



VERIFICATION REPORT FOR

“BIOMASS BASED STEAM GENERATION PROJECT BY GUJARAT AMBUJA EXPORTS LTD.”



Document Prepared By LGAI Technological Center, S.A. (Applus+ Certification)

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Summary:

LGAI Technological Center, S.A. (here after referred as Applus+ Certification) has been contracted by Gujarat Ambuja Exports Limited to conduct the verification of the project “Biomass based steam generation project by Gujarat Ambuja Exports Ltd.”, VCS ID 733, against VCS Standard Version 4.3.

The verification includes confirming the implementation of the monitoring plan of the registered VCS PD and MR (Project ID 733) and the application of the monitoring methodologies as per AMS I.C. version 16: “Thermal Energy production with or without electricity” A Verification On-site visit was conducted to verify the data submitted in the monitoring report.

The project activity involves setting up a biomass-based boiler of capacity 30 TPH in the agro processing manufacturing facility of the project proponent. The biogas generated due to anaerobic digestion of wastewater in the plant is also co-fired along with biomass in the boiler. The project reduces greenhouse gas emission by combusting biomass residue available in the region thereby substituting consumption of fossil fuel.

A risk based approach has been followed to perform this verification. In the course of verification, 02 Corrective Action request (CARs) and 02 Clarification request (CRs) were raised and successfully closed.

The review of the project design documentation, monitoring report and additional documents related to baseline and monitoring methodology; the subsequent background investigation, follow-up interviews and stakeholders have provided Applus+ Certification with sufficient evidence to validate the fulfilment of the stated criteria.

Applus+ Certification confirms that the project is implemented in accordance with the registered VCS PD & MR. The monitoring system is in place and the emission reductions are calculated without

material misstatements. Our opinion relates to the projects GHG emissions and the resulting GHG emission reductions reported and related to the valid and registered project baseline and monitoring and its associated documents. Based on the information seen and evaluated we confirm that the emission reductions from the project activity “Biomass based steam generation project by Gujarat Ambuja Exports Ltd.” in India during the period 01-January-2014 to 31-March-2018 (including both days) amount to 55,888 tonnes of CO₂e.

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1 INTRODUCTION

1.1 Objective

Applus+ Certification has been contracted by Gujarat Ambuja Exports Ltd. (project proponent), to undertake the verification of the renewable energy project titled “Biomass based steam generation project by Gujarat Ambuja Exports Ltd.” (VCS ID- 733) The verifiers have reviewed the GHG data collected to date for the monitoring period from 01/01/2014 to 31/03/2018 (both days included) covered in this verification. The objective of this verification is a thorough and independent assessment of registered project activities against the applicable VCS requirement by the VVB. 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 the verification was the independent and objective review and ex-post determination of the monitored reductions in GHG emissions from “Biomass based steam generation project by Gujarat Ambuja Exports Ltd.”, VCS ID 733”. The verification of this project was based on the registered project description/01/ & monitoring report /04/ and supporting documents submitted by the project proponent to the verification team. The documents were reviewed against the following guidance and protocols:

VCS Standard: Version 4.3, issued dated 19/09/2019 updated 22/06/2022 /14/

Approved methodologies for small-scale CDM Project activities:

AMS I.C, version 16, Title “Thermal Energy production with or without electricity”/9/

VCS Program Definitions (v4.2, issued dated 19/09/2019 updated 22/06/2022) /16/

VCS Program Guide, Version 4.2, issued 19/09/2019 updated 22/06/2022 /15/

ISO 14064-3: Specification with guidance for the validation and verification of greenhouse gas assertions, 2006

The verification is not meant to provide any consulting towards the client. However, stated request for clarifications and/or corrective actions may provide input for improvement of the project design.

1.3 Level of Assurance

The level of assurance of the verification report falls under reasonable assurance engagements as selected by the Client. 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. Materiality for the project is 5%.

1.4 Summary Description of the Project

Gujarat Ambuja Exports Ltd. (Hereafter referred as Project proponent) has undertaken a project activity, which entails thermal energy generation using renewable biomass. The project activity involves setting up a biomass-based boiler of capacity 30 TPH in the agro processing manufacturing facility of the project proponent. The biogas generated due to anaerobic digestion of wastewater in the plant is also co-fired along with biomass in the boiler. The project reduces greenhouse gas emission by surplus combusting biomass residue available in the region thereby substituting consumption of fossil fuel. The generated thermal energy is being used for captive consumption in the manufacturing unit.

Project proponent has installed a 30 TPH biomass based boiler, which avoided the use of coal in steam generation. In the absence of this project activity, an equivalent amount of energy would have been generated from the coal based boiler with higher GHG emissions. In this current monitoring period from 1-January- 2014 to 31-March-2018; 100% rice husk was used and it resulted in the reduction of 55,888 tons of GHG emissions.

The project proponent applied the baseline methodology for small scale project activities AMS-I.C “Thermal Energy production with or without electricity”, version 16. The baseline scenario for the proposed project activity for steam generation was coal based boilers. The efficiency of the boiler using coal that would have been used in the absence of the project activity has been considered as 100% and chosen as ex-ante and it has been used for the calculating the baseline emissions as per the methodology.

The verification team has verified the technical specifications of the boiler equipments installed at the project site:

Parameter	Value
Boiler type	Semi-outdoor, Bi-drum, Water tube, AFBC boiler
Capacity	30TPH
Steam Pressure	17.5 kg/cm ²
Steam temperature	Saturated
Fuel	Rice husk/Coal/Bio-gas
Make	Cheema Boilers

This Boiler specification was verified through photos of boiler in Verification On-visit and found to be in line with the details provided in the registered PD /01/.

Location of the project was verified through Latlong.net (<https://www.gps-coordinates.net/>) and found consistent with the data provided in the registered PD /01/.

The project qualifies the start date requirements under VCS and successfully Commissioned on 28-March-2008 respectively. It has been checked against the commissioning certificate. Further in line with VCS guidelines, crediting period starts from 01-April-2008 end up-to 31-March-2018. The emission reductions from the project activity during the current monitoring period 01/01/2014 to 31/03/2018 (including both days) amount to 55,888 tonnes of CO₂e.

The PP has discussed the SDG parameter 13: Tonnes of greenhouse gas emissions avoided or removed in section 1.11 of the MR Version 1.2, which included the impact as Implemented activities to increase in GHG emission reduction. The PP has provided the details of previous all three monitoring period details of GHG emission reductions and also discussed the current status of emission reduction for current monitoring period 01/01/2014 to 31/03/2018 (including both days) amount to 55,888 tonnes of CO₂e. The same has been verified from previous verification report and confirmed, hence accepted.

2 VERIFICATIONPROCESS

The registered VCS project is undergoing periodic verification under first crediting period, the approach adopted to ensure the quality of emission reductions is described in the following sections.

2.1 Method and Criteria

Verification was conducted using Applus+ Certification's procedures in line with the requirements specified in the VCS standard Version 4.3 Requirements, CDM M&P, the latest version of the CDM Validation and Verification Standard, and relevant decisions of the COP/MOP and the CDM EB and applying standard auditing techniques.

It is to be 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
- Verification On-Site visit and follow up interviews with project stakeholders
- The resolution of outstanding issues and issuance of final report and opinion.

2.2 Document Review

The verification is performed primarily as a document review of the registered VCS PD/01/, previous MR and Verification report and associated documents as stated in details 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, 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

The representatives of the PP were interviewed during site visit on 17/06/2022 and 18/06/2022. The details of the people interviewed are mentioned in the table.

S N	Name	Role	Organization
1	R.K Gupta	Sr. General Manager	GAEL
2	Mr. N S Bisht	Dy Manager	GAEL

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 the site personnel interview coupled with the documentation, photos and observations.

2.4 Site Inspections

Site Location visited: SIDCUL Industrial Park, Sitarganj, Udham Singh Nagar District, Uttarakhand in India.

A Verification On-site visit was undertaken by the verification team on 17/06/2022 and 18/06/2022 to carry out the following:

- a) An assessment of the implementation and operation of the registered project activity as per the registered VCS PD and VCS MR;
- b) A review of information flows for generating, aggregating and reporting the monitoring parameters;
- c) Interviews with relevant personnel to determine whether the operational and data collection procedures are implemented in accordance with the monitoring plan in the PD;
- d) 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;
- e) A check of the monitoring equipment including calibration performance and observations of monitoring practices against the requirements of the PD, the applied methodology including applicable tool(s), and, where applicable, the applied standardized baseline;
- f) A review of calculations and assumptions made in determining the GHG data and emission reductions;
- g) 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 Verification On-site 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 (CR) is raised if information is insufficient or not clear enough to determine whether the applicable CDM requirements have been met. All CARs and CRs raised by the Applus+ Certification 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 current verification, 02 Corrective Action request (CARs) and 02 Clarification request (CRs) and 00 Forward Action Request (FARs) were raised and successfully closed.

All the findings that are raised and communicated to project participant during the verification are included under Appendix 3. The section also includes the response, if provided, by the project participants and an assessment by the verification team if it was closed out or otherwise.

2.5.1 Forward Action Requests

Not applicable.

2.6 Eligibility for Validation Activities

This section is not applicable for present verification, as Applus+ Certification holds the accreditation for Validation of projects under this Sectoral Scope.

3 VALIDATION FINDINGS

Use this section to provide details of all validation activities that took place during the verification, such as gap validation, validation of methodology deviations and project description deviations, and the inclusion of new project activity instances into grouped projects.

3.1 Participation under Other GHG Programs

The project activity is registered under the VCS only (VCS Project ID 0733). The project proponent has provided a self-declaration in this regard which confirms that project proponent will not claim Emission reductions for current monitoring period **01-January-2014 to 31-March-2018 (including both days)** under any other GHG program except VCS, hence accepted by the assessment team.

Audit team checked the REC Mechanism database of India and found that the project activity is not accredited / registered under REC mechanism. Further, declaration for the same is checked and found correct by the assessment team. Also assessment team checked the following registries to confirm the same. The details of the registries checked are as follows:

1. <https://www.recregistryindia.nic.in/>
2. <http://www.goldstandard.org/>

Rejection by other GHG programs

VVB has crossed check the same through other GHG interfaces and found consistent. A declaration has been submitted by PP to VVB confirming the same. Thus, this was further confirmed through a declaration/12/ submitted by the PP and hence accepted by the assessment team.

The details of the registries checked are as follows:

1. <https://www.recregistryindia.nic.in/>
2. <http://cdm.unfccc.int/>
3. <http://www.goldstandard.org/>
4. <https://verra.org/verra-standards-and-programs/>

3.2 Methodology Deviations

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

3.3 Project Description Deviations

There is no project description deviation identified during the current monitoring period.

3.4 Grouped Project

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

4 VERIFICATION FINDINGS

4.1 Project Implementation Status

The project activity involves the installation and operation of a project activity, which entails thermal energy generation using renewable biomass. The purpose of the project activity is to utilise the available surplus renewable biomass in the region for the generation of thermal energy.

The project activity was implemented in the starch processing division of Gujarat Ambuja Exports Ltd (GAEL) at ELDECO – SIDCUL Industrial Park, Sitarganj, Udham Singh Nagar District, Uttarakhand with Latitude 28° 55' 43" N, and Longitude 79° 42' 25" E. The generated thermal energy is being used for captive consumption in the agro processing manufacturing facility unit.

The project activity was implemented in the agro processing manufacturing facility unit of GAEL which has installed a 30 TPH biomass based boiler, which avoided the use of coal in steam generation. In the absence of this project activity, an equivalent amount of energy would have been generated from the coal based boiler with higher GHG emissions. In this current monitoring period from 1-January- 2014 to 31-March-2018; 100% rice husk was used and it resulted in the reduction of 55,888 tons of GHG emissions.

The steam boiler in the project started commercial operation on 27-Mar-2008. This is considered as start date of the project activity. The project has undergone emission reductions verification three times before. This is 4th verification undergoing for monitoring period from 1-January- 2014 to 31-March-2018. The implementation of the project activity was as described in the VCS PD, checked against supportive documents presented. The verification team was able to verify that there was no change in project design compared to the design presented in the VCS PD. The installation and specification of boiler has been checked with commissioning certificates/7/ and site assessment/17/. The commissioning has also been duly validated in the VCS validation report of the project activity/02/.

The PP has clarified that the project activity has been in use only as a backup after a new cogeneration plant was installed at the plant site. Therefore, the project activity has been operated for a shorter period than normal during the current monitoring period. There has been no generation in the year 2018 found during assessment of logbook and plant records. The VVB has confirm the same based on review of logbook and plan records provided by the PP and also it was discussed with the PP and found to be correct and hence accepted. Further the PP has provided the details about equipment breakdowns that occurred during this monitoring period in Appendix –II of the MR and same was checked and confirmed by the VVB team.

Assessment team concludes the following:

- The implementation status of project activity was found to be in compliance with registered PD
- VVB has conducted the site visit to confirm the implementation status of the project.
- The commissioning date of the project activity was found to be accurately and consistently recorded.
- The actual operation of project activity was found to be in compliance with the flow diagram provided in registered PD.
- There was no increase in emission reduction from estimates made in registered PD, and hence no further justification to be provided for the same.

4.2 Safeguards

4.2.1 No Net Harm

There is no negative impact to any socio economic conditions of the region due to the project activity. Being renewable power generation project there is no negative environmental and socio-economic impacts in fact project activity contributes positively by providing environment friendly power generation leading to sustainable development of the region (as referred under the section 1.11). Also, the generation of local employment has directly supported the socio-economic development of the status of the project region. An environmental impact assessment is not required by law for these types of project activities. As per the prevailing regulation of the Host Party i.e. India represented by (erstwhile) Ministry of Environment and Forests (MoEF) and now Ministry of Environment, Forests & Climate Change, Govt. of India and also the line ministry for environmental issues in India EIA need not to be carried out for projects which falls under the list whose investment is less than INR 1000 million. As per MoEF&CC notification the project activity does not fall under the purview of the Environmental impact Assessment thus the project activity is exempted from the environmental clearances.

Based on interview and documents reviewed, the VVB team has confirmed that the project has no negative socio-economic impacts. The project creates only positive socio-economic impacts in the form of employment generation and thereby providing income generation opportunities to people. There is direct and indirect employment generation in biomass collection and logistics and plant operation. The VVB has been conducted interview with the PP and confirmed that same.

4.2.2 Local Stakeholder Consultation

At the time of project registration PP has organized stakeholder consultation meetings by the District Magistrate, (Sitarganj and Gram Panchayat of village-Lalar Khas) on 17/04/2009 and Gram Panchayats of village-Lalar Khas on 17/04/2009 as per the provision of VCS requirements and reported under the validated PD. A meeting was also held with villagers at the plant site on 25/05/2009. In the meeting Mr. R.K.Rai of GAEL welcomed all the invitees and briefed about the company and Sitarganj unit. Mr. UdesHVij of GAEL explained them about the causes and effect of global warming and how it could possibly affect the planet. He also introduced them to the concept of CDM and explained as to how the project activity would help in reducing greenhouse gas emissions. Then Mr. R.K.Gupta invited the stakeholders to present their views on how the setting up of the project activity had affected their lives and their expectations from GAEL. The project has not received any negative or discouraging feedback from the stakeholders concerned. All the stakeholders have appreciated the measures taken by the GAEL, they were also in favour of the project activity. As this has led to various direct and indirect benefits socially and economically. All the stakeholders have entrusted their support for this project activity. During the current monitoring no comments received from local stakeholders. The project activity is located inside an industrial park which is developed by local industrial development authority (SIDCOL) and is responsible for compliance of all local laws and regulatory requirements. Nonetheless PP has appointed Head-HR as the focal point for all communication with regard to community grievances. No such grievance has been received from anyone so far. Besides this, PP has taken up several initiatives for community welfare from time to time.

4.3 AFOLU-Specific Safeguards

Not Applicable.

4.4 Accuracy of GHG Emission Reduction and Removal Calculations

The project monitoring has been carried in accordance with the registered VCS PD/01/ and the monitoring report/04/. The monitoring plan laid in the registered PD is being followed at the site/17/. The assessment team has verified the information flow (from data generation, aggregation, to recording, calculation and reporting for these parameters including the values) in the MR/04/.

The emission reductions are purely based on the steam generated from project activity. PP has provided all the sufficient data for current monitoring period. The value of the parameter net steam generation by project activity used in deriving the GHG emission reduction could be very well correlated between the data sets and ER spreadsheet/05/ provided by PP. The PP has provided the sample calculation of clarity on the equations applied and method of using measured data to arrive at the results in sections 5.1, 5.2 and 5.4 of the MR. VVB team has verified the same by review the calculation in the ER sheet and found to be appropriate and correct. The verification of each monitoring parameter has been discussed later in section 4.5.

The calculation method and formulae used in calculating baseline emission and project emission is in compliance to the methodologies used i.e. AMS I.C version 16/9/.

4.5 Quality of Evidence to Determine GHG Emission Reductions and Removals

The below tables describe how the parameter, that is to be measured according to the monitoring plan, has been verified to confirm that the actual monitoring complies with the monitoring plan, monitoring data has been thoroughly assessed and that the calibration requirements are met.

Parameter 1.	Quantity of steam generated $(Q_{\text{steam},i})$	
Means of verification	Criteria/Requirements	Assessment/Observation
	Measuring /Reading /Recording frequency	Reading is directly taken from steam flow meter by boiler attendant supervisor on hourly basis.
	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 registered PD/01/ and monitoring methodology/9/.
	Monitoring equipment	Equipment :Mass flow integrating totalizer Type : Digital Model number: MICRO CS-3003-NOT-2 Make: Manas Meter number: 10070322 Meter accuracy: $\pm 3\%$ Least Count: 0.1 tonne/hr

	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?	Yes, the accuracy of the monitoring equipment used as per the registered PD/01/.	
	Is the accuracy valid for the entire measuring range or do different accuracy levels apply to different measuring ranges?	Yes. The accuracy of monitoring equipment's is valid for the entire range.	
	Calibration frequency /interval:	Calibration frequency of the meters is annual	
	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. The calibration frequency is in line with the monitoring plan as outlined in the registered PD/01/.	
	Is the calibration of measuring equipment carried out by an accredited person or institution?	Yes the calibration is conducted by external accredited NABL agencies./07/.	
	Is(are) calibration(s) valid for the whole reporting period?	Yes. Calibration of flow Indicator and Totaliser meter is valid for the whole reporting period.	
	Is the calibration carried out for a measuring range comparable with the range for which measurements have been carried out?	Yes. The calibration is carried out appropriately.	
	How were the values in the	Cumulative value of Q_{steam} for	

	monitoring report verified?	entire monitoring period is reported in the monitoring report/04/, however monthly values are reported in the ER calculation sheet/06/. The monthly values were verified from the plant data and found to be consistent.	
	If applicable, has the reported data been cross-checked with other available data?	Not applicable	
	Does the data management ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Verification On- site assessment of the project activity confirms that the necessary QA/QC procedures are in place and the data management system is effective and reliable.	
Findings	CR #01 was raised and resolved successfully		
Conclusion	The parameter has been monitored appropriately, in accordance with the registered monitoring plan (as per measurement methods and procedures to be applied) and applied methodologies. The monitoring results were recorded consistently as per the approved frequency in the monitoring plan.		

Parameter 2.	Temperature of the steam generated(T_{steam})	
Means of verification	Criteria/Requirements	Assessment/Observation
	Measuring /Reading /Recording frequency	On site measurement taken from Steam Temperature Gauge installed at steam outlet from the boiler.
	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 registered PD/01/ and monitoring methodology/9/.

	Monitoring equipment	Equipment: Steam Temperature Gauge Meter number: GAEL/BL/89 Make: TEMPESENS Gauge Accuracy: $\pm 1\%$ Least count: 1 Degree C	
	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?	Yes, the accuracy of the monitoring equipment used as per the registered PD/01/.	
	Is the accuracy valid for the entire measuring range or do different accuracy levels apply to different measuring ranges?	Yes. The accuracy of monitoring equipment's is valid for the entire range.	
	Calibration frequency /interval:	Calibration frequency of the temperature sensor is annual.	
	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. The calibration frequency is in line with the monitoring plan as outlined in the registered PD/01/.	
	Is the calibration of measuring equipment carried out by an accredited person or institution?	Yes the calibration is conducted by external accredited NABL agencies./07/.	

	Is(are) calibration(s) valid for the whole reporting period?	Yes. Calibration of temperature gauge is valid for the whole reporting period.	
	Is the calibration carried out for a measuring range comparable with the range for which measurements have been carried out?	Yes. The calibration is carried out appropriately.	
	How were the values in the monitoring report verified?	Cumulative value of T_{steam} for entire monitoring period is reported in the monitoring report/04/, however monthly values are reported in the ER calculation sheet/06/. The monthly values were verified from the plant data and found to be consistent.	
	If applicable, has the reported data been cross-checked with other available data?	Not applicable	
	Does the data management ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Verification On- site assessment of the project activity confirms that the necessary QA/QC procedures are in place and the data management system is effective and reliable.	
Findings	No finding has been raised		
Conclusion	The parameter has been monitored appropriately, in accordance with the registered monitoring plan (as per measurement methods and procedures to be applied) and applied methodologies. The monitoring results were recorded consistently as per the approved frequency in the monitoring plan.		
Parameter 3.	Pressure of the steam generated ($P_{\text{steam},I}$)		

Means of verification	Criteria/Requirements	Assessment/Observation
	Measuring /Reading /Recording frequency	On site measurement taken from steam pressure gauge installed at steam outlet from the boiler.
	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 registered PD/01/ and monitoring methodology/9/.
	Monitoring equipment	Steam Pressure gauge. Meter number: 6390 Make: CBL Gauge Accuracy: $\pm 4\%$
	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?	Yes, the accuracy of the monitoring equipment as per the registered PD/01/.

	Is the accuracy valid for the entire measuring range or do different accuracy levels apply to different measuring ranges?	Yes. The accuracy of monitoring equipment's is valid for the entire range.	
	Calibration frequency /interval:	Calibration frequency of the meters is Annual.	
	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. The calibration frequency is in line with the monitoring plan as outlined in the registered PD/01/.	
	Is the calibration of measuring equipment carried out by an accredited person or institution?	Yes the calibration is conducted by external accredited NABL agencies./07/.	
	Is(are) calibration(s) valid for the whole reporting period?	Yes. Calibration of pressure gauge is valid for the whole reporting period.	
	Is the calibration carried out for a measuring range comparable with the range for which measurements have been carried out?	Yes. The calibration is carried out appropriately.	
	How were the values in the monitoring report verified?	Cumulative value of P_{steam} for entire monitoring period is reported in the monitoring report/05/, however monthly values are reported in the ER calculation sheet/06/. The monthly values were verified from the plant data and found to be consistent.	

	If applicable, has the reported data been cross-checked with other available data?	Not applicable	
	Does the data management ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Verification On- site assessment of the project activity confirms that the necessary QA/QC procedures are in place and the data management system is effective and reliable.	
Findings	No finding has been raised		
Conclusion	The parameter has been monitored appropriately, in accordance with the registered monitoring plan (as per measurement methods and procedures to be applied) and applied methodologies. The monitoring results were recorded consistently as per the approved frequency in the monitoring plan.		

Parameter 4.	Temperature of the feed water in the boiler(T_{FW})		
Means of verification	Criteria/Requirements	Assessment/Observation	
	Measuring /Reading /Recording frequency	On-site measurement from temperature gauge installed at feed water inlet.	
	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 registered PD/01/ and monitoring methodology/9/.	
	Monitoring equipment	Feed Water Temp Gauge Meter Number: GAEL/BL/90 Make: MIEPL Accuracy class: $\pm 1\%$	

	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?	Yes, the accuracy of the monitoring equipment used as per the registered PD/01/.	
	Is the accuracy valid for the entire measuring range or do different accuracy levels apply to different measuring ranges?	Yes. The accuracy of monitoring equipment's is valid for the entire range.	
	Calibration frequency /interval:	Calibration frequency of the meters is Annual.	
	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. The calibration frequency is in line with the monitoring plan as outlined in the registered PD/01/.	
	Is the calibration of measuring equipment carried out by an accredited person or institution?	Yes the calibration is conducted by external accredited NABL agencies./07/.	
	Is(are) calibration(s) valid for the whole reporting period?	Yes. Calibration of temperature gauge is valid for the whole reporting period.	
	Is the calibration carried out for a measuring range comparable with the range for which measurements have been carried out?	Yes. The calibration is carried out appropriately.	
	How were the values in the	Cumulative value of $T_{FW,i}$ for	

	monitoring report verified?	entire monitoring period is reported in the monitoring report/05/, however monthly values are reported in the ER calculation sheet/06/. The monthly values were verified from the plant data and found to be consistent.	
	If applicable, has the reported data been cross-checked with other available data?	Not applicable	
	Does the data management ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Verification On- site assessment of the project activity confirms that the necessary QA/QC procedures are in place and the data management system is effective and reliable.	
Findings	No finding has been raised		
Conclusion	The parameter has been monitored appropriately, in accordance with the registered monitoring plan (as per measurement methods and procedures to be applied) and applied methodologies. The monitoring results were recorded consistently as per the approved frequency in the monitoring plan.		

Parameter 5.	Quantity of Biomass of type i= rice husk transported and combusted in year y.($Q_{biomass, i, y}$)		
Means of verification	Criteria/Requirements	Assessment/Observation	
	Measuring /Reading /Recording frequency	MeasuringbyWeigh bridge	
	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 registered PD/01/ and monitoring methodology/9/.	

	Monitoring equipment	Equipment : Weigh bridge Serial number of equipment: 6637	
	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?	Yes, the accuracy of the monitoring equipment as per the registered PD/01/.	
	Is the accuracy valid for the entire measuring range or do different accuracy levels apply to different measuring ranges?	Yes. The accuracy of monitoring equipment's is valid for the entire range.	
	Calibration frequency /interval:	Calibration frequency of the weighing bridge is once in 3 years.	
	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. The calibration frequency is in line with the monitoring plan as outlined in the registered PD/01/.	
	Is the calibration of measuring equipment carried out by an accredited person or institution?	Yes the calibration is conducted by external agency NABL accredited /07/.	
	Is(are) calibration(s) valid for the whole reporting period?	Yes. Calibration of weighing bridge is valid for the whole reporting period.	

	Is the calibration carried out for a measuring range comparable with the range for which measurements have been carried out?	Yes. The calibration is carried out appropriately.	
	How were the values in the monitoring report verified?	Cumulative value of $Q_{\text{biomass}, i, y}$ for entire monitoring period is reported in the monitoring report/04/, however monthly values are reported in the ER calculation sheet/06/. The monthly values were verified from the plant data and found to be consistent.	
	If applicable, has the reported data been cross-checked with other available data?	The data were cross checked with the Invoices raised by biomass (rice husk) suppliers.	
	Does the data management ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Verification On-site assessment of the project activity confirms that the necessary QA/QC procedures are in place and the data management system is effective and reliable.	
Findings	No finding has been raised		
Conclusion	The parameter has been monitored appropriately, in accordance with the registered monitoring plan (as per measurement methods and procedures to be applied) and applied methodologies. The monitoring results were recorded consistently as per the approved frequency in the monitoring plan.		

Parameter 6.	Quantity of fossil fuel of type i= coal combusted in year y. ($Q_{\text{fossil}, i, y}$)	
Means of verification	Criteria/Requirements	Assessment/Observation
	Measuring /Reading /Recording frequency	Onsite Measurement by Weigh bridge
	Is measuring and reporting frequency in accordance with	Yes. The reporting frequency is in line with the monitoring plan

	the monitoring plan and monitoring methodology? (Yes / No)	as outlined in the registered PD/01/ and monitoring methodology/9/.	
	Monitoring equipment	Equipment : Weigh bridge Serial number of equipment:6637	
	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?	Yes, the accuracy of the monitoring equipment as per the registered PD/01/.	
	Is the accuracy valid for the entire measuring range or do different accuracy levels apply to different measuring ranges?	Yes. The accuracy of monitoring equipment's is valid for the entire range.	
	Calibration frequency /interval:	Calibration frequency of the weighing bridge is once in 3 years.	
	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. The calibration frequency is in line with the monitoring plan as outlined in the registered PD/01/.	
	Is the calibration of measuring equipment carried out by an accredited person or institution?	Yes the calibration is conducted by external agency NABL accredited /07/.	

	Is(are) calibration(s) valid for the whole reporting period?	Yes. Calibration of weighing bridge is valid for the whole reporting period.	
	Is the calibration carried out for a measuring range comparable with the range for which measurements have been carried out?	Yes. The calibration is carried out appropriately.	
	How were the values in the monitoring report verified?	Cumulative value of $Q_{fossil, i, y}$ for entire monitoring period is reported in the monitoring report/04/, however monthly values are reported in the ER calculation sheet/06/. The monthly values were verified from the plant data and found to be consistent.	
	If applicable, has the reported data been cross-checked with other available data?	The data were cross checked with the Invoices raised by biomass (rice husk) suppliers.	
	Does the data management ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Verification On-site assessment of the project activity confirms that the necessary QA/QC procedures are in place and the data management system is effective and reliable.	
Findings	No finding has been raised		
Conclusion	The parameter has been monitored appropriately, in accordance with the registered monitoring plan (as per measurement methods and procedures to be applied) and applied methodologies. The monitoring results were recorded consistently as per the approved frequency in the monitoring plan.		

Parameter 7.	Net Calorific Value of biomass of type I= rice husk used ($NCV_{biomass, I}$)
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Means of verification	Criteria/Requirements	Assessment/Observation
	Measuring /Reading /Recording frequency	Net calorific value of biomass was checked in the Plant laboratory using bomb calorimeter on every procurement and an external testing is also done half yearly.
	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 registered PD/01/ and monitoring methodology/9/.
	Monitoring equipment	Equipment: Digital Bomb Calorimeter Type: Digital
	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?	Yes, the accuracy of the monitoring equipment used as per the registered PD/01
	Is the accuracy valid for the entire measuring range or do different accuracy levels apply to different measuring ranges?	Yes. The accuracy of monitoring equipment's is valid for the entire range.
	Calibration frequency /interval:	Calibration frequency of the bomb calorimeter is Annual.
	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	Yes. The calibration frequency is in line with the monitoring plan as outlined in the registered PD/01/.

	selected frequency in accordance with the local/national standards, or as per the manufacturer's specifications?		
	Is the calibration of measuring equipment carried out by an accredited person or institution?	Yes the calibration is conducted by external accredited NABL agencies./07/.	
	Is(are) calibration(s) valid for the whole reporting period?	Yes. Calibration of bomb calorimeter is valid for the whole reporting period.	
	Is the calibration carried out for a measuring range comparable with the range for which measurements have been carried out?	Yes. The calibration is carried out appropriately.	
	How were the values in the monitoring report verified?	Cumulative value of NCV_{biomass} for entire monitoring period is reported in the monitoring report/04/, however monthly values are reported in the ER calculation sheet/06/. The monthly values were verified from the plant data and found to be consistent.	
	If applicable, has the reported data been cross-checked with other available data?	Not Applicable	
	Does the data management ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Verification On- site assessment of the project activity confirms that the necessary QA/QC procedures are in place and the data management system is effective and reliable.	
Findings	Not Applicable		
Conclusion	The parameter has been monitored appropriately, in accordance with the registered monitoring plan (as per measurement methods and procedures to be applied) and applied methodologies. The monitoring results were recorded consistently as per the		

	approved frequency in the monitoring plan.
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Parameter 8.	Net Calorific Value of fossil fuel typei = coalused($NCV_{ff,i}$)	
Means of verification	Criteria/Requirements	Assessment/Observation
	Measuring /Reading /Recording frequency	Net calorific value of fossil fuel type I used is checked using the plant log book records.
	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 registered PD/01/ and monitoring methodology/9/.
	Monitoring equipment	Not Applicable
	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?	Not Applicable
	Is the accuracy valid for the entire measuring range or do different accuracy levels apply to different measuring ranges?	Not Applicable
	Calibration frequency /interval:	Not Applicable
	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	Not Applicable

	selected frequency in accordance with the local/national standards, or as per the manufacturer's specifications?		
	Is the calibration of measuring equipment carried out by an accredited person or institution?	Not Applicable	
	Is(are) calibration(s) valid for the whole reporting period?	Not Applicable	
	Is the calibration carried out for a measuring range comparable with the range for which measurements have been carried out?	Not Applicable	
	How were the values in the monitoring report verified?	Cumulative value of NCV_{ff,I} for entire monitoring period is reported in the monitoring report/04/, however monthly values are reported in the ER calculation sheet/06/. The monthly values were verified from the plant data and found to be consistent.	
	If applicable, has the reported data been cross-checked with other available data?	Not Applicable	
	Does the data management ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Verification On- site assessment of the project activity confirms that the necessary QA/QC procedures are in place and the data management system is effective and reliable.	
Findings	Not Applicable		
Conclusion	The parameter has been monitored appropriately, in accordance with the registered monitoring plan (as per measurement methods and procedures to be applied) and applied methodologies. The monitoring results were recorded consistently as per the		

	approved frequency in the monitoring plan.
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Parameter 9.	Quantity of biogas combusted in boiler in year y.(Q _{biogas,y})	
Means of verification	Criteria/Requirements	Assessment/Observation
	Measuring /Reading /Recording frequency	Onsite Measurement by gas flow meter.
	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 registered PD/01/ and monitoring methodology/9/.
	Monitoring equipment	Gas Flow Meter type : Orifice type Accuracy : ±0.25% Meter Serial No. : 98402 Make: Manas Model: MICRO CS-3003-NOT-2
	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?	Yes, the accuracy of the monitoring equipment as per the registered PD/01/.
	Is the accuracy valid for the entire measuring range or do different accuracy levels apply to different measuring ranges?	Yes. The accuracy of monitoring equipment's is valid for the entire range.
	Calibration frequency /interval:	Calibration frequency of the gas flow meter is once in 3 years.

	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. The calibration frequency is in line with the monitoring plan as outlined in the registered PD/01/.
	Is the calibration of measuring equipment carried out by an accredited person or institution?	Yes the calibration is conducted by external agency NABL accredited /07/.
	Is(are) calibration(s) valid for the whole reporting period?	Yes. Calibration of gas flow meter is valid for the whole reporting period.
	Is the calibration carried out for a measuring range comparable with the range for which measurements have been carried out?	Yes. The calibration is carried out appropriately.
	How were the values in the monitoring report verified?	Cumulative value of $Q_{biogas,y}$ for entire monitoring period is reported in the monitoring report/04/, however monthly values are reported in the ER calculation sheet/06/. The monthly values were verified from the plant data and found to be consistent.
	If applicable, has the reported data been cross-checked with other available data?	The data is directly measured by the gas flow meter at site.
	Does the data management ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Verification On-site assessment of the project activity confirms that the necessary QA/QC procedures are in place and the data management system is effective and reliable.

Findings	No finding has been raised		
Conclusion	The parameter has been monitored appropriately, in accordance with the registered monitoring plan (as per measurement methods and procedures to be applied) and applied methodologies. The monitoring results were recorded consistently as per the approved frequency in the monitoring plan.		

Parameter 10.	Net Calorific Value of biogas (NCV_{biogas})		
Means of verification	Criteria/Requirements	Assessment/Observation	
	Measuring /Reading /Recording frequency	Net calorific value of biogas was checked by external laboratory tests are conducted	
	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 registered PD/01/ and monitoring methodology/9/.	
	Monitoring equipment	Not Applicable	
	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?	Not Applicable	

	Is the accuracy valid for the entire measuring range or do different accuracy levels apply to different measuring ranges?	Not Applicable	
	Calibration frequency /interval:	Not Applicable	
	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?	Not Applicable	
	Is the calibration of measuring equipment carried out by an accredited person or institution?	Not Applicable	
	Is(are) calibration(s) valid for the whole reporting period?	Not Applicable	
	Is the calibration carried out for a measuring range comparable with the range for which measurements have been carried out?	Not Applicable	
	How were the values in the monitoring report verified?	Cumulative value of NCV_{biogas} for entire monitoring period is reported in the monitoring report/04/, and in the ER calculation sheet/06/.	
	If applicable, has the reported data been cross-checked with other available data?	Not Applicable	

	Does the data management ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Verification On- site assessment of the project activity confirms that the necessary QA/QC procedures are in place and the data management system is effective and reliable.	
Findings	Not Applicable		
Conclusion	The parameter has been monitored appropriately, in accordance with the registered monitoring plan (as per measurement methods and procedures to be applied) and applied methodologies. The monitoring results were recorded consistently as per the approved frequency in the monitoring plan.		

Parameters fixed ex ante:

$\eta_{BL, thermal}$: It is the efficiency of the baseline coal fired boiler fixed at the time of project registration the mentioned value of 100% is consistent with the registered PD/01/.

$\eta_{BL, thermal}$: It is the efficiency of the biomass fired boiler fixed at the time of project registration the mentioned value of 80% is consistent with the registered PD/01/.

EF_i : It is the emission factor for fossil fuel. The mentioned value of 96.1tCO₂/ TJ is consistent with the registered PD/01/.

$SEC_{Biomass, PJ, y}$: It is the Specific Energy Consumption of Biomass at the time of project registration the mentioned value of 1.25 kJ/ kJ steam is consistent with the registered PD/01/.

$SEC_{Coal, PJ, y}$: It is the Specific Energy Consumption of Coal at the time of project registration the mentioned value of 1.00kJ/ kJ steam is consistent with the registered PD/01/.

Calibration of meters:

During the verification assessment of the project activity, accuracy of all the metering have been checked and found appropriate. The installation and working conditions of the meters were checked through photos of meters and site visit and were found to be satisfactory. Details of meters are provided in below table:

	Mass flow integrating Totalizer	Flow meter- Biogas	Steam Pressure Gauge	Steam Temp. Gauge	Feed Water Temp Gauge	Weigh bridge
Meter Serial No	10070322	98402	6390	GAEL/BL/89	GAEL/BL/90	6637
Make	Manas	Manas	CBL	TEMPSENS	MIEPL	

	Mass flow integrating Totalizer	Flow meter- Biogas	Steam Pressure Gauge	Steam Temp. Gauge	Feed Water Temp Gauge	Weigh bridge
Model	MICRO CS-3003-NOT-2	MICRO CS-3003-NOT-2				
Accuracy class	± 3%	± 0.25%	± 4%	± 1%	± 1%	
Calibration frequency in years	1	3	1	1	1	3 ¹
Date of calibration I	09-Mar-2013	25-Feb-2013	09-Mar-2013	19-Mar-2013	09-Mar-2013	8-Nov-2013
Validity	08-Mar-2014	24-Feb-2016	08-Mar-2014	18-Mar-2014	08-Mar-2014	7-Nov-2016
Date of calibration II	08-Mar-2014	24-Feb-2014	08-Mar-2014	18-Mar-2014	08-Mar-2014	11-Nov-2014
Validity	07-Mar-2015	23-Feb-2017	07-Mar-2015	17-Mar-2015	07-Mar-2015	10-Nov-2017
Date of calibration III	07-Mar-2015	23-Feb-2015	07-Mar-2015	17-Mar-2015	07-Mar-2015	16-Nov-2015
Validity	06-Mar-2016	22-Feb-2018	06-Mar-2016	16-Mar-2016	06-Mar-2016	15-Nov-2018
Date of calibration IV	05-Mar-2016	22-Feb-2016	05-Mar-2016	16-Mar-2016	05-Mar-2016	21-Nov-2016
Validity	04-Mar-2017	21-Feb-	04-Mar-	15-Mar-	04-Mar-	20-Nov

¹ In the project case calibration frequency of Weigh Bridge is not specified in monitoring plan of VCS-PD. However, taking the conservative approach, PP has considered the guidance on calibration of meters for small scale projects which prescribe calibration of meters at least once in 3 years, As per para 12 (c) of EB 35 Annex 35 "Measuring equipments should be certified to national or IEC standards and calibrated according to the national standards and reference points or IEC standards and recalibrated at appropriate intervals according to manufacturers specifications, but **at least once in three years**". Hence, three years is considered to be the calibration frequency in this project case.

	Mass flow integrating Totalizer	Flow meter-Biogas	Steam Pressure Gauge	Steam Temp. Gauge	Feed Water Temp Gauge	Weigh bridge
		2019	2017	2017	2017	2019
Date of calibration V	04-Mar-2017	21-Feb-2017	04-Mar-2017	14-Mar-2017	04-Mar-2017	20-Nov-2017
Validity	03-Mar-2018	20-Feb-2020	03-Mar-2018	14-Mar-2018	03-Mar-2018	19-Nov-2020
Date of calibration VI	03-Mar-2018	20-Feb-2018	03-Mar-2018	14-Mar-2018	03-Mar-2018	
Validity	02-Mar-2019	19-Feb-2021	02-Mar-2019	13-Mar-2019	02-Mar-2019	

The Project proponent has done the equipment calibration on time hence no error factor of equipment on monitored values as per GUIDELINES FOR ASSESSING COMPLIANCE WITH THE CALIBRATION FREQUENCY REQUIREMENTS” for delay in calibration is applied. The calculation is presented in ER sheet.

The details of monitoring equipment are involved in the project activity and their calibration details/07/ are mentioned in data and parameter monitored values tables of section 4.2 of the VCS MR/04/. The meters have been checked through photos in Verification on site visit and the meter details are found to be consistent with that observed during the site visit.

The assessment team has verified the monthly invoices, plant log book , NCV and calibration certificates and confirmed that only the data recorded through all meters is used to calculate parameters 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. The registered VCS PD/01/ & MR /04/ and meter photos confirm that the energy metering equipment are sealed and maintained by the state utility.

In view of the above discussion the assessment team is 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 methodologies equals the baseline emissions and project emissions (leakage emissions for such project activities is considered zero). The formula provided for the calculation of baseline emissions is:

A. Baseline Emission:

As per the methodology, baseline emissions for this case should be calculated as:

As per Para 35, AMS I.C Ver. 16

$$BE_{Cofire,y} = (FC_{biomass,k,y} * NCV_{biomass,k,y} * EF_{BL}) / (SEC_{PJ,j,y} * \eta_{BL})$$

Where,

$BE_{Cofire,y}$ = Baseline emissions during the year y in tCO₂

$FC_{biomass,k,y}$ = Quantity of biomass type k combusted during the year y in volume or mass unit

$NCV_{biomass,k,y}$ = Average net calorific value of biomass type k combusted during the year y in TJ per unit volume or mass unit

EF_{BL} = CO₂ emission factor of the fossil fuel that would have been used in the baseline co-fired plant established using three years average historical data (tCO₂ / MWh)]

$SEC_{PJ,j,y}$ = Specific energy consumption of fuel type j of the project activity in year y in TJ/MWh

η_{BL} = Energy efficiency of the equipment that would have been used in the baseline

As per Para 15, AMS I.C Ver. 16

$$BE_{Thermal,CO2,y} = (EG_{Thermal,Biomass,y} / \eta_{BL,Thermal}) * EF_{FF,CO2}$$

Where,

$BE_{Thermal,CO2,y}$ = the baseline emissions from steam/heat displaced by the project activity during the year y; tCO₂e

$EG_{Thermal,Biomass,y}$ = the net quantity of steam/heat supplied by the project activity through biomass during the year y; TJ

$EF_{FF,CO2}$ = The CO₂ emission factor of the fossil fuel that would have been used in the baseline plant; tCO₂ / TJ, obtained from reliable local or national data if available, otherwise, IPCC default emission factors are used

$\eta_{BL,Thermal}$ = the efficiency of the plant using fossil fuel that would have been used in the absence of the project activity

$$EG_{Thermal,Biomass,y} = EG_{Thermal,y} - EG_{Biogas,y}$$

$EG_{Thermal,y}$ = Total steam/ heat supplied by the project activity during the year y; TJ

$EG_{Biogas,y}$ = Total steam / heat supplied to project activity through biogas during the year y; TJ

Sample calculation of baseline emissions for the current monitoring period

As per Para 35, AMS I.C Ver. 16

$$\begin{aligned} BE_{Cofire,y} &= (FC_{biomass,k,y} * NCV_{biomass,k,y} * EF_{BL}) / (SEC_{PJ,j,y,measured} * \eta_{BL}) \\ &= (75,460.12 * 1000 * 3,322 * 4.1868 * 96.1) / (1.25 * 100\% * 10^9) \\ &= 80,688.40 \text{ tCO}_2\text{e} \end{aligned}$$

As per Para 15, AMS I.C Ver. 16

$$\begin{aligned} BE_{Thermal,CO2,y} &= (EG_{Thermal,Biomass,y} / \eta_{BL,Thermal}) * EF_{FF,CO2} \\ &= (581.59 / 100\%) * 96.1 \end{aligned}$$

$$= 55,890.88 \text{ tCO}_2\text{e}$$

The detailed worksheet of baseline emission calculation is provided in ER sheet where total baseline emissions came out to be 55,890.88 tCO₂e.

B. Project Emission:

There are no project activity emissions as this is a renewable project activity. However, small quantity of fossil fuel would be used for start up the boiler. Project emissions on account of use of fossil fuel would be considered and monitored.

Project Emissions due to Auxiliary Fuel (e.g. Coal) Consumption is estimated as per the following equation:

$$PE_y = \sum FF_{i,y} \times NCV_i \times EF_i$$

Where

PF_y = Project emissions from on-site fossil fuel combustion in year y, tCO₂e

ΣFF_{i,y} = Quantity of fossil fuel combusted in the project plant in year y, tonne

NCV_i = Net calorific value of fossil fuel type i, TJ/tonne

EF_i = Emission factor for fuel i; IPCC default value, tCO₂/ TJ

Calculation of project emission for the current monitoring period

As per Para 35, AMS-I.C. Ver. 16

$$PE_y = 0$$

As per Para 15, AMS-I.C. Ver. 16

$$\begin{aligned} PE_y &= \sum FF_{i,y} \times NCV_i \times EF_i \\ &= (0 \times 4042 \times 14.1868 \times 96.1) / 10^6 \\ &= 0 \text{ tCO}_2\text{e} \end{aligned}$$

For the entire monitoring period there are no project emissions identified and same can be verified from the ER sheet/6/

C. Leakage:

a. Leakage due to use of non-renewable biomass:

Since no non-renewable biomass used this component is zero.

b. Leakage due to transportation of biomass residues to the project site:

No leakage as per the PD.

$$L_y = 0$$

Calculation of Emission Reductions for the current monitoring period

$$ER_y = BE_y - PE_y - L_y$$

BE_y = Baseline Emissions as calculated in Section 4.1

PE_y = Project emissions as calculated in Section 4.2

L_y = Leakages = 0

As per Para 35, AMS IC Ver. 16

$$\begin{aligned}ER_y &= 80,688.40 - 0 - 0 \\ &= 80,688.40 \text{ tCO}_2\text{e}\end{aligned}$$

As per Para 15, AMS IC Ver. 16

$$\begin{aligned}ER_y &= 55,890.88 - 0 - 0 \\ &= 55,890.88 \text{ tCO}_2\text{e}\end{aligned}$$

So final emission reductions for the current monitoring period

$$\begin{aligned}&= \text{Min (tCO}_2\text{e as per Para 35, tCO}_2\text{e as per Para 15)} \\ &= \text{Min (80,688.40 tCO}_2\text{e, 55,890.88 tCO}_2\text{e)} \\ &= 55,890.88 \text{ tCO}_2\text{e}\end{aligned}$$

Note Round down value

4.6 Non-Permanence Risk Analysis

Not applicable for the project activity.

5 VERIFICATION CONCLUSION

LGAI Technological Center, S.A. (Applus+ Certification) (also referred to as Applus+ Certification), contracted by Gujarat AmbujaExports Ltd (GAEL), to perform the independent verification of the emission reductions for the VCS project activity (VCS ID 733) "Biomassbased steam generationproject by Gujarat AmbujaExports Ltd" in India for the monitoring period01/01/2014 to 31/03/2018 as reported in the Monitoring Report Version 1.2 dated 05/10/2022. GAEL personnel 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.

Applus+ Certification commenced the verification on the basis of the baseline and monitoring methodologies AMS I.C version 16, the monitoring plan contained in the registered VCS PD dated 25/09/2009 and VCS guidelines version 4.2, Monitoring Report Version 1.2 dated 05/10/2022 as per the process described under Section 2 of this report.

Applus+ Certification 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. Applus+ Certification planned and performed the verification by obtaining evidence and other

information and explanations that Applus+ Certification considered necessary to give reasonable assurance that reported GHG emission reductions are fairly stated.

The PP has clarified that the project plant was not operated at all during 2018 and hence no data has been collected during the year 2008. Therefore that the table provided in the section 5.4 of the MR mentioned zero emission reduction for the year of 2008. The PP has mentioned that there has been no generation in the year 2018 and same has been verified by VVB assessment team with conducted interview with the PP and project plant record and logbook details, hence accepted.

In our opinion the GHG emissions reductions reported for the project activity for the period 01/01/2014 to 31/03/2018 are fairly stated in the Monitoring Report Version 1.2 dated 05/10/2022. The GHG emission reductions were calculated correctly on the basis of the approved baseline and monitoring methodologies AMS I.C version 16 and the VCS standard.

Verification period: From 01/01/2014 to 31/03/2018 (including both days)

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

Year	Baseline emissions or removals (tCO ₂ e)	Project emissions or removals (tCO ₂ e)	Leakage emissions (tCO ₂ e)	Net GHG emission reductions or removals (tCO ₂ e)
Year 2014 (01/01/2014 - 31/12/2014)	33,762.58	0	0	33,762 (Round down value conservatively considered)
Year 2015 (01/01/2015 - 31/12/2015)	15,663.90	0	0	15,663 (Round down value conservatively considered)
Year 2016 (01/01/2016 - 31/12/2016)	4,932.62	0	0	4,932 (Round down value conservatively considered)
Year 2017 (01/01/2017 - 31/12/2017)	1,531.78	0	0	1,531 (Round down value conservatively considered)
Year 2018 (01/01/2018 - 31/12/2018)	-	0	0	-

18 - 31/03/20 18)				
Total	55,890.88	0	0	55,888 (Round down value conservatively considered)

The PP has provided a comparison analysis of emission reductions or net anthropogenic removals achieved with estimates in the registered PD in section 5.4 of the MR. The baseline emissions in the current monitoring period are 71% lower than the estimated ex-ante emission reductions. The PP has explained the major reason for lower emission reduction as the project activity has been in use only as a backup after a new cogeneration plant was installed at the plant site. The project activity has been operated for a shorter period than normal during the current monitoring period. There has been no generation in the year 2018. The same has been checked and found to be correct, hence accepted by the VVB assessment team.

APPENDIX 1: DOCUMENT REFERENCES

S.No	Title of Document	Version	Date
1.	Registered VCS PD	1.0	25/09/2009
2.	VCS Validation Report	01	26/03/2010
3.	Previous VCS Verification report (For Monitoring period: 01/01/2013-31/12/2013)	01	31/03/2020
4.	VCS Monitoring Report (Final)	1.2	05/10/2022
4.1	VCS Monitoring Report	1.0	04/05/2022
	VCS Monitoring Report	1.1	25/06/2022
5.	ER spread sheet(Final)	1.1	25/06/2022
6.	ER spread sheet	1.0	04/05/2022
7	Certificates of Calibration for all the meters belongs to project activity for energy meters, steam flow meters, temperature sensors, pressure sensors and Weighbridge	-	From 01/01/2014 to 31/03/2018
8.	Biomass weighment records		From 01/01/2014 to 31/03/2018
9.	Methodology AMS I.C, "Thermal Energy production with or without electricity"	Version 16 (AMS I.C.)	-
10.	Consent to Operate issued by Uttar Pradesh Pollution control board		
11.	VCS webpage for the project, VCS ID 0563; https://registry.terra.org/app/projectDetail/VCS/733	-	-
12.	Letter of declaration dated from PP regarding not having created or sought any other form of environmental credit for the same period	-	From 01/01/2014 to 31/03/2018
13.	Biomass consumption record	-	From 01/01/2014 to 31/03/2018
14.	VCS Standard	Version 4.3	issued dated 19/09/2019 updated 22/06/2022
15.	VCS Program Guide	Version 4.2	issued dated 19/09/2019 updated 22/06/2022
16.	VCS Programme Definition	Version 4.2	issued dated 19/09/2019 updated 22/06/2022
17.	Site assessment –interviews of staff personnel, photographs,	-	17/06/2022

S.No	Title of Document	Version	Date
	physical inspection of monitoring system		to 18/06/2022
18.	NCV of biomass – NABL accredited third party test reports for the verification period under consideration.		From 01/01/2014 to 31/03/2018

APPENDIX 2: ABBREVIATIONS

Abbreviations	Full texts
CAR	Corrective Action Request
CDM PCP	Clean Development Mechanism Project Cycle Procedure
CDM PS	Clean Development Mechanism Project Standard
CDM VVS	Clean Development Mechanism Validation and Verification Standard
EB	Executive Board
EF	Emission Factor
EPC	Engineering ,Procurement and Construction
ER	Emission Reductions
CEA	Central Electricity Authority
CER	Certified Emission Reduction
CR	Clarification Request
FAR	Forward Action Request
GAEL	Gujarat Ambuja Exports Ltd
GHG	Greenhouse Gas(es)
GOI	Government of India
IPCC	Intergovernmental Panel on Climate Change
MGR	Monthly Generation Reports
MP	Monitoring Plan
MR	Monitoring Report
MWh	Megawatt hour
NCV	Net Calorific Value
PD	Project Description
PP	Project Proponent
PS	Project Standard
TR	Technical Review
UNFCCC	United Nations Framework Convention on Climate Change
VVB	Validation and Verification Body
VVS	Validation and Verification Standard

APPENDIX 3: FINDINGS OVERVIEW

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

FAR ID		Section no.		Date : DD/MM/YYYY
Description of FAR				
NA				
Project participant response				Date : DD/MM/YYYY
NA				
Documentation provided by project participant				
NA				
DOE assessment				Date: DD/MM/YYYY
NA				

Table 1. CL from this verification

CL ID	01	Section no.	MR	Date : 24/06/2022
Description of CL				
1. PP is requested to provide the supporting documents for coal and biomass consumed during the monitoring period. 2. PP is requested to clarify, how are they ensuring the on-going communication with local stakeholders and provide some evidence. 3. PP is requested to clarify if they have mentioned the correct validity of calibration of all Flow gas meters as the validity dates are not matching with the certificates provided and also the stated validity in MR and registered PD is one year then how the calibration is valid for 3 years. 4. PP is requested to update the calibration details of flow gas meter completely, according to the certificates provided the calibration detail of year 2017 is missing. Kindly Clarify				
Project participant response				Date : 25/06/2022
1. Supporting documents for coal and biomass consumed are provided. 2. The project activity is located inside an industrial park which is developed by local industrial development authority (SIDCOL) and is responsible for compliance of all local laws and regulatory requirements. Nonetheless PP has appointed Head-HR as the focal point for all communication with regard community grievances. No such grievance has been received from anyone so far. Besides this, PP has taken up several initiatives for community welfare. 3. Calibration details of all flow meter biogas meters are corrected. 1. 4. As above.				
2. Documentation provided by project participant				
MR V1.1				

DOE assessment	Date: 26/06/2022
Assessment team confirms that:- 1. PP has provided the supporting documents for coal and biomass consumption to DOE during the current monitoring period. 2. PP has ensured the ongoing communication local stakeholders by interview with the PP during site visit. 3. The calibration details of all flow gas meter is updated according to the calibration certificates provided to DOE in the revised VCS MR version 1.1 dated 25-June-2022. Hence accepted. CL #01 is Closed	

CL ID	02	Section no.	MR	Date : 24/06/2022
Description of CL				
1. PP is requested to clarify, how the SEC biomass and SEC coal parameter is valid in this monitoring report section 4.1 as this is not found in the registered VCS PD version 01 dated 25/09/2009. 2. PP is requested to provide a document to verify the SEC biomass value as it is not found in VCS registered PD. 3. PP is requested to provide a document to verify the SEC coal value as it is not found in VCS registered PD				
Project participant response				Date : 25/06/2022
1. These are validated values of registered PD. Refer page 16 of PD. 2. As above 3. As above				
Documentation provided by project participant				
MR V1.1				
DOE assessment				Date: 26/06/2022
Assessment team confirms that:- 1. PP has clarified that provided the SEC biomass and SEC coal parameter is valid in this monitoring report section 4.1 as they are provided on Page no. 16 of the registered VCS PD, thus they are accepted. 2. the SEC biomass value and SEC coal value can be verified from the VCS registered PD page no. 16. Hence accepted. CL #02 is closed.				

Table 2. CAR from this verification

CAR ID	01	Section no.	MR	Date :24/06/2022
Description of CAR				

1. PP is requested to update the font size to century gothic 13 on title page according to the latest VCS MR template version 4.1. 2. PP is requested to update the content table as some sections are missing in section 2. 3. PP is requested to provide the telephone number in the required field in section 1.3 and 1.4. 4. PP is requested to update the sub-headings of section 2 and make it consistent with the registered MR Template version 4.1 5. PP is requested to mention the tools as well applied in the Project activity to calculate emission reductions as per the VCS MR template version 4.1 in section 1.8. 6. PP is requested to follow the VCS MR template guideline Version 4.1 and provide the sustainable Development Contribution in 100 words describing the activities implemented that resulted in SD contributions. 7. PP is requested to update the least count unit as it is found to be inconsistent with the registered VCS PD in P_{steam} parameter table in section 4.2. 8. PP is requested to use non-italic font throughout the MR according to the VCS MR template V4.1 in section 4.3.	
Project participant response	Date : 25/06/2022
1. Reviewer's assertion is incorrect. Template prescribes font size 12 on cover page and not 13. 2. Table is updated 3. Numbers are provided 4. Section 2 is made consistent with template 5. No tools are referred to. Hence these need no mention 6. SDG contribution text is revised 7. Least count is updated/corrected 8. The text is made non-italic	
Documentation provided by project participant	
MR V1.1	
DOE assessment	Date: 26/06/2022
Assessment team confirms that:- 1. PP has followed the VCS MR Template guideline properly, thus kept the font size same on title page. 2. PP has updated the content table and now all the sections are included in the revised VCS MR version 1.1 dated 25-June-2022. 3. PP has updated the telephone numbers in the respective table of section 1.3 and 1.4 of revised MR version 1.1 4. PP has updated the subheadings of section 2 and now made consistent with the latest MR Template version 4.1 in the revised VCS MR version 1.1 dated 25-June-2022. 5. There are no tools applied in the project activity as can be verified from the registered VCS PD and MR version 1.1. 6. PP has updated the SDG contribution text according to the latest MR Template version 4.1 in the revised VCS MR version 1.1 dated 25-June-2022. 7. PP has updated the least count unit in section 4.2 and now made consistent with the latest MR Template version 4.1 in the revised VCS MR version 1.1 dated 25-June-2022. 8. PP has updated the text in section 4.3 and made it non-italic in the revised VCS MR version 1.1 dated 25-June-2022. Hence accepted. CAR #01 is Closed	

CAR ID	02	Section no.	ER	Date :24/06/2022
Description of CAR				
1. PP is requested to clarify, why in some months such as Feb-15, Aug-15 and so on are empty. 2. PP is requested to confirm if they have provided the correct monitoring period ER sheet to DOE for verification. 3. PP is requested to provide some sample stock reports to confirm the values of coal and biomass consumption in project. 4. PP is requested to clarify, why the actual emission reductions vary so much. Kindly provide the evidence to support such huge difference in emission reduction values. 5. PP is requested to explain why PP has chosen average instead of the weighted average or maximum value of calorific value of coal which is a more conservative approach. 6. Please clarify why the baseline emissions in the current monitoring period are 71% lower than the estimated ex-ante emission reductions.				
Project participant response				Date : 25/06/2022
1. There is no steam generation in Aug 2015. Hence it is empty. Plant was under shutdown also during Feb 2015. 2. The dates are correct and are in continuation to the last date of previous MP which is 31/03/2013. 3. The project activity has been in use only as a backup after a new cogen plant was installed at the plant site. This is the reason that project activity has been operated for a shorter period than normal. 4. Now max value of coal CV is taken which is most conservative. 5. As per point 3 above.				
Documentation provided by project participant				
MR V1.1				
Revised ER sheet				
DOE assessment				Date: 26/06/2022
Assessment team confirms that:- 1. There was no generation in the month of Feb-15 and Aug-15 and others where there are no values for steam generation mentioned in ER sheet and it can be verified from breakdown details provided by PP 2. The PP have provided the correct ER sheet to DOE for verification and the monitoring period and crediting period mentioned is found to be consistent with the complimentary MR provided to DOE. 3. PP has provided some stock record reports for verification of coal and biomass consumption in project. 4. PP confirms that the project is operational only as a backup after a new cogen plant was installed at the plant site. That's why the actual emission reduction achieved by the project are 71% lower as compared to the estimated emission reduction. 5. PP has updated the coal CV value and opted for the maximum value of coal CV which is more conservative in the revised ER sheet submitted to DOE. 6. Explained in point 4. Hence accepted. CAR #02 is Closed				

Table 3. FAR from this verification

FAR ID	XX	Section No.	XX	Date :DD/MM/YYYY
Description of FAR				
NA				
Project participant response				Date : DD/MM/YYYY
NA				
Documentation provided by project participant				
NA				
DOE assessment				Date: DD/MM/YYYY
NA				

APPENDIX 4: COMPETENCY STATEMENTS

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

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

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

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

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

Name	Qualification	Coverage of scope	Coverage of technical Area	Financial aspect	Host country Experience	Attendance to the Assessment (Verification On-)
Vivek Ahirwar	Lead Auditor (LA)/	Yes (1)	Yes (1.1)	N/A	Yes	Yes

	Technical Expert (TE)					
Simon Shen	Technical Reviewer (TR)	Yes (1)	Yes (1.1)	N/A	N/A	N/A

The curricula vitae of the VVB's team members are provided below:

Vivek Kumar Ahirwar is a BEE-Certified Energy Auditor by Govt of India with over eight years of relevant experience in energy efficiency, energy audit, thermal and electrical energy generation technology from renewable source and energy conservation in energy intensive industries, designated consumers and commercial buildings, implementation of energy conservation building codes, research, process and green building projects. He is a certified lead auditor for ISO 14001 EMS and 14064. He has experience under various categories of projects stating from renewable to waste to supercritical projects and WCD. He has successfully audited more than 100 GHG (CDM/VCS/GS) projects in different states across the India. He has done Master in Technology (Energy Management) from a premier institute, School of Energy & Environmental Studies, DAVV, Indore (M.P.), India and Bachelor of Engineering (Mechanical Engineering) from Govt. Engineering college, Rewa, RGPV, India.

Simon Shen (master degree in thermal energy engineering, bachelor degree in environmental engineering) is a lead auditor appointed by Applus+ certification for the GHG project assessment. He is based in Shanghai. He has several years of work experience in environmental protection field. Before he joined Applus+ certification, he had been worked for TÜV SÜD as a GHG validator/verifier and ISO 9001/14001 lead auditor for 3.5years.