VALIDATION REPORT: BIOMASS BASED COGENERATION PLANT AT GODREJ AGROVET LTD. CHINTAMPALLI

TÜV Rheinland (China) Ltd
Unit 707, AVIC Building, No. 10B, Central Road,
East 3rd Ring Road, Chaoyang District, Beijing 100022,
People's Republic of China.
Tel.: +86 10 65 66 66 60 (ext.169)
FAX: +86 1065 66 66 67
E-mail: doe@chn.tuv.com

Project Title	Biomass based cogeneration plant at Godrej Agrovet Ltd. Chintampalli
Version	03
Report ID	01 997 9105078805

Report Title	Validation Report: Biomass based cogeneration plant at Godrej Agrovet Ltd. Chintampalli
Client	Godrej Agrovet Ltd.
Pages	39
Date of Issue	23- September-2014
Prepared By	TÜV Rheinland (China) Ltd
Contact	Unit 707, AVIC Building, No. 10B, Central Road, East 3rd Ring Road, Chaoyang District, Beijing 100022, People's Republic of China.

	Tel.: +86 10 65 66 66 60 (ext.169) FAX: +86 1065 66 66 67 E-mail: doe@chn.tuv.com
Approved By	Mr. Henri Phan
Work Carried Out By	

Full name	Role	Technical Area
Mr. M.P.Kanal*	Team Leader	1.2, 3.1, 6.1, 13.1, 15.1
Mr. R Narendra Kumar**	Team Leader	1.2, 3.1
Mr. Anudeep Thorat	Technical Expert	1.1
Ms. Indumathi	Technical Reviewer	1.2
Mr. Walter Tang	TR Expert	1.1

***TL from 01/06/2014**

****TL till 31/05/2014**

Summary:

The validation team assigned by the DOE (TÜV Rheinland (China) Ltd.), here after called TRC, is been assigned by "Godrej Agrovet Limited." to perform the validation of their project "Biomass based cogeneration plant at Godrej Agrovet Ltd. Chintampalli". The validation was performed on the basis of VCS Guidelines/ VCSA Rules. The scope of the validation is defined as an independent and objective review of the VCS project description, the project's baseline study and monitoring plan and other relevant documents. The information in these documents is reviewed against VCS Standard, version 3.4.

The report is based on the assessment of the VCS project description (VCS PD) document undertaken through stakeholder consultations, application of standard auditing techniques including but not limited to document reviews, site visit, and stakeholder interviews, review of the applicable methodology and its underlying formulae and calculations.

Validation methodology and process

The validation has been performed as described in the VCS Validation Verification Manual version 03.1 and constitutes the following steps:

- Desk review of the VCS PD and the relevant documents

- On-site assessment (21/04/2014)

- Issuance of Validation Report & Validation Representation

The project correctly applies the baseline and monitoring methodology AMS I.C, Version 19, "Thermal energy production with or without electricity".

The project results in reductions of CO_2 emissions that are real, measurable and give long-term benefits to the mitigation of climate change. It is demonstrated that the project is not a likely baseline scenario. Emission reductions attributable to the project are hence additional to any that would occur in the absence of the project activity.

The validation did not reveal any information that indicates that the project can be seen as a diversion of ODA funding towards "India".

The monitoring plan provides for the monitoring of the project's emission reductions. The monitoring arrangements described in the monitoring plan are feasible within the project design and it is TRC's opinion that the project participants are able to implement the monitoring plan.

The project uses renewable biomass residue and replaces use of coal that would have otherwise led to equivalent CO_2 emissions. Thus the project activity result in reductions of greenhouse gas (GHG) emissions that are real, measurable and give long-term benefits to the mitigation of climate change.

The total emission reductions from the project are estimated to be 703,140 t of CO_2e over a 10 year crediting period, averaging 70,314 t of CO_2e annually. The emission reduction forecast has been checked and it is deemed likely that the stated amount is achieved given the underlying assumptions do not alter.

The validation protocol describes a total of 10 findings which include:

13 Corrective Action Requests (CARs);

4 Clarification Requests (CLs);

0 Forward Action Requests (FARs);

All findings in CARs/CLs have been closed satisfactorily. There are no restrictions of uncertainties related to this validation.

TRC concludes that the VCS Project Activity "Biomass based cogeneration plant at Godrej Agrovet Ltd. Chintampalli, as described in the VCS PD (version 04, date 23/09/2014), meets all relevant requirements of VCS Standard, version 3.4

The selected baseline and monitoring methodologies (AMS IC version 19) are applicable to the project and correctly applied. The TRC therefore requests the registration of the project as a VCS project activity.

Table of Contents

1 INTRODUCTION

1.1 Objective

The purpose of a validation is to have an independent, professional, ethical and fair third party assessment of the project design. In particular, the project's baseline, monitoring plan, and the project's compliance with relevant VCS and host Party criteria are validated in order to confirm that the project design, as documented, is sound and reasonable and meets the identified criteria. Validation is a requirement for all VCS projects and is seen as necessary to provide assurance to stakeholders of the quality of the project and its intended generation of Verified Carbon Units (VCUs).

1.2 Scope and Criteria

The validation scope is defined as an independent and objective review of the VCS Project Description (VCS PD). The VCS PD is reviewed against the relevant criteria (see above) and decisions by the VCS Board, including the approved baseline and monitoring methodology. The validation team has, based on the recommendations in the Validation and Verification Manual employed (latest version) a risk-based approach, focusing on the identification of significant risks for project implementation and the generation of VCUs.

The validation is not meant to provide any consulting towards the project participants. However, stated requests for clarifications and/or corrective actions may have provided input for improvement of the project description.

While carrying out the validation, TRC determines if the project activity complies with the requirements of VCS guidelines and also assesses the claims and assumptions made in the VCS PD without limitation on the information provided by the project participants.

The scope of the validation is:

- To apply TRC's own quality management system integrated with the Validation and Verification Manual along with the guidance provided by the VCS board to determine if the project activity meets all applicable VCS requirements, including those specified in the VCS standard, relevant methodologies, tools and guidelines and processing the same with VCS Program Guide;
- Asses the accuracy, conservativeness, relevance, completeness, consistency and transparency of the information provided by the project participants;
- Determine whether information provided by the project participants are reliable and credible;
- Present information in the form of validation report in a factual, neutral, coherent manner and document all assumptions, provide references to the background material and identify changes made to the documentation;
- Base the findings and conclusions on objective evidence and conduct all validation in accordance with VCS rules and procedures;

- Apply consistent validation criteria in providing expert judgments to the requirements of applicable approved methodologies, tools and also cross check the same with projects of similar characteristics, technology, time period and region; and
- Safeguard the confidentiality of all information's obtained or created during validation.
- Where sampling is involved, the standard for sampling and surveys are applied.

1.3 Level of Assurance

The validation report is based on VCS PD, supporting documents (refer below section 2.2) made available to the validation team and information collected through performing interviews and document review. The validation opinion is assured provided the credibility of all above.

1.4 Summary Description of the Project

The project activity involves implementation of biomass based cogeneration plant which consist 35 TPH biomass based boiler and 2.5 MW turbine generator. The project activity is implemented in the premises of Godrej Agrovet Limited (GAVL)'s new 60 TPH palm oil production plant. The steam generated is used in the 2.5 MW turbine generator and the extracted steam from turbine generator is used for the processing in the plant. The electricity generated will be used to cater the captive demand.

The project activity is located at Chintampalli village, West Godavari district, Andhra Pradesh, India. The biomass used in the boiler are biomass fibre, shell and empty fruit bunches (EFB) which are waste from the palm oil processing plant which are also considered as renewable biomass. In the absence of the project activity, the project proponent would have implemented coal based cogeneration plant with the same capacity to meet the plant's thermal energy and electricity requirement. Since the project use renewable biomass for the thermal energy and electricity generation, this replaces fossil fuel (coal) burning and there by avoid the associated CO2 emission.

The technical specifications of major equipment verified during site visit are mentioned below:

Specification	**Unit**	**Value**
Boiler		
Type		Pulsating grate bi-drum air cooled boiler
Make and Model		Thermax Ltd. BDPG - 350
Design steam generation capacity at MCR	TPH	35
Steam pressure at MCR	kg/cm^2	35

Steam temperature	°C	350±10
Fuel requirement Fuel 1: 75% palm fibre + 25% palm shell Fuel 2: 70% palm fibre + 30% empty bunches	TPD mixed biomass	250
Efficiency of boiler (for fuel 1 and fuel 2)		73%
Feed water temperature to economiser	°C	105
Turbine Generator		
Type		multistage, impulse, nozzle governed back pressure
Make		Triveni Turbine Limited
Design capacity	MW	2.5
Inlet steam pressure	kg/cm^2	33
Inlet steam temperature	°C	350±10
Specific steam consumption	kg/kWh	13.9
Outlet steam pressure	kg/cm^2	4.5
Electrical output at AC generator terminal (3 phase, 4 wire system, 0.8 PF)	25 m/s	2500 kW (415 V, 50 Hz)

2 VALIDATION PROCESS

2.1 Method and Criteria

The validation consists of the following four phases:

I A desk review of the project design documents

- A review of data and information;
- Cross checking between information provided in VCS PD with all necessary means without limitations to the information provided by the project proponent;

II On-site visit and follow-up interviews with project stakeholders

- Interviews with relevant stakeholders in host country with personnel's having knowledge with the project development via telephone, email or direct on-site visits;
- Cross checking between information provided by interviewed personnel with all necessary means without limitations to the information provided by the project proponent;

III Reference to available information's relating to projects or technologies similar projects under validation and review based on the approved methodology being applied of the appropriateness of formulae and accuracy of calculations.

IV The resolution of outstanding issues and the issuance of the final validation report & opinion and Validation representation.

The following sections outline each step in more detail.

2.2 Document Review

The following table outlines the documentation reviewed during the validation:

Ref no.		Reference Document
/P1/	/P1.1/	VCS PD [Biomass based cogeneration plant at Godrej Agrovet Ltd. Chintampalli], Version 01, Date 15/04/2014
	/P1.2/	VCS PD [Biomass based cogeneration plant at Godrej Agrovet Ltd. Chintampalli], Version 03, Date 13/08/2014
	/P1.3/	VCS PD [Biomass based cogeneration plant at Godrej Agrovet Ltd. Chintampalli], Version 04, Date 23/09/2014
/P2/	/P2.1/	ER & Financial calculation sheets (draft), version 01, date 15/04/2014
	/P2.2/	ER & Financial calculation sheets (final), version 03, date 13/08/2014
	/P2.3/	ER & Financial calculation sheets (final), version 04, date 23/09/2014
/P3/		Purchase order issued by M/s Godrej Agrovet Ltd. to Thermax Limited for erection and commissioning of boiler, dated 10/05/2011 Purchase order issued by M/s Godrej Agrovet Ltd. to Thermax Limited for supply of boiler, dated 10/05/2011 Purchase order issued M/s Godrej Agrovet Ltd. to Thermax Limited for supply, supervision of erection and commissioning of water treatment plant, RO plant

	and DM plant, dated 19/10/2011 Purchase order issued by M/s Godrej Agrovet Ltd. to Triveni Turbine Limited for supply of turbine generator, dated 12/05/2011 Purchase order issued M/s Godrej Agrovet Ltd. to Global Technologies for supply, erection & commissioning of fuel and material handling system, dated 29/12/2011
/P4/	Consent to establish of the palm oil plant and captive power plant from APPCB, dated 19/12/2011 Consent for operate and Hazardous waste authorisation order from APPCB, dated 13/06/2013 Amendment to the consent for operate and Hazardous waste authorisation order from APPCB, dated 24/07/2013
/P5/	Approval for the HT electricity connection to the plant by Eastern Power Distribution Company of A.P Limited, dated 23/07/2012
/P6/	Commissioning certificate of boiler form Thermax (commissioning date 16/07/2012), dated 16/07/2012 Commissioning certificate of turbine generator form Triveni Turbine Ltd (commissioning date 18/08/2012), dated 29/08/2013
/P7/	Name change certificate from Government of Andhra Pradesh (for the name change from 'Godrej Oil Palm Ltd' to 'Godrej Agrovet Ltd', dated 02/11/2012
/P8/	Declarations states that Godrej Agrovet Ltd has no intention of creating and trading of another form of environmental credits out of VCUs would be created from this given project (Cp para 1.13 of VCS PD template) and technology and capacity would not change during the entire crediting period, dated 15/02/2014
/P9/	Stakeholders survey and feedback forms.(March to April 2014)
/P10/	Price Notification of The Singareni Collieries Company Ltd. Hyderabad dt. 11/09/2013

Background investigation and other referred documents/websites:

Ref no.	Reference Document
/B1/	VCS Standard, version 3.4 VCS Program guide, version 3.5

	VCS Program definitions, version, 3.5 VCS Validation and verification manual, version 3.1 CDM Validation and Verification Standard, version 7.0. CDM project standard, version 7.0
/B2/	Approved CDM Baseline & Monitoring Methodology: AMS I.C, version 19
/B3/	CDM Guidance: Guidelines on the demonstration of additionality of small-scale project activities, version 9.0
/B4/	1. Glossary of CDM terms, version 07 2. Relevant CDM and PoA specific requirements (CDM M & P and decisions by the CMP and documents released by CDM EB) published on the UNFCCC CDM website
/B5/	VCS Registration and issuance process, version 3.5
/B6/	CDM Guidance: Guidelines on the assessment of investment analysis, Version 05
/B7/	APERC order, dated 06/08/2013
/B8/	Websites used: Steam table: http://www.spiraxsarco.com/resources/steam-tables.asp
/B9/	Tool to calculate the emission factor for an electricity system, Version: 04.0
/B10/	APERC order for Purchase of power from Non-conventional energy projects, dated 10/03/2004
/B11/	APERC order, dated 31/03/2009
/B12/	10 years -Bagasse price index sourced from Ministry of Commerce and Industry, Government of India

2.3 Interviews

TÜV Rheinland validation team carried out an on-site visit dated 21/04/2014 and performed interviews with the project representatives and stakeholders. The site visit was conducted to validate the accuracy and completeness of the project description as specified under VCS PD.

During the site visit, the validation team reviewed the available project activity designs, feasibility studies, documentation and comparison analysis with equivalent projects as appropriate.

Prior to the interview salient points to be discussed were planned. Date of interview, interviewee and points discussed are given in the following table.

	Date	Name	Organization	Topic
/i/	21/04/2014	Mr. Prasad Jakkaraju	Dy.General Manager, Godrej Industries Ltd.	-PP's background -Investment decision -Public funding -Additionality issues -Double counting issues
/ii/	21/04/2014	MSMS.KUMAR	DGM, Godrej Industries Ltd.	
/iii/	21/04/2014	N.Venkateswarao	Manager-Cogen	- Project design - Project implementation - Technical design - Monitoring plan
	21/04/2014	P.Anandrao	Asst.Manager-Prodn	
/iv/	21/04/2014	Ramachandra Rao	Executive-Prodn.	
	21/04/2014	M.A.Ansari	Sr.Officer-Quality	
/v/	21/04/2014	Mr. Pravin Jadhav	AVP, RSM GC Advisory Services Pvt. Ltd	-Project design -Baseline identification -ER calculation -IRR Calculation -Additionality issues -Monitoring plan

Validation team considered the views obtained in these interviews while arriving at Validation Opinion.

2.4 Site Inspections

TÜV Rheinland validation team carried out an on-site visit dated 21/04/2014 and checked the project technical design and implementation. The site visit was conducted to validate the accuracy and completeness of the project description as specified under VCS PD. Validation team considered the views obtained in site observation while arriving at Validation Opinion.

2.5 Resolution of Findings

The objective of this phase of the validation is to resolve any outstanding issues (issues that require further elaboration, research or expansion) which need be clarified prior to TÜV Rheinland's positive conclusion on the project design. In order to ensure transparency a validation protocol is customized for the project. The protocol shows in transparent manner criteria (requirements), means of validation and the results from validating the identified criteria. The validation protocol serves the following purposes:

- It organizes, details and clarifies the requirements a VCS project is expected to meet VCS requirements;
- It ensures a transparent validation process where the validator will document how a particular requirement has been validated and the result of the validation.
- It ensures that the issues are accurately identified, formulated, discussed and concluded in the validation report.
- It ensures the determination of achieving credible emission reductions from the project activity.

The validation findings are described and resolved in the Appendix I

Findings established during the validation can either be seen as a non-fulfillment of VCS criteria or where a risk to the fulfillment of project objectives is identified. Corrective action requests (CAR) are issued, where:

- Mistakes have been made with a direct influence the ability of the project activity to achieve on project results like real, measurable, verifiable and additional emission reductions;
- VCS and/or methodology specific requirements have not been met; or
- There is a risk that the project would not be accepted as a VCS project or that emission reductions will not be certified.

A request for clarification (CL) may be used where additional information is needed to fully clarify an issue.

On total, 10 findings are identified which consist 13 Corrective Action Requests (CAR) and 4 Clarification Request (CL). Please refer Appendix I for the findings.

2.6 Forward Action Requests

A forward action request (FAR) is raised during validation to highlight issues related to project implementation that require review during the first verification of the project activity. FARs shall not relate to the VCS requirements for registration. No FARs is raised in this project activity.

3 VALIDATION FINDINGS

3.1 Project Details

Project type, technologies and measures implemented, and eligibility of the project:

The project activity is a cogeneration unit and had commissioned one 35 TPH biomass based boiler and a 2.5 MW turbine generator (TG). The generated steam and electricity is used to meet the captive demand of a greenfield palm oil production unit. The project is located at Chintampalli village of Andhra Pradesh.

The technical specification of the project activity is verified from the site visit and the supporting documents/P3/

The project is not a grouped project. Hence no eligibility criterion has been setup for the inclusion of new instance.

- The new plant has 35 TPH boiler and 2.5 MW turbine generator and are not expected to undergo any change within the crediting period, the same is confirmed by validation team during interview with project proponent for this project activity.

- The verified details of key equipment implemented under the project activity are illustrated below and confirmed through document review of and purchase order/P5/ and commissioning certificate/P6/:

The technology being used in the project activity is indigenously available and is deemed to represent current good practice and state-of-the-art technology. The generated steam and electricity is used to meet the captive demand of a greenfield palm oil production unit.

The PLF of the project activity has been calculated 80% which is based on APERC tariff order 06/08/2013/B7/.This is in line with the requirement of § 3 (b) of annex 11 of EB 48.

The project uses renewable biomass residue and replaces use of coal that would have otherwise led to equivalent CO2 emissions. Hence the project avoided the associated CO_2 emission and the emission reduction due to the project is calculated to be 70,314 tCO_2 per annum

Project proponent and other entities involved in the project:

Project proponent involved in the project is Godrej Agrovet Limited. which is correctly mentioned in the section 1.3 of the VCS PD/P1.2/.

No other entity is involved in this project.

Project start date:

The turbine of the project activity was commissioned on 18/08/2012/ P6/. Since this is the date, when the project began generating GHG emission reductions, which is considered as project starting date as per section 3.7.1 of VCS Standard version 3.4; the same is verified through commissioning report/P6/ and found to be correct.

Project crediting period:

The project crediting period is of 10 years which can be renewed for 2 times. The starting date of crediting period is 18/08/2012/P6/. This is appropriate and in line with section 3.8.1 of VCS standard, version 3.4

Project scale and estimated GHG emission reductions or removals:

The project scale category described in VCS PD section 1.7/P1.2/ is 'Projects'. This is found to be appropriate as the estimated emission reduction of the project is 70,314 tCO_2 which is less than 300,000 tonnes of CO_2e per year and hence in line with section 3.9.1 of Project standard.

Project location:

The project is located at Chintampalli Village, West Godavari, State – Andhra Pradesh, Country - India. The geographical coordinates Latitude -17° 12' 36'' N and longitude: 80° 56' 34'' E are verified to be OK.

The location of the project activity is checked during site visit and found to be correct.

Conditions prior to project initiation:

In pre-project scenario, no energy generation sources or the consumer of energy existed in this location. This is confirmed through interview with the PP.

Project compliance with applicable laws, statutes and other regulatory frameworks:

The project proponent however has obtained the necessary approvals from the applicable statutory bodies. Letters of approval/P4/ for Consent to Establish, Boiler Inspection, Electrical connections, Electrical Inspection Consent to Operate were checked hence confirmed that project has got all statutory clearances required to install the project.

Ownership and other programs:

- ***Right of use:*** POs of boilers and turbines to the OEM suppliers/P3/ establishing ownership rights including commissioning certificate/P6/ was reviewed by validation team as a proof of title in respect of rights of use accorded to the project proponent and it is found to be acceptable.

- ***Emissions trading programs and other binding limits****:* The project proponent is not part of any emission trading program. The respective websites are checked and found that the project is not applied in any emission trading program. Also a declaration letter from PP has been submitted which confirms the same/P8/. Hence no double counting applies for this project as per declarations provided by PP.

- ***Other forms of environmental credit sought or received:*** The declaration given by the PP mentions that project has not created any other environmental credits and the PP will not seek any form of environmental credit in future/P8/.

- ***Participation under other GHG programs:*** The project under the ownership of Godrej Agrovet Limited have not applied under any other GHG programs. This is confirmed from the declaration letter provided by PP that mentions that project has not created any other environmental Credits/P8/.

- ***Rejection by other GHG programs:*** This project activity is not rejected by any other GHG Programs. The declaration letter form PP confirms the same/P8/.

Additional information relevant to the project

- ***Eligibility criteria for grouped projects:*** This is not a group project activity. Hence no eligibility conditions were setup.

- ***Leakage management for AFOLU projects:*** This is not an AFOLU project activity.

- ***Commercially sensitive information:*** There is no commercially sensitive information in this project activity. The same is confirmed in the section 1.13 of the VCS PD/P1.2/.

The processes undertaken by the validation team to validate the accuracy and completeness of the project description include conducting a physical site inspection, sampling, reviewing available designs and feasibility studies, conducting comparison analysis with equivalent projects.

The validation team hereby confirms that the project description in the final VCS-PD is accurate and complete in all respects.

3.2 Application of Methodology

3.2.1 Title and Reference

Title of the Methodology	AMS I.C: Thermal energy production with or without electricity, Version 19
Reference of the Methodology	Category: Approved Small Scale Methodology IC: http://cdm.unfccc.int/methodologies/DB/6EL4AG49US2S1DNH55Y4S7GDQFA2JF
Tools Used	Tool to calculate the emission factor for an electricity system (Version 04/EB 75 Annex 15)

The methodology and tools version used is the latest version available in the UNFCCC website and hence it is valid at the time of validation of the project activity. .

3.2.2 Applicability

Approved baseline and monitoring methodology AMS .I.C "*Thermal energy production with or without electricity* has been applied for the proposed project activity. At the time of validation of the project and methodology (AMS.I.D) version 19 applied is the latest one.

The validation team determined the applicability of methodology AMS I.C (version 19) as follows:

Applicability criteria of the methodology: AMS I.D, Version 17	Criteria fulfilled	Determination by the validation team
§ 1 of methodology	☒ Yes ☐ No ☐ NA	The project activity comprises of renewable biomass residue based thermal energy generation for captive use. The project activity displaces the energy generation from coal. This has been confirmed through purchase orders/P3/ and commissioning certificates/P6/. Hence the applicability criterion is fulfilled.
§ 2 of methodology	☒ Yes ☐ No ☐ NA	The project activity involves one biomass based boiler and TG in a cogeneration mode. This has been confirmed through purchase orders/P3/ and commissioning certificates/P6/. Hence the applicability criterion is fulfilled.
§ 3 of methodology	☒ Yes ☐ No	Emission reductions from the project activity accrue and are claimed from electricity and steam production for onsite consumption. The ER sheet was checked in this regard/P2.2/. Hence the applicability criterion is fulfilled.

Applicability criteria of the methodology: AMS I.D, Version 17	Criteria fulfilled	Determination by the validation team
	☐ NA	
§ 4 of methodology	☒ Yes ☐ No ☐ NA	The total installed capacity of project equipment is 25.89 MWth. The calculations were checked from PD and found to be OK. This is less than 45 MW thermal limit of the methodology and will remain same throughout the crediting period. Hence the applicability criterion is fulfilled.
§ 5 of methodology	☒ Yes ☐ No ☐ NA	The boiler of 35 TPH is a multi fuel fired boiler which is capable of firing biomass as well as coal. However, the project activity primarily intends to use biomass. In case of non-availability of biomass etc; if coal and biomass are co-fired; it will be ensured that the thermal energy generation capacity of the boiler will remain within the small scale limit of 45 MW thermal. This has been confirmed during on site visit and interviews. Hence the applicability criterion is fulfilled.
§ 6 of methodology	☒ Yes ☐ No ☐ NA	The project activity meets the capacity limits prescribed in option (a), as the project activity includes emission reduction from both the thermal and electrical energy components, the thermal energy generation capacity calculation is done maximum design steam outlet 35 TPH and 35kg/cm^2 pressure, the thermal output will remain at 25.89 MWth. Hence the applicability criterion is fulfilled.
§ 7 of methodology	☒ Yes ☐ No ☐ NA	The project activity includes new facilities and meets the capacity limits specified in methodology. The same was cross checked during on site visit. Thus the applicability condition is fulfilled
§ 8 of methodology	☐ Yes ☐ No ☒ NA	The project activity includes new greenfield facilities. Hence NA
§ 9 of methodology	☒ Yes ☐ No	Based on document review and on site visit, the validation team confirms the project activity includes new greenfield facilities and comply with relevant requirements in the “General Guidelines to SSC CDM methodologies

Applicability criteria of the methodology: AMS I.D, Version 17	Criteria fulfilled	Determination by the validation team
	☐ NA	
§ 10 of methodology	☐ Yes ☐ No ☒ NA	Project activity does not include use of solid biomass like briquette and this applicability condition is not relevant. This was confirmed during site visit.
§ 11 of methodology	☐ Yes ☐ No ☒ NA	The project participant is the producer of the processed biomass residues used in the project and this applicability condition is not relevant. This was confirmed during site visit.
§ 12 of methodology	☐ Yes ☐ No ☒ NA	During site visit, it was confirmed that the electricity and steam generated in the project activity is used in-house in GAVL plant and this applicability condition is not relevant.
§ 13 of methodology	☐ Yes ☐ No ☒ NA	During site visit, it was confirmed that the project activity does not recover and utilize biogas for power/ heat production.
§ 14 of methodology	☐ Yes ☐ No ☒ NA	During site visit, it was confirmed that the project activity will not use charcoal.

As demonstrated above, the project complies with all the relevant criteria to fit into the specified methodology, AMS I.C version 19.

3.2.3 Project Boundary

The project boundary of this project activity includes (a) All plants generating power and/or heat located at the project site, whether fired with biomass, fossil fuels or a combination of both, (b) All power plants connected physically to the electricity system (grid) that the project plant is

connected to and (c) Industrial, commercial or residential facility, or facilities, consuming energy generated by the system and the processes or equipment affected by the project activity as per the methodology.

The geographical and physical project boundary of the project activity was determined by the validation team during the on-site assessment. The coordinates were correctly documented in the VCS PD. The sources and sinks of greenhouse gas identified in the VCS PD are deemed to be appropriate. The coordinates were confirmed by the validation team through Google maps (https://maps.google.co.in/maps?hl=en).

Emissions	GHGs involved	Description
Baseline emissions	CO_2	Major emission source, which is emitted from the electricity generation by fossil fuel-fired power plants connected to the grid.
Project emissions	CO_2	CO_2 emissions from surplus biomass residues do not lead to changes of carbon pools in the LULUCF sector

In summary, the project boundary was correctly identified in accordance with the methodology AMS I.C, version 19. All greenhouse gas emissions occurring within the proposed project activity boundary as a result of the implementation of the proposed VCS project activity have been appropriately addressed in the VCS PD.

3.2.4 Baseline Scenario

As per the approved methodology AMS I.C. version 19, project activity involves the identification of alternative baseline scenarios that provide or produce electricity/ steam for in-house consumption. The analysis of alternative baseline scenarios mentioned in VCS PD were checked to be OK. Thus the identified alternative scenario "Electricity and thermal energy (steam) are produced in a cogeneration unit using fossil fuel" is accepted to be the plausible baseline scenario for the project activity.

Hence the validation team confirms that the proposed project activity meets the methodological requirement. Therefore, the identified baseline scenario is applicable to the proposed project activity. The validation took cognizance of § Section 7.12 of CDM VVS (version 07.0).

All the assumption and data used by the project participants are listed in the VCS PD and/or supporting documents. All documentation relevant for establishing the baseline scenario are correctly quoted and interpreted in the VCS PD. Assumptions and data used in the identification of the baseline scenario are justified appropriately supported by evidence and can be deemed reasonable. Relevant national and/or sectoral policies and circumstances are considered and listed in the VCS PD.

The approved baseline methodology has been correctly applied to identify a realistic and credible baseline scenario, and the identified baseline scenario most reasonably represents what would occur in the absence of the proposed VCS project activity.

3.2.5 Additionality

The project is small scale in size i.e. the installed thermal energy capacity is 25.89 MWhth and is in line with the requirement of "General Guidelines to SSC CDM methodologies". The additionality of the project activity has been demonstrated using Annex 27 of EB 68, "Guidelines on the demonstration of additionality of small-scale project activities", Version 09.0/B3/.

The PP has used investment barrier to demonstrate the Additionality.

The project activity, being a small scale project, is not mandatory to apply "Tool for the demonstration and assessment of Additionality". However, a part of the tool is referred here for a systematic evaluation of financial analysis for investment barrier.

PP has chosen the investment comparison analysis between the project activity and the plausible alternative scenario identified in the section above. The financial indicator, levelised cost of energy generation has been calculated for the project activity and is compared with the levelised cost of energy generation with alternative scenario. Since the Project does not generate any revenue other than the CDM the investment comparison analysis is deemed to be appropriate and acceptable.

Thus, cost of energy generation is the selected as suitable financial indicator.

As the electricity is consumed for captive demand in the plant, there is no sale of electricity. Thus, the cost of energy generation will not account for electricity separately and total energy as boiler outlet will be used to get the financial indicator. Since for both the baseline alternatives the similar financial analysis will be used, this is assessed to be conservative.

Thus the unit cost of energy generation in (INR/GJ) is used as a financial indicator which is an appropriate indicator for the project type and in the context of investment decision and deemed acceptable.

PP had calculated the levelised cost of energy generation for both the cases for biomass and coal. The detailed assessment of the parameters chosen for the investment comparison analysis is given below.

Input parameters:

Total project cost

For conservative analysis, the project cost of coal based cogeneration plant is taken same as that of biomass based plant. The total cost of the biomass based cogeneration plant is checked to be INR 1139.2 lakh which is cross verified from Purchase orders/P3/ and work orders and hence accepted.

Plant specifications and fuel characteristics

For conservative analysis, the plant specifications of coal based cogeneration plant are taken same as that of biomass based plant which is acceptable. Common parameters for both biomass based and coal based cogeneration plants are assessed below :

Parameter	**Value and unit**	**Justification by the validation team according to §120, 121 of VVS**
Boiler rated capacity	35 TPH at 35 kg/cm^2	This has been considered from the technical specifications of the boiler provided in the purchase orderto Thermax dated 10/05/2011/P3/ which is found to be correct and appropriate for the investment comparison analysis
Turbine Generator rated capacity	2.5 MW	This has been considered from the technical specifications of the turbine generator provided in the purchase orderto Triveni dated 12/05/2011/P3/ which is found to be correct and appropriate for the investment comparison analysis.
Plant operation days	365 / year	This is estimated based on the production plant operations which is deemed acceptable.
Plant load factor	80%	PLF has been sourced from APERC tariff order dated 06/08/2013, pg. 2/B7/ which is found to be correct and appropriate for the investment comparison analysis. Sensitivity analysis has been done for the PLF and it shows that levelised cost of generation of project activity is higher than the alternative scenario with ± 10% variation

Inlet feed water temperature	105°C	The temperature has been considered from the technical specifications of the boiler provided in the purchase orderto Thermax dated 10/05/2011/P3/ which is found to be correct and appropriate for the investment comparison analysis
Efficiency of Boiler	73%	The value has been considered from the technical specifications of the boiler provided in the purchase order to Thermax dated 10/05/2011/P3/ which is found to be correct and appropriate for the investment comparison analysis. The efficiency of the biomass /coal fired boiler is also cross checked from the publicly available data and found that the efficiency of the Biomass fired boiler ranges from 70% to 80% from low load to full load. Hence the efficiency considered for the project case most conservative and is appropriate.
Auxiliary electricity consumption of cogen plant	10%	10% of generation has been sourced from APERC tariff order dated 06/08/2013, pg. 2/B7/ which is found to be correct and appropriate for the investment comparison.
Depreciation on plant and machinery	5.28%	The Companies Act was checked and the applied value is checked to be correct.
Annual O&M cost	4%	4% of capital cost has been sourced from APERC tariff

		order dated order 2004, pg. 36[/B10/] which is found to be correct and appropriate for the investment comparison. Sensitivity analysis has been done for the O&M cost and it shows that levelised cost of generation of project activity is higher than the alternative scenario with ± 10% variation.

The assessment of calorific value and landed price of fuel specific to biomass based and coal based cogeneration plants are provided below

	Project activity **Biomass based cogeneration plant**	**Alternative scenario** **Coal based cogeneration plant**
Parameter:	Landed Cost of (Palm fiber, palm shell and EFB)	Landed Cost of coal
Value applied for the investment calculation:	INR 2,430/ ton (average)	INR 3000 /ton
Justification by the validation team according to §120, 121 of VVS	The value has been considered from As per APERC Tariff order dated 31/03/2009, pg. 5[/B11/] and applying annual escalation of 5%. DOE has cross checked the value with other biomass suppliers during site visit and found the applied cost to be in acceptable terms. Sensitivity analysis has been done for the cost of fuel and it shows that levelised cost of generation of project activity is higher than the alternative scenario with ± 10% variation	The value has been calculated from Price Notification of The Singareni Collieries Company Ltd. Hyderabad dt. 11/09/2013[/P10/] which was available at start of validation .and also sourced from reference on railway tariff based on distance between mine and project plant. DOE has cross checked the value with other biomass suppliers during site visit and found the applied cost to be in acceptable terms. Sensitivity analysis has been done

		for the cost of coal and it shows that levelised cost of generation of project activity is lower than the project scenario with ± 10% variation

	Project activity **Biomass based cogeneration plant**	**Alternative scenario** **Coal based cogeneration plant**
Parameter:	Fuel calorific value	Calorific value of coal
Value applied for the investment calculation:	*kcal/kg* Palm fiber - 2,800 Palm shell -4,450 EFB -2,400	4,000 kcal/kg
Justification by the validation team according to §120, 121 of VVS	The value has been considered from Laboratory analysis of samples. DOE has cross checked the value with other biomass suppliers during site visit and found the applied value to be in acceptable terms. Sensitivity analysis has been done for calorific value and it shows that levelised cost of generation of project activity is higher than the alternative scenario with ± 10% variation	The value has been sourced from Price Notification of The Singareni Collieries Company Ltd. Hyderabad dt. 11/09/2013/P10/ which was available at start of validation. DOE has cross checked the same with other biomass suppliers during site visit and found the applied value to be in acceptable terms. Sensitivity analysis has been done for the calorific value and it shows that levelised cost of generation of project activity is lower than the project scenario with ± 10% variation

As per the above financial analysis the levelised electricity cost of generation for the project activity and the baseline is given below:

Alternative	Levelised Electricity generation costs (Rs/ GJ)
Baseline activity	349.3
Project activity without consideration of CDM	385.2.

As it can be seen from the above analysis of the levelised cost of energy generation from coal based option is less than the project activity. Thus, the financially viable alternative is coal based cogeneration plant that would have led to higher GHGs emissions into the atmosphere. However, the project opponent has chosen the project activity that would also provide significant amount of returns from the sale of the Emission Reductions accrued from the project activity. These returns would increase the cash flow of the project activity and make the project financially more feasible for the project proponent.

Sensitivity analysis:

According to the "Guidelines on the assessment of investment analysis" (version 05), only variables including the initial investment cost, that constitute more than 20% of either total project costs or total project revenues should be subjected to reasonable variation and the results of this variation should be presented in the PDD and be reproducible in the associated spreadsheets. The validation team thus confirms that the following parameters meet the requirement and these parameters have been subjected to variations in the range of +10% and -10% in the PDD.

Under sensitivity Analysis, unit cost of energy generation (Rs/ GJ) of the project activity has been subjected to subjected to different variables and then compared to a static unit cost of the baseline.

Unit cost of energy generation using VCS project *(*Rs./GJ)

PLF		***Fuel cost***		***NCV***		***O&M cost***		***Project cost***	
-10%	*+10%*	*-10%*	*+10%*	*-10%*	*+10%*	*-10%*	*+10%*	*-10%*	*+10%*
386.94	*383.75*	*348.25*	*422.13*	*426.23*	*351.61*	*384.5*	*385.88*	*383.61*	*386.77*

Validation team has checked that the unit cost of energy generation in project case is higher and economically unattractive compared to that in the baseline for all sensitivity cases except one.

In only one sensitivity case, i.e., when cost of biomass is reduced by 10%, the unit cost of energy generation using biomass (348.25 *Rs./GJ)* is less than unit cost of energy generation using coal (*349.3 Rs./GJ*). However, validation team accepts this situation to be unlikely based on verification of following references.

1. The Bagasse price index sourced from Ministry of Commerce and Industry, Government of

India was checked to verify the net price increase in bagasse over a 10 year period/B12/.

2. Validation team has also verified APERC Tariff order dated 31/03/2009/B11/ showing annual 5% price escalation for biomass based power project.

Based on above facts and scenarios, it has been accepted that decrease in biomass cost is improbable.

The validation team thus confirms that the sensitivity analysis is in accordance with the "Guidelines on the assessment of investment analysis". The justifications provided by the PP with the variations of these parameters are been analyzed, clarified and accepted by the DOE.

Following Timeline of the project implementation have been verified.

Milestone
PO of boiler issued to Thermax Limited, Pune dated 10-05-2011/P3/
PO of steam turbine generator (STG) issued to Triveni Turbine Ltd dated 12-05-2011 /P3/
Commissioning of boiler dated 16-07-2012 /P6/
Commissioning of STG dated 18-08-2012 /P6/
Local stakeholders' consultation March – April 2014 /P9/
VCS Project Pipeline listing of the project dated 14-04-2014

The evidences were transparently reviewed by the validation team and considered to be effective. Investment comparison analysis and sensitivity analysis clearly demonstrate that the proposed project activity is financially unattractive. Therefore, the proposed project activity is not business-as-usual, i.e. the proposed project activity is additional.

3.2.6 Quantification of GHG Emission Reductions and Removals

The emission reduction calculations have been applied as per the applied methodology AMS I.C Version 19.

Baseline Emission:

As per para 27 of the SSC methodology

"For electricity and thermal energy (steam/heat) produced in a baseline cogeneration unit, using fossil fuel (case 19 (d)), the following equation shall be used to determine baseline emissions:

$$BE_{cogen,CO_2,y} = [(EG_{PJ,thermal,y} + EG_{PJ,electrical,y} * 3.6) / \eta_{BL,cogen}] * EF_{FF,CO_2} \quad \textbf{(1)}$$

Where:

$BE_{cogen,CO_2,y}$	Baseline emissions from electricity and thermal energy displaced by the project activity during the year *y* (tCO_2)
$EG_{PJ,electrical,y}$	The amount of electricity supplied by the project activity during the year *y*; GWh
3.6	Conversion factor (TJ/GWh)
$EG_{PJ,thermal,y}$	The net quantity of thermal energy supplied by the project activity during the year *y* (TJ)
EF_{FF,CO_2}	The CO_2 emission factor of the fossil fuel that would have been used in the baseline cogeneration plant obtained from reliable local or national data if available, alternatively, IPCC default emission factors can be used-(tCO_2/TJ)
$\eta_{BL,cogen}$	The total annual average efficiency of the cogeneration plant using fossil fuel determined in accordance with paragraphs 28 and 29 below"

Thus based on above equations, $EG_{PJ,thermal,y}$ = 567.11 TJ , has been calculated as the steam consumption by the process which is generated by the cogeneration plant.

Installed electrical capacity of project = 2.5 MW. Therefore, annual electricity generation has been calculated as 17,520.00 MWh which is checked to be OK.

Auxiliary consumption of 10% of generation has been verified from APERC tariff order 06/08/2013, pg. 2 . Therefore net et electricity generation by project activity is verified to be 15,768.00 MWh

$EG_{PJ,electrical,y}$ = 15.77 GWh

$\eta_{BL,cogen}$ = 85%

Thus using default efficiency of new coal fired boiler as per 'Tool to determine the baseline efficiency of thermal or electric energy generation systems', Ver. 01, EB 48, Annex 12 and taking

steam turbine efficiency of 100% as per Para 29(b) of SSC methodology, EF_{FF,CO_2} has been calculated as 95.80 tCO2/TJ.

Based on above values, $BE_{cogen,CO_2,y}$ is calculated as 70,314 $tCO_{2/year}$ which is verified to be correct.

Project emissions

According to the paragraph 45 of the methodology AMS I.C version 19 project proponents shall consider the project activity emissions for the following cases

The project emissions from fossil fuel combustion have been calculated using the latest version of "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion"

As per equation 1 of the "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion"; PE has been calculated as 0 which is deemed accepted.

Leakage

The SSC methodology gives leakages to be considered in para 47 and 48 as below.

As per the methodology AMS I.C version 19 leakage emissions shall be considered for the following two cases

a)If the energy generating equipment currently being utilised is transferred from outside the boundary to the project activity, leakage is to be considered.
b)In cases where the collection/processing/transportation of biomass residues is outside the project boundary CO_2 emissions from the collection/processing/transportation of biomass residues to the project site shall be taken into account as leakage.

It's a green field project activityand the equipment is not transferred from any other activity. PP. is getting the biomass from the nearer sugar plants those are located nearer to the distillery plant. PP. had submitted the biomass availability study and found that the surplus biomass is around 50% more than the requirement. Hence PP. has estimated the leakage emissions due to the project activity are zero.

Hence, this leakage is not applicable.

Emission Reductions

Emission reductions are calculated as follows:

$$ER_y = BE_y - PE_y - LE_y$$

70,314 – 0 – 0

= 70,314 tCO_2e

Emission Reductions:

The emission reductions are calculated as the difference between the baseline emissions and the project and leakage emissions, as represented below:

$$ER_y = BE_y - PE_y - LE_y$$

Parameter	Value applied	Units
ER_y	**70,314**	tCO_2e/year
BE_y	**70,314**	tCO_2e/year
PE_y	0	tCO_2e/year
LE_y	0	tCO_2e/year

Therefore ER_y = **70,314** tCO_2e/year

In summary, the calculation of emission reductions was correctly demonstrated by the PP according to the methodology AMSI.C (version 19). All assumptions and data used by the project participants are listed in the PD and/or supporting documents, including their references and sources. All documentation used by the project participants as the basis for assumptions and source of data is correctly quoted and interpreted in the PD. All values used in the PD are considered reasonable and conservative in the context of the proposed project activity. The baseline methodology has been applied correctly to calculate project emissions, baseline emissions, and leakage and emission reductions. All estimates of the baseline, project and leakage emissions can be replicated using the data and parameter values provided in the PD.

.

3.2.7 Methodology Deviations

No methodology deviations applied to this GHG project.

3.2.8 Monitoring Plan

The project monitoring plan is in compliance with the monitoring methodology AMS I.C (version 19). It is DOE's opinion that the project participant is able to implement the monitoring plan.

Parameters determined ex-ante

The project adopts the ex-ante calculation for The total annual average efficiency of the cogeneration plant using coal ($\eta_{BL,cogen}$) and Combined margin emission factor (EFgrid,CM,y) of the grid. This calculation process, incl. the applied parameters and equations, were assessed by the validation team in accordance with the 'Tool to determine the baseline efficiency of thermal or electric energy generation systems', Ver. 01, EB 48, Annex 12 and Tool to calculate the emission factor for an electricity system, Version 04.0 by using the CEA baseline database, version 9.

The validation team confirms that all relevant parameters have been sufficiently considered and the values of the parameters are real, measureable and conservative.

Parameters monitored ex-post

According to the methodology AMS I.C, version 19, following parameters are monitored.

Sl. No.	Parameters	Description	Measured/calculated
1	**$EF_{CO2,i,y}$**	CO_2 emission factor of fossil fuels: coal and diesel	Central Electricity Authority (CEA) CO_2 Baseline Database for the Indian Power Sector was checked with respect to the EF values of coal and diesel and the applied values of 95.80 tCO_2 / TJ and 76.4 tCO_2 / TJ are verified to be correct.
2	**$EG_{PJ,thermal,y}$**	Net quantity of thermal energy supplied by project	Parameter **$EG_{PJ,thermal,y}$** for project activity boiler is calculated from net steam output (ton) and its net enthalpy. Source for net steam output is steam production data log and corresponding enthalpy (at operating temperature) is inferred from steam table with respect to operating pressure and temperature. Thus the monitoring procedure is checked to be correct.
3	$EG_{PJ,electrical}$	Net electricity supplied by the project activity	Electricity meter in control room will measure the net quantity of electricity supplied by the project activity cogen plant. The data will be sourced from log book records which is acceptable. The estimated value of 15,786.00 is checked to be OK
4	**$Q_{k, biomass}$**	Net Quantity of biomass type k consumed in the boiler in year y	The quantity of the palm fibre consumed will be measured using weigh bridge. The validation team has cross checked the measurements using mass/energy balance.
5	**NCV** $_{k, biomass}$	Net Calorific Value of biomass type k	Lab analysis report of NCV will checked with respect to NCV. The measurement results differ significantly from previous measurements or other relevant data sources, additional measurements will

			be conducted.
6	**Extracted steam Enthalpy**	Enthalpy of exhaust steam at the outlet of the steam turbine	The data is monitored from Plant log books Enthalpy of steam from turbine can be calculated from steam tables based on the corresponding values of quantity of steam and pressure.
7	**Pressure**	Pressure of flowing exhaust steam at the outlet of steam turbine	The parameter has been measured using pressure gauge which will measure the pressure of the steam at the turbine outlet.
8	$\mathbf{FC_{i,j,y}}$	Quantity of fossil fuel combusted in the project in year y	The validation team has checked the weigh bridge for coal and level guage for diesel.
9	$\mathbf{NCV}_{\text{fossil fuels}}$	Net Calorific Value of fossil fuel	Lab analysis report has been checked for the NCV of fossil fuels.
10	$EC_{PJ,j,y}$	Electricity taken from grid for the cogen plant start up/ emergency operations.	Cogen plant log book has been checked for the Electricity taken from grid for the cogen plant start up and found to be OK.

All the parameters are continuously monitored and recorded monthly as required by the methodology AMS I.C version 19. All the parameters are monitored to ensure that the emission reductions during the monitoring period are real and accurate. All the metering equipment installed at the plant have been verified during the site visit and found that all the meters are accurate and are able to measure the required parameters during the crediting period. DOE has verified the technical specifications of all monitoring equipment installed in the plant and found to be appropriate.

In summary DOE concluding that the monitoring parameters and the metering equipment chosen by the project proponent are in compliance with the chosen methodology AMS I.C version19 and meet all the requirements of small scale project activities.

The described monitoring mechanism, data collection procedures were verified during the site visit and found to be appropriate. It is confirming that the PP can able to measure all the parameters required for the calculation emission reductions during the crediting period.

PP had confirmed in the PD that no emission reductions will be claimed for periods of plant failure or failure of any of the abovementioned meters/sensors. A management structure has been put in place to ensure that these failures are kept to a minimum.

DOE has interviewed the management during the site visit and found that the Personnel responsible for the monitoring and the emission reduction calculations are well trained and are technically qualified.

According to document review in the PD and on-site interviews with the representatives of the PP, detailed monitoring procedures, monitoring structure, management team, monitoring items and functions are clearly demonstrated in the PDD which will enable subsequent verification of the project's emission reductions in line with the applied methodology. The validation team confirms that the specific uncertainty levels, methods and associated accuracy level of measurement instruments and calibration procedures used for various parameters and variables are identified in the PD /P1.2/, along with detailed quality assurance and quality control procedures. All the monitored data will be archived until 2 years after the crediting period to facilitate cross-checking during the crediting period.

Hence the validation team considers that the PP is capable to implement the monitoring plan and hence confirms compliance of VCS guidelines.

3.3 Non-Permanence Risk Analysis

Not applicable

3.4 Environmental Impact

The validation team concludes that, the project activity does not fall in any of the two categories specified in the guidelines for conduction an EIA under Para 4 . The same is confirmed from the MOEF website (http://envfor.nic.in/legis/eia/so1533.pdf)

Moreover, as the biomass will be used for energy generation with efficient combustion, there are no significant environmental impacts of the project activity.

3.5 Comments by Stakeholders

TUV Rheinland considers the local stakeholder consultation carried out adequately. The local stakeholder consultation was carried by distributing survey forms March 2014 and responses were received during March and April 2014. All the stakeholders appreciated the project and no negative comments received from the stakeholders. These are confirmed through the minutes of stakeholder feed back forms/P9/ and through interview with the stakeholders during the site visit..

4 VALIDATION CONCLUSION

The validation team assigned by the DOE (TÜV Rheinland (China) Ltd.), is been assigned by "Godrej Agrovet Limited." to perform the validation of their project "Biomass based cogeneration plant at Godrej Agrovet Ltd. Chintampalli." in India with regard to the requirements of VCS standard version 3.4

The project uses renewable biomass residue and replaces use of coal that would have otherwise led to equivalent CO_2 emissions. Thus the project activity result in reductions of greenhouse gas (GHG) emissions that are real, measurable and give long-term benefits to the mitigation of climate change.

In the course of the draft validation 13 Corrective Action Requests (CARs), 4 Clarification Requests (CLs) were successfully closed and 0 Forward Action Request (FAR) will be verified during the first periodic verification

The review of the project design documentation and additional documents related to baseline and monitoring methodology and subsequent background investigation have provided the TÜV Rheinland (China) Ltd with sufficient evidence to validate the fulfilment of the stated criteria.

In detail the conclusions can be summarised as follows:

- A reasonable level of assurance has been applied.
- All data and information used for ex-ante calculation of emission reductions is of projected and/or hypothetical nature.
- The project is in line with all relevant host country legislation incl. its GHG assertions, where applicable.
- The project additionality is sufficiently justified in the VCS-PD.
- The monitoring plan is transparent and adequate.
- The calculation of the project emission reductions is carried out in a transparent and conservative manner, so that the calculated emission reductions of 703,140 tCO_2e is most likely to be achieved within the 10 year renewable crediting period with the average annual emission reduction of 70,314 tCO_2e.

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 standard, version 3.4 without any qualifications or limitations.

Mr. M.P.Kanal (Team Leader)

TÜV Rheinland (India) Pvt. Ltd.
Bangalore, 23/08/2014

Mr. Henri Phan (DOE/AIE Manager)

TÜV Rheinland (China) Ltd.
Beijing, 24/08/2014

APPENDIX I: LIST OF REQUESTS FOR CORRECTIVE ACTION (CAR) AND CLARIFICATION (CL)

Table 1: List of Requests for Corrective Action (CAR) and Clarification (CL)

No.	CAR/CL		Observation (CAR/CL)	Summary of project owner response	Validation team conclusion
1)	CAR	01	VCS-PD-Section 1.1: This section is not filled in accordance with the template requirement. The following details are missing • The location of the project. • An explanation of how the project is expected to generate GHG emission reductions or removals. • A brief description of the scenario existing prior to the implementation of the project. • An estimate of annual average and total GHG emission reductions and removals.	The PD is now updated to give required information in line with the CAR.	The section 1.1.of VCS PD is complete. Necessary changes have been made correctly. CAR 01 is closed.
2)	CL	02	VCS-PD-Section 1.5: Though the boiler is commissioned on 30-June-2012, the turbine was commissioned on 12-August-2012 only. So the project started reducing emission only after 12-August-2012. Clarify how considering start date as 30-June-2012 is appropriate.	The PD and calculations are updated now to correct the project start date to 12-08-2012.	The start date has been corrected which is in line with VCS guidelines. Hence OK. CL 02 is closed
3)	CAR	03	VCS-PD- Section 1.7: Crediting period is starting on 12-August-2012. Hence achieving 47,890 tCO2	The PD and calculations are updated now to correct emission reductions in 2012 in line with the crediting period start date.	The emission reductions have been corrected accordingly, which are

			emission reduction is not possible in the year 2012.		checked to be OK CL03 is closed.
4)	CAR	04	VCS-PD-Section 1.8: 1. Load factor details of the power plant are not provided 2. Line diagram shall be provided for clear understanding	The PD is now updated to give load factor of power plant and line diagram.	The load factor details and line diagram have been added in the PD correctly. CAR 04 is closed.
5)	CAR	05	VCS-PD-Section 1.12.1: It is specified that the boiler and turbine were purchased by GAVL. However the PO is issued by Godrej Oil Palm Ltd. Please explain the name change details.	The name of company was changed from M/s. Godrej Oil Palm Limited (at time of giving POs) to M/s. Godrej Agrovet Limited (present name) and all relevant evidences are shared with the DOE. Thus, all legal ownership and rights of earlier company are still with the same company with new name. This clarification is added now in the PD.	The explanation by PP is accepted.. Name change certificate from Government of Andhra Pradesh (for the name change from 'Godrej Oil Palm Ltd' to 'Godrej Agrovet Ltd', dated 02/11/2012/ P7/ was checked in this regard and hence OK. CAR 05 is closed.
6)	CAR	06	VCS-PD-Section 2.1: Title and version number of tools applied by the project is missing. Please check the template requirements	The PD is updated now to give tools used and their version No.s as well as reference.	The methodological tools applied in the project activity have been listed in VCS PD section 2.1. CAR 06 is closed.
7)	CL	07	VCS-PD-Section 2.3: 1. It is mentioned that the following is included in the project boundary: '*All power plants connected physically to the electricity system (grid) that the project plant is connected to;*' Clarify how this is appropriate when	The project plant doesn't produce total energy requirement of palm oil mill, hence grid connection is also available. Further, during cold start of plan, grid electricity is used for cogeneration plant as well. However, this is deducted	1. The explanation provided by PP is acceptable. Hence consideration of grid in project boundary is deemed acceptable. 2. TG capacity has been

			baseline identified is electricity produced form in-house cogeneration plant. 2. Capacity of the turbine generator is mentioned as 2 MW in the boundary diagram which is not consistent with the section 1.8 of VCS-PD	during calculation of net which is used to calculate ER. This, grid is considered in the boundary. The PD is now corrected to give TG capacity as 2.5 MW.	corrected. Above 2 points have been successfully addressed. Hence CL07 is closed.
8)	CL	08	VCS-PD-Section 2.4: The detailed analysis on baseline identification is not provided. It should be in line with the para 19 of the methodology.	The PD is now updated to discuss baseline identification in line with the para 19 of the methodology.	The detailed analysis on baseline identification has been provided in PDD which are checked to be in line with methodology AMS IC. Hence CL 08 is closed.
9)	CAR	09	VCS-PD-Section 3.1: The thermal energy is estimated based on the PLF of 80% and operating days of 250 days. Since, the PLF itself calculated based on the CUF and operating days, again considering operating days in the energy calculation is not appropriate. the steam pressure at the end of turbine generator is mentioned as 3 kg/cm2 which is not consistent with the section 1.8 of the VCS-PD.	The PD and calculations are updated to apply only PLF and annual days are corrected as 365. The steam pressure at TG outlet is corrected to 4.5 kg/cm^2. The calculations are updated as per.	The revised calculations for thermal energy supplied have been checked to be correct. CAR 09 is closed.
10)	CL	10	VCS-PD-Section 3.2: The provision of monitoring fossil fuel is made in the monitoring section. But the calculation method of project emission due to fossil fuel consumption is not provided.	The PD is now updated to discuss procedure of calculation of project emissions due to fossil fuel use.	The calculations of project emissions due to fossil fuel use have been checked to be correct.

			Clarify		CL 10 is closed.
11)	CAR	11	VCS-PD-Section 3.3: Requirements of 'General guidance on leakage in biomass project activities' is not justified	The PD is updated now to discuss the requirement of 'General guidance on leakage in biomass project activities'.	Under section 3.3 of PD, the requirements of 'General guidance on leakage in biomass project activities' have been correctly justified. CAR 11 is closed.
12)	CAR	12	VCS-PD-Section 4.2: **1.** calculation method of the parameter $\mathbf{EG_{PJ,thermal,y}}$ is not clearly explained 2. Monitoring frequency of the parameters used to calculate $\mathbf{EG_{PJ,thermal,y}}$ are not specified 3. The following parameters are missing in this section: • NCV and emission factor of fossil fuel • Moisture content of biomass	The PD is updated to discuss calculation method of parameter $\mathbf{EG_{PJ,thermal,y.}}$ The monitoring frequency of parameter is discussed now. The parameter NCV of fossil fuel is added now. The parameter $EF_{fossil\ fuel}$ is available already in the monitoring parameters. The moisture content of biomass is not used in the calculations of ER as only thermal output gives data required for this calculation. Hence the parameter is not included in the monitoring.	1. calculation method of the parameter $\mathbf{EG_{PJ,thermal,y}}$ has been mentioned which is checked to be OK 2. Monitoring frequency of the parameter $\mathbf{EG_{PJ,thermal,y}}$ has been mentioned. It is checked to be ok. 3. The parameter NCV is added in the PD. Non-inclusion of moisture content is deemed acceptable. Above points have been successfully addressed. CAR 12 is closed.
13)	CAR	13	VCS-PD-Section 6: 1. The date or period of stakeholder survey and the areas where the survey was done is missing in this section 2. Proof for local stakeholder consultation is not submitted to DOE	The PD is now updated to discuss period over which the survey was conducted. The sample survey forms of 11 stakeholders (few English and few in	The period of survey and the sample survey forms were verified by validation team and found to be in order. CAR 13 is closed.

				Telugu) are submitted now.	
14)	CAR	14	ER & LCOE sheet_UC-biomass: 1. The biomass consumption is calculated based on the NCV of palm fiber which is not correct as the mixed fuel is used in this project. 2. In the calculation of biomass consumption, the PLF or CUF is not considered. Clarify 3. Factor used for conversion of kcal to kJ is not correct.	The ER & LCOE sheet is updated to show biomass consumption based on planned fuel mix. The PLF is considered now to correct biomass consumption. The conversion factor is corrected now.	The changes in ER sheet with respect to biomass consumption based on planned fuel mix , PLF and conversion factor have been checked to be correct. CAR 14 is closed.
15)	CAR	15	ER & LCOE sheet_UC-coal: In the calculation of biomass consumption, the PLF or CUF is not considered. Clarify Factor used for conversion of kcal to kJ is not correct. The O&M cost of coal based energy generation is kept same as the biomass based energy generation and justified as it is conservative. Please clarify how this is conservative.	The ER & LCOE sheet is updated to show PLF accounted in coal consumption calculations. The conversion factor is corrected now. Please refer pg. 26 of APERC NCE Tariff Order in 2004 (in later 2009 and 2013 orders, this value is left unchanged), it shows O&M cost of biomass projects is allowed to be more than coal based thermal projects. Thus, assuming same vale is conservative.	The changes in ER sheet with respect to PLF accounted in coal consumption calculations and conversion factor have been checked to be OK. APERC tariff order /B7/ was checked &M cost of biomass projects and found to be OK. CAR 15 is closed.
16)	CAR	16	ER & LCOE sheet_ER: 1. Efficiency of the cogeneration plan considered is 82.3% which is not correct. 2. The details of only baseline emission are given. Details of project emission, leakage and emission reduction are not explained	The efficiency of cogeneration plant is corrected to 85% now. The calculations are revised as per. The details of PE and leakage emissions are now added in the ER sheet.	1. Efficiency calculation has been checked to be correct. 2. The Project emissions and leakage have been correctly added.

					CAR 16 is closed.
17)	CAR	17	Please submit the following documents: 1. WO to Triveni - 12/05/2011 2. Proof for NCV of biomass & coal 3. APERC Tariff order dated 31/03/2009 4. Proof for Efficiency of coal Boiler 5. Cost of coal 6. Proof for the name change from Godrej Oil Palm Ltd to Godrej Agrovet Ltd. 7. Manufacture specification of boiler & turbine	The required evidences are submitted to the DOE now. 1) Submitted now 2) Biomass – shared now, coal taken from price notification as each coal grade has respective NCV and price 3) Submitted now 4) Reference is now made to default value as per Tool 5) Same as reference 2 above 6) Shared already 7) Shared now	All required evidences have been checked and found to be in Order. CAR 17 is closed