

86 MW HYDRO PROJECT IN HIMACHAL PRADESH



Document Prepared By

LGAI Technological Center S.A. (Applus+ Certification)

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Summary:

Verification purpose: The main purpose of this project activity is to generate clean form of electricity through renewable energy sources. The project activity involves 2 Units of 43 MW each across Malana Nallah, 3 Km downstream of Malana village at village Jari, Kullu District, Himachal Pradesh.

The project is a grid connected hydel power plant which is run of the river type with a small reservoir. It involved construction of a barrage, a head regulator, a de-silting basin storage reservoir to divert water draft of 21cumecs through a 3.2 Km long headrace tunnel, ending in a 5 m diameter surge shaft. A pressure shaft conveys water through a 2.2 m diameter surface penstock to 2 Pelton turbines, each of capacity 43 MW totaling to 86 MW plant capacity, housed in a surface powerhouse.

Unit 2 of 43 MW generating unit was commissioned on 05/07/2001 and first unit of 43 MW was commissioned on 09/07/2001. The purpose of the project activity is to generate electricity by using the renewable energy source (water) for a grid system. The project activity displaces electricity and greenhouse gases (GHG) emissions currently produced by thermal fossil fuel-burning facilities. The generated electricity by the project activity is being exported to the PTC (Power Trading Company) India Ltd.

The project is a green field activity with the objective to generate electricity by using potential energy of water which is a renewable source of energy. Start date of the project activity is 05/07/2001 which is the date of commissioning of first phase of the Project. This is the day on which the first project was commissioned under the Project activity which is as per the registered VCS-PD dated 20/03/2012 and Final Validation report version dated 23/04/2012.

In this process, there are no greenhouse gas emissions or burning of any fossil fuels. The electricity is generated through sustainable means without causing any negative effect to the environment and therefore the technology is environmentally safe and sound.

The project activity helps to reduce the supply demand gap in the state and also helps in contributing to the sustainable development by using Hydro energy as the source of power generation and reduction of GHG Emissions.

Reporting period: From 01/03/2015 to 31/12/2018 (Both days included). The total emission reductions achieved for the project activity during the monitoring period has been 666,460 tonnes of CO₂e.

Thus, VCS crediting period should be maximum of 10 years and renewed twice till end date of CDM crediting period. **1st Crediting Period** (05/07/2001 – 04/07/2011) already completed and VCU got issued for entire period). Now this is 2nd verification under **2nd crediting period** (05/07/2011 – 04/07/2021)

The GHG credits from 01/03/2015 to 31/12/2018 will be claimed under VCS, however, I-REC claimed during this period are excluded from the VCS. An undertaking from the project participant confirms that project will not claim any other scheme benefits for the concerned monitoring period apart from VCS & I-REC.

A risk based approach has been followed to perform this verification activity. In the course of verification, 06 Corrective Action requests (CAR), 00 Clarification Requests (CLs) and 00 Forward action requests (FARs) were raised and successfully closed. The review of the Monitoring report and additional documents related to baseline and monitoring methodology; the subsequent background investigation, follow-up interviews and PP have provided DOE with sufficient evidence to verify the fulfilment of the stated criteria of VCS.

LGAI Technological Center S.A. (Applus+ Certification) (Hereafter referred as Applus+ Certification) has been appointed by “Malana Power Trading Company Limited” to perform the 8th periodic verification of the “86 MW Hydro Project in Himachal Pradesh” under VCS standard and guideline version 3.7. The objective of this verification activity is to have an independent third party for the assessment of the project design, Monitoring report and Final Verification report and to ensure a thorough assessment of the proposed project activity against the applicable CDM and VCS requirements. In particular;

- the project's baseline is assessed against “ACM0002 version 12.3.0”
- the project's monitoring plan is assessed against “ACM0002 version 12.3.0”
- the projects compliance with, the requirements of Article 12 of the Kyoto Protocol, the CDM Modalities and Procedures as agreed in the Marrakech Accords under decision 3/CMP.1, the annexes to this decision, subsequent decisions and guidance made by COP/MOP & CDM Executive Board and other relevant rules, including the Host Country legislation and sustainability criteria along with VCS guideline and standard version 3.7
- CDM validation and verification standard for project activities, version 02.0
- CDM project standard for project activities, version 02.0
- CDM project cycle procedure for project activities, version 02.0
- VCS standard v3.7
- VCS program guideline v3.7

Verification is a requirement for all VCS projects and is seen as necessary to provide assurance to stakeholders of the quality of the project and its intended generation of verified emission reductions (VERs).

The scope of the verification is the independent and objective review of the Monitoring report (MR). The MR is reviewed against the relevant criteria (see above) and decisions by the CDM Executive Board and VCS executive board, including the approved baseline and monitoring methodology. The verification was based on the guidance given in the CDM validation and verification standard for project activities, version 02.0, review against registered PD and Final Validation report, CDM project standard for project activities, version 02.0, CDM project cycle procedure for project activities, version 02.0 and VCS program guideline and standard version 3.7.

The assessment team has employed a risk based approach to assess the completeness and accuracy of the claims and conservativeness of the assumptions in the MR. The main focus of the assessment team is to identify the significant risks for the project implementation and the generation of VERs. The verification is not meant to provide any consulting towards the project participants. However, stated requests for clarifications and/or corrective actions may have provided input for improvement of the monitoring report combined.

The only purpose of the verification is its usage during the issuance process as part of the VCS project cycle. Therefore, LGAI Technological Center S.A. (Applus+ Certification) can't be held liable by any party for decisions made or not made based on the verification opinion, which will go beyond that purpose.

The verification has been planned and organized to achieve a Reasonable Level of assurance as per the requirement of VCS. No sampling procedure applied for site visit or document verifications. The entire documents checked/WTGs verification conducted to arrive at positive verification conclusions.

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1 INTRODUCTION

1.1 Objective

LGAI Technological Center S.A. (Hereinafter referred as Applus+ Certification) has been appointed by “**Malana Power Company Limited**” to perform an independent verification of the registered VCS project entitled “**86 MW Hydro Project in Himachal Pradesh**” under VCS standard and guideline version 3.7. The objective of verification activity is to have an independent third party for the assessment of the Monitoring Report and to ensure a thorough assessment of the proposed project activity against the applicable CDM and VCS requirements. In particular;

- the project's baseline is assessed against “ACM0002 version 12.3.0¹”
- the project's monitoring plan is assessed against “ACM0002 version 12.3.0”
- the project's compliance with the requirements of Article 12 of the Kyoto Protocol, the CDM Modalities and Procedures as agreed in the Marrakech Accords under decision 3/CMP.1, the annexes to this decision, subsequent decisions and guidance made by COP/MOP & CDM Executive Board and other relevant rules, including the Host Country legislation and sustainability criteria along with VCS guideline and standard version 3.7
- CDM validation and verification standard for project activities, version 02.0
- CDM project standard for project activities, version 02.0
- CDM project cycle procedure for project activities, version 02.0
- VCS standard, v3.7²
- VCS guideline, v3.7

Verification is a requirement for all VCS projects and is seen as necessary to provide assurance to stakeholders of the quality of the project and its intended generation of estimated verified emission reductions (VERs).

1.2 Scope and Criteria

The scope of the verification is the independent and objective review of the Monitoring report (MR). The MR is reviewed against the relevant criteria (see 1.1) and decisions by the CDM Executive Board and VCS executive board, including the approved baseline and monitoring methodology. The verification was based on the guidance given in the CDM validation and verification standard for project activities, version 02.0, review against registered PD and Final Validation report, CDM project standard for project

¹ As per revalidated VCS PD, applied methodology version is ACM0002 Version 12.1.0. However, due to editorial change methodology version has been updated by CDM EB from ACM0002 Version 12.1.0 to ACM0002 Version 12.3.0. Same assessed during previous verification by DoE vide Report No. CCP.VOL0908 MP01 (CP2) dated 17/12/2012.

²<http://www.v-c-s.org/project/vcs-program/rules-and-requirements/>

activities, version 02.0, CDM project cycle procedure for project activities, Version 02.0 and VCS program guideline and standard version 3.7

The assessment team has employed a risk based approach to assess the completeness and accuracy of the claims and conservativeness of the assumptions in the MR. The main focus of the assessment team is to identify the significant risks for the project implementation and the generation of VERs. The verification is not meant to provide any consulting towards the project participants. However, stated requests for clarifications and/or corrective actions may have provided input for improvement of the monitoring report combined.

The only purpose of the verification is its usage during the issuance process as part of the VCS project cycle. Therefore, LGAI Technological Center S.A. (Applus+ Certification) can't be held liable by any party for decisions made or not made based on the verification opinion, which will go beyond that purpose.

1.3 Level of Assurance

The verification has been planned and organized to achieve a Reasonable Level of assurance as per the requirement of VCS. No sampling procedure applied for site visit or document verifications. The entire documents checked/Power plant verification conducted to arrive at positive verification conclusions.

1.4 Summary Description of the Project

The purpose of the project activity is to generate power using renewable energy source and sell the power generated to the power trading company. The project activity generates electricity using hydro power and converts it into kinetic energy using turbines, which drives the alternators to generate energy. The generated electricity is exported to the regional grid system which is under the purview of the NEWNE grid of India.

The project is a green field activity with the objective to generate electricity by using potential energy of water which is a renewable source of energy. The PP has entered in Power purchase agreement on for both units (43+43 MW) with HPSEB and hence the generated electricity is sold to NEWNE (Now Indian) grid which otherwise would have been supplied through the fossil fuel based power plants connected to the grid. Start date of the project activity is 05/07/2001 which is the date of commissioning of first phase i.e. unit 2 of the Project. This is the day on which the first project was commissioned under the Project activity which is as per the registered VCS-PD. Unit 1 was commissioned on 09/07/2001.

There was no activity at the site prior to implementation of the project activity (Greenfield). The electricity generated by the project is exported to the Indian grid. The project activity will therefore displace an equivalent amount of electricity which would have otherwise been generated by fossil fuel dominant electricity grid. Since Hydro power is Greenhouse Gas (GHG) emissions free, the power generated will prevent the anthropogenic gas emissions generated by fossil fuel based thermal power stations comprising coal, diesel, furnace oil and gas.

Unit wise commissioning dates are as follows:

Name of Unit	Date of Synchronization to Grid	Commissioning Date
Unit I	23/06/2001	09/07/2001
Unit II	23/06/2001	05/07/2001

2 VERIFICATIONPROCESS

2.1 Method and Criteria

Verification Scope: The scope is defined as an independent and objective review of the Monitoring report (MR) prepared as per the registered PD and registered approved methodology ACM002, version 12.3.0. The MR is reviewed against the criteria stated in Article 12 of the Kyoto Protocol, the CDM modalities and procedures as agreed in the Marrakech Accords and the relevant decisions by the CDM Executive Board and VCS standard and guideline version 3.7, including the approved baseline and monitoring methodology, ACM002, version 12.3.0. The verification was based on the requirements in the CDM validation and verification standard for project activities, version 02.0, CDM project standard for project activities, version 02.0, CDM project cycle procedure for project activities, version 02.0 and VCS program guideline and standard version 3.7

The verification is not meant to provide any consulting towards the project participants. However, stated requests for clarifications and/or corrective actions may have provided input for improvement of the Monitoring report. In line with Guidelines for Application of materiality in verifications, the verification team has conducted a complete verification of all the information presented in the monitoring report and data monitored as presented in the emission reduction calculation spread sheet. It invoices follows the paper trail back to the raw data such as meter reading records and invoices. There are no material errors, overestimation of ER, omission or misstatement. No sampling is used as the verification team has visited Hydro site along with the substations. The verification team has reviewed all the documents like commissioning certificates, JMR, invoices etc.

Verification Process: The project assessment is based on the CDM validation and verification standard for project activities, version 02.0 and “VCS standard and program guideline version 3.7” and is conducted using standard auditing techniques to assess the correctness of the information provided by the project participants. Before the assessment begins, members of the team covering the technical scope(s), sectoral scope(s), and relevant host country experience for evaluating the VCS project activity are appointed.

Once the project is received by the assessment team, the members of the assessment team carried out:

1. A desk review of the Monitoring report against the registered PD and final validation report;
2. Follow-up interviews with project participant;
3. The resolution of outstanding issues and the issuance of the final verification report and opinion.

The prepared verification report and other supporting documents then undergo an internal quality control at the HQ (Accredited office) before being submitted to the VCS executive board.

In order to ensure transparency, assumptions must be clear and stated explicitly and background material must also be referenced. Applus+ Certification has developed a specific checklist customized for the project. The checklist demonstrates, in a transparent manner, the project criteria (requirements), discussion on each criterion by the assessment team, and the results from validating the identified criteria.

Appointment of the assessment team

According to the sectoral scope / technical area and experience in the sectoral or national business environment, Applus+Certification has composed a project assessment team in accordance with the appointment rules in the internal Quality Management System of Applus+ Certification.

The composition of audit team shall be approved by the Applus+Certification ensuring that the required skills are covered by the team.

The four qualification levels for team members that are assigned by formal appointment rules are as presented below:

- Lead Auditor (LA).
- Auditor (A) / Auditor in Training (AiT).
- Technical Expert (TE).
- Technical Reviewer (TR).

The sectoral scope / technical area knowledge linked to the applied methodology/ies shall be Covered by the assessment team.

Name	Role	SS Coverage	TA Coverage	Financial aspect	Host country experience
Mr. Atul Takarkhede	LA/TE	YES	YES	NA	YES
Mr. Denny Xue	TR	YES	YES	NA	NA

The detail regarding the assessment team is provided below in this report as Appendix 3

Document review

The Monitoring report version 1 submitted by the PP was reviewed against the approved methodology, registered PD, final validation report and other relevant criteria to verify the correctness, credibility, and interpretation of the presented information. Furthermore, a cross-check between information provided and information from other sources has been done. A complete list of all documents and evidence material reviewed is included in this report below in appendix 1.

Follow-up interviews

A site visit is conducted by Applus+ Certification. Audit team performed interviews, telephone conferences, and physical site inspection with project stakeholders to confirm selected information and to resolve issues identified in the document review. The detail is provided in this report.

Resolution of Clarification and Corrective Action Request

The objective of this phase of the Verification was to resolve the requests for corrective actions and clarification and any other outstanding issues which need to be clarified for Applus+ Certification positive conclusion on the Monitoring report. The Corrective Action Requests and Clarification Requests raised by Applus+ Certification were resolved during communications between the Client and Applus+ Certification to guarantee the transparency of the verification process, the concerns raised and responses given are summarized below in the appendix 2.

The final MR Version 02 submitted by PP serves as the basis for the final assessment presented. Additional changes to the project during the verification process are not considered to be significant with respect to the main CDM/VCS objectives. The two CDM/VCS main objectives are the reduction of anthropogenic GHG emissions and the contribution of sustainable development to the host country.

Internal quality control

As final step of a verification of the final documentation including the verification report and the checklist have to undergo an internal quality control by the technical review committee, i.e. each report has to be finally approved either by the head of the technical review committee or the deputy. In case one of these two persons is part of the assessment team approval can only be given by the other one to avoid any conflict of Interest.

After confirmation of the PP the positive verification opinion and relevant documents are submitted to the VCS board through the VCS web-platform

2.2 Document Review

The details of the document observed during the gap validation and verification process are listed below in appendix 1 of this report.

2.3 Interviews

No.	Interviewee			Date	Subject	Team member
	Last name	First name	Affiliation			
1.	Ajmera	O.P.	PP Representative	25/09/2019	Implementation of the project and monitoring. Baseline emission calculation, achieved emission reduction for the monitoring period, monitoring process followed onsite	Dr. Atul Takarkhede
2	Singh	Shailesh	Villager	25/09/2019	Local Stakeholder Consultations	
3	Trikha	Ashish	Villager	25/09/2019	Local Stakeholder Consultations	

2.4 Site Inspections

Duration of on-site inspection: 25/09/2019				
No.	Activity performed on-site	Site location	Date	Team member
1.	Assessment team checked the implementation of the project, Baseline emission, Emission reduction calculation, technical description of the project and Monitoring. Assessment team also checked that whether the monitoring plan as described in the VCS PD is actually practised onsite. Also assessment team checked any change in host country criteria which may affect the baseline of the project activity. Assessment team also had a discussion with Local stakeholders and checked grievance register placed onsite as per the continuous improvement measure of PP for the Local villagers.	The project is located in below address: Jari village in district Kullu of Himachal Pradesh	25/09/2019	Dr. Atul Takarkhede

2.5 Resolution of Findings

The objective of this phase of the Verification was to resolve the requests for corrective actions and clarification and any other outstanding issues from validation which need to be clarified for Applus+ Certification's positive conclusion on the Monitoring report. The Corrective Action Requests and Clarification Requests raised by Applus+ Certification were resolved during communications between the Client and Applus+ Certification to guarantee the transparency of the verification process, the concerns raised and responses given are summarized below in the appendix 2.

The final MR Version2 submitted by PP serves as the basis for the final assessment presented. Additional changes to the project during the verification process are not considered to be significant with respect to the main CDM/VCS objectives. The two CDM/VCS main objectives are the reduction of anthropogenic GHG emissions and the contribution of sustainable development to the host country.

Areas of validation and verification findings	No. of CL	No. of CAR	No. of FAR
Project design document and Monitoring report	00	00	00
Description of project activity	00	02	00
Application of selected baseline and monitoring methodology and selected standardized baseline			
Applicability of methodology and standardized baseline	00	00	00
Deviation from methodology	00	00	00
Clarification on applicability of methodology, tool and/or standardized baseline	00	00	00
Project boundary	00	00	00
Establishment and description of baseline scenario	00	00	00
Demonstration of additionality	00	00	00
Emission reductions	00	01	00
Calibration details	00	01	
Monitoring plan	00	01	00
No Net harm assessment	00	00	
Local stakeholder consultation	00	00	
Others (please specify Sustainable benefits)	00	01	00
Total	00	06	00

The list of findings and there resolution is presented in Appendix 2 of this report.

2.5.1 Forward Action Requests

This is 8th periodic verification of the project activity and no FAR raised from previous verification.

2.6 Eligibility for Validation Activities

This section is not applicable for present verification.

3 VALIDATION FINDINGS

3.1 Participation under Other GHG Programs

This section is not applicable for present verification.

3.2 Methodology Deviations

This section is not applicable for present verification.

3.3 Project Description Deviations

This section is not applicable for present verification.

3.4 Grouped Project

The project do not involve any addition of new project activity and thus the project do not falls under grouped project.

4 VERIFICATION FINDINGS

4.1 Project Implementation Status

During the verification site visit it was concluded that the project is implemented as per the requirement of the registered PD and Final Validation report. During the current monitoring period it was observed that no unforeseen incident/event evolved which can impact the operation of the project activity. The project undergone continuous operation and only scheduled maintenance is observed as per the manufactures specification which is acceptable to the assessment team.

Project location is confirmed by the assessment team during the site visit. Assessment team also checked with the GPS meter regarding the latitude and longitude of the project site and confirm that the details as mentioned in the registered PD are correct. The detail is as below:

District	State		Latitude	Longitude
Kullu	Himachal Pradesh	Barrage	32° 2' 24" N	77° 15' 4" E
		Power House	32° 0' 12" N	77° 14' 30" E

Assessment team also checked the Technical details of the Hydro plant installed onsite. The same is checked during the onsite visit from the number plate capacity of each Hydro Unit and also cross checked from the technical manual of the Manufactures. The technical detail is as below:

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 3280 m length
Installed capacity	MW	86
Size of Power House	-	55m x 18.7 m x 28.9 m
Type of Turbines	-	Pelton, Vertical Axix
Generating units	-	2 Units of 43 MW each
Maximum Gross Head	meter	505

Assessment team checked the commissioning certificate and confirmed that the dates of Commission for the Hydro power plant (Unit 1 and 2) are correct.

The assessment team confirmed that there is no proposed or actual change to the project design during this monitoring period. The project design as mentioned in the registered PD is implemented and thus the same is acceptable to the assessment team. All required monitoring equipment's and procedures as mentioned in the registered PD are available and implemented in an appropriate manner.

The organisational role and responsibility as mentioned in the registered PD is followed onsite. All the monitoring equipment was calibrated as per the specified interval in the registered PD. All the emergency preparedness as mentioned in the registered PD is followed onsite and no discrepancies were found regarding the same.

Assessment team would like to clarify that the project PP then also applied for I- Renewable energy Certificate (REC) benefits and the project activity has been registered under I-REC mechanism. The PP has claimed I-REC from the project. The details for the period, during which I-REC has been claimed/issued, is provided in the table below.

Sr.	Duration	Volume claimed/issued
1.	01/01/2016 to 31/12/2016	315,567
2.	01/01/2017 to 30/06/2017	119,495
3.	01/10/2017 to 30/11/2017	32,618
4.	01/01/2018 to 31/05/2018	49,287
5.	01/01/2019 to 24/06/2019	116,601

DoE checked the undertaking provided by International REC Standard and confirmed that during the current monitoring period, the durations during which I-REC has been issued, has been excluded for the VCU calculations. The current VCS monitoring period is from 01/03/2015 to 31/12/2018.

Further, the project activity has not participated under any other GHG program, apart from Verified Carbon Standard and I-REC. PP will not claim benefits of carbon emission reduction credits achieved through this project activity under any other GHG programme for the crediting period claimed under VCS. Moreover, the project has not generated any other form of environmental credit and a declaration for the same has been submitted to the assessment team and the same is acceptable.

The assessment team observed that the project is in line with the registered PD, FVR and approved methodology and thus no clarification/deviation is sought. CAR 01 and CAR 02 were raised during the verification process and closed successfully. Please refer below Appendix 2 for the detail closure of the CAR

Assessment team confirms following during the verification site visit:

1. Start date of the project is 05/07/2001³ which is the date of commissioning of first phase of the Project
2. An undertaking letter dated 29/10/2019 has been submitted by PP for double counting with any other GHG program. PP also has given a written declaration that project has not claimed other form of GHG credit for the concerned monitoring period. Assessment team also checked that the

³As per the commissioning certificate.

duration for which I-REC benefits claimed not included in this verification. PP has given a written declaration that the credit claimed under VCS for the current monitoring period is not claimed under any other GHG mechanism except I-REC.

- Assessment team confirms that this is the 8th monitoring under VCS and covers the activity from 01/03/2015 to 31/12/2018 (inclusive of both dates). Thus, VCS crediting period should be maximum of 10 years and renewed twice till end date of CDM crediting period.

05/07/2011 is the start date and 04/07/2021 will be the end date of the crediting period.

The GHG credits from 01/03/2015 to 31/12/2018 will be claimed under VCS and also, I-REC are claimed for the period of 01/01/2016 to 31/12/2016, 01/01/2017 to 30/06/2017, 01/10/2017 to 30/11/2017, 01/01/2018 to 31/05/2018 & 01/01/2019 to 24/06/2019 are excluded from VCS. At any point of time during the crediting period, the project proponent will abide by the “Double Counting”.

- Assessment team checked and found that the Project proponent of the project activity is as below for the current monitoring period:

Organization name	Malana Power Company Limited
Contact person	Mr. O.P. Ajmera
Title	Chief Executive Officer
Address	Bhilwara Towers, A-12, Sector -1, Noida-201301, Uttar Pradesh, India
Telephone	+91-120- 4390300
Email	opajmera@lnjbhilwara.com

- Assessment team also checked the details of other entity and their details are as below:

Organization name	EKI Energy Services Limited
Role in the project	Project Consultant
Contact person	Mr. Manish Dabkara
Title	MD & CEO
Address	Office No. 201, EnKing Embassy, Plot No. 48, Scheme No. 78, Part II, Vijay Nagar, Indore – 452010, Madhya Pradesh, India.
Telephone	+91-731-4289086
Email	manish@enkingint.org

- The quantified emission reduction calculation for the monitoring period is correct and conservative. Assessment team also compared actual VER with the estimated VER and found

that the actual VER is 37 % higher than the estimated emission reduction which is due to high PLF attained by the hydro power plant because of more water availability which is not under the control of PP. During registration of the project activity, additionality was justified on the basis of Implementation Barriers and Common practice Analysis. Thus, there is no impact of the increased emission reduction on both of these additionality criteria's. Hence, assessment team confirms that there is no impact on the additionality of the project activity, due to increased emission reductions.

Sustainable development indicators

The National CDM Authority (NCDMA), which is the Designated National Authority (DNA) for the Government of India (GOI) under the Ministry of Environment, Forests & Climate Change (MoEF&CC), has mentioned four indicators for the sustainable development in the interim approval guidelines for Clean Development Mechanism (CDM/VCS) projects from India⁴. Thus the project's contribution towards sustainable development has been addressed based on the following sustainable development aspects:

Social well-being

The project activity provided / provides job opportunity to local people during erection, commissioning and maintenance of the Hydro project. Frequency of visiting villages and nearby areas by skilled, technical and industrialist increase due to installation /site visit/operation and maintenance work related to solar plant. This directly and indirectly positively effects the economy of villages and nearby area.

Environmental well-being

Hydro power is one of the cleanest renewable energy powers and does not involve any fossil fuel. There are no GHG emissions. The impact on land, water, air and soil is negligible. Thus the project activity contributes to environmental well-being without causing any negative impact on the surrounding environment.

Economic well-being

The VCS project activity generates permanent and temporary employment opportunity within the vicinity of the project. The electricity supply in the nearby area improves which directly and indirectly improves the economy and life style of the area.

Technological well-being

⁴http://www.cdmindia.gov.in/approval_process.php

The project activity is step forward in harnessing the untapped Hydro potential and further diffusion of the Hydro technology in the region. The project activity leads to the promotion and demonstrates the success of hydro projects in the region which further motivate more investors to invest in Hydro power projects. Hence, the project activity leads to technological well-being.

4.2 Accuracy of GHG Emission Reduction and Removal Calculations

Means of verification	The verification team assessed whether the data and calculations of GHG emission reductions achieved resulting from the VCS PD. The verification team has checked whether calculations of baseline GHG emissions, project GHG emissions and leakage GHG emissions have been carried out in accordance with the formulae and methods described in the monitoring plan of the VCS PD
Findings	CAR 02 & CAR 05 was raised during the verification process and closed successfully. Please refer Appendix 2 of this report for the detail closure of the CAR
Conclusion	The baseline Emissions for a given year is calculated by multiplying the energy baseline (EB) with the regional grid emission factor. Formula Used:- Baseline emission: $BE_y = EG_{,y} \times EF_{CO_2,grid,y}$ Where, BE_y = Baseline Emissions in year y; tCO₂ $EG_{,y}$ = Quantity of net electricity supplied to the grid as a result of the implementation of the VCS project activity in year y (MWh) $EF_{CO_2,grid,y}$ = CO₂ Emission Factor of the grid in year y; tCO₂/MWh The baseline emission factors are taken ex-ante in line with the registered VCS-PD as well as cross checked with section validation report and found correct. Combined margin CO₂ emission factor of NEWNE grid ($EF_{grid,CM,y}$) is equal to 0.858 tCO₂/MWh. The calculation approach was in line with the VCS-PD. Project Emission: Inline with the registered VCD PD, Since Power density is greater than 4 W/M²; therefore, $PE_{HP,y} = 0$. Further, since there is no fossil fuel combustion; $PE_{FF,y}$ is considered zero Thus, Total project emissions (PE_y) = $PE_{HP,y} + PE_{FF,y}$ $= 0 + 0$ $= 0 \text{ tCO}_2$ Leakage Emission: As specified in ACM0002 version 12.3.0, project participants do not need to consider leakage, hence leakage emission in this project activity considered as zero, which is also in line with registered VCS-PD and methodology. Ex-ante parameters:

The baseline emission factors are taken ex-ante in line with the registered VCS-PD as well as cross checked with section validation report and found correct. Combined margin CO₂ emission factor of NEWNE grid ($EF_{grid,CM,y}$) is equal to 0.858 tCO₂/MWh. The calculation approach was in line with the VCS-PD.

Values are as follows:

$EF_{grid,OM,y} = 0.994 \text{ tCO}_2/\text{MWh}$

$EF_{grid,BM,y} = 0.812 \text{ tCO}_2/\text{MWh}$

$EF_{grid,CM,y} = 0.858 \text{ tCO}_2/\text{MWh}$

Ex-post parameter:

Data/Parameter, Unit : Net electricity supplied to the NEWNE grid by the project activity during the year y (EGy), MWh

	Discussion and verification assessment
Purpose of Data	For estimation of Baseline Emissions
Monitoring equipment	Not Applicable as it is a calculated parameter
Measuring/ Reading/Recording frequency	Electricity is monitored continuously by the energy meters and recorded monthly, the root parameters to derive the parameters are verified in the below section.
Data collection	Calculated using the formula in line with registered PD and applied methodology
Verified value, Unit	776,771.30 MWh
Cross checks	The value mentioned in the ER spread sheet, is cross verified by studying the onsite logbooks and invoices raised by PP to the grid.
QA/QC procedure applied	This is calculated parameter the QA/QC related to the root parameter derived to this are verified in the below section.

Data / Parameter, Unit :Energy generated by Malana Hydro Power project at the generation point ($EG_{Gen, Malana}$) MWh

	Discussion and verification assessment
Purpose of Data	For estimation of Baseline Emissions
Monitoring equipment	Type: Electricity Meter Accuracy Class of meters :0.2% For meter calibration detail, please refer the appendix 5.
Measuring/ Reading/Recording frequency	Electricity is monitored continuously by the energy meters and recorded monthly.
Data collection	The monthly generation data has been obtained from Joint Meter Reading (JMR) documents maintained by State Electricity Board (SEB). The JMR is signed by the representative of grid and PP

		both . All the JMRs were verified by the verification team and found the reported value of the parameter is consistent with the JMR.
	Verified value, Unit	790,096.28 MWh
	Cross checks	The value mentioned in the ER spread sheet is cross verified by studying the onsite log books and invoices raised by PP to the grid.
	QA/QC procedure applied	Meters are maintained by state electricity board. These meters are calibrated once in three year and the records maintained by state electricity department. The calibration detail of each meter is provided in the below table. There was no delay in the calibration and all the result of calibration were found to be satisfactory.
	Data / Parameter, Unit: Energy supplied by the Malana Hydro Power project to the Malana transmission line at Malana Yard (EG_{Malana}) MWh	
		Discussion and verification assessment
	Purpose of Data	For estimation of Baseline Emissions
	Monitoring equipment	Not Applicable as it is a calculated parameter
	Measuring/ Reading/Recording frequency	Electricity is monitored continuously by the energy meters and recorded monthly.
	Data collection	Calculated using the formula in line with registered PD and applied methodology
	Verified value, Unit	786,756.66 MWh
	Cross checks	The value mentioned in the ER spread sheet is cross verified by studying the onsite log books and invoices raised by PP to the grid.
	QA/QC procedure applied	This is calculated parameter, the QA/QC related to the root parameter derived to this are verified in the below section.
	Data/Parameter, Unit: The units/ Energy supplied by the Toss Hydro Power Project to the Malana transmission line at Malana Yard (EG_{Toss})MWh	
		Discussion and verification assessment
	Purpose of Data	For estimation of Baseline Emissions
	Monitoring equipment	Type: Electricity Meter Accuracy Class of meters :0.2% For meter calibration detail, please refer the appendix 5.
	Measuring/	Electricity is monitored continuously by the energy

	Reading/Recording frequency	meters and recorded monthly.
	Data collection	The monthly generation data has been obtained from Joint Meter Reading (JMR) documents maintained by State Electricity Board (SEB).
	Verified value, Unit	183,120.20 MWh
	Cross checks	The value mentioned in the ER spread sheet is cross verified by studying the onsite log books and invoices raised by PP to the grid.
	QA/QC procedure applied	Meters are maintained by State electricity board. These meters are annually calibrated and the records maintained by state electricity department. The details of calibration is provided in the below table separately.
	Data/Parameter, Unit: Total Energy sent out both Malana and Toss Hydro Power Project to the Malana transmission line at Malana Yard (EG_{M&T}) MWh	
		Discussion and verification assessment
	Purpose of Data	For estimation of Baseline Emissions
	Monitoring equipment	Type: Electricity Meter Accuracy Class of meters :0.2% For meter calibration detail, please refer the appendix 5.
	Measuring/ Reading/Recording frequency	Electricity is monitored continuously by the energy meters and recorded monthly.
	Data collection	The monthly generation data has been obtained from Joint Meter Reading (JMR) documents maintained by State Electricity Board (SEB).
	Verified value, Unit	969,876.86 MWh
	Cross checks	The value mentioned in the ER spread sheet is cross verified by studying the onsite log books and invoices raised by PP to the grid.
	QA/QC procedure applied	Meters are maintained by State electricity board. These meters are annually calibrated and the records maintained by state electricity department. The details of calibration is provided in the below table separately.
	Data/ Parameter, Unit: Auxiliary consumption by Malana hydro power project (EG_{AUX,Malana})MWh	
		Discussion and verification assessment

	Purpose of Data	For estimation of Baseline Emissions
	Monitoring equipment	Not Applicable as it is a calculated parameter
	Measuring/ Reading/Recording frequency	Electricity is monitored continuously by the energy meters and recorded monthly.
	Data collection	Calculated using the formula in line with registered PD and applied methodology
	Verified value, Unit	3339.624 MWh
	Cross checks	The value mentioned in the ER spread sheet is cross verified by studying the onsite log books and invoices raised by PP to the grid.
	QA/QC procedure applied	This is calculated parameter ,the QA/QC related to the root parameter derived to this are verified for each parameter separately.
	Data/ Parameter, Unit: Energy injected at Bajoura substation by both Malana and Toss hydro power project (EG_{Bajoura,M&T})MWh	
		Discussion and verification assessment
	Purpose of Data	For estimation of Baseline Emissions
	Monitoring equipment	Type: Electricity Meter Accuracy Class of meters :0.2% For meter calibration detail, please refer the appendix 5.
	Measuring/ Reading/Recording frequency	Electricity is monitored continuously by the energy meters and recorded monthly.
	Data collection	Calculated using the formula in line with registered PD and applied methodology
	Verified value, Unit	961,851.09 MWh
	Cross checks	The value mentioned in the ER spread sheet is cross verified by studying the onsite log books and invoices raised by PP to the grid.
	QA/QC procedure applied	Meters are maintained by State electricity board. These meters are annually calibrated and the records maintained by state electricity department. The details of calibration is provided in the below table separately.
	Data/ Parameter, Unit: Total transmission losses between Malana yard and Bajoura substation (L_{Transmission})MWh	
		Discussion and verification assessment
	Purpose of Data	For estimation of Baseline Emissions

	Monitoring equipment	Not Applicable as it is a calculated parameter
	Measuring/ Reading/Recording frequency	Electricity is monitored continuously by the energy meters and recorded monthly.
	Data collection	Calculated using the formula in line with registered PD and applied methodology
	Verified value, Unit	8,025.76 MWh
	Cross checks	The value mentioned in the ER spread sheet is cross verified by studying the onsite log books and invoices raised by PP to the grid.
	QA/QC procedure applied	This is calculated parameter ,the QA/QC related to the root parameter derived to this are verified for each parameter separately.
	Data/ Parameter, Unit: Shares of losses of Malana hydro power plant (L_{Malana})MWh	
		Discussion and verification assessment
	Purpose of Data	For estimation of Baseline Emissions
	Monitoring equipment	Not Applicable as it is a calculated parameter
	Measuring/ Reading/Recording frequency	Electricity is monitored continuously by the energy meters and recorded monthly.
	Data collection	Calculated using the formula in line with registered PD and applied methodology
	Verified value, Unit	6,645.73 MWh
	Cross checks	The value mentioned in the ER spread sheet is cross verified by studying the onsite log books and invoices raised by PP to the grid.
	QA/QC procedure applied	This is calculated parameter, the QA/QC related to the root parameter derived to this are verified for each parameter separately.
	Data/ Parameter, Unit: Shares of losses of Toss hydro power plant(L_{Toss})MWh	
		Discussion and verification assessment
	Purpose of Data	For estimation of Baseline Emissions
	Monitoring equipment	Not Applicable as it is a calculated parameter
	Measuring/ Reading/Recording frequency	Electricity is monitored continuously by the energy meters and recorded monthly.
	Data collection	Calculated using the formula in line with registered PD and applied methodology
	Verified value, Unit	1,380.028 MWh
	Cross checks	The value mentioned in the ER spread sheet is

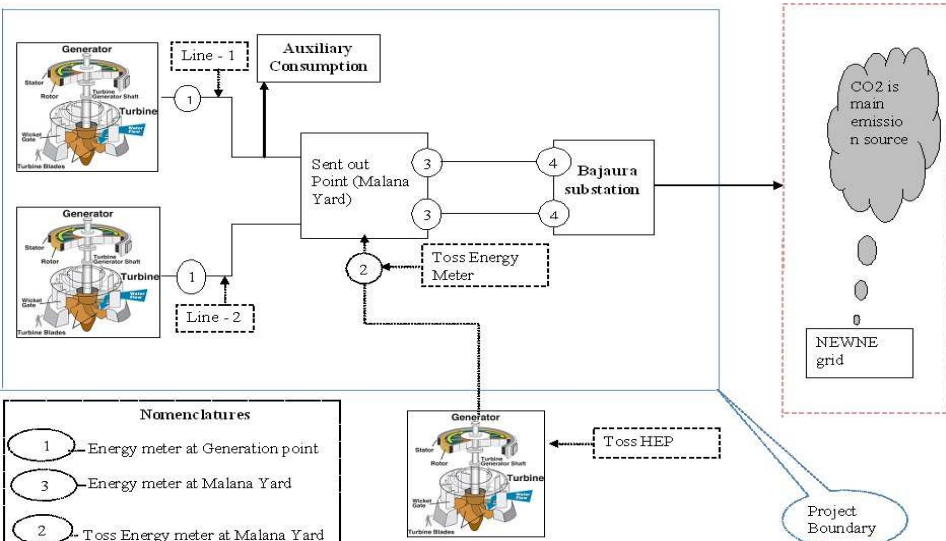
	cross verified by studying the onsite log books and invoices raised by PP to the grid.
QA/QC procedure applied	This is calculated parameter ,the QA/QC related to the root parameter derived to this are verified for each parameter separately.
Data/ Parameter, Unit: Area of the reservoir measured in the surface of the water, after the implementation of the project activity, when the reservoir is full (A_{PJ})m²	
	Discussion and verification assessment
Purpose of Data	For estimation of Baseline Emissions
Monitoring equipment	Not Applicable as it is a calculated parameter
Measuring/ Reading/Recording frequency	Yearly
Data collection	Calculated by making physical measurement using topographical surveys, maps, satellite pictures, etc on site
Verified value, Unit	18,250 ⁵ m ²
Cross checks	The value of the area of the reservoir is confirmed during onsite interviews with PP.
QA/QC procedure applied	Not applicable. Moreover, it is a civil structure and is same since commissioning.
Data/ Parameter, Unit: Installed capacity of the hydro power plant after the implementation of the project activity (Cap_{PJ}) Watt	
	Discussion and verification assessment
Purpose of Data	For estimation of Baseline Emissions
Monitoring equipment	Not Applicable
Measuring/ Reading/Recording frequency	One time based on accepted standards and techniques.
Data collection	-
Verified value, Unit	86,000,000 ⁶ W
Cross checks	The turbine and generator specification were physically verified to confirm the actual installed

⁵ There is no change in the civil structure of the reservoir and thus no change in area of the reservoir. Same was also confirmed during onsite interviews with PP.

⁶ The turbine and generator capacity was physically verified during onsite visit and no change in capacity observed.

		capacity of the power plant.
	QA/QC procedure applied	Not applicable

4.3 Quality of Evidence to Determine GHG Emission Reductions and Removals

Means of verification	The verification team checked the Calibration details of the monitoring meters with the calibration certificates.
Findings	CAR 06 was raised during the verification process. The description of the CAR and its closure is described below in Appendix 2 of this report
Conclusion	The metering arrangement is bi-directional energy meters (main and check) at the State Electricity Board (SEB) substation. These meters record several parameters including electricity exported & imported. These electricity meters are being used by state electricity board for JMR statements. There are altogether 12 main meter and check meters installed at generation point, Malana yard and Bajura substation which was confirmed by Applus during site visit. Location of meters in project boundary depicted below: For the uninterrupted metering system the PP has also kept 5 spare meters, details of these spare meters and their calibration details provided in Appendix 5 of this report.  Nomenclatures 1 - Energy meter at Generation point 3 - Energy meter at Malana Yard 2 - Toss Energy meter at Malana Yard 4 - Energy meter at Bajura Substation Figure 1: Positioning of monitoring equipment Assessment team confirms that all the energy meters (both main and check meter) installed at the substation are of accuracy class of 0.2s are calibrated as per the national standards followed by the electricity board, but they are calibrated at least once in a three year as per the deviation requested and accepted by the assessment team as per the requirement of state electricity board guideline. There was no delay in calibration observed. The meters have been calibrated by Electrical Research and Development Association which is NABL (National Accreditation Board for Laboratory, Govt of India) accredited agency. The meter

	test records have been maintained in the plant. The testing of the meters carried out as per the national regulation and thus traceability of the Calibration is also confirmed by the assessment team.
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4.4 Non-Permanence Risk Analysis

No.	Risk that could lead to material errors, omissions or misstatements	Assessment of the risk		Response to the risk in the verification plan and/or sampling plan
		Risk level	Justification	
NA	NA	NA	NA	NA

5 SAFEGUARDS

5.1 No Net Harm

No potential environment or socio-economic matter was found during the site visit. The project is renewable energy project and thus no negative impact observed onsite.

The project activity promotes environmental and socio-economic well-being as it results in zero GHG emissions due to installation and operation of clean, renewable energy technology for electricity generation.

However, assessment team still conducted the No net harm assessment for some of the parameters and the result is described below.

SL.NO	Indicator	Assessment team opinion
1	Air quality	The project generates clean energy which replaces the fossil fuel intensive electricity generation. Adequate measures were taken to mitigate the envisaged impacts like spraying water on the road side to reduce dust level, etc. This was confirmed by the local stakeholders. Therefore, it is validated that mitigation measures were robustly implemented on ground for air quality issues project will have a positive impact on air quality.
3	Soil condition	There are negligible impacts envisaged during operation of the project activity. For mitigating the impacts during construction, various mitigation measures were taken which is validated from the plant records of PP and the interview with local villagers. The top soil excavated during construction, was stockpiled and used for compaction. The roads were not paved and soling was done with excavated earth & rock material, so land disturbance could be minimized. It was also confirmed that, the vegetation done at site helps for soil erosion. The same is confirmed during the stakeholder meetings during onsite visit. Therefore, it can be concluded that the project has no effect on soil

		conditions during its operation because it has no waste coming out.
4	Biodiversity	During the validation site visit it was observed that the condition of ground vegetation will be gradually improved; No rare species has been found in the around area. The project site is not on the migration route of migratory bird. As Such hydro plant do not have any obstruction in the path of migratory birds. With the implementation of Project, the greening water will be increased significantly; the biodiversity in the vicinity will be improved with the vegetation improvement. No negative impact envisaged.
5	Employment Generation	The project activity employed local population as skilled workers as well as security guards which were envisaged during the validation site visit. The personnel employed by the project activity are also provided trainings and exposed to various awareness programs therefore a positive indicator has been accepted.
6	Livelihood of the poor	The project is associated with infrastructure development like roads in the nearby areas and promoting economic activities like grants to local school and communities temples etc. Also, project employed local villagers as guards for the security of power project. Positive impact envisaged. .

5.2 Local Stakeholder Consultation

All the stakeholders are happy with the implementation and operation of the project activity and no negative comments envisaged for the project activity. There was no change in technical project description from the registered VCS PD. Assessment team confirmed the same during the verification site visit. Also, as best practice method PP also placed a grievance register onsite to record any grievance from the stakeholders during and after the implementation of the project activity. Assessment team checked the grievance register maintained onsite and no negative comments were observed for the project activity. Local people are happy as the project generated employment opportunities and thus the living standards in and around the vicinity of the project is increased and thus assessment team confirms that local stakeholders have no issue with this project activity after implementation and continuous operation.

The interaction with some of the stakeholders during the site visit is presented below:

Name of the stakeholder	Shailesh Singh
Occupation	Villager
DOE QUESTION: Did PP promised employment opportunity? Answer: Yes, PP told us that employment is generated and the locals are given priority. DOE also like to conclude that during the site visit it was observed that local people were employed for security and operation related work like water spraying, vegetation improvement and other unskilled work. DOE also found that skilled local persons were also employed by the organization for the operation and maintenance of the power plant.	

Name of the stakeholder	Ashish Trikha
Occupation	Villager
DOE questions: Did the power plant discharge any harmful pollutants? Answer: NO the plant does not discharge any harmful pollutants. DOE questions: Did the power plant destroy any crop fields? Answer: The plant is implemented in barren land and there were no any fertile land or crop which is damaged.	

6 VERIFICATION CONCLUSION

Applus+ Certification has been engaged by Malana Power Company Limited to perform the 8th periodical verification of the “86 MW Hydro Project in Himachal Pradesh”

The management of Malana Power Company Limited is responsible for the preparation of the GHG emissions data and the reported GHG emissions reductions on the basis set out within the project's Monitoring Plan in the registered VCS PD and the applied methodology ACM0002, Ver. 12.3.0

Our verification approach was based on the requirements as defined under the Kyoto Protocol, Marrakesh accord, as well as those defined by the CDM Executive Board. 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 team can confirm that:

- the project is operated as planned and described in the project document;
- the monitoring plan is as per the applied methodology;
- the monitoring process in Monitoring Report is as per the PD
- the development and maintenance of records and reporting procedures are in accordance with the monitoring plan;
- 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.

Verification period: 01/03/2015 to 31/12/2018⁷ (inclusive of both days)

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)
01/03/15-31/12/15	281,727	0	0	281,727
01/01/17-31/12/17	166,408	0	0	166,408
01/01/18-31/12/18	218,325	0	0	218,325
Total	666,460	0	0	666,460

⁷ In year 2016, entire VCUs claimed under I-REC, hence VCUs for 2016 not considered under this verification

APPENDIX 1: DOCUMENTS REVIEWED OR REFERENCED (VERIFICATION)

No.	Author	Title	References to the document	Provider
1	NA	Documents pertaining to the implementation of project activity. Commissioning certificates of the Hydro power plant implemented in the project site.	Erection and Commissioning of 2x43 MW Hydro generating units of Malana Hydroelectric Project issued by Bharat Heavy Electricals Limited: - Commissioning of Unit I:09/07/2001 - Commissioning of Unit I:05/07/2001 Copy of 40 years implementation agreement dated 12 March 1997	Project participant
2	NA	Contract of the project participant with the DOE	Contract document signed between PP and DOE	Project participant
3	NA	Technical specifications of Hydro generators from manufacturers	Manufacturer technical specifications	Project participant
4	NA	Registered PD https://www.vcsprojectdatabase.org/#/project_details/93	NA	Project participant
5	NA	Registered Final Validation and 1st and 2nd verification report https://www.vcsprojectdatabase.org/#/project_details/93	NA	Project participant
6	NA	Emission reduction sheet version 01	ER sheet version 01	Project participant
7	NA	The operational lifetime of the project activity from the manufacturer=(Technical	Manufacturer technical	Project

		specifications)	specifications	participant
8	NA	RBI: Reserve Bank of India www.rbi.org.in Ministry of Environment and forest: www.envfor.nic.in UNFCCC www.cdm.unfccc.int CEA: Central electricity authority www.cea.nic.in Income tax act 1961 http://law.incometaxindia.gov.in/DIT/ VCS: Verified Carbon Standard www.v-c-s.org	Reference link is provided.	Independent Search
09	NA	Tools/ guidelines used in the project activity • Tool to determine the remaining lifetime of the project activity in line with Annex 15 EB 50 • Tool for the demonstration and assessment of additionality (Version 04.0.0) • Glossary of CDM terms version 07 • VCS verification report template version 03	UNFCCC CDM/VCS web site	UNFCCC
10	NA	Monthly statement- JMR for the complete monitoring period	Share reports/Monthly statement for the complete monitoring period	PP
11	NA	MR version 01	03/09/2019	PP

		MR version 02	30/09/2019	
12	NA	Invoices for the complete monitoring period	Invoice	PP
13	NA	Break down details of the complete monitoring period	Log sheet	PP
14	NA	Declaration regarding no participation in other GHG program for the concerned monitoring period	Declaration dated 29/10/2019	PP
15	NA	Calibration certificates	Calibration records for the generation, transmission and sub-station energy meters for the entire monitoring period. Calibration records for the meters at the Toss injection point at Malana yard for the entire monitoring period. Details of changes in the tri-vector meters at generation end.	PP

APPENDIX 2: CLARIFICATION REQUESTS, CORRECTIVE ACTION REQUESTS & FORWARD ACTION REQUESTS (CAR/CL/FAR)

VERIFICATION FINDINGS

Project Implementation Status

CAR ID	01	Section no.	4.1	Date: 25/09/2019
Description of CAR				
1. Monitoring report not clear about inclusion of first & last days of the monitoring period chosen. Corrections requested 2. Weblink of source reference for the applied methodology and tools is missing in the MR. Corrections requested.				
Project participant response				Date: 30/09/2019
1. The first and last days of the monitoring period are included and the same is now corrected in the MR-Version 2. 2. The web-link for the applied methodology and tools are now provided in the MR.				
Documentation provided by project participant				
MR-Version 2.				
DOE assessment				Date: 08/11/2019
1. Necessary amendment made by PP in revised MR, ver. 02 dated 30/09/2019 and clarified that both days (first and last day) included in this monitoring period. 2. Weblinks for applied methodology and corresponding tools now provided by PP in revised MR, ver. 02. CAR closed.				

CAR ID	02	Section no.	4.1	Date: 25/09/2019
Description of CAR				
As per section 1.9 of the VCS MR, the project has taken REC benefits during current monitoring period, however, ER sheet is not clear about REC exclusion of the generation under REC mechanism. Corrections requested for the same. PP also requested to submit evidence of REC issuance.				
Project participant response				Date: 30/09/2019
The durations during which I-REC has been claimed has now been mentioned in the ER sheet. Also, the same durations have been excluded from the current monitoring period for the VCU calculation. I-REC issuance document from I-REC standard is now submitted to the assessment team.				
Documentation provided by project participant				
1. ER calculation sheet 2. I-REC issuance document				
DOE assessment				Date: 08/11/2019
PP has now provided revised ER sheet dated 30/09/2019 which have now details of VCUs issued to I-REC. Duration of I-REC claimed checked in ER sheet and cross checked by declaration provided by International REC Standard. Verification team confirms that duration of I-REC claimed for this monitoring period excluded from ER calculation. Revised MR and ER sheet found to be consistent and in line. CAR closed.				

CAR ID	03	Section no.	4.1	Date: 25/09/2019
Description of CAR				
Section 1.10 of MR lacking project contribution to achieving nationally stated sustainable development priorities. Correction requested in MR.				
Project participant response				Date: 30/09/2019

The section 1.10 of the MR, regarding contribution to achieving nationally stated sustainable development priorities has now been updated in the MR-Version 2.

Documentation provided by project participant

MR-Version 2.

DOE assessment

Date: 08/11/2019

PP has now included details regarding contribution to sustainable development in revised MR, ver. 02. CAR closed.

Accuracy of GHG Emission Reduction and Removal Calculations

CAR ID	04	Section no.	4.2	Date: 25/09/2019
Description of CAR				
PP requested to submit complete JMR for the Malana& Toss HEP covering all monitoring parameters. Also PP requested to submit invoices raised towards state utility.				
Project participant response				Date: 30/09/2019
The JMRs & Invoices for the entire monitoring period for Malana& Toss HEP have now been provided to the DOE assessment team.				
Documentation provided by project participant				
JMR & Invoices of Malana& Toss HEP for the entire monitoring period.				
DOE assessment				Date: 08/11/2019
PP has now submitted copies of JMRs and invoices for Malana& Toss HEPs covering this monitoring period which has been checked and found to be appropriate. CAR closed.				

CAR ID	05	Section no.	4.2	Date: 25/09/2019
Description of CAR				
PP requested to submit revised ER sheet indicating REC share during current monitoring period. Further, PP requested to round down the emission reduction values appropriately for conservativeness.				
Project participant response				Date: 30/09/2019
I-REC durations have now been mentioned in the ER calculation sheet. Emission Reduction values are now rounded-down appropriately for conservativeness.				
Documentation provided by project participant				
ER calculation sheet				
DOE assessment				Date: 08/11/2019
PP has submitted revised ER sheet dated 30/09/2019 which includes details of REC share during this monitoring period and ER calculation has also been rounded down. CAR closed				

Quality of Evidence to Determine GHG Emission Reductions and Removals

CAR ID	06	Section no.	4.3	Date: 25/09/2019
Description of CAR				
Calibration certificates for all the monitoring points are missing. PP requested to submit the same and also revise MR for details of the same.				
Project participant response				Date: 30/09/2019
The calibration certificates of the energy meter are now provided for the entire monitoring period. The details are also provided in the annex-1 of the MR version-2.				
Documentation provided by project participant				
1. Calibration certificates 2. MR-Version 2				
DOE assessment				Date: 08/11/2019
PP has provided calibration certificates of all energy meters related to this project activity and details of calibration also included in annex 1 of revised MR, ver. 02. CAR closed				

APPENDIX 3: COMPETENCE OF TEAM MEMBERS AND TECHNICAL REVIEWERS**Verification team member**

No.	Role	Type of resource	Last name	First name	Affiliation (e.g. name of central or other office of DOE or outsourced entity)	Involvement in			
						Desk review	On-site inspection	Interview(s)	Verification findings
1.	Lead Auditor/ Technical Expert	OR	Takarkhede	Atul	TQC- Outsourced entity	Yes	Yes	Yes	Yes

Technical reviewer and approver of the verification and certification report

No.	Role	Type of resource	Last name	First name	Affiliation (e.g. name of central or other office of DOE or outsourced entity)
1.	Technical reviewer (TR)	EI	Xue	Denny	LGAI Technological Center S.A. (Applus+ Certification)
2.	Approver	IR	Sendin	Juan	LGAI Technological Center S.A. (Applus+ Certification)

Short CVs of the Team:

1. Dr. Atul Takarkhede counts with 10 years of experience in field of Environmental Auditing, consulting and accreditation. He is an Expert in ISO 9001-14001, CO₂/GHG Reporting, Carbon Foot Print, Energy, Water and Waste Management Reporting for organizations environmental performance. His professional portfolio is mainly related with carrying out EIA, conducting QA/QC of EIA Reports; Conducting Environmental/water Audits; NABET requirements appliance. Furthermore, he counts with solid experience on CDM-VCS-GS consultancy and auditing. He has Ph.D. (Environmental Science) from Institute of Science, RTM Nagpur University, Nagpur, and he has already published different technical reports related to environmental science. Currently he is associated with True Quality Certifications Private Limited and is empanelled with Applus+ Certification to carry out GHG audit.
2. Mr. Denny Xue has a Bachelor's Degree on Thermal Energy Engineering and Master's Degree on Environmental Engineering. He has more than 10 years of experience on CDM project development. Before he joined Applus+ Certification, he has been worked for Shanghai Chuanji Investment and Management which is a CDM consultancy company as a project manager for CDM project development. He is working with Applus+ since 2011 carrying out Validation and verification for CDM/GS/VCS project under scope 1 and 13 as auditor, lead auditor, technical expert and technical reviewer.

APPENDIX 4: ABBREVIATIONS

Abbreviations	Full texts
BM	Build Margin
CAR	Corrective Action Request
CDM	Clean Development Mechanism
CER	Certified Emission Reduction(s)
CEA	Central Electricity Authority
CL	Clarification request
CM	Combined Margin
CMS	Central Monitoring system
CO ₂	Carbon dioxide
CO ₂ e	Carbon dioxide equivalent
DNA	Designated National Authority
DOE	Designated Operational Entity
DR	Document Review
EF	Emission Factor
EIA	Environmental Impact Assessment
ER	Emission Reductions
FAR	Forward Action Request
GHG	Greenhouse gas(es)
OM	Operating Margin
GWP	Global Warming potential
JMR	Joint Metering reading
RBI	Reserve Bank Of India

APPENDIX 5: CALIBRATION DETAILS

Meter Serial No.	Accuracy Class	Meter Make	Location of the Meter	Date of calibration	Due date of calibration
KRB00282	0.2 s	Secure	Malana G-1 Main Meter	19/08/2014	18/08/2015
HPU05820 ⁸				17/08/2015	16/08/2016
				12/08/2016	11/08/2017
				10/08/2017	09/08/2018
				08/08/2018	07/08/2019
KRB00281	0.2 s	Secure	Malana G/1 Check Meter	19/08/2014	18/08/2015
HPU06253 ⁹				17/08/2015	16/08/2016
				12/08/2016	11/08/2017
				10/08/2017	09/08/2018
				09/08/2018	08/08/2019
AB0014A	0.2 s	Secure	Malana G/2 Main Meter	19/08/2014	18/08/2015
HPU05821 ¹⁰				17/08/2015	16/08/2016
				12/08/2016	11/08/2017
				10/08/2017	09/08/2018
				08/08/2018	07/08/2019
KRB00279	0.2 s	Secure	Malana G/2 Check Meter	19/08/2014	18/08/2015
AB0013A ¹¹				17/08/2015	16/08/2016
				12/08/2016	11/08/2017
				10/08/2017	09/08/2018
				08/08/2018	07/08/2018
AB0006A	0.2 s	Secure	Malana Line/1 Main Meter	19/08/2014	18/08/2015
HPU05987 ¹³				17/08/2015	16/08/2016
				12/08/2016	11/08/2017
				10/08/2017	09/08/2018
				08/08/2018	07/08/2019
AB0010A	0.2 s	Secure	Malana Line/1 Check Meter	19/08/2014	18/08/2015
				17/08/2015	16/08/2016
				12/08/2016	11/08/2017
				10/08/2017	09/08/2018
				08/08/2018	07/08/2019
AB0011A	0.2 s	Secure	Malana	19/08/2014	18/08/2015

⁸ The old Main Meter with SI. No. KRB00282 was replaced with the new Main Meter with SI. No. HPU05820, which was calibrated and installed on 12/08/2016.

⁹ The old Check Meter with SL. No. KRB00281 was replaced with the new Main Meter with SL. No. HPU06253, which was calibrated and installed on 08/08/2018.

¹⁰ The old Main Meter with SI. No. AB0014A was replaced with the new Main Meter with SL. No. HPU05821, which was calibrated and installed on 12/08/2016.

¹¹ The old Check Meter with SI. No. KRB00279 was replaced with the new Check Meter with SI. No. AB0013A, which was calibrated and installed on 17/08/2015.

¹² The old Check Meter with SL. No. HPU06254 was replaced with the new Check Meter with SL. No. HPU06254, which was calibrated and installed on 08/08/2018.

¹³ The old Main Meter with SI. No. AB0006A was replaced with the new Main Meter with SI. No. HPU05987, which was calibrated and installed on 10/08/2017.

HPU05988 ¹⁴			Line 2 Main Meter	17/08/2015	16/08/2016
				12/08/2016	11/08/2017
				10/08/2017	09/08/2018
				08/08/2018	07/08/2019
AB0005A	0.2 s	Secure	Malana Line-2 Check Meter	19/08/2014	18/08/2015
				17/08/2015	16/08/2016
				12/08/2016	11/08/2017
				10/08/2017	09/08/2018
KRB09865	0.2 s	Secure	Bajaura Line-1 Main Meter	08/08/2018	07/08/2019
				19/08/2014	18/08/2015
				17/08/2015	16/08/2016
				12/08/2016	11/08/2017
AB0001A	0.2 s	Secure	Bajaura Line-1 Check Meter	10/08/2017	09/08/2018
				08/08/2018	07/08/2019
				19/08/2014	18/08/2015
				17/08/2015	16/08/2016
AB0002A	0.2 s	Secure	Bajaura Line-2 Main Meter	12/08/2016	11/08/2017
				10/08/2017	09/08/2018
				08/08/2018	07/08/2019
				19/08/2014	18/08/2015
HPU05989 ¹⁵				17/08/2015	16/08/2016
AB0003A	0.2 s	Secure	Bajaura Line-2 Check Meter	12/08/2016	11/08/2017
				10/08/2017	09/08/2018
				08/08/2018	07/08/2019
				19/08/2014	18/08/2015
AB0013A	0.2 s	Secure	Spare Meter	19/08/2014	18/08/2015
AB0007A	0.2 s	Secure	Spare Meter	19/08/2014	18/08/2015
KRB06956	0.2 s	Secure	Spare Meter	16/08/2015	15/08/2016
HPU05821	0.2 s	Secure	Spare Meter	16/08/2015	15/08/2016
HPU05820	0.2 s	Secure	Spare Meter	16/08/2015	15/08/2016

¹⁴The old Main Meter with SI. No. AB0011A was replaced with the new Main Meter with SI. No. HPU05988, which was calibrated and installed on 10/08/2017.

¹⁵ The old Main Meter with SI. No. AB0002A was replaced with the new Main Meter with SI. No. HPU05989, which was calibrated and installed on 10/08/2017.