Verification and certification report form for CDM project activities

(Version 04.0)

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 Asia Palm Oil Mill, Malaysia UNFCCC Reference Number: 7245
Scale of the project activity	☐ Large-scale ☒ Small-scale
Version number of the verification and certification report	1.2
Completion date of the verification and certification report	11/04/2021
Monitoring period number and duration of this monitoring period	1st monitoring 15/05/2015 to 31/12/2019 (both days included)
Version number of the monitoring report to which this report applies	03.2 of 09/04/2021
Crediting period of the project activity corresponding to this monitoring period	15/05/2015 to 14/05/2025 (Fixed)
Project participants	Asia Ecogreen 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	223,175 tCO_2e

Certified amount of GHG emission reductions or GHG removals for this monitoring period	Amount before 1 January 2013	Amount from 1 January 2013 until 31 December 2020	Amount from 1 January 2021
	0	122,295 tCO_2e	0

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	Amit Anand, CEO 

SECTION A. Executive summary

>>**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 Asia Palm Oil Mill located at 24.6km off the 45km Lahad Datu Sandakan Highway, Lahad Datu, Sabah in East Malaysia with GPS coordinates of 5°17'29.35" N and 118°12'21.17" 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 Asia Palm Oil Mill, Malaysia” in the host country “Malaysia” for the period 15/05/2015 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 registered 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 commissioned CCIPL to carry out the verification and certification of emission reductions reported for the approved "Methane Capture and Utilization Project at Asia Palm Oil Mill, Malaysia" project in Malaysia **/03/** for the period 15/05/2015 to 31/12/2019. The project was validated by SIRIM QAS International Sdn Bhd (validation report N° SQAS-CDM-EP10850001 issued on 27/09/2012) /**05**/ and it was registered on 02/10/2012 under the CDM registration reference number 7245. The post registration changes of the project activity have been validated by Carbon Check (India) Pvt. Ltd. duly approved on 28/09/2020. 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**/. This verification includes a post registration change along with this request for issuance and accordingly updated PDD version 3.2 of 10/02/2021 /**36**/ and its validation report version 1.0 of 11/02/2021 /4(b)/ is referred in this report.

In conclusion, it is CCIPL's opinion that the project activity "Methane Capture and Utilization Project at Asia Palm Oil Mill, Malaysia", in "Malaysia", as described in the Monitoring Report version 3.2 of 09/04/2021 /**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 122,295 tCO_2e emission reductions during the monitoring period from 15/05/2015 to 31/12/2019.

CCIPL 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	CCIPL	✓	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	EI	Biswas	Subhendu	CCIPL
2.	Approver	IR	Anand	Amit	CCIPL

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 1st verification, there is likelihood of human error while data reporting and transferring for emission reduction calculation. Therefore, the risk level is medium.	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 and in internal laboratory. COD measurement and monitoring did not follow registered monitoring plan and a temporary deviation is proposed as explained in section E.4.1 of this report. Similarly for methane fraction monitoring the monitoring did not meet the requirement of registered monitoring plan and therefore 90/10 confidence precision has been applied for the gap period. 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.
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. Log books are also maintained and monitoring equipments are calibrated at defined frequency. Hence, the risk level is low.	
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 and in internal laboratory. COD measurement and monitoring did not follow registered monitoring plan and a temporary deviation is proposed as explained in section E.4.1 of this report. The monitoring equipment are calibrated according to national standards and rules. Hence, the risk level is low.	

C.2. Consideration of materiality in conducting the verification

>>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 122,295 tCO_2e which is equal to 6,115 tCO_2e.

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 of wastewater flow and biogas generation are downloadable, hence 100% verifiable. Biogas flow to boiler are recorded manually in log book. COD analysis are done by accredited third party and in internal laboratory. For COD monitoring and measurement, the registered monitoring plan was not followed and accordingly a temporary deviation has been proposed as explained in section E.4.1 of this report. The methane concentration was monitored in continuous analyzer. 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. However, temporary deviation has been applied for COD monitoring and measurement as explained in section E.4.1 of this report. In case of periodic measurement of methane fraction a 90/10 confidence precision has been followed in consistent with the applied methodology. For delay in calibration frequency conservative error factor over the measured value have been applied. Therefore, in conclusion the verification team confirms emission reductions are calculated with most conservative approach.

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SECTION D. Means of verification

D.1. Desk/document review

>>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.

CCIPL 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.	Ken	Ang Jen	Factory Manager (Asia Ecogreen Sdn. Bhd.)	28/10/2020	Implementation of the project activity. Monitoring plan and monitoring parameters. Data collection and recording. Quality assurance/Quality control procedures, Calibration records etc.	Champok Buragohain
2.	Leong	Tay Chwee	Factory Director (Asia Ecogreen Sdn. Bhd.)	28/10/2020		
3.	Nathan	Selva	Factory Controller (Asia Ecogreen Sdn. Bhd.)	28/10/2020		
4.	Raya	Sirinut	Representative from Perenia Pty Ltd.	28/10/2020	Preparation of the Monitoring Report (MR), calculation of the ERs, data records, methodology applicability, compliance of monitoring plan etc.	
5.	Khunikakorn	Ladaporn	Regional Director Southeast Asia (South Pole)	28/10/2020		

D.4. Sampling approach

>>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	The verification team confirms that the monitoring report used by the PP is compliance with the latest MR form available at UNFCCC website and is in accordance with the applicable instruction. CCIPL, had made the version 1.0, dated 30/09/2020 of the Monitoring report /01/, covering the monitoring period from 15/05/2015 to 31/12/2019 (both days inclusive) publicly available on 05/10/2020 through its dedicated interface on the UNFCCC website /13/. This confirms compliance with paragraph 352 & 353 of VVS, version 02 /**10**/.

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 close 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	**Actual implementation of the registered project activity**: Based on off-site assessment, document review and discussion with project proponent, CCIPL 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 3.2 dated 09/04/2021 /**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 also captured biogas is utilization 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. Sludge removed and utilized for land application is monitored to ensure aerobic conditions. 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 are continuously monitored using flow meter and readings are recorded electronically through SCADA system. Biogas flow to boiler are recorded manually in log book. Excess biogas is flared in an enclosed flaring system and flow to flaring is monitored continuously and readings are recorded electronically through SCADA system. CCIPL verified the successful commission and handover of the project to be on 15/05/2015 from the technology supplier which confirm that the project technology is as per the approved revised PDD /16/. 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.
Findings	N/A
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 registered 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 documents[1]

>>A 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-($COD_{ww,discharge,PJ,y}$)) from 15/05/2015 to 31/12/2019. As per registered monitoring plan the COD testing was to be carried out by an accredited laboratory according to national or international standards. However, during the monitoring period, PP carried out the testing in internal laboratory (which is not accredited) in additional to accredited outsider labs. Although the internal testing was done using spectrophotometer as per international standard (spectrophotometric method[2]). The deviation meets the monitoring measurement methods and procedure of the applied methodology (AMS-III.H Version 16) and CDM project standard version 2.0 paragraph 231 (a): the alternative monitoring arrangement does not overestimate the GHG emission reductions since the procedure followed to measure COD is internationally accepted method and calibrated spectrophotometer was used during that period. 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.

For the same above parameters (i.e. 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-($COD_{ww,discharge,PJ,y}$)) temporary deviation from registered monitoring plan has been applied for the entire monitoring period from 15/05/2015 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 15/05/2015 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

[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).

[2] https://www.astm.org/Standards/D1252.htm

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.

E.4.2. Corrections

>> PP has proposed editorial correction in the updated approved PDD version 3.1 of 19/06/2020 for the parameter 'Methane correction factor for project activity not equipped with biogas recovery in the year, y (**$MCF_{ww,treatment,PJ}$**) under choice of data or measurement procedure. The revised description is consistent with the description of the parameter and in line with the requirement of the applied methodology. Another editorial correction is made for the parameter 'Methane correction factor of baseline and project wastewater treatment system sent for plantation irrigation purpose in the year,y (**$MCF_{ww,BL,discharge}$** , **$MCF_{ww,PJ,discharge}$**)' where the purpose of the data is corrected to be applicable for both baseline and project emissions. The correction is in consistent with the applied methodology.

Another correction is made of the parameter 'Amount of biogas fuelled in the gas engine and/or boiler in year,*y* (**$BG_{fuelled,y}$**) and 'BG_{burnt}' in calibration frequency which has been corrected as 'The meters will undergo maintenance/calibration as per the manufacturer's specifications, or at least once every three years'. It is noted that the registered PDD version 2.3 of 04/07/2012 and its corresponding validation report dated 27/09/2012 correctly stated the calibration frequency 'as per the manufacturer's specifications, or at least once every three years' which was by mistake updated as 'thermocouples should be replaced or calibrated every year' in the updated PDD version 3.1 of 19/06/2020. It is also noted that this was not part of PRC validation report version 1.1 of 01/07/2020. Therefore, this correction is acceptable.

DOE confirms that the corrections made by project participant are in compliance to project standard version 2.0. DOE further confirms that the corrected information is an accurate reflection of actual project information and the corrected parameters are in accordance with the applied methodology and the registered monitoring plan. The corrections does not affect the design of the project activity and its monitoring provisions. The updated PDD version 3.2 of 10/02/2021 with corrections are suitable for approval under the issuance track as per Appendix of CDM PS version 2.0.

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

>> Reference number: PRC-7245-001
Approval date: 28/09/2020

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

>> Reference number: PRC-7245-001
Approval date: 28/09/2020.

E.4.6. Changes to the project design

>> Reference number: PRC-7245-001
Approval date: 28/09/2020.

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 project period	Assessment/Observation
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 baseline anaerobic treatment system ($\eta_{COD,BL}$)	Data based on approved revised PDD /03/ and validation report /05/	98%	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 baseline aerobic treatment system ($\eta_{PJ,aerobic}$)	Data based on approved revised PDD /03/ and validation report /05/	52%	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 ($B_{o,ww}$)	Data based on approved revised PDD /03/ and validation report /05/	0.25 kg CH_4/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.
	Model correction factor to account of model uncertainties (UF_{BL})	Data based on approved revised PDD /03/ and validation report /05/	0.89	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 ($MCF_{WW,treatment,PJ}$)	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 ($MCF_{WW,treatment,PJ,aerobic}$)	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_{CH4})	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	CAR 1 was raised as ex-ante fixed $\eta_{COD,BL}$ value and $\eta_{PJ,aerobic}$ value was not correct in MR which PP has corrected in updated MR and hence CAR is closed.			
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		
	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	<table><tr><th>Monitoring period</th><th colspan="2">Monitored value</th></tr><tr><th></th><th>Lower</th><th>Higher</th></tr><tr><td>15/05/2015 to 31/12/2015</td><td>79,951</td><td>80,459</td></tr><tr><td>01/01/2016 to 31/12/2016</td><td>140,085</td><td>141,139</td></tr><tr><td>01/01/2017 to 31/12/2017</td><td>160,100</td><td>160,458</td></tr><tr><td>01/01/2018 to 31/12/2018</td><td>159,313</td><td>160,915</td></tr><tr><td>01/01/2019 to 31/12/2019</td><td>94,792</td><td>95,466</td></tr></table> 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: <table><tr><th>Meter</th><th>Flow meter 1</th><th>Flow meter 2</th></tr><tr><td>Manufacturer</td><td>Endress & Hauser</td><td>Endress & Hauser</td></tr><tr><td>Sl. Number</td><td>F9056C20000 (Upto 20/12/2019) JA028820000 (from 20/12/2019 onwards)</td><td>JA028A20000</td></tr><tr><td>Accuracy</td><td>±0.5%</td><td>±0.5%</td></tr></table>
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**/.
Calcualtion 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	<table><tr><th>Monitoring period</th><th colspan="2">Monitored value</th></tr><tr><th></th><th>Lower</th><th>Higher</th></tr><tr><td>15/05/2015 to 31/12/2015</td><td>0.0682</td><td>0.0774</td></tr><tr><td>01/01/2016 to 31/12/2016</td><td>0.0595</td><td>0.0711</td></tr><tr><td>01/01/2017 to 31/12/2017</td><td>0.0658</td><td>0.0774</td></tr><tr><td>01/01/2018 to 31/12/2018</td><td>0.0643</td><td>0.0769</td></tr><tr><td>01/01/2019 to 31/12/2019</td><td>0.0660</td><td>0.0789</td></tr></table> As temporary deviation (as explained in section E.4.1 above) COD was measures both in internal and external laboratories. Third party accredited laboratory (Dynakey Laboratories Sdn. Bhd. & KL-Kepong (Sabah) Sdn. Bhd.) adopted internationally accepted method (DL-LAB-TM02 based on MN Method 0-26, 0-28, 0-29 and DOE (M'sia 2011) (ALT). Input values are cross checked from third party reports /**21(a)**/ and internal laboratory results /**21(b)**/. Sample measurement ensures 90/10 confidence precision and lower and higher bound values are used

	for emission reduction calculation.
Monitoring equipment	For Internal laboratory 'Spectroquant Photometer' used as below: Manufacturer: MERK Model: Pharo3000 Serial number: 141620190 Period of utilization: commissioning to present Accuracy: +/- 0.33% Third party laboratory 'Dynakey Laboratories Sdn. Bhd. & KL-Kepong (Sabah) Sdn. Bhd.' are 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 by accredited laboratory. However, during the monitoring period the frequency was not followed fully from 15/05/2015 to 31/12/2019 and internal unaccredited laboratory was also used. 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.
Calcualtion 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): 15/05/2015 to 31/12/2015: 0.0034 / 0.0070 01/01/2016 to 31/12/2016: 0.0033 / 0.0056 01/01/2017 to 31/12/2017: 0.0033 / 0.0053 01/01/2018 to 31/12/2018: 0.0038 / 0.0055 01/01/2019 to 31/12/2019: 0.0056 / 0.0073 As temporary deviation (as explained in section E.4.1 above) COD was measures both in internal and external laboratories. Third party accredited laboratory (Dynakey Laboratories Sdn. Bhd. & KL-Kepong (Sabah) Sdn. Bhd.) adopted internationally accepted method (DL-LAB-TM02 based on MN Method 0-26, 0-28, 0-29 and DOE (M'sia 2011) (ALT). Input values are cross checked from third party reports /**21(a)**/ and internal laboratory results /**21(b)**/. Sample measurement ensures 90/10 confidence precision and lower and higher bound values are used for emission reduction calculation.
Monitoring equipment	For Internal laboratory 'Spectroquant Photometer' used as below: Manufacturer: MERK Model: Pharo3000

	<table><tr><td>Serial number</td><td>141620190</td></tr><tr><td>Period of utilization</td><td>commissioning to present</td></tr><tr><td>Accuracy</td><td>+/- 0.33%</td></tr></table> Third party laboratory 'Dynakey Laboratories Sdn. Bhd. & KL-Kepong (Sabah) Sdn. Bhd.' are 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 by accredited laboratory. However, during the monitoring period the frequency was not followed fully from 15/05/2015 to 31/12/2019 and internal unaccredited laboratory was also used. 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.
Calcualtion 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><tr><th rowspan="2">Monitoring period</th><th colspan="2">Monitored value</th></tr><tr><th>Lower</th><th>Higher</th></tr><tr><td>15/05/2015 to 31/12/2015</td><td>0.0005</td><td>0.0007</td></tr><tr><td>01/01/2016 to 31/12/2016</td><td>0.0003</td><td>0.0021</td></tr><tr><td>01/01/2017 to 31/12/2017</td><td>0.0005</td><td>0.0006</td></tr><tr><td>01/01/2018 to 31/12/2018</td><td>0.0005</td><td>0.0006</td></tr><tr><td>01/01/2019 to 31/12/2019</td><td>0.0005</td><td>0.0006</td></tr></table> As temporary deviation (as explained in section E.4.1 above) COD was measures both in internal and external laboratories. Third party accredited laboratory (Dynakey Laboratories Sdn. Bhd. & KL-Kepong (Sabah) Sdn. Bhd.) adopted internationally accepted method (DL-LAB-TM02 based on MN Method 0-26, 0-28, 0-29 and DOE (M'sia 2011) (ALT). Input values are cross checked from third party reports /**21(a)**/ and internal laboratory results /**21(b)**/. Sample measurement ensures 90/10 confidence precision and lower and higher bound values are used for emission reduction calculation.
Monitoring equipment	For Internal laboratory 'Spectroquant Photometer' used as below: <table><tr><td>Manufacturer</td><td>MERK</td></tr><tr><td>Model</td><td>Pharo3000</td></tr><tr><td>Serial number</td><td>141620190</td></tr><tr><td>Period of utilization</td><td>commissioning to present</td></tr><tr><td>Accuracy</td><td>+/- 0.33%</td></tr></table> Third party laboratory 'Dynakey Laboratories Sdn. Bhd. & KL-Kepong (Sabah) Sdn. Bhd.' are 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 by accredited laboratory. However, during the monitoring period the frequency was not followed fully from 15/05/2015 to 31/12/2019 and internal unaccredited laboratory was also used. 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.
Calcualtion 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	**Monitoring period** / **Calculated value** 15/05/2015 to 31/12/2015 — 1,539,081 01/01/2016 to 31/12/2016 — 2,024,662 01/01/2017 to 31/12/2017 — 2,884,469 01/01/2018 to 31/12/2018 — 2,142,195 01/01/2019 to 31/12/2019 — 3,354,773 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
Calcualtion 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** / **Calculated value** 15/05/2015 to 31/12/2015 — 1,533,761 01/01/2016 to 31/12/2016 — 2,016,969 01/01/2017 to 31/12/2017 — 2,882,521 01/01/2018 to 31/12/2018 — 2,142,195 01/01/2019 to 31/12/2019 — 3,352,709

Monitoring period	Monitored value	
	BG to gas engine	BG to boiler lower
15/02/2015 to 31/12/2015	1,533,761	0
01/01/2016 to 31/12/2016	2,016,969	0
01/01/2017 to 31/12/2017	2,777,174	105,347
01/01/2018 to 31/12/2018	2,102,896	39,299
01/01/2019 to 31/12/2019	3,278,448	74,261

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 two set of meters are installed**:

Set 1 (main line):

Equipment type	Pressure transmitter	DP Flowmeter
Manufacturer	Mercoid	Mercoid
Model	3200G-1-FM-1-1-LCD	3100D-3-FM-1-1-LCD
Serial number	DWY3200-11131602	DWY3100-1140338
Accuracy	0.2%	0.2%
Period of utilization	Commissioning to 20/12/2019	Commissioning to 20/12/2019

The above pressure transmitter and DP flowmeter were replaced on 20/12/2019 and new meter details are as below:

Equipment type	Pressure transmitter	DP Flowmeter
Manufacturer	Siemens	Siemens
Model	7MF4033-1BA10-2AC1	7MF4433-1DA22-2AC1-A01+A40
Serial number	N1K4039000039	N1K0039120020
Accuracy	0.2%	0.25%
Period of utilization	From 20/12/2019 onwards	From 20/12/2019 onwards

Manufacturer	DYWER
Equipment type	Temperature transmitter
Model	659RTD-1
Serial number	Not available
Accuracy	0.2%

Set 2 (sub-line):

Equipment type	Pressure transmitter	DP Flowmeter
Manufacturer	Mercoid	Mercoid
Model	3200G-1-FM-1-1-LCD	3100D-3-FM-1-1-LCD
Serial number	DWY3200-12130957	DWY3100-1140343
Accuracy	0.2%	0.2%
Period of	Commissioning	Commissioning to

utilization	to 20/12/2019	20/12/2019	

The above pressure transmitter and DP flowmeter were replaced on 20/12/2019 and new meter details are as below:

Equipment type	Pressure transmitter	DP Flowmeter
Manufacturer	Siemens	Siemens
Model	7MF4033-1BA10-2AC1	7MF4433-1DA22-2AC1-Z
Serial number	N1K4039000040	N1K4039120025
Accuracy	0.2%	0.2%
Period of utilization	From 20/12/2019 onwards	From 20/12/2019 onwards

Manufacturer	DYWER
Equipment type	Temperature transmitter
Model	659RTD-1
Serial number	Not available
Accuracy	0.2%

For monitoring **biogas to Boiler**:

Equipment type	Pressure transmitter	DP Flowmeter
Manufacturer	Mercoid	Mercoid
Model	3200G-1-FM-1-1-LCD	3100D-3-FM-1-1-LCD
Serial number	DWY3200-11131603	DWY3100-1140341
Accuracy	0.2%	0.2%
Period of utilization	Commissioning to 20/12/2019	Commissioning to Present

The above pressure transmitter was replaced on 20/12/2019 and new meter details are as below

Manufacturer	Siemens
Equipment type	Pressure transmitter
Model	7MF4033-1BA10-2AC1
Serial number	N1K4039000036
Accuracy	0.2%

Manufacturer	DYWER-
Model	659RTD-1
Equipment type	Temperature transmitter
Serial number	Not available
Accuracy	0.2%

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.
Calcualtion method (if applicable)	Sum of biogas sent to gas engine and boiler is used.

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

Monitoring period	Monitored value	
	Higher	Lower
15/05/2015 to 31/12/2015	5,621	5,321
01/01/2016 to 31/12/2016	8,127	7,693
01/01/2017 to 31/12/2017	1,948	1,948
01/01/2018 to 31/12/2018	0	0
01/01/2019 to 31/12/2019	2,064	2,064

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.

Monitoring equipment

Equipment type	Pressure transmitter	DP Flowmeter
Manufacturer	Mercoid	Mercoid
Model	3200G-1-FM-1-1-LCD	3100D-3-FM-1-1-LCD
Serial number	DWY3200-121-30958	DWY3100-11-40336
Accuracy	0.2%	0.2%
Period of utilization	Commissioning to 20/12/2019	Commissioning to 20/12/2019

The above pressure transmitter and DP flowmeter were replaced on 20/12/2019 and new meter details are as below:

Equipment type	Pressure transmitter	DP Flowmeter
Manufacturer	Siemens	Siemens
Model	7MF4033-1BA10-2AC1	7MF4433-1BA22-2AC1-Z
Serial number	N1K4039000038	N1K4039120024
Accuracy	0.2%	0.2%
Period of utilization	From 20/12/2019 onwards	From 20/12/2019 onwards

Manufacturer	DYWER
Equipment type	Temperature transmitter
Model	659RTD-1
Serial number	Not available
Accuracy	0.2%

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.
Calcualtion 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	See table below and text
Monitoring equipment	See tables below

Monitoring period	At Gas engine	At flaring
15/05/2015 to 31/12/2015	64%	68%
01/01/2016 to 31/12/2016	65%	69%
01/01/2017 to 31/12/2017	65%	68%
01/01/2018 to 31/12/2018	62%	Data package incomplete
01/01/2019 to 31/12/2019	63%	68%

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 /25/. For the year 2018, the monitoring details of methane fraction was not complete before flaring point. Since, there was no flaring in 2018, this has no impact. In addition, in the year 2016 and 2018 methane concentration monitoring was periodic and therefore in line with the applied methodology and registered monitoring plan a 90/10 confidence precision has been applied over the measured values and lower value was selected for the baseline emission calculation, while higher value was selected for the project emission. This is conservative.

Continuous analyzer **near gas engine**:

Equipment type	Continuous analyzer	
Manufacturer	Edinburgh Sensors	
Serial number	6737	13753
Period of utilization	Commissioning to 19/12/2019	19/12/2019 to present
Accuracy	± 0.2%	± 0.2%

Continuous analyzer **near flaring:**

Equipment type	Continuous analyzer	
Manufacturer	Edinburgh Sensors	
Serial number	5320	16810
Period of utilization	Commissioning to	19/12/2019 to present

	19/12/2019 | | **Accuracy** | ± 0.2% | ±0.2%
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.
Calcualtion 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	N/A.
Calcualtion method (if applicable)	N/A

Data/Parameter	$\eta_{flare,h}$
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
Calcualtion 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** 15/05/2015 to 31/12/2015: 529.74 01/01/2016 to 31/12/2016: 876.24 01/01/2017 to 31/12/2017: 1,037.73 01/01/2018 to 31/12/2018: 1,908.22 01/01/2019 to 31/12/2019: 1,069.17 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 /26/.
	Monitoring equipment	Weighing bridge is used to weigh the sludge removed and sent for soil application: **Manufacturer**: Avery **Model**: ZM305 **Serial number**: 007242 **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.
	Calcualtion method (if applicable)	N/A
Findings	CAR 2 was raised as there was inconsistency in reporting monitored data and monitoring equipment details in MR which PP has corrected in the updated MR. 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	CCIPL confirms: - 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 15/05/2015 to 31/12/2019. Calibration details of monitoring equipment is given below:

Parameter	Equipment details	Date of calibration	Validity as per calibration certificate
$Q_{ww,i,y}$	Flow meter-F9056C20000	08/10/2012 /**27**/	07/10/2013
		09/10/2016 /**28(a)**/	08/10/2017
		09/09/2019 /**29**/	08/09/2020

		Flow meter-JA028820000	30/03/2019 /**28(b)**/	29/03/2020
		Flow meter-JA028A20000	07/11/2014 /**27(b)**/	06/11/2015
			09/10/2016 /**28(c)**/	08/10/2017
			30/03/2019 /**28(c)**/	29/03/2020
	$COD_{measurement}$ (Internal lab)	Spectro Photometer (141620190)	16/10/2015 /37/	15/10/2016
			26/10/2017 /37/	25/10/2018
			14/09/2018 /38/	13/09/2019
			16/08/2019 /38/	15/08/2020
			28/07/2020 /38/	27/07/2021
	$BG_{fuelled,y}$ to gas engine	Pressure transmitter (main line)- DWY3200-11131602	26/03/2014 /**30(a)**/	25/03/2015
			09/10/2016 /**28(d)**/	08/10/2017
			30/03/2019 /**28(d)**/	29/03/2020
		Pressure transmitter (main line)- N1K4039000039	26/11/2019 /**31**/	25/11/2020
		Pressure transmitter (sub line)- DWY3200-12130957	25/03/2014 /**30(b)**/	24/03/2015
			09/10/2016 /**28(e)**/	08/10/2017
			30/03/2019 /**28(e)**/	29/03/2020
		Pressure transmitter (sub line)- N1K4039000040	26/11/2019 /**31(f)**/	25/11/2020
		Temperature transmitter- 659RTD-1 (main line)	27/03/2014 /**30(c)**/	26/03/2015
			09/10/2016 /**28(f)**/	08/10/2017
			30/03/2019 /**28(f)**/	29/03/2020
		Temperature transmitter- 659RTD-1 (sub line)	27/03/2014 /**30(e)**/	26/03/2015
			09/10/2016 /**28(h)**/	08/10/2017
			30/03/2019 /**28(h)**/	29/03/2020
		DP flowmeter (main line)- DWY3100-1140338	26/03/2014 /**30(d)**/	25/03/2015
			09/10/2016 **/28(g)/**	08/10/2017
			30/03/2019 **/28(g)/**	29/03/2020
		DP flowmeter (main line)- N1K0039120020	26/11/2019 /**31(b)/**	25/11/2020
		DP flowmeter (sub line)- DWY3100-1140343	26/03/2014 /**30(f)**/	25/03/2015
			09/10/2016 **/28(i)/**	08/10/2017
			30/03/2019 **/28(i)/**	29/03/2020
		DP flowmeter (sub line) - N1K4039120025	26/11/2019 /**31(g)**/	25/11/2020
	$BG_{fuelled,y}$ to boiler	Pressure transmitter-DWY3200-11131603	26/03/2014 /**30(k)**/	25/03/2015
		Pressure transmitter-N1K4039000036	26/11/2019 /**31(c)**/	25/11/2020
		Temperature transmitter- 659RTD-1	27/03/2014 /**30(j)**/	26/03/2015
			10/10/2016 /**28(p)**/	09/10/2017
			19/01/2018 /**28(p)**/	18/01/2019
			30/03/2019 /**28(p)**/	29/03/2020
		DP flowmeter-DWY3100-1140341	17/10/2016 /**28 (j)**/	16/10/2017
			30/03/2019 /**28 (j)**/	29/03/2020
	$BG_{flared,y}$	Pressure transmitter-DWY3200-121-30958	25/03/2014 /**30(g)**/	24/03/2015
			09/10/2016 /**28(k)**/	08/10/2017
			30/03/2019 /**28(k)**/	29/03/2020
		Pressure transmitter-N1K4039000038	26/11/2019 /**31**/	25/11/2020
		Temperature transmitter-659RTD-1	27/03/2014 /**30(h)**/	26/03/2015
			09/10/2016 /**28(l)**/	08/10/2017
			30/03/2019 /**28(l)**/	29/03/2020
		DP flowmeter-DWY3100-11-40336	26/03/2014 /**30(i)**/	25/03/2015
			09/10/2016 /**28(m)**/	08/10/2017
			30/03/2019 /**28(m)**/	29/03/2020
		DP flowmeter-	26/11/2019 /**31(e)**/	25/11/2020

	N1K4039120024		
$W_{CH4,y}$	Continuous analyzer-Near gas engine: 6737 (old)	10/12/2013 /**32(a)**/	09/12/2014
		24/11/2016 /**28(n)**/	23/11/2017
	Continuous analyzer-Near gas engine: 16810 (new)	26/11/2019 /**32(d)**/	25/11/2020
	Continuous analyzer-Near flaring: 5320 (old)	10/12/2013 /**32(c)**/	09/12/2014
		24/11/2016 /**28(o)**/	23/11/2017
		30/03/2019 /**28(o)**/	29/03/2020
	Continuous analyzer-Near flaring: 13753 (new)	24/04/2018 /**32(b)**/	23/04/2019
		30/03/2019 **/28(q)**/	29/03/2020
T_{flare}	Thermocouple (TK4S-A4CN)	09/10/2016 /**33**/	08/10/2017
		27/09/2017 /**33**/	26/09/2018
		16/07/2018 /**33**/	15/07/2019
		30/03/2019 /**33**/	29/03/2020
$S_{final,PJ,y}$	Weighing bridge-007242	22/04/2015 /**34**/	21/04/2016
		19/04/2016 /**34**/	18/04/2017
		20/04/2017 /**34**/	19/04/2018
		16/05/2018 /**34**/	15/05/2019
		01/02/2020 /**34**/	31/01/2021

The flow meter for monitoring wastewater inflow (F9056C20000) had calibration gap from 15/05/2015 to 09/10/2016 and from 08/10/2017 to 09/09/2019. To cover the calibration gap PP has applied maximum error of 0.5% over the measured value (as calibration resulted error within permissible limit) from 15/05/2015 to 09/10/2016 and from 08/10/2017 to 09/09/2019 which is as per VVS paragraph 366 (a). Similarly, for flow meter 'JA028A20000' had calibration gap from 07/11/2015 to 09/10/2016 and 08/10/2017 to 30/03/2019. To cover the calibration gap PP has applied maximum error of 0.5% over the measured value (as calibration resulted error within permissible limit) from 07/11/2015 to 09/10/2016 and from 08/10/2017 to 30/03/2019 which is as per VVS paragraph 366 (a)

The spectrophotometer used for measuring COD in internal laboratory had calibration gap from 15/05/2015 to 16/10/2015. Again, calibration gap noted from 16/10/2016 to 26/10/2017. To cover the calibration gap PP has applied maximum error of 0.33% over the measured value (as calibration resulted error within permissible limit) in the year 2015, 2016 and 2017 conservatively which is as per VVS paragraph 366 (a).

For monitoring biogas flow to gas engine considering both main and subline and all instruments, calibration gap noted from 25/03/2015 to 26/11/2019 and from 08/10/2017 to 30/03/2019. To cover the calibration gap PP has applied maximum error of 2% over the measured value (as calibration resulted higher error of 2% for pressure transmitter) from 25/03/2015 to 26/11/2019 and error of 0.78% over the measured value (as calibration resulted higher error of 0.78% for pressure transmitter) from 08/10/2017 to 30/03/2019 which is as per VVS paragraph 366 (b).

For monitoring biogas flow to boiler calibration gap noted for Pressure transmitter from 15/03/2015 to 20/12/2019 and DP flowmeter from 16/10/2017 to 30/03/2019. 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 15/05/2015 to 20/12/2019 which is as per VVS paragraph 366 (a).

For monitoring biogas flow to flare calibration gap noted from 24/03/2015 to 09/10/2016 and from 08/10/2017 to 30/03/2019. To cover the calibration gap PP has applied maximum error of 2.75% over the measured value (as calibration resulted higher error of 2.75% for pressure transmitter) from 24/03/2015 to 09/10/2016 which is as per VVS paragraph 366 (b). Also for the gap period from 08/10/2017 to 30/03/2019 maximum error of 0.2% over the measured value (as calibration resulted error within permissible limit) which is as per VVS paragraph

366 (a).

For monitoring methane concentration before flaring, calibration gap noted from 10/12/2014 to 24/11/2016 and from 24/11/2017 to 19/12/2019. To cover the calibration gap PP has applied maximum error of 0.2% over the measured average value (as calibration resulted error within permissible limit) for the gap periods which is as per VVS paragraph 366 (a). Similarly, for methane concentration before gas engine, calibration gap noted from 10/12/2014 to 24/11/2016 and from 24/11/2017 to 19/12/2019. To cover the calibration gap PP has applied maximum error of 0.2% over the measured average value (as calibration resulted error within permissible limit) for the gap periods which is as per VVS paragraph 366 (a).

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.
Siemens	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
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/)
Millivest Sdn.Bhd.	The calibration was done by accredited person tractable to national standard.
Dynakey Laboratories	Accredited agency from Department of Standards Malaysia (http://www.jsm.gov.my/documents/11396/300433/SAMM0576)

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	CCIPL 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.

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	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: $BE_{ww,y} = BE_{ww,treatment,y}$ Where, $$BE_{ww,treatment,y} = \sum_i \left(Q_{ww,i,y} \times COD_{inflow,i,y} \times \eta_{COD,BL,i} \times MCF_{ww,treatment,BL,i}\right) \times B_{o,ww} \times UF_{BL} \times GWP_{CH4}$$ Flow of wastewater treated in the year y ($Q_{ww,y}$): The measured value (corrected due to calibration delay) during the monitoring period is 634,242 m^3. CCIPL 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, CCIPL 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. $COD_{inflow,i,y}$: $COD_{inflow,y}$ 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 as explained in section E.4.1 above. CCIPL 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/. $\eta_{COD,BL,i}$: 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 98% /**03/,/11**/. 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**/. Therefore, $BE_{ww,treatment,y}$ for the monitoring period calculated yearly basis is 178,701 tCO_{2e}.
Findings	CAR 2 was raised as there was inconsistency in reporting monitored data and monitoring equipment details in MR which PP has corrected in the updated MR. 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	CCIPL 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	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.

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.

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 $PE_{ww,discharge,y} = 0$

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 $PE_{s,final,y} = 0$

Methane fugitive emissions on account of inefficiencies in capture systems ($PE_{fugitive,y}$) are determined as per AMS-III.H and as follows:

$PE_{fugitive,y} = PE_{fugitive,ww,y} + PE_{fugitive,s,y}$

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.

Fugitive emissions through capture inefficiencies in the anaerobic wastewater treatment systems in the year y ($PE_{fugitive,ww,y}$) is estimated as follows:

$PE_{fugitive,ww,y} = (1 - CFE_{ww}) * MEP_{ww,treatment,y} * GWP_{CH4}$

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/**.

Methane emission potential of wastewater treatment systems equipped with biogas recovery system in year y ($MEP_{ww,treatment,y}$) is calculated as follows:

$$MEP_{ww,treatment,y} = Q_{ww,y} \times B_{o,ww} \times UF_{PJ} \times \sum_{k} COD_{removed,PJ,k,y} \times MCF_{ww,treatment,PJ,k}$$

Flow of wastewater treated in the year y ($Q_{ww,y}$) during the monitoring period is 638,436 m^3 (corrected value due to delay in calibration) as explained in above.

Methane producing capacity of the wastewater ($B_{o,ww}$) is fixed ex-ante to be 0.25 kg CH_4/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**/.

$COD_{removed,PJ,k,y}$ 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 /11/. $PE_{fugitive,ww,y}$ for the monitoring period is 25,170 tCO_{2e} /**02**/.

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:

	$$PE_{flare,y} = \sum_{h=1}^{8760} TM_{RG,h} \times (1 - \eta_{flare,h}) \times \frac{GWP_{CH4}}{1000}$$ Global Warming Potential for methane (GWP_{CH4}) is 25 from 01/01/2013 onwards as per IPCC **/03/.** As per revised approved 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/. 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: $TM_{RG,h} = FV_{RG,h} * fv_{CH4,RG,h} * \rho_{CH4,n,h}$ Density of methane at normal condition ($\rho_{CH4,n,h}$) is fixed ex-ante to be 0.716 kg/m^3 as per the 'Tool to determine project emissions from flaring gases containing methane' /17/. Biogas sent to flare ($FV_{RG,h}$) is 17,761 Nm^3 for the monitoring period. Fraction of methane ($fv_{CH4,RG,h}$) is measured continuously and average yearly values are applied. $PE_{flaring,y}$ for the monitoring period is 220 tCO_{2e} **/02/**. Therefore, total PE for the monitoring period is 25,393 tCO_2.
Findings	CAR 2 was raised as there was inconsistency in reporting monitored data and monitoring equipment details in MR which PP has corrected in the updated MR. 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	CCIPL 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 revised approved PDD, there are no leakage emissions associated with the project activity /**03**/, /**11**/.
Findings	N/A
Conclusion	CCIPL confirms that no leakage emissions are to be considered as per the revised approved PDD and the applied methodology.

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

Means of verification	As per revised approved 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: $ER_{y,ex\ post} = \min((BE_{y,ex\ post} - PE_{y,ex\ post} - LE_{y,ex\ post}), (MD_y - PE_{power,y} - PE_{biomass,y} - LE_{y,ex\ post}))$ For the current monitoring period the achieved $BE_{y,ex\ post}$ is 178,701 tCO_{2e}, achieved $PE_{y,ex\text{-}post}$ is 25,393 tCO_{2e} and $LE_{y,ex\text{-}post}$ is zero as explained in above. As per equation 16 of AMS-III.H, version 16, in case of flaring/combustion MDy will be measured using the conditions of the flaring process: $MD_y = BG_{burnt,y} * w_{CH4,y} * D_{CH4} * FE * GWP_{CH4}$ 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 11,928,155

	Nm^3. Total biogas flared during the monitoring period is 17,025 Nm^3. 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_{CH4}) is fixed ex-ante to be 0.716 kg/m^3 as per the 'Tool to determine project emissions from flaring gases containing methane'. Global Warming Potential for methane (GWP_{CH4}) is 25 from 01/01/2013 onwards as per IPCC **/03/.** Methane fraction (W_{CH4}) is as per continuous measurement and daily records /**25**/. Methane fraction is measured near the biogas usage point and hence complies the methodology requirements. Therefore, MDy achieved during the monitoring period amounts to 136,166 tonnes of CO_2 equivalent /**02**/. Therefore, $ER_{y,ex\ post} = \min((BE_{WW,y,ex\ post} - PE_{ww.y,ex\ post} - LE_{ww,y,ex\ post}), (MD_y - PE_{power,y} - LE_{y,ex\ post}))$ With yearly achieved minimum of above is considered and accordingly the achieved emission reduction during the monitoring period is 122,295 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 3.2 of 09/04/2021 /**01**/ is equivalent to 122,295 tCO_{2e}. The reported emission reductions are 45% lower than the estimated emission reduction of 223,175 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	122,295 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
Findings	N/A
Conclusion	N/A

E.10. Global stakeholder consultation

Means of verification	The monitoring report version 1 of 30/09/2020 is published for global stakeholder commenting period on 05/10/2020.
Findings	N/A

Conclusion	CCIPL confirms that no comment received during the commenting period.

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. (CCIPL) has performed the first periodic verification of the registered CDM Project Activity "Methane Capture and Utilization Project at Asia Palm Oil Mill, Malaysia" having UNFCCC reference number as 7245.

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 updated PDD version 3.2 of 10/02/2021 and the Monitoring report (version 03.2, dated 09/04/2021) /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) and updated PDD version 3.2 of 10/02/2021, 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 (28/10/2020)
- 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 122,295 tCO_2e emission reductions during this first monitoring period.

Verified emission reductions for the project activity: 122,295 tCO_2e.

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_2e)	0	122,295

CCIPL 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 Asia Palm Oil Mill, Malaysia" having UNFCCC Registration Number 7245. 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 updated PDD version 3.2 of 10/02/2021 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 18/12/2020, version 03 of 22/01/2021, version 3.1 of 10/02/2021 and version 3.2 of 09/04/2021

This statement covers verification period from 15/05/2015 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 122,295 tCO_2 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
Emission reductions (t CO_2e)	0	122,295 tCO_2e

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
CCIPL	Carbon Check India Pvt. Ltd.
CL	Clarification Request
CO_2	Carbon dioxide
CO_2e	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	☒	Team Leader	☒	Technical reviewer	☐		
Verifier	☒	Technical Expert	☒	Local Assessor[1]	☒		

In the following Technical Areas:

TA 1.1	☒	TA 3.1	☒	TA 5.2	☐	TA 9.2	☐	TA 13.2	☒
TA 1.2	☒	TA 4.1	☐	TA 8.1	☐	TA 10.1	☐	TA 14.1	☐
TA 2.1	☐	TA 5.1	☐	TA 9.1	☐	TA 13.1	☒		

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.

CARBON CHECK (INDIA) PRIVATE LIMITED
CIN: U74930DL2012PTC232495
Regd. Off: 2071/38, 2nd Floor, Naiwala, Karol Bagh, New Delhi - 110005
Corporate off: Unit No. 1701, Logix City Centre Office Tower, Plot No. BW-58, Sector-32 Noida, Uttar Pradesh
Tel: +91 120 4373114 | **URL:** www.carboncheck.co.in | **e-mail:** info@carboncheck.co.in

Carbon CHECK

Carbon Check (India) Private Ltd.

Subhendu Biswas

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

For following functions:

Validator	☐	**Team Leader**	☐	**Technical reviewer**	☐
Verifier	☐	**Technical Expert**	☒	**Local Assessor**	☐

In the following Technical Areas:

TA 1.1	☒	**TA 3.1**	☒	**TA 5.2**	☐	**TA 9.2**	☐	**TA 13.2**	☐
TA 1.2	☒	**TA 4.1**	☒	**TA 8.1**	☒	**TA 10.1**	☒	**TA 14.1**	☐
TA 2.1	☐	**TA 5.1**	☒	**TA 9.1**	☒	**TA 13.1**	☒		

Mr. Vikash Kumar Singh
Compliance Officer

Mr. Amit Anand
CEO

Date of Approval
24/12/2020

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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

CARBON CHECK (INDIA) PRIVATE LIMITED
CIN: U74930DL2012PTC232495
Regd. Off: 2071/38, 2nd Floor, Naiwala, Karol Bagh, New Delhi - 110005
Corporate off: Unit No. 1701, Logix City Centre Office Tower, Plot No. BW-58, Sector-32 Noida, Uttar Pradesh
Tel: +91 120 4373114 | **URL:** www.carboncheck.co.in | **e-mail:** info@carboncheck.co.in

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 Asia Palm Oil Mill, Malaysia" in Malaysia	Version 1.0 of 30/09/2020, version 2 of 18/12/2020 and version 3.0 of 22/01/2021, version 3.1 of 10/02/2021, version 3.2 of 09/04/2021	PP
02	Perenia Pty Ltd.	Emission reduction calculation spreadsheet (301395Asia_ER cal_v1 30092020) '301395Asia_ER cal_v3.1 10022021.xlsx'	Version 1.0 of 30/09/2020, version 2 of 18/12/2020 and version 3.0 of 22/01/2021, version 3.1 of 10/02/2021, version 3.2 of 09/04/2021	PP
03	Perenia Pty Ltd.	Registered PDD for project activity "Methane Capture and Utilization Project at Asia Palm Oil Mill, Malaysia"	version 3.1 of 19/06/2020	PP
04	Carbon Check	a) Validation report on post registration changes for project activity "Methane Capture and Utilization Project at Asia Palm Oil Mill, Malaysia" b) Validation report on post registration changes for project activity "Methane Capture and Utilization Project at Asia Palm Oil Mill, Malaysia	Version 1.1 of 01/07/2020 Version 1.0 of 11/02/2021	Others
05	SIRIM	CDM validation report for the project "Methane Capture and Utilization Project at Asia Palm Oil Mill, Malaysia"	Validation report N° SQAS-CDM-EP10850001 issued on 27/09/2012	Others
06	UNFCCC	Project 7245: Methane Capture and Utilization Project at Asia Palm Oil Mill, Malaysia	https://cdm.unfccc.int/Projects/DB/SIRIM1347336155.79/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	Tool to calculate the emission factor for an electricity system" version 02	EB 50 annex 14	Others

	Board			
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 15/05/2015	PP
17	UNFCCC	Methodological "Tool to determine project emissions from flaring gases containing methane"	Annex 13, EB 28	Others
18	Perenia Pty Ltd.	Remote audit video	Recorded on 28/10/2020	PP
19	Perenia Pty Ltd.	Latest photographs of monitoring equipments		PP
20	Asia Ecogreen Sdn. Bhd.	Hourly electronic recording of wastewater flow to anaerobic digesters (downloaded through SCADA)	Records for the period 15/05/2015 to 01/01/2020	PP
21 (a)	Dynakey Laboratories Sdn. Bhd. & KL-Kepong (Sabah) Sdn. Bhd.	COD of wastewater analysis reports covering the period from 15/05/2015 to 31/12/2019	Third party COD of wastewater analysis reports	PP
21(b)	Asia Ecogreen Sdn. Bhd. (Internal laboratory)	COD of wastewater analysis reports covering the period from 15/05/2015 to 31/12/2019	COD of wastewater analysis reports	PP
22	Department of Standards Malaysia	Accreditation to Dynakey Laboratories Sdn. Bhd. & KL-Kepong (Sabah) Sdn. Bhd. in accordance with MS ISO/IEC 17025:2017 (ISO/IEC 17025:2017)	http://www.jsm.gov.my/documents/11396/300433/SAMM0576 http://www.jsm.gov.my/documents/11396/300433/SAMM0094	Others
23	Asia Ecogreen Sdn. Bhd.	Hourly electronic recording of biogas flow to gas engine/boiler (downloaded through SCADA)	Records for the period 15/05/2015 to 01/01/2020	PP
24	Asia Ecogreen Sdn. Bhd.	Hourly electronic recording of biogas flow to flare (downloaded through SCADA)	Records for the period 15/05/2015 to 01/01/2020	PP
25	Asia Ecogreen Sdn. Bhd.	Daily recording of methane concentration in biogas	Records for the period 15/05/2015 to 31/12/2019	PP
26	Asia Ecogreen Sdn. Bhd.	Records of sludge removed and applied for soil application ensuring aerobic conditions	Records for the period 15/05/2015 to 31/12/2019	PP
27	Endress+Hauser	a) Calibration certificate of flow meter with serial number F9056C20000 dated 08/10/2012 b) Calibration certificate of flow meter with serial number JA028A20000 dated	Calibration certificate	PP

		07/11/2014		
28	Pro-info Sys Technology Sdn Bhd	a) Calibration certificate of flow meter (F9056C20000) calibrated on 09/10/2016 b) Calibration certificate of flow meter (JA028820000) calibrated on 30/03/2019 c) Calibration certificate of flow meter (JA028A20000) calibrated on 09/10/2016 and on 30/03/2019 d) Calibration certificate of pressure transmitter with serial number DWY3200-11131602, calibrated on 09/10/2016 and on 30/03/2019 e) Calibration certificate of pressure transmitter with serial number DWY3200-12130957, calibrated on 09/10/2016 and on 30/03/2019 f) Calibration certificate of temperature transmitter (659RTD-1)-main line to gas engine calibrated on 09/10/2016 and on 30/03/2019 g) Calibration certificate of DP flowmeter with serial number DWY3100-1140338, calibrated on 09/10/2016 and on 30/03/2019 h) Calibration certificate of temperature transmitter (659RTD-1)-sub line to gas engine calibrated on 09/10/2016 and on 30/03/2019 i) Calibration certificate of DP flowmeter with serial number DWY3100-1140343, calibrated on 09/10/2016 and on 30/03/2019 j) Calibration certificate of DP flowmeter with serial number DWY3100-1140341, calibrated on 17/10/2016 and on 30/03/2019 k) Calibration certificate of pressure transmitter with serial number DWY3200-121-30958, calibrated on 09/10/2016 and on 30/03/2019 l) Calibration certificate of temperature transmitter (659RTD-1)-flare line calibrated on 09/10/2016 and on 30/03/2019 m) Calibration certificate of DP flowmeter with serial number	Calibration certificates	PP

		DWY3100-11-40336, calibrated on 09/10/2016 and on 30/03/2019 n) Calibration certificate of methane analyser (6737) calibrated on 24/11/2016 o) Calibration certificate of methane analyser (5320) calibrated on 24/11/2016 and on 30/03/2019 p) Calibration certificate of temperature transmitter (659RTD-1)-boiler line calibrated on 10/10/2016, on 19/01/2018 and on 30/03/2019 q) Calibration certificate of methane analyser (13753) calibrated on 30/03/2019		
29	Kenberich Systems and Control	Calibration certificate of flow meter (F9056C20000) calibrated on 09/09/2019	Calibration certificate	PP
30	Metal Technologies	a) Calibration certificate of pressure transmitter with serial number DWY3200-11131602, calibrated on 26/03/2014 b) Calibration certificate of pressure transmitter with serial number DWY3200-12130957, calibrated on 25/03/2014 c) Calibration certificate of temperature transmitter (659RTD-1)-main line to gas engine calibrated on 27/03/2014 d) Calibration certificate of DP flowmeter with serial number DWY3100-1140338, calibrated on 26/03/2014 e) Calibration certificate of temperature transmitter (659RTD-1)-sub line to gas engine calibrated on 27/03/2014 f) Calibration certificate of DP flowmeter with serial number DWY3100-1140343, calibrated on 26/03/2014 g) Calibration certificate of pressure transmitter with serial number DWY3200-121-30958, calibrated on 25/03/2014 h) Calibration certificate of temperature transmitter (659RTD-1)-flare line calibrated on 27/03/2014 i) Calibration certificate of DP flowmeter with serial number DWY3100-11-40336,		

		calibrated on 26/03/2014 j) Calibration certificate of temperature transmitter (659RTD-1)- boiler line calibrated on 27/03/2014 k) Calibration certificate of pressure transmitter (DWY3200-11131603)- boiler line calibrated on 26/03/2014		
31	Precision Control Sdn.Bhd.	a) Calibration report of pressure transmitter (N1K4039000039) calibrated on 26/11/2019 b) Calibration report of DP flowmeter (N1K0039120020) calibrated on 26/11/2019 c) Calibration report of pressure transmitter (N1K4039000036) calibrated on 26/11/2019 d) Calibration report of pressure transmitter (N1K4039000038) calibrated on 26/11/2019 e) Calibration report of DP flowmeter (N1K4039120024) calibrated on 26/11/2019 f) Calibration report of pressure transmitter (N1K4039000040) calibrated on 26/11/2019 g) Calibration report of DP flowmeter (N1K4039120025) calibrated on 26/11/2019	Calibration certificate	PP
32	Edinburgh Instruments	a) Calibration certificate of methane analyser (6737) calibrated on 10/12/2013 b) Calibration certificate of methane analyser (13753) calibrated on 24/04/2018 c) Calibration certificate of methane analyser (5320) calibrated on 10/12/2013 d) Calibration certificate of methane analyser (16810) calibrated on 26/11/2019	Calibration certificate	PP
33	Pro-info Sys Technology Sdn Bhd.	Calibration certificate of thermocouple (TK4S-A4CN) calibrated on 09/10/2016, on 27/09/2017, on 16/07/2018 and on 30/03/2019	Calibration certificate	PP
34	Metrology Corporation Malaysia Sdn.Bhd.	Calibration certificate of weighing bridge (007242) calibrated on 22/04/2015, 19/04/2016, 20/04/2017, 16/06/2018, 01/02/2020	Calibration certificate	PP
35	Asia Ecogreen Sdn. Bhd	Training records of biogas plant SOP, Generator SOP and SCADA system	Training dated 17/10/2016, 25/09/2017, 21/11/2018 and on 14/11/2019	PP
36	Perenia Pty Ltd.	Updated PDD for project activity “Methane Capture and Utilization Project at Asia Palm Oil Mill, Malaysia”	version 3.2 of 10/02/2021	PP

37	Millivest Sdn.Bhd.	Calibration certificate of Spectroquant Photometer (141620190), calibrated on 16/10/2015 and on 26/10/2017	Calibration certificate	PP
38	Dynakey Laboratories	Calibration certificate of Spectroquant Photometer (141620190), calibrated on 14/09/2018, on 16/08/2019 and on 28/07/2020	Calibration certificate	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				
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. *2) PP to ensure the establishment of the training procedure for the monitoring personnel.* *3) PP needs to ensure the availability of day-to-day records handling procedure*				
Project participant response				**Date:** 16/12/2020
1) Training required for each personnel in the project were in place. Biogas training record of year 2015 – 2019 along with registration form of personnel involved in the training have been prepared as evidence (Att01.1). Two main training have been conducted yearly: training for personnel working in the biogas plant, and training for personnel working in the gas engine room. 2) Asia plant has established standard operation manual. Under standard operation manual mentions that the training shall be conducted by well-train and qualified personnel. The plant has the training procedure in place. The supportive document has been provided as Att01.1 & Att01.2. 3) Regarding the standard operation manual, the document also includes procedure for parameter recording. The data from operating 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 supervisor. The operator shall communicate between the two shifts and the recording shall be submitted to the supervisor; Att01.2.				
Documentation provided by project participant				
Att01.1 Training records Att01.2 Standard Operation Manual				
DOE assessment				**Date:** 01/02/2021
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 responsibilitis 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				
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:** 16/12/2020

1. The downloaded data (totalized reading) of flow meters (wastewater flow meter, gas meter at gas engine, gas meter to burner and gas meter for flaring) have been prepared in Att02.1 *2. The calibration records of monitoring equipment have been prepared in Att0.2.2. 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 information;* *a. Gas meters: including gas meter at the gas engine, gas meter at the flaring system, thermocouple, and gas meter at the burner were calibrated by Pro Infosys Technology Sdn. Bhd. and Precision Control Sdn. Bhd.;* *https://pro-infosys.com/* *http://www.jsm.gov.my/documents/11396/300433/SAMM0045* *b. POME flow meters were calibrated by Endress+Hauser;* *https://www.endress.com/en/instrumentation-services/calibration-services* *c. Weighbridge were sent for calibration by Metrology Corporation Malaysia SDN BHD who provides services for all weighing and measuring instruments belong to the federal government, state government, municipalities and local councils:* *https://www.metrology.com.my/* *d. Spectrophotometer or COD analysis instrument was calibrated by DYNAKEY Laboratories Sdn. Bhd.* *http://www.jsm.gov.my/documents/11396/300433/SAMM0576* *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. There are two main labs which the wastewater was sent for analysis; DYNAKEY LABORATORIES SDN. BHD. and KL-Kepong (Sabah) Sdn. Bhd. The accreditation of the labs can be access through these links;* *http://www.jsm.gov.my/documents/11396/300433/SAMM0576* *http://www.jsm.gov.my/documents/11396/300433/SAMM0094* *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 reading Att02.2 Calibration certificates Att02.3 COD analysis external lab Att02.4 COD analysis internal lab Att02.5 CDM datasheet
DOE assessment **Date:** 01/02/2021
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.6.1	**Date:** 30/10/2020
Description of CAR				
1. The COD removal efficiency of the baseline anaerobic treatment system ($\eta_{COD,BL}$) is not consistent with the registered PDD. *2. The COD removal efficiency of the baseline aerobic treatment system ($\eta_{PJ,aerobic}$) is not consistent with the registered PDD.*				
Project participant response				**Date:** 16/12/2020
1. The COD removal efficiency of the baseline anaerobic treatment system (ηCOD,BL) has been updated and it is now consistent with the registered PDD. *2. The COD removal efficiency of the baseline aerobic treatment system (ηPJ,aerobic) has also been updated and it is now consistent with the registered PDD.*				
Documentation provided by project participant				
301395Asia_ER cal_v2 17122020 *301395Asia_MR_15052015to31122019_v2 17122020 trc*				
DOE assessment				**Date:** 01/02/2021
The corrections are done and updated input data are now consistent with registered PDD and hence CAR is closed.				

CAR ID	02	**Section no.**	E.6.2	**Date:** 30/10/2020
Description of CAR				

1. *It is noted that two flow meters for wastewater flow to digester are used. However, MR and ER sheet provide only one flow meter details.*
2. *The ER sheet does not provide COD measurement value as per defined frequency of monitoring and recording. Clarify how the measurement meets methodology requirement.*
3. *Please clarify whether there is no biogas consumption or flaring on 01/06/2015, 11/03/2016, 12/03/2016, 31/03/2017, 02/11/2019 although there was wastewater flow recorded in those days. On the other hand, on 01/11/2019 there was no wastewater flow but biogas consumption is recorded. Kindly clarify.*
4. *Biogas consumption in boiler is not included in excel sheet for the year 2016,*
5. *BG_{burnt} calculation in excel sheet for the year 2016 did not account biogas flared. The excel sheet does not provide calculation formula in the year 2017, 2018 for the same parameter.*
6. *In the year 2017, it is noted from excel sheet, there was no wastewater flow and biogas consumption of flaring from 13/06/2017 to 30/06/2017, although BG_{burnt} value is provided. Kindly rectify the same.*
7. *The monitoring equipment details for biogas consumption at gas engine, boiler and flaring are not provided in the MR.*
8. *The monitoring values of $W_{CH4,y}$ for the entire monitoring period is not complete in emission reduction worksheet. Kindly clarify if defined monitoring frequency is met in line with applied methodology and registered monitoring plan? As per monitoring flow diagram $W_{CH4,y}$ is to be monitored at two points, although the emission reduction worksheet provides only one monitored value. Kindly clarify.*
9. *The monitoring equipment details for 'End use of final sludge from the digester system' is not provided in the MR.*

Project participant response	**Date:** 16/12/2020

1. The ER calculation sheet has been updated with wastewater flow from two meters. The monitoring report has also been updated with both meters' information. Please see the attached data.
2. The COD value in the ER sheet has been revised. COD analysis could not be done as per the frequency specified in the registered PDD, some longer gap before next COD analysis was found. Though the average COD value of each year was selected for the emission reduction calculation. The average COD value was applied with the 90/10 confidence level. This approach is conservative and in accordant with the standard sampling and surveys for CDM project activities and programmes of activities version 08.0.

3. Clarification of no biogas consumption are as follows:
• 01/06/2015 The ER calculation sheet has been updated and there was some biogas consumption at the gas engine as well as the flaring system. Please see the revised ER.
• 11/03/2016 – 12/03/2016 As a comment provided by the plant manager (Att02.5), there was no gas engine running due to the breakdown repairing and reinstatement of the engines during 10/03/2016 to 12/03/2016. This results in no biogas consumption during the period.
• 31/03/2017 The ER calculation sheet has been updated and there was some biogas consumption at the gas engine. Please see the revised ER.
• 02/11/2019 The ER calculation sheet has been updated and there was some biogas consumption at the gas engine. Please see the revised ER.

Clarification of no wastewater entering the system on 01/11/2019 though there was biogas consumption is as follows:
Please see the revised excel sheet, there was wastewater entering the system on 01/11/2019.

4. The plant has started sending the biogas for boiler in year 2017. The commissioning date of the biogas sending to burner was on 12/07/2017. Thus, no biogas consumption was recorded in 2016.
5. The formular for BGburnt in year 2016, 2017 & 2018 has been updated. The parameter is now showing the actual value as per its description in the registered PDD.
6. It was possible that the biogas could be generated from the remaining wastewater in system during 13/06/2017 to 30/06/2017.
7. The 'End use of final sludge from the digester system' was measured through the weighbridge. The monitoring equipment details has been updated in the MR

Documentation provided by project participant

Att02.5 CDM datasheet
301395Asia_ER cal_v2 17122020
301395Asia_MR_15052015to31122019_v2 17122020 trc

DOE assessment	**Date:** 01/02/2021

1. Wastewater inflow with two flow meters are found updated in the MR and ER sheet and details are found to be consistent with monitoring records.
2. 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.
3. PP has updated the emission reduction worksheet in consistent with monitoring records. Response is accepted.
4. From commissioning details of biogas usage in boiler it is noted biogas consumption in boiler started from 2017 only.
5. The updated emission reduction worksheet is found corrected with appropriate formula in place during the monitoring period.
6. The emission reduction worksheet is corrected and monitored wastewater flow from 13/06/2017 to 30/06/2017 is provided. The reported data are consistent with downloaded raw data. Calculation found correct and hence issue is closed.
7. The weighbridge details for monitoring sludge is provided and 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				
The calibration details of monitoring equipments are not provided in the MR.				
Project participant response				**Date:** 16/12/2020
The monitoring report has been updated and the calibration detail of equipment has been mentioned. Please see the revised MR for more detail.				
Documentation provided by project participant				
301395Asia_MR_15052015to31122019_v2 17122020 trc				
DOE assessment				**Date:** 01/02/2021
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
-				

- - - - -

Document information

Version	*Date*	*Description*
04.0	6 April 2021	Revision to: • Reflect the “Clarification: Regulatory requirements under temporary measures for post-2020 cases” (CDM-EB109-A01-CLAR).
03.0	31 May 2019	Revision to: • 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.

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