

86 MW Hydro Project in Himachal Pradesh

Monitoring Period: 2010-10-01 to 2011-06-30
(incl. both days)

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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

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Prepared By	TÜV NORD CERT GmbH
Contact	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
Approved By	Mr. Dr. Jochen Schubert
Work Carried Out By	Mr. Archak Pattanaik, TL Mr. Pankaj Mohan, TM Mr. Vishnu Patidar, TM Mr. Ashwin A. S., TM

Summary:

Malana Power Company Limited has commissioned the TÜV NORD JI/CDM Certification Program to carry out the seventh periodic verification of the project "86 MW Hydro Project in Himachal Pradesh", with regard to the relevant requirements of VCS standard version 03.

The project activity involves generation of electricity by using the renewable energy source (hydro) for a grid system in the state of Himachal Pradesh, India. Thus, the project activity displaces electricity and green house

gas (GHG) emissions currently produced by fossil fuel-burning Power plants. The generated electricity by the project activity is being exported to the Northern regional grid (now a part of NEWNE grid) in India.

Reporting period: From 2010-10-01 to 2011-06-30 (incl. both days)

In the course of the verification four (04) Corrective Action Requests (CARs) were raised and all these CARs were successfully closed.

The verification is based on the draft monitoring report^{/MR1/}, revised monitoring report^{/MR2/}, emission reduction calculation spreadsheet^{/XLS1//XLS2/}, the monitoring plan as set out in the validated PD^{/PD/}, the validation report^{/VAL/}, the sixth verification report^{/VER6/}, the revision in the monitoring plan^{/RMP/}, and supporting documents^{/LOG//CAL//TRG//JMR/} made available to the TÜV NORD JI/CDM CP by the project participant.

As the result of the 7th 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 (2010-10-01 to 2011-06-30) as follows:

Emission reductions 136,756 t CO2 equivalents

The monitoring period has been split into monthly emission reductions achieved and the verified emission reductions are as follows:

- from 2010-10-01 to 2010-10-31 is 17,523 tCO2e
- from 2010-11-01 to 2010-11-30 is 9,660 tCO2e
- from 2010-12-01 to 2010-12-31 is 6,631 tCO2e
- from 2011-01-01 to 2011-01-31 is 5,170 tCO2e
- from 2011-02-01 to 2011-02-28 is 1,096 tCO2e
- from 2011-03-01 to 2011-03-31 is 8,731 tCO2e
- from 2011-04-01 to 2011-04-30 is 14,393 tCO2e
- from 2011-05-01 to 2011-05-31 is 31,310 tCO2e
- from 2011-06-01 to 2011-06-30 is 42,242 tCO2e

Totalling to 136,756 t CO2 equivalents for the monitoring period.

Abbreviations

CA	Corrective Action / Clarification Action
CAR	Corrective Action Request
CDM	Clean Development Mechanism
CL	Clarification Request
CO₂	Carbon dioxide
CO_{2e}	Carbon dioxide equivalent
CP	Certification Program
cumecs	cubic metre per second
ER	Emission Reduction
FAR	Forward Action Request
GHG	Greenhouse gas(es)
HEP	Hydro Electric Project
HPSEB	Himachal Pradesh State Electricity Board
IPCC	Intergovernmental Panel on Climate Change
JMR	Joint Meter Reading
Km	Kilo meter
KV	Kilo Volt
kWh	Kilo Watt Hour
m	Meter
MP	Monitoring Plan
MPCL	Malana Power Company Limited
MR	Monitoring Report
MWh	Mega Watt Hour
NEWNE	North East West North East (Grid of India)
PDD	VCS V01 Project Design Document
QC/QA	Quality control/Quality assurance
UNFCCC	United Nations Framework Convention on Climate Change
VCS	Voluntary Carbon Standard
VCU	Voluntary Carbon Unit
VVM	Validation and Verification Manual

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1 INTRODUCTION

The Malana Power Company Limited has commissioned the TÜV NORD JI/CDM Certification Program to carry out the verification of the project:

“86 MW Hydro Project in Himachal Pradesh”

with regard to the relevant requirements of the Verified Carbon Standard; VCS version 03^{VCS/}. The verifiers have reviewed the implementation of the monitoring plan (MP) in the validated VCS project for the monitoring period 2010-10-01 to 2011-06-30 (incl. both days).

The applied monitoring methodology is ACM0002, version 06 “consolidated baseline methodology for grid-connected electricity generation from renewable sources”^{ACM0002/}.

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 V01 PDD and the revised monitoring plan dated 2009-12-07^{RMP/};
- 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 document^{PD/}, the monitoring report^{MR1//MR2/}, emission reduction calculation spread sheet^{XLS1//XLS2/}, supporting documents^{LOG//CAL//JMR/} made available to the verifier and information collected through performing interviews^{IM01//IM02/} 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 Level of assurance

The verification has been planned and organized to achieve a

- ☒ reasonable level of assurance
- ☐ limited level of assurance.

1.4 Summary Description of the Project

1.4.1 Project Characteristics

Essential data of the project is presented in the following Table 1-4.1, Table 1-4.2 and Table 1-4.3.

Table 1-4.1: Project Characteristics

Item	Data
Project title	86 MW hydro project in Himachal Pradesh
Project owner	Malana Power Company Limited
Any specific project categories	☐ Mega project ($> 10^6$ t CO _{2eq} / a) ☒ Project (5000 t CO _{2eq} / a to 10^6 t CO _{2eq} / a) ☐ Micro project (< 5000 t CO _{2eq} / a) ☐ AFOLU project ☐ Grouped project ☐ No specific project category
VCS MR dated	Draft: 2011-07-11 Final: 2011-07-28
Applied Methodology	ACM0002, version 06
Scope/Technical area	01/Renewable Hydro
Project starting date	2001-07-05
Crediting period	☐ Renewable Crediting Period (7 y) ☒ Renewable Crediting Period (10 y)
Start of crediting period	2001-07-05

1.4.2 Project Location

The details of the project location are given in Table 1-4.2:

Table 1-4.2: Project Location

No.	Project Location
Host Country	India
Region:	Himachal Pradesh
Project location address:	Jari village, Kullu district
Latitude (Power house):	32° 0' 12'' N
Longitude (Power house):	77° 14' 30'' E

1.4.3 Technical Project Description

The project is a grid connected hydro power plant which is run of the river type with a small reservoir. It involved construction of a barrage across Malana river, 3 Km downstream of Malana village, a head regulator, a de-silting basin storage reservoir to divert water draft of 21 cumecs through a 3.2 Km long headrace tunnel, ending in a 5 m diameter surge shaft.

The water discharged is channelled through a 2.85 m wide D- shaped pressure tunnel or head race tunnel. At the end of headrace tunnel, a surge shaft has been provided which is 72 m high and has an orifice diameter of 1.4 m to certain the height of surges.

A vertical pressure shaft of 2.5 m diameter followed by a steel lined horizontal pressure tunnel of 2.2 m diameter which runs down the hill slope and bifurcates into two branches of 1.5 m diameter each to feed the two vertical axis type Pelton units. To exploit the net head of 480 meters, a power house has been created with two units of 43 MW each and is also housing the step-up transformer. The generated electricity is fed into NEWNE grid through 132 KV transmission lines.

The key parameters of the project are given in Table 1-4.3:

Table 1-4.3a: Technical data of the project

Parameter	Unit	Value
Capacity of Reservoir	cubic meter	2,35,000
Diameter of Penstock	meter	2.2
Design Discharge	cubic meter/ second	21
Head race tunnel	meter	One head race tunnel with 3280m length
Installed Capacity	MW	86
Size of Power House	-	55m X 18.7m X 28.9 m
Type of Turbines	-	Pelton , Vertical Axis
Generating Units	-	2 Units of 43 MW each
Maximum Gross Head	meter	505

Table 1-4.3b: Parameters confirmed during verification

Parameter	Name	Unit	Value
Energy Generated by Malana HEP(KWh)		MWh	184,131.072
Net energy Generated by Malana HEP(kwh) and injected into NEWNE grid	EG _y	MWh	182,349.215
Toss HEP electricity injected into Malana yard	EG _{y Toss}	MWh	408,96.473

2 VALIDATION PROCESS, FINDINGS AND CONCLUSION

Validation process is not applicable as this is a verification report.

2.1 Validation Process

NA

2.2 Validation Findings

NA

2.2.1 Gap Validation

NA

2.2.2 Methodology Deviations

NA

2.2.3 New Project Activity Instances

NA

2.3 Validation Conclusion

NA

3 VERIFICATION PROCESS

3.1 Method and Criteria

The verification of the project consisted of the following steps:

- Contract review
- Appointment of team members and technical reviewers
- Desk review of the Monitoring Report^{/MR1/} 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.

Verification is based on the criteria laid down by VCS version 03.

The sequence of the verification is given in the table 3.1 below:

Table 3.1: Verification sequence

Topic	Time
Assignment of verification	2011-07-11
On-site visit	2011-07-15
Draft reporting finalised	2011-07-16
Final reporting finalised	2011-07-28
Technical review on final reporting finalised	2011-07-28
Final corrections	-

The main verification steps are described below.

3.2 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 3.2-1 below.

Table 3.2-1: Involved Personnel

	Name	Company	Function ¹⁾	Qualification Status ²⁾	Scheme competence ³⁾	Technical competence ⁴⁾	Verification competence ⁵⁾	Host country Competence	Team Leading competence
☒ Mr. ☐ Ms.	Archak Pattanaik	TUV India Pvt Ltd	TL	LA	☒		☒	☒	☒
☒ Mr.	Pankaj Mohan	TUV India Pvt	TM	LA	☒	S	☒	☒	☒

	Name	Company	Function ¹⁾	Qualification Status ²⁾	Scheme competence ³⁾	Technical competence ⁴⁾	Verification competence ⁵⁾	Host country Competence	Team Leading competence
☐ Ms.		Ltd							
☒ Mr. ☐ Ms.	Ashwin A.S.	TUV India Pvt Ltd	TM	A	☒		☐	☒	☐
☒ Mr. ☐ Ms.	Vishnu Patidar	TUV India Pvt Ltd	TM	A	☒		☐	☒	☐
☒ Mr. ☐ Ms.	Heiner Lenzian	TUV Nord Cert GmbH	TR ^{B)}	A	☒	S	☒	☐	☐
☒ Mr. ☐ Ms.	Samir Beqqal	TUV Nord Cert GmbH	TR ^{B)}	A	☒	-	☐	☐	☐
☒ Mr. ☐ Ms.	Dr. Jochen Schubert	TUV Nord Cert GmbH	FA	SA	☒	S	☒	☐	☒

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

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

³⁾ GHG auditor status (at least Assessor)

⁴⁾ As per S01-MU03 or S01-VA070-A2 (such as 1.1, 1.2, ...)

⁵⁾ In case of verification projects

A) Team Member: GHG auditor (at least Assessor status), Technical Expert (incl. Host Country Expert or Verification Expert), not ETE

B) No team member

3.3 Document Review

The validated PD^{/PD/}, VCS MR^{/MR1//MR2/}, emission reduction calculation spread sheet^{/XLS1//XLS2/} and supporting background documents^{/LOG//JMR//CAL//TRG/} related to the project implementation, project design, monitoring and baseline were reviewed.

The project proponent furnished performance records of the project in form of data logs, registers^{/LOG/}, generation reports^{/JMR/}, training records^{/TRG/} and calibration certificates^{/CAL/} etc. VER Calculation sheet^{/XLS1//XLS2/} was checked thoroughly by the verification team for correctness of calculation approach. Data input values were also checked from the records maintained by the project proponents. Result of calculations reported in the monitoring report^{/MR1//MR2/} was checked against data values as available from the project proponent in VER calculation sheet^{/XLS1//XLS2/}. These data values and other information related to project performance including calibrations details are available in the form of data logs and records duly archived and maintained as per the quality assurance/quality control procedure specified as a part of monitoring plan given in the validated PD^{/PD/}.

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 Annex 2.

3.4 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.

Before and during the on-site visit, verification team performed interviews with the representative of project participant to confirm selected information and to resolve issues identified in the document review.

Representatives of Malana Power Company Limited (MPCL) and Emergent Ventures India Pvt. Ltd. (project consultant) including the operational staff of the plant were interviewed. Details of the interviewed persons are included in Table: Annex 2.4. The main topics of the interviews are summarised in Table 3-4.1.

Table 3-4.1: Interviewed persons and interview topics

Interviewed Persons / Entities	Interview topics
1. Projects & Operations personnel from MPCL ^{/IM01/} 2. Project consultant ^{/IM02/} (Reff.: Table: Annex 2.4)	- General aspects of the project - Technical equipment and operation - Changes since validation - Monitoring and measurement equipment - Calibration procedures - Quality management system - Involved personnel and responsibilities - Training and practice of the operational personnel - Implementation of the monitoring plan - Monitoring data management

Interviewed Persons / Entities	Interview topics
	- Data uncertainty and residual risks - GHG emission reduction calculation - Procedural aspects of the verification - Maintenance - Environmental aspect

3.5 Site Inspections

As most essential part of the verification exercise, it is indispensable to carry out an inspection on site in order to verify that the project is implemented in accordance with the applicable criteria. Furthermore the on-site assessment is necessary to check the monitoring data with respect to accuracy to ensure the calculation of emission reductions. The main tasks covered during the site visit include, but are not limited to:

- The on-site assessment included an investigation of whether all relevant equipment is installed and works as anticipated.
- The operating staff was interviewed and observed in order to check the risks of inappropriate operation and data collection procedures.
- Information processes for generating, aggregating and reporting the selected monitored parameters were reviewed.
- The duly calibration of all metering equipment was checked.
- The monitoring processes, routines and documentations were audited to check their proper application.
- The monitoring data were checked completely.
- The data aggregation trails were checked via spot sample down to the level of the meter recordings.

Mr. Pankaj Mohan having technical expertise for the Renewable hydro projects and a CDM Assessor (Mr. Vishnu Patidar) attended the site visit.

3.6 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 4 of this report.

4 VERIFICATION FINDINGS

In this section the assessments and findings from the desk review of the VCS V01 PDD, site visit, interviews and supporting documents as well as the final assessments are summarised. Table 4-1 includes an overview of all raised CARs, CLs and FARs.

Table 4-1: Overview of CARs, CLs and FARs issued

No.	Topic / Chapter	CAR	CL	FAR
4.1	Project Implementation Status	03	-	-
4.2	Accuracy of GHG Emission Reduction or Removal Calculations	-	-	-
4.3	Quality of Evidence to Determine GHG Emission Reductions or Removals	-	-	-
4.4	Management and Operational System	01	-	-
-	SUM	04	0	0

4.1 Project Implementation Status

4.1.1 Implementation status of the project activity

The project proponent i.e. Malana Power Company Limited has successfully commissioned unit 2 (43 MW) of project activity on 2001-07-05 followed by unit 1 (43 MW) on 2001-07-09, since then project is operational with some planned/unplanned shutdowns. The phase wise commissioning dates of unit 1 and unit 2 have been addressed in the Annex 2 and confirmed from the commissioning certificates^{/CC/}. Project activity was operational during the current monitoring period with minor shutdowns. Shutdown/outages details were included in section 5.2 of monitoring report^{/MR2/} and same are checked and verified from the Plant records^{/LOG/} as well.

As per the onsite assessment, observations, interviews^{/IM01//IM02/} and collected evidences, it is concluded that project activity has been implemented as described in the Project Design Document^{/PD/} validated as per VCS V01 and is grandfathered to VCS 2007.1^{/VCS//RMP/}. There is no change in the key equipments as described in Table 1-4.3a of this report. During the monitoring period covering 2010-10-01 to 2011-06-30 (both days included), the project displaced 182,349.214 MWh of NEWNE grid in India. This was verified by the verification team during the on site visit by checking the recorded generation data^{/LOG/}, plant records, joint metering report^{/JMR/} and invoices against the power supplied to the grid^{/INV/}.

4.1.2 Implementation status of the monitoring plan and the completeness of monitoring

The monitoring plan of the validated PD was revised and project activity monitoring is in compliance with the approved revision in monitoring plan dated 2009-12-07^{/RMP/}.

Description:

- The monitoring and reporting procedures reflect the requirements of the monitoring plan of the validated PD^{/PD/} and the revised monitoring plan^{/RMP/}. The monitoring parameters are recorded as per the monitoring plan and methodology^{/ACM0002/}.
- Following metering and measurement was verified during onsite visit dated 2011-07-15:
 1. Energy units supplied by the project activity (Malana HEP) to the grid (EG_Y)
 2. Energy injected from Toss HEP into Malana yard (EG_{Y, TOSS})
 3. Energy sent out from Malana yard (which includes Toss energy) to Bajoura sub station
 4. Energy Injected at Bajoura substation from Malana yard
- For the monitoring purpose, there are four meters (2 main and 2 check meters) at the generation point for measuring electricity generated by the two generators, and another four meters (2 main and 2 check meters) for measuring electricity transferred from the plant to the substation at the outgoing point through the two lines. Further there are four meters (main and check) at the substation for measuring the electricity supplied to the grid.
- There are two meters (1 Main and 1 check meter) at the injection point of Toss electricity into the Malana yard.
- The meter readings at all the three points in Malana HEP and at the Toss HEP injection point are found to be recorded at an hourly basis in the log sheets by the shift in-charge at Malana HEP.
- Daily, weekly and monthly generation reports are also found to be archived.
- Invoices^{/INV/} to the grid company were available for verification, which was used for comparisons of the JMR values and other archived records^{/LOG/}.
- The submitted monitoring report^{/MR1//MR2/} which forms the basis of the verification was observed to be prepared by summarizing consolidated monthly data^{/JMR/} over the whole monitoring period in accordance with the monitoring plan.
- All necessary monitoring instruments are found to be installed. The measuring devices are well known to the personnel^{/IM01/} and calibrated annually by authorised agency^{/CAL/} as defined in response of FAR 1 of VCS verification report^{/VER3/}
- The calibration records of all the installed energy meters and backup (spare) meters were made available to the verification team^{/CAL/}. As from the previous verification, some of energy meters are replaced with the spare meters during the said monitoring period. The details of the calibrations and the replacement is found to be provided in section 5.4 of the monitoring report^{/MR2/}. The calibration certificate of the replaced energy meters are also submitted to the verification team. No abnormality was observed in the metering.
- The reporting procedures reflect the requirements of the monitoring report^{/MR1//MR2/}. The net electricity replaced is recorded hourly, summarized daily, weekly and month.
- Archiving is found to be appropriate during the whole monitoring period^{/LOG/}. The daily, weekly and monthly data also was found to be cross checked by the Assistant manager (Electricals) to weed out any anomaly.
- It has been found to the verification team's satisfaction that the data from Toss HEP is also being

monitored from the date of installation, as mentioned above^{/LOG/}.

- Periodic Internal audits for VCS data monitoring, QA/QC (calibrations, generation records etc.) have been evidenced^{/AUDIT/}.
- The personnel involved have been found to be given training which also involved skill development in job safety analysis from the experience of other hydro projects. During the interviews it was known that further training was planned^{/TRG/}.
- The verification team has verified the monthly generation reports^{/JMR/}, log books^{/LOG/}, invoices^{/INV/} and found they are recorded and maintained in line with monitoring plan of the validated PD^{/PDD/}, methodology ACM0002 version 06 and revision in monitoring plan^{/RMP/}. Thus the DOE confirms the completeness of the monitoring in the key areas.

Furthermore, there are no open/pending issues (i.e. FARs) indicated in the previous verification report (Report No. 8107173718-10/465-V-06)^{/VER6/}, dated 2011-11-11 issued by the DOE i.e. TÜV NORD CERT GmbH.

However the following CARs were raised on the transparent description of monitoring in the monitoring report and were closed successfully.

Related Findings

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

Finding	4.1.1		
Classification	☒ CAR	☐ CL	☐ FAR
Description of finding	A consolidated CAR is raised on the editorial issues of the MR: 1. Full form of various acronyms used in the MR e.g. ROR etc. shall be provided. 2. GPS coordinates in section 1.7 are not correct as per validated PDD and project information on the VCS project registry. 3. In section 3.2 of MR, QA/QC procedures to be applied for EG_y is not appropriately described with reference to the on-site visit and the validated PDD. 4. In section 3.2 of MR, value applied for monitoring parameter EG_{y, Toss} is inconsistent with the excel worksheet.		

Corrective Action #1	1. Full form of various acronym have been included in the revised MR. 2. There was a typo error in section 1.7 of the MR. Correct GPS coordinates of the project activity has been incorporated in the revised MR. 3. QA/QC procedures mentioned in section 3.2 of MR have been described according to validated PDD. 4. There was a typo error in section 3.2 for monitoring parameter $EG_{y, Toss}$ which has been corrected in the revised MR										
DOE Assessment #1	1. Revised monitoring report^{/MR2/} is checked and full forms of acronyms used were found mentioned in page 03 as abbreviations. Thus, the raised finding #1 of CAR 4.1.1 is closed. 2. The exact location of the project activity has been incorporated with GPS coordinates (latitude and longitude up to seconds level) in section 1.7 of the monitoring report^{/MR2/}. Verification team has checked GPS coordinates with VCS registry (Project ID: 93) as well as on web search. Also, location is physically verified during on-site visit. Thus, the raised finding #2 of CAR 4.1.1 is closed. 3. QA/QC procedures applied for EG_y is appropriately described in section 3.2 of monitoring report^{/MR2/} and found appropriate as followed on-site. Verification team has confirmed the same by verifications of joint meter readings, plant log records^{/LOG/} and weekly invoices^{/INV/}. Thus, the raised finding #3 of CAR 4.1.1 is closed. 4. The value applied for monitoring parameter $EG_{y, Toss}$ is corrected in In section 3.2 of MR^{/MR2/}. Thus, the raised finding #4 of CAR 4.1.1 is closed.										
Conclusion	<table border="0"> <tr> <td>☐</td> <td>To be checked during the next periodic verification</td> </tr> <tr> <td>☒</td> <td>Appropriate action was taken</td> </tr> <tr> <td>☒</td> <td>Project documentation was corrected correspondingly</td> </tr> <tr> <td>☐</td> <td>Additional action should be taken</td> </tr> <tr> <td>☒</td> <td>The project complies with the requirements</td> </tr> </table>	☐	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
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☒	Appropriate action was taken										
☒	Project documentation was corrected correspondingly										
☐	Additional action should be taken										
☒	The project complies with the requirements										

Finding	4.1.2		
Classification	☒ CAR	☐ CL	☐ FAR
Description of finding	A consolidated CAR is raised on the editorial issues of the MR: 1. Section 4.2 and 4.3 is lacking in terms of referencing of validated VCS PDD and applied methodology for justifications of negligence of project and leakage emissions. 2. Representation of comparison between actual VERs generated in current monitoring period with estimated ERs in the validated PD is not correct. Proper corrections need to be provided. 3. Meter Sr. No. for check meter installed at Malana generation end are not correct.		
Corrective Action #1	1. Section 4.2 and 4.3 regarding justification of negligence of project and leakage emissions have been revised according to validated VCS PDD and applied methodology. 2. Comparison between actual VERs generated in current monitoring period with estimated ERs in the validated PD has been revised in the section 5.3 of the revised MR Version 2. 3. There was a typo error in the section 5.4, under check meter calibration detail at generation point which has been rectified in the revised MR.		
DOE Assessment #1	1. Justification and reference for negligence of project and leakage emissions is included in section 4.2 and 4.3 of revised monitoring report. The finding #1 of CAR 4.1.2 is closed. 2. Comparison between actual VERs generated in current monitoring period (for 2010-10-01 to 2011-06-30 (incl. both days)) with estimated ERs in the validated PD is now corrected in section 5.3 of revised monitoring report. Verification team has checked the involved calculations and found correctly reported. The finding #2 of CAR 4.1.2 is closed. 3. The required correction in the meter serial no. is done. The finding #3 of CAR 4.1.2 is closed.		
Conclusion	☐ 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		

Finding	4.1.3		
Classification	☒ CAR	☐ CL	☐ FAR
Description of finding	In section 3.3 of MR, Figure 1 describing the positions of monitoring equipments is not accurate as per on-site monitoring and approved revised monitoring plan. Also, referred figure and formula given in worksheets "Data source for the monitored parameters" shall be co-related.		
Corrective Action #1	Figure mentioned in the section 3.3 describing monitoring system has been revised according to RMP, under section 3.3 of the revised MR.		
DOE Assessment #1	In section 3.3, figure 1 showing the position of monitoring equipments is found correct as per on-site monitoring procedures and approved revised monitoring plan in the revised monitoring report ^{/MR2/} . Also, nomenclature used in the figure is now correctly correlated with the formula given in worksheet "Data source". The raised CAR 4.1.3 is closed.		
Conclusion	☐ 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 project is found to be implemented as described in validated PD^{/PD/} and the revised monitoring plan^{/RMP/}.

4.2 Accuracy of GHG Emission Reduction or Removal Calculations

Description

- The approved CDM baseline and monitoring methodology ACM0002 version 06^{/ACM0002/}, is applied to the project activity. GHG emission reduction is calculated as baseline emission minus project emission minus leakage.
- The formula and emission factor used in the calculations of emission reductions are in accordance to the approved methodology ACM0002, Version 6 and monitoring plan of the validated PD^{/PD/} and the revised monitoring plan^{/RMP/}.
- Baseline emission is net electricity delivered to the grid multiplied with emission factor (EF), in compliance with ACM0002 version 06. EF is calculated *ex-ante* as 0.750 tCO₂e/MWh.
- As referred in section 4.1, the calibration frequency is defined as once in one year as per third periodic verification report^{/VER3/}. The calibration certificates of all the meters (including spare

meters) were checked and calibration was found to be within one year in all the cases.

- The generation records^{/LOG/} were found to be of adequate quality. The verification team has cross checked the resulted value of units supplied by the project activity to the grid (EG_y) with the measurements observed at plant's generation^{/LOG/} and transmission (outgoing) points^{/JMR/} and are found to be correct.
- The outage detail during the monitoring period was also checked^{/LOG/} and is found to be appropriately recorded.
- Moreover the verification team has interviewed the HPSEB engineers at Bajaura substation^{/IM03/} and understood the total energy received at Bajaura substation (kwh) is recorded daily. The data will be sent to higher authorities and also there is mechanism of weekly billing. Moreover, apportioning was further discussed, and it was observed that the HPSEB was closely monitoring the generation data and apportioning details to a satisfactory level. Moreover, the resulted value of units supplied by the project activity to the grid (EG_y) was found to be correctly calculated from the approved formula for apportioning. During the site visit, the verification team has verified the daily, weekly and monthly generation reports^{/LOG/} to cross check the reliability of data and were satisfied.
- The set of calculations for the actual emission reduction of the 6th verification period (2010-10-01 to 2011-06-30 (incl. both days) are transparently computed and presented in the spread sheet of VER calculation^{/XLS2/} with the reference sources of data. A correct and appropriate grid emission factor in accordance validated PD^{/PD/} is applied. The sources of project specific electrical energy generation data were cross-checked with the JMR reports^{/JMR/LOG/} and found to be correctly applied.

Related Findings

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

Final Assessment

The emission reduction spread sheet is transparent and clearly referenced. The excel sheets were rigorously cross checked with the archived monitored data and no discrepancies were found. All the formulae have been found to be correctly applied in the emission reduction calculations. Thus, the verification team is confident that the ER calculation is correct and accurate.

4.3 Quality of Evidence to Determine GHG Emission Reductions or Removals

Description

- Several documents were submitted by the project proponent as evidence to determine emission reductions which form apart of Annex 2.
- All energy generation reports^{/JMR/} used for EG_y and EG_{toss} are duly signed by the authorised signatory from the HPSEB-Bajaura sub-station. All third party calibration reports are also found valid in the current verification period. These documents were verified through site visit interviews^{/IM01/IM02/IM03/} and found to be authentic.
- Apart from the documents there is an electronic device i.e. Data collection device (DCD) found to

be in place. DCD records the data in the electrical format from the meters and this data is archived electronically^{/LOG/}.

- The recorded DCD data was verified on sample basis and found to be matching with the other recorded data in the log records^{/LOG/}. The energy generation by Malana HEP and energy measured at outgoing point are collected using the DCD as stated above which completely avoids the manual errors.
- Furthermore competent employees are recruited, who are found knowledgeable not only about the plant operations but also ensuring the quality of the data and recording and maintaining^{/IM01/}.
- The verification team finds the quality to be of adequate level to assure confidence in the accurate quantification of the emission reductions.

Related Findings

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

Final Assessment

Documents used as evidences for input values of ER calculation were assessed and found to be reliable and authentic. The verification team concludes that the evidence and the data are of at acceptable level of quality.

4.4 Management and Operational System

Description

- During the verification site visit it was found the operational structure and operation of the structure is found as stated in the monitoring plan of the VCS V1 PDD^{/PD/}, revised monitoring plan^{/RMP/} and the monitoring report^{/MR1/MR2/}.
- Moreover the competent staff is employed to ensure the data quality as discussed in section 4.3.
- An operational structure is established with responsibilities identified. Personnel are also sent for training as against the identified requirements^{/TRG/}.
- Data collection, measurement, calibration, recording and archiving was found to be carried out as per the monitoring plan as described in the validated PD^{/PD/} and the revised monitoring plan^{/RMP/}.
- The weekly and monthly summary report is submitted to the head office located at Noida, Uttar Pradesh.
- The verification team is satisfied with the management and operational system.

Related Findings

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

Finding	4.4.1		
Classification	☒ CAR	☐ CL	☐ FAR
Description of finding	Description of the procedures for handling internal audits and non-conformities is missing in section 3.3 of MR in line with the validated PD, Cp VCS Monitoring Report Template, V03.		
Corrective Action #1	Procedures for handling internal audits has been included in the section 3.3 of the revised MR.		
DOE Assessment #1	In section 3.3 of revised monitoring report ^{/MR2/} , details of the on-site procedures for internal audits has been included. Verification team has checked the internal audit report, dated 2011-04-04 and confirmed that data archiving, control, calibrations etc. are in-compliance with validated PD. Verification team has also checked the data management procedures during on-site visit and found satisfactory. The raised CAR 4.4.1 is closed.		
Conclusion	☐ 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

An organogram describing the hierarchy of management and operation system related to the project activity GHG monitoring and QA/QC has been included as Annex II in the revised monitoring report^{/MR2/}. Thus, the CAR 4.4.1 as described above is appropriately corrected by the PP and no other discrepancy was identified from the designed management and operation system as described in the validated PD^{/PD/}. The monitoring report^{/MR2/} clearly describes the management and operational system for the current monitoring period.

5 VERIFICATION CONCLUSION

Malana Power Company Limited has commissioned the TÜV NORD JI / CDM Certification Program to carry out the 7th (seven) verification of the Project “86 MW Hydro Project in Himachal Pradesh” at Jari village in Kullu district of Himachal Pradesh, India with regard to the requirements of VCS standard version 03^{/VCS/}.

The project activity involves generation of electricity by using the renewable energy source (hydro) for a grid system in the state of Himachal Pradesh, India. Thus the project activity displaces electricity and green house gas (GHG) emissions currently produced by fossil fuel based power plants. The generated electricity by the project activity is being exported to the Northern regional grid (now a part of NEWNE grid) in India.

Reporting period: From 2010-10-01 to 2011-06-30 (incl. both days)

In the course of the verification four (04) Corrective Action Requests (CARs) were raised and all these CARs were successfully closed.

The verification is based on the draft monitoring report^{/MR1/}, revised monitoring report^{/MR2/}, the monitoring plan as set out in the validated PD^{/PD/}, the revised monitoring plan^{/RMP/}, emission reduction calculation spreadsheet^{/XLS1/XLS2/}, the validation report^{/VAL/}, the previous verification reports^{/VER3/VER6/} and supporting documents^{/LOG/CAL/TRG/JMR/} 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 and project activity confirms with the verification criteria for project and their GHG emission reductions or removals set out in the VCS rules i.e. VCS 2007.1 and VCS version 03.
- The monitoring plan is in accordance with the applied approved methodology, i.e, ACM0002, version 06 and approved revision in monitoring plan, dated 2009-12-07.
- The installed equipments essential for measuring parameters (energy meters) required for calculating emission reductions are calibrated appropriately.
- The monitoring system is in place and functional. The project has generated verifiable GHG emission reductions.

As the result of the 7th 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: 00 t CO₂ equivalents

Baseline emissions: 136,756 t CO₂ equivalents

Emission reductions: 136,756 t CO₂ equivalents.

The monitoring period has been split into monthly emission reductions achieved and the verified emission reductions are as follows:

- from 2010-10-01 to 2010-10-31 is 17,523 tCO₂e
- from 2010-11-01 to 2010-11-30 is 9,660 tCO₂e
- from 2010-12-01 to 2010-12-31 is 6,631 tCO₂e
- from 2011-01-01 to 2011-01-31 is 5,170 tCO₂e
- from 2011-02-01 to 2011-02-28 is 1,096 tCO₂e
- from 2011-03-01 to 2011-03-31 is 8,731 tCO₂e
- from 2011-04-01 to 2011-04-30 is 14,393 tCO₂e
- from 2011-05-01 to 2010-05-31 is 31,310 tCO₂e
- from 2011-06-01 to 2011-06-30 is 42,242 tCO₂e

Totalling to 136,756 t CO₂ equivalents for the monitoring period.

New Delhi, 2011-07-28



Archak Pattanaik
TUV India Pvt. Ltd.
Verification Team Leader

Essen, 2011-07-28



Dr. Jochen Schubert
TÜV NORD JI/CDM Certification Program
Final Approval

Annex 2

Table: Annex 2.1: Documents provided by the project participant

Reference	Document
/AUDIT/	1. Internal audit report, conducted for VCS data monitoring of registered project activity "86 MW Hydro Project in Himachal Pradesh", dated 2011-04-04, 2011-07-15 2. Monthly statements of unit wise energy generated/transmitted from Malana Hydro Electric Project, reviewed by General Manager, Malana Power Plant.
/CAL/	1. Calibration records for the generation, transmission and sub-station energy meters for the monitoring period from 01-10-2010 to 30-06-2011. 2. Calibration records for the meters at the Toss injection point at Malana yard for the monitoring period from 01-10-2010 to 30-06-2011. 3. Details of changes in the tri-vector meters at generation, injection, substation points and the Toss injection point during the monitoring period. - Minutes of meeting held on 2010-10-04, 2011-03-09, 2011-05-04 at Malana between HPSEB Ltd. and MPCL regarding replacement of meters
/INV/	1. Sample monthly invoice copies to cross check the energy supplied to the grid. 2. Sample weekly invoice copies to cross check the energy supplied to the grid.
/JMR/	1. Monthly Joint Meter Reading (JMR) certificates of Malana HEP indicating main and check meter numbers and the energy total generated at the project site (Malana project), energy sent out from the power station (including TOSS energy) and that injected at Sarabai Sub-station at Bajaura by HPSEB covering entire reported monitoring period (01-10-2010 to 30-06-2011), (thus, already incorporates the auxiliary consumption and transmission losses. 4. Weekly Joint Meter Reading (JMR) certificates of Malana HEP indicating main and check meter numbers and the energy generated at the site and that injected at Sarabai Sub-station at Bajaura by HPSEB covering entire reported monitoring period (01-10-2010 to 30-06-2011) (thus, already incorporates the auxiliary consumption and transmission losses. 5. Joint meter readings of Toss HEP covering entire reported monitoring period (01-10-2010 to 30-06-2011)

Reference	Document
/LOG/	1. Sample of daily log book records showing Malana HEP generation. 2. Sample of weekly data from the Data Collecting Device (DCD). 3. Sample of daily reports sent to the head office (HO). 4. Records of the electricity from the Toss Hydro project injected at Malana yard from 01-10-2010 to 30-06-2011. 5. Plant log records showing details of the outages occurred during the monitoring period.
/MR1/	Monitoring Report “86 MW Hydro project in Himachal Pradesh” for the period 01-10-2010 to 30-06-2011, version 01, dated 2011-07-11
/MR2/	Final monitoring Report “86 MW Hydro project in Himachal Pradesh” for the period 01-10-2010 to 30-06-2011, version 02, dated 2011-07-28.
/PHOTO/	Photographs of the site visit.
/XLS1/	Emission reduction calculation spread sheets provided by the project participant explaining the emission reductions achieved during the monitoring period (related to MR1).
/XLS2/	Final emission reduction calculation spread sheets provided by the project participant explaining the emission reductions achieved during the monitoring period (related to MR2).

Table: Annex 2.2: Background investigation and assessment documents

Reference	Document
/ACM0002/	ACM0002: “Consolidated baseline methodology for grid connected electricity generation from renewable sources” (Version 6 dt. 2006-05-19)
/CPM/	TÜV NORD JI / CDM CP Manual (incl. CP procedures and forms)
/CON/	The signed contract between TUV NORD and Malana Power Company Limited for carrying out verification of voluntary emission reduction dated 2011-07-11.
/CEA/	CO2 Baseline Database for the Indian Power Sector, December 2006, published by

Reference	Document
	Central Electricity Authority, Ministry of Power, Government of India
/IPCC/	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
/PDD/	Validated project document of the project "86 MW Hydro project in Himachal Pradesh" against VCS V01.
/RMPI/	Revised monitoring plan dated 07/12/2009 approved during the fourth periodic verification.
/VAL/	Validation Report and opinion for the project "86 MW Hydro Project in Himachal Pradesh" issued by TUV Nord, Report number 53213807-07/36 dated 2007-04-25
/VER3/	3rd Periodic Final Verification Report No. 53206509-09/166-V03 for the CDM project: "86 MW Hydro Project in Himachal Pradesh" for the period 2008-04-01 to 2009-03-31, dated 2009-05-26.
/VER6/	6th Periodic Final Verification Report No. 8107173718-10/465-V-06 for the CDM project: "86 MW Hydro Project in Himachal Pradesh" for the period, 2010-04-01 to 2010-09-30, dated 2010-11-11.
/VCS/	Voluntary Carbon Standard 2007.1; Program Guidelines; VCSA Rules ;and VCS Guidance Document
/VVM/	CDM Validation and Verification Manual (Version 2 as per EB 55)

Table: Annex 2.3: Websites used

Reference	Link	Organisation
/ceal/	http://www.cea.nic.in/	Central Electricity Authority, India
/iso/	www.iso.org/iso/en	The International Organisation for Standardisation
/hpseb/	http://www.hpseb.com/	Himachal Pradesh State Electricity Board Limited
/ieta/	http://www.ieta.org/	International Emissions Trading Association
/mpcl/	http://www.malanamodelhep.com/	Malana Power Company Limited
/unfccc/	http://cdm.unfccc.int/	UNFCCC-CDM
/VCS/	http://www.v-c-s.org/	The Voluntary Carbon Standard

Table: Annex 2.4: Websites used

Reference	MoM1		Name	Organisation / Function
/IM01/	V	☒ Mr. ☐ Ms.	J. K. Beri	Malana Power Company Limited- General Manager, Operation & Maintenance
/IM01/	V	☒ Mr. ☐ Ms.	Abhishek Garg	Malana Power Company Limited- Executive (Commercial)
/IM01/	V	☒ Mr. ☐ Ms.	M. A. Rafiq	Malana Power Company Limited- Assistant Manager-Electrical
/IM01/	V	☒ Mr. ☐ Ms.	Chandan Thakur	Malana Power Company Limited- Electrical Engineer
/IM01/	V	☒ Mr. ☐ Ms.	Ankit Baksht	Malana Power Company Limited- Engineer (C.R.)

Reference	MoM1		Name	Organisation / Function
/IM02/	V	☒ Mr. ☐ Ms	Satyapal Singh	Emergent Ventures India Private Limited, Consultant
/IM03/	V	☒ Mr. ☐ Ms.	Hemchand Bandhu	S.S.S., HPSEB Limited
/IM03/	V	☒ Mr. ☐ Ms.	Ratan Lal	Foreman, HPSEB Limited

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