tel: +86 21 6246 2036; Fax: +86 21 2301 9950

Project Title	Zhoubai Hydroelectric Project
Version	1.1
Report ID	N/A
Date of Issue	09/09/2022
Project ID	45
Monitoring Period	01/05/2012 to 24/08/2016 (first and last day included)
Prepared By	Zixiao Zhang
Contact	Block B, Level 24, Jiangong Mansion, 33 Fushan Road, Pudong New Area, Shanghai, P.R. of China Telephone: +86 2162462036; Email: zhang.zixiao@climatebridge.com ; projects@climatebridge.com http://www.climatebridge.com

CONTENTS

1	PROJECT DETAILS.....	4
1.1	Summary Description of the Implementation Status of the Project	4
1.2	Sectoral Scope and Project Type	4
1.3	Project Proponent	4
1.4	Other Entities Involved in the Project	5
1.5	Project Start Date	5
1.6	Project Crediting Period	5
1.7	Project Location	6
1.8	Title and Reference of Methodology	6
1.9	Participation under other GHG Programs.....	6
1.10	Other Forms of Credit.....	8
1.11	Sustainable Development Contributions	9
2	SAFEGUARDS	11
2.1	No Net Harm	11
2.2	Local Stakeholder Consultation	11
2.3	AFOLU-Specific Safeguards	12
3	IMPLEMENTATION STATUS	12
3.1	Implementation Status of the Project Activity	12
3.2	Deviations	13
3.3	Grouped Projects	14
4	DATA AND PARAMETERS.....	14
4.1	Data and Parameters Available at Validation	14
4.2	Data and Parameters Monitored.....	15
4.3	Monitoring Plan	16
5	QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS	18
5.1	Baseline Emissions	18
5.2	Project Emissions	24
5.3	Leakage.....	24
5.4	Net GHG Emission Reductions and Removals.....	24

APPENDI1: <SUPPORTING EVIDENCE>	26
--	-----------

1 PROJECT DETAILS

1.1 Summary Description of the Implementation Status of the Project

Zhoubai Hydroelectric Project (hereafter, the Project) is a new reservoir hydropower plant. The Project is located in the town of Zhoubai, Qianjiang District, Chongqing City, the People's Republic of China. The installed capacity of the Project is 22 MW, with a reservoir with storage capacity of 12 million cubic meters. The project reservoir has a flooded area of 1.91km² and a power density of 11.52 W/m². Total installed capacity of the Project is 22 MW, consisting of two 11MW turbines. The purpose of the project is to utilize existing hydrological resources to generate electricity and deliver it to South China Power Grid (SCPG), the estimated annual power delivered to the grid is 75,030 MWh. The Project will generate emission reductions by displacing electricity generation from grid connected fossil fuel-fired power plants that would otherwise be generating electricity needed.

During the first crediting period, this project would achieve an amount of 58,051 tCO_{2e} emission reductions every year.

The project started construction in January 2005. The start date of commercial operation is 01/08/2006. All project equipment and facilities as described in the CDM PDD have been correctly installed. Please refer to section 3.1 for details.

This monitoring period covers the period from 01/05/2012 to 24/08/2016. The project operated in accordance with the CDM PDD.

Total GHG emission reduction achieved in this monitoring period is 224,957 tCO_{2e}.

1.2 Sectoral Scope and Project Type

Sectoral Scope 1: Energy industries (renewable / non-renewable sources)

Project Type: Grid-connected renewable hydropower generation

The project is not a grouped project.

1.3 Project Proponent

Organization name	Chongqing Wujiang Industry (Group) Co., Ltd
Contact person	Yang Wei
Title	Project Manager
Address	No. 118, Chengxi 4 th Road, Chengxi Office, Qianjiang District, Chongqing City, China

Telephone	+86-2162462036
Email	3542346576@qq.com

1.4 Other Entities Involved in the Project

Organization name	Climate Bridge (Shanghai) Ltd.
Role in the Project	Consultant and VCU Buyer
Contact person	Gao Zhiwen
Title	General Manager
Address	Block B, Level 24, Jiangong Mansion, 33 Fushan Road, Pudong New Area, Shanghai, China 200120
Telephone	+86-2162462036
Email	gao.zhiwen@climatebridge.com

1.5 Project Start Date

25/08/2006 (continued operation period start date)¹

1.6 Project Crediting Period

There is a deviation for the crediting period. The project is registered under previous VCS Standard and completed validation before 19/03/2020, thus it remains eligible to apply the crediting period requirements under VCS Version 3 which shall be a maximum of ten years and may be renewed at most twice.

The project started operation on 01/08/2006 and was registered as a CDM project activity on 02/07/2007, considering the availability of monitoring data on site, the project start date was determined as 25/08/2006. Considering 3*7- year CDM crediting period and 25 years lifetime, it is reasonable that the total VCS crediting period was determined from 25/08/2006 to 24/08/2027, of which the first VCS crediting period is from 25/08/2006 to 24/08/2016. This monitoring period belongs to the first crediting period from 25/08/2006 to 24/08/2016.

As per para 3.8.9-3 of VCS Standard version 4.3, "The updated project description shall be validated in accordance with the VCS Program rules. In addition, the project shall be validated against the (current) scope of the VCS. Such validation report shall be issued after the end of the (previous) project crediting period but within two years after the end of the (previous) project

¹ Considering the availability of monitoring data on site, the project start date was determined as 25/08/2006.

crediting period.” Since the project did not conduct the validation of crediting period renewal within the two years after the end of the first VCS crediting period, the VCS crediting period of the project ends on 24/08/2016.

1.7 Project Location

The Project is located on the upper reaches of A’Peng Jiang River, 1.7km away from Zhoubai town, in Chongqing City, P.R.China. The geographical coordinate range of the Project are 29°30’03.9” north latitude, 108°49’59.1” east longitude.

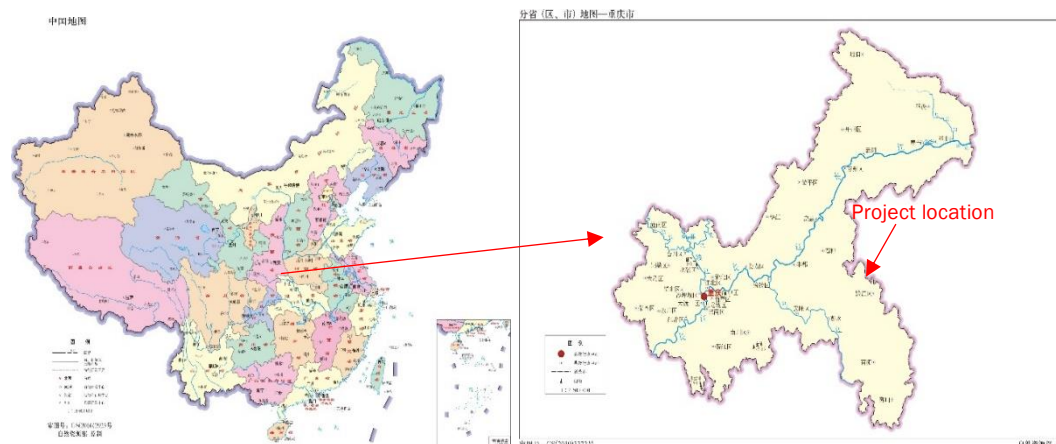


Figure 1 Location of this project

1.8 Title and Reference of Methodology

Methodology:

ACM0002: “Consolidated baseline methodology for grid-connected electricity generation from renewable sources” version 06.

<http://cdm.unfccc.int/methodologies/DB/UB3431UT9I5KN2MUL2FGZXZ6CV71LT>

Tool:

“Tool to calculate the emission factor for an electricity system” version 05.0.

<https://cdm.unfccc.int/methodologies/PAMethodologies/tools/am-tool-07-v5.0.pdf>

1.9 Participation under other GHG Programs

The project has been registered as CDM project with UNFCCC ref. No. of 0996 on 02/07/2007. Some periods of the project in this crediting period have registered and issued under CDM scheme, and for detail information of GHG credit claimed under this CDM project please refer to the website: <https://cdm.unfccc.int/Projects/DB/DNV-CUK1173700712.12/view?cp=1>.

And monitoring periods and details of CERs sought are listed below:

Start Date	End Date	GHG Emission Reduction (CO ₂ e)	Credit	Program
02/07/2007	25/10/2007	25,151	CER	CDM
26/10/2007	25/07/2008	29,143	CER	CDM
26/07/2008	25/11/2008	28,852	CER	CDM
26/11/2008	25/06/2009	28,827	CER	CDM
26/06/2009	25/04/2010	26,119	CER	CDM
26/04/2010	28/02/2011	46,155	CER	CDM
29/02/2011	30/04/2012	55,325	CER	CDM

The 239,572 tCO₂e of emission reductions achieved during period 02/07/2007 to 30/04/2012 have been issued as CERs under CDM program. The 39,070 tCO₂e of emission reductions achieved during period 01/05/2012 to 31/12/2012 is currently awaiting issuance request under CDM program. It is promised by the project owner that the emission reduction in the monitoring period from 01/05/2012 to 31/12/2012 (the first and last days included) will not request for CERs under CDM program and will be submitted under VCS scheme.

The project has also been registered as VCS project with ref. No. of 45. Some periods of the project in this crediting period have issued under VCS scheme, and for detail information of GHG credit claimed please refer to the website:

<https://registry.verra.org/app/projectDetail/VCS/45>.

And monitoring periods and details of VCU's sought are listed below:

Start Date	End Date	GHG Emission Reduction (CO ₂ e)	Credit	Program
25/08/2006	25/06/2007	32,651	VCUs	VCS

26/06/2007	01/07/2007	Not claimed		
01/05/2012	24/08/2016	224,957	In requesting for VCUs	VCS

The emission reductions from the period from 26/06/2007 to 01/07/2007 will not be claimed. All emission reductions during this monitoring period (01/05/2012 to 24/08/2016, first and last day included) have not and will not seek CDM CER issuance. Emission reductions during this monitoring period will only seek VCUs issuance under VCS program.

1.10 Other Forms of Credit

Emission Trading Programs and Other Binding Limits:

China has a national emissions trading scheme only cover the high-emission industries, such as thermal power generation, petrochemical, chemical, building materials, iron and steel, non-ferrous, paper, aviation and other key emission industries that emitted at least 26,000 tons of CO₂e/year, not including renewable project².

Also, the project has not been registered as a CCER (Chinese Certified Emission Reductions) project in China, thus it is not eligible for emission reductions transaction under the China's ETS. Therefore, the project does not reduce GHG emissions from activities that are included in an emissions trading program or any other mechanism that includes GHG allowance trading. The net GHG emission reductions generated during this monitoring period have not been used for compliance under such programs or mechanisms.

Furthermore, as a voluntary emission reduction project, the GHG emission reductions and removals generated by the project will not be enforced to be used for compliance in China. The credits in this monitoring period have not been counted and will not be counted under emission trading programs and other binding limits.

Other Forms of Environmental Credit:

The project has not sought or received another form of GHG-related environmental credit, including renewable energy certificates.

² http://www.mee.gov.cn/xxgk2018/xxgk/xxgk05/202103/t20210330_826728.html

1.11 Sustainable Development Contributions

The project activity is a renewable hydropower project located in Zhoubai town, Central China. In this monitoring period,



The project utilizes water resources to generate and supply 290,758.325 MWh renewable electricity to CCPG, which contributes to SDG 7.



The project provides 9 long-term job opportunities for local, which has a positive effect on the local economy and contributes to SDG 8.



The project reduces 224,957 tCO_{2e} GHG emission and contributes to SDG 13.

These contribute to achieve China's stated sustainable development priorities, included strengthening resistance capacity to climate risks, increasing labor force participation rate, increasing the share of clean energy consumption.

Table 1: Sustainable Development Contributions

Row number	SDG Target	SDG Indicator	Net Impact on SDG Indicator	Current Project Contributions	Contributions Over Project Lifetime
1)	7.2	Renewable energy share in the total final energy consumption	Implemented activities to increase	The project generated renewable energy and export electricity to state grid. During this monitoring period, 290,758.325 MWh of electricity has been exported.	From 25/08/2006 onwards, about 642,608.515 MWh of electricity has been exported.
2)	8.5	The number of long-term jobs provided by the implementation of the project	Implemented activities to increase	5 male and 4 female employees have signed long-term contracts and receive stable payments due to the implementation of the project activity.	Provided 9 long-term employment positions for local villagers in the reporting period.
3)	13.2	Tonnes of greenhouse gas emissions avoided or removed	Implemented activities to increase	The project achieved GHG emission reductions of 224,957 tCO ₂ e during the reporting period.	From 25/08/2006 onward, the project has achieved a GHG emission reduction of 497,180 tCO ₂ e.

2 SAFEGUARDS

2.1 No Net Harm

Environmental Impact

The Environmental Impact Assessment (EIA) of the project has been conducted and approved by local government officials. The EIA report has assessed every possible aspect of environmental impacts of the project and recommended corresponding measures, where applicable. The environmental impacts and corresponding mitigation measures during construction and operation period have been discussed in the CDM PDD. No negative environmental impacts have been identified.

Socio-economic impact

Furthermore, the project is renewable project and achieves the SDG 7 and SDG 13. Also, the project provides 9 long-term job opportunities for local, which has a positive effect on the local economy and contributes to SDG 8. Please refer to section 1.11 of this report for details.

In conclusion, no net harm on local environment and social community has been detected for the project.

2.2 Local Stakeholder Consultation

Local Stakeholder Consultation during the project preparation stage:

In order to get the comments and suggestions from local stakeholders, the project owner visited local residents and coherent organizations for stakeholder consultation in May 2006. 35 questionnaires were sent to the stakeholders by the project developer.

The survey showed that the project receives strong support from local people, which is closely linked to the fact that the majority of local residents have some understandings with hydro power projects. All the respondents believed that the Project would have overall positive impacts on their livelihoods with increase of job opportunities, increase of income and others. The concern about the environmental impacts has been clarified in EIA. All the impacts would be reduced by mitigating measures.

100% of the investigated people are supportive to the project construction.

Local Stakeholder Consultation during the project implementation stage:

Communications with local stakeholders are being carried out at periodic intervals. In this monitoring period, the project owner also carried out questionnaire survey for the local

stakeholder to collect the relevant comments and suggestions in August 2012, April 2014 and June 2016. And there are no negative comments received for the project. In line with VCS requirements all the processes have been implemented to receive comments from local stakeholders as well as communicate with them at periodic intervals. During the implementation stage of this monitoring period, local authority has conducted spot checks on the implementation of the project periodically as per the request from the local governments' regulations and the project passed all the periodic spot checks by local government.

2.3 AFOLU-Specific Safeguards

Not Applicable.

3 IMPLEMENTATION STATUS

3.1 Implementation Status of the Project Activity

The Project is a reservoir hydropower project with a total installed capacity of 22 MW (consisting of two 11 MW turbines) with a reservoir with storage capacity of 12 million cubic meters. The project reservoir has a flooded area of 1.91km² and a power density of 11.52 W/m². The designed operation lifetime of the project activity is 25 years.

The electricity production can be described as following: Water is taken from the reservoir via the intake in front of the reservoir, and then enters the turbine through the penstock. At the power plant the water then enters the turbine, spinning it, thus the potential energy converts to kinetic energy; the kinetic energy will then convert to electric energy by driving the generator. After that the water will finally discharge into to the A' Peng Jiang River through the tailrace. The main technical parameters of the project are shown in Table 3-1.

Table 3-1 Main technical parameters of the proposed project

	Value	Unit
Installed Capacity	22	MW
Annual Operation Time	3,643	h
Feed Water Flow Rate	91.7	m ³ /s
Water Head	17.5	m

Reservoir Storage Capacity	12,200,000	m ³
Flooded Area	1.91	km ²
Power Density	11.52	W/m ²
Location on the River	A'Peng Jiang River	-

It is expected that the annual electricity delivered to the grid is 75,030MWh to CCPG (Central China Power Grid) and replace the same amount of electricity generated by fossil fuel fired power plants connected to CCPG. There's two bi-directional meters installed at the project site, revenue meter and back-up meter. Revenue meter is installed at the outlet of the project site to measure the exported electricity. Back-up line meter is installed at the 10kV back-up line to measure the electricity imported from back-up line.

During this monitoring period, the project is under normal operation, no special event occurred which may impact the applicability of the methodology, the GHG emission reductions or removals and monitoring. And the project is implemented in accordance with the CDM PDD.

The emission reductions in the monitoring period from 25/08/2006 to 25/06/2007 have been issued as VCUs under VCS program and 02/07/2007 to 30/04/2012 have been issued as CERs under CDM program. During the intervals of 26/06/2007 to 01/07/2007 (both days included), the project has operated normally without any emergency. The project proponent voluntarily gives up the emission reductions achieved in the period from 26/06/2007 to 01/07/2007 (Both days included) and will not seek issuance of the emission reductions under any other emission trading programs.

3.2 Deviations

3.2.1 Methodology Deviations

There is no deviation applied to this monitoring period.

3.2.2 Project Description Deviations

There is a deviation for the crediting period. The project is registered under previous VCS Standard and completed validation before 19/03/2020, thus it remains eligible to apply the crediting period requirements under VCS Version 3 which shall be a maximum of ten years and may be renewed at most twice, the first crediting periods of the project is from 25/08/2006 to 24/08/2016 (10 years). This monitoring period belongs to the first crediting period from 25/08/2006 to 24/08/2016.

The deviation does not impact the applicability of the methodology, additionality and the appropriateness of the baseline scenario.

3.3 Grouped Projects

The Project is not a grouped project.

4 DATA AND PARAMETERS

4.1 Data and Parameters Available at Validation

The baseline grid emission factor EF_y is calculated and fixed ex ante based on the relevant basis parameters ($F_{i,j,y}$, $GEN_{j,y}$, NCV_i , EF_i , $OXID_i$, $CAP_{i,y}$) in registered CDM PDD which are not described in detail here. With consideration of the fact of the project, data and parameters available at validation are summarized in below table.

Data / Parameter	EF_y
Data unit	tCO ₂ e/MWh
Description	Baseline emission factor
Source of data	Calculated according to the procedure outlined in B.6.1 of the validated CDM PDD
Value applied	0.7737
Justification of choice of data or description of measurement methods and procedures applied	Calculated according to the procedure outlined in B.6.1 of the validated CDM PDD
Purpose of Data	Calculation of baseline emissions
Comments	-

Data / Parameter	<i>Installed Capacity</i>
Data unit	MW
Description	The installed capacity
Source of data	Feasibility capacity
Value applied	22
Justification of choice of data or description of measurement methods and procedures applied	-

Purpose of Data	-
Comments	-

4.2 Data and Parameters Monitored

Data / Parameter	EG _y																							
Data unit	MWh																							
Description	Electricity delivered to the grid																							
Source of data	Project site																							
Description of measurement methods and procedures to be applied	Revenue meter with accuracy of 0.2S is installed at the outlet of the project site to measure the exported electricity. Back-up line meter with accuracy of 0.5S is installed at the 10kV back-up line to measure the electricity imported from back-up line. Data type: Continuously measured. Archiving procedure: Electronic. Responsibility: The electricity meter was calibrated by a qualified third party regularly. Calibration Frequency: Annually. In this monitoring period, before 01/01/2015, the grid company and the plant operation staff read and record the meters at 24:00 of the 25th day of each month. After 01/01/2015, the grid company and the plant operation staff read and record the meters at 24:00 of the last day of each month.																							
Frequency of monitoring/recording	Continuously measured, and monthly recorded																							
Value monitored	290,758.325																							
Monitoring equipment	<table><tr><td>Meter</td><td>Revenue meter</td><td>Back-up line meter</td></tr><tr><td>Serial No.</td><td>5314-10602988</td><td>5014-01003678</td></tr><tr><td>Type</td><td>DTSD1088</td><td>DTSD546</td></tr><tr><td>Accuracy class</td><td>0.2S</td><td>0.5S</td></tr><tr><td>Calibration Frequency</td><td>Yearly</td><td>Yearly</td></tr><tr><td>Date of Calibration</td><td>15/11/2011 06/11/2012 31/10/2013 29/10/2014 27/10/2015</td><td>15/11/2011 06/11/2012 30/10/2013 26/10/2014 22/10/2015</td></tr><tr><td>Validity</td><td>14/11/2012 05/11/2013</td><td>15/11/2012 05/11/2013</td></tr></table>			Meter	Revenue meter	Back-up line meter	Serial No.	5314-10602988	5014-01003678	Type	DTSD1088	DTSD546	Accuracy class	0.2S	0.5S	Calibration Frequency	Yearly	Yearly	Date of Calibration	15/11/2011 06/11/2012 31/10/2013 29/10/2014 27/10/2015	15/11/2011 06/11/2012 30/10/2013 26/10/2014 22/10/2015	Validity	14/11/2012 05/11/2013	15/11/2012 05/11/2013
Meter	Revenue meter	Back-up line meter																						
Serial No.	5314-10602988	5014-01003678																						
Type	DTSD1088	DTSD546																						
Accuracy class	0.2S	0.5S																						
Calibration Frequency	Yearly	Yearly																						
Date of Calibration	15/11/2011 06/11/2012 31/10/2013 29/10/2014 27/10/2015	15/11/2011 06/11/2012 30/10/2013 26/10/2014 22/10/2015																						
Validity	14/11/2012 05/11/2013	15/11/2012 05/11/2013																						

		30/10/2014 28/10/2015 26/10/2016	29/10/2014 25/10/2015 21/10/2016
QA/QC procedures to be applied	The accuracy of the meter(s) meets the national standard DL/T 448. Meters are calibrated annually by Chongqing Institute of Metrology and Quality Inspection according to the relevant national standard (JJG 596). Data measured by the meters are cross checked with ETNs.		
Purpose of the data	Calculation of baseline emissions		
Calculation method	Net electricity supplied = EG_y = power export via revenue meter – power import via revenue meter – power import via back up line meter		
Comments	-		

Data / Parameter	<i>Area Submerged</i>
Data unit	m ²
Description	Surface area of the reservoir at full reservoir level
Source of data	Project site
Description of measurement methods and procedures to be applied	The data is measured by professional design institute
Frequency of monitoring/recording	Once at the beginning of each crediting period.
Value monitored	1,910,000
Monitoring equipment	The area was monitored based on topographical data and the height of the dam.
QA/QC procedures to be applied	Monitored once at start of the project. Archived data will be kept during the crediting period.
Purpose of the data	Calculation of project emissions
Calculation method	-
Comments	Project emission. Power density is 11.52 W/m ² , greater than 10 W/m ² , therefore $PE_y=0$.

4.3 Monitoring Plan

The Monitoring Plan for this project has been developed to ensure that from the start, the project is well organised in terms of the collection and archiving of complete and reliable data.

Monitoring organisation

Prior to the start of the crediting period, the organisation of the monitoring team has been established. Clear roles and responsibilities have been assigned to all staff involved in the project. The project manager will have the overall responsibility for the monitoring system on this project. The project manager is responsible for managing the collection, storage and archive of all data and records; technicians are in charge of the maintenance of the meters; data recorders read the meters and record them, then report to the project manager. All staffs are trained for their duty. Training records are kept on site.

The procedures are agreed and signed off by the Chongqing Wujiang Industry Group Co., Ltd. and EcoSecurities. Any changes to procedures will need to be agreed by both parties. The project manager is responsible for ensuring that the procedures are followed on site and for continuously improving the procedures to ensure a reliable monitoring system is established.

Monitoring equipment and installation

Given the emission factor is calculated ex-ante and according to the Monitoring Methodology ACM0002, the only data to be monitored is electricity supplied to the grid by the project.

There's two bi-directional meters installed at the project site, revenue meter and back-up meter. Revenue meter is installed at the outlet of the project site to measure the exported electricity. Back-up line meter is installed at the 10kV back-up line to measure the electricity imported from back-up line.

The electricity produced by the project is metered at the power station. The power is delivered to the local grid operator and then transmitted to the Guizhou Power Grid Company. The local grid company provides the project developer with the agreed total amount of electricity of Zhubai project supplied to the grid, which forms the electricity supply figure on the purchase receipt. The electricity monitored and recorded at the power stations can be cross-checked with electricity records from meters owned by the local grid company.

Quality Assurance and Quality Control

The QA/QC procedure for measurement and calibration is specified by the grid company to ensure the measurement accuracy of the main meter. The meter located at the power station are calibrated annually by Chongqing Institute of Metrology and Quality Inspection.

The site manager will notify the grid company in case there is doubt about the correct functioning of the meters mentioned in the monitoring plan. In that case, the grid company and the operator will check and where necessary replace the meters. No CERs are claimed for the period during which the meters were not functioning correctly.

In the monitoring period covered by this monitoring report, the monitoring system never had to rely on the emergency procedures.

Data and records management

Data collection procedures: The revenue meter is located at the power plant and record the power delivered to and used from the grid continuously.

Data recording: Before January 2015, the project developer records the power meter readings on the 25th day of each month and the data are written down in a form and put into an excel sheet. From January 2015 onwards, the meter reading date has changed from 25th day to the last day of each month. Data records are filed electronically each month and kept for 2 years after the end of the crediting period.

Data aggregation: The calculated monthly net electricity supplied to the grid is summed over the monitoring period. Physical document such as paper-based maps, diagrams and environmental assessments have been collected in a central place, together with this monitoring plan. All paper-based information and the electronic records are stored by the technology department of the project owner and will be kept until 2 years after the end of the crediting period of the VCS project.

Calculation: Please refer to section 5.1 for the detailed information. Net electricity supplied to the grid is exported electricity minus imported electricity from the grid and backup line. Net electricity supplied to the grid multiplied by emission factor is the emission reductions.

Reporting: The calculated values are included in an Excel sheet and VCS - MR. All the events or situations that occurred during the monitoring period, which may impact the accuracy of data, have been detailed recorded by the project owner in the run log and summarized in VCS-MR.

Each month the monitoring data needs to be filed electronically. The electronic files need to be saved on CD and the computers. The project developer keeps ETNs or invoices. All the data are kept until two years after the end of the crediting period.

5 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

5.1 Baseline Emissions

According to the CDM PDD, the baseline emission BE_y during the monitoring period results from:

$$BE_y = EG_y \times EF_y$$

Where,

BE_y = Baseline emissions (t CO₂e)

EG_y = Electricity supplied by the project to the grid (MWh)

EF_y = Baseline emission factor (tCO₂e / MWh)

y = Refers to a given year

Electricity supplied by the project to the grid (EG_y) = 290,758.325 MWh

Baseline emission factor with combined margin (EF_y) = 0.7737 tCO₂e/MWh

The monthly electricity data is listed as following.

Table 5-1 Determination of EG_y

Period		Electricity Supplied to the Grid (MWh)			Electricity Imported from the Grid (MWh)			Electricity Imported from the Backup Line (MWh)			EG _y (MWh)
Start Date	End Date	By Meter Reading	By ETNs	The Lower value between ETN and Meter Reading	By Meter Reading	By ETNs	The Higher value between Receipt and Meter Reading	By Meter Reading	By ETNs	The Higher value between Receipt and Meter Reading	
01/05/201 ₂	25/05/2012	10,801.16 ₃	10,801.16 ₃	10,801.16 ₃	2.200	2.200	2.200	0.000	0.000	0.000	10,798.9 ₆₃
26/05/201 ₂	25/06/2012	9,386.124	9,386.124	9,386.124	11.880	11.880	11.880	0.000	0.000	0.000	9,374.24 ₄
26/06/201 ₂	25/07/2012	6,528.324	6,528.324	6,528.324	23.760	23.760	23.760	0.000	0.000	0.000	6,504.56 ₄
26/07/201 ₂	25/08/2012	5,397.744	5,397.744	5,397.744	34.980	34.980	34.980	0.000	0.000	0.000	5,362.76 ₄
26/08/201 ₂	25/09/2012	7,061.604	7,061.604	7,061.604	24.420	24.420	24.420	0.000	0.000	0.000	7,037.18 ₄
26/09/201 ₂	25/10/2012	3,757.644	3,757.644	3,757.644	38.280	38.280	38.280	0.000	0.000	0.000	3,719.36 ₄
26/10/201 ₂	25/11/2012	4,116.024	4,116.024	4,116.024	36.960	36.960	36.960	0.000	0.000	0.000	4,079.06 ₄
26/11/201 ₂	25/12/2012	3,436.884	3,436.884	3,436.884	51.480	51.480	51.480	0.000	0.000	0.000	3,385.40 ₄
26/12/201 ₂	31/12/201 ₂	249.863	249.863	249.863	12.774	12.774	12.774	0.000	0.000	0.000	237.089
subtotal in 2012		50,735.37 ₄	50,735.37 ₄	50,735.37 ₄	236.734	236.734	236.734	0.000	0.000	0.000	50,498.6 ₄₀
01/01/201 ₃	25/01/2013	1,041.097	1,041.097	1,041.097	53.226	53.226	53.226	0.000	0.000	0.000	987.871
26/01/201 ₃	25/02/2013	2,054.580	2,054.580	2,054.580	67.980	67.980	67.980	0.000	0.000	0.000	1,986.600
26/02/201 ₃	25/03/2013	2,396.460	2,396.460	2,396.460	31.680	31.680	31.680	0.640	0.640	0.640	2,364.140
26/03/201 ₃	25/04/2013	4,596.900	4,596.900	4,596.900	27.720	27.720	27.720	0.000	0.000	0.000	4,569.180

³ In order to divide a monitoring period into vintages according to requirement of VCS Standard, the electricity between 26/12/2012 and 25/01/2013 is divided into 2 period based on daily meter records, including period from 26/12/2012 to 31/12/2012 and other period from 01/01/2013 to 25/01/2013. And this total monthly electricity is not change. The same method is applied to December 2013 and December 2014 as well.

26/04/2013	25/05/2013	8,639.400	8,639.400	8,639.400	11.880	11.880	11.880	0.000	0.000	0.000	8,627.520
26/05/2013	25/06/2013	13,007.280	13,007.280	13,007.280	0.000	0.000	0.000	0.000	0.000	0.000	13,007.280
26/06/2013	25/07/2013	5,866.080	5,866.080	5,866.080	31.020	31.020	31.020	0.136	0.136	0.136	5,834.924
26/07/2013	25/08/2013	1,742.400	1,742.400	1,742.400	56.760	56.760	56.760	0.012	0.012	0.012	1,685.628
26/08/2013	25/09/2013	8,817.600	8,817.600	8,817.600	15.180	15.180	15.180	0.000	0.000	0.000	8,802.420
26/09/2013	25/10/2013	2,034.120	2,034.120	2,034.120	40.920	40.920	40.920	0.000	0.000	0.000	1,993.200
26/10/2013	25/11/2013	1,540.440	1,540.440	1,540.440	26.400	26.400	26.400	0.316	0.316	0.316	1,513.724
26/11/2013	25/12/2013	2,777.940	2,777.940	2,777.940	38.280	38.280	38.280	0.000	0.000	0.000	2,739.660
26/12/2013	31/12/2013	487.207	487.207	487.207	8.175	8.175	8.175	0.188	0.188	0.188	478.844
subtotal in 2013		55,001.504	55,001.504	55,001.504	409.221	409.221	409.221	1.292	1.292	1.292	54,590.991
01/01/2014	25/01/2014	2,030.033	2,030.033	2,030.033	34.065	34.065	34.065	0.784	0.784	0.784	1,995.184
26/01/2014	25/02/2014	1,616.340	1,616.340	1,616.340	54.780	54.780	54.780	1.036	1.036	1.036	1,560.524
26/02/2014	25/03/2014	813.120	813.120	813.120	50.820	50.820	50.820	0.000	0.000	0.000	762.300
26/03/2014	25/04/2014	7,157.700	7,157.700	7,157.700	19.140	19.140	19.140	0.000	0.000	0.000	7,138.560
26/04/2014	25/05/2014	9,379.260	9,379.260	9,379.260	31.020	31.020	31.020	0.000	0.000	0.000	9,348.240
26/05/2014	25/06/2014	7,067.280	7,067.280	7,067.280	1.980	1.980	1.980	0.000	0.000	0.000	7,065.300
26/06/2014	25/07/2014	8,125.920	8,125.920	8,125.920	21.780	21.780	21.780	0.000	0.000	0.000	8,104.140
26/07/2014	25/08/2014	2,898.720	2,898.720	2,898.720	53.460	53.460	53.460	0.056	0.056	0.056	2,845.204
26/08/2014	25/09/2014	12,404.040	12,404.040	12,404.040	6.600	6.600	6.600	0.000	0.000	0.000	12,397.440
26/09/2014	25/10/2014	2,716.560	2,716.560	2,716.560	56.760	56.760	56.760	0.000	0.000	0.000	2,659.800
26/10/2014	25/11/2014	6,071.340	6,071.340	6,071.340	33.000	33.000	33.000	0.000	0.000	0.000	6,038.340
26/11/2014	25/12/2014	4,866.840	4,866.840	4,866.840	27.060	27.060	27.060	0.144	0.144	0.144	4,839.636

26/12/2014	31/12/2014	356.783	356.783	356.783	9.452	9.452	9.452	0.000	0.000	0.000	347.331
subtotal in 2014		65,503.936	65,503.936	65,503.936	399.917	399.917	399.917	2.020	2.020	2.020	65,101.999
01/01/2015	31/01/2015	1,486.597	1,486.597	1,486.597	39.388	39.388	39.388	0.000	0.000	0.000	1,447.209
01/02/2015	28/02/2015	3,139.620	3,139.620	3,139.620	33.660	33.660	33.660	0.000	0.000	0.000	3,105.960
01/03/2015	31/03/2015	3,457.740	3,457.740	3,457.740	24.420	24.420	24.420	0.000	0.000	0.000	3,433.320
01/04/2015	30/04/2015	6,481.200	6,481.200	6,481.200	19.800	19.800	19.800	0.000	0.000	0.000	6,461.400
01/05/2015	31/05/2015	6,394.740	6,394.740	6,394.740	19.140	19.140	19.140	0.000	0.000	0.000	6,375.600
01/06/2015	30/06/2015	14,630.880	14,630.880	14,630.880	0.000	0.000	0.000	0.000	0.000	0.000	14,630.880
01/07/2015	31/07/2015	6,312.900	6,312.900	6,312.900	20.460	20.460	20.460	0.000	0.000	0.000	6,292.440
01/08/2015	31/08/2015	4,519.680	4,519.680	4,519.680	29.040	29.040	29.040	0.052	0.052	0.052	4,490.588
01/09/2015	30/09/2015	6,168.360	6,168.360	6,168.360	23.100	23.100	23.100	0.208	0.208	0.208	6,145.052
01/10/2015	31/10/2015	2,706.660	2,706.660	2,706.660	25.740	25.740	25.740	0.000	0.000	0.000	2,680.920
01/11/2015	30/11/2015	882.420	882.420	882.420	122.100	122.100	122.100	0.212	0.212	0.212	760.108
01/12/2015	31/12/2015	1,690.260	1,690.260	1,690.260	99.000	99.000	99.000	0.000	0.000	0.000	1,591.260
subtotal in 2015		57,871.057	57,871.057	57,871.057	455.848	455.848	455.848	0.472	0.472	0.472	57,414.737
01/01/2016	31/01/2016	2,775.300	2,775.300	2,775.300	71.280	71.280	71.280	0.292	0.292	0.292	2,703.728
01/02/2016	29/02/2016	3,122.460	3,122.460	3,122.460	39.600	39.600	39.600	0.148	0.148	0.148	3,082.712
01/03/2016	31/03/2016	4,577.100	4,577.100	4,577.100	34.320	34.320	34.320	0.000	0.000	0.000	4,542.780
01/04/2016	30/04/2016	12,925.440	12,925.440	12,925.440	3.300	3.300	3.300	0.000	0.000	0.000	12,922.140
01/05/2016	31/05/2016	9,304.680	9,304.680	9,304.680	13.200	13.200	13.200	0.000	0.000	0.000	9,291.480
01/06/2016	30/06/2016	10,080.840	10,080.840	10,080.840	12.540	12.540	12.540	0.200	0.200	0.200	10,068.100
01/07/2016	31/07/2016	14,909.400	14,909.400	14,909.400	3.300	3.300	3.300	0.000	0.000	0.000	14,906.100

01/08/2016	24/08/2016	5,661.011	5,661.011	5,661.011	25.548	25.548	25.548	0.545	0.545	0.545	5,634.918
subtotal in 2016		63,356.231	63,356.231	63,356.231	203.088	203.088	203.088	1.185	1.185	1.185	63,151.958
Total		292,468.102	292,468.102	292,468.102	1,704.808	1,704.808	1,704.808	4.969	4.969	4.969	290,758.325

The annual baseline emissions are as following:

Table 5-2 Annual baseline emission Calculation

Period		EG _y (MWh)	EF _y (tCO ₂ e/MWh)	Baseline Emissions (tCO ₂ e)	Project Emissions (tCO ₂ e)	Leakage Emissions (tCO ₂ e)	Net Emission Reductions (tCO ₂ e)
Start Date	End Date	K	L	M=K*L	N	O	P=M-N-O
01/05/2012	31/12/2012	50,498.640	0.7737	39,070	0	0	39,070
01/01/2013	31/12/2013	54,590.991	0.7737	42,237	0	0	42,237
01/01/2014	31/12/2014	65,101.999	0.7737	50,369	0	0	50,369
01/01/2015	31/12/2015	57,414.737	0.7737	44,421	0	0	44,421
01/01/2016	24/08/2016	63,151.958	0.7737	48,860	0	0	48,860
Total		290,758.325	/	224,957	0	0	224,957

5.2 Project Emissions

As per the CDM PDD, the power density of the project, ((given as the total capacity (in W) divided by the surface area of the full reservoir (in m²)) is shown to be 11.52 W/m². According to ACM0002, hydroelectric power plants with a Power Density greater than 10 W/m² may neglect project emissions from the reservoir. Therefore, the project emissions is zero.

5.3 Leakage

According to the ACM0002, Leakage (L_y) is not considered.

5.4 Net GHG Emission Reductions and Removals

According to the Section 5.1, 5.2 and 5.3 above,

$$BE_y = 224,957 \text{ tCO}_2\text{e};$$

$$PE_y = 0 \text{ tCO}_2\text{e};$$

$$LE_y = 0 \text{ tCO}_2\text{e};$$

$$\text{Therefore, } ER_y = BE_y - PE_y - LE_y = 224,957 \text{ tCO}_2\text{e}$$

Year	Baseline emissions or removals (tCO ₂ e)	Project emissions or removals (tCO ₂ e)	Leakage emissions (tCO ₂ e)	Net GHG emission reductions or removals (tCO ₂ e)
01/05/2012-31/12/2012	39,070	0	0	39,070
01/01/2013-31/12/2013	42,237	0	0	42,237
01/01/2014-31/12/2014	50,369	0	0	50,369
01/01/2015-31/12/2015	44,421	0	0	44,421
01/01/2016-24/08/2016	48,860	0	0	48,860
Total	224,957	0	0	224,957

This monitoring period started from 01/05/2012 to 24/08/2016, with totally 1,577 days. Based on the annual estimated emission reductions from the CDM PDD, the amount of emission reductions for this monitoring period would be 58,051 tCO₂e/ 365 days × 1,577 days = 250,812 tCO₂e. The actual emission reductions in this monitoring period (1,577 days) are 224,957 tCO₂e, which is 10.31% less than the estimated value. It is because the surface runoff caused by the

abundant rainfall for the monitoring period is lower than the previous years⁴. So, it is reasonable that during this monitoring period, the actual emission reduction is less than the estimated value.

⁴ Chongqing Statistics Yearbook 2013&2016

APPENDI1: <SUPPORTING EVIDENCE>

Evidence for SDG 7 and SDG 13: From project operation date onwards, the net electricity supplied to the grid and corresponding emission reduction in every monitoring period have been listed in below table. Please refer to following links for details.

<https://cdm.unfccc.int/Projects/DB/DNV-CUK1173700712.12/view?cp=1>

<https://registry.verra.org/app/projectDetail/VCS/45>

Period		EG _y	ER	Scheme
From	To	MWh	t CO _{2e}	
25/08/2006	25/06/2007	42,201.220	32,651	VCS
02/07/2007	25/10/2007	32,507.880	25,151	CDM
26/10/2007	25/07/2008	37,667.180	29,143	CDM
26/07/2008	25/11/2008	37,291.640	28,852	CDM
26/11/2008	25/06/2009	37,259.500	28,827	CDM
26/06/2009	25/04/2010	33,759.600	26,119	CDM
26/04/2010	28/02/2011	59,655.560	46,155	CDM
29/02/2011	30/04/2012	71,507.610	55,325	CDM
01/05/2012	24/08/2016	290,758.325	224,957	VCS
Total		642,608.515	497,180	

Evidence for SDG 8: The staff roster of the project has been submitted to VVB for verification are not included as appendices to this report due to confidentiality requirement of the project proponent.