BIOMASS BASED POWER GENERATION PLANT AT VILLAGE CHANNU, PUNJAB

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Summary:

M/s. Universal Biomass Energy Private Limited has commissioned the TÜV NORD JI / CDM Certification Program to carry out the verification of the Project "Biomass Based Power Generation Plant at Village Channu, Punjab" in Punjab, India with regard to the requirements of VCS version 3.2 Standard.

The project activity involves installation of a 14.50 MW Biomass Residue based Power Plant which is primarily fired with cotton stalks and mustard stalks to generate electricity and export power to the regional grid. The project activity shall thus reduce GHG emissions by displacing the fossil fuel dominated grid based electricity with biomass residues based renewable electricity

Reporting period: From 2009-10-30 to 2011-02-28 (both days included)

In the course of the verification 7 Corrective Action Requests (CARs), 0 Clarification Requests (CLs) were successfully closed. The Forward Action Request (FAR) is raised during CDM validation is closed for this verification and shall be reconfirmed during the subsequent verifications.

The verification is based on the draft monitoring report/MR1/, revised monitoring report/MR2/, the monitoring plan as set out in the registered CDM PDD/PDD/, supplementary VCS PD/S-PD/, CDM validation report/val/, Supplementary Validation report/S-Val/, emission reduction calculation spreadsheet/ER/ and supporting documents/JMR/xls/INV/ made available to the TÜV NORD JI/CDM CP by the project participant.

As the result of the 1st periodic verification, the verifier confirms that the GHG emission reductions are calculated without material misstatements in a conservative and appropriate manner. TÜV NORD JI/CDM CP herewith confirms that the project has achieved emission reductions in the above mentioned reporting period as follows:

Emission reductions 95,284 t CO_2 equivalents

Contents

1 INTRODUCTION

1.1 Objective

The Universal Biomass Energy Private Limited has commissioned the TÜV NORD JI/CDM Certification Program to carry out the verification of the project:

"Biomass based power generation plant at village Channu, Punjab"

with regard to the relevant requirements of the Voluntary Carbon Standard version 3.2/VCS/. The verifiers have reviewed the implementation of the monitoring plan (MP) in the registered VCS project for the monitoring period 2009-10-30 to 2011-02-28 (both days included),

The applied monitoring methodology is AMS I.D "Grid connected renewable electricity generation" version 15.

1.2 Scope and Criteria

The purpose of this verification, by independent checking of objective evidence, is as follows:

- to verify that the project is implemented as described in the project design document;
- to assess the implementation of the monitoring plan (MP) content in the CDM-PDD;
- to assess the project's compliance with other relevant rules, including the host country (India) legislation;
- to confirm that the monitoring system is implemented and fully functional to generate voluntary emission reductions (VERs / VCUs) without any double counting; and
- to establish that the data reported are accurate, complete, consistent, transparent and free of material error or omission by checking the monitoring records and the emissions reduction calculation.

1.3 Scope and Criteria

The verification of this project is based on the registered project design document /PDD/, the monitoring report/MR1/, emission reduction calculation spread sheet/XLS/, supporting documents made available to the verifier and information collected through performing interviews and during the on-site assessment. Furthermore publicly available information was considered as far as available and required.

The TÜV NORD JI/CDM CP has employed a risk-based approach in the verification, focusing on the identification of significant risks and reliability of project monitoring and generation of emission reductions.

1.4 Level of assurance

The verification has been planned and organized to achieve a

☒ reasonable level of assurance

☐ limited level of assurance.

1.5 Summary Description of the Project

The project involves installation of 14.5 MW biomass based power plant. The project operates in Rankine cycle route where the high pressure steam is produced in a 70 TPH biomass fired boiler and fed to the 14.5 MW turbo-generator set for power generation.

The plant and machinery of the project consists of one number multi biomass residue fuel fired travelling grate type of boiler, one number steam generator set, power evacuation system and fuel handling system etc. The electricity voltage level generated by the turbo generator at 11 kV will be stepped up to the 132 kV suitable to interface with the grid electricity. Other plant equipment includes ash-handling system, power evacuation facilities, cooling tower, water treatment plant, compressed air plant, etc. Export of power to the grid has to be through 132 kV transmission line.

The project activity will also include all auxiliary installations and systems, including electrostatic precipitator (ESP), cooling water system and cooling tower, ash handling system, feed water system, raw water system and DM plant, electrical system and control and instrumentation.

The key parameters of the project are given in table 1-3:

Table 1-3a: Technical data of the project

Parameter	Unit	Value
Parameters of Boiler		
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)	TPH	70
Steam pressure at main steam stop valve outlet	kg/cm^2 (g)	67
Steam temperature at main steam stop valve outlet	℃	485 ± 5
Feed water temperature at the economizer inlet	℃	129
Design code for pressure parts		IBR IWT-6212
Technical Parameters of Steam Turbine generator		
Makers		Qingdao Jieneng Power Station Engineering Co., Ltd (QJPS)
Type		Extraction cum condensing
Rated capacity of turbine	MW	14.5
Steam conditions at turbine inlet pressure (g)	kg/cm^2	64.5281
Temperature	℃.	475 ± 5
Condenser operational pressure	M Pascal	0.0098
Designed temperature rise in the cooling tower	℃	10

Table 1-4b: Parameters confirmed during verification

Parameter	Name	Unit	Value
Rated Capacity	Boiler	TPH	70
Steam outlet Pressure	Boiler	kg/cm^2 (g)	67
Steam Outlet Temperature	Boiler	℃	485 ± 5
Rated capacity	Turbine	MW	14.5

2 VALIDATION PROCESS, FINDINGS AND CONCLUSION

2.1 Validation Process

The project is registered under CDM (UNFCCC No. 4488) on 2011-02-22[1], thus the section is not applicable for the current monitoring period.

N/A

2.2 Validation Findings

2.2.1 Gap Validation

The commissioning date of the project activity is 2009-10-30, the date when the project activity began generating GHG emission reductions .The project is registered under CDM on 2011-02-22[2] which is within 2 years of VCS start date which is in line with the VCS validation requirement.

Also, the VCS PD covering sections 1.2, 1.3, 1.5, 1.6, 1.7, 1.9, 1.10, 1.12.1, 1.12.2, 1.12.3, 1.12.4 and 1.13 of the VCS Project Description Template/S-PD/ has been submitted and the same is validated/S-Val/ and a validation representation is provided as a gap validation for the project's compliance with the VCS rules.

2.2.2 Methodology Deviations

No methodology deviation is required for this project activity.

2.2.3 New Project Activity Instances

2.3 There is no new project activity instances is identified or proposed by the project proponent during the current monitoring period.Validation Conclusion

The review of the registered CDM PDD/PDD/, Supplementary VCS PD/S-PD/, CDM validation report/Val/, Supplementary validation report/S-Val/ and additional documents related to baseline and monitoring methodology and subsequent background investigation have provided the TÜV NORD JI/CDM CP with sufficient evidence to validate the fulfilment of the stated criteria.

In detail the conclusions can be summarised as follows:

- The project is validated under CDM within 2 years of VCS start date
- The VCS PD covering sections 1.2, 1.3, 1.5, 1.6, 1.7, 1.9, 1.10, 1.12.1, 1.12.2, 1.12.3, 1.12.4 and 1.13 of the VCS Project Description Template/S-PD/ has been submitted

[1] http://cdm.unfccc.int/Projects/DB/RWTUV1297334673.09/view

[2] http://cdm.unfccc.int/Projects/DB/RWTUV1297334673.09/view

- The VCS PD covering sections 1.2, 1.3, 1.5, 1.6, 1.7, 1.9, 1.10, 1.12.1, 1.12.2, 1.12.3, 1.12.4 and 1.13 is validated and the validated report and validation representation is submitted.
- There is no double counting of credits as this VCS monitoring period do not overlap with the CDM crediting period start date.

The conclusions of this report show, that the project, as it was described in the project documentation, is in line with all criteria applicable for the validation against the VCS version 3.2 standards without any qualifications or limitations.

3 VERIFICATION PROCESS

3.1 Method and Criteria

The verification of the project consisted of the following steps:

- Contract review
- Appointment of team members and technical reviewers
- Publication of the monitoring report
- Desk review of the Monitoring Report /MR1/ submitted by the client and additional supporting documents.
- Verification planning,
- On-Site assessment,
- Background investigation and follow-up interviews with personnel of the project developer and its contractors,
- Draft verification reporting
- Resolution of corrective actions (if any)
- Final verification reporting
- Technical review
- Final approval of the verification.

The sequence of the verification is given in the table 3.3-1 below:

Table 3.1-1: Verification sequence

Topic	Time
Assignment of verification	2011-05-28
On-site visit	2011-10-18
Draft reporting finalised	2011-10-25
Technical review on draft reporting finalised	2011-10-25
Final reporting finalised	2011-12-26
Technical review on final reporting finalised	2012-07-17
Final corrections	2012-07-18

The main verification steps are described below.

3.2 Document Review

The CDM PDD /PDD/ and supporting background documents related to the project design and baseline were reviewed.

Furthermore, the verification team used additional documentation by third parties like host party legislation, technical reports referring to the project design or to the basic conditions and technical data.

The references used in the course of this verification are summarized in section 5.

3.3 Interviews

The verification team has carried out interviews in order to assess the information included in the project documentation and to gain additional information regarding the compliance of the project with the relevant criteria applicable for the VCS.
During verification the verification team has performed interviews to confirm selected information and to resolve issues identified in the document review. The main topics of the interviews are summarized in Table 3.3-1.

Table 3.3-1: Interviewed persons and interview topics

Interviewed Persons / Entities	Interview topics
Project proponent representatives /IM01/	- General aspects of the project - Technical equipment and operation - Changes since validation - Monitoring and measurement equipment - Remaining issues from validation / previous verifications - Calibration procedures - Quality management system - Involved personnel and responsibilities - Training and practice of the operational personnel - Implementation of the monitoring plan - Monitoring data management - Data uncertainty and residual risks - GHG calculation - Procedural aspects of the verification - Maintenance - Environmental aspects - Editorial issues of the Monitoring Report

3.4 Site Inspections

The verification team has carried out an inspection on site on 2011-10-18 in order to verify that the project is implemented in accordance with the applicable criteria. Furthermore the on-site assessment was conducted and monitoring data were checked with respect to accuracy to ensure the calculation of emission reductions. The main tasks covered during the site visit include,

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

Responsibilities related to monitoring are executed as defined in the monitoring plan /PDD/ & /MR2/ and were assessed and found to be OK.

3.5 Resolution of Any Material Discrepancy

Material discrepancies identified in the course of the verification are addressed either as CARs, CLs or FARs.

A **Corrective Action Request (CAR)** is established where:

- mistakes have been made in assumptions, application of the methodology or the project documentation which will have a direct influence the project results,
- the requirements deemed relevant for verification of the project with certain characteristics have not been met or
- there is a risk that the project would not be registered or that emission reductions would not be able to be verified and certified.

A **Clarification Request (CL)** will be issued where information is insufficient, unclear or not transparent enough to establish whether a requirement is met.

A **Forward Action Request (FAR)** will be issued when certain issues related to project implementation should be reviewed during the first verification.

A detailed list of the CARs CLs and FAR raised and discussed in the course of this verification is included in the next section 4 of this report.

4 VERIFICATION FINDINGS

In this section the assessments and findings from the desk review of the CDM PDD, CDM validation report supplementary VCS-PD/S-PD/, Supplementary Validation report/S-Val/ site visit, interviews and supporting documents as well as the final assessments are summarised. Table 3-1 includes an overview of all raised CARs, CLs and FARs.

Table 3-1: Overview of CARs, CLs and FARs issued

No.	Topic / Chapter	CAR	CL	FAR
4.1	Project implementation status	-	-	1
4.2	Accuracy of GHG Emission Reduction or Removal Calculations	5	-	
4.3	Quality of Evidence to Determine GHG Emission Reductions or Removals	1	-	-
4.4	Management and Operational System	1	-	-
-	**SUM**	**7**	**-**	**1**

4.1 Project Implementation Status

Description

The project involves installation of 14.5 MW biomass based power plant. The project operates in Rankine cycle route where the high pressure steam is produced in a 70 TPH biomass fired boiler and fed to the 14.5 MW turbo-generator set for power generation.

The plant and machinery of the project consists of one number multi biomass residue fuel fired travelling grate type of boiler, one number steam generator set, power evacuation system and fuel handling system etc. The electricity voltage level generated by the turbo generator at 11 kV will be stepped up to the 132 kV suitable to interface with the grid electricity. Other plant equipment includes ash-handling system, power evacuation facilities, cooling tower, water treatment plant, compressed air plant, etc. Export of power to the grid has to be through 132 kV transmission line.

The project is implemented on 2009-10-30 which is before registration of this project activity. So description mentioned in the CDM PDD is the real site situation.

The CDM-PDD addresses the project description in sections A.4.2. The validation team has checked during site visit whether the project is implemented as per the description given in the registered CDM-PDD/PDD/.

There is one FAR raised by the CDM validation team which is presented below

. Related Findings

☐ No CARs, CLs or FARs have been identified in this context

☒ The following finding(s) have been addressed:

Finding:	**4.1-1**		
Classification	☐ CAR	☐ CL	☒ FAR
Description of finding *Describe the finding in unambiguous style; address the context (e.g. section)*	"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 neighbouring 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		
Corrective Action #1 *This section shall be filled by the PP. It shall address the corrective action taken in details.*	Surplus mustard stalk availability in the districts of Muktsar, Bathinda and Ferozepur is minimal. Hence mustard stalk is procured from neighbouring 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. A detailed sketch indicating location of these procurement centres is enclosed with the response.		

DOE Assessment #1 *The assessment shall encompass all open issues. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.*	From the verification of fuel procurement receipt/FR/ 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.
Conclusion *Tick the appropriate checkbox*	☒ To be checked during the next periodic verification ☐ Appropriate action was taken ☐ Project documentation was corrected correspondingly ☐ Additional action should be taken ☐ The project complies with the requirements

Final Assessment

On-site visit was carried out during Verification. The location and implementation details of the boilers and turbines in this project activity were verified during on-site visit and confirmed that the project has been implemented as described in the registered PDD/PDD/

The FAR raised regarding the procurement of mustard husk during the validation is addressed above. The PDD/PDD/ and validation report/val/ are checked and found to be OK.

☒ FAR 4.1.1 is closed for this verification and the same will be checked for next verification

4.2 Accuracy of GHG Emission Reduction or Removal Calculations

Description

The proposed project uses CDM approved methodology AMS I.D, Version 15: "Grid connected renewable electricity generation", which is approved under VCS version 3.2

The emission reductions (ER_y) of the project activity are the difference between the baseline emissions (BEy), project emissions (PE_y) and the leakage emissions (L_y) as follows:

$$ER_y = BE_y - PE_y - LE_y$$

Baseline emission: The baseline emissions is the product of electrical energy produced by the renewable generating unit multiplied by an emission factor. Combined margin grid emission factor for the southern regional grid of India which is relevant to the project activity has been fixed ex ante for the entire crediting period in the registered PDD has been used for calculations.

BEy is calculated by multiplying the net electricity supplied to the southern grid (EGy) with combined margin emission factor ($EF_{grid,CM,y}$):

$$BEy = EGy \times EF_{grid,CM,y}$$

The emission factor ($EF_{grid,CM,y}$) is calculated by using the valid version of the "Tool to calculate the emission factor for an electricity system". It is determined ex-ante and consists of the weighted average factors of operating margin (EF_{OM}) and build margin (EF_{BM}).

The data source and process of calculation OM and BM are derived from data published by Central electricity authority/cea/, a government body which is responsible for statistics on the power generation and usage in India. The data vintages and calculation have been checked and were assessed as correct. EF_{OM} and EF_{BM} are calculated as 0.68 tCO2e/MWh and 1.01 tCO2e/MWh respectively. In accordance with ACM0002 that weight factors of $w_{OM} = w_{BM} = 0.5$ have been used to calculate the grid emission factor EFgrid,CM,y (**0.84 tCO2e/MWh**).

The annual net generated electricity of the project is **114 242 MWh.**

The baseline emissions works out to be BE_y **= 95 963 tCO2**

Project emissions: The emission due to transportation of biomass is considered as project emission in the project. The emission due to transportation is calculated based on the number of trips, average round trip distance, vehicle mileage and the emission factor of diesel.

The estimated project emission in the monitoring period is PE_y **= 679 tCO2.**

All the input values considered for calculation of project emission due to transportation of biomass are provided in the ER sheet.

Leakage: According to AMS I.D., the leakage is zero since the technology utilized is new and not transferred from another project activity.

$LE_y = 0$

Emission reduction:

$ER_y = BE_y - PE_y - LE_y$

$ER_y =$ **95963 -679 -0**

$ER_y = 95284$ *tCO2*

According to above information, the total emission reductions of the project works out to be **95 284 tCO2.**

The project satisfies all criteria of AMS I.D, Version 15. The application of monitoring methodology is assessed as correct. The main parameters monitored in the project activity are

No.	Parameter	Monitoring method	Value source
1	Quantity of Electricity exported to the grid by the project during the year y	Total electricity exported minus electricity imported which are monitored by tri-vector energy meter.	Joint meter reading/JMR/
2	Quantity of cotton stalk received in the project activity Quantity of mustard stalk received in the project activity	Weigh bridge	Log sheet/log/
3	Quantity of biomass residue (cotton	Weigh bridge	Log sheet/log/

	stalk) combusted in project plant during the year y Quantity of biomass residue (mustard stalk) combusted in project plant during the year y		
4	Average round trip distance (from and to) between biomass fuel supply sites and the project site	Round trip distance is noted in the factory gate whenever the truck enters in to the plant	Log sheet/log/
5	Number of truck trips for the transportation of biomass.	Number of truck trips counted and noted in the factory gate whenever the truck enters in to the plant	Log sheet/log/

The monitoring plan/PDD/ provides detailed information related to the collection and archiving of all relevant data needed to:

- Estimate or measure emissions occurring from GHG sources, sinks and reservoirs
- Determine the baseline emissions
- Estimate changes in emissions from the site

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

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

The emission reduction calculation sheet/ER/ is provided to DOE is verified. The calculation is in line with the AMS I.D version 16 and the monitoring plan mentioned in the CDM registered PDD/PDD/.

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

Related Findings

☐ No CARs, CLs or FARs have been identified in this context

☒ The following finding(s) have been addressed:

Finding:	4.2-1		
Classification	☒ CAR	☐ CL	☐ FAR
Description of finding *Describe the finding in unambiguous style; address the context (e.g. section)*	The period selected for the monitoring period is 30-10-2009 to 22-02-2011. But it is not mentioned in the MR about, whether both the dates are included or excluded.		
Corrective Action #1 *This section shall be filled by the PP. It shall address the corrective action taken in details.*	The monitoring period has been revised from 30-10-2009 to 28-02-2011.The necessary modifications have been made in the MR.		
DOE Assessment #1 *The assessment shall encompass all open issues. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.*	The monitoring period has been revised from 30-10-2009 to 28-02-2011, considering the complete billing cycle. Further as the CDM crediting period starts from 15th March 2011, thus the current monitoring period does not overlap with the CDM project crediting period. Further the necessary corrections are done. Both initial and final days are included in the monitoring period under MR version 2. CAR 4.2-1 is closed		
Conclusion *Tick the appropriate checkbox*	☐ To be checked during the first periodic verification ☒ Appropriate action was taken ☒ Project documentation was corrected correspondingly ☐ Additional action should be taken ☒ The project complies with the requirements		

Finding:	4.2-2		
Classification	☒ CAR	☐ CL	☐ FAR
Description of finding *Describe the finding in unambiguous style; address the context (e.g. section)*	The parameter "Average CO_2 emission factor for the trucks during the year y" (**$EF_{km},CO_{2,y}$**) is not included under section 3.1 of MR.		
Corrective Action #1 *This section shall be filled by the PP. It shall address the corrective action taken in details.*	The necessary modifications have been made in the MR.		
DOE Assessment #1 *The assessment shall encompass all open issues. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.*	The parameter Average CO_2 emission factor for the trucks during the year y" (**$EF_{km},CO_{2,y}$**) is included in the section 3.1 of MR version 2. CAR 4.2-2 is closed		
Conclusion *Tick the appropriate checkbox*	☐ To be checked during the first periodic verification ☒ Appropriate action was taken ☒ Project documentation was corrected correspondingly ☐ Additional action should be taken ☒ The project complies with the requirements		

Finding:	4.2-3		
Classification	☒ CAR	☐ CL	☐ FAR

Description of finding *Describe the finding in unambiguous style; address the context (e.g. section)*	The frequency of monitoring is mentioned wrongly for the few parameters in the MR. Please check the comments in the MR and correct the same. Details of all the meters/equipments used for the monitoring have not been included in the respective parameter table.
Corrective Action #1 *This section shall be filled by the PP. It shall address the corrective action taken in details.*	The frequency of monitoring has been corrected and the details of the meters/equipment have been incorporated.
DOE Assessment #1 *The assessment shall encompass all open issues. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.*	Frequency of monitoring of the parameters is corrected in the MR. Details of the all meters/equipments used for the monitoring are included in the MR version 2. CAR 4.2-3 is closed
Conclusion *Tick the appropriate checkbox*	☐ To be checked during the first periodic verification ☒ Appropriate action was taken ☒ Project documentation was corrected correspondingly ☐ Additional action should be taken ☒ The project complies with the requirements

Finding:	**4.2-4**		
Classification	☒ CAR	☐ CL	☐ FAR
Description of finding *Describe the finding in unambiguous style; address the context (e.g. section)*	As per the CDM PDD the biomass combusted in the boilers will be cross checked through an energy balance undertaken on quarterly basis. Please explain how it has been done. Also please submit the quarterly energy balance calculation.		
Corrective Action #1 *This section shall be filled by the PP. It shall address the corrective action taken in details.*	The fuel combusted is calculated using Sp. Fuel Consumption and actual power generated (quarter wise). This is compared with the fuel actually consumed / combusted in the boiler. The energy balance for all the quarters in the present monitoring period is enclosed as a separate excel sheet.		
DOE Assessment #1 *The assessment shall encompass all open issues. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.*	The quarterly energy balance calculation/EB/ based on the specific fuel consumption fixed ex-ante has been submitted. As per the energy balance there is 3.5% increase in biomass consumption compared to the estimation in the registered PD. So there is no significant difference between the calculated fuel consumption value and the actual fuel consumption value. CAR 4.2-4 is closed		

Conclusion *Tick the appropriate checkbox*	☐ To be checked during the first periodic verification ☒ Appropriate action was taken ☐ Project documentation was corrected correspondingly ☐ Additional action should be taken ☒ The project complies with the requirements

Finding:7.	**CAR 4.2-5**		
Classification	☒ CAR	☐ CL	☐ FAR
Description of finding *Describe the finding in unambiguous style; address the context (e.g. section)*	The specific fuel consumption mentioned under section 3.1 of MR is not consistent with the Specific fuel consumption fixed in the registered CDM PDD. Please clarify. Also the purpose of the data in the parameter table is missing.		
Corrective Action #1 *This section shall be filled by the PP. It shall address the corrective action taken in details.*	The value of SFC has been corrected and is now consistent with the registered PDD. The purpose of the data has been included.		
DOE Assessment #1 *The assessment shall encompass all open issues. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.*	The Specific fuel consumption is corrected and now consistent with the value fixed in CDM PDD. Also the purpose of the data has been included in the table. CAR 4.2-5 is closed		
Conclusion *Tick the appropriate checkbox*	☐ To be checked during the first periodic verification ☒ Appropriate action was taken ☒ Project documentation was corrected correspondingly ☐ Additional action should be taken ☒ The project complies with the requirements		

Final Assessment

During on-site visit, the details of monitoring equipments such as make, accuracy class, type and serial numbers were recorded. The details w.r.t energy meters provided in the monitoring report/MR1/ were verified with their respective calibration certificates/cal/ and registered CDM PDD/PDD/ and are found to be OK.

All other relevant evidences were fully checked by the verification team during the on-site visit. All evidences are clearly identifiable and assessed to be correct. For the considered verification period, all indicators stated in the applicable monitoring methodology AMS I.D (Version 15) were correctly monitored and reported. Hence all the value applied for emission reduction calculation is found to be accurate and correct.

Comparison of emission reduction with ex-ante estimation:

Year	2009	2010	2011	Total
Actual Emission reduction achieved (t CO2)	11200	76434	7650	95284
ER as per PDD (pro-rata emission reduction) (t CO2)	12926	74891	12106	99923
Difference	-13%	2%	-37%	-5%

It is also noticed that the emission reduction achieved is 5% less than the ex-ante emission reduction estimation mentioned in the CDM registered PDD.

☒ CAR 4.2.1 to CAR 4.2.5 are closed

4.3 Quality of Evidence to Determine GHG Emission Reductions or Removals

Description

Proper data management inclusive of data acquisition and aggregation, data management system is being followed for the project activity.

The joint meter reading statement/JMR/ 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 calibration frequency has been followed except for the weigh bridge. However as the emission reduction calculations are not based on the quantity of biomass consumption thus the application of EB 52 annex 60 is not required.

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/TC/ were checked during on-site verification.

Related Findings

☐ No CARs, CLs or FARs have been identified in this context

☒ The following finding(s) have been addressed:

Finding:	4.3-1		
Classification	☒ CAR	☐ CL	☐ FAR
Description of finding *Describe the finding in unambiguous style; address the context (e.g. section)*	Please submit the following documents 1. Emission reduction calculation sheet 2. Calibration certificates 3. Electricity selling invoice copies 4. Biomass purchase invoice copies		

Corrective Action #1 *This section shall be filled by the PP. It shall address the corrective action taken in details.*	The above mentioned documents are attached with the response.
DOE Assessment #1 *The assessment shall encompass all open issues. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.*	1. Emission reduction calculation sheet is submitted. It is found that the emission reduction is calculated as per the registered CDM PDD. CAR is closed 2. Calibration certificate of all the equipments are submitted. From the verification of calibration reports it is found that all the energy meters are calibrated as per the frequency mentioned in the CDM registered PDD and thereby it is confirmed that the energy meters are operated within the accuracy limit in the monitoring period. But the weighbridge is not calibrated within 1 year frequency. However since the biomass consumption reading does not have any impact on emission reduction calculation the biomass consumption value is not adjusted. CAR is closed. 3. All the electricity selling invoice copies are submitted. It is found that the readings in the joint meter readings (EB statement) are matching with the invoice copies. CAR is closed 4. Biomass purchase receipts[/FR/] are submitted. The values of biomass procurement is crosschecked with the biomass purchase receipt and found that the values are matching. CAR is closed
Conclusion *Tick the appropriate checkbox*	☐ To be checked during the first periodic verification ☒ Appropriate action was taken ☐ Project documentation was corrected correspondingly ☐ Additional action should be taken ☒ The project complies with the requirements

Final Assessment

All the monitored records[/JMR/INV/] are in line with the monitoring plan mentioned in the registered CDM PDD[/PDD/]. All the monitoring records provided are of appropriate quality and reliability. All the monitored data provided in electronic form were verified with the supporting documents and found to be OK.

☒ CAR 4.3-1 is closed

4.4 Management and Operational System

Description

All internal data are subjected to QA/QC measures. All monitored data are archived in Electronic form. The allocation of responsibilities is documented in a written form and is followed as described in the CDM registered PDD[/PDD/] and VCS MR[/MR2/]. This has been verified. Routines for the archiving of data

are defined and documented. Calculations are laid down in the monitoring report are in line with CDM PDD/PDD/.

Members of monitoring team were interviewed/IM01/ during the site visit. Procedure for training and maintenance of critical equipments were discussed during site visit. The shift-in-charge is responsible for logging hourly readings. Managers and heads are responsible for the compilation and data correlation. All the staffs involved in the monitoring are well trained and have adequate knowledge. Training records/TR/ for the monitoring personnel were reviewed during site visit.

All monitored data are archived in plant log sheet (in paper) and Electronic form. Details on monitoring constraint was verified during the site visit and found that proper procedures were adopted for data handling. The data will be stored for 2 years after the end of crediting period or till the issuance of VERs for this project activity whichever occurs later.

Related Findings

☐ No CARs, CLs or FARs have been identified in this context

☒ The following finding(s) have been addressed:

Finding:	**4.4-1**		
Classification	☒ CAR	☐ CL	☐ FAR
Description of finding *Describe the finding in unambiguous style; address the context (e.g. section)*	Details related to training of monitoring personnels are not included in the monitoring report.		
Corrective Action #1 *This section shall be filled by the PP. It shall address the corrective action taken in details.*	The details of training have been incorporated in the MR.		
DOE Assessment #1 *The assessment shall encompass all open issues. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.*	The training details are included in the revised monitoring report. The training records/TR/ submitted is also verified and found that the training details mentioned in the monitoring report is correct. The training provided are sufficient for the monitoring personnel to carry out the monitoring. CAR 4.4-1 is closed.		
Conclusion *Tick the appropriate checkbox*	☐ To be checked during the first periodic verification ☒ Appropriate action was taken ☒ Project documentation was corrected correspondingly ☐ Additional action should be taken ☒ The project complies with the requirements		

Final Assessment

The monitoring procedures and responsibilities mentioned in the monitoring report/MR2/ are in line with the registered CDM PDD/PDD/. In the site visit it is verified and confirmed that the monitoring procedure is being followed in the site is in line with the registered CDM PDD/PDD/ and the monitoring report/MR2/. Calculations are laid down in the monitoring report/MR2/ and ER sheet/ER/ are in line with registered

CDM PDD[/PDD/].The monitoring personnel are well trained and thus, they have the necessary competence to carry out the relevant tasks with sufficient accuracy. The training schedules for the monitoring personnel's were checked by the verification team during the on-site verification. Thus, they have the necessary competence to carry out the relevant tasks with sufficient accuracy

5 VERIFICATION CONCLUSION

M/s. Universal Biomass Energy Private Limited has commissioned the TÜV NORD JI / CDM Certification Program to carry out the verification of the Project "Biomass Based Power Generation Plant at Village Channu, Punjab" in Punjabt, India with regard to the requirements of VCS version 3.2 Standard.

The project activity involves installation of a 14.50 MW Biomass Residue based Power Plant which is primarily fired with cotton stalks and mustard stalks to generate electricity and export power to the regional grid. The project activity shall thus reduce GHG emissions by displacing the fossil fuel dominated grid based electricity with biomass residues based renewable electricity

Reporting period: From 2009-10-30 to 2011-02-28 (both days included)

In the course of the verification 7 Corrective Action Requests (CARs), 0 Clarification Requests (CLs) were successfully closed. The Forward Action Request (FAR) is raised during CDM validation is closed for this verification.

The verification is based on the draft monitoring report[/MR1/], revised monitoring report[/MR2/], the monitoring plan as set out in the registered CDM PDD[/PDD/], Supplementary VCS-PD[/S-PD/], the CDM validation report[/val/], Supplementary validation report/[S-Val/]emission reduction calculation spreadsheet[/ER/] and supporting documents[/JMR/xls/INV/] made available to the TÜV NORD JI/CDM CP by the project participant.

In detail the conclusions can be summarised as follows:

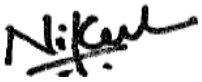
- all operations of the project are implemented and installed as planned and described in the validated project description.
- the monitoring plan is in accordance with the applied approved methodology ,ie, AMS I.D Ver 15
- the installed equipment essential for measuring parameters required for calculating emission reductions is calibrated appropriately or maximum possible error is applied for the delay period in calibration.
- the monitoring system is in place and functional. The project has generated GHG emission reductions.

As the result of the 1st periodic verification, the verifier confirms that the GHG emission reductions are calculated without material misstatements in a conservative and appropriate manner. TÜV NORD JI/CDM CP herewith confirms that the project has achieved emission reductions in the above mentioned reporting period as follows:

GHG Emission Reductions or Removals	2009	2010	2011	Total in the monitoring period

Baseline Emissions (tCO_2e)	11314.8	76945.68	7702.8	95963.28356.32
Project Emissions (tCO_2e)	113.91	511.21	51.85	676.9702
Leakage (tCO_2e)	0	0	0	0
Net GHG emission reductions or removals (tCO_2e)	11200	76434	7650	95284

Bangalore, 2012-07-18



R S Nikesh
TÜV India Pvt. Ltd., Bangalore
Verification Team Leader

Essen, 2012-07-18

Stefan Winter
TN JI/CDM Certification Program
Final Approval

6 REFERENCES

Table 6-1: Documents provided by the project participant

Reference	Document
/**CtO**/	Consent to operate for the plant issued by Punjab Pollution Control Board dated 2011-03-31
/**Comm**/	Commissioning certificate for the project issued by Punjab State Power Corporation dated 2011-01-24
/**cal**/	**Year 2009** Calibration certificate of energy (main) meter (Sr. No 08043957) dated 2009-10-16 for the calibration done on 2009-10-15 Calibration certificate of energy (main) meter (Sr. No 08043951) dated 2009-10-16 for the calibration done on 2009-10-15 Calibration certificate of weighbridge (Sr. No 2008-043) dated 2009-09-16 **Year 2010** Calibration certificate of energy (main) meter (Sr. No 08043957) dated 2010-10-09 for the calibration done on 2010-10-08 Calibration certificate of energy (main) meter (Sr. No 08043951) dated 2010-10-09 for the calibration done on 2010-10-08 Calibration certificate of weighbridge (Sr. No 2008-043) dated 2010-10-03
/**EB**/	Quarterly energy balance calculation sheet for the fuel consumption dated 2011-12-11
/**ER**/	Emission reduction calculation sheet dated 2011-11-04
/**FR**/	Biomass purchase receipts for the monitoring period from November 2009 to February 2011
/**inv**/	Electricity selling invoice copies for the months from November 2009 to February 2011
/**JMR**/	Joint meter reading reports for the months from November 2009 to February 2011
/**MR1**/	Monitoring report of the project “Biomass Based Power Generation Plant at Village Channu, Punjab”, Version 1, dated 2011-07-06
/**MR2**/	Monitoring report of the project “Biomass Based Power Generation Plant at Village Channu, Punjab”, Version 2 dated 2011-11-04

Reference	Document
/**Spec**/	Manufactures specification of Boiler & turbine
/**TR**/	Training records of the plant personnel
/**xls**/	Electricity export and biomass consumption monitoring data for the monitoring period of the project "Biomass Based Power Generation Plant at Village Channu, Punjab"

Table 6-2: Background investigation and assessment documents

Reference	Document
/**AMS ID**/	Approved CDM Methodology AMS I.D, version 15 "Grid connected renewable electricity generation"
/**CPM**/	TÜV NORD JI / CDM CP Manual (incl. CP procedures and forms)
/**IPPC**/	1. 1996 IPCC Guidelines for National Greenhouse Gas Inventories: work book 2. 2006 IPCC Guidelines for National Greenhouse Gas Inventories: work book
/**ISO 14064**/	Greenhouse gases -- Part 1: Specification with guidance at the organization level for quantification and reporting of greenhouse gas emissions and removals Greenhouse gases -- Part 2: Specification with guidance at the project level for quantification, monitoring and reporting of greenhouse gas emission reductions or removal enhancements Greenhouse gases -- Part 3: Specification with guidance for the validation and verification of greenhouse gas assertions
/**ISO14065**/	Greenhouse gases -- Requirements for greenhouse gas validation and verification bodies for use in accreditation or other forms of recognition
/**PDD**/	Registered CDM PDD of the project "Biomass Based Power Generation Plant at Village Channu, Punjab" version 03 dated 2011-02-08
/**S-PD**/	Supplementary VCS-PD of the project "Biomass Based Power Generation Plant at Village Channu, Punjab" version 1 dated 2011-05-02
/**S-Val**/	Supplementary VCS validation report of the project "Biomass Based Power Generation Plant at Village Channu, Punjab" version 1 dated 2011-05-11
/**val**/	Final CDM validation report of the "Biomass Based Power Generation Plant at Village Channu, Punjab" revision 0 dated 2010-02-10

Reference	Document
VCS	Voluntary Carbon Standard version 3.2
/**VCS-MR**/	VCS version 3.1 Monitoring report Template
/**VVM**/	Validation and Verification Manual (Version as per EB 51)

Table 6-3: Websites used

Reference	Link	Organisation
/**cd4cdm**/	www.cd4cdm.org	UNEP Riso Centre
/**ipcc**/	www.ipcc-nggip.iges.or.jp	IPCC publications
/**vcs**/	www.v-c-s.org	VCSA
/**unfccc**/	http://cdm.unfccc.int	UNFCCC

Table 6-4: List of interviewed persons

Reference	MoI[1]		Name	Organisation / Function
/**IM01**/	V	☒ Mr. ☐ Ms	Pawanpree Singh	Director, UBEPL
	T,E,V	☒ Mr. ☐ Ms	Nirmolak Singh	UBEPL
	T,V	☒ Mr. ☐ Ms	M.L.Arora	G.M, UBEPL

1) Means of Interview: (**T**elephone, **E**-Mail, **V**isit)