18 MW KEMPHOLE MINI HYDEL SCHEME (KMHS), BY INTERNATIONAL POWER CORPORATION LIMITED, INDIA

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Summary:

4K Earth Science Private Limited (4KES) has performed the verification of the project "18 MW Kemphole Mini Hydel Scheme (KMHS), by International Power Corporation Limited, India" VCS ID 1893, against VCS Standard Version 4. The project involves installation and operation of 18 MW Hydro power project in the state of Karnataka, India. The project is developed by International Power Corporation Limited. The electricity generated by the project activity displaces the grid electricity and there by avoid associated CO_2 emission.

During the current monitoring period, project activity undergoes continued operation since their commissioning and no major breakdown had taken place

The proposed project is a voluntary action being undertaken by International Power Corporation Limited. The Kosher Climate India Private Limited (hereafter referred as "Kosher") is acting as the other party for this project activity.

The scope of verification includes confirming the implementation of the monitoring plan of the registered CDM PDD (Version 12, Dated 23/11/2020) and the application of the monitoring methodology "ACM0002: Grid-connected electricity generation from renewable sources" Version 20.0.

The monitoring period covered in the verification is 20-October-2017 to 30-September-2021

The verification is consisted of three phases: i) desk review of the project; ii) interviews with project stakeholders; iii) resolution of outstanding issues and the issuance of the final verification report and opinion. The overall verification, from Contract Review to Verification Report & Opinion, was conducted following 4KES internal quality procedures.

During the verification process 04 CARs, 05 CLs and 00 FARs were raised. All the findings have been closed satisfactorily and the same has been discussed in Appendix II.

4KES confirms that the monitoring system is in place and the emission reductions are calculated without material misstatements. The emission reductions from the project activity "18 MW Kemphole Mini Hydel Scheme (KMHS), by International Power Corporation Limited, India" in India during the period 20-October-2017 to 30-September-2021 (including both days) amount to 112,482 tonnes of CO_2e.

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1 INTRODUCTION

1.1 Objective

Kosher Climate India Private Limited has contracted 4K Earth Science Pvt. Ltd (4KES) to perform VCS Verification of the '18 MW Kemphole Mini Hydel Scheme (KMHS), by International Power Corporation Limited, India' in India (hereafter called project). This project has already been registered as a VCS project (VCS ID 1893). The objective of this verification is a thorough and independent assessment of registered project activities against the applicable VCS requirement by the DOE. The verification process shall determine whether the proposed project activity complies with the requirements of latest VCS guidelines, applicability conditions of the selected methodology, relevant host country regulations and guidance issued by the VCS Board.

1.2 Scope and Criteria

The scope of verification is to assess the claims and assumptions made in the VCS monitoring report (MR) against the VCS criteria, including but not limited to, VCS standard, applied methodology and other relevant rules and requirements established for VCS project activities.

The Verification is not meant to provide any consulting towards the project participants. However, stated requests for clarification and/or correction actions request may have provided inputs for improvement of the project design

1.3 Level of Assurance

The verification team verified the complete monitoring data for all the parameters of the monitoring plan and confirms that the reported emission reductions are free from any type of material errors. Therefore, 4KES confirms that the verification is conducted with reasonable level of assurance

1.4 Summary Description of the Project

The main purpose of this project activity is to generate clean form of electricity through flow of the water. The project activity aims to harness kinetic energy of water flow through installation of hydro power plant with total installed capacity of 18 MW. The project is located Heggadde villages of Sakaleshpura Taluk, Hassan District, Karnataka State, India. The project was completed in two stages; in first stage 2X6 MW units were installed (20th Oct 2003, 20th Nov 2003), in second stage 6 MW was installed (10th Jan 2005).

As per MR, the electricity generated from the project is supplied to grid which is confirmed form approved CDM PDD/4/, verification of supporting documents, interview with PP.

As mentioned above, the project was completed in two stages; in first stage 2X6 MW units were installed (on 20th Oct 2003 & 20th Nov 2003), in second stage 6 MW was installed (on 10th Jan 2005). The commissioning date of the project is verified against the commissioning certificates/7/.

Location of the project was verified through Google Map (https://maps.google.com/maps) and found consistent with the data provided in the registered CDM PDD/4/

The Project activity is a new facility (Greenfield) and the electricity delivered by the project activity is exported to the Western regional grid (now part of Indian grid). The project will therefore displace an equivalent amount of electricity which would have otherwise been generated by fossil fuel dominant electricity grid.

The monitoring report was prepared in line with the CDM PDD applicable for 3rd crediting period (20-October-2017 to 19-October-2024). This is found to be appropriate.

As per registered CDM PDD, the project activity results in replacing anthropogenic emissions of greenhouse gases (GHG's) estimated to be approximately 115,817 tCO_2e per year, thereon displacing 122,234 MWh/year amount of electricity from the gird.

During the monitoring period from 20-October-2017 to 30-September-2021 (including both days), the project replaced 112,482 tonnes of CO_2e by displacing the 131,484 MWh electricity.

2 VERIFICATION PROCESS

The registered VCS project is undergoing second verification under VCS apart from various verification completed in CDM, the approach adopted to ensure the quality of emission reductions is described in the following sections.

2.1 Method and Criteria

4KES assessed and determined whether the proposed implementation and operation of the project activity, and the steps taken to report emission reductions comply with the criteria and relevant guidance provided by the VCS Board. The validation/verification process consist of the following three phases;

- A desk review of the CDM PDD and VCS MR
- Follow up interviews with project stakeholders
- The resolution of outstanding issues and issuance of final report and opinion.

The prepared verification report and other supporting documents then undergo an internal quality control before being submitted to the VCS executive board for issuance of credits as per VCS standard version 4.

2.2 Document Review

The verification is performed primarily as a document review of the approved CDM PDD, previous MR and Verification report and associated documents as stated in detail in appendix 1 of this document. The assessment is performed by a verification team using a protocol. The cross checks between information provided in the Monitoring report, CDM PDD and information from sources other than those used, if available, the team's sectoral or local expertise and, if necessary, independent background investigations

2.3 Interviews

A site visit for the project activity has been conducted on 26-September-2021 by the verification team and during site visit the following stakeholders were interviewed:

Sr. No	Name of the person	Role/Designation
1	Mahesh Kumar. S	General Manager (Operations), International Power Corporation Limited
2	K A Satish	DGM (O&M), International Power Corporation Limited
3	Vamsi Krishna M	Consultant, Kosher Climate

The topics covered during interview ranges from general features and implementation of project to technical details of the project like calibration details, monitoring and measuring system and data collection, recording and archiving procedures. The assessment was drawn based on the feedback received during interview coupled with the documentation and on-site observations.

No sampling procedures were adopted in document verification and all the document were cross checked to ensure conservative estimation of emission reduction.

2.4 Site Inspections

A site visit was undertaken by verification team on 26-September-2021 to carry out the following;

- An assessment of the implementation and operation of the registered project activity as per the approved CDM PDD and VCS MR;
- A review of information flows for generating, aggregating and reporting the monitoring parameters;
- Interviews with relevant personnel to determine whether the operational and data collection procedures are implemented in accordance with the monitoring plan in the PDD;
- A cross check between information provided in the monitoring report and data from other sources such as plant logbooks, inventories, purchase records or similar data sources;
- A check of the monitoring equipment including calibration performance and observations of monitoring practices against the requirements of the PDD, the applied methodology including applicable tool(s), and, where applicable, the applied standardized baseline;
- A review of calculations and assumptions made in determining the GHG data and emission reductions;
- An identification of quality control and quality assurance procedures in place to prevent or identify and correct any errors or omissions in the reported monitoring parameters.

2.5 Resolution of Findings

The objective of this step is to identify, discuss and conclude on the issues related to the monitoring, implementation and operations of the registered project activity that could impair the capacity of the registered project activity to achieve emission reductions or influence the monitoring and reporting of emission reductions. This is done based on the desk review and onsite assessment. The verification team prepares and/or updates a verification protocol (internal document) that records the conformities and non-conformities, which may be of following types;

CAR (Corrective Action Request) is raised if one of the following occurs:

- Non-compliance with the monitoring plan, the methodology or the standardized baseline are found in monitoring and reporting and has not been sufficiently documented by the project participants, or if the evidence provided to prove conformity is insufficient;
- Modifications to the implementation, operation and monitoring of the registered project activity has not been sufficiently documented by the project participants;
- Mistakes have been made in applying assumptions, data or calculations of emission reductions that will impact the quantity of emission reductions;
- Issues identified in a FAR during validation to be verified during verification or previous verification(s) have not been resolved by the project participants.

Clarification request (CL) is raised if information is insufficient or not clear enough to determine whether the applicable CDM requirements have been met. All CARs and CLs raised by the 4KES during verification shall be resolved prior to submitting a request for issuance.

FAR (Forward Action Request) is raised during verification if the monitoring and reporting require attention and/or adjustment for the next verification period.

During the Verification process, total 04 CAR and 05 CL were raised and resolved satisfactorily. No FAR has been raised in the verification. The list of CARs/CLs/FARs raised and the response provided, the mean of validation, reasons for their closure and references to correction in the relevant documents are provided in Appendix II of this report.

2.5.1 Forward Action Requests

The project activity is undergoing 2nd verification of under VCS; there were no FARs raised during the validation or previous verification.

2.6 Eligibility for Validation Activities

The Validation and verification body holds accreditation to carry out both validation and verification activities. The accreditation scope can be checked from the below link:

http://cdm.unfccc.int/DOE/list/DOE.html?entityCode=E-0069

3 VALIDATION FINDINGS

3.1 Participation under Other GHG Programs

The assessment team checked registries of other carbon mechanism such as CDM & Gold Standard and confirmed the project is registered under CDM (Reference no: 0312). However, the PP did not opt for verification under CDM for this monitoring period. PP has also provided a declaration/16/ that the PP will not claim emission reduction from any other GHG program for the reported monitoring period.

The project is not registered under any other emissions trading program or any other mechanism that includes GHG allowance trading PP also confirms that net GHG emission reductions or removals generated during this monitoring period shall not be used for compliance under any such programs or mechanisms. This was confirmed through a declaration/16/ submitted by the PP and hence accepted by the assessment team.

However, it is observed that project is also registered under I-REC mechanism (Device ID: KEMPHOLE[1]) and PP claimed REC during the year 2019 & 2020 under the I-REC mechanism. PP has provided the details of period and volume of I-REC claimed which are covered under this current monitoring period in the Appendix IV. The total REC claimed during the period is 55,756 MWh which is excluded from the emission reduction calculation. Hence there is no double counting involved.

3.2 Methodology Deviations

There is no methodology deviation applied during the current monitoring period.

3.3 Project Description Deviations

No deviation from the project description is applied during the correction monitoring period. However, the

3.4 Grouped Project

Not applicable. The project activity is not a grouped project.

[1] https://evident.services/device-register/KEMPHOLE

4 VERIFICATION FINDINGS

4.1 Project Implementation Status

The project activity is installation of 18 MW hydro power plant promoted by International Power Corporation Limited. The purpose of the project activity is to generate clean electricity with utilization of kinetic energy of water flow. The project location and commissioning details are given below:

Project Investors' Name	International Power Corporation Limited
Capacity in MW	18
Commissioning Date	1st stage (2X6 MW units) -20th Oct 2003 & 20th Nov 2003 2nd stage (1 x 6 MW unit) - 10th Jan 2005.
Location (Village/State)	Heggadde villages of Sakaleshpura Taluk, Hassan District, Karnataka State, India
Geograpical Coordinates	9°18'44.21"N, 78°23'48.16"E

Starting date of the operation of the project activity is 20-October-2003 which is the date of commissioning/commercial operation of the first unit of hydro power plant.

The technical specifications of the project are as below:

S. No	Parameters	Specifications
Generator		
1	No of Generating Units	3
2	Capacity of Each Generating Units	7059 kVA/6000 kW (+10% overload)
3	Total Capacity of this project activity	18000 kW
4	Type of generator	3 phase, Synchronous Generator
5	Excitation Voltage & Current	110 Volts (dc), 5.2 Amps (dc)
6	Power Factor	0.85
7	Rated Frequency	50HZ
8	Synchronous Speed	500 RPM
9	Over speed	850 RPM for 15 mins
10	Generation Voltage	11kV
11	Generator Current	371 Amps
Turbine		
12	Type of Turbine	Hydraulic Turbine
13	No of Turbines	3
14	Turbine Speed	500 RPM
15	Continuous Over Load Capacity	115%
16	Rated Net Head in (m)	58 m
17	Flow	12020 Lit/sec

The installation and specification of hydro power plant has been checked with power plant Technical Specification/6/ and commissioning certificates/7/. The commissioning has also been duly validated in the VCS validation report of the project activity/04/. There was no major breakdown or shutdowns during the monitoring period which might affect the applicability of methodology or might cause material errors in emission reductions.

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 CDM PDD & monitoring report submitted is implemented and thus the same is acceptable to the assessment team. All required monitoring equipment's and procedures as mentioned in the registered CDM PDD & monitoring report are available and implemented in an appropriate manner

The organisational role and responsibility as mentioned in the registered CDM PDD & monitoring report is followed onsite. All the monitoring equipment was calibrated as per the specified interval in the registered CDM PDD & monitoring report. No delay is observed in Calibration for the current monitoring period and hence the calibration is valid for the complete monitoring period. All the emergency preparedness as mentioned in the registered CDM PDD & monitoring report is followed onsite and no discrepancies were found regarding the same.

It was also observed during the verification process that project is not rejected by any other GHG program around the world. Declaration in that effect is also provided by PP.

The assessment team found that the project is in line with the registered CDM PDD. No deviation on project design or monitoring plan is observed.

Assessment team concludes the following:

- There is no material discrepancies between project implementation and the project description provided in the registered CDM PDD/04/.
- The project is implemented as per the description mentioned in the registered CDM PDD./04/
- The monitoring plan is implemented completely and monitoring system (i.e., process and schedule for obtaining, recording, compiling and analysing the monitored data and parameters) is appropriate.
- There is no material discrepancies between the actual monitoring system, and the monitoring plan set out in the project description and the applied methodology/08/.
- The GHG emission reductions or removals generated by the project have not included in an emissions trading program or any other mechanism that includes GHG allowance trading/16/.
- The project has not received or sought any other form of environmental credit, or has become eligible to do so since validation or previous verification.

In view of the information's as verified above the assessment team is able to conclude that the project has been implemented as described in the project description.

4.2 Safeguards

4.2.1 No Net Harm

The project is a small hydro power project which is a cleaner source of power generation. The small hydro power project does not emit any GHG or any other toxic gases. Hence, small hydro power plant has no significant impact on the environment. As per the EIA notification dated 14thSeptember 2006, the small hydro power projects are exempted from environmental clearance. Hence, Environmental impact assessment is not required for this project activity.

However, in Section D of the registered CDM PDD, the details regarding the Environmental Impact has been detailed out. As per the description provided, the project activity does not have any negative impact to stakeholders and running satisfactorily since commissioning. The Environment Impact Assessment study was conducted for the project activity and judicious efforts to cause minimal impacts on the surrounding environment and to maintain the natural balance.

Hence verification team confirms that there are no any significant impacts due to implementation of project activity on air, water, soil quality and ambience are envisaged due to the project activity.

4.2.2 Local Stakeholder Consultation

As per the section 2.2 of the MR, the projects have continuous feedback mechanism and kept a grievance register to receive any feedback/grievances from stakeholder.

As verified from the copy of grievances register from site/19/ no grievances/feedback received on the operation of the project activity. Verification team also discussed with the site in-charge and confirmed that no grievances are received during the monitoring period.

4.3 AFOLU-Specific Safeguards

Not Applicable.

4.4 Accuracy of GHG Emission Reduction and Removal Calculations

The verification team assessed whether the data and calculations of GHG emission reductions achieved resulting from the MR. 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 CDM PDD and VCS MR.

In detail the following has been verified:

Transparency: It has been checked whether the calculation of baseline emissions is fully traceable and, where used, the Excel calculation provides all calculation formulae.

Parameter consistency: It has been checked whether all internal and external parameters and data used for the calculation are applied consistently in the monitoring report and the calculation spreadsheet.

Correctness: It has been checked whether the applied formulae and methods for calculating baseline emissions are in accordance with the monitoring plan and the approved methodology.

Completeness: It has been checked whether all calculations are complete and without omissions

Baseline emission: The baseline Emissions for a given year is calculated by multiplying the energy baseline (EB) with the regional grid emission factor. The grid in this case would be the 'Indian Grid'

Formula Used:-

$BE_y = EG_{facility,\ y} * EF_{grid,CM,y}$

BE_y	Baseline emissions in year y (t CO_2/yr)
$EG_{facility,\ y}$	Quantity of net electricity generation supplied by the project plant/unit to the grid in year y (MWh/yr)
$EF_{grid,CM,y}$	Combined margin CO_2 emission factor for grid connected power generation in year y calculated using the latest version of the "Tool to calculate the emission factor for an electricity system" (t CO_2/MWh)

$EF_{grid,CM,y}$ is fixed ex-ante (i.e, 0.8555 tCO2/MWh).

Project Emission:

As per section B.6.1 of CDM PDD, If the power density (*PD*) of power plant is greater than 4 W/m^2 and less than or equal to 10 W/m^2:

$$PE_y = \frac{EF_{Res} \cdot TEG_y}{1000}$$

Where,

PE_y = Emission from reservoir expressed as tCO_2e/year

ES_{Res} = The default emission factor for emissions from reservoirs, and the default value (as per EB 23) is 90 Kg CO_2e /MWh.

TEG_y = Total electricity produced by the project activity, including the electricity supplied to the grid and the electricity supplied to internal loads, in year *y* (MWh).

b) If the power density of the project is greater than 10 W/m^2, PE_y= 0.

Since the KMHS project activity is a run-of-river hydro project with power density of 450 W/m^2,

(greater than the threshold value of 10 W/m_2 as calculated below), hence according to the chosen baseline methodology ACM0002, project emissions are nil i.e. PE_y = 0.

The power density of the project activity is calculated as follows:

$$PD = \frac{Cap_{PJ} - Cap_{BL}}{A_{PJ} - A_{BL}}$$

Where:

PD = Power density of the project activity, in W/m^2.

Cap_{PJ} = Installed capacity of the hydro power plant after the implementation of the project activity (W).

Cap_{BL} = Installed capacity of the hydro power plant before the implementation of the project activity (W). For new hydro power plants, this value is zero.

A_{PJ} = Area of the reservoir measured in the surface of the water, after the implementation of the project activity, when the reservoir is full (m^2).

A_{BL} = Area of the reservoir measured in the surface of the water, before the implementation of the project activity, when the reservoir is full (m^2). For new reservoirs, this value is zero.

For the project activity:

Cap_{PJ} = 18,000,000 W

CAP_{BL} = 0

A_{PJ} = 40,000 sq m

PD = (18,000,000 – 0) / (40,000 - 0) = 450 W/m^2

So the emissions from the project are zero. The justification provided by PP is found to be correct.

Leakage:

As per methodology and registered CDM PDD the leakage is zero. LEy= 0.

Emission Reduction:

Emission reduction is calculated as below:

$ERy = BE_y – PE_y - LE_y$

PP has submitted emission reduction the calculation in the excel sheet/2/. The emission reduction calculation in the excel sheet is checked whether the calculation is in accordance with the formula given in the approved CDM PDD/4/ and the selected methodologies/8/.

The verification team confirms the following:

- The calculations of emission reduction have been carried out in accordance with the equations and methods described in the registered monitoring plan and applied methodology.
- The emission factor applied is an ex-ante value valid for the fixed crediting period.
- Any assumptions used in emission or removal calculations have been justified.
- Appropriate emission factor and other reference values have been correctly applied. It can be confirmed that the emission reduction calculation is overall correct.
- The ER calculation sheet provided is clear, transparent and the calculations provided in the sheet are reproducible.
- Hence, the emission reduction reported in the monitoring report for the monitoring period is verified to be correct

4.5 Quality of Evidence to Determine GHG Emission Reductions and Removals

The monitoring parameters selected in the project activity are

- Quantity of electricity supplied by the project plant/unit to the grid in year y (**EG** $_{facility, export, y}$)
- Quantity of electricity imported by the project plant/unit from the grid in year y (**EG** $_{facility, import, y}$)
- Quantity of net electricity supplied to the grid in the year y (**EG**$_{facility,y}$)
- Installed capacity of the hydro power plant after the implementation of the project activity (**Cap** $_{PJ}$)
- Area of the reservoir measured in the surface of the water, after the implementation of the project activity, when the reservoir is full (**A** $_{PJ}$)

The export & import are monitored through bi-directional energy meters installed at the project substation. The next electricity is calculated from the difference of export & import. The project has dedicated energy meter at high voltage level and the export and import reading are recorded every month. The DISCOM will record the export, import and net electricity (as difference between export & import).

The export, and import & net energy generated will be reported in monthly JMR/B-Form which is the source for the parameter **EG** $_{facility, export, y}$, **EG** $_{facility, import, y}$ & **EG** $_{facility, y}$.

The monthly net export are recorded in the Joint meter reading (JMR)/ B-Form which is signed by DISCOM and PP. The appropriateness of reading is assessed as below:

Criteria/Requirements	Assessment/Observation
Measuring /Reading /Recording frequency	The electricity exported to the grid is determined through static meter reading and bulk energy meter installed at government sub-station. The electricity exported is measured on continuous basis and reported monthly.
Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Yes. The reporting frequency is in line with the monitoring plan as outlined in the approved CDM PDD/04/ and monitoring methodology/8/.
Monitoring equipment	Energy meters (main & Check) installed at

	substation.
Is accuracy of the monitoring equipment as stated in the monitoring plan? If the monitoring plan does not specify the accuracy of the monitoring equipment, does the accuracy of the monitoring equipment comply with local/national standards, or as per the manufacturer's specification?	The energy meters are two-way tri-vector meters of accuracy class 0.2s. Accuracy of the monitoring equipment's is in accordance with the monitoring plan as outlined in the PD.
Is the accuracy valid for the entire measuring range or do different accuracy levels apply to different measuring ranges?	Yes the accuracy valid for the entire measuring range.
Calibration frequency /interval:	1 year
Is the calibration interval in line with the monitoring plan and/or methodology? If the monitoring plan does not specify the frequency of calibration, is the selected frequency in accordance with the local/national standards, or as per the manufacturer's specifications?	Yes
Is the calibration of measuring equipment carried out by an accredited person or institution?	Calibration of the measuring equipment's is carried out by an accredited entity.
Is(are) calibration(s) valid for the whole reporting period?	Yes, the calibration is valid for the whole monitoring period.
Is the calibration carried out for a measuring range comparable with the range for which measurements have been carried out?	Yes, calibration carried out for a measuring range comparable with the range for which measurements have been carried.
How were the values in the monitoring report verified?	Reported values of this parameter have been verified with monthly joint metering/ B-Form/12/. Value of this parameter for the current monitoring period are verified and the values is 187,240 MWh. However, 55,756 MWh was claimed under I-REC. Hence, PP considered the net export value of 131,484 MWh for the emission reduction estimation. This is found to be appropriate.

	Furthermore monthly values of this parameter is reported in the ER calculation sheet/02/ are also verified with the MR/01/ and found to be consistent.
If applicable, has the reported data been cross-checked with other available data?	The monthly reported values of this parameter were further cross checked with the monthly invoices raised by the PP /13/ and found to be consistent.
Does the data management ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Yes, the adequate QA/QC procedures were implemented by all the stakeholders, namely, the Grid Authority, the PP and the O&M team. The Net electricity exported to the grid is cross checked against the invoice raised by the PP towards the DISCOM and found to be correct
In case project participants have temporarily not monitored the parameter, has either i) a deviation been approved by the CDM EB or ii) has the parameter been estimated as stipulated by Appendix 1 to the CDM Project Standard?	No such issues.

Cap $_{PJ\ \&}$ A $_{PJ}$ are monitored to check the power density for every monitoring period.

Installed capacity of the hydro power plant after the implementation of the project activity (Cap $_{PJ}$) – As the installed capacity is not changed after installation, the installation capacity is considered as 18 MW. This is confirmed from name plate details of the turbine generator. Hence, the value considered

Area of the reservoir measured in the surface of the water, after the implementation of the project activity, when the reservoir is full (A $_{PJ}$) – PP provided recent satellite map of the reservoir with the calculation of reservoir capacity. As verified from the map, the reservoir capacity is not changed after installation. Hence, the reservoir capacity considered 40,000 m2 is found to be correct. `

Parameter fixed ex-ante:

$EF_{grid,CM,y}$; tCO_{2e}/MWh: it is the Combined Margin emission factor for Indian grid fixed at the time of project registration and mentioned value of 0.8555 tCO_{2e}/MWh is consistent with the registered CDM PDD/04/.

Cap_{BL}; W: it is the Installed capacity of the hydro power plant before the implementation of the project activity and mentioned value of 0 W is appropriate for new hydro power plant and consistent with the registered CDM PDD/04/ .

A_{BL}; m2: it is the Area of the reservoir measured in the surface of the water, before the implementation of the project activity, when the reservoir is full and mentioned value of 0 is appropriate for the new hydro project and consistent with the registered CDM PDD/04/.

Calibration of meters: During the verification assessment of the project activity, accuracy of all the metering have been checked and found appropriate. The bulk energy meters installed at the substation are at the control of DISCOM and are regularly calculated by DISCOM. Details of meter calibration are provided in below table:

S.No.	Equipment type and identification	Old/New Meter Sr No	Calibration dates					
1	Line 1- Main Meter	Old Meter : 02048056	27.06.2017	28.11.2018				
		New Meter: 18148113*			31.10.2019	25.06.2020	29.01.2021	27.07.2021
2	Line 1- Check Meter	Old Meter: 03129382	27.06.2017	28.11.2018				
		New Meter: 18148129*			31.10.2019	25.06.2020	29.01.2021	27.07.2021
3	Line 2- Main Meter	Old Meter : 03129375	27.06.2017	28.11.2018	31.10.2019			
		New Meter: 18153040**				06.01.2020	29.01.2021	27.07.2021
4	Line 2- Check Meter	Old Meter : 03129379	27.06.2017	28.11.2018	31.10.2019			
		New Meter 18158317**				06.01.2020	29.01.2021	27.07.2021

** Old meter is removed and replaced with new meter on 31st October 2019*

*** Old meter is removed and replaced with new meter on 06th January 2020*

The energy meter calibration certificates/14/ are checked and found that the calibration details provided in the MR is correct. It is found that energy meters are calibrated as per the required frequency (ie,1 year).

The assessment team has verified the monthly joint meter reading report issued by respective state utility and confirmed that only the data recorded through main meters is used to calculate net electricity supplied to the grid by the projects belongs to particular developer and consequently for ER calculations. As verified through the calibration certificates, that meters were working satisfactorily during the current monitoring period.

In view of the above discussion the assessment team able to confirm that evidence used to determine the GHG reductions and removals are sufficient and appropriate with respect to quality and quantity.

GHG Calculations

The emission reduction as per the applied methodology equals the baseline emissions (project emissions and leakage emissions for such project activities is considered zero). The formula provided for the calculation of baseline emissions is:

$BE_y = EG_{facility,\ y} * EF_{grid,CM,y}$

The electricity generation claimed under I-REC has been excluded from calculation of baseline emission. The calculation is provided below.

Year	$EG_{facility,\ y}$ (unadjusted)	Electricity Generation claimed under I-REC*	Net Electricity considered for VCU Claim $EG_{facility,\ y}$ (adjusted)	Emission Factor ($EF_{grid,CM,y}$)	BEy
	MWh	MWh	MWh	tCO2/MWh	tCO2
2017	5,963	0	5,963	0.8555	5,101
2018	51,713	0	51,713	0.8555	44,240
2019	46,527	35,006	11,521	0.8555	9,856
2020	47,114	20,750	26,364	0.8555	22,554
2021	35923	0	35923	0.8555	30731
Total	**187240**	**55756**	**112482**	**0.8555**	**112482**

*rounded down values

Since project emission and leakage are zero, baseline emission is equal to emission reduction.

$ER_y = BE_y$

The emission reduction is estimated for each month in ER calculation sheet, and the summary of emission reduction is as below:

Year	Baseline emissions or removals* (tCO2e)	Project emissions or removals (tCO2e)	Leakage emissions (tCO2e)	Net GHG emission reductions or removals (tCO2e)
2017	5,101	0	0	5,101
2018	44,240	0	0	44,240
2019	9,856	0	0	9,856
2020	22,554	0	0	22,554
2021	30,731	0	0	30,731

Total	112,482	0	0	112,482

* rounded down value

The verification team confirms that appropriate methods and formulae for calculating baseline emissions have been followed. The assumptions, emission factors and default values that were applied in the calculations are justified. All the data were made available and have monitored as per required monitoring frequency. The means of verification for the values of parameters, used for baseline emission calculation, is described above.

However, verification team has observed that the actual ER achieved during the current monitoring period is 13.15% lower than the estimated ER as per registered CDM PDD for the comparable period. Since the emission reduction is less than the estimated emission reduction, no further justification is required.

4.6 Non-Permanence Risk Analysis

Not applicable.

5 VERIFICATION CONCLUSION

4K Earth Science Pvt. Ltd (4KES), contracted by Kosher Climate India Private Limited, has performed the independent verification of the emission reductions for the VCS project activity "18 MW Kemphole Mini Hydel Scheme (KMHS), by International Power Corporation Limited, India" (VCS ID- 1893) in India for the monitoring period 20-October-2017 to 30-September-2021 as reported in the Monitoring Report Version 02 dated 20-October-2021. The Kosher Climate and the project proponent are responsible for the collection of data in accordance with the monitoring plan and the reporting of GHG emissions reductions from the project activity. It is our responsibility to express an independent verification statement on the reported GHG emission reductions from the project activity

4KES commenced the verification on the basis of the baseline and monitoring methodology ACM0002, Version 20.0., the monitoring plan contained in the registered CDM PDD (Dated 23-November-2020 and VCS guidelines version 4, Monitoring Report (Version 02 dated 20-October-2021) as per the process described under Section 2 of this report.

4KES verification approach is based on the understanding of the risks associated with reporting of GHG emission data and the controls in place to mitigate these. 4KES planned and performed the verification by obtaining evidence and other information and explanations that

4KES considered necessary to give reasonable assurance that reported GHG emission reductions are fairly stated.

In our opinion the GHG emissions reductions reported for the project activity for the period 20-October-2017 to 30-September-2021 are fairly stated in the Monitoring Report Version 02 dated 20-October-2021. The GHG emission reductions were calculated correctly on the basis of the approved baseline and monitoring methodology ACM0002, Version 20.0, and the VCS standard.

Verification period: From 20-October-2017 to 31-September-2021

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

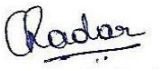
Year	Baseline emissions or removals (tCO_2e)	Project emissions or removals (tCO_2e)	Leakage emissions (tCO_2e)	Net GHG emission reductions or removals (tCO_2e)
2017	5,101	0	0	5,101
2018	44,240	0	0	44,240
2019	9,856	0	0	9,856
2020	22,554	0	0	22,554
2021	30,731	0	0	30,731
Total	**112,482**	**0**	**0**	**112,482**

Approved by

Chandrakala R.

Director

Date:23-November-2021



4K Earth Science Private Limited

Place: Bangalore, India

APPENDIX I: LIST OF DOCUMENTS

Ref. No	Title of Document	Version	Date
1	Monitoring Report	1.0	18/09/2021
		2.0	20/10/2021
2	Emission Reductions Calculation Spread sheet	1.0	18/09/2021
		2.0	20/10/2021
3	VCS Project page: https://registry.verra.org/app/projectDetail/VCS/1893	-	-
	Registered CDM PDD (Applicable for 3rd crediting period)	12	23/11/2020
	CDM Validation Report for renewal of crediting period	2	02/12/2020
5	Previous VCS Monitoring Report (1st Monitoring)	2	22/07/2019
	Previous VCS Verification Report (1st Verification)	1	25/17/2019
6	Technical specifications of the project plant		
7	Commissioning certificates of the hydro power plant	-	-
8	CDM Methodology: ACM0002: Grid-connected electricity generation from renewable sources	Version 20.0	-
9	VCS Standard	Version 4	19/09/2019
	VCS Program Guide	Version 4	19/09/2019
10	Clean Development Mechanism Validation and Verification Standard	03.0	-
9	Grievances Registers	-	-
12	Joint Meter Reading/B-Form of project for the monitoring period	-	-
13	Invoices for the electricity sold for the monitoring period	-	-
14	Energy meter Calibration Certificates		
15	Break down details of the complete monitoring period	-	-
16	Declaration regarding participation in other GHG program for the concerned monitoring period	-	-
17	Details of I-REC claimed	-	-
18	MOEF Notification http://envfor.nic.in/legis/eia/so1533.pdf		14/09/2006
19	Satellite map of reservoir	-	-
20	Name plate photograph of turbine generator	-	-
21	Plant outage log records	-	-

APPENDIX II: VERIFICATION FINDINGS

FAR from validation and/or previous verification

~~FAR ID~~		~~Section no.~~		~~Date:~~
~~Description of CAR~~				
~~NA~~				
~~Project participant response~~				~~Date:~~
~~Documentation provided by project participant~~				
~~DOE assessment~~				~~Date:~~

Clarification Requests

CL ID	01	Section no.	1.1	Date:30/09/2021
Description of CL				
The 1st Verification under VCS ended on 19th October 2017, the PP has opted the start date of verification of 2nd Verification under VCS as 20th October 2017. The billing period starts from 01st of every month and ends last day of given month. PP to clarify the amount of ERs claimed and no. of days up to which the ERs were claimed during the previous verification for the month of October 2017.				
Project participant response				Date: 20/10/2021
In the previous monitoring, the emission reduction for the month October 2017 is calculated based on the 19 days energy generation which is apportioned from the total October 2017 energy generation. Similarly for this monitoring period, the October 2017 emission reduction is calculated for 12 days energy generation apportioned from October 2017 energy generation. The ER sheet of previous monitoring period is submitted now for reference.				
Documentation provided by project participant				
Previous year emission reduction calculation sheet.				
DOE assessment				Date: 25/10/2021
The emission reduction calculation sheet of previous monitoring period is checked and found that the apportioning calculation used in the previous monitoring period and the current monitoring period is found to be appropriate. CL is closed.				

CL ID	02	Section no.		Date:30/09/2021
Description of CL				
Based on the information available on https://cdm.unfccc.int/Projects/DB/SGS-UKL1142326439.29/view?cp=2 , it is noted that the PP has opted for renewal of crediting period under CDM. PP to provide clarity on the above.				
Project participant response				**Date:** 20/10/2021
As this project is a CDM registered project, PP has renewed the crediting period as per the CDM requirements. As per CDM website, the PDD approved in the RCP is applicable from 20th October 2017. Hence, latest approved PDD is now considered as basis for this monitoring period under VCS.				
Documentation provided by project participant				
-				
DOE assessment				**Date:** 25/10/2021
PP now submitted revised CDM PDD. The emission reduction for this monitoring period is now calculated based on the latest approved PDD (for 3rd crediting period). This is found to be appropriate. CL is closed.				

CL ID	03	Section no.	1.7	Date:30/09/2021
Description of CL				
Geographical coordinates and project location to be reaffirmed by the PP.				
Project participant response				**Date:** 20/10/2021
The geographical coordinate of the power plant is 12°50'17.98" N, 75°40'11.88" E which is also mentioned in the section 1.7 of the MR. However, the geographical coordinate of weir mentioned in the MR falls few meters away from the actual wear location which is now corrected in the MR				
Documentation provided by project participant				
Revised MR				
DOE assessment				**Date:** 25/10/2021
The geographical coordinates of the project provided in the revised MR is verified and found to be correct. CL is closed				

CL ID	04	Section no.	3.1	Date:30/09/2021

Description of CL	
PP to clarify about any major repairs or over hauling or changes with respect to turbine during the current monitoring period. PP to share log books / Operation & Maintenance book for the current monitoring period.	
Project participant response	**Date:** 20/10/2021
The outage details with reason are now provided in Appendix III. Also, the outage log book is now provided for verification.	
Documentation provided by project participant	
Revised MR Outage logbook	
DOE assessment	**Date:** 25/10/2021
PP provided complete outage details in the MR. The outage logbook submitted by PP is also checked and found that the outage details provided in the MR is correct. CL is closed	

CL ID	05	Section no.	4.2 & 4.3	Date:30/09/2021
Description of CL				
PP is requested to share the calibration certificates as per the details mentioned in Appendix II.				
Project participant response				**Date:** 20/10/2021
All the calibration certificates are submitted now.				
Documentation provided by project participant				
Calibration reports				
DOE assessment				**Date:** 25/10/2021
PP provided all the calibration certificates as per Appendix III. CL is closed.				

Corrective Action Requests

CAR ID	01	Section no.	1.2	Date :30/09/2021
Description of CAR				

The version of methodology applied differs from the VCS PD and 1st Monitoring Report. It is not whether the latest version was basis on which Emission Factor and the ERs were calculated.
Project participant response **Date:** 20/10/2021
The project is registered based on the CDM registration and gap validation. As the CDM PDD is the basis for emission reduction calculation, PP now used the latest CDM PDD (approved in the renewal CDM crediting period). Hence, the methodology, emission factor and other parameters as per CDM PDD is considered.
Documentation provided by project participant
-
DOE assessment **Date:** 25/10/2021
The explanation provided by PP is appropriate. PP now provided the latest approved CDM PDD (applicable for 3rd crediting period of CDM). Hence, the monitoring report prepared based on the latest CDM PDD is found to be appropriate. CAR is closed.

CAR ID	02	**Section no.**	1.9	**Date :** 30/09/2021
Description of CAR				
The PP has registered the project under multiple Carbon Offset programs and claimed CERs, VERs and IRECs. During the current monitoring period the PP mentions to have claimed partial IRECs for the period 2019 and 2020 and currently pursuing to claim partial VERs for the same period. PP to justify a) Conformity of the claim w.r.t section 3.20.2 of VCS Standard Ver. 4.0 and b) Provide further information to VVB with reference to 3.20.3 para (3) & (4)				
Project participant response				**Date:** 20/10/2021
a) The VCUs issued will be without CORSIA VCU label. Hence, the project complies with section 3.20.2 of VCS Standard Ver. 4.0 b) The project is not included under any other emission trading program. Hence project comply with section 3.20.3 para (3) of VCS standard ver 4.0. The monitoring period considered under I-REC is now provided in the MR. The volume & period of I-REC claimed during period 2019 & 2020 are now provided in the appendix IV of MR.				
Documentation provided by project participant				
Volume & period of I-REC claimed during the year 2019 & 2020.				
DOE assessment				**Date:** 25/10/2021

PP now provided the requested details. PP also provided the volume & period of I-REC claimed during the monitoring period. The same also crosschecked with the I-REC registry (https://evident.services/device-register/KEMPHOLE) . From verification the ER sheet, it is also found that the generation claimed under I-REC is excluded in the VCU estimation. Hence, the project is in compliance with section 3.20.3 of VCS standard, v4. CAR is closed.

CAR ID	03	**Section no.**	1.2	**Date :**30/09/2021
Description of CAR				
PP to justify the conservativeness while calculating the ERs w.r.t billing cycle and double counting. PP to share the emission reduction calculation of the previous verification (1st Verification)				
Project participant response				**Date:** 20/10/2021
In the previous monitoring, the emission reduction for the month October 2017 is calculated based on the 19 days energy generation which is apportioned from the total October 2017 energy generation. Similarly for this monitoring period, the October 2017 emission reduction is calculated for 12 days energy generation apportioned from October 2017 energy generation. The ER sheet of previous monitoring period is submitted now for reference.				
Documentation provided by project participant				
ER sheet of previous monitoring period				
DOE assessment				**Date:** 25/10/2021
The explanation provided by PP is found to be appropriate. The ER sheet of previous monitoring period is verified and the apportioning calculation of emission reduction is found to be correct. CAR is closed.				

CAR ID	04	**Section no.**	Appendix I	**Date :**30/09/2021
Description of CAR				
The actual ERs as per ER sheet and other relevant section of MR is 103,391, as per the table in Appendix I the Net ERs calculated works out to be 1,51,092, it is not clear why is this difference in the values mentioned.				
Project participant response				**Date:** 20/10/2021

As per the JMR, the total generation during the monitoring period is 176,613 MWh. But PP has claimed REC of 55,756 MWh under I-REC mechanism. Hence, only 120,857 MWh is considered for ER calculation under VCS that resulted ER of 1,03,391 tCO2 However, for the comparison purpose in Appendix I, PP calculated emission reduction based on the entire generation (ie, 176,613 MWh), that resulted 1,51,092 tCO2 which found to be appropriate for the comparison purpose. The explanation is now provided in Appendix 1 However, now the September 2021 month generation is included now.
Documentation provided by project participant
NA

DOE assessment	**Date:** 25/10/2021
The explanation provided by PP is found to be acceptable. CAR is closed.	

Forward Action Requests

~~**FAR ID**~~		~~**Section no.**~~		~~**Date:**~~
~~**Description of CAR**~~				
~~NA~~				
~~**Project participant response**~~				~~**Date:**~~
~~**Documentation provided by project participant**~~				
~~**DOE assessment**~~				~~**Date:**~~

APPENDIX III: TEAM COMPETENCE

Certificate of Competence							
Name	☒ Mr. ☐ Ms.	**Ma Paa Puratchikkanal**					
Qualification Procedure		*Fulfils the requirement as per the appointment of personnel procedure of 4KES for Validation and Verification of CDM/VCS/GS/GHG Projects.*					
Appointed to work as:							
		CDM Validator/Verifier	**Team Leader**	**Team Member**	**Technical Expert**	**Technical Reviewer**	**Financial Expert**
Appointed		Yes	Yes	Yes	Yes	Yes	No
Appointed Date		27-04-2021					
Authorized to work as Technical Expert for:							
Authorized Technical Area		**Sectoral Scope**		**TA Code**	**Technical Area within the scope**		
		Energy industries (renewable - / non-renewable sources)		1.1	Thermal energy generation		
		Energy industries (renewable - / non-renewable sources)		1.2	Renewables		
		Energy demand		3.1	Energy demand		
		Construction		6.1	Construction		
		Waste handling and disposal		13.1	Solid waste and wastewater		
		Waste handling and disposal		13.2	Manure		
		Agriculture		15.1	Agriculture		
Authorized to work as Local Expert for:							
Country/Countries		India					
Compliance check by: Anand S. R.							

Certificate of Competence							
Name	☒ Mr. ☐ Ms.	**Chetan Swaroop Sharma**					
Qualification Procedure		*Fulfils the requirement as per the appointment of personnel procedure of 4KES for Validation and Verification of CDM/VCS/GS/GHG Projects.*					
Appointed to work as:							
		CDM Validator/Verifier	**Team Leader**	**Team Member**	**Technical Expert**	**Technical Reviewer**	**Financial Expert**
Appointed		Yes	Yes	Yes	Yes	Yes	No
Appointed Date		27-04-2021					
Authorized to work as Technical Expert for:							
Authorized Technical Area		**Sectoral Scope**		**TA Code**	**Technical Area within the scope**		
		Energy industries (renewable - / non-renewable sources)		1.1	Thermal energy generation		
		Energy industries (renewable - / non-renewable sources)		1.2	Renewables		
		Energy distribution		2.1	Energy distribution		
		Energy demand		3.1	Energy demand		
		Waste handling and disposal		13.1	Solid waste and wastewater		
		Waste handling and disposal		13.2	Manure		
Authorized to work as Local Expert for:							
Country/Countries		India					
Compliance check by: Anand S. R.							

APPENDIX IV: ABBREVIATIONS

BM	Build Margin
CAR	Corrective Action Request
CDM	Clean Development Mechanism
CL	Clarification Request
DPR	Detailed Project Report
EB	Executive Board
EIA	Environmental Impact Assessment
ER	Emission Reductions
FAR	Forward Action Request
GHG	Greenhouse Gases
IPCC	Intergovernmental Panel for Climate Change
JMR	Joint Meter Readings
LCS	Local Controller System
MP	Monitoring Period
MR	Monitoring Report
MW	Mega Watt
MWh	MegaWatt hour
OM	Operating Margin
O&M	Operation & Maintenance
PD	Project Description
PP	Project proponent
PPA	Power Purchase Agreement
QA/QC	Quality Assurance/Quality Control
tCO_2	Tonnes of Carbon Dioxide
UNFCCC	United Nations Framework Convention on Climate Change
VCS	Verified Carbon Standard
VCSA	Verified Carbon Standard Association
VCU	Verified Carbon Unit