Biomass Based Power Generation Plant at Village Channu, Punjab. VCS ID 650

Document Prepared By 4K Earth Science Private Limited

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Summary:

4K Earth Science Private Limited (4KES) has been contracted by, "Universal Biomass Energy Private Limited (UBEPL)" to undertake verification and certification for the greenhouse gas (GHG) emission reductions reported from 'Biomass Based Power Generation Plant at Village Channu, Punjab' for the monitoring period 01st March 2017 to 29th October 2019 (inclusive of both days).

The project activity is a greenfield biomass residue based power plant, the total installed capacity is 14.50 MW and categorises as a small scale power project. The project activity is located The biomass residue is the main source of fuel used to produce heat within the installed boiler and further the heat is converted into mechanical energy resulting in electricity production. The electricity generated from this power plant is delivered to the grid.

The management of 'Universal Biomass Energy Private Limited (UBEPL)' are responsible for the preparation of the Electricity Generated data (monthly & yearly) and the reported GHG emissions reductions on the basis set out within the project Final Monitoring Report, Version 1.1, dated 03rd March 2022/2/. The calculation and determination of GHG emission reductions from the project is the responsibility of the consultant 'EKI Energy Services Limited'. The development and maintenance of records and reporting procedures are in accordance with the registered Monitoring Plan or registered PD.

A risk-based approach has been followed to perform the 3rd verification of the project activity. In the course of the verification, 05 Corrective Action Requests (CARs), 09 Clarification Request (CL) and 00 Forward Action Request (FAR) were raised based on the initial monitoring report version 1, dated: 07th December 2021 /1/ and subsequently closed after the necessary corrections were incorporated

in the final monitoring report version 1.1, dated: 03rd March 2022/2/.

It is our responsibility to express an independent GHG verification opinion on the GHG emissions and on the calculation of GHG emission reductions from the project for the period 01st March 2017 to 29th October 2019 based on the reported emission reductions in the final monitoring report /2/.

Based on an understanding of the risks associated with reporting GHG emissions data and the controls in place to mitigate these, 4KES planned and performed our work to obtain the information and explanations that we considered necessary to provide sufficient evidence for us to give reasonable assurance that this reported amount of GHG emission reductions for the period is fairly stated.

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1 INTRODUCTION

1.1 Objective

4K Earth Science Private Limited (4KES) has been contracted by, "Universal Biomass Energy Private Limited (UBEPL)" to undertake verification and certification for the greenhouse gas (GHG) emission reductions reported from 'Biomass Based Power Generation Plant at Village Channu, Punjab' for the monitoring period 01st March 2017 to 29th October 2019 (inclusive of both dates). The VCS projects must undergo an independent third-party verification and certification of emission reductions as the basis for issuance of Voluntary Emission Reductions (VERs).

The objectives of this verification exercise are, by review of objective evidence, to establish that:

- The project activity has been implemented and operated as per the project description (PD) and that all physical features (technology, project equipment, and monitoring and metering equipment) of the project are in place;
- Monitoring report and other supporting documents are complete;
- The data is recorded and stored as per the monitoring methodology and approved monitoring plan.
- To confirm that the monitoring system is implemented and fully functional to generate Voluntary Emission Reductions (VERs/VCUs) without any double counting, and
- To establish that the data reported are accurate, complete, consistent, transparent, and free of material error or omission by checking the monitoring records and the emissions reduction calculation.

1.2 Scope and Criteria

The 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 /3/, and Validation Verification Manual, Version 3.2 /24/ and Registration and Issuance Process, Version 4.0 /22/ 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'* and the same is in line paragraph 4.1.18 (1) of the VCS standard, v4.2 /3/.

1.4 Summary Description of the Project

The project activity is a Greenfield biomass based power plant, the electricity generated from this project is delivered to the Punjab State Electricity Board (PSEB) /23/ and the Power Purchase Agreement was signed between the PP and PSEB on 02nd June 2009. The agreement (PPA) is signed for a long term period of 30 years for the sale of electricity. The electricity generated from this project activity would displace the equivalent amount of electricity that would have been generated from the grid.

The project activity uses the locally available biomass residues namely cotton and mustard stalks as fuel. The PP have developed management systems to monitor, record, QA&QC measures and manage the project as per the registered monitoring plan (VCS PD).

As per the registered VCS PD & CDM PDD the project activity is designed to produce 90,311 MWh and ex-ante emission reductions is 74,891 tCO_2e.

2 VERIFICATION PROCESS

The registered VCS project is undergoing second verification under VCS with Fixed Crediting period option, the approach adopted to ensure the quality of emission reductions is described in the subsequent sections of this report.

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 VCS PD 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 VERRA Secretariat for issuance of credits as per VCS standard version 4.2 /3/.

Duration of Verification:

Verification Contract	13/12/2021

Remote audit	05/01/2022
Findings raised	09/01/2022
Draft Verification Report	23/02/2022
Final Verification Report	08/03/2022

2.2 Document Review

The verification is performed primarily as a document review of the approved VCS PD /4/ and registered CDM PDD /5/, previous MR /6/ along with Verification Report /7/ and associated documents as stated in detail in Appendix 1 of this report. The assessment is performed by a Verification Team using a protocol. The cross checks between information provided in the Monitoring Report, VCS PD 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

Due to COVID-19 pandemic lockdown and restrictions on travel Verification team could not conduct the site visit. Since the date of closure of lockdown was uncertain due to the increase spread of COVID-19 and travel restrictions Verification Team did not conduct site visit for this project activity and also referring to COVID-19 Travel Guidance for Projects[1]. However, the verification team performed the Zoom remote interview with the PP and site personnel and project representative to assess the information and review the documents to achieve a reasonable level of assurance in the verification. This is in line with Section 4.1.2 of the VCS Standard, v4.2 /3/ which does not explicitly mandate site visits as part of the validation and verification process, only that VVBs must achieve a reasonable level of assurance on all validations and verifications. No sampling procedures were adopted in document verification and all the document were cross checked to ensure conservative estimation of emission reduction. Kindly find below names of the persons interviewed (Zoom remote interview).

Location	Zoom Meeting	
Dates	05/01/2022	
Key points discussed	**Name of person, interviewed**	**Designation, Organization**
Implementation, Monitoring, Operational data, Calibration, Data collection, QA/QC procedures,	UBEPL and EKI Energy Services Pvt Ltd	
		Personnel and Site–Incharge of Universal Biomass Energy Private Limited.
	Saroj Sahoo	Mr. Saroj Sahoo DGM, Climate Change, EKI Energy Services Limited

[1] https://verra.org/covid-19-travel-guidance/ published on 18th March 2021

Calculation of ERs, VCS requirements	Abhishek Garg	Abhishek Garg Team Lead - Climate change and sustainability UBEPL
	Ananya Malik	Ananya Malik Associate - Climate change and sustainability UBEPL
	Rajneesh Kr. Tripathi	Rajneesh Kr. Tripathi DGM - HR & Admin UBEPL
	Hiralal Yadav	Hiralal Yadav Assistant Manager UBEPL
	Ashwani Garg	Ashwani Garg Manager – Accounts UBEPL
	Prince Gakhar	Prince Gakhar Plant Head UBEPL

2.4 Site Inspections

As detailed above, the intermittent lockdown due to COVID-19 third wave pandemic in India and travel restrictions, Verification team could not conduct the site visit. Since the date for revocation of travel restrictions on travel was not clear, the VVB could not perform physical verification of the site for this project activity. However, the verification team performed the Zoom remote interview with PP and site personnel and reviewed documents to achieve a reasonable level of assurance in the verification. This is in line with COVID-19 Travel Guidance for Projects and Section 4.1.2 of the VCS Standard, ver 4.2 which does not explicitly mandate site visits as part of the validation and verification process, only that VVBs must achieve a reasonable level of assurance on all validations and verifications.

2.5 Resolution of Findings

Describe the process for the resolution of any findings (corrective actions and clarifications or other findings) raised by the verification team during the verification and, where applicable, outstanding forward action requests from the validation or previous verifications.

State the total number of corrective action requests, clarification requests and forward action requests and other findings raised during the verification.

Provide a summary of each finding, including the issues raised, the response(s) provided by the project proponent, and the final conclusions and any resulting changes to project documents. Unless this fits on one page, put all findings in an appendix.

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 Zoom remote interview. 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 the 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 05 CARs and 09 CLs were raised and resolved satisfactorily. No FAR has been raised in the current verification. The list of CARs/CLs 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

There were no Forward Action Requests (FARs) raised during the current verification.

2.6 Eligibility for Validation Activities

4KES conducted the verification activity, the validation was performed by the other VVB. 4KES has a valid UNFCCC accreditation in the sectoral scope from UNFCCC. The accreditation scope can be checked from the below URL:

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

3 VALIDATION FINDINGS

3.1 Participation under Other GHG Programs

The Project Proponent had opted issuance of GHG credits under VCS for the 1st monitoring period from 30th October 2009 till 28th February 2011 and for the current monitoring 01st March 2017 to 29th October 2019 has again chosen issuance through VCS.

The project is also registered as a CDM project with UNFCCC on 22nd February 2011, reference no '4488' (https://cdm.unfccc.int/Projects/DB/RWTUV1297334673.09/view), the project has submitted Request of Issuance of CERs under CDM, and the periods of claim are as follows:

i) 13th March 2012 to 28th February 2017

ii) 01st March 2017 to 29th October 2019

iii) 30th October 2019 to 31st December 2020

The verification team raised two clarification requests (CLs) w.r.t the double claim and delay in verification between the first and current monitoring period. The concise of two CLs are presented below, for the detailed findings and conclusions please refer Appendix II of this report.

The verification team raised a CL03, since the PP was claiming issuance under VCS for the similar period 01st March 2017 to 29th October 2019 (current monitoring period claim). The PP responded with a declaration dated 17th January 2022 /8/ stating that they will not be claiming emission reductions dually under CDM and VCS. The declaration and response submitted by PP was accepted by the verification team and CL02 was closed.

Delay between the 1st verification and 2nd verification (current) was observed, hence CL09 was raised. The PP responded stating that the verification for the period 2012 to 2017 (upto 28th February 2017) under VCS is performed by other VVB and the same was under process, the description of the same is included in section 5.4 of the final MR /2/. The verification team has accepted the response and hence CL09 was closed, details about closure of the CL09 is detailed in Appendix II of this report.

3.2 Methodology Deviations

The project activity has applied AMS-ID - Grid connected renewable electricity generation, Version 15. The project activity has met the all criteria and applicability conditions and has not resulted in methodology deviations. Hence this section is not applicable.

3.3 Project Description Deviations

The verification team raised CL01, CL04, CL05 & CL07, to check and ascertain that the project activity has been implemented and operated as per the details specified in the registered VCS PD /4/ & CDM PDD /5/. The PP in response to the above clarifications submitted documents and photographs to support the claim that the size /capacity of project, technical specifications and monitoring parameters have remained same / constant w.r.t the registered PD / PDD. The verification team reviewed the documents and was able to conclude that the project design, size and monitoring parameters are consistent and further through remote audit & interviews was able to affirm that there are no deviations to the project. Hence this section is not applicable.

3.4 Grouped Project

The project activity is not a grouped project or part of any grouped project. The verification team additionally checked the Host Country Approval /9/ which was obtained on 20th July 2009 with Ref no: F.No.4/6/2009 and ascertained that the project is a single project activity and not part of any group project.

4 VERIFICATION FINDINGS

4.1 Project Implementation Status

The project activity is a Greenfield power project which involves using the biomass residues as a main source fuel to generate electricity. The project activity was synchronised with grid on 30th October 2009, which was confirmed by the verification team from the letter dated 24th January 2011 with reference no: 234 /10/. The letter issued by from the office of Senior Executive Engineer of the Punjab State Power State Limited, DS Division Powercom Badal. The capacity of the project activity was also cross checked and confirmed from the same letter as 14.50 MW.

The boiler inspection reports from 2010 to 2021 /11/ were made available to the verification team, the reports were the basis to confirm the boiler specifications with details presented in the registered VCS PD and CDM PDD. The turbine generator details were cross verified from the manufacturer specifications /12/ and photographs /13/. The project activity specific technical details were also discussed and confirmed during the remote audit interviews with Project Personnel of the PP.

Description	Parameters
No of boilers	One (1)
Makers	ISGEC John Thomson (IJT)
Type	Bi-drum, natural circulation, balanced draft, bottom supported, outdoor water tube type travelling grate
Steam flow at main steam stop valve outlet (100% BMCR)	70 TPH
Steam pressure at main steam stop valve outlet	67 kg/cm2 (g)
Steam temperature at main steam stop valve outlet	475 +/- 5 deg C.
Feed water temperature at the economizer inlet	126 deg C
Design code for pressure parts	IBR IWT-6212
No of Turbine	One (1)
Makers	Qingdao Jieneng Power Station Engineering Co., Ltd (QJPS)
Type	Condensing
Rated capacity of turbine	14.5 MW with 10TPH extraction at 2.5 ata
Steam conditions at turbine inlet pressure (g)	64.5281 kg/cm2
Temperature	485 deg C.
Condenser operational pressure	0.0098 M Pascal
Designed temperature drop in the cooling tower (deg C)	10
Rating at the generator terminals (MW)	14.50
Electrical generator	Jinan Power Equipment Factory

For the monitoring parameters the PP presented the photographs /13/ of energy meter and calibration certificates /14/ for the period ranging from 2016 to 2019. The monthly biomass stock report /15/ was submitted and the details were cross checked with data presented in the Monitoring Report and upon review of the data the verification team did not find any discrepancies and concluded that is meeting requirements stated in paragraph 3.21.3 of VCS standard /3/.

The monitoring parameters, accuracy of calculations, QA & QC procedures are detailed out in the subsequent sections of this verification report.

Verification team reviewed the documents, photographs and also conducted interviews to verify the accuracy of information presented in the registered VCS PD & CDM PDD. Additionally the verification team also accessed the monitoring report and verification report of the first verification. Based on the assessment the verification team is able to conclude that there were no deviations identified w.r.t the project design, size, baseline scenario and the project activity has been implemented, operated as per the registered VCS PD and CDM PDD.

4.2 Safeguards

4.2.1 No Net Harm

The project activity is a renewable biomass residue based power project, as per the registered PDD and MR the Project Participant bifurcates potential impacts into 4 category whilst, Air, Ecology, Land and Water. The project participant has devised measures & equipment to control potential impacts.

Air – The PP follows the Air quality monitoring requirements prescribed by PSPCB. Electrostatic Precipitator has been installed to filter the impurities /particulate emissions from flowing air and operates within permissible limits of Central Pollution Control Board (CPCB) viz., 100mg/Normal m^3.

Ecology – The project is location is not situated in any eco-sensitive or forest area and does not affect any flora or fauna. The fuel is sourced locally from the farmers who grow cotton and mustard.

Land - Ash generated from the plant is diverted towards brick manufacturing process and is in line with requirements of Punjab State Pollution Control Board (PSPCB).

Water -Wastewater Treatment ensures that there are no negative impacts on the water body and adheres to norms set by PSPCB.

The verification team cross checked the Consent / Environmental Clearance from the State Expert Appraisal Committee, with ref no SEAC/52/22921, Dt., 05th June 2008 /25/. Based on the assessment the verification team concludes that the Project Activity's has no negative impacts and the PP's approach is in line with paragraph 3.16.1 of VCS standard /3/.

4.2.2 Local Stakeholder Consultation

The local stakeholder consultation was held on 5th July 2008 at Channu Village in Muktsar district, Punjab State, India prior to registration of this project activity with VCS. The local stakeholders were invited by distribution of handouts /pamphlets and sending individual letters and also the regulatory /statutory agencies were notified.

Based on minutes of meeting /16/ the verification team noted that the local stakeholders had expressed positive opinion about the project activity, no negative comments were recorded.

4.3 AFOLU-Specific Safeguards

The project activity falls under non-AFOLU projects category, hence this section is not applicable.

4.4 Accuracy of GHG Emission Reduction and Removal Calculations

4.4.1 Data Parameters available at validation:

Data / Parameter	EF_{CO2}
Data unit	tCO2e/MWh
Description	Combined margin (CM)value of CO_2 baseline emission factor for the grid electricity displaced due to the project activity during the year y
Source of data	Central Electricity Authority,India"CO2 baseline database,version5,November 2009)"(http://www.cea.nic.in/planning/c%20and%20e/user_guide_ver5.pdf)
Value applied	0.84
Purpose of Data	Used for calculation of Baseline emissions
DOE Justification	Combined Margin (CM) is fixed ex-ante for the entire crediting period. The data for calculating CM is derived from the CDM CO_2 Baseline Database, developed by Central Electricity Authority (CEA), a reputed organization under the purview of Ministry of Power, Government of India. This data is an official publication of the Government of India for the purpose of CDM baselines. The data was published in November 2009 and the applied value (CM) was checked and confirmed by the verification team by accessing the following URL https://cea.nic.in/wp-content/uploads/baseline/2020/07/database_5.zip

Data / Parameter	$EF_{grid,OM,y}$
Data unit	tCO_2e/MWh
Description	Operating Margin(OM) emission factor for northern grid
Source of data	Central Electricity Authority, India"CO2baselinedatabase,version5,November2009)"(http://www.cea.nic.in/planning/c%20and%20e/user_guide_ver5.pdf)
Value applied	1.01
Purpose of Data	Used for calculation of Baseline emissions
DOE Justification	Operating Margin (OM) is fixed ex-ante for the entire crediting period. The data for calculating CM is derived from the CDM CO_2 Baseline Database, developed by Central Electricity Authority (CEA), a reputed organization under the purview of Ministry of Power, Government of India. This data is an official publication of the Government of India for the purpose of CDM baselines. The data was published in November 2009 and the applied value (OM) was checked and confirmed by the verification team by accessing the following URL https://cea.nic.in/wp-content/uploads/baseline/2020/07/database_5.zip

Data / Parameter	$EF_{grid,BM,y}$
Data unit	tCO_2e/MWh
Description	Build Margin(OM) emission factor for northern grid
Source of data	Central Electricity Authority, India"CO2baselinedatabase,version5,November2009)"(http://www.cea.nic.in/planning/c%20and%20e/user_guide_ver5.pdf)
Value applied	0.68
Purpose of Data	Used for calculation of Baseline emissions
DOE Justification	Build Margin (BM) is fixed ex-ante for the entire crediting period. The data for calculating CM is derived from the CDM CO_2 Baseline Database, developed by Central Electricity Authority (CEA), a reputed organization under the purview of Ministry of Power, Government of India. This data is an official publication of the Government of India for the purpose of CDM baselines. The data was published in November 2009 and the applied value (BM) was checked and confirmed by the verification team by accessing the following URL https://cea.nic.in/wp-content/uploads/baseline/2020/07/database_5.zip

Data / Parameter	$EF_{km,CO2,y}$
Data unit	tCO_2e/km
Description	Average CO_2 emission factor for the trucks during the year, y
Source of data	The emission factor has been determined using appropriate net Calorific values and CO_2 emission factor from national reliable default values and/or IPCC default values.
Value applied	0.00044
Purpose of Data	Used for calculation of Project emissions
DOE Justification	The default value applied was checked and confirmed by the verification team.

Data / Parameter	$EF_{DieselCO2}$
Data unit	tCO_2/TJ
Description	The CO_2 emission factor of Diesel
Source of data	National CO_2 emission factor for diesel
Value applied	71.4
Purpose of Data	Used for calculation of project emissions
DOE Justification	The default value was derived from the National CO_2 Emission factor for Diesel. The same was checked and confirmed.

Data / Parameter	$SFC_{biomass}$
Data unit	Kg/kWh
Description	Specific fuel consumption of biomass fuel types envisaged to be utilized in the project activity
Source of data	"Detailed Project Report", prepared by Subhash Kamboj & Associates.
Value applied	Type of biomass: SFC(kg/kWh) Cotton stalk (75%): 1.188 Mustard stalk (25%): 1.188
Purpose of Data	To crosscheck the generation. Theoretical electricity Generation calculated using the specific fuel consumption of each biomass used in the project activity.
DOE Justification	The Specific Fuel Consumption of the power plant was calculated and fixed ex-ante, this data was derived from the third party Detailed Project Report (DPR) and Biomass Survey Report. The SFC is used to cross check the no. of units electricity in kWh produced

	per kilogram (kg) of biomass combusted. The DPR and biomass survey report were checked by the Verification Team and values for the Cotton Stalk and Mustard Stalk was confirmed.

4.4.2 Data and Parameters Monitored

Data / Parameter	$EG_{BL,y}$
Data unit	MWh
Description	Quantity of Electricity exported to the grid by the project during the monitoring period.
Source of data	Joint Meter reading
Description of measurement methods and procedures to be applied	Electric power exported to grid will be measured monthly using calibrated meters by both project proponent and Punjab State Power Corporation Ltd. (PSPCL) as specified in the PPA and records maintained.
Frequency of monitoring/recording	The data is measured continuous and recorded monthly
Value monitored	2,59,241
Monitoring equipment	The electronic meters are calibrated annually to ensure correct readings throughout the project life. The calibration details for both main and check meters is furnished in the appendix-1.
QA/QC procedures to be applied	The meters are Tri-vector meters of 0.2S accuracy class. Power exported to the grid and measured by state utility are checked for consistency comparing the readings with the meter installed at the project site. This is crosschecked with the records for the sold electricity. This is to be noted that the accuracy class of the energy meters are defined to be 0.5s whereas the accuracy class of the energy meters used during the monitoring period is 0.2s which is more accurate.
Purpose of the data	To calculate emission reductions

DOE Justification	The energy meters installed at the site are of 0.2s class meter, the earlier energy meters were of 0.5s class, and the meters were replaced prior to the start of this current monitoring period (2017 to 2019). The 0.2s class of meter is that it would maintain its accuracy of an error of +/- 0.2%, even at very low loadings of the order of 20% of the rated value. The calibration of energy meters are performed annually by Punjab States , during the course of monitoring period there no were delays in calibration, the same was checked and confirmed from the calibration certificates /14/ and was adhering to paragraph 3.15.5 of VCS standard /3/. The net electricity is the basis for the emission reductions, the net electricity is determined after subtracting the total electricity import from the total electricity export to the grid. The Joint Meter Readings (JMR) is the primary source of document and based on which the payment is made for the sale of electricity. The JMR and invoices were made available to the verification team, the data covered period ranging from March 2017 to October 2019, the documents checked, and the net electricity was confirmed to be correct and consistent in the MR and Emission Reduction Calculation sheet.

Data / Parameter	$Q_{y,cottonstalk}$
Data unit	Tonnes
Description	Quantity of cotton stalk received in the project activity
Source of data	Plant records/log books
Description of measurement methods and procedures to be applied	All the biomass is received truck wise and is recorded on daily and collated on monthly basis. - Each truck that enters the site will be recorded at the weigh bridge installed at the factory.
Frequency of monitoring/recording	Batch monitoring (every truck of biomass is monitored)
Value monitored	233562

Monitoring equipment	Weigh bridge is used to measure the weight of the biomass that is received. The details of the weigh bridge are provided in appendix 1.
QA/QC procedures to be applied	The weigh bridge records could be tallied against transporters receipts or against the computer generated payment invoices. The weigh bridge is calibrated annually to ensure proper functioning. The calibration details of the weigh bridge are provided in appendix 1
Purpose of the data	Not used in calculation of emission reduction. Used for cross checking purpose.
Calculation method	*It is calculated based on the weight of the loaded truck and the empty truck.*
DOE Justification	The incoming biomass residue weights are measured at the weigh bridge installed inside project premises. The weigh bridge data forms the basis for payments to biomass suppliers and to maintain the record and stock of the biomass residues. During the course of this monitoring period the PP had replaced weigh bridges twice the details are as follows: a) Weigh bridge with Sl No: 2008-043 was replaced with new weigh bridge with Sl No: 1017010k on 12/08/2017 and subsequently, b) Weigh bridge with Sl No: 1017010k was replaced with new weigh bridge with Sl No: 0516011k on 03/04/2019. The calibration of weigh bridge is done every year and the calibration certificates of weigh bridge was made available to the verification team and it was confirmed that the calibration is done annually. The total quantity of cotton stalk (biomass residue) supplied (cotton stalk) was checked and confirmed the monthly stock record and there were no discrepancy identified.

Data / Parameter	$Q_{y,mustardstalk}$
Data unit	Tonnes
Description	Quantity of mustard stalk received in the project activity
Source of data	Plant records/log books
Description of measurement methods and procedures to be applied	- All the biomass is received truck wise and is recorded on daily and collated on monthly basis. - Each truck that enters the site will be recorded at the weigh bridge installed at the factory.
Frequency of monitoring/recording	Batch monitoring (every truck of biomass is monitored)

Value monitored	59726
Monitoring equipment	Weigh bridge is used to measure the weight of the biomass that is received. The details of the weigh bridge are provided in appendix 1.
QA/QC procedures to be applied	The weigh bridge records could be tallied against transporters receipts or against the computer generated payment invoices. The weigh bridge is calibrated annually to ensure proper functioning. The calibration details are provided in the appendix 1.
Purpose of the data	Not used in calculation of emission reduction. Used for cross checking purpose.
Calculation method	It is calculated based on the weight of the loaded truck and the empty truck.
DOE Justification	The incoming biomass residue weights are measured at the weigh bridge installed inside project premises. The weigh bridge data forms the basis for payments to biomass suppliers and to maintain the record and stock of the biomass residues. The calibration of weigh bridge is done every year and the calibration certificates of weigh bridge was made available to the verification team and it was confirmed that the calibration is done annually. The total quantity of mustard stalk (biomass residue) supplied was checked and confirmed the monthly stock record and there were no discrepancy identified.

Data / Parameter	$BF_{k,y,\ cottonstalk}$
Data unit	Tonnes of cotton stalk
Description	Quantity of biomass residue (cotton stalk) combusted in project plant during the year monitoring period
Source of data	Plant records
Description of measurement methods and procedures to be applied	Biomass received is analyzed for moisture content. Analysis is carried out in the laboratory at the project site itself. The quantity of biomass is measured by weighbridge at the project site.
Frequency of monitoring/recording	Batch monitoring (every truck of biomass is monitored)
Value monitored	299444
Monitoring equipment	Periodically quantity of fuel actually used on a particular day is

	weighed on the weight bridge and data recorded. The same is also crosschecked with monthly stock balance. The details of the weigh bridge used for the measurement are provided in the appendix 1.
QA/QC procedures to be applied	Biomass combusted in the boilers shall be cross checked through an energy balance undertaken on quarterly basis for the project activity. This will include the calculation of the both types of biomass residues used in the boilers. Please refer the calibration details of the weigh bridge provided in the appendix 1.
Purpose of the data	Not used in calculation of emission reduction. Used for cross checking purpose.
Calculation method	It is calculated based on the weight of the loaded truck and the empty truck.
DOE Justification	The daily record of cotton stalk being combusted in the boiler is recorded & verified by the plant personnel and the verified data is compiled and presented monthly. The monthly data is accumulated for the entire year and used for cross checking for any errors or mismatch. The weigh bridge details and monthly stock record /15/ were cross checked and no discrepancy was identified by the Verification Team.

Data / Parameter	$BF_{k,y,mustardstalk}$
Data unit	Tonnes of mustard stalk
Description	Quantity of biomass residue (mustard stalk) combusted in project plant during the monitoring period.
Source of data	Plant records
Description of measurement methods and procedures to be applied	Biomass received is analyzed for moisture content. Analysis is carried out in the laboratory at the project site itself. The quantity of biomass is measured by weighbridge at the project site.
Frequency of monitoring/recording	Batch monitoring (every truck of biomass is monitored)
Value monitored	83188
Monitoring equipment	Periodically quantity of fuel actually used on a particular day is weighed on the weight bridge and data recorded. The same is also crosschecked with monthly stock balance. The details of the weigh bridge are provided in appendix 1.

QA/QC procedures to be applied	Biomass combusted in the boilers shall be cross checked through an energy balance undertaken on quarterly basis for the project activity. This will include the calculation of the both types of biomass residues used in the boilers. Please refer the calibration details of the weigh bridge provided in the appendix 1.
Purpose of the data	Not used in calculation of emission reduction. Used for cross checking purpose.
Calculation method	It is calculated based on the weight of the loaded truck and the empty truck.
DOE Justification	The daily record of mustard stalk being combusted in the boiler is recorded & verified by the plant personnel and the verified data is compiled and presented monthly. The monthly data is accumulated for the entire year and used for cross checking for any errors or mismatch. The weigh bridge details and monthly stock record /15/ were cross checked and no discrepancy was noted by the Verification Team.

Data / Parameter	AVD_y
Data unit	Km
Description	Average round trip distance (from and to) between biomass fuel supply sites and the project site
Source of data	Plant records
Description of measurement methods and procedures to be applied	Factory records maintained at the factory gate at the time of receipt of biomass residues at factory include the distance from the collection centers and weight carried out.
Frequency of monitoring/recording	Batch monitoring (every truck carrying biomass will be monitored)
Value monitored	78.6 (Average for the entire monitoring period)
Monitoring equipment	Plant records for the consignment that enters and the distance of the various centers from where it comes.
QA/QC procedures to be applied	Record of all distance of various collection centre from projects is maintained separately to crosscheck the distance travelled for each consignment.
Purpose of the data	Used to calculate the project emissions from the project activity .
Calculation method	Total Round Trips of Cotton Straw and Mustard Straw/total no.of Trips of

	Cotton Straw and Mustard Straw
DOE Justification	The trip details of each truck carrying the biomass residues are recorded at the project premises entrance. The recorded details helps in assessing the average no. of kilometres (to & fro) between the residue supply point to the project site. The trip sheet details were made available to the Verification Team, based on the assessment the team is able to conclude that the average of 78.4 kilometres is acceptable and appropriate.

Data / Parameter	N_y
Data unit	-
Description	Number of truck trips for the transportation of biomass.
Source of data	Plant records
Description of measurement methods and procedures to be applied	All consignments shall be entered in the log-book maintained at the main gate by security persons.
Frequency of monitoring/recording	Batch monitoring (every truck carrying biomass will be monitored)
Value monitored	32114 (for the entire monitoring period)
Monitoring equipment	Plant records for the number of consignment that enters
QA/QC procedures to be applied	These shall be crosschecked with the bills produced by suppliers for supply of biomass residues.
Purpose of the data	Used to calculate the project emissions from the project activity.
Calculation method	-
DOE Justification	The trip details of each truck carrying the biomass residues are recorded at the project premises entrance. The details of no. of trucks which supplied (to & fro) between the residue supply point to the project site were made available to the Verification Team, based on the assessment the team is able to conclude that the trip records are found to be correct without any discrepancy and same is acceptable.

The verification team after the document review raised CL7, and CL8, since the information was not adequate and clearly reflected the requirements stated in the VCS standard. The PP revised the MR and supported his claims with adequate documentation, hence the above raised were closed. The detailed assessment is provided in Appendix II of this report.

Based the assessment the parameters have been correctly monitored and there were no mismatch or material discrepancy identified by the Verification Team. The GHG emission reductions were calculated correctly on the basis of the Approved Small Scale methodology for 'Grid connected renewable electricity generation', AMS ID (Version 15.0), /17/ and meets the requirements stated paragraphs 3.15.1 and 3.15.3 of VCS Standard /3/.

4.5 Quality of Evidence to Determine GHG Emission Reductions and Removals

The basis of emission reductions is the displacement of equivalent amount of electricity that would be generated in the baseline. The electricity generated, biomass residues consumed, and equipment efficiency data are essential while calculating the emission reductions. The formulas and methodology defined approach are discussed below:

Emission reductions due to displacement of electricity

The baseline emissions due to displacement of electricity are determined by the following equation:

$BEy = EGBL, y * EFCO_2$

Where,

- BEy is Baseline Emissions in year y;tCO_2
- EGBL,y is Energy baseline in year y;kWh
- EFCO2 is CO_2 Emission Factor in yeary;tCO_2e/kWh

Determination of CO_2 emission factor ($EFCO_2$)

The emission factor for the displacement of electricity corresponds to grid emission factor ($EFCO_2$= EFgrid). The grid emission factor (EFgrid) has been fixed ex-ante and the calculations of the Emission Factor was carried out by Central Electricity Authority applying the guidance provided in "Tool to calculate the emission factor for an electricity system Version 1.1" (as per CEA CO_2 Baseline database for Indian Power sector, Version 5)[2].

[2] https://cea.nic.in/wp-content/uploads/baseline/2020/07/database_5.zip

At the time of registration as per the CEA report the Northern Regional Grid was synchronized with the integrated Eastern, North Eastern and Western (NEWNE) Grid on August, 2006 and the four regional grids have since been operating in synchronous mode.

The project activity is part of the erstwhile Northern, Eastern, Western and North Eastern (NEWNE) grid which is now termed as Northern Regional Grid. Hence the year wise values determined for NEWNE are as follows:

Simple Operating Margin(tCO2/MWh)			
Grid	2006-07	2007-08	2008-09
NEWNE	1.01	1.00	1.01
Southern	1.00	0.99	0.97
India	1.01	1.00	1.01

Build Margin (tCO_2/MWh)			
Grid	2006-07	2007-08	2008-09
NEWNE	0.63	0.60	0.68
Southern	0.70	0.71	0.82
India	0.65	0.63	0.71

Combined Margin = Average Simple OM x 0.50 + BM x 0.50 = 1.01 x 0.50 + 0.68 x 0.50 = 0.84 (Source: CEA, CO_2 baseline database, version 5, November 2009)

Determination of net electricity generation (EGy)

As per the AMS-I.D. Version 15, EGBL,y corresponds to Energy baseline in year, y; kWh. Under the project activity this will be the net quantity of electricity exported to grid.

$EG_{BL,y}=EG_{export,y}$

The baseline emission are calculated as below,

Year	Quantity of Electricity exported to the grid by the project			Baseline Emission (BEy) in tCO_2e
	Export in MWh	Import in MWh	Net Export in MWh	
2017	86840	273	86567	72,716
2018	90739	449	90290	75,843
2019	84062	233	82384	69,202
Total	**2,61,641**	**955**	**2,59,241**	**2,17,761**

Project Emissions

As per the applied methodology the project emissions for renewable energy projects is considered to be zero.

The PP as conservative approach has opted to demonstrate the possibility of emissions that may take place because of transportation of biomass residues. The probability of project emissions may occur due to transportation of biomass residue from the source to the power project site. The following equation is used to calculate the total project emissions of the project activity during the monitoring period:

PETy = Ny*AVDy*EFkm,CO_2

Where,

PETy is CO_2 emissions during the year y due to transport of the biomass residues to the project plant (tCO_2/yr)

- Ny is Number of Truck trips per during the monitoring period

- AVDy is Average round trip distance (from and to) between the biomass residue fuel supply sites and the site of the project plant during the monitoring period (km)

- EFkm, CO_2 is Average CO_2 emission factor for the trucks measured during the year, y(t CO_2/km)

The calculation of Project emissions is as below

Year	Total number of trucks received	Avg. distance travelled km/trip	Project Emission (PEy) (tCO_2)
2017	15274	76.9	517
2018	5241	80.8	187
2019	11599	77.6	397
Total	**32,114**		**1,101**

Leakage:

As per the applied approved methodology, AMS-I.D.(Version15),leakage is to be considered if the energy generating equipment is transferred from another activity. The project activity is a green field biomass based power generation facility and the energy generating equipment used in the project activity has not been transferred from any other activity.

As per the attachment C to Appendix B it has been specified that for the small scale project activity, the leakage emission sources can be identified as follows:

As the project activity utilizes only cotton stalk and mustard stalk (biomass residue), the implementation of project activity did not lead to shifting of pre-project activities.

The biomass being used in the project activity is a waste generated from the cotton and mustard crop. This waste would have anyways been generated even in the absence of the project activity and would have burnt in the field in uncontrolled manner. The plant uses the waste generated and does not need application of fertilizer and clearance of land. Hence there are no emissions due to the same.

The only possible source of leakage in the project activity can be competing uses of biomass - The biomass residue may in the absence of the project activity be used elsewhere, for the same or a different purpose. To establish the same, the PP has hired an independent agency to carry out a biomass residue assessment study in the surrounding area (surrounding area refers to the area within 50 km radius of the project activity). The results of the study pertaining to the surplus availability of cotton stalk and mustard stalk are available in the subject study report.

The biomass assessment study /19/ demonstrates that the quantity of available biomass in the region is larger than 25% after considering the biomass residue utilization in the area; hence this source of leakage is not applicable to the project activity.

Emission reductions

The emission reductions estimated from the project activity are the difference between baseline emissions, project emissions and leakage emissions. The formulae for calculating the emission reductions are provided below:

$ERy = BEy - PEy - Ley$

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	72,716	517	0	72,199
2018	75,843	187	0	75,656
2019	69,202	397	0	68,805
Total	**217,761**	**1,101**	0	**216,660**

The actual emission reductions have exceeded the estimated emission reductions as per the registered PDD. There is an 8.52% increase when compared to the estimated ex-ante emission reductions, the verification team wanted to assess whether the increase in electricity generation and resultant emission reductions have occurred consistently in the previous years.

The verification team accessed the monitoring report available on the CDM website[3], the PP has claimed for the period 2012 to 2017 (13th March 2012 to 28th February 2017). The verification team assessed the MR /26/ available on the CDM website[4] and noted, that there was decrease of the actual emission reductions claim which was 336,211 tCO_2e as against the estimated ex-ante emission reductions of 372,198 tCO_2e.

Further assessment revealed that the overall emission reductions for the CDM monitoring period from 2011 to 2019 (01st March 2011 to 29th October 2019) has been 5.83% lesser than the estimated emission reductions.

The verification team concluded that the increase in emission reductions for the current monitoring period has occurred temporarily and it may be noted that the increase in generation has not occurred consistently for project activity. The verification team also noted the decrease in electricity generation and resultant emission reductions based on the past data.

Proper data management inclusive of data acquisition and aggregation, data management system is being followed for the project activity. The joint meter reading statement/27/ is the source for quantity of net electricity supplied to grid based on which the baseline emission is calculated. The joint meter reading is taken from the calibrated energy meter and the statement is issued by Punjab State Electricity Board and hence the source is authentic

All the other parameters also measured/ monitored by calibrated meters. As per the registered CDM PDD, The energy meters and the weighbridge(s) need to be calibrated once in a year. The monitoring personnel at site are well trained and follow reproducible routines. The training records/TR/of the plant personals have been cross checked and found OK. Thus, monitoring personals are competent to carry out the relevant tasks with sufficient accuracy. All necessary monitored and measured raw data/log sheets were checked during on-site verification.

Conclusion:

[3] https://cdm.unfccc.int/Projects/DB/RWTUV1297334673.09/iProcess/Applus1641297003.6/view

[4] https://cdm.unfccc.int/filestorage/G/8/2/G82VKYFINLRJTXWDH31ZPUAQ4BM7E0/Untitled%20%28uploaded%201

[4] https://cdm.unfccc.int/filestorage/G/8/2/G82VKYFINLRJTXWDH31ZPUAQ4BM7E0/Untitled%20%28uploaded%2012%20Jan%2022%2009%3A34%3A39%29.pdf?t=b0l8cjdxZ2tlfDBCJ2omow_AbFhiPE6pYvRa

Evidences (Documents & Zoom interviews) referred for verification of individual monitoring parameter and fixed parameters are defined under section 4.4. The Verification Team further confirm that, sufficient evidence covering the entire monitoring period and at the required frequency were available. A list of referred documents for verification is also included in Appendix 1 of this report.

4.6 Non-Permanence Risk Analysis

Not applicable, since this is a non- AFOLU project.

5 VERIFICATION CONCLUSION

4K Earth Science Pvt. Ltd (4KES), contracted by 'Universal Biomass Energy Private Limited (UBEPL)', has performed the independent verification of the emission reductions for the VCS project activity (VCS ID- 650) titled: "Biomass Based Power Generation Plant at Village Channu, Punjab" for the monitoring period 01st March 2017 to 29th October 2019 as reported in the Final Monitoring Report Version 1.1 /2/. The project proponent whilst 'Universal Biomass Energy Private Limited (UBEPL)' is 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 AMS ID, Version 15.0, the monitoring plan contained in the registered VCS PD & CDM PDD/5/ and VCS Standard version 4.2 /3/, Monitoring Report (Version 1.1, Dated: 03rd March 2022) 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 01st March 2017 to 29th October 2019 are fairly stated in the Final Monitoring Report /2/. The GHG emission reductions were calculated correctly on the basis of Approved small scale methodology for 'Grid-connected electricity generation from renewable sources', Version 15.0 /17/, and the VCS standard 4.2.

Verification period: From 01st March 2017 to 29th October 2019 (inclusive of both days).

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	72,716	517	0	72,199

2018	75,843	187	0	75,656
2019	69,202	397	0	68,805
Total	**217,761**	**1,101**	0	**216,660**

Approved by

Chandrakala R.

Director

4K Earth Science Private Limited

Date : 08 March-2022

Place: Bangalore, India

APPENDIX I: List of Documents

S. No.	Document/Evidence/Reference/Web-link, Version, Date
1	Monitoring Report, Version 1.0, Dt., 07th December 2021
2	Final Monitoring Report, Version 1.1, Dt., 03rd March 2022
3	VCS Standard, Version 4.2, Dt., 20 January 2022
4	Registered VCS PD version 1 dated 02/05/2011
5	Registered CDM PDD, Version 03, Dt., 08th February 2011
6	1st Monitoring Period - Monitoring Report, Version 2.0, Dt., 04th November 2011
7	1st Monitoring Period Verification Report, Version 01, 18th July 2012
8	Declaration from Project participant regarding double counting , Dt., 17th January 2022
9	Host Country Approval (HCA), Ref no: F.No.4/6/2009, Dt.,20th July 2009
10	The letter issued by from the office of Senior Executive Engineer of the Punjab State Power State Limited, DS Division Powercom Badal,Dt., 24th January 2011 with reference no: 234
11	Boiler Inspection Reports - issued by Inspector of Boilers Punjab, for the period ranging from 2016 to 2019 : Year 2016 & 17 - MKT/2016-17/14, No 98/BA-Test/45 Year 2017 & 18 - MKT/2017-18/20, No 599 Year 2018 & 19 - MKT/2018-19/17, No 867
12	Manufacturer Specifications of Turbine Generator
13	Photographs of boiler, turbine generator and energy meters
14	Energy Meter Calibration Certificates - between 2016 to 2019 Year 2016: Certificate No: BA/2K16/ET-2815, Dt of Testing: 07/05/2016 Year 2017: Certificate No: BA/2K17/115A/01 Dt of Testing: 05/05/2017 Year 2018: Certificate No: BA/2K16/122A/01, Dt of Testing: 04/05/2018 Year 2019: Certificate No: BA/2K19/119A/01, Dt of Testing: 28/04/2019
15	Monthly Biomass Stock Report - from March 2017 to October 2019
16	Stakeholder Minutes of Meeting, Dt., 05th July 2008
17	AMS ID, Version 15.0, Dt., 16th October 2009
18	Trip sheet details for the monitoring period and biomass procurement receipts
19	Biomass Assessment Study
20	1st Emission Reduction Calculation Sheet
21	Final Emission Reduction Calculation Sheet.
22	Registration and Issuance Process, Version 4.0, Dt., 19th September 2019
23	Power Purchase Agreement between UBEPL and Punjab State Electricity Board Dt., 02nd June 2009.
24	Validation and Verification Manual, Dt.,19th October 2016, v3.2
25	Environmental Clearance from the State Expert Appraisal Committee, with ref no SEAC/52/22921, Dt., 05th June 2008
26	CDM Monitoring Report for the period 13th March 2012 to 28th February 2017
27	Monthly Energy Generation Statements form state utility covering the Monitoring period.
28	Daily Generation logbooks from the Plant meter for the Month of October 2019 and sale of invoices and receipts.
29	Training Records of monitoring personnel

APPENDIX II: Verification Findings

Clarification requests, corrective action requests and forward action requests

Table 1.Remaining FAR from validation and/or previous verifications

FAR ID	01	Section no.	2.5	Date: 09/01/2022
Description of FAR				
As per the biomass assessment study the surplus mustard stalk availability in the districts Muktsar, Bhatinda & Ferozepur of Punjab is zero. And hence the PP decided to procure required mustard stalk from the neighboring districts of Hanumangarh, in state of Rajasthan and Sirsa in state of Haryana. Hence the verification team need to check whether the entire mustard stalk procured during the monitoring period are from Hanumangarh district of Rajasthan and Sirsa district of Haryana. If not, then leakage calculation should be applied appropriately" With refer to the above FAR raised in validation report, please justify the same for this monitoring period with supporting documents				
Project participant response				**Date:** DD/MM/YYYY
Surplus mustard stalk availability in the districts of Muktsar, Bathinda and Ferozepur is minimal. Hence mustard stalk is procured from neighboring Districts of Sirsa in Haryana and Hanumangarh in Rajasthan. The plant located at Channu is in southern part of Muktsar district. It has Sirsa district of Haryana and Hanumangrh district of Rajasthan contiguous to it. The procurement centres are located along the Inter district/ Inter-state boundaries. Farmers bring their produce to the procurement centres for further transportation to the plant.				
Documentation provided by project participant				
Trip Details Logs and procurement Receipts submitted by the project participant.				
DOE assessment				**Date:** DD/MM/YYYY
From the verification of fuel procurement receipt/18/ it is confirmed that the all the mustard stalks are purchased by fuel collection center located in the Hanumangarh district of Rajasthan and Sirsa district of Haryana. Hence no leakage calculation is required. However, the same needs to be checked in next verification.				

Table 2. CLs from this Verification

CL ID	01	Section no.	1.1	Date: 09/01/2022
Description of CL				
PP is requested to share (from 2017 to 2019) the following supporting's: 1. The regulatory consents for Air, Water and Hazardous waste. 2. Fuel purchase receipts (biomass used) and monthly fuel stock balance report. 3. Plant shift log books for operating parameters & planned and forced outages details. 4. Joint Meter Readings and Sales Invoices. 5. Clearances by the Inspector of Boilers. 6. Calibration reports for Energy Meters & Weigh Bridge. 7. Net Calorific Value report issued by Third Parties. 8. Commissioning certificate for the project issued by Punjab State Power Corporation. 9. Truck/Vehicle Trip Details. 10. Power Purchase Agreement.				
Project participant response				**Date: 26/01/2022**
1. Enclosed 2. Enclosed 3. The break down details are enclosed. The month wise monitoring parameters are included in the revised ER sheet. 4. Enclosed 5. Enclosed 6. Enclosed 7. The third party test reports are not required as per the registered PDD. 8. Enclosed 9. The monthly recorded values are included in the revised ER sheet. 10. Enclosed.				
Documentation provided by project participant				
Document Listed above.				
DOE assessment				**Date: 05/02/2022**
The Verification Team has reviewed the following documents and response, hence CL 01 is closed. 1. The regulatory consents for Air, Water and Hazardous waste. 2. Fuel purchase receipts (biomass used) and monthly fuel stock balance report. 3. Plant shift log books for operating parameters & planned and forced outages details. 4. Joint Meter Readings and Sales Invoices. 5. Clearances by the Punjab State Inspector of Boilers. 6. Calibration reports for Energy Meters & Weigh Bridge. 7. Commissioning certificate for the project issued by Punjab State Power Corporation. 8. Truck/Vehicle Trip Details. 9. Power Purchase Agreement between UBEPL & Punjab State Electricity Board.				

CL ID	02	Section no.	1. 9	Date : 09/01/2022
Description of CL				
Kindly submit the declaration for not claiming the issuance of CERs under CDM for the current monitoring period.				
Project participant response				**Date: 26/01/2022**
The declaration is submitted herewith.				
Documentation provided by project participant				
Declaration letter provided by the project participant				
DOE assessment				**Date: 05/02/2022**
Declaration dated 17th January 2022 has been checked and found to be acceptable, Hence CL02 is closed.				

CL ID	03	Section no.	2.6	Date: 09/01/2022
Description of CL				
PP to submit the supporting's and affirm that there are no changes to equipment's / machineries which were mentioned in the CDM PDD & VCS PD at the time of Registration.				
Project participant response				**Date: 26/01/2022**
Latest boiler inspection certificates and the photographs of the equipment are submitted to support the same.				
Documentation provided by project participant				
Boiler Inspection Certificates covered current monitoring period and photographs of major equipments.				
DOE assessment				**Date: 05/02/2022**

The boiler inspection reports ranging from the year 2010 to 2021 and photographs were submitted, the verification team also cross checked the following documents:

- Verification report & monitoring for the 1st monitoring period
- Validation report prior to registration with VCS,
- Registered CDM PDD & VCS PD.

Based on the documents submitted and review the verification team is able to conclude that there are no changes to equipment's / machineries which were mentioned in the CDM PDD & VCS PD at the time of Registration. The machineries & equipment are intact, hence CL03 is closed.

CL ID	04	**Section no.**	3.1	**Date:** 09/01/2022
Description of CL				
PP is requested to share the manufacturer details of Boiler, Generator and Turbine along with Technical Specifications.				
Project participant response				**Date: 26/01/2022**
The photographs of the nameplates of boiler, generator and turbine mentioning technical specifications are submitted herewith.				
Documentation provided by project participant				
Technical Specifications of the Boiler and Turbine.				
DOE assessment				**Date: 05/02/2022**
The technical specifications, photographs were checked and the same was also cross checked during the remote audit interview, the review process established that the Project Activity has been implemented as per the registered VCS PD & CDM PDD, hence CL 04 is closed.				

CL ID	05	**Section no.**	3.1	**Date:** 09/01/2022
Description of CL				
PP is requested to share the photographs of nameplates of Boiler, Energy Meter, Generator and Turbine which should clearly have the following information: 1. Manufacturer's name 2. Capacity 3. Rated Power (for Generator & Turbine) 4. Serial Nos / IBR No (Boiler) 5. Accuracy class of meter				
Project participant response				**Date: 26/01/2022**

The photographs are enclosed herewith.
Documentation provided by project participant
Photographs .
DOE assessment | **Date: 05/02/2022**
Photographs of the boiler, turbine generator and energy meters were submitted, the same was checked and confirmed, hence CL05 is closed

CL ID	06	**Section no.**	3.1	**Date:** 09/01/2022
Description of CL				
PP to confirm that the project activity has been implemented & operated as per the information provided in registered CDM PDD & VCS PD. The plant has been in operation for more than 10 years, PP to submit the Boiler Inspection Reports / Chartered Engineer report and supporting's to determine the remaining life time of Boiler and Turbine.				
Project participant response				**Date: 26/01/2022**
The project has been implemented and operated as per the information provided in the CDM PD and VCS PD. The latest boiler inspection certificate dated 16/02/2021 submitted herewith confirms that the boiler is fit and permitted to be used under the provision of section 7/8 of the Indian Boiler Act no. V of 1923.				
Documentation provided by project participant				
Boiler Inspection certificate and Commissioning certificate of the plant				
DOE assessment				**Date: 05/02/2022**
The boiler inspection reports along with the plant log book, maintenance schedule and photographs were submitted, the verification team also cross checked the following documents: - Verification report for the 1st monitoring period - Validation report submitted to VCS board, - Registered CDM PDD & VCS PD. Based on the documents submitted and review the verification team is able to conclude that the project activity has been implemented & operated as per the information provided in registered VCS PD & CDM PDD, hence CL06 is closed.				

CL ID	07	Section no.	4.2	Date: 09/01/2022
Description of CL				
PP to clarify the billing cycle / date of JMR and the no. of days /period (first & last dates) claimed for ER calculations for the current monitoring period, since the start date of monitoring period is 01st March 2017 and last date is 29th October 2019.				
Project participant response				**Date: 26/01/2022**
The start date of the monitoring period, 01/03/2017 is also the start date of billing cycle for the JMR for the month of Mar 2017. However, the end date of the monitoring period is 29/10/2019 whereas the end date of the billing cycle for the month of Oct 2019 is 02/11/2019. In the initial version of MR and ER sheet, the entire generation as per the JMR for the month of Oct 2019 was considered which is wrong. *To subtract the generation for 4 additional days (i.e., 30/10/2019, 31/10/2019, 01/11/2019 and 02/11/2019), 4 times of highest recorded single day generation in the entire month, Oct 2019 as per the daily generation report recorded at the site has been considered. The calculation is included in the revised ER sheet.*				
Documentation provided by project participant				
Log sheets of the daily generation of the month.				
DOE assessment				**Date:05/02/2022**
The PP has revised the calculations and has followed a conservative approach, as a result there is decrease in total no. of emission reductions which was claimed in the initial monitoring report whilst, 217,876 tCO_2e and in the revised final monitoring report the no. of emission reductions claimed is 216,660 tCO_2e. The monitoring report and revised emission reduction calculation sheet have been checked and found to be ok, hence CL07 is closed.				

CL ID	08	Section no.	4.2	Date: 09/01/2022
Description of CL				
The details of calibration have been provided upto 2017, PP to clarify whether: - there were any delay in calibration (from 2017 to 2019), - for the period of delay whether any error factor was considered by PP while computing Emission Reduction calculations.				
Project participant response				**Date: 26/01/2022**

The calibration details are incorporated appropriately in the revised MR being submitted herewith. *The calibration has been carried out regularly and at the appropriate intervals defined in the registered PDD. Therefore, no error is required to be accounted for computing emission reduction.*
Documentation provided by project participant
Calibration Certificates of energy meters.
DOE assessment | **Date: 05/02/2022**
Calibration Certificates have been submitted; the annual calibration of energy meters is performed by Bharthi Automation Private Limited. From the details mentioned in the certificates it can be concluded that there was no delay in calibration and process followed by the PP is meeting the requirements stated in paragraph 3.15.5 of the VCS Standard, Ver 4.1, based on satisfactory response and document review CL 08 is closed. However, based on the calibration certificates it is noted there was difference in accuracy class of energy meters (main & check) earlier 0.5s currently 0.2s accuracy class meters, hence CAR05 is raised.

CL ID	09	**Section no.**	5.4	**Date:** 09/01/2022
Description of CL				
The information on VCS website states that the last vintage issued was in 2012 & 2013 for the period 2009 to 2011. The current vintage period proposed to be claimed is between 01/03/2017 to 29/10/2019. PP to provide clarity on the delay for the current submission and whether the claim for issuance of VCUs were made for the vintage period the between 2012 to 2017 (upto last date Feb 2017).				
Project participant response | **Date: 26/01/2022**				
The VCS verification for the period 01/03/2011 to 28.02.2017 is being undertaken in parallel with this verification period by other DoE. The monitoring period had to split and the verification was to be done by different DoE to meet the requirement outlined vide clause no. 4.1.20 of the VCS Standard, v4.1 where states that a validation/verification body may not verify more than six consecutive years of a project's GHG emission reductions or removals.				
Documentation provided by project participant				
NA.				
DOE assessment | **Date:05/02/2022**				
The PP has affirmed that the process is continual and verification team based on the information available on VERRA and CDM website is able to conclude that the PP has made claims for request for issuances and there time delay or difference between the claim periods the same is agreeable, hence CL 09 is closed.				

Table 2. CARs from this Verification

CAR ID	01	Section no.	1.1	Date: 09/01/2022
Description of CAR				
The description states *"proposed CDM project activity is undertaken by Universal Biomass Energy Private Limited (UBEPL) in Muktsar district of Punjab, India",* the statement seems incorrect since the project is already commissioned and in operation.				
Project participant response				**Date: 26/01/2022**
The description is now revised appropriately in the revised MR.				
Documentation provided by project participant				
Revised MR .				
DOE assessment				**Date:05/02/022**
The corrections have been incorporated in section 1.1 of the revised MR, the same is checked and confirmed, hence CAR 01 is closed.				

CAR ID	02	Section no.	1.8	Date: 09/01/2022
Description of CAR				
The URL provided is general link to the AMS-ID methodology not the link to the Version 15. http://cdm.unfccc.int/methodologies/DB/RSCTZ8SKT4F7N1CFDXCSA7BDQ7FU1X				
Project participant response				**Date: 26/01/2022**
The direct link to the methodology is now included in the revised MR.				
Documentation provided by project participant				
Revised MR				
DOE assessment				**Date: 05/02/2022**
The revised link has been provided and the same is checked and found to be redirecting to the main methodology page, hence CAR 02 is closed.				

CAR ID	03	Section no.	4.2	Date: 09/01/2022
Description of CAR				
The current monitoring period ends on 29/10/2019. The details of calibration for energy meters have been provided only up to 2017.				
Project participant response				**Date: 26/01/2022**
The details of the calibration are incorporated appropriately in the revised MR and the calibration certificates are enclosed herewith.				
Documentation provided by project participant				
Calibration certificates and Revised MR.				
DOE assessment				**Date: 05/02/2022**
The PP in Appendix I of revised MR has mentioned complete details calibration covering the entire monitoring period (2017 to 2019). The corrections have been checked and details are also cross checked with calibration certificates, the information provided in the MR are correct and there is no mismatch, hence CAR 03 is closed.				

CAR ID	04	Section no.	4.2	Date: 09/01/2022
Description of CAR				
There are multiple parameters which are monitored on daily basis, the MR is silent on the QA/QC procedures in the event of data discrepancies or mismatch.				
Project participant response				**Date: 26/01/2022**
The section 4.3 of the revised MR is elaborated to include the description for the same.				
Documentation provided by project participant				
Revised MR.				
DOE assessment				**Date: 05/02/2022**
The QA/QC procedures in revised MR contains the actions / procedures in the event of data discrepancies or mismatch have been detailed out as per the requirements stated in paragraph 3.15.2 of VCS Standard , Ver 4.1, the corrections are agreeable. Hence CAR 04 is closed.				

CAR ID	05	Section no.	4.2	Date: 10/02/2022
Description of CAR				
The calibration certificates for the period ranging from the year 2016 to 2019 have been submitted, from certificates it is noted that accuracy class of energy meters have changed from 0.5s to 0.2S. PP is requested to state the reason for change in energy meters.				
Project participant response				**Date:16/02/2022**
The age of existing energy meters were more than 7 years and since option for higher accuracy energy meters (0.2s) was available also asper regulatory requirement of Punjab state electricity board , it was decided to change meters from 0.5s to 0.2s. Due to this change there is no impact on the monitoring parameters – Export and Import.				
Documentation provided by project participant				
Calibration certificates , Revised MR .				
DOE assessment				**Date: 18/02/2022**
The old energy meters with 0.5s accuracy class (Main & Check) were replaced with higher accuracy class energy meters. The energy meters (Main & Check) are 2- Way Trivector Meters manufactured by L&T Electrical & Automation. Both energy meters are of 0.2s accuracy class, the 0.2s class of meter is that it would maintain its accuracy of an error of +/- 0.2%, even at very low loadings of the order of 20% of the rated value. The serial numbers of replaced energy meters are: Main Meter No: 13196703 Check Meter No: 12093212 Also, as per Punjab State Electricity Regulatory Commission regulations for Intra state Open access regulations the customer has to provide Availability Based Tarif (ABT) Compatible meter with 0.2S accuracy class at the point of injection to grid. The energy meters change does not affect the monitoring of the primary data whilst., electricity generated & exported to grid and electricity imported from grid for consumption. The change in energy meters also does not affect the process of data recording, the electricity readings are taken jointly by the PP and Punjab State Power Corporation Limited personnel. The Joint Meter Readings (JMR) forms the basis for determining the net electricity generated, payment and calculation of emission reductions. Based on the local sectoral expertise and submitted evidence CAR 05 is closed.				

~~Table 3. FAR from this Verification~~

~~FAR ID~~	~~01~~	~~Section no.~~	~~NA~~	~~Date:~~ ~~09/01/2022~~
~~Description of FAR~~				
~~DOE assessment~~				~~Date:~~ ~~09/01/2022~~

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.	**Senthil Kumar**					
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		29-09-2021					
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	
		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

ABBREVIATIONS	
AMS	Approved Small Scale Methodology
BG	Biogas
BM	Build Margin
CAR	Corrective Action Request
CDM	Clean Development Mechanism
CDM EB	CDM Executive Board
CH4	Methane
CL	Clarification Request
CEA	Central Electricity Authority
CM	Combined Margin
CMP	Conference of the Parties serving as the Meeting of the Parties to the Kyoto Protocol
CO_2	Carbon di Oxide
CPCB	Central Pollution Control Board
DNA	Designated National Authority
DOE	Designated Operational Entity
EF	Emission Factor
ER	Emission Reduction
ESP	Electrostatic Precipitator
FAR	Forward Action Request
FICCI	Federation of Indian Chambers of Commerce and Industry
GHG	Greenhouse Gas(es)
GoI	Government of India
GWP	Global Warming Potential
IPCC	Intergovernmental Panel on Climate Change
KP	Kyoto Protocol
MP	Monitoring Plan
MW	Megawatt
N2O	Nitrous Oxide
OM	Operational Margin
SDG	Sustainable Development Goal
PD	Project Description
PDD	Project Design Document
PP	Project Participant
PSPCB	Punjab State Pollution Control Board
PSPCL	Punjab State Power Corporation Limited
UBEPL	Universal Biomass Energy Private Limited
UNFCCC	United Nations Framework Convention for Climate Change
URL	Uniform Resource Locator
VCS	Voluntary Carbon Standard
VCUs	Voluntary Carbon Units

VER	Verified Emission Reduction
VVB	Validation and Verification Body
4KES	4K Earth Science Private Limited