



VCS VERIFICATION REPORT

YUNNAN MANGLI HYDROPOWER
PROJECT

(VCS PROJECT ID: 928)



Document Prepared By

Shenzhen CTI International Certification Co., Ltd.

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Summary:

Shenzhen CTI International Certification Co., Ltd (CTI) has performed the verification of the emission reductions reported for the project activity “Yunnan Mangli Hydropower Project” (VCS Project ID: 928) for the monitoring period 01/11/2013 to 30/04/2018, to review and determine the monitored reductions in GHG emissions that have occurred as a result of the project activity. These emission reductions are claimed as Verified Carbon Units (VCU) under the Verified Carbon Standard (VCS) version 4.1.

The verification was performed on the basis of VCS Programme Guide version 4.0 and VCS Standard version 4.1 for the VCS projects, as well as criteria given to provide for consistent project operations, monitoring and reporting. The verification was conducted by means of document review, follow-up interviews and site inspections, and the resolution of outstanding issues. The verification team identified 1 CL, 1 CAR and no FAR in this monitoring period.

In CTI's opinion, the GHG emission reductions reported for the project in the monitoring report (version 3.0 dated 25/11/2021) are fairly stated. The GHG emission reductions of the period were calculated correctly on the basis of approved methodology ACM0002 “Consolidated methodology for grid-connected electricity generation from renewable sources” (Version 12.1.0) and the monitoring plan contained in the VCS PD (version 02 dated 25/10/2012).

CTI does not assume any responsibility towards the issuance and utilization of the VCUs hereby verified and

certified. Request for issuance of VCU's shall be made by the project proponent to an approved VCS Program Registry based on the requirements set out under the most recent version of the VCS Program Guidelines clause on VCS Registration.

The verification of reported emission reductions is based on the information made available to CTI and the engagement conditions detailed in this report. CTI cannot be held liable by any party for decisions made or not made based on this report.

Hence, CTI is able to certify that the emission reductions from the "Yunnan Mangli Hydropower Project" during the period amount to 342,023 tCO₂e.

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1 INTRODUCTION

Climate Bridge (Shanghai) Ltd. has commissioned Shenzhen CTI International Certification Co., Ltd (CTI) to carry out the verification and certification of emission reductions reported for the “Yunnan Mangli Hydropower Project” (the project) for the period 01/11/2013 to 30/04/2018. This report contains the findings from the verification and includes a verification statement for the verified carbon units.

1.1 Objective

Verification is the periodic independent review and ex-post determination by an accredited verification body of the monitored reductions in GHG emissions that have occurred as a result of the registered VCS project activity during a defined verification period.

A verification statement is the written assurance by a verification body that, during a specific period in time, a project activity achieved the emission reductions as verified.

The objective of this verification was to verify and provide a verification statement of emission reductions reported for the “Yunnan Mangli Hydropower Project” for the period 01/11/2013 to 30/04/2018.

1.2 Scope and Criteria

The scope of the verification is:

- To verify that actual monitoring systems and procedures are in compliance with the monitoring systems and procedures described in the monitoring plan;
- To evaluate the GHG emission reduction data and express a conclusion with a reasonable level of assurance about whether the reported GHG emissions reduction data is free from material misstatement;
- To verify that reported GHG emissions data is sufficiently supported by evidence.

The criteria of the verification are:

- VCS Program Guide (version 4.0) /25/
- VCS Standard (version 4.1) /24/ and other relevant requirements defined by Verra;
- The approved methodology ACM0002 (Version 12.1.0) /29/ applied by the project.

The verification shall ensure that reported emission reductions are complete and accurate in order to be verified.

1.3 Level of Assurance

The verification report expresses a conclusion with a reasonable level of assurance about whether the reported GHG emissions reduction data is free from material misstatement. CTI applied a materiality threshold of 5% with respect to omission or misstatements concerning reported quantities as per VCS standard.

1.4 Summary Description of the Project

Sectoral Scope and Project Type

According to the VCS Program Guide (version 4.0) /25/, the project is applicable under the following activity categories:

- Sectoral Scope: 1. Energy (Renewable/non-renewable).
- Project type: hydro power generation project.

According to Annex A of the Kyoto Protocol, the project is applicable under the Sectoral Scope 1: Energy Industries (renewable/ non-renewable sources).

Project Background

Project title:	Yunnan Mangli Hydropower Project
Project proponent:	Datang Mangli Hydropower Development Company Limited
Project location:	Mangshi River, Luxi City of Yunnan Province, P.R.China
VCS Project ID:	928
Applied methodology:	ACM0002 Version 12.1.0
VCS project crediting period:	25/01/2010 to 24/01/2020 (the first VCS crediting period)
VCU verification period:	01/11/2013 to 30/04/2018

2 VERIFICATION PROCESS

2.1 Method and Criteria

The verification was performed through means of the following three phases in accordance with the requirement of the VCS PD (version 02 dated 25/10/2012), the applied methodology, and the VCS Standard (version 4.1) and other relevant VCS requirements:

- A desk review of the monitoring report and all support documents;
- Follow-up interviews with project stakeholders and site inspection;
- The resolution of outstanding issues and the issuance of the verification report and statement.

The following sections outline each step in more detail.

The verification of the emission reductions has assessed all factors and issues that constitute the basis for emission reductions from the project. These include:

- The emission reduction calculations and the relevant data records;
- The calibration and maintenance records for the monitoring instruments;
- The management systems to support the project operation and monitoring.

2.2 Document Review

Based on the requirements of competency, experience and qualified sectoral scopes, CTI appointed a verification team in accordance with CTI's internal procedures.

Function	Name	Technical competence	Task Performance*
Team Leader	Wang Guolian	1.2, 3.1, 4.1, 5.1, 5.2, 11.1, 11.2, 12.	☒ DR ☒ SV ☒ RP ☐ TR
Technical Reviewer	Lin Shunrong	1.2, 14.1, 15.	☒ DR ☐ SV ☐ RP ☒ TR

*DR=Document review; SV=Site visit; RP=Reporting; TR=Technical review

In addition to the VER/VCU monitoring report /1/ and emission reduction calculation spreadsheet /2/, the following documents also were assessed as a part of the verification audit:

- VCS PD (version 02 dated 25/10/2012) /11/;
- registered CDM PDD (version 02 dated 28/12/2010) /13/;
- Validation Report of registered CDM PDD (version 03 dated 05/10/2011) /19/;
- revised CDM PDD approved by CDM EB (version 03 dated 06/08/2012) /10/;
- Validation Opinion on revised CDM PDD approved by CDM EB (version 01 dated 10/09/2012) /17/;
- VCS Verification Report (version 01 dated 08/11/2012) /12/;
- Baseline and monitoring methodology ACM0002 applied by the project /29/;
- Relevant decisions, clarifications and guidance from the Verra /24/-/27/; and
- Other information and references relevant to the project activity.

During the desk review, CTI has applied standard auditing techniques to assess the quality of information provided. The following activities were performed:

- A review of the data and information presented to verify their completeness;
- A review of the monitoring plan and monitoring methodology, paying particular attention to the frequency of measurements, the quality of metering equipment including calibration requirements, and the quality assurance and quality control procedures; and

An evaluation of data management and the quality assurance and quality control system in the context of their influence on the generation and reporting of emission reductions.

2.3 Interviews

On 17/09/2021, CTI visited Datang Mangli Hydropower Development Company Limited performed on-site assessment. The key personnel of the project were interviewed or assisted the verification team /29/. Main topics of the interview cover implementation of the project construction, applicability of selected methodology, implementation of project monitoring, emission reduction calculation, etc.

The key personnel interviewed /29/ are summarized in the table below:

Interviewed personnel	Role	Organization	Subject
Mr. He Youliang	General Manager	Datang Mangli Hydropower Development Company Limited	Operation of the project activity; Implementation of the monitor plan of the project activity; Data collection and data achievement; Calibration of meters and equipment maintenance;
Ms. Li Lin	Director	Safety Production Department of Datang Mangli Hydropower Development Company Limited	
Ms. Zhou Ying	Duty Staff	Safety Production Department of Datang Mangli Hydropower Development Company Limited	
Mr. Xu Mingrui	Staff	General Department of Datang Mangli Hydropower Development Company Limited	
Mr. Jin Xiaosan	Villager	Local resident	The impact of the project activity; The complaint by local stakeholders; The stakeholder consultation during the operation of the project activity.
Ms. Zhao Qing	Staff	Local Environment Protection Bureau	
Mr. Zhang Zixiao	Project Manager	Climate Bridge (Shanghai) Ltd.	

2.4 Site Inspections

The verification team performed the on-site verification (Mangshi River, Luxi City of Yunnan Province, P.R.China) on 17/09/2021. The interviewed personnel and objective are listed in above table. During

the on-site assessment, CTI has applied standard auditing techniques to assess the quality of information provided. The following aspects of the project activity have been verified:

- An assessment of the implementation and operation of the registered project activity is as per the VCS PD;
- A review of information flows for generating, aggregating and reporting the monitoring parameters; and
- Interviews with relevant personnel to determine whether the operational and data collection procedures are implemented in accordance with the monitoring plan in the VCS PD;
- A cross-check between information provided in the monitoring report and data from other sources such as plant logbooks and electricity sale receipts;
- A check of the monitoring equipment including calibration performance and observations of monitoring practices against the requirements of the VCS PD and the selected methodology;
- A review of calculations and assumptions made in determining the GHG data and emission reductions; and
- An identification that quality control and quality assurance procedures in place to prevent or identify and correct any errors or omissions in the reported monitoring parameters.

The data presented in the monitoring report were assessed by review of the detailed project documentation and production records, as well as by interviews with personnel from the project developer Datang Mangli Hydropower Development Company Limited and observation of collection of measurements, observation of established monitoring and reporting practices and assessment of the reliability of monitoring equipment. This has enabled the verification team to assess the accuracy and completeness of reported monitoring results, to verify the correct application of the approved monitoring methodology and the determination of the emission reductions.

In addition, all parameters required by the monitoring methodology ACM0002 (Version 12.1.0), and the management system were assessed during the site visit.

2.5 Resolution of Findings

A corrective action request (CAR) shall be raised, where:

- i. Non-conformities with the monitoring plan or methodology are found in monitoring and reporting, or if the evidence provided to prove conformity is insufficient;
- ii. Mistakes have been made in applying assumptions, data or calculations of emission reductions which will impair the estimate of emission reductions;
- iii. Issues identified in a FAR during validation to be verified during verification have not been resolved by the project proponents.

A clarification request (CL) shall be raised if information is insufficient or not clear enough to determine whether the applicable VCS requirements have been met.

The verification team identified 1 CL and 1 CAR in this monitoring period.

2.5.1 Forward Action Requests

A forward action request (FAR) is issued for actions if the monitoring and reporting require attention and/or adjustment for the next monitoring period.

CTI confirmed that there was no FAR identified in previous verification /12/, and no FAR was raised during this verification.

2.6 Eligibility for Validation Activities

The registered CDM PDD of the project activity was validated by DNV Climate Change and Environmental Services on 05/10/2011 /19/. The revised CDM PDD approved by CDM EB was validated by Bureau Veritas Certification Holding SAS on 10/09/2012 /17/. The previous VCS verification was carried out by Bureau Veritas Certification Holding SAS on 08/11/2012 against Voluntary Carbon Standard version 3. The proposed monitoring period 01/11/2013 to 30/04/2018 is the 2nd VCS verification, and CTI just undertook verification activities for the project according to the VCS Program Guide. This section is thus not applicable.

3 VALIDATION FINDINGS

3.1 Participation under Other GHG Programs

The project was validated by DNV Climate Change and Environmental Services on 10/09/2012 under CDM scheme for registration /19/, and validated by Bureau Veritas Certification Holding SAS on 10/09/2012 for post-registration changes on registered CDM PDD /17/. CTI only performed verification activities on the proposed monitoring period for the project according to the VCS Program Guide.

3.2 Methodology Deviations

The validation process /17/ /19/ has assessed all factors and issues that constitute the basis for emission reductions from the project according to the applicable CDM methodology ACM0002 (Version 12.1.0) /29/. There was not any methodology deviation applied to this project. Details refer to section 4.1.

3.3 Project Description Deviations

By checking the registered VCS PD /11/ and site visit interview with project owner, it is confirmed that the project started operation on 13/01/2010, which is the project start date according to the requirement of VCS. By checking previous VCS Verification Report (version 01 dated 08/11/2012), it is confirmed that since 25/01/2010, the data have been monitored and collected following the monitoring procedure and therefore 25/01/2010 was determined as the start date of crediting period in the VCS PD and the VCS crediting period is from 25/01/2010 to 06/10/2011. However, a deviation was identified for the crediting period of the Project activity in the monitoring report (version 3.0 dated 25/11/2021). In the monitoring report, it was mentioned that the project commission date is 13/01/2010 and the VCS crediting period was from 25/01/2010 to 24/01/2020. The project is registered under VCS Version 3.2 and completed validation before 19/03/2020. As per VCS requirement, 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 (theoretically the maximum VCS crediting period is 30 years, from 25/01/2010 to 24/01/2040). Therefore, the first renewable crediting period of the Project is updated from 25/01/2010 - 06/10/2011 to 25/01/2010 - 24/01/2020, which lasts for 10 years. However, as the project is also registered as a CDM project with a seven year twice renewable (7*3 renewable) project crediting period, Therefore, the length of total VCS crediting period of the project activity should not be longer than 21 years and is determined as 25/01/2010 to 24/01/2031 and the project activity is not eligible for VCU issuance beyond 24/01/2031. This deviation has no impact on the applicability of the methodology, additionality or the appropriateness of the baseline scenario and meet all appropriate rules and requirements of VCS standard.

Except crediting period related deviations, there were no project description deviations identified by CTI to this monitoring period. The verification team assessed through visual inspection and document review that all physical features of the project activity including data monitoring, reporting and collecting systems have been implemented in accordance with the monitoring plan included in the VCS PD (version 02 dated 25/10/2012) /12/. Details refer to section 4.1.

3.4 Grouped Project

The project was not a grouped project; hence this clause is not applicable.

4 VERIFICATION FINDINGS

This section summarises the findings from the verification of the emission reductions reported for the “Yunnan Mangli Hydropower Project” for the period 01/11/2013 to 30/04/2018.

4.1 Project Implementation Status

Project Implementation in accordance with the registered project design document

The project is a grid-connected hydro power plant, which is located in Mangshi River, Luxi City of Yunnan Province, P.R.China. The installed capacity of the project activity is 36MW, consisting of 2 sets of hydro turbines with unit capacity of 18MW. The average annual power delivered to the grid by the project is expected to be 143,652 MWh. The actual implementation of the project during this verification period was verified in terms of name plate capacities of hydro turbines and monitoring equipment. The details of hydro turbines with respect to installation and capacity have been verified to be consistent with description indicated in the VCS PD. The project activity was put into operation on 13/01/2010, which has been verified by site visit interview, checking VCS Verification Report (version 01 dated 08/11/2012) /12/. The electricity generated by the project activity was supplied to the China Southern Power Grid (CSPG), which can be confirmed by the Power Purchase Agreement (PPA) signed between the project owner and Yunnan Power Grid Co., Ltd. Dehong Power Supply Bureau /3/.

The project start date was identified as 13/01/2010 when the project started to operate, and since 25/01/2010 the data have been monitored and collected following the monitoring procedure, therefore 25/01/2010 was determined as the start date of crediting period which began generating GHG emission reductions. A deviation was identified for the crediting period of the Project. Detail refer to section 3.3 of this report.

All the monitoring system in operation period is consistent with the description and monitoring plan in the VCS PD. The control system at the power plant is automated and assures continuous operation, including monitoring on malfunction of equipment. By checking the daily operation and maintenance records /6/, CTI can confirm that no serious malfunction happened and the plant was under a normal operation as expected in this monitoring period.

On-site training for the related procedures including monitoring, recording and reporting was verified to be in place /5/ and their implementation was confirmed by interview with the key operators /29/ and observing the operation.

As part of the site visit, CTI confirms that the project implementation is in accordance with the project description and monitoring plan contained in the the VCS PD (version 02 dated 25/10/2012). The verification team confirmed through visual inspection and document review that all physical features of the project activity including data collection systems and storage systems have been implemented in accordance with monitoring plan contained in the VCS PD (version 02 dated 25/10/2012).

Compliance of monitoring plan with monitoring methodology

CTI is able to confirm that the monitoring plan in the VCS PD (version 02 dated 25/10/2012) is in accordance with the approved methodology applied by the project activity, i.e. ACM0002 (Version 12.1.0).

Compliance of monitoring with the monitoring plan

The monitoring has been carried out in accordance with the monitoring plan contained in the VCS PD (version 02 dated 25/10/2012). CTI confirms that all parameters stated in the monitoring plan are monitored and reported appropriately. All parameters required to be monitored by the monitoring plan as per the monitoring methodology ACM0002 (Version 12.1.0) and the management system were assessed during the site visit. The monitoring report lists each parameter required by the monitoring plan and the information flow (i.e. from data generation, aggregation, recording, calculation and reporting) for these parameters is provided. The information flow for the each parameter in further verified in the following sections.

Parameters monitored

According to the VCS PD (version 02 dated 25/10/2012), there are 5 monitoring parameters of the project:

- **Electricity supplied by the project activity to the grid in year y ($EG_{\text{export},y}$)**

The parameter was monitored by 2 bidirectional electricity meters (meter M1 and M2) continuously. Meter M1 was installed at the substation of Grid Company while meter M2 was installed at the project site. When M1 is not working, the readings from M2 will be used for reference. The meter reading was recorded monthly and archived electronically. Meter M1 was used to measure electricity supplied by the project activity to the grid and is the basis of issuing Electricity Transaction Notes (ETNs) /8/ by local grid company. By checking the operation log /6/ and interview with project owner during site visit /29/, it is confirmed that during this monitoring period, M1 is working well and has no malfunction. By checking the ETNs /8/ and interviewing with project owner during site visit /29/, it is confirmed that from 01/11/2013 to 15/05/2015, the cut-off time was 24:00 hr of 15th of each month, and from 16/05/2015 to 30/04/2018, the cut-off time was 24:00 hr of last day of each month. At the cut-off time, the staff from project developer and the grid company read the meter reading of meter M1 together. The project owner will afterwards form Monthly Reading Records (MRRs) /7/ while the grid company transcribes the data into ETNs /8/. $EG_{\text{export},y}$ was sourced from Meter Reading Records (MRRs) /7/ issued by the project developer and ETNs /8/ issued by power grid company covering monitoring period. The conservative data between MRRs and ETNs will be used to calculate the emission reductions.

- **Electricity imported by the project activity from the grid in year y ($EG_{\text{import},y}$)**

The parameter was monitored by 2 bidirectional electricity meters (meter M1 and M2) continuously. Meter M1 was installed at the substation of Grid Company while meter M2 was installed at the project site. When M1 is not working, the readings from M2 will be used for reference. The meter reading was

recorded monthly and archived electronically. Meter M1 was used to measure electricity imported by the project activity from the grid and is the basis of issuing Electricity Purchase Receipts /9/ by local grid company. By checking the Electricity Purchase Receipts /9/ and interviewing with project owner during site visit /29/, it is confirmed that from 01/11/2013 to 15/05/2015, the cut-off time was 24:00 hr of 15th of each month, and from 16/05/2015 to 30/04/2018, the cut-off time was 24:00 hr of last day of each month. At the cut-off time, the staff from project developer and the grid company read the meter reading of meter M1 together. The project owner will afterwards form Monthly Reading Records (MRRs) /7/ while the grid company transcribes the data into Electricity Purchase Receipts /9/. $EG_{import,y}$ was sourced from Meter Reading Records (MRRs) /7/ issued by the project developer and Electricity Purchase Receipts /9/ issued by power grid company covering monitoring period. The conservative data between MRRs and Electricity Purchase Receipts will be used to calculate the emission reductions.

■ **Electricity imported through backup line from the grid in year y ($EG_{backup,y}$)**

The parameter was monitored by meter M_{backup} continuously which was installed on the backup line. During this monitoring period, The meter reading was recorded monthly and archived electronically. Meter M_{backup} was used to measure electricity imported through backup line and is the basis for transacting with local grid company. Through interviewing with project owner during site visit /29/ and checking operation log /6/, it is confirmed that no electricity imported through backup line from the grid during this monitoring period.

■ **Installed capacity of the hydro power plant after the implementation of the project activity (Cap_P)**

By checking Nameplate of hydropower turbine and generator, it is confirmed by the verification team the installed capacity of project activity is 36,000,000 W, which is consistent with that in the VCS PD /11/. The parameter will be checked annually.

■ **Area of the reservoir measured in the surface of the water, after the implementation of the project activity, when the reservoir is full (AP_J)**

By checking Survey Report issued by Road Bridge Jiada Surveying Center in Dehong, Yunnan Province /22/, it is confirmed the area of the reservoir measured in the surface of the water, after the implementation of the project activity, when the reservoir is full is 2,732,305 m², 2,732,380 m², 2,732,305 m², 2,732,355 m², 2,732,385 m² and 2,732,380 m² respectively for year 2013, 2014, 2015, 2016, 2017 and 2018 through the whole monitoring period. The parameter will be checked annually.

Monitoring equipment and calibration

The meters have been calibrated periodically as per the relevant industrial standard by the qualified third party to ensure the monitoring equipments' accuracy and in good conditions. The relevant information of meters' calibration is listed as below.

Meter	Serial Number	Type	Accuracy Class	Calibration Frequency	Calibration Date	Validity
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meter M1	02299816	DTS5	0.2S	Annually	25/04/2013	24/04/2014
					23/04/2014	22/04/2015
					21/04/2015	20/04/2016
					16/04/2016	15/04/2017
					14/04/2017	13/04/2018
					04/04/2018	03/04/2019
Meter M2	20081167020135	DTSD341	0.2S	Annually	17/04/2013	16/04/2014
					15/04/2014	14/04/2015
					12/04/2015	11/04/2016
					09/04/2016	08/04/2017
					07/04/2017	06/04/2018
					03/04/2018	02/04/2019
Meter M _{backup}	060001004134	HX3000	1.0	Annually	11/04/2013	10/04/2014
					07/04/2014	06/04/2015
					03/04/2015	02/04/2016
					31/03/2016	30/03/2017
					29/03/2017	28/03/2018
					26/03/2018	25/03/2019

The meters were calibrated by Yunnan Power Grid Co., Ltd. Dehong Metrology Center. Calibration records and accreditation certificates /14//15/ have been verified by the verification team. The accuracy of meters are comply with that in the VCS PD. By checking the industrial metering configuration standard “Technical Administrative Code of Electric Energy Metering” /16/, CTI can confirm that the accuracy level of all meters meet the requirement stipulated in this standard. CTI can thus confirm that the accuracy of the meters is in line with the VCS PD and relevant industry standard.

In the monitoring plan of the VCS PD, it stated that the meters will be calibrated and checked annually for accuracy. By checking the calibration reports, CTI found the calibration frequency of these meters is annual, which is in line with the calibrating standard “Technical Administrative Code of Electric Energy Metering” /16/. Hence, CTI can confirm that the meters’ calibration frequency is in line with the monitoring plan of the VCS PD and relevant industry standard, and the calibrations of meters are verified to be valid for the whole reporting period.

Data management and control

The project owner is responsible for operation and routine maintenance of power plant under the project activity. The quality assurance and quality control procedures have been addressed in the VER project management and monitoring manual /4/, including the organization structure with the responsibilities, personnel competencies, monitoring procedures and monitoring management. By interview with the staff /29/ and check records /4/-/6/ during on-site visit, it can be confirmed that the monitoring management system is implemented following the project management and monitoring manual.

All monitoring devices have been calibrated and maintained periodically to ensure the accuracy of measurement. Calibration records of instruments used in measurements were made available during the verification visit and found to be valid for the entire period of the verification. Competence and training records of in-plant personnel engaged in measurement of plant parameters were presented during verification and found to be in order.

By checking UNFCCC website (<https://cdm.unfccc.int/Projects/DB/DNV-CUK1305694841.24/view>), it is confirmed by CTI that the project has been registered as CDM project activity on 07/10/2011 with reference No. 4821. 30,655 tCO₂ CERs have been issued for the period from 07/10/2011 to 30/04/2012 under CDM program, 72,018 tCO₂ CERs have been issued for the period from 01/05/2012 to 31/10/2013.

Furthermore, CTI checked public information from the REC Mechanism database of China, Chinese Emission Trading System, Gold Standard Registry and interviewed with project owner during site visit, it is confirmed that except CDM and VCS scheme, the project has not been participated or been rejected under any other GHG programs since validation or previous verification.

Therefore, the verification team confirmed that the project only applies CERs and VCU under CDM and VCS, and no rejection from CDM and VCS occurs, there are no other forms of environmental credits applied or issued for the project activity, the emission reduction resulted from the project during this monitoring period would only apply for VCUs.

By checking the registered VCS PD (version 02 dated 25/10/2012), China 's National Plan on Implementation of the 2030 Agenda for Sustainable Development and 17 SDGs defined by UNDP, and interviewing with stakeholders during site visit, the verification team confirmed that the project would contribute to sustainable development in as below:

- SDG 13: Reducing greenhouse gas emissions compared to a business-as-usual scenario;
- SDG 7: Providing clean and renewable energy source and displacing the power generation of fossil fuel power plants, reducing PM, SO_x and NO_x emissions significantly, thus mitigating the air pollution and its adverse impacts on human health, promoting sustainable economic development in local area;
- SDG 8: Providing approximately 103 employment opportunities during construction and operation period, which promotes sustained, inclusive and sustainable economic growth, full and productive employment and decent work for local residents.

The technical parameters have been verified with the nameplates /18/ and Technical Specification of Equipment Contract /21/ as below:

Generator		Turbine	
Model	SF-J18-30/5050	Model	HLA551c-LJ-262
Quantity	2	Quantity	2
Rated Power	18 MW	Rated Power	18.66 MW
Rated Voltage	10.5 kV	Rated Water Head	37m
Rated Current	1100 A	Rated Flux	55.42 m3/s
Rated Speed	200 r/min	Rated Speed	200 r/min

The verification team confirmed that there is no proposed or actual change to the VCS PD during this monitoring period. All required equipments and procedures are available and implemented in an appropriate manner. All necessary monitoring instruments are installed. All required instruments including standby and operating procedures for the same have been implemented in an appropriate manner. The project is completely operational and the same has been confirmed on-site. Neither mistakes nor malfunction on meters have been observed during this monitoring period.

4.2 Safeguards

4.2.1 No Net Harm

By checking the EIA summary and conclusion provided in the VCS PD, it is confirmed that hydro power is green power and the impact caused by hydro power on the surrounding ecosystem and residents, wastewater, solid waste and atmosphere etc. is very little, there would be no net harm caused due to the project activity. Also, the EIA of the project are approved by the government.

Also, no potential environment or social economic matter was found during the site visit. The project is renewable energy project and thus no net harm observed in air or water quality on-site.

4.2.2 Local Stakeholder Consultation

As per the registered VCS PD (version 02 dated 25/10/2012), the local stakeholder's consultation was conducted in June 2009 through distributing a questionnaire which was designed to be easily filled in. 100 copies of questionnaire were distributed. The participants filled in the questionnaires included local residents, builders and members of the local authorities. The opinions expressed by the stakeholders were recorded and are available on request.

The survey showed that the project receives strong support from the local community. They all believe the project will provide job opportunities and promote local economic development and agree with the project development and construction.

By checking the filled questionnaires from local stakeholders, it is confirmed by the verification team that communications with local stakeholders was being carried out in April 2014, August 2016 and March 2018 by the project owner. There are no negative comments received for the project.

Via checking questionnaires from local stakeholders and interviewing with staff from local environmental protection bureau and local residents during the site visit, it is confirmed by the verification team that 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. It is confirmed by the verification team that there were no negative comments and issues from the local stakeholders during this monitoring period and the project passed all the periodic spot checks by local government.

All such conclusion has been verified through site visit and check revised CDM PDD approved by CDM EB.

4.3 AFOLU-Specific Safeguards

For non-AFOLU projects, this section is not required.

4.4 Accuracy of GHG Emission Reduction and Removal Calculations

CTI confirms that appropriate methods and formulae for calculating baseline emissions, project emissions and leakage have been followed, and the assumptions, emission factors and default values that are applied in the calculation have been justified.

According to the applied methodology, the emission reductions are determined as the difference between the baseline emissions, project emissions and leakage:

$$ER_y = BE_y - PE_y$$

Baseline emissions

Baseline reductions are determined as multiplying Quantity of net electricity generation supplied by the project plant/unit to the grid in year y ($EG_{\text{facility},y}$) by the validated ex-ante fixed grid emission factor ($EF_{\text{grid},CM,y}$).

$$BE_y = EG_{\text{facility},y} \times EF_{\text{grid},CM,y} = (EG_{\text{export},y} - EG_{\text{import},y} - EG_{\text{backup},y}) \times EF_{\text{grid},CM,y}$$

Grid emission factor ($EF_{\text{grid},CM,y}$)

The parameters determine $EF_{\text{grid},CM,y}$, including $FC_{i,y}$, $NCV_{i,y}$, $EF_{c,i,y}$, GEN_y , $CAP_{j,y}$, electricity imports to CSPG, electricity self-consumption ratio, are monitored ex-ante in the VCS PD. In this monitoring report, parameter $EF_{\text{grid},CM,y}$ is determined ex-ante by China DNA, which is comply with the VCS PD. EF is the grid emission factor that has been verified ex-ante in the validation stage in the VCS PD (version 02 dated 25/10/2012) as 0.7879 tCO₂e/MWh.

Quantity of net electricity generation supplied by the project plant/unit to the grid in year y (EG_{facility,y})

$$EG_{\text{facility},y} = EG_{\text{export},y} - EG_{\text{import},y} - EG_{\text{backup},y}$$

EG_{export,y} and EG_{import,y} are determined by readings of meter M1 (meter M2 as backup). For EG_{export,y}, Data in the ETNs were used to cross-checked with that in the Monthly Reading Records (MRRs). For EG_{import,y}, data in the Electricity Purchase Receipts were used to cross-checked with that in the Monthly Reading Records (MRRs). EG_{backup,y} is determined by readings of meter M_{backup}. Through interviewing with project owner during site visit /29/ and checking operation log /6/, it is confirmed that no electricity imported through backup line from the grid during this monitoring period. The most conservative values have been applied to calculate the electricity supplied by the project activity to the grid.

In this monitoring period, before 16/05/2015, the readings of the meters have been normally recorded by the grid company and the plant operation staff together on 24:00 of 15th of each month. From 16/05/2015 onwards, the grid company and the plant operation staff read and record the meters at 24:00 of the last day of each month. By checking the statement from local power grid company, it is confirmed that the amount of electricity from 01/11/2013 to 15/11/2013, 16/12/2013 to 31/12/2013, 16/12/2014 to 31/12/2014, 01/01/2015 to 15/01/2015 has been confirmed.

Period	EG _{export,y} (MWh)			EG _{import,y} (MWh)			EG _{backup,y} (MWh)	EG _{facility,y} (MWh)
	Measured by M1 (M2 as backup)			Measured by M1 (M2 as backup)			Measured by M _{backup}	
	MRRs	ETNs	Conservative value	MRRs	ETNs	Conservative value	value	
01/11/2013~31/12/2013	11,894.465	11,894.465	11,894.465	27.456	27.456	27.456	0	11,867.009
2014	97,312.177	97,312.177	97,312.177	209.792	209.792	209.792	0	97,102.385
2015	89,251.190	89,251.190	89,251.190	210.320	210.320	210.320	0	89,040.870
2016	107,339.760	107,339.760	107,339.760	205.920	205.920	205.920	0	107,133.840
2017	117,568.000	117,568.000	117,568.000	184.800	184.800	184.800	0	117,383.200
01/01/2018~30/04/2018	11,666.160	11,666.160	11,666.160	95.040	95.040	95.040	0	11,571.120
Total	435,031.752	435,031.752	435,031.752	933.328	933.328	933.328	0	434,098.424

Hence, the corresponding baseline emission reductions are calculated as:

Period	EG _{facility,y}	EF _{grid,CM,y}	BE _y
	MWh	tCO ₂ /MWh	tCO ₂
01/11/2013~31/12/2013	11,867.009	0.7879	9,350
2014	97,102.385	0.7879	76,506
2015	89,040.870	0.7879	70,155
2016	107,133.840	0.7879	84,410
2017	117,383.200	0.7879	92,486
01/01/2018~30/04/2018	11,571.120	0.7879	9,116
Total	434,098.424	/	342,023

Project emissions

According to registered VCS PD (version 02 dated 25/10/2012) and by checking Nameplate of hydropower turbine and generator during site visit, it is confirmed that the installed capacity of the project (Cap_{PJ}) is 36,000,000W. By checking Survey Report issued by Road Bridge Jiada Surveying Center in Dehong, Yunnan Province /22/, it is confirmed the area of the reservoir measured in the surface of the water, after the implementation of the project activity, when the reservoir is full is measured a third party in April of year 2013, 2014, 2015, 2016, 2017 and 2018 through the whole monitoring period. As per registered VCS PD (version 02 dated 25/10/2012), the power density of the project activity is calculated as: $\text{power density} = (Cap_{PJ} - Cap_{BL}) / (A_{PJ} - A_{BL})$, and parameter Cap_{BL} and A_{BL} are determined ex-ante as 0. Therefore, the power density of the project activity during this monitoring period is:

Year	Cap _{PJ} (W)	A _{PJ} (m ²)	Power Density (W/ m ²)
2013	36,000,000	2,732,305	13.176
2014	36,000,000	2,732,380	13.175
2015	36,000,000	2,732,305	13.176
2016	36,000,000	2,732,355	13.175
2017	36,000,000	2,732,385	13.175
2018	36,000,000	2,732,380	13.175

From the above table, it is concluded that the power density of the whole monitoring period are greater than 10W/m². Therefore, based on ACM0002, Version 12.1.0, the project emission (PE_y) = 0 tCO₂e.

Leakages

Leakage does not need to be accounted for this project as per the VCS PD (version 02 dated 25/10/2012).

Emission reductions

The emission reductions for this monitoring period was calculated as:

Monitoring period	GHG emission reductions or removals (tCO ₂ e)
01/11/2013~31/12/2013	9,350
2014	76,506
2015	70,155
2016	84,410
2017	92,486
01/01/2018~30/04/2018	9,116
Total ERs claimed (in 1642 days)	342,023

Comparison of actual emission reductions or net anthropogenic GHG removals by sinks with estimates in validated VCS PD

The emission reductions claimed are 342,023 tCO₂e in this monitoring period (i.e. 1642 days). Compared with expected emission reductions 509,195 tCO₂e (calculated as 113,189 tCO₂e/365d × 1642d) in the VCS PD, the reported emission reductions in this monitoring period are 32.83% less than the expected, which is due to less water flow caused by the rainfall in the monitoring period and considered to be in the reasonable variation range.

CTI is able to confirm that the actual power supply and also emission reductions reported in this monitoring period are reasonable and appropriate. CTI verified the input data for calculating emission reductions and the calculating process, and confirmed the result were complete and transparent.

4.5 Quality of Evidence to Determine GHG Emission Reductions and Removals

All necessary documentations are collected, referenced and aggregated, which is easily accessible in hard-copy or electronic format. Measurements are performed by calibrated equipment, and the key data can also be cross-checked via other sources, such as records, receipts and inventory data. No assumptions are used that have any material influence on reported emission reductions.

CTI concludes that during this monitoring period, the evidences for determination of emission reductions are sufficient and reasonable, and the calculation of emission reductions is reliable.

4.6 Non-Permanence Risk Analysis

The project is not AFOLU project, and thus non-permanence risk analysis is not applicable for the project.

5 VERIFICATION CONCLUSION

Shenzhen CTI International Certification Co., Ltd (CTI) has performed the verification of the emission reductions that have been reported for the project activity “Yunnan Mangli Hydropower Project” in China (VCS Project ID: 928) for the period 01/11/2013 to 30/04/2018.

The verification is based on the baseline and monitoring methodology ACM0002 (Version 12.1.0), VCS PD (version 02 dated 25/10/2012) and the monitoring report (version 3.0 dated 25/11/2021). The verification consisted of the following three phases: i) desk review of the project design and the baseline and monitoring plan; ii) follow-up interviews with project stakeholders; iii) resolution of outstanding issues and the issuance of the final verification and certification report.

The project proponents are responsible for the collection, calculation and determination of the GHG data in accordance with the monitoring plan and the reporting of GHG emission reductions on the basis set out within the project monitoring report.

Our verification approach was based on the requirements as defined under the applicable VCS Version 4 and relevant UNFCCC requirements. Our approach is risk-based, drawing on an understanding of the risks associated with reporting GHG emissions data and the controls in place to mitigate these. The verification can confirm that:

- the project is implemented and operated as per the VCS PD;
- the monitoring plan in VCS PD is as per the applied methodology;
- the monitoring complies with the monitoring plan in the VCS PD;
- the monitoring report and other supporting documents provided are complete and verifiable and in accordance with the applicable VCS Version 4 and CDM requirements;
- the installed equipment being essential for generating emission reduction runs reliably and is calibrated appropriately;
- the monitoring system is in place and generates GHG emission reductions data;
- the GHG emission reductions are calculated without material misstatements.

It is CTI's responsibility to provide an independent verification statement on the reported GHG emission reductions for the project. Based on an understanding of the risks associated with reporting of GHG emission data and the controls in place to mitigate these, CTI planned and performed our work to obtain the information and explanations that we considered necessary to provide reasonable assurance that reported GHG emission reductions are fairly stated.

CTI does not assume any responsibility towards the issuance and utilization of the VCUs hereby verified and certified. Request for issuance of VCUs shall be made by the project proponent to an approved VCS Program Registry based on the requirements set out under the most recent version of the VCS Program Guidelines clause on VCS Registration.

The verification of reported emission reductions is based on the information made available to CTI and the engagement conditions detailed in this report. CTI cannot be held liable by any party for decisions made or not made based on this report.

In CTI's opinion the GHG emissions reductions of the "Yunnan Mangli Hydropower Project" for the period 01/11/2013 to 30/04/2018 are fairly stated in the monitoring report (version 3.0 dated 25/11/2021). The GHG emission reductions were calculated correctly on the basis of the approved methodology ACM0002 (Version 12.1.0) and the monitoring plan contained in the VCS PD (version 02 dated 25/10/2012).

CTI can confirm that the GHG emission reductions are calculated without material misstatements. Based on the evidence and information that are considered necessary to guarantee that GHG emission reductions are appropriately calculated, CTI confirms the following statement:

Verification period: From 01/11/2013 to 30/04/2018

Verified GHG emission reductions and removals in the above verification period:

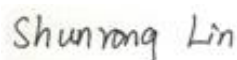
Year	Baseline emissions or removals (tCO ₂ e)	Project emissions or removals (tCO ₂ e)	Leakage emissions (tCO ₂ e)	Net GHG emission reductions or removals (tCO ₂ e)
01/11/2013~31/12/2013	9,350	0	0	9,350
2014	76,506	0	0	76,506
2015	70,155	0	0	70,155
2016	84,410	0	0	84,410
2017	92,486	0	0	92,486
01/01/2018~30/04/2018	9,116	0	0	9,116
Total	342,023	0	0	342,023



Ms. Wang Guolian

Team Leader

25/11/2021



Ms. Lin Shunrong

Technical Reviewer

25/11/2021

APPENDIX A: ABBREVIATIONS

CAR	Corrective Action Request
CER	Certified Emission Reduction(s)
CL	Clarification request
CO ₂	Carbon Dioxide
CO ₂ e	Carbon Dioxide Equivalent
CTI	Shenzhen CTI International Certification Co., Ltd
DOE	Designated Operational Entity
EF	Emission Factor
ER	Emission Reduction
FAR	Forward Action Request
GHG	Greenhouse Gas(es)
MP	Monitoring Period
MR	Monitoring Report
CSPG	China Southern Power Grid
PD	Project Description
PP	Project Proponent
VCS	Verified Carbon Standard
VCU	Verified Carbon Unit

APPENDIX B: REFERENCES

Documentation used to verify the information provided by the project proponents

- /1/ Climate Bridge (Shanghai) Ltd.: VER/VCU Monitoring Report for Yunnan Mangli Hydropower Project, version 1.0 dated 26/08/2021, version 2.0 dated 22/09/2021, version 3.0 dated 25/11/2021
- /2/ Climate Bridge (Shanghai) Ltd.: Emission reduction calculation spreadsheet for Yunnan Mangli Hydropower Project, version 1.0 dated 26/08/2021, version 2 dated 22/09/2021, version 3 dated 25/11/2021.
- /3/ Datang Mangli Hydropower Development Company Limited and Yunnan Power Grid Co., Ltd. Dehong Power Supply Bureau: Power Purchase Agreement for Yunnan Mangli Hydropower Project.
- /4/ Datang Mangli Hydropower Development Company Limited: VER monitoring manual and management procedure.
- /5/ Datang Mangli Hydropower Development Company Limited: Records of training for on-site staff.
- /6/ Datang Mangli Hydropower Development Company Limited: Operation log, from 01/11/2013 to 30/04/2018.
- /7/ Datang Mangli Hydropower Development Company Limited: Monthly reading records (MMRs) of Yunnan Mangli Hydropower Project from 01/11/2013 to 30/04/2018.
- /8/ Yunnan Power Grid Co., Ltd. Dehong Power Supply Bureau: Electricity Transaction Notes (ETNs) of Electricity supplied by the project activity to the grid from 01/11/2013 to 30/04/2018.
- /9/ Yunnan Power Grid Co., Ltd. Dehong Power Supply Bureau: Electricity Purchase Receipts of Electricity imported by the project activity from the grid from 01/11/2013 to 30/04/2018.
- /10/ Climate Bridge (Shanghai) Ltd.: revised CDM PDD approved by CDM EB, version 03 dated 06/08/2012.
- /11/ Climate Bridge (Shanghai) Ltd.: Registered VCS PD version 02 dated 25/10/2012.
- /12/ Bureau Veritas Certification Holding SAS: VCS Verification Report, version 01 dated 08/11/2012.
- /13/ registered CDM PDD version 02 dated 28/12/2010.
- /14/ Yunnan Provincial Market Supervision Administration: Accreditation certificate of Yunnan

- Power Grid Co., Ltd. Dehong Metrology Center issued on 25/12/2009 valid till 24/12/2014, issued on 25/12/2014 valid till 24/12/2019.
- /15/ Yunnan Power Grid Co., Ltd. Dehong Metrology Center: Calibration certificates for meters covering this monitoring period.
- /16/ State Economic and Trade Commission: Technical administrative code of electric energy metering (DL/T 448-2016).
- /17/ Bureau Veritas Certification Holding SAS: the Validation Opinion on revised CDM PDD approved by CDM EB, version 01 dated 10/09/2012.
- /18/ Datang Mangli Hydropower Development Company Limited: nameplate of the equipment
- /19/ DNV Climate Change and Environmental Services: the Validation Report of registered CDM PDD, version 03 dated 05/10/2011.
- /20/ Climate Bridge (Shanghai) Ltd.: VER/VCU Monitoring Report for Yunnan Mangli Hydropower Project of previous monitoring period, version 02 dated 25/10/2012.
- /21/ Technical Specification of Equipment Contract signed between Datang Mangli Hydropower Development Company Limited and Shandong Angli Tiansheng Photovoltaic Technology Co., Ltd..
- /22/ Road Bridge Jiada Surveying Center in Dehong, Yunnan Province: Survey Report of the area of the reservoir measured in the surface of the water, after the implementation of the project activity, when the reservoir is full of year 2013 ~ 2018.
- /23/ Statement from local power grid company about the amount of electricity from 01/11/2013 to 15/11/2013, 16/12/2013 to 31/12/2013, 16/12/2014 to 31/12/2014, 01/01/2015 to 15/01/2015.

Methodologies, tools and other guidance

- /24/ Verified Carbon Standard: VCS Standard, version 4.1.
- /25/ Verified Carbon Standard: VCS Program Guide, version 4.0.
- /26/ Verified Carbon Standard: VCS Sectoral Scopes
- /27/ Verified Carbon Standard: Registration and Issuance Process, version 4.0.
- /28/ UNFCCC EB: Approved methodology, ACM0002, Version 12.1.0

Persons interviewed

- /29/ Mr. He Youliang, General Manager, Datang Mangli Hydropower Development Company Limited
- Ms. Li Lin, Director, Safety Production Department of Datang Mangli Hydropower

Development Company Limited

Ms. Zhou Ying, Duty Staff, Safety Production Department of Datang Mangli Hydropower Development Company Limited

Mr. Xu Mingrui, Staff, General Department of Datang Mangli Hydropower Development Company Limited

Ms. Zhao Qing, Staff, Local Environment Protection Bureau

Mr. Jin Xiaosan, Villager, local resident

APPENDIX C: CORRECTIVE ACTION REQUESTS, CLARIFICATION REQUESTS AND FORWARD ACTION REQUESTS

Table 1: Corrective Action Requests

CAR ID	Corrective Action Request	Response by Project Proponent	Verification Team Assessment
01	Please supplement the monitoring information of meter M2 and M _{backup} , including type, serial, accuracy, installed location, calibration etc.	The monitoring information of meter M2 and M _{backup} , including type, serial, accuracy, installed location has been supplemented in the monitoring report.	By checking VCS MR (version 3.0 dated 25/11/2021), it is confirmed that the monitoring information of meter M2 and M _{backup} , including type, serial, accuracy, installed location has been correctly supplemented. Therefore, CAR 01 was closed.

Table 2: Clarification Requests

CL ID	Clarification Request	Response by Project Proponent	Verification Team Assessment
01	A deviation was identified for the crediting period of the Project in the Monitoring Report (version 1.0 dated 26/08/2021). PP is requested to clarify the first crediting period from 25/01/2010~24/01/2020.	The deviation about the duration of first crediting period has been supplemented in the monitoring report.	By checking VCS MR (version 3.0 dated 25/11/2021), it is confirmed that a deviation about the duration of first crediting period has been supplemented. The project is registered under VCS Version 3.2 and completed validation before 19/03/2020. As per VCS requirement, 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 (theoretically the maximum VCS crediting period is 30 years, from 25/01/2010 to

			24/01/2040). Therefore, the first renewable crediting period of the Project is updated from 25/01/2010 - 06/10/2011 to 25/01/2010 - 24/01/2020, which lasts for 10 years. Therefore, CL 01 was closed.
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Table 3: Forward Action Requests

FAR ID	Forward Action Request	Response by Project Proponent	Verification Team Assessment
NA	NA	NA	NA