




**Verification and certification report form for
CDM project activities
(Version 03.0)**

Complete this form in accordance with the instructions attached at the end of this form.

BASIC INFORMATION

Title and UNFCCC reference number of the project activity	Methane Capture and Utilization Project at Carotino Palm Oil Mill, Malaysia UNFCCC Reference Number: 6762
Scale of the project activity	<input type="checkbox"/> Large-scale <input checked="" type="checkbox"/> Small-scale
Version number of the verification and certification report	1.2
Completion date of the verification and certification report	07/01/2021
Monitoring period number and duration of this monitoring period	1 st monitoring 20/12/2014 to 31/12/2019 (both days included)
Version number of the monitoring report to which this report applies	4.1 of 06/01/2021
Crediting period of the project activity corresponding to this monitoring period	20/12/2014 to 19/12/2024 (Fixed)
Project participants	Carotino Sdn Bhd. (Malaysia) Perenia Pty Ltd. (Australia)
Host Party	Malaysia
Applied methodologies and standardized baselines	AMS-III.H- Methane recovery in wastewater treatment, Version 16
Mandatory sectoral scopes	Sectoral scope 13: Waste handling and disposal
Conditional sectoral scopes, if applicable	N/A
Estimated amount of GHG emission reductions or GHG removals for this monitoring duration in the registered PDD	164,127 tCO ₂ e
Certified amount of GHG emission reductions or GHG removals for this monitoring period	77,217 tCO ₂ e
Name and UNFCCC reference number of the DOE	Carbon Check (India) Private Ltd. (E-0052)
Name, position and signature of the approver of the verification and certification report	Vikash Kumar Singh, Compliance Officer 

SECTION A. Executive summary

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Purpose and general description of the project activity:

The purpose of the project activity is to capture anthropogenic methane emissions from the Palm Oil Mill anaerobic effluent treatment system and utilize the methane gas to generate renewable energy. The project is located within the Carotino Palm Oil Mill located at 23 km off Sri Jaya, Maran, Pahang in Peninsular Malaysia with GPS coordinates of 3°49'01" N, 102°49'04" E.

Scope of verification:

This report summarises the findings of the verification of the project, performed on the basis of paragraph 62 of the CDM Modalities & Procedures, as well as criteria given to provide for consistent project operations, monitoring and reporting and the subsequent decisions by the CDM Executive Board. Verification is required for all registered CDM project activities intending to confirm their achieved emission reductions and proceed with request for issuance of CERs. This report contains the findings and resolutions from the verification and a certification statement for the certified emission reductions.

Verification is the periodic independent review and ex-post determination of both quantitative and qualitative information by a Designated Operational Entity (DOE) of the monitored reductions in GHG emissions that have occurred as a result of the registered CDM project activity during a defined monitoring period.

Certification is the written assurance by a DOE that, during a specific period in time, a project activity achieved the emission reductions as verified.

The objective of this verification was to verify and certify emission reductions reported for the "Methane Capture and Utilization Project at Carotino Palm Oil Mill, Malaysia" in the host country "Malaysia" for the period 20/12/2014 to 31/12/2019 (including both the days).

The purpose of verification is to review the monitoring results and verify that the monitoring methodology was implemented according to the monitoring plan and monitoring data, and used to confirm the reductions in anthropogenic emissions by sources, is sufficient, definitive and presented in a concise and transparent manner. CCIPL's objective is to perform a thorough, independent assessment of the registered project activity.

In particular, the monitoring plan, monitoring report and the project's compliance with relevant UNFCCC and host Party criteria are verified in order to confirm that the component project/s has/have been implemented in accordance with the previously registered/included component project design and conservative assumptions, as documented. It is also confirmed if the monitoring plan is in compliance with the approved revised PDD and the approved monitoring methodology.

The scope of the verification is to verify that:

- the actual monitoring systems and procedures are in compliance with the monitoring systems and procedures described in the monitoring plan;
- the GHG emission reduction data and express a conclusion with a reasonable level of assurance about whether the reported GHG emission reduction data is free from material misstatement;
- the reported GHG emission data is sufficiently supported by evidence.

Verification shall ensure that reported emission reductions are complete and accurate in accordance with applicable UNFCCC criteria for CDM in order to be certified.

Verification process:

Verification is conducted using Carbon Check India Private Ltd.'s (CCIPL) procedures in line with the requirements specified in the latest version of the CDM Validation and Verification Standard, relevant decisions of the CDM EB and applying standard auditing techniques. CCIPL assesses and determines that the implementation and operation of the project activity, and steps taken to

report emission reductions comply with the CDM criteria and relevant guidance provided by the Board. The verification assessment involved a document review of relevant documentation and the off-site interviews. Verification is not meant to provide any consultancy towards the project participants. However, stated requests for clarifications and/or corrective actions may have provided input for improvement of the monitoring.

Conclusion:

Perenia Pty Ltd. has appointed CCIPL to carry out the first (01st) periodic verification and certification of emission reductions reported for the approved “Methane Capture and Utilization Project at Carotino Palm Oil Mill, Malaysia” project in Malaysia /03/ for the period 20/12/2014 to 31/12/2019. The project was validated by SIRIM QAS International Sdn Bhd (validation report N° SQAS-CDM-EP10850002 issued on 27/09/2012) /05/ and it was registered on 02/10/2012 under the CDM registration reference number 6762. The post registration changes of the project activity has been validated by Carbon Check (India) Pvt. Ltd. duly approved on 21/09/2020. The GHG emission reductions were calculated on the basis of the approved methodology AMS-III-H, version 16, “Methane recovery in wastewater treatment” /11/ and the monitoring plan included in the approved Project Design Document, version 3.1 of 19/06/2020 /03/.

In conclusion, it is CCIPL’s opinion that the project activity “Methane Capture and Utilization Project at Carotino Palm Oil Mill, Malaysia”, in “Malaysia”, as described in the Monitoring Report version 04.1 of 06/01/2021 /01/, meets all relevant requirements for CDM activities and all relevant host Party criteria and correctly applies the baseline and monitoring methodology “AMS-III.H”, “Methane recovery in wastewater treatment”, version 16 /11/. Through document review and remote interviews, the verification team confirms that the project activity has resulted 77,217 tCO₂e emission reductions during the monitoring period from 20/12/2014 to 31/12/2019.

CC IPL as a DOE is therefore pleased to issue a positive verification opinion expressed in the attached Certification statement.

SECTION B. Verification team, technical reviewer and approver

B.1. Verification team member

No.	Role	Type of resource	Last name	First name	Affiliation (e.g. name of central or other office of DOE or outsourced entity)	Involvement in			
						Desk/document review	On-site inspection	Interviews	Verification findings
1.	Team Leader/ verifier/ technical expert/local expert	EI	Buragohain	Champok	CC IPL	✓	X	✓	✓

B.2. Technical reviewer and approver of the verification and certification report

No.	Role	Type of resource	Last name	First name	Affiliation (e.g. name of central or other office of DOE or outsourced entity)
1.	Technical reviewer	IR	Anand	Amit	CC IPL
2.	Approver	IR	Singh	Vikash Kumar	CC IPL

SECTION C. Application of materiality

C.1. Consideration of materiality in planning the verification

No.	Risk that could lead to material errors, omissions or misstatements	Assessment of the risk		Response to the risk in the verification plan and/or sampling plan
		Risk level	Justification	
1.	Human error in the quantification of emissions (which may be more likely to occur if personnel are unfamiliar with, or not well trained regarding, emissions processes or data recording).	Medium	Being 1 st verification, there is likelihood of human error while data reporting and transferring for emission reduction calculation. Therefore, the risk level is medium.	
2.	Undue reliance on a poorly designed information system, which may have few effective quality controls.	Low	The project proponent has already established a well-organized monitoring team, monitoring plan, including data collection procedure and QA/QC procedure consistent with registered monitoring plan. All data parameters are electronically recorded. Logbooks are also maintained and monitoring equipment are calibrated at defined frequency. Hence, the risk level is low.	The verification team interviewed the staff of the CDM team and checked all records to confirm whether the monitoring plan has been well implemented. The major parameters used for determining the project's baseline emissions are the wastewater flow to digesters and biogas generation. The team reviewed the whole data set of the daily records. COD measurement is done by accredited third party.
3.	Manual adjustment of otherwise automatically recorded activity levels.	Low	As detailed in section C.2 below, the data of the main monitoring parameters are taken from calibrated meters (flow meters). COD analysis is done by accredited third party. The monitoring equipment are calibrated according to national standards and rules. Hence, the risk level is low.	The verification team interviewed the staff of the CDM team and could verify the relevant records to confirm whether the data collection procedure and QA/QC procedure have been well implemented.

C.2. Consideration of materiality in conducting the verification

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The threshold of materiality was evaluated based on paragraph 326(c) of CDM VVS for project activities, version 02 /10/. It was concluded that the materiality threshold applicable to the project activity based on actual emission reductions achieved is 5% of 77,217 tCO₂e which is equal to 3,861 tCO₂e.

At the beginning of the verification, the verification team leader has assessed the nature, scale and complexity of the verification tasks by carrying out a strategic analysis of all activities relevant to the project activity. The team leader has collected and reviewed the information relevant to assess that the designated verification team is sufficiently competent to carry out the verification and to ensure that it is able to conduct the necessary risk analysis. As explained above, the potential sources of error were:

Mitigation of risks: The project activity happens at a single site and 100% data is available for verification. The data which directly affect emission reduction calculations being wastewater flow and biogas generation which are monitored and measured by calibrated flow meters and totalized readings are downloadable,

hence 100% verifiable. COD analysis are done by accredited third party and therefore 100% reliable. Hence as per paragraph 326 and section 9.1.2.3 of the CDM validation and verification standard for project activities, version 02 /10/ no significant reporting risks to the materiality of the verification were envisaged while planning for the verification and were not identified during the verification process.

During the course of the verification, the team reviewed the whole data set of the records for all parameters and cross-check against totalized readings. The data reported in the monitoring report are consistent with daily records, and the emission reductions are correctly calculated.

In conclusion, the verification team confirms the data set to be free from material error.

SECTION D. Means of verification

D.1. Desk/document review

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The verification was performed primarily based on the review of the Monitoring report /01/ and the supporting documentation. This process included review of data and information presented to verify their completeness and review of the monitoring plan and monitoring methodology. Documents reviewed or referenced during the verification are listed in Appendix 3 below.

D.2. On-site inspection

Duration of on-site inspection: DD/MM/YYYY to DD/MM/YYYY				
No.	Activity performed on-site	Site location	Date	Team member
1.	-	-	-	-

Site visit for the subject project activity was avoided due to travel restrictions imposed in the host country due to COVID-19 impact. DOE also noted CDM Executive Board's notice to relax mandatory site visits by DOEs until 31 December 2020 because of COVID-19 /15/. DOE could not further postpone the site visit due to commitments by DOE in its proposal to complete the assignment within stipulated timeframe.

The alternative means used for the purpose of verification are demonstrated as follow:

The verification team has carried out remote interviews (by telephone and video call) in order to assess the information included in the monitoring report and monitoring measurement procedures adopted during the monitoring period. During the desk review, the relevant monitoring records in consistent with the approved revised PDD and corresponding validation report were checked. The totalizer readings of flow meters, photographs of nameplate of the main equipment and the monitoring meters were used to cross check the consistency of information.

CC IPL confirms that the project is implemented in line with the approved revised PDD during the monitoring period and the monitoring system is in line with the PDD and latest MR. There is no change of the project design, construction, operation. The monitoring plan is as per the updated approved PDD.

Telephonic interview was performed by verification team as given in below table.

D.3. Interviews

No.	Interviewee			Date	Subject	Team member
	Last name	First name	Affiliation			
1.	Ligunjang	Kenny Alvin	Factory Manager (Carotino Sdn Bhd.)	27/10/2020	Implementation of the project activity. Monitoring plan and monitoring parameters.	Champak Buragohain
2.	Kannan	Chandran	Sr. Mill Assistant Manager (Carotino Sdn Bhd.)	27/10/2020	Data collection and recording. Quality assurance/Quality control procedures.	

3.	Krishnan	Prakash	Sr. Mill Assistant Manager (Carotino Sdn Bhd.)	27/10/2020		
4.	Ghaffar	Norzilawati Abdul	Admin Officer (Carotino Sdn Bhd.)	27/10/2020		
5.	Leong	Tay Chwee	Factory Director (Carotino Sdn Bhd.)	27/10/2020		
6.	Nathan	Selva	Factory Controller (Carotino Sdn Bhd.)	27/10/2020		
7.	Raya	Sirinut	Representative from Perenia Pty Ltd.	27/10/2020	Preparation of the Monitoring Report (MR), calculation of the ERs, data records, methodology applicability, compliance of monitoring plan etc.	
8.	Saengnark	Waroot	Representative from Perenia Pty Ltd.	27/10/2020		

D.4. Sampling approach

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N/A

D.5. Clarification requests (CLs), corrective action requests (CARs) and forward action requests (FARs) raised

Areas of verification findings	No. of CL	No. of CAR	No. of FAR
Compliance of the monitoring report with the monitoring report form	-	-	-
Compliance of the project implementation and operation with the registered PDD	-	-	-
Post-registration changes	-	-	-
Compliance of the registered monitoring plan with the methodologies including applicable tools and standardized baselines	-	1	-
Compliance of monitoring activities with the registered monitoring plan	1	1	-
Compliance with the calibration frequency requirements for measuring instruments	-	1	-
Assessment of data and calculation of emission reductions or net removals	-	-	-
Assessment of reported sustainable development co-benefits	-	-	-
Global stakeholder consultation	-	-	-
Others (please specify)- Remaining FAR from validation	-	-	1
Total	1	3	1

SECTION E. Verification findings**E.1. Compliance of the monitoring report with the monitoring report form**

Means of verification	Comparing the monitoring report /01/ with the monitoring report form provided by CDM EB listed in UNFCCC website /07/.
Findings	N/A

Conclusion	<p>The verification team confirms that the monitoring report used by the PP is compliance with the latest version of CDM-MR-FORM (version 07.0) form available at UNFCCC website and is in accordance with the applicable instruction.</p> <p>CC IPL, had made the version 1.0, dated 30/09/2020 of the Monitoring report /01/, covering the monitoring period from 20/12/2014 to 31/12/2019 (both days inclusive) publicly available on 05/10/2020 through its dedicated interface on the UNFCCC website /13/.</p> <p>This confirms compliance with paragraph 352 & 353 of CDM VVS for project activities (version 02.0) /10/.</p>
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E.2. Remaining forward action requests from validation and/or previous verifications

>> Based on the review of validation report /05/, one FAR found raised during the validation which needed to be verified during first verification. The FAR is closed as discussed under Appendix 4 of this report. The FAR is not applicable for future verifications.

E.3. Compliance of the project implementation and operation with the registered project design document

Means of verification	<p>Actual implementation of the registered project activity:</p> <p>Based on off-site assessment, document review and discussion with project proponent, CC IPL confirms the project is implemented and operated as described in the approved revised PDD (version 3.1 of 19/06/2020) /03/ and the monitoring report version 04.1 dated 06/01/2021 /01/. The project activity involves the installation of closed tank anaerobic digester system to treat wastewater from the existing crude palm oil extraction mill and capture biogas to utilize for electricity generation and thermal application. The raw Palm Oil Mill Effluent (POME) undergoes hydrolysis and acidification process at the acidification pond. The larger materials in POME are screened off prior to being pumped and distributed to the first digester system. The discharge from the first digester system overflows to the second digester system, while the effluent from the second digester tanks is recycled and returned to the first stage digester system for better mixing and to maintain optimum percentage total solid. Treated effluent from the second digester overflows to the existing aerobic pond, settling pond and subsequently to an existing effluent polishing plant. The wastewater flow to each digester is continuously monitored using flow meter and readings are recorded electronically through SCADA system. Digested sludge from the project activity is utilised for land application in the plantation under aerobic condition. Digester removed and utilized for land application is monitored to ensure aerobic conditions.</p> <p>The generated biogas is channeled through a desulphurization plant before being transferred to biogas engine system and boiler. The amount of biogas flow to gas engine and boiler are continuously monitored using flow meter and readings are recorded electronically through SCADA system. Excess biogas is flared in an enclosed flaring system and flow to flaring is monitored continuously and readings are recorded electronically through SCADA system.</p> <p>CC IPL verified the successful commission and handover of the project to be on 20/12/2014 from the technology supplier which confirm that the project technology is as per the approved revised PDD /16/.</p> <p>It is noted that no changes have been observed or identified which may impact the additionality of the project, no addition of component nor extension of technology, no addition nor removal of project sites since there is only one site of the project activity, no change of values of the actual operational parameter relevant to determination of emission reductions which are within the control of the PP. PP was unable to monitor all monitoring parameters temporarily from 20/12/2014 to 04/02/2015 and therefore emission reductions are not claimed for this period. Emission reductions are claimed from 05/02/2015 onwards.</p>
Findings	<p>CAR 1 was raised as monitored data are available from 05/02/2015 onwards as against 20/12/2014 for which PP claiming emission reductions from 05/02/2015</p>

	onwards only. Zero value is considered for the period from 20/12/2014 to 04/02/2015 and this conforms paragraph 231(b)(i) of project standard version 2.0. Hence, CAR is closed.
Conclusion	The verification team is able to confirm that the implementation and operation of the project during this first monitoring period is consistent with the approved revised PDD /03/; the information provided in the MR /01/ is also in accordance with the description of the approved revised PDD, which have been confirmed through review of various supporting documents as listed in Appendix 3 of this report and through off site interviews with consultants and representative of PP.

E.4. Post-registration changes

E.4.1. Temporary deviations from the registered monitoring plan, applied methodologies, standardized baselines or other methodological regulatory documents¹

>> Temporary deviation from registered monitoring plan has been applied for monitoring of COD of wastewater (COD of wastewater entering the anaerobic digester system (COD_{ww,untreated,y}), COD of wastewater exiting the anaerobic digester system (COD_{ww,treated,y}) and COD of wastewater leaving the final discharge point-(COD_{ww,discharge,PJ,y})) for the monitoring period from 01/01/2017 to 31/12/2019 in monitoring frequency. As per registered monitoring plan the defined frequency of monitoring is once in two weeks which was not complied with fully during the period from 01/01/2017 to 31/12/2019. Although the frequency was not met; in line with the requirement of applied methodology AMS-III.H version 16 and registered monitoring plan, PP ensured the samples and measurements to meet a 90/10 confidence/precision level and conservative value has been applied for emission reduction calculations for the entire monitoring period. The deviation meets the monitoring measurement methods and procedure of the applied methodology and CDM project standard version 2.0 paragraph 231 (a): the alternative monitoring arrangement does not overestimate the GHG emission reductions. Referring sampling guideline version 04 (Sampling and surveys for CDM project activities and programmes of activities), the sample requirement is 22 whereas PP has considered more than 22 samples in each year. In addition, conservatively the upper and lower COD measurement values as per 90/10 confidence precision has been used in emission reduction calculations. Therefore, in line with VVS for PA version 2.0 paragraph 283, DOE confirms that the alternative monitoring arrangement does not overestimate GHG emission reductions.

Also, for the period from 20/12/2014 to 04/02/2015 PP was temporarily unable to monitor all monitoring parameters as per registered monitoring plan. Therefore, in line with paragraph 231(b)(i) of CDM project standard from PA, zero value has been applied for the entire non-conforming monitoring period.

E.4.2. Corrections

>>N/A

E.4.3. Changes to the start date of the crediting period

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Reference number: PRC-6762-001

Approval date: 21/09/2020

E.4.4. Inclusion of a monitoring plan

>>N/A

E.4.5. Permanent changes from registered monitoring plan, or permanent deviation of monitoring from the applied methodologies, standardized baselines or other methodological regulatory documents

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Reference number: PRC-6762-001

¹ Other standards, methodologies, methodological tools and guidelines (to be) applied in accordance with the applied(selected) methodologies are collectively referred to as the other (applied) methodological regulatory documents).

Approval date: 21/09/2020

E.4.6. Changes to the project design>>
N/A**E.4.7. Changes specific to afforestation and reforestation project activities**

>>N/A

E.5. Compliance of the registered monitoring plan with applied methodologies, applied standardized baselines, and other applied methodological regulatory documents

Means of verification	The monitoring methodology AMS-III.H (version 16) has been applied in this project. The amount of wastewater flow and biogas generated are monitored using flow meters. COD measurement frequency did not meet the requirement as per registered monitoring plan for which a temporary deviation has been applied as explained in section E.4.1 above. The temporary deviation meets the requirement of CDM project standard for PA, version 2.0. The parameters to be monitored and their monitoring frequency corresponded to the approved revised PDD and the methodology /03/, /11/.
Findings	N/A
Conclusion	All monitoring parameters, monitoring and calibration procedures follow the methodology requirements.

E.6. Compliance of monitoring activities with the registered monitoring plan**E.6.1. Data and parameters fixed ex ante or at renewal of crediting period**

Means of verification	Data/Parameter/ Unit	Source of data	Reported value for the monitoring period	Assessment by VT
	Methane correction factor for the baseline anaerobic wastewater treatment systems (MCF _{WW,treatment,BL})	Data based on approved revised PDD /03/ and validation report /05/	0.8 for anaerobic deep lagoon depth more than 2 meters	The value is ex-ante fixed for the fixed 10 years crediting period as per the approved revised PDD, which has been justified and validated by validation DOE to follow the applied methodology and tool and already approved by EB.
	Methane correction factor for the baseline aerobic wastewater treatment systems (MCF _{WW,treatment,aerobic})	Data based on approved revised PDD /03/ and validation report /05/	0 for Aerobic treatment, well managed pond	The value is ex-ante fixed for the fixed 10 years crediting period as per the approved revised PDD, which has been justified and validated by validation DOE to follow the applied methodology and tool and already approved by EB.
	COD removal efficiency of the	Data based on approved	99%	The value is ex-ante fixed for the fixed 10

	baseline anaerobic treatment system ($\eta_{\text{COD, BL}}$)	revised PDD /03/ and validation report /05/		years crediting period as per the approved revised PDD, which has been justified and validated by validation DOE to follow the applied methodology and tool and already approved by EB.
	COD removal efficiency of the baseline aerobic treatment system ($\eta_{\text{PJ, aerobic}}$)	Data based on approved revised PDD /03/ and validation report /05/	61%	The value is ex-ante fixed for the fixed 10 years crediting period as per the approved revised PDD, which has been justified and validated by validation DOE to follow the applied methodology and tool and already approved by EB.
	Methane generation capacity of COD in waste water ($B_{0, \text{ww}}$)	Data based on approved revised PDD /03/ and validation report /05/	0.25 kg $\text{CH}_4/\text{kg COD}$	The value is ex-ante fixed for 10 years fixed crediting period as per the approved revised PDD, which has been justified and validated by validation DOE to follow the applied methodology and tool and already approved by EB.
	Methane correction factor for project activity equipped with biogas recovery ($\text{MCF}_{\text{WW, treatment, PJ}}$)	Data based on approved revised PDD /03/ and validation report /05/	0.8	The value is ex-ante fixed for 10 years fixed crediting period as per the approved revised PDD, which has been justified and validated by validation DOE to follow the applied methodology and tool and already approved by EB.
	Methane correction factor for project activity not equipped with biogas recovery ($\text{MCF}_{\text{WW, treatment, PJ, aerobic}}$)	Data based on approved revised PDD /03/ and validation report /05/	0	The value is ex-ante fixed for 10 years fixed crediting period as per the approved revised PDD, which has been justified and validated by validation DOE to follow the applied methodology and tool and already approved by EB.

	Methane correction factor for baseline wastewater treatment system sent for plantation irrigation purpose in year 'y' ($MCF_{WW,BL,discharge}/MCF_{ww,PJ,discharge}$)	Data based on approved revised PDD /03/ and validation report /05/	0	The value is ex-ante fixed for the fixed 10 years crediting period as per the approved revised PDD, which has been justified and validated by validation DOE to follow the applied methodology and tool and already approved by EB /03/, /04/.
	Global Warming Potential of methane (GWP_{CH_4})	Data based on approved revised PDD /03/ and validation report /04/	25	The value is ex-ante fixed for 10 years crediting period as per the approved revised PDD, which has been justified and validated by validation DOE to follow the applied methodology and tool and already approved by EB.
	Model correction factor to account of model uncertainties (UF_{PJ})	Data based on approved revised PDD /03/ and validation report /05/	1.12	The value is ex-ante fixed for 10 years fixed crediting period as per the approved revised PDD, which has been justified and validated by validation DOE to follow the applied methodology and tool and already approved by EB.
	Capture efficiency of the biogas recovery equipment in the wastewater treatment (CFE_{ww})	Data based on approved revised PDD /03/ and validation report /05/	0.9	The value is ex-ante fixed for 10 years fixed crediting period as per the approved revised PDD, which has been justified and validated by validation DOE to follow the applied methodology and tool and already approved by EB.
Findings	N/A			
Conclusion	CCIPL is able to confirm that the data and parameters fixed ex ante have been implemented in full compliance with the revised and approved monitoring plan.			

E.6.2. Data and parameters monitored

Means of verification	PP was unable to monitor all monitoring parameters temporarily from 20/12/2014 to 04/02/2015 and therefore emission reductions are not claimed for this period. Emission reductions are claimed from 05/02/2015 onwards.			
	Data/Parameter	Q_{ww,y}		
	Data Unit	m ³		
	Description	The flow of wastewater entering the project anaerobic digester system		
	Source of data to be used	Measured		
	Value of monitored parameter for the monitoring period	Monitoring period	Monitored value	
			Lower	Higher
		20/12/2014 to 04/02/2015	Data package incomplete	
		05/02/2015 to 31/12/2015	70,997	71,067
		01/01/2016 to 31/12/2016	82,763	82,763
		01/01/2017 to 31/12/2017	77,421	77,421
		01/01/2018 to 31/12/2018	101,839	101,839
		01/01/2019 to 31/12/2019	108,946	108,946
	The measured value is cross checked from daily electronic records downloaded through SCADA /20/ and found to be correct.			
	Monitoring equipment	The monitoring equipment is flow meter located at the inlet of anaerobic reactor, detailed information of the meter is listed in the following table:		
Meter		Wastewater Flow meter		
Manufacturer		Endress & Hauser		
Sl. Number		F9056D20000		
	Accuracy	±0.5%		
Accuracy of the monitoring equipment	The accuracy of the meters is ±0.5% which is as per the equipment specifications.			
Measuring/Reading/Recording frequency	The parameter is continuously monitored, hourly recorded and summarized daily. This is in accordance with the methodology AMS-III.H version 16 /11/ and the approved revised PDD /03/.			
Calculation method (if applicable)	Not applicable			
	Data/Parameter	COD_{ww,untreated,y}		
	Data Unit	tCOD/m ³		
	Description	COD of wastewater entering the anaerobic digester system		
	Source of data to be used	Laboratory testing		
Value of monitored parameter for the monitoring period	Monitoring period	Monitored value		
		Lower	Higher	
	20/12/2014 to 04/02/2015	Data package incomplete		
	05/02/2015 to 31/12/2015	0.0592	0.0703	
	01/01/2016 to 31/12/2016	0.0734	0.0782	
	01/01/2017 to 31/12/2017	0.0678	0.0752	
	01/01/2018 to 31/12/2018	0.0599	0.0683	
01/01/2019 to 31/12/2019	0.0548	0.0605		

		COD is measured by third party accredited laboratory (Felda/FGV Palm Industries Sdn Bhd.) using international accepted method (spectrophotometric method). Input values are cross checked from third party reports /21/. Sample measurement ensures 90/10 confidence precision and lower and higher bound values are used for emission reduction calculation.		
	Monitoring equipment	Not applicable. Third party laboratory 'FGV Palm Industries Sdn Bhd.' is accredited for COD analysis by Department of Standards Malaysia /22/.		
	Measuring/Reading/Recording frequency	As per the registered monitoring plan, the parameter is required to measure and record at least once in two weeks. However, during the monitoring period the frequency was not followed fully from 01/01/2017 to 31/12/2019. Therefore, PP has proposed temporary deviation proposing alternative arrangement as described in section E.4.1 above. The monitoring arrangement is as per the applied methodology. The sample measurement ensures 90/10 confidence precision and lower and higher bound values are used for emission reduction calculation for the entire monitoring period conservatively.		
	Calculation method (if applicable)	Not applicable		
	Data/Parameter	COD_{ww,treated,y}		
	Data Unit	tCOD/m ³		
	Description	COD of wastewater exiting the anaerobic digester system		
	Source of data to be used	Laboratory testing		
	Value of monitored parameter for the monitoring period	Monitoring period	Monitored value	
			Lower	Higher
	20/12/2014 to 04/02/2015	Data package incomplete		
	05/02/2015 to 31/12/2015	0.0041	0.0061	
	01/01/2016 to 31/12/2016	0.0091	0.0145	
	01/01/2017 to 31/12/2017	0.0029	0.0070	
	01/01/2018 to 31/12/2018	0.0053	0.0101	
	01/01/2019 to 31/12/2019	0.0048	0.0098	
	COD is measured by third party accredited laboratory (Felda/FGV Palm Industries Sdn Bhd.) using international accepted method (spectrophotometric method). Input values are cross checked from third party reports /21/. Sample measurement ensures 90/10 confidence precision and lower and higher bound values are used for emission reduction calculation.			
Monitoring equipment	Not applicable. Third party laboratory 'FGV Palm Industries Sdn Bhd.' is accredited for COD analysis by Department of Standards Malaysia /22/.			
Measuring/Reading/Recording frequency	As per the registered monitoring plan, the parameter is required to measure and record at least once in two weeks. However, during the monitoring period the frequency was not followed fully from 01/01/2017 to 31/12/2019. Therefore, PP has proposed temporary deviation proposing alternative arrangement as described in section E.4.1 above. The monitoring arrangement is as per the applied methodology. The sample measurement ensures 90/10 confidence			

	precision and lower and higher bound values are used for emission reduction calculation for the entire monitoring period conservatively.
Calculation method (if applicable)	Not applicable

Data/Parameter	COD_{ww,discharge,PJ,y}																							
Data Unit	tCOD/m ³																							
Description	COD of wastewater exiting the anaerobic digester system																							
Source of data to be used	Laboratory testing																							
Value of monitored parameter for the monitoring period	<table border="1"> <thead> <tr> <th rowspan="2">Monitoring period</th><th colspan="2">Monitored value</th></tr> <tr> <th>Lower</th><th>Higher</th></tr> </thead> <tbody> <tr> <td>20/12/2014 to 04/02/2015</td><td colspan="2">Data package incomplete</td></tr> <tr> <td>05/02/2015 to 31/12/2015</td><td>0.00008</td><td>0.00010</td></tr> <tr> <td>01/01/2016 to 31/12/2016</td><td>0.00011</td><td>0.00015</td></tr> <tr> <td>01/01/2017 to 31/12/2017</td><td>0.00018</td><td>0.00023</td></tr> <tr> <td>01/01/2018 to 31/12/2018</td><td>0.00020</td><td>0.00023</td></tr> <tr> <td>01/01/2019 to 31/12/2019</td><td>0.00024</td><td>0.00030</td></tr> </tbody> </table> <p>COD is measured by third party accredited laboratory (Felda/FGV Palm Industries Sdn Bhd.) using international accepted method (spectrophotometric method). Input values are cross checked from third party reports /21/. Sample measurement ensures 90/10 confidence precision and lower and higher bound values are used for emission reduction calculation.</p>	Monitoring period	Monitored value		Lower	Higher	20/12/2014 to 04/02/2015	Data package incomplete		05/02/2015 to 31/12/2015	0.00008	0.00010	01/01/2016 to 31/12/2016	0.00011	0.00015	01/01/2017 to 31/12/2017	0.00018	0.00023	01/01/2018 to 31/12/2018	0.00020	0.00023	01/01/2019 to 31/12/2019	0.00024	0.00030
Monitoring period	Monitored value																							
	Lower	Higher																						
20/12/2014 to 04/02/2015	Data package incomplete																							
05/02/2015 to 31/12/2015	0.00008	0.00010																						
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01/01/2017 to 31/12/2017	0.00018	0.00023																						
01/01/2018 to 31/12/2018	0.00020	0.00023																						
01/01/2019 to 31/12/2019	0.00024	0.00030																						
Monitoring equipment	Not applicable. Third party laboratory 'FGV Palm Industries Sdn Bhd.' is accredited for COD analysis by Department of Standards Malaysia /22/.																							
Measuring/Reading/Recording frequency	As per the registered monitoring plan, the parameter is required to measure and record at least once in two weeks. However, during the monitoring period the frequency was not followed fully from 01/01/2017 to 31/12/2019. Therefore, PP has proposed temporary deviation proposing alternative arrangement as described in section E.4.1 above. The monitoring arrangement is as per the applied methodology. The sample measurement ensures 90/10 confidence precision and lower and higher bound values are used for emission reduction calculation for the entire monitoring period conservatively.																							
Calculation method (if applicable)	Not applicable																							

Data/Parameter	BG_{burnt,y}												
Data Unit	Nm ³												
Description	Amount of biogas fuelled or flared in year, y												
Source of data to be used	Calculated by adding together the BG _{fuelled,y} and BG _{flared,y}												
Value of monitored parameter for the monitoring period	<table border="1"> <thead> <tr> <th>Monitoring period</th><th>Monitored value</th></tr> </thead> <tbody> <tr> <td>20/12/2014 to 04/02/2015</td><td>No data recorded</td></tr> <tr> <td>05/02/2015 to 31/12/2015</td><td>846,419</td></tr> <tr> <td>01/01/2016 to 31/12/2016</td><td>1,252,425</td></tr> <tr> <td>01/01/2017 to 31/12/2017</td><td>1,074,498</td></tr> <tr> <td>01/01/2018 to 31/12/2018</td><td>1,667,203</td></tr> </tbody> </table>	Monitoring period	Monitored value	20/12/2014 to 04/02/2015	No data recorded	05/02/2015 to 31/12/2015	846,419	01/01/2016 to 31/12/2016	1,252,425	01/01/2017 to 31/12/2017	1,074,498	01/01/2018 to 31/12/2018	1,667,203
Monitoring period	Monitored value												
20/12/2014 to 04/02/2015	No data recorded												
05/02/2015 to 31/12/2015	846,419												
01/01/2016 to 31/12/2016	1,252,425												
01/01/2017 to 31/12/2017	1,074,498												
01/01/2018 to 31/12/2018	1,667,203												

		01/01/2019 to 31/12/2019	1,495,894
		Input value of BG _{fuelled,y} and BG _{flared,y} are discussed below.	
	Monitoring equipment	Flow meter details of BG _{fuelled,y} and BG _{flared,y} are given below.	
	Accuracy of the monitoring equipment	Refer for BG _{fuelled,y} and BG _{flared,y}	
	Measuring/Reading/Recording frequency	Refer for BG _{fuelled,y} and BG _{flared,y} are	
	Calculation method (if applicable)	BG _{burnt,y} = BG _{fuelled,y} + BG _{flared,y}	

Data/Parameter	BG _{fuelled,y}		
Data Unit	Nm ³		
Description	Amount of biogas fuelled in the gas engine and/or boiler in year, y		
Source of data to be used	Measured		
Value of monitored parameter for the monitoring period	Monitoring period		Monitored value
	20/12/2014 to 04/02/2015		No data recorded
	05/02/2015 to 31/12/2015		840,546
	01/01/2016 to 31/12/2016		1,242,633
	01/01/2017 to 31/12/2017		940,284
	01/01/2018 to 31/12/2018		1,667,203
	01/01/2019 to 31/12/2019		1,485,441
	Monitoring period		Monitored value
		BG to gas engine	BG to boiler lower
	20/12/2014 to 04/02/2015	No data recorded	No data recorded
	05/02/2015 to 31/12/2015	840,546	0
	01/01/2016 to 31/12/2016	1,242,633	0
	01/01/2017 to 31/12/2017	936,683	3,601
	01/01/2018 to 31/12/2018	1,437,394	229,809
	01/01/2019 to 31/12/2019	1,223,587	261,854
The input values are cross checked from daily readings of biogas flow to gas engine and boiler and found to be correct /23/.			
Monitoring equipment	For monitoring biogas to gas engine:		
	Equipment type	Pressure transmitter	Temperature transmitter
	Manufacturer	Mercoid – PT	DWYER
	Model	3200G-1-FM-1-1-LCD	659RTD-1
	Serial number	DWY3200-10130697	Not available
	Accuracy	0.075%	0.1%
	Manufacturer		Mercoid
Equipment type		DP Flowmeter	

		<table border="1"> <tr> <td>Serial number</td> <td colspan="2">DWY3100-9131328</td> </tr> <tr> <td>Accuracy</td> <td colspan="2">0.075%</td> </tr> </table> <p>For monitoring biogas to Boiler:</p> <table border="1"> <tr> <td>Manufacturer</td> <td>Mercoid – PT</td> <td>Siemens – PT</td> </tr> <tr> <td>Equipment type</td> <td>Pressure transmitter</td> <td>Pressure transmitter</td> </tr> <tr> <td>Period of utilization</td> <td>Commissioning to 26/11/2019</td> <td>26/11/2019 to present</td> </tr> <tr> <td>Serial number</td> <td>DWY3200-10130707</td> <td>N1K4039009025</td> </tr> <tr> <td>Accuracy</td> <td>0.075%</td> <td>0.075%</td> </tr> </table> <table border="1"> <tr> <td>Manufacturer</td> <td>Mercoid - DPFM</td> <td>DWYER-659RTD-1</td> </tr> <tr> <td>Equipment type</td> <td>DP Flowmeter</td> <td>Temperature transmitter</td> </tr> <tr> <td>Serial number</td> <td>DWY3100-9131323</td> <td>Not available</td> </tr> <tr> <td>Accuracy</td> <td>0.075%</td> <td>0.1%</td> </tr> </table>	Serial number	DWY3100-9131328		Accuracy	0.075%		Manufacturer	Mercoid – PT	Siemens – PT	Equipment type	Pressure transmitter	Pressure transmitter	Period of utilization	Commissioning to 26/11/2019	26/11/2019 to present	Serial number	DWY3200-10130707	N1K4039009025	Accuracy	0.075%	0.075%	Manufacturer	Mercoid - DPFM	DWYER-659RTD-1	Equipment type	DP Flowmeter	Temperature transmitter	Serial number	DWY3100-9131323	Not available	Accuracy	0.075%	0.1%
		Serial number	DWY3100-9131328																																
		Accuracy	0.075%																																
		Manufacturer	Mercoid – PT	Siemens – PT																															
		Equipment type	Pressure transmitter	Pressure transmitter																															
		Period of utilization	Commissioning to 26/11/2019	26/11/2019 to present																															
		Serial number	DWY3200-10130707	N1K4039009025																															
		Accuracy	0.075%	0.075%																															
		Manufacturer	Mercoid - DPFM	DWYER-659RTD-1																															
		Equipment type	DP Flowmeter	Temperature transmitter																															
Serial number	DWY3100-9131323	Not available																																	
Accuracy	0.075%	0.1%																																	
Accuracy of the monitoring equipment	Accuracy of monitoring equipment provided above is as per manufacturer specifications.																																		
Measuring/Reading/Recording frequency	Continuous monitoring and hourly measured. Daily totalizer readings are provided for emission reduction calculation. Monitoring and recording frequency is as per registered monitoring plan.																																		
Calculation method (if applicable)	Sum of biogas sent to gas engine and boiler to be used. However, during the monitoring period there was no biogas consumption in boiler.																																		
Data/Parameter	BG_{flared,y}																																		
Data Unit	Nm ³																																		
Description	Amount of biogas flared in year, y																																		
Source of data to be used	Measured																																		
Value of monitored parameter for the monitoring period	<table border="1"> <tr> <th>Monitoring period</th> <th>Monitored value</th> </tr> <tr> <td>20/12/2014 to 04/02/2015</td> <td>No data recorded</td> </tr> <tr> <td>05/02/2015 to 31/12/2015</td> <td>5,873</td> </tr> <tr> <td>01/01/2016 to 31/12/2016</td> <td>9,792</td> </tr> <tr> <td>01/01/2017 to 31/12/2017</td> <td>134,214</td> </tr> <tr> <td>01/01/2018 to 31/12/2018</td> <td>0</td> </tr> <tr> <td>01/01/2019 to 31/12/2019</td> <td>10,453</td> </tr> </table> <p>The input values are cross checked from daily readings of biogas flow to flare and found to be correct /24/. There was no flaring in the year 2018 as verified from totalizer readings.</p>	Monitoring period	Monitored value	20/12/2014 to 04/02/2015	No data recorded	05/02/2015 to 31/12/2015	5,873	01/01/2016 to 31/12/2016	9,792	01/01/2017 to 31/12/2017	134,214	01/01/2018 to 31/12/2018	0	01/01/2019 to 31/12/2019	10,453																				
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Monitoring equipment	<table border="1"> <tr> <td>Equipment type</td> <td>Pressure transmitter</td> <td>Temperature transmitter</td> </tr> <tr> <td>Manufacturer</td> <td>Siemens – PT</td> <td>DWYER</td> </tr> <tr> <td>Model</td> <td>3200G-1-FM-1-1-LCD</td> <td>659RTD-1</td> </tr> <tr> <td>Serial number</td> <td>DWY3200-10130704</td> <td>Not available</td> </tr> <tr> <td>Accuracy</td> <td>0.075%</td> <td>0.1%</td> </tr> </table>	Equipment type	Pressure transmitter	Temperature transmitter	Manufacturer	Siemens – PT	DWYER	Model	3200G-1-FM-1-1-LCD	659RTD-1	Serial number	DWY3200-10130704	Not available	Accuracy	0.075%	0.1%																			
Equipment type	Pressure transmitter	Temperature transmitter																																	
Manufacturer	Siemens – PT	DWYER																																	
Model	3200G-1-FM-1-1-LCD	659RTD-1																																	
Serial number	DWY3200-10130704	Not available																																	
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		<table border="1"> <tr> <td>Manufacturer</td> <td colspan="2">Mercoid – DPFM</td> </tr> <tr> <td>Equipment type</td> <td colspan="2">DP Flowmeter</td> </tr> <tr> <td>Serial number</td> <td colspan="2">DWY3100-9131333</td> </tr> <tr> <td>Accuracy</td> <td colspan="2">0.075%</td> </tr> </table>	Manufacturer	Mercoid – DPFM		Equipment type	DP Flowmeter		Serial number	DWY3100-9131333		Accuracy	0.075%																				
	Manufacturer	Mercoid – DPFM																															
	Equipment type	DP Flowmeter																															
	Serial number	DWY3100-9131333																															
	Accuracy	0.075%																															
	Accuracy of the monitoring equipment	Accuracy of monitoring equipment provided above is as per manufacturer specifications.																															
	Measuring/Reading/Recording frequency	Continuous monitoring and hourly measured. Daily totalizer readings are provided for emission reduction calculation. Monitoring and recording frequency is as per registered monitoring plan.																															
	Calculation method (if applicable)	N/A																															
	Data/Parameter	W_{CH4,y}																															
	Data Unit	Percentage																															
Description	Methane content in biogas in the year y																																
Source of data to be used	Measured (Continuous analyser)																																
Value of monitored parameter for the monitoring period	<table border="1"> <thead> <tr> <th>Monitoring period</th> <th>At Gas engine</th> <th>At flaring (Higher reading)</th> </tr> </thead> <tbody> <tr> <td>20/12/2014 to 04/02/2015</td> <td>Data not recorded</td> <td>Data not recorded</td> </tr> <tr> <td>05/02/2015 to 31/12/2015</td> <td>66%</td> <td>65%</td> </tr> <tr> <td>01/01/2016 to 31/12/2016</td> <td>70%</td> <td>71%</td> </tr> <tr> <td>01/01/2017 to 31/12/2017</td> <td>70%</td> <td>70%</td> </tr> <tr> <td>01/01/2018 to 31/12/2018</td> <td>70%</td> <td>Data package incomplete</td> </tr> <tr> <td>01/01/2019 to 31/12/2019</td> <td>71%</td> <td>69%</td> </tr> </tbody> </table> <p>The yearly average value is considered for emission reduction calculation. Daily readings as per continuous analyser are recorded in logbooks. Values are cross checked from logbook records and found to be correct /26/. For the year 2018, the monitoring details of methane fraction was not complete. Since, there was no flaring in 2018, this has no impact.</p>			Monitoring period	At Gas engine	At flaring (Higher reading)	20/12/2014 to 04/02/2015	Data not recorded	Data not recorded	05/02/2015 to 31/12/2015	66%	65%	01/01/2016 to 31/12/2016	70%	71%	01/01/2017 to 31/12/2017	70%	70%	01/01/2018 to 31/12/2018	70%	Data package incomplete	01/01/2019 to 31/12/2019	71%	69%									
Monitoring period	At Gas engine	At flaring (Higher reading)																															
20/12/2014 to 04/02/2015	Data not recorded	Data not recorded																															
05/02/2015 to 31/12/2015	66%	65%																															
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01/01/2017 to 31/12/2017	70%	70%																															
01/01/2018 to 31/12/2018	70%	Data package incomplete																															
01/01/2019 to 31/12/2019	71%	69%																															
Monitoring equipment	<p>Continuous analyzer near gas engine:</p> <table border="1"> <tr> <td>Equipment type</td> <td colspan="2">Continuous analyzer</td> </tr> <tr> <td>Manufacturer</td> <td colspan="2">Edinburgh Sensors</td> </tr> <tr> <td>Serial number</td> <td>6735</td> <td>13752</td> </tr> <tr> <td>Period of utilization</td> <td>Commissioning to 17/10/2019</td> <td>17/10/2019 to present</td> </tr> <tr> <td>Accuracy</td> <td>± 2%</td> <td>± 2%</td> </tr> </table> <p>Continuous analyzer near flaring:</p> <table border="1"> <tr> <td>Equipment type</td> <td colspan="2">Continuous analyzer</td> </tr> <tr> <td>Manufacturer</td> <td colspan="2">Edinburgh Sensors</td> </tr> <tr> <td>Serial number</td> <td colspan="2">8278</td> </tr> <tr> <td>Period of utilization</td> <td colspan="2">Commissioning to present</td> </tr> <tr> <td>Accuracy</td> <td colspan="2">± 2%</td> </tr> </table>			Equipment type	Continuous analyzer		Manufacturer	Edinburgh Sensors		Serial number	6735	13752	Period of utilization	Commissioning to 17/10/2019	17/10/2019 to present	Accuracy	± 2%	± 2%	Equipment type	Continuous analyzer		Manufacturer	Edinburgh Sensors		Serial number	8278		Period of utilization	Commissioning to present		Accuracy	± 2%	
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Manufacturer	Edinburgh Sensors																																
Serial number	8278																																
Period of utilization	Commissioning to present																																
Accuracy	± 2%																																

	Accuracy of the monitoring equipment	Accuracy of monitoring equipments are provided above as per manufacturer specifications.	
	Measuring/Reading/Recording frequency	Continuous monitoring and daily recorded. Monitoring and recording frequency is as per registered monitoring plan and applied methodology.	
	Calculation method (if applicable)	N/A	
	Data/Parameter	T_{flare}	
	Data Unit	°Celsius	
	Description	Temperature in the exhaust gas of the flare	
	Source of data to be used	Measured (Thermocouple in the enclosed flare; Type N)	
	Value of monitored parameter for the monitoring period	No data recorded during the entire monitoring period. In consistent with the 'Tool to determine project emissions from flaring gases containing methane, version 1.0' if there is no record of the temperature of the exhaust gas of the flare, flare efficiency to be considered zero for that period.	
	Monitoring equipment	Equipment type	Thermocouple (Type N)
		Manufacturer	Autonics
		Model	TK4S-A4CN
		Accuracy	0.5%
	Accuracy of the monitoring equipment	Accuracy of monitoring equipments are provided above as per manufacturer specifications.	
	Measuring/Reading/Recording frequency	Continuous monitoring through SCADA system.	
	Calculation method (if applicable)	N/A	
	Data/Parameter	η_{flare,h}	
	Data Unit	Percentage	
	Description	Flare efficiency in hour h	
	Source of data to be used	Default value for enclosed flare as per flaring tool (Tool to determine project emissions from flaring gases containing methane, version 1.0)	
	Value of monitored parameter for the monitoring period	0%. During the monitoring period, there is no record of the temperature of the exhaust gas of the flare, therefore, it is considered the flare efficiency is zero for the entire monitoring period. This is consistent with the flaring tool /17/.	
Monitoring equipment	N/A		
Accuracy of the monitoring equipment	N/A		
Measuring/Reading/Recording frequency	N/A		
Calculation method (if applicable)	N/A		
Data/Parameter	S_{final,PJ,y}		

	Data Unit	Tonne		
	Description	End use of final sludge from the digester system		
	Source of data to be used	Records/ Log sheet		
	Value of monitored parameter for the monitoring period	Monitoring period	Monitored value	
		20/12/2014 to 04/02/2015	No data recorded	
		05/02/2015 to 31/12/2015	1,044	
		01/01/2016 to 31/12/2016	217	
		01/01/2017 to 31/12/2017	14,685	
		01/01/2018 to 31/12/2018	1,506	
		01/01/2019 to 31/12/2019	1,213	
	The sludge as removed and applied for soil application is weighed and records are kept electronically. Electronic records for the monitoring period is cross checked and found to be correct /25/.			
Monitoring equipment	Weighing bridge is used to weigh the sludge removed and sent for soil application:			
	Manufacturer	Avery		
	Model	ZM305		
	Serial number	033133		
	Accuracy	± 10 kg		
Accuracy of the monitoring equipment	The accuracy of the weighing bridge is ± 10 kg as per the specification of the weighing bridge.			
Measuring/Reading/Recording frequency	As in when sludge is removed and applied for soil application, it is weighed, and results are recorded electronically.			
Calculation method (if applicable)	N/A			
Findings	CAR 1 was raised as monitored data are available from 05/02/2015 onwards as against 20/12/2014 for which PP claiming emission reductions from 05/02/2015 onwards only. Zero value is considered for the period from 20/12/2014 to 04/02/2015 and this conforms paragraph 231(b)(i) of project standard version 2.0. Hence, CAR is closed. CL 1 was raised to provide evidences of monitored data which are now found to consistent with input values in ER and MR. Hence CL is closed.			
Conclusion	CC IPL confirms: <ul style="list-style-type: none"> - that all the parameters listed in the approved MP have been monitored. - the responsibilities and authorities for monitoring and reporting are in accordance with those stated in the approved monitoring plan. - the monitoring results are consistently recorded as per the approved frequency. - quality assurance and quality control procedure have been applied in accordance with the PDD. 			

E.6.3. Implementation of sampling plan

Means of verification	No sampling plan has been applied in the project.
Findings	N/A
Conclusion	N/A

E.7. Compliance with the calibration frequency requirements for measuring instruments

Means of verification	The monitoring period is from 20/12/2014 to 31/12/2019. However, emission reductions are claimed from 05/02/2015 to 31/12/2019. Calibration details of monitoring equipment is given below:		
	Parameter	Equipment details	Date of calibration
	Validity as per approved revised PDD		
	Q _{ww,i,y}	Flow meter-	08/10/2012 /27/
			07/10/2015

		F9056D20000	03/12/2015 /29(a)/	02/12/2018
			09/01/2018 /29(a)/	08/01/2021
			20/09/2019 /29(a)/	19/09/2022
	BG _{fuelled,y} to gas engine	Pressure transmitter- DWY3200-10130697	27/11/2013 /28(a)/	26/11/2016
			04/12/2015 /29(b)/	03/12/2018
			09/01/2018 /29(b)/	08/01/2021
			20/09/2019 /29(b)/	19/09/2022
		Temperature transmitter- 659RTD-1	08/11/2013 /28(b)/	07/11/2016
			04/12/2015 /29(c)/	03/12/2018
			09/01/2018 /29(c)/	08/01/2021
			20/09/2019 /29(c)/	19/09/2022
		DP flowmeter- DWY3100-9131328	27/11/2013 /28(c)/	26/11/2016
			04/12/2015 /29(d)/	03/12/2018
			09/01/2018 /29(d)/	08/01/2021
			20/09/2019 /29(d)/	19/09/2022
	BG _{fuelled,y} to boiler	Pressure transmitter- DWY3200-10130707	27/11/2013 /28(d)/	26/11/2016
			20/09/2019 /29(e)/	19/09/2022
		Pressure transmitter- N1K4039009025	26/11/2019 /30/	25/11/2022
			Temperature transmitter- 659RTD-1	08/11/2013 /28(h)/
		03/12/2015 /29(i)/		02/12/2018
		20/09/2019 /29(i)/	19/09/2022	
		DP flowmeter- DWY3100-9131323	27/11/2013 /28(i)/	26/11/2016
			03/12/2015 /29(j)/	02/12/2018
			20/09/2019 /29(j)/	19/09/2022
		BG _{flared,y}	Pressure transmitter- DWY3200-10130704	27/11/2013 /28(e)/
	03/12/2015 /29(f)/			02/12/2018
	09/01/2018 /29(f)/			08/01/2021
	20/09/2019 /29(f)/			19/09/2022
	Temperature transmitter-659RTD-1		08/11/2013 /28(f)/	07/11/2016
			03/12/2015 /29(g)/	02/12/2018
			09/01/2018 /29(g)/	08/01/2021
			20/09/2019 /29(g)/	19/09/2022
	DP flowmeter- DWY3100-9131333		27/11/2013 /28(g)/	26/11/2016
			03/12/2015 /29(h)/	02/12/2018
			09/01/2018 /29(h)/	08/01/2021
			20/09/2019 /29(h)/	19/09/2022
	W _{CH4,y}	Continuous analyzer- Near gas engine: 6735 (old)	26/02/2016 /29(k)/	25/02/2019
			09/01/2018 /29(k)/	08/01/2021
		Continuous analyzer- Near gas engine: 13752 (new)	24/04/2018 /31/	23/04/2021
			Continuous analyzer- Near flaring: 8278	26/02/2016 /29(l)/
	T _{flare}	Thermocouple (TK4S-A4CN)		09/01/2018 /29(l)/
			26/11/2013 /32/	25/11/2014
			11/04/2014 /32/	10/04/2015
			03/12/2015 /32/	02/12/2016
			26/02/2016 /32/	25/02/2017
			09/01/2018 /32/	08/01/2019
	S _{final,PJ,y}	Weighing bridge- 033133	20/09/2019 /32/	19/09/2020
			10/04/2014 /33/	09/04/2015
			10/04/2015 /33/	09/04/2016
			08/04/2016 /33/	07/04/2017
			14/04/2017 /33/	13/04/2018
			20/04/2018 /33/	19/04/2019
	30/04/2019 /33/	29/04/2020		
The flow meter for monitoring wastewater inflow (F9056D20000) had calibration				

gap from 07/10/2015 to 03/12/2015. To cover the calibration gap PP has applied maximum error of 0.2% over the measured value (as calibration resulted error within permissible limit) from 07/10/2015 to 03/12/2015 which is as per VVS paragraph 366 (a).

For monitoring biogas flow to boiler calibration gap noted for Pressure transmitter (DWY3200-10130707) from 26/11/2016 to 20/09/2019 and DP flowmeter (DWY3100-9131323) from 02/12/2018 to 20/09/2019. To cover the calibration gap PP has applied maximum error of 0.2% over the measured value (as calibration resulted error within permissible limit) from 26/11/2016 to 20/09/2019 which is as per VVS paragraph 366 (a).

The continuous gas analysers (6735 & 8278) had calibration gap upto 26/02/2016. To cover the calibration gap PP has applied maximum error of 2% over the measured value (as calibration resulted error within permissible limit) from 05/02/2015 to 26/02/2016 which is as per VVS paragraph 366 (a).

For the thermocouple there was calibration gap although there was no recording of the monitored data and as per the flaring tool (Tool to determine project emissions from flaring gases containing methane, version 1.0) if there is no record of the temperature of the exhaust gas of the flare, flare efficiency to be considered zero for that period. PP has accordingly considered zero flare efficiency for the monitoring period. Therefore, calibration gap has no impact.

Also, the weighing bridge used to monitor sludge generated and sent for soil application had calibration gap. However, the parameter does not have impact on emission reduction calculation and hence the calibration gap is neglected.

The credibility of calibrating agencies are discussed below:

Entity Name	Assessment
Endress+Hauser	Manufacturer of flow meters and hence credible to calibrate its products.
Pro-info Sys Technology Sdn Bhd	The entity has competency in industrial automation systems and solutions concentrating on palm oil milling, biogas, biomass, food processing and the general industries (https://pro-infosys.com/). Calibrations are done by accredited person and reports are traceable to national standard.
METCAL Technologies	Accredited agency from Department of Standards Malaysia (http://www.jsm.gov.my/documents/11396/300433/SAMM0256)
Precision Control Sdn.Bhd.	The entity has 35 years of experience and capabilities, Precision Control has been actively involved in the field of Process Control Instrumentation, Valves, Analytical Instruments, Process Control Systems, SCADA, Instrument Servicing & Calibration and Engineering Outsourcing since 1985 (https://www.precisioncontrol.com.my/about/). Calibrations are done by accredited person and reports are traceable to national standards.
Edinburgh Instruments Ltd.	Manufacturer of the gas analyser and hence credible to calibrate its products
Pyrometro Services (M) Sdn Bhd	Accredited agency from Department of Standards Malaysia (https://www.pyrometro.com/calibration.html#)
Metrology Corporation Malaysia Sdn.Bhd.	Govt. entity with the sole objective of providing the verification and re-verification services for all weighing and all measuring instruments use for trade in Malaysia (https://www.metrology.com.my/)

Findings

CAR 3 was raised as calibration details of monitoring equipments were not provided in version 1 of the MR which is updated in the final version of the MR and appropriate error factor applied for delay in calibration as per CDM project standard version 2.0. Therefore, CAR is closed.

Conclusion	CC IPL confirms that all applicable monitoring and measuring equipment have been calibrated by accredited agencies as per defined frequency of approved monitoring plan in consistent with applied methodology and appropriately maintained.
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E.8. Assessment of data and calculation of emission reductions or net removals

E.8.1. Calculation of baseline GHG emissions or baseline net GHG removals by sinks

Means of verification	<p>The baseline emissions using ex-post monitored value for the wastewater treatment system as described in the PDD and in line with the applied methodology is calculated as:</p> $BE_{ww,y} = BE_{ww,treatment,y}$ <p>Where,</p> $BE_{ww,treatment,y} = \sum_i (Q_{ww,i,y} \times COD_{inflow,i,y} \times \eta_{COD,BL,i} \times MCF_{ww,treatment,BL,i}) \times B_{o,ww} \times UF_{BL} \times GWP_{CH4}$ <p>Flow of wastewater treated in the year y ($Q_{ww,y}$): The measured (corrected due to calibration gap) value during the monitoring period is 441,966.24 m³. CC IPL has verified the values against the daily recording of volume of the wastewater treated digesters /20/, which is in line with the requirements of the registered monitoring plan /03/ and the applied monitoring methodology AMS-III.H version 16 /11/. Continuous wastewater flow to both digesters (there are two digesters) are downloaded through SCADA system where totalizer values are recorded. Daily flow is calculated as difference of previous days reading and the reporting day. When the mill does not operate the reported value is kept as zero and the emission reduction worksheet represents the same /02/. Hence, CC IPL was able to determine that all data applied in the emission reduction calculation spread sheet /02/ and monitoring report /01/ were correct and from the original data.</p> <p>$COD_{inflow,i,y}$: $COD_{inflow,y}$ is analyzed once every two weeks by accredited third party laboratory. This is in line with the approved revised PDD. However, the frequency was not fully met for which temporary deviation has been applied. CC IPL has verified the values in the monitoring report /01/ against the Original test reports of the $COD_{ww,inflow,y}$, /21/ which is in line with the requirements of the registered monitoring plan /03/ and the applied monitoring methodology AMS-III.H version 16 /11/.</p> <p>$\eta_{COD,BL,i}$: COD removal efficiency of the baseline anaerobic treatment system was determined as per the paragraphs 26, 27 or 28 in AMS III.H (Version 16) and fixed ex-ante to be 99% /03/,/11/.</p> <p>Methane correction factor for baseline wastewater treatment system i ($MCF_{ww,treatment,BL,i}$) has been fixed ex-ante as 0.8 for Anaerobic deep lagoon (depth more than 2 m) /03/. Methane producing capacity of the wastewater ($B_{o,ww}$) has been fixed ex-ante as 0.25 kg CH₄/kg COD /03/. Model correction factor to account for model uncertainties (UF_{BL}) is fixed ex-ante to be 0.89 /03/. Global Warming Potential for methane (GWP_{CH4}) is 25 from 01/01/2013 onwards as per IPCC /03/.</p> <p>Therefore, $BE_{ww,treatment,y}$ for the monitoring period calculated yearly basis is 121,934 tCO_{2e}</p>
Findings	CAR 2 was raised for inconsistency in reporting monitored data and clarifications in monitoring and reporting of some monitoring parameters. PP has clarified and updated the MR and emission reduction worksheet. Hence, CAR is closed. CL 1 was raised to provide raw data of monitoring records and calibration records covering the monitoring period. PP has provided the required documents and details reported in MR is consistent with calibration records. Hence, CL is closed.
Conclusion	CC IPL confirms that baseline emissions have been appropriately calculated and are consistent with off-site review, the applied methodology and approved revised PDD /01/, /02/, /03/, /04/, /05/, /11/.

E.8.2. Calculation of project GHG emissions or actual net anthropogenic GHG removals by sinks

Means of verification	<p>As per approved revised PDD and actual implementation of the project, Emissions from electricity or fossil fuel consumption in the year y ($PE_{power,y}$) is zero as electricity generated (renewable) from the project activity is used for internal consumption and hence $PE_{power,y}$ is zero.</p> <p>As per approved revised PDD and actual implementation of the project, Methane emissions from wastewater treatment systems affected by the proposed project activity, and not equipped with biogas recovery in the project situation ($PE_{ww,treatment,y}$) is zero (0) as methane correction factor of baseline aerobic wastewater treatment system is '0' (zero) for aerobic treatment well managed ponds as per AMS-III.H version 16.</p> <p>Methane emissions from degradable organic carbon in treated wastewater ($PE_{ww,discharge,y}$): In the proposed project activity, the final treated effluent is sent for land irrigation. The implementation of the project activity does not change the operational characteristics of treated wastewater discharged to plantation as in the baseline and the MCF values as per AMS-III.H version 16 is '0'. Therefore, on this basis $PE_{ww,discharge,y} = 0$</p> <p>Methane emissions from the decay of the final sludge generated by the project activity treatment systems ($PE_{s,final,y}$): The sludge removed periodically from the digester is eventually applied to the palm plantation as soil application and applied in a thin layer under aerobic conditions. Therefore $PE_{s,final,y} = 0$</p> <p>Methane fugitive emissions on account of inefficiencies in capture systems ($PE_{fugitive,y}$) are determined as per AMS-III.H and as follows: $PE_{fugitive,y} = PE_{fugitive,ww,y} + PE_{fugitive,s,y}$</p> <p>As described in the approved revised PDD and actual implementation details of the project, sludge is removed and applied for land application under aerobic conditions. Hence, $PE_{fugitive,s,y}$ is considered zero in this monitoring period.</p> <p>Fugitive emissions through capture inefficiencies in the anaerobic wastewater treatment systems in the year y ($PE_{fugitive,ww,y}$) is estimated as follows: $PE_{fugitive,ww,y} = (1 - CFE_{ww}) * MEP_{ww,treatment,y} * GWP_{CH4}$</p> <p>Capture efficiency of the biogas recovery equipment in the wastewater treatment (CFE_{ww}) is fixed ex-ante to be 0.9 as per approved revised PDD /03/. Global Warming Potential for methane (GWP_{CH4}) is 25 from 01/01/2013 onwards as per IPCC /03/.</p> <p>Methane emission potential of wastewater treatment systems equipped with biogas recovery system in year y ($MEP_{ww,treatment,y}$) is calculated as follows:</p> $MEP_{ww,treatment,y} = Q_{ww,y} \times B_{o,ww} \times UF_{PJ} \times \sum_k COD_{removed,PJ,k,y} \times MCF_{ww,treatment,PJ,k}$ <p>Flow of wastewater treated in the year y ($Q_{ww,y}$) during the monitoring period is 442,036 m³ (corrected value due to delay in calibration) as explained in above.</p> <p>Methane producing capacity of the wastewater ($B_{o,ww}$) is fixed ex-ante to be 0.25 kg CH₄/kg COD /03/. Model correction factor to account for model uncertainties (UF_{PJ}) is fixed ex-ante to be 1.12 /03/. Methane correction factor for wastewater treatment system k equipped with biogas recovery ($MCF_{ww,treatment,PJ,k}$) is fixed ex-ante to be 0.8 as per approved revised PDD /03/.</p> <p>$COD_{removed,PJ,k,y}$ is calculated as the difference between $COD_{ww,untreated,y}$ and $COD_{ww,treated,y}$ /03/. $COD_{ww,untreated,y}$ and $COD_{ww,treated,y}$ is analyzed once every two weeks by accredited third party laboratory. This is in line with the approved revised PDD. However, the frequency was not fully met for which temporary deviation has been applied. CCIPL has verified the values in the monitoring report /01/ against the Original test reports /21/ which is in line with the requirements of the registered monitoring plan /03/ and the applied monitoring methodology AMS-III.H version 16</p>
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	<p>/11/. $PE_{fugitive,ww,y}$ for the monitoring period is 15,962 tCO_{2e} /02/.</p> <p>Project Emissions from flaring in year y ($PE_{flare,y}$) is calculated as per the “Tool to determine project emissions from flaring gases containing methane” /17/ and as follows:</p> $PE_{flare,y} = \sum_{h=1}^{8760} TM_{RG,h} \times (1 - \eta_{flare,h}) \times \frac{GWP_{CH_4}}{1000}$ <p>Global Warming Potential for methane (GWP_{CH_4}) is 25 from 01/01/2013 onwards as per IPCC /03/. As per approved revised PDD, for flare efficiency of the enclosed flare ‘default approach’ to be applied. However, it is noted there was no record of the temperature of the exhaust gas of the flare during the entire monitoring period. Therefore, flare efficiency in hour ‘h’ ($\eta_{flare,h}$) is 0% as per the applied tool /17/.</p> <p>Mass flow rate of methane in the residual gas in hour ‘h’ ($TM_{RG,h}$) is calculated as per the ‘Tool to determine project emissions from flaring gases containing methane’ as follows:</p> $TM_{RG,h} = FV_{RG,h} * fv_{CH_4, RG,h} * \rho_{CH_4,n,h}$ <p>Density of methane at normal condition ($\rho_{CH_4,n,h}$) is fixed ex-ante to be 0.716 kg/m³ as per the ‘Tool to determine project emissions from flaring gases containing methane’ /17/.</p> <p>Biogas sent to flare ($FV_{RG,h}$) is 160,332 Nm³ for the monitoring period. Fraction of methane ($fv_{CH_4, RG,h}$) measured continuously, however due to delay in calibration corrected value applied upto 26/02/2016. Therefore, $PE_{flaring,y}$ for the monitoring period is 2,001 tCO_{2e} /02/.</p> <p>Therefore, total PE for the monitoring period is 17,963 tCO₂.</p>
Findings	CAR 2 was raised for inconsistency in reporting monitored data and clarifications in monitoring and reporting of some monitoring parameters. PP has clarified and updated the MR and emission reduction worksheet. Hence, CAR is closed. CL 1 was raised to provide raw data of monitoring records and calibration records covering the monitoring period. PP has provided the required documents and details reported in MR is consistent with calibration records. Hence, CL is closed.
Conclusion	CC IPL confirms that project emissions are appropriately considered and are consistent with off-site observations, the applied methodology and approved revised PDD /01/, /02/, /03/, /04/, /05/, /11/.

E.8.3. Calculation of leakage GHG emissions

Means of verification	In line with the applied methodology and approved revised PDD, there are no leakage emissions associated with the project activity /03/, /11/.
Findings	N/A
Conclusion	CC IPL confirms that no leakage emissions are to be considered as per the approved revised PDD and the applied methodology.

E.8.4. Summary calculation of GHG emission reductions or net anthropogenic GHG removals by sinks

Means of verification	<p>As per approved revised PDD and applied methodologies AMS-III.H version 16, the emission reductions achieved ($ER_{y,ex\ post}$) in any year are the lowest value of the following:</p> $ER_{y,ex\ post} = \min((BE_{y,ex\ post} - PE_{y,ex\ post} - LE_{y,ex\ post}), (MD_y - PE_{power,y} - PE_{biomass,y} - LE_{y,ex\ post}))$ <p>For the current monitoring period the achieved $BE_{y,ex\ post}$ is 121,934 tCO_{2e}, achieved $PE_{y,ex\ post}$ is 17,963 tCO_{2e} and $LE_{y,ex\ post}$ is zero as explained in above.</p> <p>As per equation 16 of AMS-III.H, version 16, in case of flaring/combustion MD_y will be measured using the conditions of the flaring process:</p> $MD_y = BG_{burnt,y} * w_{CH_4,y} * D_{CH_4} * FE * GWP_{CH_4}$
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	<p>The $BG_{burnt,y}$ is the sum of total biogas fired in generator and boiler ($BG_{fuelled,y}$) and biogas flared ($BG_{flared,y}$). CCIPL has verified the values in the monitoring report /01/ against the daily recording of biogas fired in generator, boiler and flared /23/,/24/ which is in line with the requirements of the registered monitoring plan /03/ and the applied monitoring methodology AMS-III.H version 16 /11/. The amount of biogas burnt in generator and boiler ($BG_{fuelled,y}$) during the monitoring period is 6,176,106 Nm³. Total biogas flared during the monitoring period is 160,332 Nm³. Destruction efficiency of 100% applied for gas engine and boiler as per EB guideline. For flare efficiency 0% is applied as per the applied flaring tool. Density of methane at normal condition (D_{CH_4}) is fixed ex-ante to be 0.716 kg/m³ as per the 'Tool to determine project emissions from flaring gases containing methane'. Global Warming Potential for methane (GWP_{CH_4}) is 25 from 01/01/2013 onwards as per IPCC /03/. Methane fraction (W_{CH_4}) is as per continuous measurement and daily records /26/. Methane fraction is measured near the biogas flow meter (generator inlet) and hence complies the methodology requirements. Therefore, MDy achieved during the monitoring period amounts to 77,217 tonnes of CO₂ equivalent /02/.</p> <p>Therefore,</p> $ER_{y,ex\ post} = \min((BE_{WW,y,ex\ post} - PE_{ww,y,ex\ post} - LE_{ww,y,ex\ post}), (MD_y - PE_{power,y} - LE_{y,ex\ post}))$ $= \min(121,934 - 17,963 - 0), (77,217 - 0 - 0)$ $= 77,217\ tCO_2e$
Findings	N/A
Conclusion	The data presented in the monitoring report /01/ and emission reduction worksheet /02/ were assessed by reviewing in detail project documentation, collection of monitored data, observation of established monitoring and reporting practices and assessment of the reliability of monitoring equipment. Sufficient evidences were presented and verified by CCIPL for the reported emission reductions as listed above.

E.8.5. Comparison of actual GHG emission reductions or net anthropogenic GHG removals by sinks with estimates in registered PDD

Means of verification	The emission reductions from the project for the monitoring period as reported in the monitoring report revision 04.1 of 06/01/2021 /01/ is equivalent to 77,217 tCO _{2e} . The reported emission reductions are 53% lower than the estimated emission reduction of 164,127 tCO _{2e} for the period as per the approved revised PDD version 3.1 of 19/06/2020 /03/.
Findings	N/A
Conclusion	The emission reduction calculations provided in the spreadsheet /02/ have been verified to be correct and in line with the approved revised PDD /03/.

E.8.6. Remarks on difference from estimated value in registered PDD

Means of verification	N/A
Findings	N/A
Conclusion	N/A

E.8.7. Actual GHG emission reductions or net anthropogenic GHG removals by sinks during the first commitment period and the period from 1 January 2013 onwards

Means of verification	GHG emission reductions or net GHG removals by sinks reported up to 31 December 2012	GHG emission reductions or net GHG removals by sinks reported from 1 January 2013 onwards
	NA	77,217 tCO _{2e}
Findings	N/A	
Conclusion	The actual monitoring period does not fall into the first commitment period.	

E.9. Assessment of reported sustainable development co-benefits

Means of verification	N/A
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Findings	N/A
Conclusion	N/A

E.10. Global stakeholder consultation

Means of verification	N/A
Findings	N/A
Conclusion	N/A

SECTION F. Internal quality control

>> The final verification report has passed a technical review before being submitted to the UNFCCC Executive Board. A technical reviewer qualified in accordance with the CCIPL's qualification scheme for CDM validation and verification performed the technical review.

SECTION G. Verification opinion

>> Carbon Check (India) Private Ltd. (CC IPL) has performed the first periodic verification of the registered CDM Project Activity "Methane Capture and Utilization Project at Carotino Palm Oil Mill, Malaysia" having UNFCCC reference number as 6762.

The verification team assigned by the DOE concludes that the project activity as described in the approved revised PDD version 3.1 of 19/06/2020 /03/ and the Monitoring report (version 04.1, dated 06/01/2021) /01/, meets all relevant requirements of the UNFCCC for CDM project activities including article 12 of the Kyoto Protocol and paragraph 62 of CDM M & P, the modalities and procedures for CDM (Marrakesh Accords) and the subsequent decisions by the COP/MOP and CDM Executive Board. The verification has been conducted in-line with the CDM VVS for project activities, version 02.0 requirements /10/.

Verification methodology and process:

The Verification team confirms the contractual relationship signed on 06/03/2020 between the DOE, Carbon Check (India) Private Ltd. and the Project Participant, (Perenia Pty Ltd.). The team assigned to the verification meets the CCIPL's internal procedures including the UNFCCC requirements for the team composition and competence. The verification team has conducted a thorough contract review as per UNFCCC and CCIPL's procedures and requirements.

The verification has been performed as per the requirements described in the CDM VVS for project activities, version 02.0 and constitutes the review and completion of the following steps:

- Reviewing the approved revised PDD (version 3.1 of 19/06/2020), including the monitoring plan and the corresponding validation report /04/,/05/;
- Publication of the MR (version 1 of 30/09/2020) /01/ on the UNFCCC website on 05/10/2020
- Desk review of the validation report, MR and other relevant documents including documents related to the project activities in emission reductions
- Review of the applied monitoring methodology (AMS-III.H version 16) /11/;
- Remote assessment (27/10/2020)
- Resolution of CARs and CLs raised during verification
- Issuance of Verification Report

The project activity was correctly implemented according to selected monitoring methodology, monitoring plan and the approved revised PDD. The monitoring system was installed, maintained in a proper manner, while collected monitoring data allowed for the verification of the amount of achieved GHG emission reductions. Through the review and off site visit the verification team confirms that the project activity has resulted 77,217 tCO₂e emission reductions during this first monitoring period.

Verified emission reductions for the project activity: 77,217 tCO₂e.

The break-up of emission reduction up-to 31/12/2012 and 01/01/2013 onwards as verified during the course of verification are as below:

Item	Emission reductions up to 31 December 2012	Emission reductions from 1 January 2013 onwards
Emission reductions (t CO ₂ e)	0	77,217

CC IPL as a DOE is therefore pleased to issue a positive verification opinion expressed in the attached Certification statement.

SECTION H. Certification statement

>> Carbon Check (India) Private Ltd., the DOE, has performed the verification of the registered project activity "Methane Capture and Utilization Project at Carotino Palm Oil Mill, Malaysia" having UNFCCC Registration Number 6762. The project activity involves wastewater treatment in palm oil mill and methane capture to generate electricity.

The PP is responsible for the collection of data in accordance with the monitoring plan and the reporting of GHG emissions reductions. It is DOE's responsibility to express an independent verification statement on the reported GHG emission reductions from the project activity. The DOE does not express any opinion on the selected baseline scenario or on the validated and approved revised PDD. The verification is carried out in-line with the requirements of CDM VVS for project activities.

The verification was performed to identify the compliance with implementation and monitoring requirements, and to verify the actual amount of achieved emission reductions, through obtaining evidence and information off-site that includes i) checking whether the provisions of the monitoring methodology and the monitoring plan were consistently and appropriately applied and ii) the collection of evidence supporting the reported data.

The verification is based on:

- PDD version 3.1 dated 19/06/2020 and the corresponding validation reports;
- Approved monitoring methodology AMS-III.H "Methane recovery in wastewater treatment", version 16;
- Monitoring reports versions 1 of 30/09/2020, version 2.0 of 30/11/2020, version 03 of 21/12/2020, version 4 of 30/12/2020 and version 4.1 of 06/01/2021.

This statement covers verification period from 24/12/2014 and 31/12/2019 (including both the dates).

The DOE raised one clarification request and three corrective action requests, all of which have been resolved by the PP. One FAR raised during validation is also closed successfully.

The DOE considers necessary to give reasonable assurance that reported GHG emission reductions were calculated correctly on the basis of the approved baseline and monitoring methodology and the monitoring plan contained in the approved revised PDD are fairly stated.

The DOE, hereby certifies that the project activity, achieved emission reductions by sources of GHG equal to 77,217 tCO₂ equivalent and all monitoring requirements have been fulfilled and is substantiated by an audit trail that contains evidence and records. The break-up of emission reduction up-to 31/12/2012 and 01/01/2013 onwards as verified during the course of verification are as below:


Item	Emission reductions up to 31 December 2012	Emission reductions from 1 January 2013 onwards
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Item	Emission reductions up to 31 December 2012	Emission reductions from 1 January 2013 onwards
Emission reductions (t CO ₂ e)	0	77,217 tCO ₂ e

Appendix 1. Abbreviations

Abbreviations	Full texts
BE	Baseline Emissions
CAR	Corrective Action Request
CDM	Clean Development Mechanism
CDM M&P	Modalities and Procedures CDM
CDM-PCP	Clean Development Mechanism Project Cycle Procedure
CDM-PS	Clean Development Mechanism Project Standard
CDM-VVS	Clean Development Mechanism Validation and Verification Standard
CER(s)	Certified Emission Reduction(s)
CH ₄	Methane
CC IPL	Carbon Check India Pvt. Ltd.
CL	Clarification Request
CO ₂	Carbon dioxide
CO ₂ e	Carbon dioxide equivalent
DNA	Designated National Authority
DOE	Designated Operational Entity
EB	Executive Board
ER	Emission Reductions
ERPA	Emission Reductions Purchase Agreement
EVN	Electricity Corporation of Vietnam
FAR	Forward Action Request
GHG(s)	Greenhouse gas(es)
GWP	Global Warming Potential
IPCC	Intergovernmental Panel on Climate Change
LoA	Letter of Approval
MoV	Means of Verification
MR	Monitoring Report
N/A	Not Applicable
ODA	Official Development Assistance
PDD	Project Design Document
PE	Project Emission
PP(s)	Project Participant(s)
Ref.	Document Reference
SS(s)	Sectoral Scope(s)
TA(s)	Technical Area(s)
UNFCCC	United Nations Framework Convention on Climate Change

Appendix 2. Competence of team members and technical reviewers



Carbon
CHECK

Carbon Check (India) Private Ltd.

Champok Buragohain

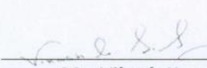
has been qualified as per CCIPL's internal qualification procedures, in accordance with requirements of Accreditation Standard (version 07.0):

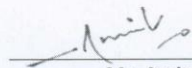
For following functions:

Validator	<input checked="" type="checkbox"/>	Team Leader	<input checked="" type="checkbox"/>	Technical reviewer	<input type="checkbox"/>
Verifier	<input checked="" type="checkbox"/>	Technical Expert	<input checked="" type="checkbox"/>	Local Assessor ¹	<input checked="" type="checkbox"/>

In the following Technical Areas:

TA 1.1	<input checked="" type="checkbox"/>	TA 3.1	<input checked="" type="checkbox"/>	TA 5.2	<input type="checkbox"/>	TA 9.2	<input type="checkbox"/>	TA 13.2	<input checked="" type="checkbox"/>
TA 1.2	<input checked="" type="checkbox"/>	TA 4.1	<input type="checkbox"/>	TA 8.1	<input type="checkbox"/>	TA 10.1	<input type="checkbox"/>	TA 14.1	<input type="checkbox"/>
TA 2.1	<input type="checkbox"/>	TA 5.1	<input type="checkbox"/>	TA 9.1	<input type="checkbox"/>	TA 13.1	<input checked="" type="checkbox"/>		


Mr. Vikash Kumar Singh
 Compliance Officer


Mr. Amit Anand
 CEO

Date of Approval
 24/12/2020

Valid Till
 24/12/2021

Revision History of the Document

26/12/2014	Initial Adoption
24/12/2015	Annual Revision
20/01/2016	Interim Revision for office address change
23/12/2017	Annual Revision
24/12/2017	Annual Revision
24/12/2018	Annual Revision
24/12/2019	Annual Revision
01/03/2020	Interim Revision for office address change
01/09/2020	Interim Revision for CCIPL logo change
24/12/2020	Annual Revision

¹ Please state the name of countries for which the candidate is qualified as local assessor.

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Carbon Check (India) Private Ltd.

Amit Anand

has been qualified as per CCIPL's internal qualification procedures, in accordance with requirements of Accreditation Standard (version 07.0):

For following functions:

Validator	<input checked="" type="checkbox"/>	Team Leader	<input checked="" type="checkbox"/>	Technical reviewer	<input checked="" type="checkbox"/>
Verifier	<input checked="" type="checkbox"/>	Technical Expert	<input checked="" type="checkbox"/>	Local Assessor ¹	<input checked="" type="checkbox"/>

In the following Technical Areas:

TA 1.1	<input checked="" type="checkbox"/>	TA 3.1	<input checked="" type="checkbox"/>	TA 5.2	<input type="checkbox"/>	TA 9.2	<input type="checkbox"/>	TA 13.2	<input type="checkbox"/>
TA 1.2	<input checked="" type="checkbox"/>	TA 4.1	<input type="checkbox"/>	TA 8.1	<input checked="" type="checkbox"/>	TA 10.1	<input type="checkbox"/>	TA 14.1	<input checked="" type="checkbox"/>
TA 2.1	<input type="checkbox"/>	TA 5.1	<input type="checkbox"/>	TA 9.1	<input type="checkbox"/>	TA 13.1	<input checked="" type="checkbox"/>		

Vikash K. S.

Mr. Vikash Kumar Singh
Compliance Officer

Date of Approval
24/12/2020

Valid Till
24/12/2021

Revision History of the Document

26/12/2014	Initial Adoption
24/12/2015	Annual Revision
20/01/2016	Interim Revision for office address change
23/12/2017	Annual Revision
24/12/2017	Annual Revision
24/12/2018	Annual Revision
24/12/2019	Annual Revision
01/03/2020	Interim Revision for office address change
01/09/2020	Interim Revision for CCIPL logo change
24/12/2020	Annual Revision

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Appendix 3. Documents reviewed or referenced

No.	Author	Title	References to the document	Provider
01	Perenia Pty Ltd.	Monitoring report for project activity "Methane Capture and Utilization Project at Carotino Palm Oil Mill, Malaysia" in Malaysia	Version 1.0 of 30/09/2020, version 2 of 30/11/2020, version 3 of 21/12/2020 and version 4 of 30/12/2020, version 4.1 of 06/01/2021	PP
02	Perenia Pty Ltd.	Emission reduction calculation spreadsheet (301407Carotino_ER cal_v2 27102020)	Version 2.0 of 27/10/2020, version 4.0 of 30/12/2020	PP
03	Perenia Pty Ltd.	Approved revised PDD for project activity "Methane Capture and Utilization Project at Carotino Palm Oil Mill, Malaysia"	version 3.1 of 19/06/2020	PP
04	Carbon Check	Validation report on post registration changes for project activity "Methane Capture and Utilization Project at Carotino Palm Oil Mill, Malaysia"	Version 1.1 of 07/01/2021	Others
05	SIRIM	CDM validation report for the project "Methane Capture and Utilization Project at Carotino Palm Oil Mill, Malaysia"	Validation report N° SQAS-CDM-EP10850002 issued on 27/09/2012	Others
06	UNFCCC	Project 6762: Methane Capture and Utilization Project at Carotino Palm Oil Mill, Malaysia	https://cdm.unfccc.int/Projects/DB/SIRIM1343013701.33/view , in English language, retrieved on 30/10/2020	Others
07	CDM Executive Board	Monitoring report form (CDM-MR-FORM) for CDM Project activity	version 07.0 of 31/05/2019	Others
08	CDM Executive Board	CDM project cycle procedure for project activities	version 02.0 of 29/11/2018	Others
09	CDM Executive Board	Clean Development Mechanism Project Standard	version 02.0 of 29/11/2018	Others
10	CDM Executive Board	Clean Development Mechanism Validation and Verification Standard for project activities	version 02.0 of 29/11/2018	Others
11	CDM Executive Board	AMS-III.H – Methane recovery in wastewater treatment	Version 16	Others
12	CDM Executive Board	Tool to calculate the emission factor for an electricity system" version 02	EB 50 annex 14	Others
13	UNFCCC	Publication of MR at UNFCCC	https://cdm.unfccc.int/Issuance/MonitoringReports/mr_for_date.html?date=2020/10/05 , in English language, retrieved on 30/10/2020	Others
14	UNFCCC	Guideline: Application of materiality in verifications	Version 02, Annex 11, EB 82 dated 20/02/2015	Others
15	UNFCCC	CDM Executive Board agrees to relax mandatory site visits by DOEs until 31 December 2020 because of COVID-19	Website 'https://cdm.unfccc.int/newsroom/latestnews/releases/2020/01041_index.html' in English language retrieved on 30/10/2020	Others
16	Watermech Engineering Sdn. Bhd.	Commissioning and handover report	Dated 20/12/2014	PP
17	UNFCCC	Methodological "Tool to determine project emissions from flaring gases	Annex 13, EB 28	Others

		containing methane"		
18	Perenia Pty Ltd.	Remote audit video	Recorded on 27/10/2020	PP
19	Perenia Pty Ltd.	Latest photographs of monitoring equipments		PP
20	Carotino Sdn Bhd.	Hourly electronic recording of wastewater flow to anaerobic digesters (downloaded through SCADA)	Records for the period 05/02/2015 to 01/01/2020	PP
21	Felda/FGV PALM INDUSTRIES SDN BHD.	COD of wastewater analysis reports covering the period from 02/02/2015 to 31/12/2019	Third party COD of wastewater analysis reports	PP
22	Department of Standards Malaysia	Accreditation to FGV Palm Industries Sdn Bhd. in accordance with MS ISO/IEC 17025:2017 (ISO/IEC 17025:2017)	http://www.jsm.gov.my/documents/11396/300433/SAMM0247	Others
23	Carotino Sdn Bhd.	Hourly electronic recording of biogas flow to gas engine/boiler (downloaded through SCADA)	Records for the period 01/02/2015 to 01/01/2020	PP
24	Carotino Sdn Bhd.	Hourly electronic recording of biogas flow to flare (downloaded through SCADA)	Records for the period 01/02/2015 to 01/01/2020	PP
25	Carotino Sdn Bhd.	Records of sludge removed and applied for soil application ensuring aerobic conditions	Records for the period 20/12/2014 to 31/12/2019	PP
26	Carotino Sdn Bhd.	Daily recording of methane concentration in biogas	Records for the period 20/12/2014 to 31/12/2019	PP
27	Endress+Hauser	Calibration certificate of flow meter with serial number F9056D20000 dated 08/10/2012	Calibration certificate	PP
28	METCAL Technologies	a) Calibration certificate of pressure transmitter with serial number DWY3200-10130697, calibrated on 27/11/2013 b) Calibration certificate of temperature transmitter (659RTD-1)-gas engine calibrated on 08/11/2013 c) Calibration certificate of DP flow meter (DWY3100-9131328) calibrated on 27/11/2013 d) Calibration certificate of pressure transmitter with serial number DWY3200-10130707, calibrated on 27/11/2013 e) Calibration certificate of pressure transmitter with serial number DWY3200-10130704, calibrated on 27/11/2013 f) Calibration certificate of temperature transmitter (659RTD-1)-flare line calibrated on 08/11/2013 g) Calibration certificate of DP flow meter (DWY3100-9131333) calibrated on	Calibration certificate	PP

		27/11/2013 h) Calibration certificate of temperature transmitter (659RTD-1)-boiler line calibrated on 08/11/2013 i) Calibration certificate of DP flow meter (DWY3100-9131323) calibrated on 27/11/2013		
29	Pro-info Sys Technology Sdn Bhd	a) Calibration certificate of DP flow meter (F9056D20000) calibrated on 03/12/2015, on 09/01/2018 and on 20/09/2019 b) Calibration certificate of pressure transmitter with serial number DWY3200-10130697, calibrated on 04/12/2015, on 09/01/2018 and on 20/09/2019 c) Calibration certificate of temperature transmitter (659RTD-1)-gas engine line calibrated on 04/12/2015, on 09/01/2018 and on 20/09/2019 d) Calibration certificate of DP flow meter (DWY3100-9131328) calibrated on 04/12/2015, on 09/01/2018 and on 20/09/2019 e) Calibration certificate of pressure transmitter with serial number DWY3200-10130707, calibrated on 20/09/2019 f) Calibration certificate of pressure transmitter with serial number DWY3200-10130704, calibrated on 03/12/2015, on 19/01/2018 and on 20/09/2019 g) Calibration certificate of temperature transmitter (659RTD-1)-flare line calibrated on 03/12/2015, on 09/01/2018 and on 20/09/2019 h) Calibration certificate of DP flow meter (DWY3100-9131333) calibrated on 03/12/2015, on 09/01/2018 and on 20/09/2019 i) Calibration certificate of temperature transmitter (659RTD-1)-boiler line calibrated on 03/12/2015 and on 20/09/2019 j) Calibration certificate of DP flow meter (DWY3100-9131323) calibrated on 03/12/2015 and on	Calibration certificates	PP

		20/09/2019 k) Calibration certificate of methane analyser 6735 calibrated on 26/02/2016, on 09/01/2018 l) Calibration certificate of methane analyser 8278 calibrated on 26/02/2016, on 09/01/2018		
30	Precision Control Sdn.Bhd.	Calibration report of DP flow meter (N1K4039009025) calibrated on 26/11/2019	Calibration certificate	PP
31	Edinburgh Instruments	Calibration certificate of methane analyser (13752) calibrated on 24/04/2018	Calibration certificate	PP
32	Pyrometro Services (M) Sdn Bhd	Calibration certificate of thermocouple (TK4S-A4CN) calibrated on 26/11/2013, on 11/04/2014, on 03/12/2015, on 26/02/2016 and on 20/09/2019	Calibration certificate	PP
33	Metrology Corporation Malaysia Sdn.Bhd.	Calibration certificate of weighing bridge (033133) calibrated on 10/04/2014, 10/04/2015, 08/04/2016, 14/04/2017, 20/04/2018 and 30/04/2019	Calibration certificate	PP
34	Watermech	Training records of biogas plant SOP, Generator SOP and SCADA system	31/12/2018	PP

Appendix 4. Clarification requests, corrective action requests and forward action requests

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

FAR ID	01	Section no.	E.2	Date: 30/10/2020
Description of FAR				
<p>1) The technology provider will provide training on the operation and maintenance of the installed equipment. PP however needs to verify the training required for each personnel involved.</p> <p>2) PP to ensure the establishment of the training procedure for the monitoring personnel.</p> <p>3) PP needs to ensure the availability of day-to-day records handling procedure</p>				
Project participant response				Date: 30/11/2020
<p>1) Training required for each personnel in the project were in place. Training plans of year 2018/2019 and 2019/2020 along with reference pictures, result of assessment and the registration forms of personnel involved in the training (Att01.1) have been provided as evidence. Training have been provided to all operators.</p> <p>2) Carotino has established training procedures for their operators. The plant has implemented the biogas plant Standard Operation Procedure (SOP, Att01.2). The SOP mentions that "all operators should (be) well trained and know all the equipment located and understand the process flow of biogas plant". And from the evidence Att01.1, the training, and assessment after training have been provided to all the operators and results have been recorded.</p> <p>3) Regarding the SOP (Att01.2), the document also includes procedure for parameter recording. The diagram show that the data from operation of biogas plant, sludge handling system, biogas engine shall be recorded. If abnormalities are found, the system should be maintained or troubleshoot, and report to the supervisor. The operators must communicate between the two shifts and the records will be submitted to the supervisor; Att01.2.</p>				

Documentation provided by project participant	
Att01.1 Training records Att01.2 Carotino Biogas SOP	
DOE assessment	Date: 31/12/2020
From documented evidences, monitoring records and commissioning details it is evident that appropriate operating procedures are in place to monitor and record monitoring data. The quality control measures are in place. Training records are evident to ensure proper operation and maintenance of the biogas plant. Organization structure with responsibility are in place. Hence, FAR is closed.	

Table 2. CL from this verification

CL ID	01	Section no.	E.6.2	Date: 30/10/2020
Description of CL				
<ol style="list-style-type: none"> 1. Kindly submit the raw downloaded data (totalized monitored readings) of flow meters 2. Kindly submit calibration records of monitoring equipments covering the monitoring period. Also clarify if calibrations are conducted by accredited agency? 3. Kindly submit the third party monitored results of COD measurement covering the monitoring period. Also provide accreditation certificate of the agency. 4. For end use of final sludge, please clarify with evidence how aerobic conditions are ensured. 				
Project participant response				Date: 30/11/2020
<ol style="list-style-type: none"> 1. The downloaded data (totalized reading) of flow meters (wastewater flow meter, gas meter at gas engine, and gas meter for flaring) have been provided in Att02.1 2. The calibration certificates of CDM monitoring instruments have been prepared in Att02.2 The certificate of each instrument covers the monitoring period of the project activity. The instruments have been sent for calibration at the accredited agency. Please see following link: <ol style="list-style-type: none"> a. Gas meters: including gas meter at the gas engine, gas meter at the flaring system, gas meter at the burner, methane analyzer were calibrated by METCAL & Pro-Info Sys; http://www.jsm.gov.my/documents/11396/300433/SAMM0256 https://pro-infosys.com/ b. POME flow meters were calibrated by Endress+Hauser & Pro-Info Sys; https://www.endress.com/instrumentation-services/Accreditation-on-site-calibration c. Thermocouple were sent for calibration by Pyro Metro & Pro-Info Sys; https://www.pyrometro.com/calibration.html d. Weighbridge were sent for calibration by Metrology Corporation Malaysia SDN BHD whom provides services for all weighing and measuring instruments belong to the federal government, state government, municipalities and local councils: https://www.metrology.com.my/ 3. The result of COD analysis refers two data sources: internal and external lab. The result has been presented in the report of COD analysis issued by the external laboratory, please see Att02.3. The result of COD analysis from the internal lab can be found in the Att02.4. The external lab is accredited by Ministry of International Trade and Industry. The accreditation of the lab can be access through this link; http://www.jsm.gov.my/documents/11396/300433/SAMM0576 4. The end-use final sludge was utilized for land application in their palm plantation. The picture of end use of final sludge has been prepared as a sheet in CDM data sheet; Att02.5. 				
Documentation provided by project participant				
Att02.1 Totalized no from data logger Att02.2 Calibration Att02.3 COD result - external lab Att02.4 COD result – internal lab Att02.5 CDM data sheet				
DOE assessment				Date: 31/12/2020
The raw monitored data as downloaded through SCADA system found consistent with emission reduction worksheet. The calibration records cover the monitoring period and for delay calibration appropriate error factor as per CDM project standard has been applied. Hence, CL is closed.				

Table 3. CAR from this verification

CAR ID	01	Section no.	E.3	Date: 02/11/2020
Description of CAR				
It is noted no monitored data available for the period from 20/12/2014 to 31/12/2014. PP has not provided any details for this missing data under section B.1 of the MR.				
Project participant response				Date: 30/11/2020

Only the wastewater entering the system has been recorded manually during the 20/12/2014 to 04/02/2015. The information in the ER sheet has been updated with comments. The justification of missing data has also been provided under section B.1 of the MR.	
Documentation provided by project participant	
Att02.6 Log sheet 301407Carotino_MR_20122014to31122019_v2 25112020 trc	
DOE assessment	Date: 31/12/2020
It is noted PP was unable to monitor required data as per monitoring plan temporarily from 20/12/2014 to 04/02/2015 for which zero value is considered for all monitoring parameters as per CDM project standard version 2.0. No emission reductions are claimed for this period and hence CAR is closed.	

CAR ID	02	Section no.	E.6.2	Date: 30/10/2020
Description of CAR				
<ol style="list-style-type: none"> 1. The ER sheet does not provide COD measurement value as per defined frequency of monitoring and recording. Clarify how the measurement meets methodology requirement. 2. Please clarify whether there is no biogas consumption or flaring on 04/01/2015-06/01/2015, 08/01/2015-12/01/2015, 09/02/2015, 10/04/2017 to 20/04/2017 although there was wastewater flow recorded in those days. On the other hand, from 15/02/2017 to 20/03/2017, 18/07/2017, 18/08/2017, 28/08/2017 there was no wastewater flow but biogas consumption is recorded. Kindly clarify. 3. BG_{burnt} calculation in excel sheet for the year 2018 and 2019 does not provide the calculation linked to other parameters. 4. The monitoring equipment details for wastewater flow meter, biogas consumption at gas engine, boiler and flaring are not provided in the MR. 5. $W_{CH_4,y}$ on 27/11/2015 to 03/12/2015, 08/12/2015 to 11/12/2015 provides 0 value in ER sheet. Kindly explain the correctness of the value reported. Similarly on 26/11/2015, 29/08/2015-30/08/2015. In the year 2017, reporting of monitored value is not complete. Kindly clarify if defined monitoring frequency is met in line with applied methodology and registered monitoring plan? As per monitoring flow diagram $W_{CH_4,y}$ is to be monitored at two points, although the emission reduction worksheet provides only one monitored value. Kindly clarify. 6. The monitoring equipment details for 'End use of final sludge from the digester system' is not provided in the MR. 				
Project participant response				Date: 30/11/2020

1. The ER sheet has been updated. Even though there were some longer gap before next COD analysis during 2015 to 2019, the average value of COD was selected for the emission reduction calculation and a 90/10 confidence/precision level was applied for samples and measurements. The methods used were in accordant with international standards, using spectrophotometer .
2. Clarification of no biogas consumption are as follows:
 - The plant was commissioning on 20/12/2014. The wastewater treatment has just started to operate and there was not much biogas being generated during the commissioning stage of the plant. This result in no biogas consumption during 04/01/2015 to 06/01/2015 and very small consumption during 08/01/2015 to 12/01/2015 (2 Nm3).
 - The ER calculation sheet has been updated and there was some biogas being generated on 09/02/2015. The generated biogas has been sent for flaring and to the gas engines.
 - The ER calculation sheet has been updated and there was some biogas being generated during 10/04/2017 to 20/04/2017. The generated biogas has been utilized at gas engines and flared.
 Clarification of no wastewater consumption are as follows:
 - 15/02/2017 to 20/03/2017: There was no wastewater entering the system from 15/02/2017 to 20/03/2017, as the plant has stopped for maintenance. Though there was some biogas sent for flaring. The generation of biogas was possible as it could be generated from the remain wastewater in the AD tank.
 - 18/07/2017 There was a wastewater entering the system. The ER sheet has been updated.
 - 18/08/2017 and 28/08/2017 There was wastewater entering the system. The ER sheet has been updated.
3. The formular has been inserted for BGburnt in year 2018 and 2019. Please see the revised ER sheet.
4. The monitoring report has been updated with the information of the instruments used for monitoring and recording of biogas consumption at the gas engine, boiler, and flare.
5. The clarification of the missing value of methane can be found as follows:
 - On 26/11/2015, the mill found out that the methane analyzer was not working properly. The optical sensor of methane analyzer was failed, resulting in no percentage of methane was being recorded during the 27/11/2015 to 03/12/2015. The note has been added by the plant operator in the CDM data sheet and the same has been added into the ER sheet.
 - For the value of methane percentage 08/12/2015 to 11/12/2015 has been updated, please see the revised ER sheet.
 - There were some values of methane at the gas engine on the 29/08/2015, though it was appeared very low as the methane analyzer filter was choked up, caused by high concentration of carbon this also resulted in 0 % of methane on 30/08/2015.
 - The ER calculation sheet has been updated. The value was monitored by the continuous analyzer with daily recording and it was carried out close to a location in the system where a biogas flow measurement took place; gas engines and flaring system. The monitoring frequency is in accordant with the applied methodology and registered monitoring plan.
 - The methane value has been updated in the ER sheet. The values are now presented in two sets; one is the percentage of methane monitored closed to the gas engine and another is the percentage of methane monitored closed to the flaring system (biogas plant).
6. The monitoring equipment details for 'End use of final sludge from the digester system' has been updated in the revised MR.

Documentation provided by project participant	
301407Carotino_MR_20122014to31122019_v2 25112020 trc	
301407Carotino_ER cal_v2 25112020	
DOE assessment	Date: 31/12/2020

1. For COD measurement defined frequency of monitoring and recording as per registered monitoring plan was missed couple of times during the monitoring period. Therefore PP has proposed temporary deviation as per CDM project standard version 2.0. The proposed deviation meets the methodology requirement and does not over estimate emission reductions. Therefore, response is accepted and issue is closed.
 2. PP has decided not to claim any emission reductions for the period from 20/12/2014 to 04/02/2015 as monitoring was temporarily not in line with registered monitoring plan. The error in reporting of biogas generation and consumption on highlighted dates were corrected and in line with the raw records. Therefore, the issue is closed.
 3. The error is computation of BG_{burnt} in emission reductions worksheet has been corrected.
 4. The monitoring equipment details are updated and found consistent with off-site review and calibration records.
 5. For monitoring methane concentration, correct details are provided and errors are rectified in the updated worksheet.
 6. The monitoring equipment details of weighing bridge has been provided and details found consistent with off-site assessment and calibration records.
- In summary, the CAR is closed.

CAR ID	03	Section no.	E.3	Date: 30/10/2020
Description of CAR				
<i>The calibration details of monitoring equipments are not provided in the MR.</i>				
Project participant response				Date: 30/11/2020
The monitoring report has been updated and the calibration details of equipment have been mentioned. Please see the revised MR for more details.				
Documentation provided by project participant				
301407Carotino_MR_20122014to31122019_v2 25112020 trc				
DOE assessment				Date: 31/12/2020
The calibration details of monitoring equipments are provided and details found consistent with calibration records. Hence, CAR is closed.				

Table 4. FAR from this verification

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

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Document information

<i>Version</i>	<i>Date</i>	<i>Description</i>
03.0	31 May 2019	Revision to: <ul style="list-style-type: none">• Ensure consistency with version 02.0 of the “CDM validation and verification standard for project activities” (CDM-EB93-A05-STAN);• Make structural and editorial improvements.
02.1	11 January 2018	Editorial revision to correct the numbering of appendices in the instructions.
02.0	31 October 2017	Revision to align with the requirements of the “CDM validation and verification standard for project activities” (version 01.0).
01.0	23 March 2015	Initial publication.
Decision Class: Regulatory Document Type: Form Business Function: Issuance Keywords: project activities, verifying and certifying		