



VOLUNTARY CARBON STANDARD 2007.1

VERIFICATION REPORT

AZHU HYDRO POWER PROJECT IN GUIZHOU PROVINCE, CHINA

**Monitoring Period: 2008-07-26 to 2010-02-25
(incl. both days)**

Report No: 8000386670 - 10/246

Date: 2010-09-13

TÜV NORD CERT GmbH
JI/CDM Certification Program
Langemarckstraße, 20
45141 Essen, Germany
Phone: +49-201-825-3335
Fax: +49-201-825-3290
www.tuev-nord.de
www.global-warming.de

Name of Verification company:	Date of the issue:
TÜV NORD CERT GmbH	2010-09-13
Report Title:	Approved by:
Azhu Hydro Power Project in Guizhou Province, China	Rainer Winter
Client:	Project Title:
Guizhou Zhongshui Hengyuan Project Management and Consulting Co., Ltd.	Azhu Hydro Power Project in Guizhou Province, China
Summary:	
Guizhou Zhongshui Hengyuan Project Management and Consulting Co., Ltd. has commissioned the TÜV NORD JI / CDM Certification Program to carry out the verification of the Project "Azhu Hydro Power Project in Guizhou Province, China" in Liupanshui city, Guizhou Province, China with regard to the requirements of VCS 2007.1 Standard. The project is a hydropower project generating electricity to displace electricity provided by China Southern Power Grid that is dominated by fossil fuel fired plants and thus achieves GHG emission reduction. Reporting period: From 2008-07-26 to 2010-02-25. In the course of the verification 2 Corrective Action Requests (CARs) were successfully closed. The verification is based on the draft monitoring report, revised monitoring report, the monitoring plan as set out in the validated PD, the validation report, emission reduction calculation spreadsheet and supporting documents made available to the TÜV NORD JI/CDM CP by the project participant. As the result of the 2nd periodic verification, the verifier confirms that the GHG emission reductions are calculated without material misstatements in a conservative and appropriate manner. TÜV NORD JI/CDM CP herewith confirms that the project has achieved emission reductions in the above mentioned reporting period as follows: Emission reductions 135,778 t CO2 equivalents	
Work carried out by:	Number of pages:
Li Yongjun; Huang Jessica Zhang Nancy; Stöhr Christina Yu Miao; Winter Rainer	27

Abbreviations

BAU	Business as usual
CA	Corrective Action / Clarification Action
CAR	Corrective Action Request
CDM	Clean Development Mechanism
CO₂	Carbon dioxide
CO_{2e}	Carbon dioxide equivalent
CP	Certification Program
CL	Clarification Request
CSPG	China Southern Power Grid
DNA	Designated National Authority
EB	CDM Executive Board
EIA	Environmental Impact Assessment
ER	Emission Reduction
FAR	Forward Action Request
GHG	Greenhouse gas(es)
GWP	Global Warming Potential
IPCC	Intergovernmental Panel on Climate Change
MP	Monitoring Plan
MR	Monitoring Report
QC/QA	Quality control/Quality assurance
UNFCCC	United Nations Framework Convention on Climate Change
VCS	Voluntary Carbon Standard
VCS - PD	VCS - Project Description
VCU	Voluntary Carbon Unit
VVM	Validation and Verification Manual

Table of Contents	Page
1 INTRODUCTION.....	5
1.1 Objective	5
1.2 Scope and Criteria.....	5
1.3 VCS Project Description	6
1.3.1 Project Characteristics.....	6
1.3.2 Project Location	6
1.3.3 Technical Project Description	6
1.3.4 Appointment of team members and technical reviewer	8
1.4 Level of Assurance.....	9
2 METHODOLOGY	10
2.1 Review of Project Documentation.....	11
2.2 On-Site Assessment.....	11
2.2.1 Review of Performance Records	11
2.2.2 Follow-up Interviews	11
2.2.3 Collection of Measurements	12
2.2.4 Observation of established practices and testing of the accuracy of monitoring equipment	12
2.3 Determination of the reductions in GHG emissions.....	14
2.4 Review of additional data from other sources if appropriate	14
2.5 Review of monitoring results and verification of the correct application of monitoring methodologies	14
2.6 Resolution of any material discrepancy.....	14
3 VERIFICATION FINDINGS	16
3.1 Remaining issues, including any material discrepancy, from previous validation.....	16
3.2 Project implementation.....	17
3.3 Completeness of monitoring.....	17
3.4 Accuracy of emission reduction calculations	19
3.5 Quality of evidence to determine emission reductions	22
3.6 Management and operational system.....	22
4 VERIFICATION STATEMENT	24
5 REFERENCES.....	25

1 INTRODUCTION

The Guizhou Zhongshui Hengyuan Project Management and Consulting Co., Ltd. has commissioned the TÜV NORD JI/CDM Certification Program to carry out the verification of the project:

“Azhu Hydro Power Project in Guizhou Province, China”

with regard to the relevant requirements of the Voluntary Carbon Standard 2007.1^{/VCS/}. The verifiers have reviewed the implementation of the monitoring plan (MP) in the registered VCS project for the monitoring period 2008-07-26 to 2010-02-25,

The applied monitoring methodology is ACM 0002 “Consolidated baseline methodology for grid-connected electricity generation from renewable sources” version 07.

1.1 Objective

The purpose of this verification, by independent checking of objective evidence, is as follows:

- to verify that the project is implemented as described in the project design document;
- to assess the implementation of the monitoring plan (MP) content in the VCS-PD;
- to assess the project's compliance with other relevant rules, including the host country (India) legislation;
- to confirm that the monitoring system is implemented and fully functional to generate voluntary emission reductions (VERs / VCUs) without any double counting; and
- to establish that the data reported are accurate, complete, consistent, transparent and free of material error or omission by checking the monitoring records and the emissions reduction calculation.

1.2 Scope and Criteria

The verification of this project is based on the validated project design document^{/VCS-PD/}, the monitoring report^{/MR/}, emission reduction calculation spread sheet^{/XLS/}, supporting documents made available to the verifier and information collected through performing interviews and during the on-site assessment. Furthermore publicly available information was considered as far as available and required.



The TÜV NORD JI/CDM CP has employed a risk-based approach in the verification, focusing on the identification of significant risks and reliability of project monitoring and generation of emission reductions.

1.3 VCS Project Description

1.3.1 Project Characteristics

Essential data of the project is presented in the following Table 1-1.

Table 1-1: Project Characteristics

Item	Data
Project title	Azhu Hydro Power Project in Guizhou Province, China
Project owner	Azhu Generate Electricity Co.,Ltd of Liupanshui Tuoyuan Group Co.Ltd
Any specific project categories	☐ Mega project ($> 10^6$ t CO _{2eq} / a) ☐ Micro project (< 5000 t CO _{2eq} / a) ☐ AFOLU project ☐ Grouped project ☒ No specific project category
VCS PD dated	Draft: 2008-08-20 Final: 2009-06-08
Applied Methodology	ACM 0002 "Consolidated baseline methodology for grid-connected electricity generation from renewable sources" version 07.
Project starting date	2006-06-20
Crediting period	☐ Renewable Crediting Period (7 y) ☒ Fixed Crediting Period (10 y)
Start of crediting period	2006-06-20

1.3.2 Project Location

The details of the project location are given in table 1-2:

Table 1-2: Project Location

No.	Project Location
Host Country	P.R China
Region:	Guizhou Province
Project location address:	Longchang, Liuzhi especial region, Liupanshui city
Latitude:	26°20' 02" N
Longitude:	105°27' 47" E

1.3.3 Technical Project Description

The project utilises hydro resource of Sancha River to generate electricity. The total installed capacity is 27 MW (2×13.5MW). The main constructions are: barrage, steel penstock, power plant, and booster station. The height of dam is 40 m; length of

penstock is 46.366 m. The flux used for power generation is 122m³/s, and the weighted average water head is 26m. The estimated annual electricity generation in PD is 122,000 MWh, the annual net electricity supplied to the grid is 110,000 MWh. The electricity generated by the project displaces the electricity provided by China Southern Power Grid that is dominated by fossil fuel fired plants and thus achieves GHG emission reduction.

The key parameters of the project are given in table 1-3:

Table 1-3a: Technical data of the project

Turbine		
Manufacturer		Fujian Jiuzhou Nanping Mechanical & Electric Co., Ltd
Type		HLN276-LJ-305
Quantity		2
Rated Water Head	m	26
Rated Rotation:	r/min	136.4
Designed Flow Rate:	m ³ /s	59.32
Generator		
Manufacturer		Fujian Jiuzhou Nanping Mechanical & Electric Co., Ltd
Type		SF13.5-44/6100
Quantity		2
Single Capacity	MW	13.5
Rated Power Coefficient		0.8
Rated Voltage	kV	6.3

Table 1-3b: Parameters confirmed during verification

Turbine	Turbine		
Manufacturer	Manufacturer		Fujian Jiuzhou Nanping Mechanical & Electric Co., Ltd
Type	Type		HLN276-LJ-305
Quantity	Quantity		2
Rated Water Head	Rated Water Head	m	26
Rated Rotation:	Rated Rotation:	r/min	136.4
Rated Flow Rate:	Designed Flow Rate:	m ³ /s	59.32
Generator	Generator		
Manufacturer:	Manufacturer:		Fujian Jiuzhou Nanping Mechanical & Electric Co., Ltd
Type:	Type:		SF13.5-44/6100
Quantity:	Quantity:		2



Single Capacity:	Single Capacity:	MW	13.5
Rated Power Coefficient	Rated Power Coefficient	MW	0.8
Roted Voltage	Roted Voltage		6.3

1.3.4 Appointment of team members and technical reviewer

On the basis of a competence analysis and individual availabilities a verification team was appointed. Furthermore also the personnel for the technical review and the final approval was determined.

The list of involved personnel, the tasks assigned and the qualification status are summarized in the table 1-4 below.

Table 1-4: Involved Personnel

	Name	Company	Function ¹⁾	Qualification Status ²⁾	Scheme Competence	Technical Competence ⁴⁾	Host Country Competence	Team Leading Competence
☒ Mr. ☐ Ms.	LI, Yong Jun	TÜV NORD China	TL	SA	☒		☒	☒
☐ Mr. ☒ Ms.	HUANG, Jessica	TÜV NORD China	TM	E	☒	S	☒	☐
☐ Mr. ☒ Ms.	ZHANG Nancy	TÜV NORD China	TM	E	☒		☒	☐
☐ Mr. ☒ Ms.	YU, Miao	TÜV NORD China	TM	T	☐	S	☒	☐
☐ Mr. ☒ Ms.	Stöhr, Christina	TÜV NORD Cert GmbH	TR ³⁾	-	☐		☐	☐
☒ Mr. ☐ Ms.	Winter, Rainer	TN CERT	TR ³⁾ /FA	SA	☒	S	☐	☒

¹⁾ TL : Team Leader; TM : Team Member, TR: Technical review; FA: Final approval;

²⁾ GHG Auditor Status: A : Assessor; E : Expert; SA: Senior Assessor; T : Trainee; TE Technical Expert

³⁾ No team member

⁴⁾ As per S01-MU03 or S01-VA070 A2 (such as A, B, C.....)

1.4 Level of Assurance

The verification report is based on VCS PD, Monitoring report, supporting documents made available to the verifier and information collected through performing interviews and during the on-site assessment. The verification opinion is assured provided the credibility of the documentation submitted by the PP.

The verification has been planned and organized to achieve a

☒ Reasonable level of assurance

☐ Limited level of assurance.

2 METHODOLOGY

The verification of the project consisted of the following steps:

- Contract review
- Appointment of team members and technical reviewers
- Publication of the monitoring report
- Desk review of the Monitoring Report^{MR/} submitted by the client and additional supporting documents.
- Verification planning,
- On-Site assessment,
- Background investigation and follow-up interviews with personnel of the project developer and its contractors,
- Draft verification reporting
- Resolution of corrective actions (if any)
- Final verification reporting
- Technical review
- Final approval of the verification.

The sequence of the verification is given in the table 2.1 below:

Table 2.1: Verification sequence

Topic	Time
Assignment of verification	2010-05-21
On-site visit	2010-05-27
Draft reporting finalised	2010-06-10
Technical review on draft reporting finalised	-
Final reporting finalised	2010-07-01
Technical review on final reporting finalised	2010-09-09
Final corrections	2010-09-13

The main verification steps are described below.

2.1 Review of Project Documentation

The VCS PD ^{/VCS-PD/} and supporting background documents related to the project design and baseline were reviewed.

Furthermore, the verification team used additional documentation by third parties like host party legislation, technical reports referring to the project design or to the basic conditions and technical data.

The references used in the course of this verification are summarized in section 5.

2.2 On-Site Assessment

2.2.1 Review of Performance Records

During the on-site verification on 2010-05-27, the verification team checked the project operation record and daily generation record ^{/LOG/}, Meter Reading record ^{/MRS/}, Operation & Maintenance procedures and corresponding records ^{/O&M/}, Operation Manual ^{/OAV/}, Management system Internal Audit report ^{/QAV/}, Project Management procedures ^{/QAV/}, Troubleshooting procedure ^{/QAV/}, Monthly Electricity Balance record ^{/RPR/}, calibration record ^{/CAL/}. These documents and records show that the parameters that need to be monitored acc. to the monitoring plan have been monitored. The location of the monitoring meters, the monitoring frequency, the meters' accuracy, and the working allocation are consistent with the description in the monitoring plan.

2.2.2 Follow-up Interviews

The verification team has carried out interviews in order to assess the information included in the project documentation and to gain additional information regarding the compliance of the project with the relevant criteria applicable for the VCS.

During verification the verification team has performed interviews to confirm selected information and to resolve issues identified in the document review. The main topics of the interviews are summarized in Table 2-2.

Table 2-2: Interviewed persons and interview topics

Interviewed Persons / Entities	Interview topics
Project proponent representatives ^{/IM01/} Project consultant ^{/IM02/}	- General aspects of the project - Technical equipment and operation - Changes since validation - Monitoring and measurement equipment - Remaining issues from validation / previous verifications

Interviewed Persons // Entities	Interview topics
	- Calibration procedures - Quality management system - Involved personnel and responsibilities - Training and practice of the operational personnel - Implementation of the monitoring plan - Monitoring data management - Data uncertainty and residual risks - GHG calculation - Procedural aspects of the verification - Maintenance - Environmental aspects - Editorial issues of the Monitoring Report

A comprehensive list of all interviewed persons is part of section 5 'References'.

2.2.3 Collection of Measurements

The verification team checked and collected the measurement records of $EG_{P \text{ to } G}$ (electricity delivered to the grid), $EG_{G \text{ to } P}$ (electricity imported from the grid), TEG_y (total electricity generated by the project activity), Cap_{pj} (installed capacity of the proposed project), and A_{PJ} (surface area at the full reservoir level). This measurement was recorded by the appointed persons in the monitoring plan. The persons received relevant trainings and are qualified by the grid company. The data of $EG_{P \text{ to } G}$ and $EG_{G \text{ to } P}$ is recorded hourly by the gateway meters (M3 and M4) installed at the outlet of the project station. TEG_y is recorded hourly by the meters (M1 and M2) installed at the outlet of the generators. Finally the data will be saved in the recording form and as electronic file. These records lead to the monthly records. The recording frequency is in line with the description in the MP. The cut-off time for the monthly report is 9 am. Cap_{pj} has been recorded after the implementation of the project activity. No replacement of main equipment happened during the 1st and 2nd monitoring period, which is confirmed by on-site visiting and checking the maintenance records. So Cap_{pj} is remained as 27MW. The measuring for A_{PJ} was implemented by Guizhou provincial Water Resources and Hydropower Investigation and Design Institute and will be carried out annually. The institute is authorized by State Bureau of Surveying and Mapping to provide the service with the necessary expertise. The qualification certificate^{/CAL/} of the institute has been checked by the verification team.

2.2.4 Observation of established practices and testing of the accuracy of monitoring equipment

The two bi-direction meters M3 and M4 are installed at the outlet of the project station to measure $EG_{P \text{ to } G}$ and $EG_{G \text{ to } P}$. The monthly Balance Advice Note (BAN) is



issued by the local grid company, according to the metering record collected from the meters M3 and M4. The staff recorded the meter reading hourly and aggregated it into monthly reports. The cut-off time for the monthly reports is at 9:00 on the 25th of every month. The monthly reports are confirmed by the Grid Company and PP. The monthly Balance Advice Note (BAN) will be Issued afterwards.

The two meters M1 and M2 are installed at the outlets of the two generators respectively to monitor TEG_y .

The accuracy of M3 and M4 is 0.5S, and for M1 and M2, it is 2. M1 and M2 are backup meters for M3 and M4. Once M3 or M4 break down the data recorded by M1 and M2, deducting the internal consumption, will be used to issue the Balance Advice Note (BAN).

Table 2-3: Key meters information

Item	Serial No.	Type	Accuracy	Calibration date	Valid until	Calibration entity
M1	2004-980085	DS862-2	2	05/06/2008 05/06/2009	27/07/2013	Guizhou Power Grid Corporation Liupanshui Power Supply Bureau
M2	2004-980092	DS862-2	2	05/06/2008 05/06/2009	27/07/2013	
M3	100360	DY 3050A	0.5S	09/05/2008 09/05/2009	08/05/2012	
M4	100359	DY 3050A	0.5S	05/06/2008 09/05/2009	08/05/2012	

The measuring A_{PJ} is implemented by Guizhou provincial Water Resources and Hydropower Investigation and Design Institute annually. The Design Institute is authorized by State Bureau of Surveying and Mapping to provide the service with the necessary expertise.

No emergency caused by flood nor breakdown of main equipments happened during the 2nd monitoring period^{/LOG/}.

During the 2nd monitoring period, the net power supplied to the grid is 174338.25 MWh. The net electricity supplied was verified by the verification team

during the on site visit by checking the Monthly Meter reading records^{/RPR/} and Daily Meter reading records^{/MRS/} that were derived from meter reading records. The data was also cross checked with the electricity Balance Advice Note.

2.3 Determination of the reductions in GHG emissions

The emission reduction was calculated according to the formula indicated in the methodology ACM0002 (Version 07) and the "Tool to calculate the emission factor for an electricity system" (version 1.1).

In the methodology, the baseline emission is electricity delivered to the grid by the project activity that would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources, as reflected in the combined margin (CM) calculations described in the "Tool to calculate the emission factor for an electricity system". The emission reduction is the baseline emission minus the project emission minus leakage.

The $EF_{grid,CM,y}$, it is ex-ante calculated in the PD, and remains fixed throughout the crediting period as 0.8712 tCO_{2e}/MWh.

2.4 Review of additional data from other sources if appropriate

Except for A_{PJ} , all data ($EG_{P to G}$, $EG_{G to P}$, TEG_y) are monitored by the project owner. The Emission factor was ex-ante calculated in the PDD and remains fixed during the crediting period. The data for A_{PJ} was measured by Guizhou provincial Water Resources and Hydropower Investigation and Design Institute annually that is qualified by State Bureau of Surveying and Mapping to provide the service with the necessary expertise.

2.5 Review of monitoring results and verification of the correct application of monitoring methodologies

The verification team has carried out interviews in order to assess the information included in the project documentation and to gain additional information regarding the compliance of the project with the relevant criteria applicable for the VCS.

2.6 Resolution of any material discrepancy

Material discrepancies identified in the course of the verification are addressed either as CARs, CLs or FARs.

A **Corrective Action Request (CAR)** is established where:

- mistakes have been made in assumptions, application of the methodology or the project documentation which will have a direct influence the project results,
- the requirements deemed relevant for verification of the project with certain characteristics have not been met or
- there is a risk that the project would not be registered or that emission reductions would not be able to be verified and certified.

A **Clarification Request (CL)** will be issued where information is insufficient, unclear or not transparent enough to establish whether a requirement is met.

A **Forward Action Request (FAR)** will be issued when certain issues related to project implementation should be reviewed during the first verification.

A detailed list of the CARs CLs and FAR raised and discussed in the course of this verification is included in the next section 3 of this report.

3 VERIFICATION FINDINGS

In this section the assessments and findings from the desk review of the VCS PD, site visit, interviews and supporting documents as well as the final assessments are summarised. Table 3-1 includes an overview of all raised CARs, CLs and FARs.

Table 3-1: Overview of CARs, CLs and FARs issued

No.	Topic / Chapter	CAR	CL	FAR
3.1	Remaining issues, including any material discrepancy			
3.2	Project implementation			
3.3	Completeness of monitoring	1		
3.4	Accuracy of emission reduction calculations	1		
3.5	Quality of evidence to determine emission reductions			
3.6	Management and operational system			
-	SUM	2	0	0

3.1 Remaining issues, including any material discrepancy, from previous validation

Description

There is no open issue indicated in previous verification. The 1st verification report published on VCS website was checked by the verification team.

Related Findings

- ☒ No CARs, CLs or FARs have been identified in this context
- ☐ The following finding(s) have been addressed:

Final Assessment

The previous validation report have been checked by the verification team, and no remaining issues was found.

3.2 Project implementation

Description

The project utilizes water to generate electricity and supplies power to the China Southern Power Grid (CSPG) that is dominated by the fossil fuel power plants. The operation of the project commenced on 26 Jun 2006. The total installed capacity is 27 MW (2×13.5MW). The main constructions are: barrage, steel penstock, power plant, and booster station..

During the monitoring period covering 2008-07-26 to 2010-02-25 the project exported 174,338.25 MWh of net electricity to the South China Power Grid. This was verified by the verification team during the on site visit by checking the daily generation record ^{/LOG/}, Meter Reading record ^{/MRS/}, Operation & Maintenance procedures and corresponding record ^{/O&M/}, Operation Manual ^{/QAJ/}, balance advice note ^{/BAN/}. Moreover, in order to make sure the measurement is accurate and reliable, the verification team also checked the meter calibration certificates ^{/CAL/}, the qualification certificate of the entity conducting the calibration ^{/CAL/}, record of internal audit ^{/QAJ/}, Project Management procedures ^{/QAJ/}, and Troubleshooting procedure ^{/QAJ/}.

Based on the on-site visit and the project documentation reviewed by the verification team, it can be confirmed that technology, the equipment, the work allocation, the metering devices, and the QA/QC procedure to ensure the monitoring are all consistent with the description in the PD.

Related Findings

- ☒ No CARs, CLs or FARs have been identified in this context
- ☐ The following finding(s) have been addressed:

Final Assessment

By visiting project site and reviewing documents, the verification team confirmed that the project was implemented in line with the registered monitoring plan.

3.3 Completeness of monitoring

Description

All monitored parameters $EG_{P \rightarrow G}$ (electricity delivered to the grid), $EG_{G \rightarrow P}$ (electricity imported from the grid), TEG_y (total electricity generated by the project activity), Cap_{pj} (installed capacity of the proposed project), and A_{PJ} (surface area at the full reservoir level) required by the monitoring plan have been monitored during the 2nd monitoring period.

The two bi-direction meters M3 and M4 are installed at the outlet of the project station to measure $EG_{P \rightarrow G}$ and $EG_{G \rightarrow P}$. The Balance Advice Note (BAN) is issued, based on the meter reading of M3 and M4. The other two meters M1 and M2 are installed at the outlets of the two generators respectively to monitor TEG_y . Once M3 and M4 breaks down, the measure record from M1 and M2, deducting the internal consumption, will be used to issue the Balance Advice Note (BAN).

These meter readings from M1, M2, M3 and M4 were recorded hourly by the appointed persons in the monitoring plan. They filled these measurements in the recording form and an electronic file was generated. These records were aggregated into monthly records. These persons receive relevant trainings and are qualified by grid company. The recording frequency is in line with the description in the MP.

The Cap_{pj} has been recorded yearly after the implementation of the project activity. Since no retrofit or replacement occurred to the turbines and generators, the value of Cap_{pj} remains as 27MW.

The measuring for A_{PJ} was implemented by Guizhou provincial Water Resources and Hydropower Investigation and Design Institute annually. The institute is authorized by State Bureau of Surveying and Mapping to provide the service with the necessary expertise.

All locations of monitoring meters, and recording frequencies comply with the monitoring report and the applied methodology. The monitoring procedures have been implemented appropriately and no malfunction happened during 2nd monitoring period.

However, CL 3.3-1 was raised.

Related Findings

☐ No CARs, CLs or FARs have been identified in this context

☒ The following finding(s) have been addressed:

Classification	☒ CAR	☐ CL	☐ FAR
Description of finding <i>Describe the finding in unambiguous style; address the context (e.g. section)</i>	The meter calibration time and frequency shall be specified in the Monitoring Report. The power connection diagram indicating the location of the meters shall be added to the monitoring report.		



Corrective Action #1 <i>This section shall be filled by the PP. It shall address the corrective action taken in details.</i>	The meter calibration time and frequency had been provided in section 4 of MR, and also the power connection diagram has been submitted.
DOE Assessment #1 <i>The assessment shall encompass all open issues in annex A-2. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.</i>	The calibration frequency is once a year and it has been added into the 4.1 QA/QC procedures of the PDD. The frequency complies with the national standards. The table 4.2 information about the meters has been added to section 4 of the monitoring report. The information in the table covers the meters' location and calibration time. The information in the table has been crosschecked with the documents reviewed during on-site visit by verification team and is confirmed as correct.
Conclusion <i>Tick the appropriate checkbox</i>	☐ to be checked during the next periodic verification ☒ Appropriate action was taken ☒ Project documentation was corrected correspondingly ☐ Additional action should be taken ☐ The project complies with the requirements

Final Assessment

The CAR 3.3-1 has been successfully closed. By visiting project site and reviewing documents, the verification team confirmed that all monitored parameters required by the methodology have been monitored.

3.4 Accuracy of emission reduction calculations

Description

The emission reduction spreadsheet has been provided to the verification team. The emission reduction is calculated as the baseline emission minus the project emission minus leakage. According to the ACM 0002 ver07, the baseline emission is electricity delivered to the grid by the project activity that would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources, as reflected in the Emission factor calculations described in the "Tool to calculate the emission factor for an electricity system". The EF_{CM} is ex-ante calculated as 0.8712 tCO_{2e}/MWh in the PD. Leakage does not have to be considered acc. ACM0002.

The power density of the project is equal to 9.99W/m². The project emission is calculated as the default emission factor for emissions from reservoirs multiplied by total electricity produced by the project activity, and then divided by 1000. The default emission factor for emissions from reservoirs is determined as 90 kgCO_{2e}/MWh by the methodology ACM0002 ver 07.

The data used to calculate the emission reduction were measured by M1, M2, M3, and M4. The accuracy of M3 and M4 is 0.5s, and of M1 and M2 it is 2. The accuracy meets the requirement set out by national standard. The meters have been calibrated annually, and there is no malfunction happened during the 2nd monitoring period.

Period	Generated Electricity (MWh)	Exported Electricity (MWh)	Imported Electricity (MWh)	EG _{G to P} (MWh)
26/07/2008-25/08/2008	19586.07	19270.44	2.52	19267.92
26/08/2008-25/09/2008	16799.90	16529.10	5.46	16523.64
26/09/2008-25/10/2008	19195.16	18902.52	0.84	18901.68
26/10/2008-25/11/2008	17777.66	17317.86	3.36	17314.5
26/11/2008-25/12/2008	6581.61	6319.32	8.40	6310.92
26/12/2008-15/01/2009	3266.87	3155.88	6.30	3149.58
16/01/2009-25/02/2009	4320.86	4185.72	20.16	4165.56
26/02/2009-25/03/2009	2476.85	2384.76	14.70	2370.06
26/03/2009-25/04/2009	4776.03	4606.56	13.86	4592.7
26/04/2009-25/05/2009	10570.46	10243.80	12.18	10231.62
26/05/2009-25/06/2009	14503.23	14076.72	13.02	14063.7
26/06/2009-25/07/2009	18650.21	18159.54	2.52	18157.02
26/07/2009-25/08/2009	16873.61	16441.95	1.68	16440.27
26/08/2009-25/09/2009	10158.75	9902.16	7.56	9894.6
26/09/2009-25/10/2009	4226.98	4105.92	17.22	4088.7
26/10/2009-25/11/2009	3036.92	2982.42	21.00	2961.42
26/11/2009-25/12/2009	2420.46	2369.22	22.68	2346.54
26/12/2009-25/01/2010	2086.88	2024.40	23.52	2000.88
26/01/2010-25/02/2010	1636.42	1589.70	32.76	1556.94
Total (from 26/07/2008-25/02/2010)	178944.89	174567.99	229.74	174338.25

Note: the cut-off time is 9 am at the 25th every month.

$$ER = BE - PE - LE$$

$$\begin{aligned} BE &= EG \times EF_{CM} \\ &= (EG_{P \text{ to } G} - EG_{G \text{ to } P}) \times EF_{CM} \\ &= (174567.99 - 229.74) \text{ MWh} \times 0.8712 \text{ tCO}_2\text{e/MWh} \\ &= 151,883.486 \text{ tCO}_2\text{e} \end{aligned}$$

$$\begin{aligned} PE &= EF_{Res} \times TEGy / 1000 \\ &= 90 \times 178944.89 / 1000 \\ &= 16,105 \text{ tCO}_2\text{e} \end{aligned}$$

$$LE = 0$$

$$\begin{aligned} ER &= 151,883.5 - 16,105 - 0 \\ &= 135,778 \text{ tCO}_2\text{e} \end{aligned}$$

However, the CAR 3.4-1 was raised.

Related Findings

- ☐ No CARs, CLs or FARs have been identified in this context
- ☒ The following finding(s) have been addressed:

Classification	☒ CAR	☐ CL	☐ FAR
Description of finding <i>Describe the finding in unambiguous style; address the context (e.g. section)</i>	The values for the Total (from 26/07/2008-25/02/2010) in the Table 1 of the monitoring report is inconsistent with the actual electricity records and correction should be taken.		
Corrective Action #1 <i>This section shall be filled by the PP. It shall address the corrective action taken in details.</i>	The values are revised in the Monitoring Report accordingly.		
DOE Assessment #1 <i>The assessment shall encompass all open issues in annex A-2. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.</i>	The Exported Electricity 172,567.99 MWh and $EG_{P \text{ to } G}$ 174,432.33 MWh have been revised as Exported Electricity 174,567.99 MWh, $EG_{P \text{ to } G}$ 174,338.25 MWh. The values for Exported Electricity and $EG_{P \text{ to } G}$ have been crosschecked with the meter reading record and can be confirmed as correct. The accuracy of the meters follows the standards JJG 596-1999.		
Conclusion <i>Tick the appropriate checkbox</i>	☐ to be checked during the next periodic verification ☒ Appropriate action was taken ☒ Project documentation was corrected correspondingly ☐ Additional action should be taken ☐ The project complies with the requirements		

Final Assessment

The CAR 3.4-1 has been successfully closed. By visiting project site and reviewing documents, the verification team confirmed the emission reduction was calculated accurately.

3.5 Quality of evidence to determine emission reductions

Description

The documents listed in table 5-1 have been provided to the verification team. Except the meter Reading Record, most of the evidences are provided by a qualified third party and they are reliable. The meter reading record has been cross checked with the balance advice note issued by the grid company and operation log. It can be granted as credible.

Related Findings

- ☒ No CARs, CLs or FARs have been identified in this context
- ☐ The following finding(s) have been addressed:

Final Assessment

By visiting project site and reviewing documents, the verification team confirmed the quality of the evidence to determined the emission reduction is reliable.

3.6 Management and operational system

Description

The management and operational system has been completely set up. The organization structure is clearly defined and responsibility of the staff is explicitly defined. The management and operational procedures have been checked by the verification team. The internal audit is done annually to examine the validity of the system. Based on the on-site visit and evidences reviewed, the verification team concludes that the management and operational system is effective.

Related Findings

- ☒ No CARs, CLs or FARs have been identified in this context
- ☐ The following finding(s) have been addressed:

Final Assessment



By visiting project site and reviewing documents, the verification team confirms the management and operational system is implemented, according to the registered monitoring plan.

4 VERIFICATION STATEMENT

Guizhou Zhongshui Hengyuan Project Management and Consulting Co., Ltd. has commissioned the TÜV NORD JI / CDM Certification Program to carry out the verification of the Project "Azhu Hydro Power Project in Guizhou Province, China" in Liupanshui city, Guizhou Province, China with regard to the requirements of VCS 2007.1 Standard.

The project activity involves setting up a Greenfield hydropower plant to utilize the hydro resource and generate electricity.

Reporting period: From 2008-07-26 to 2010-02-25

In the course of the verification 2 Corrective Action Requests (CARs) were successfully closed.

The verification is based on the draft monitoring report, revised monitoring report, the monitoring plan as set out in the validated PD, the validation report, emission reduction calculation spreadsheet and supporting documents made available to the TÜV NORD JI/CDM CP by the project participant.

In detail the conclusions can be summarised as follows:

- all operations of the project are implemented and installed as planned and described in the validated project description.
- the monitoring plan is in accordance with the applied approved methodology ,ACM 0002 ver 07.
- the installed equipment essential for measuring parameters required for calculating emission reductions is calibrated appropriately.
- the monitoring system is in place and functional. The project has generated GHG emission reductions.

As the result of the 1st periodic verification, the verifier confirms that the GHG emission reductions are calculated without material misstatements in a conservative and appropriate manner. TÜV NORD JI/CDM CP herewith confirms that the project has achieved emission reductions in the above mentioned reporting period as follows:

Project emissions	16,105	t CO2 equivalents
Baseline emissions	151,883	t CO2 equivalents
Emission reductions	135,778	t CO2 equivalents

Shanghai, 2010-09-13



TÜV NORD JI/CDM Certification
Program

Verification Team Leader

Essen, 2010-09-13



TÜV NORD JI/CDM Certification
Program

Final Approval

5 REFERENCES

Table 5-1: Documents provided by the project participant

Reference	Document
/CAL/	1. Calibration Record of monitoring meter covering the 2nd monitoring period; 2. Qualification certification of the calibration entity, Guizhou provincial Water Resources and Hydropower Investigation and Design Institute.
/LOG/	1. Sample copy of project operation records. 2. Sample copy of daily generation, auxiliary and system workload. 3. Sample copy of monthly generator operation time
/MM/	Monitoring Manual
/MR/	Monitoring Report 'Azhu Hydro Power Project in Guizhou Province, China' for the period 26/07/2008-25/02/2010, version 1 dt. 18/03/2010 Monitoring Report 'Azhu Hydro Power Project in Guizhou Province, China' for the period 26/07/2008-25/02/2010, version 3.0 dt. 29/06/2010
/MRS/	Meter Reading of meters covering 2 nd monitoring period
/O&M/	Project Operation and Maintenance Records 1. Operation and Maintenance procedures 2. Sample copy of O&M records
/PHT/	Photographs of Project Site
/PWD/	Power Wiring Diagram
/QA/	1. Operation Manual 2. Management system Internal Audit report 3. Project Management procedures 4. Troubleshooting procedure
/RPR/	1. Monthly Electricity Balance 2. Monthly Invoices
/TP/	Technical particulars of Turbine, Generator.
/VCS-PD/	VCS PD 'Azhu Hydro Power Project in Guizhou Province, China' version 04, dated 2009-06-08

Reference	Document
/XLS/	Excel "Calculation sheets provided by the project participant (related to MR).

Table 5-2: Background investigation and assessment documents

Reference	Document
/ACM/	Approved CDM Methodology ACM 0002 Consolidated baseline methodology for grid-connected electricity generation from renewable sources" version 07.
/CPM/	TÜV NORD JI / CDM CP Manual (incl. CP procedures and forms)
/IPPC/	1996 IPCC Guidelines for National Greenhouse Gas Inventories: work book 2006 IPCC Guidelines for National Greenhouse Gas Inventories: work book
/ISO 14064/	Greenhouse gases -- Part 1: Specification with guidance at the organization level for quantification and reporting of greenhouse gas emissions and removals Greenhouse gases -- Part 2: Specification with guidance at the project level for quantification, monitoring and reporting of greenhouse gas emission reductions or removal enhancements Greenhouse gases -- Part 3: Specification with guidance for the validation and verification of greenhouse gas assertions
/ISO14065/	Greenhouse gases -- Requirements for greenhouse gas validation and verification bodies for use in accreditation or other forms of recognition
/VCS/	Voluntary Carbon Standard 2007.1
/VDSVCS-PD-T/	VCS PD Template
/VVM/	Validation and Verification Manual (Version as per EB 51)

Table 5-3: Websites used

Reference	Link	Organisation
/cd4cdm/	www.cd4cdm.org	UNEP Riso Centre
/ipcc/	www.ipcc-nggip.iges.or.jp	IPCC publications
/vcs/	www.v-c-s.org	VCSA
/unfccc/	http://cdm.unfccc.int	UNFCCC

Table 5-4: List of interviewed persons

Reference	Mol ¹		Name	Organisation / Function
/IM01/	V	☒ Mr. ☐ Ms	He Yong	Liupanshui Tuoyuan Corporation Azhu Hydro Power Station/ Supervisor
/IM01/	V	☒ Mr. ☐ Ms	Chen Guangsheng	Liupanshui Tuoyuan Corporation Azhu Hydro Power Station/ Vice Manager
/IM02/	V	☒ Mr. ☐ Ms	WANG Jiafeng	Guizhou Zhongshui Hengyuan Project Management and Consulting Co., Ltd. / Department Director
/IM02/	V	☐ Mr. ☒ Ms.	DAN Yanyan	Guizhou Zhongshui Hengyuan Project Management and Consulting Co., Ltd. / Project Manager

¹⁾ Means of Interview: (Telephone, E-Mail, Visit)