Monitoring report form for CDM project activity (Version 08.0)

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

MONITORING REPORT			
Title of the project activity	Methane Capture and Utilization Project at Asia Palm Oil Mill, Malaysia		
UNFCCC reference number of the project activity	7245		
Version number of the PDD applicable to this monitoring report	03.1		
Version number of this monitoring report	03.2		
Completion date of this monitoring report	09/04/2021		
Monitoring period number	01		
Duration of this monitoring period	15/05/2015 to 31/12/2019 (first and last days included)		
Monitoring report number for this monitoring period	01		
Project participants	1. Asia Ecogreen Sdn. Bhd. (Malaysia) (host, project owner) 2. Perenia Pty Ltd. (Austratlia)		
Host Party	Malaysia		
Applied methodologies and standardized baselines	AMS-III.H. Methane recovery in wastewater treatment – (Version 16.0)		
Sectoral scopes	Sectoral Scope 13: Waste handling and disposal		
Amount of GHG emission reductions or net anthropogenic GHG removals achieved by the project activity in this monitoring period	Amount achieved before 1 January 2013	Amount achieved from 1 January 2013 until 31 December 2020	Amount achieved from 1 January 2021
	0 tCO_2e	122,295 tCO_2e	0 tCO_2e
Amount of GHG emission reductions or net anthropogenic GHG removals estimated ex ante for this monitoring period in the PDD	223,175 tCO_2e		

SECTION A. Description of project activity

A.1. General description of project activity

>> The “Methane Capture and Utilization Project at Asia Palm Oil Mill, Malaysia” (“the project activity”) is implemented at the Asia Palm Oil Mill (“the mill”) located at 24.6km off the 45km Lahad Datu Sandakan Highway, Lahad Datu, Sabah. The project activity is implemented by Asia Ecogreen Sdn. Bhd. (“the project owner”[1]).

The aim 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 entails the installation of a new covered anaerobic digester tank system equipped with methane capture and collection system to replace existing open anaerobic ponds “Watermech WM Closed Tank Anaerobic Digester System”. The biogas recovered is supplied to a biogas engine system. Any excess biogas would be flared in an enclosed flare and/or biomass boiler system. The project activity results in GHG emission reduction due to methane avoidance from anaerobic open ponds.

It is estimated that the project activity will annually reduce 48,172 tCO_2e annually. This is the first monitoring period of the project activity, which spans from 15/05/2015 to 31/12/2019. The total emission reduction project during the monitoring period is 122,295 tCO_2e.

A.2. Location of project activity

>> The project activity site is located within the Asia Palm Oil Mill located at 24.6 km off the 45km Lahad Datu Sandakan Highway, Lahad Datu, Sabah in East Malaysia.

The project activity coordinates are: 5° 17' 29.35" N, 118° 12' 21.17" E.

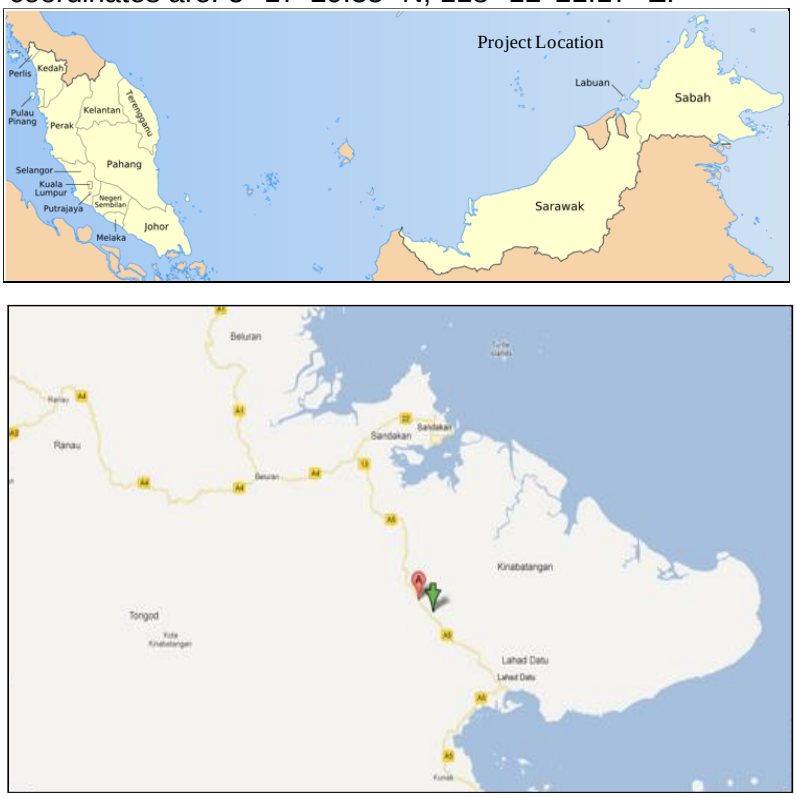


Figure 1: Map of Malaysia, indicating the location of Sabah State and Asia Palm Oil Mill location

[1] Asia Business Registration Form

A.3. Parties and project participants

Parties involved	Project participants	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
Malaysia (host party)	Asia Ecogreen Sdn. Bhd.	No
Australia	Perenia Pty Ltd.	No

A.4. References to applied methodologies and standardized baselines

>> The applied methodology is AMS-III.H. "Methane Recovery in Wastewater Treatment" (Version 16)

Reference to the methodology applied in the project activity;
https://cdm.unfccc.int/methodologies/DB/K7FDTJ4FL3432I1UKRNKLDCUFAMBX7

In accordance with the provisions of AMS-III.H. (Version 16), the following tools are used:

- "Tool to determine project emissions from flaring gases containing methane" (Version 1, EB 28)
- "Tool to calculate baseline, project and/or leakage emissions from electricity consumption (Version 01, EB39)"

Reference to the tools applied in the project activity:
https://cdm.unfccc.int/Reference/tools/index.html

A.5. Crediting period type and duration

>> Type of crediting period: Fixed crediting period
Duration of crediting period: 15/05/2015[2] to 14/05/2025
Length of crediting period: 10 years

Current monitoring period: 15/05/2015 to 31/12/2019
Length of current monitoring period: 4 years, 7.5 months

SECTION B. Implementation of project activity

B.1. Description of implemented project activity

>> Methane Capture and Utilization Project at Asia Palm Oil Mill, Malaysia has been implemented at the Asia Palm Oil Mill, located in Lahad Datu, Sabah, East Malaysia. The processing of crude palm oil from fresh palm fruit bunches (FFB) produces large amounts of Palm Oil Mill Effluent (POME) with high organic matter. The mill has a processing capacity of 330,000 tons[3] of FFB. Each tonne of FFB processed results in approximately 0.65 m^3 of POME produced[4].

In the baseline scenario, POME would have been treated via a series of open anaerobic ponds, while electricity would have been generated primarily from biomass-based boilers. The project activity involves the installation of a new covered anaerobic digester tank system equipped with methane capture and collection system to replace existing open anaerobic ponds. Methane captured from the anaerobic digester system has been transferred to a biogas engine system for electricity generation.

[2] Successful commissioning and handover date; according to commissioning report from Watermech
[3] Palm Oil Mill Board Processing Capacity License Asia
[4] LudinN, Bakri MM, HashimM, SawillaB, MenonN, MokhtarH. "Palm Oil Biomass for Electricity Generation in Malaysia"; 2004.p.1–6. Pusat Tenaga Malaysia, Malaysia Palm Oil Board, SIRIM Berhad

An enclosed flare system and/or biogas burner were installed at boiler system to combust excess biogas generated from project activity. However, the scope of biogas utilisation has been excluded from project activity.

Technology of the small-scale project activity

Project activity implements the Watermech WM Closed Tank Anaerobic Digester System. The raw POME undergoes a 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 stage digester system. The discharge from the first stage digester system overflows to the second stage 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 stage digester overflows to the existing aerobic pond, settling pond and subsequently to an existing effluent polishing plant, prior to discharge to land irrigation. Digested sludge from the project activity is utilized for land application in the plantation under aerobic condition. The sludge is not stored for longer periods; no anaerobic conditions develop.

The generated biogas is channelled through a desulfurization plant before being transferred to a biogas engine system[5]. The auxiliary power consumption of the project activity is sourced from the renewable energy generated from the biogas engine. The net electricity generated from the gas engine is supplied back to mill and for other uses e.g. to staff quarters, plantation offices and other down-stream plants. Any excess biogas is flared in an enclosed flare and/or biomass boiler system. Figure 2 illustrates the overall treatment process in detail.

Implementation status of the project activity during the monitoring period:
The details of implementation and actual operations of project activity conducted in this monitoring period are provided in the Table 1. The data monitoring of the project activity was carried out as described in the registered PRC PDD.

Table 1: The operation status of the project activity

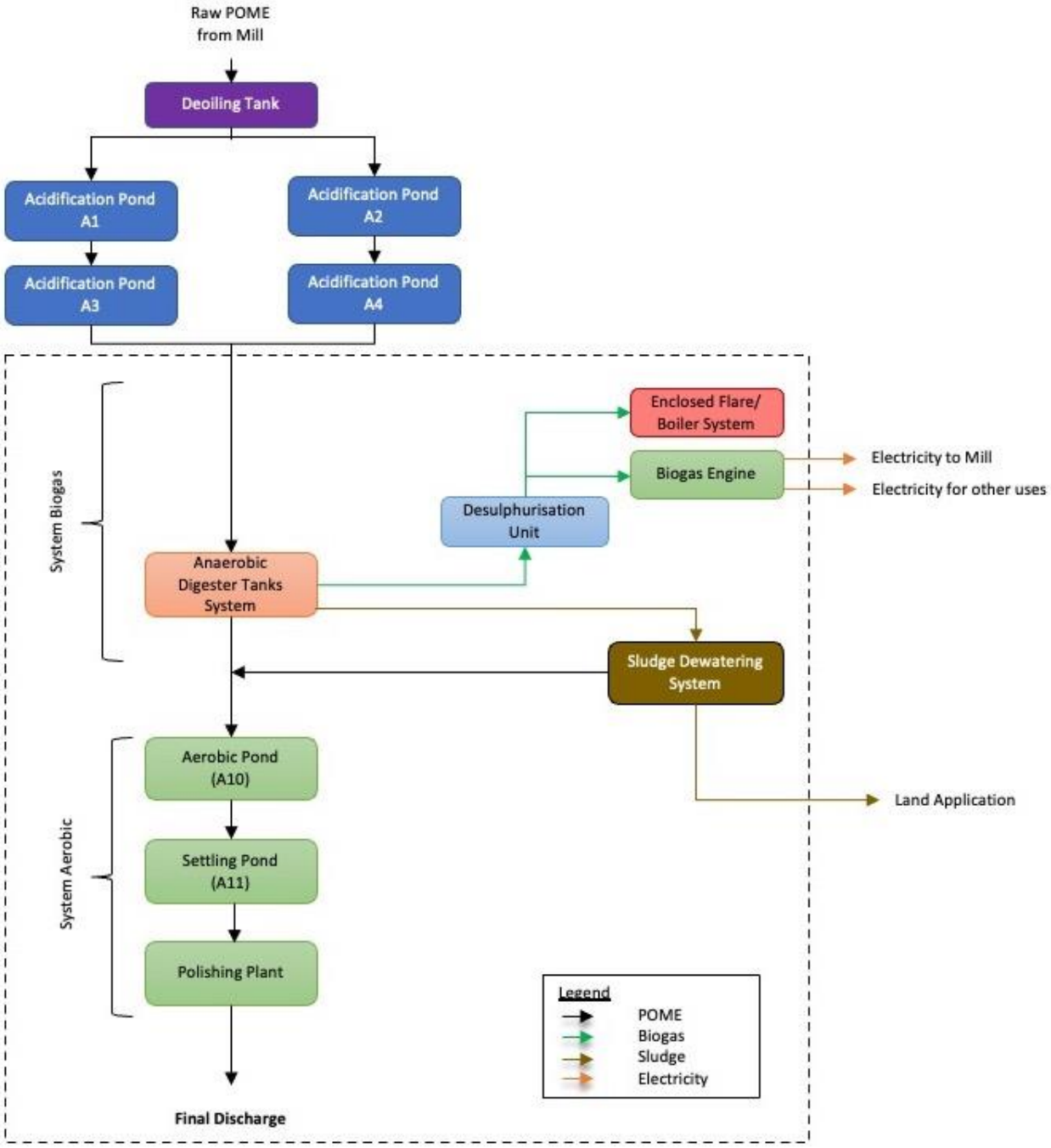
Event	Date	References
The project owner signed "Letter of Acceptance of Offer" with the Watermech Engineering Sdn.Bhd.	09/08/2011	Contract between Asia Ecogreen Sdn. Bhd. and Watermech
Construction start date (start of surveying works)	September, 2011	Asia Biogas plant project work timeline
Registration under CDM scheme	02/10/2011	UNFCCC website
Commissioning of project activity (COD – commercial operation date)	15/05/2015	Commissioning report by Watermech; Successful commission and Handover
PRC approval date (refer to section B.2) - Change on project crediting period start date - Permanent changes to the registered PRC PDD on GWP values - Change in project design	28/09/2020	Reference: PRC-7245-001[6]
First monitoring period	15/05/2015 to 31/12/2019	Refer to this report

The calibration of the equipment was conducted in this period as per the registered monitoring plan. In case of calibration delay, the measured values during the delay period were adjusted by applying the maximum value between an identified error or maximum permissible error as per

[5] General Specification of System & Project Process Flow by Watermech
[6] https://cdm.unfccc.int/PRCContainer/DB/prcp955300740/view

equipment specification for a conservative manner. This is in line with the latest version of clean development mechanism validation and verification standard (VVS).

Figure 2: Process flow diagram of project activity



B.2. Post-registration changes

B.2.1. Temporary deviations from the registered monitoring plan, applied methodologies, standardized baselines or other methodological regulatory documents

>> There are two temporary deviations on the monitoring plan of COD value.

Since the project participants were temporarily unable to monitor the project activity in accordance with the monitoring plan in the registered PRC PDD, the project participant decided to propose alternative monitoring arrangements for the non-conforming monitoring period.

From 15/05/2015 to 31/12/2019, the COD analysis was conducted by the internal and external lab. For the COD internal lab, the analysis during the period had been done by using the spectrophotometer. This procedure was accepted by international standard for water testing[7]. The instrument used for the COD test had also been calibrated by the accredited laboratory and was valid during the usage from project commissioning until the end of monitoring period; 31/12/2019. Thus, the measurement during the period was in accordance with the applicable provisions in the methodology; AMS-III.H version 16.0.

Furthermore, COD analysis could not be done as per the frequency specified in the registered PRC PDD. Even though there were some longer gaps before next COD analysis, 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.

Referring to the example 10 of standard sampling and surveys for CDM project activities and programmes of activities version 08.0, the project activity estimate sample requirement for COD is 22 samples[8] and samples taken for each monitoring year can be found as follows.

- In 2015 sample taken is 26 samplings.
- In 2016 sample taken is 29 samplings.
- In 2018 sample taken is 37 samplings.
- In 2017 sample taken is 35 samplings.
- In 2019 sample taken is 34 samplings.

The sampling sizes are all higher than the estimate sample requirement. These approaches are conservative and in compliance with the paragraph 231 (a) of CDM project standard for project activities version 2.0.

B.2.2. Corrections

>> There are corrections to the parameters of the CDM project activity in the registered PRC PDD version 03.1 date 19/06/2020. The corrections do not affect the design of the project activity. The revised PDD with version 3.2 dated 10/02/2021 has been submitted under the issuance track.

B.2.3. Changes to the start date of the crediting period

>> The start date of crediting period was changed from “01/01/2013 – 31/12/2022” to “15/05/2015 – 14/05/2025”. The change of the start date is the change that has been approved by the Board and that affects the start of this monitoring period. The changed start date is the start of this monitoring period.

PRC status: Approved
The approval date: 28/09/2020
Reference: PRC-7245-001
Link: https://cdm.unfccc.int/PRCContainer/DB/prcp955300740/view

B.2.4. Inclusion of monitoring plan

>> No inclusion of a monitoring plan to registered PRC PDD is considered during this current monitoring period.

[7] https://www.astm.org/Standards/D1252.htm
[8] Based on 2018 COD samples

B.2.5. Permanent changes to the registered monitoring plan, or permanent deviation of monitoring from the applied methodologies, standardized baselines, or other methodological regulatory documents

>> There was a change to project information or parameters fixed at the registration of the project activity. Project participant has updated the Global Warming Potential for methane (from 21 to 25) corresponding to the ex-ante parameter "GWP_{CH4}" fixed at registration of the CDM project activity. The ex-ante emission reductions have been changed from 40,466 tCO_2e to 48,172 tCO_2e.

This change has been approved by the Board as applicable from this monitoring period.

PRC status: Approved
The approval date: 28/09/2020
Reference: PRC-7245-001
Link: https://cdm.unfccc.int/PRCContainer/DB/prcp955300740/view

B.2.6. Changes to project design

>> The composting plant and biogas utilization have been excluded from the project boundary. The reason for this change is to avoid complexity and future confusion. Since the end use sludge has been utilized for soil application, emissions from the final sludge are to be ignored.

This change has been approved by the Board as applicable from this monitoring period.

PRC status: Approved
The approval date: 28/09/2020
Reference: PRC-7245-001
Link: https://cdm.unfccc.int/PRCContainer/DB/prcp955300740/view

B.2.7. Changes specific to afforestation or reforestation project activity

>> The project activity is not afforestation or reforestation project activity. This section is therefore not applicable.

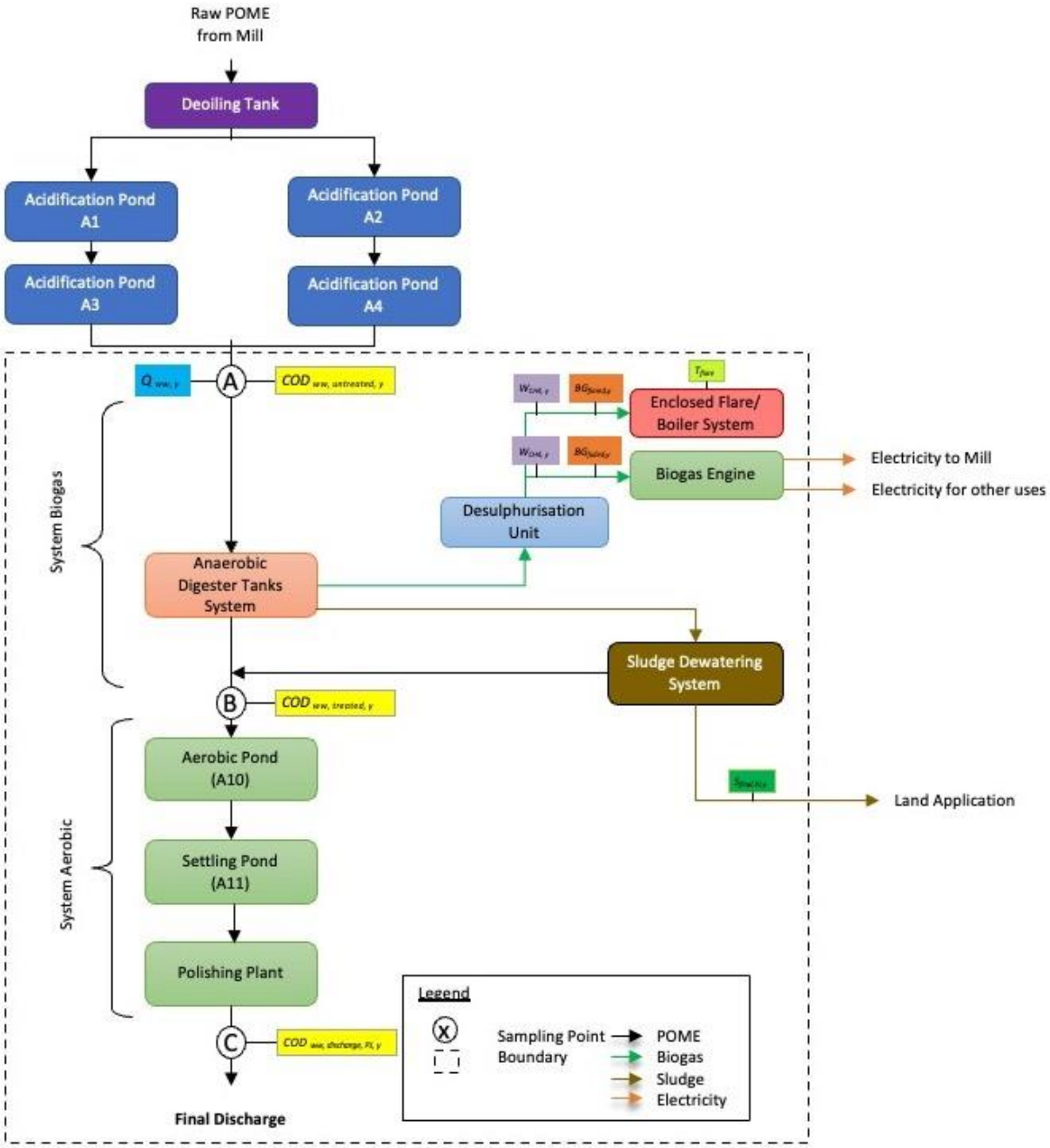
SECTION C. Description of monitoring system

>> Monitoring data was recorded and downloaded monthly and stored electronically in a database. Any problem with the monitoring equipment was noted and has been included into the database. A monitoring data report was produced containing the monthly monitoring data files and details of any equipment faults and/or loss of data. The monitoring data report was submitted to the plant manager to review and acceptance.

Monitoring

The proposed measurement and sampling points for the project activity are illustrated in Figure 3.

Figure 3: Diagram showing all monitoring points for project activity



Quality assurance and quality control

The CDM Monitoring and Management team ensures proper and timely calibration as scheduled for applicable monitoring instrumentation in accordance with the manufacturer's specification of system, data acquisition and storage. The responsible person also undertakes regular follow-ups to ensure consistency of data measurements.

Emergency preparedness

The project activity is not expected to result in any emergency that could result in substantial emissions. The proposed project activity has the necessary provisions for emergency preparedness to deal with any unforeseen events such as fire or an electrical blackout.

An emergency management procedure has been developed which explains outlines steps to be followed to quantify emission reductions in the event of equipment or meter failures

Uncertainty in data and data management

Some uncertainties may result due to malfunction of meters, calibration issues and incorrect data collection (gaps in manual log sheets, human errors by plant operators, electronic recording system failure, etc.). The operator has done its best to prevent such errors, however regular internal checks rectify any such uncertainty in the monitored data.

Data records were kept in both soft copy and hard copy format with a proper archive system by the CDM management team. All data would be electronically archived for a period of two years from the end of the crediting period.

SECTION D. Data and parameters

D.1. Data and parameters fixed ex ante

Data/Parameter	$MCF_{ww,treatment,BL}$
Unit	Factor
Description	Methane correction factor (MCF) for the baseline anaerobic wastewater treatment system
Source of data	IPCC default value for anaerobic decay of the untreated wastewater
Value(s) applied	0.8
Choice of data or measurement methods and procedures	MCF values as per Table III.H.1, AMS-III.H (anaerobic deep lagoon depth more than 2 m).
Purpose of data	Calculation of baseline emissions
Additional comment	-

Data/Parameter	$MCF_{ww,treatment,\ aerobic}$
Unit	Factor
Description	MCF for the baseline aerobic wastewater treatment system
Source of data	IPCC default value for aerobic treatment, well managed pond
Value(s) applied	0
Choice of data or measurement methods and procedures	MCF values as per Table III.H.1, AMS-III.H (aerobic treatment, well managed pond).
Purpose of data	Calculation of project emissions
Additional comment	-

Data/Parameter	$\eta_{COD,BL}$
Unit	%
Description	COD removal efficiency of the baseline anaerobic treatment system, determined as per the paragraphs 26, 27 or 28 in AMS-III.H
Source of data	Measurement campaign
Value(s) applied	98%
Choice of data or measurement methods and procedures	Measurement campaign was undertaken in the baseline wastewater treatment system for 10 normal operation days from 12/08/2011–21/08/2011.
Purpose of data	Calculation of baseline emissions
Additional comment	-

Data/Parameter	$\eta_{PJ,aerobic}$
Unit	%
Description	COD removal efficiency of the project wastewater treatment system (System-Aerobic) which is not equipped with biogas recovery digester in year y.
Source of data	Measurement campaign
Value(s) applied	52%
Choice of data or measurement methods and procedures	Measurement campaign was undertaken in the baseline wastewater treatment system for 10 normal operation days from 12/08/2011–21/08/2011.
Purpose of data	Calculation of project emissions
Additional comment	-

Data/Parameter	$B_{o,ww}$
Unit	t CH_4 /t COD
Description	Methane producing capacity of wastewater
Source of data	AMS-III.H. default value
Value(s) applied	0.25
Choice of data or measurement methods and procedures	The default value as specified in AMS-III.H (Version 16; EB58).
Purpose of data	Calculation of baseline and project emissions
Additional comment	-

Data/Parameter	UF_{BL}
Unit	-
Description	Model correction factor to account for model uncertainties
Source of data	AMS-III.H. default value
Value(s) applied	0.89
Choice of data or measurement methods and procedures	The default value as specified in AMS-III.H (Version 16; EB58) for the calculation of baseline emissions.
Purpose of data	Calculation of baseline emissions
Additional comment	-

Data/Parameter	$MCF_{ww,treatment,PJ}$
Unit	Factor
Description	MCF for project activity not equipped with biogas recovery in the year, y
Source of data	IPCC default value
Value(s) applied	0.8
Choice of data or measurement methods and procedures	MCF values per table III.H.1, AMS III.H (Anaerobic reactor without methane recovery)
Purpose of data	Calculation of project emissions
Additional comment	-

Data/Parameter	$MCF_{ww,treatment,PJ,aerobic}$
Unit	Factor
Description	MCF for project activity not equipped with biogas recovery in the year, y
Source of data	IPCC default value for aerobic treatment, well managed
Value(s) applied	0.0
Choice of data or measurement methods and procedures	MCF values as per Table III.H.1, AMS-III.H (aerobic treatment, well managed pond).
Purpose of data	Calculation of baseline emissions
Additional comment	-

Data/Parameter	$MCF_{ww,BL,discharge}$, $MCF_{ww,PJ,discharge}$
Unit	Factor
Description	Methane correction factor of baseline and project wastewater treatment system sent for plantation irrigation purpose in the year 'y'.
Source of data	IPCC default value for aerobic treatment, well managed
Value(s) applied	0.0
Choice of data or measurement methods and procedures	MCF values as per Table III.H.1, AMS-III.H (Version 16.0)
Purpose of data	Baseline emission and project emission calculation
Additional comment	

Data/Parameter	GWP_{CH4}
Unit	tCO_2/ t CH_4
Description	Global warming potential of methane
Source of data	IPCC default value
Value(s) applied	21 - for the first commitment period 25* - for the second commitment period
Choice of data or measurement methods and procedures	The default value as specified in AMS-III.H (Version 16; EB58)
Purpose of data	Calculation of baseline and project emissions
Additional comment	*According to EB69 - Annex3, the second commitment period GWP of 25 tCO_2/ tCH_4 is effective from 01/01/2013.

Data/Parameter	UF_{PJ}
Unit	-
Description	Model correction factor to account for model uncertainties
Source of data	AMS-III.H. default value
Value(s) applied	1.12
Choice of data or measurement methods and procedures	The default value as specified in AMS-III.H (Version 16, EB58)
Purpose of data	Calculation of project emissions
Additional comment	-

Data/Parameter	CEF_{ww}
Unit	Factor
Description	Capture efficiency of the biogas recovery equipment in wastewater treatment system
Source of data	AMS-III.H. default value
Value(s) applied	0.9
Choice of data or measurement methods and procedures	The default value as specified in AMS-III.H (Version 16, EB 58)
Purpose of data	Calculation of project emissions
Additional comment	-

D.2. Data and parameters monitored

Data/Parameter	$Q_{ww,i,y}$		
Unit	m^3		
Description	The flow of wastewater entering the project anaerobic digester system		
Measured/calculated/ default	Measured		
Source of data	Flow meter		
Value(s) of monitored parameter	**Monitoring period**	**Monitored value**	
		Lower	Higher
	15/05/2015 to 31/12/2015	79,951	80,459
	01/01/2016 to 31/12/2016	140,085	141,139
	01/01/2017 to 31/12/2017	160,100	160,458
	01/01/2018 to 31/12/2018	159,313	160,915
	01/01/2019 to 31/12/2019	94,792	95,466

<table>
<tr><td>Monitoring equipment</td><td>There were two meters implemented in the project activity. For the FM1 the detail of the meter can be found as follows;
<table>
<tr><td>Manufacturer</td><td>Endress+Hauser (old)</td></tr>
<tr><td>Model</td><td>10W65-SCOA1AAOA5AA</td></tr>
<tr><td>Serial number</td><td>F9056C20000</td></tr>
<tr><td>Period of utilization</td><td>Commissioning to 20/12/2019</td></tr>
<tr><td>Accuracy</td><td>+/- 0.5%</td></tr>
<tr><td>Calibration frequency</td><td>At least once in three years</td></tr>
<tr><td>Calibration date</td><td>Validity of calibration as per the certificates</td></tr>
<tr><td>08/10/2012
09/10/2016
09/09/2019</td><td>07/10/2013
08/10/2017
08/09/2020</td></tr>
</table>
The replacement of the meter was due to the error recording during the period (14/06/2019 to 19/12/2019) the project has avoided the value. The meter replacement was conduct on 20/12/2019.
<table>
<tr><td>Manufacturer</td><td>Endress+Hauser (new)</td></tr>
<tr><td>Model</td><td>10W65-SCOA1AAOA5AA</td></tr>
<tr><td>Serial number</td><td>JA028820000</td></tr>
<tr><td>Period of utilization</td><td>20/12/2019 to present</td></tr>
<tr><td>Accuracy</td><td>+/- 0.5%</td></tr>
<tr><td>Calibration frequency</td><td>At least once in three years</td></tr>
<tr><td>Latest calibration</td><td>30/03/2019</td></tr>
<tr><td>Validity of calibration as per the certificates</td><td>29/03/2020</td></tr>
</table>
FM2 detail can be found as follows.
<table>
<tr><td>Manufacturer</td><td>Endress+Hauser</td></tr>
<tr><td>Model</td><td>10W65-SCOA1AAOA5AA</td></tr>
<tr><td>Serial number</td><td>JA028A20000</td></tr>
<tr><td>Period of utilization</td><td>commissioning to present</td></tr>
<tr><td>Accuracy</td><td>+/- 0.5%</td></tr>
<tr><td>Calibration frequency</td><td>At least once in three years</td></tr>
<tr><td>Calibration date</td><td>Validity of calibration as per the certificates</td></tr>
<tr><td>07/11/2014
09/10/2016
30/03/2019</td><td>06/11/2015
08/10/2017
30/03/2020</td></tr>
</table></td></tr>
<tr><td>Measuring/reading/recording frequency</td><td>Flow of wastewater was measured continuously using calibrated cumulative flow meters; data was recorded monthly. Data is kept electronically in a systematic and transparent manner during crediting period and for two years after crediting period.</td></tr>
<tr><td>Calculation method
(if applicable)</td><td>N/A</td></tr>
<tr><td>QA/QC procedures</td><td>Equipment was calibrated according to manufacturer’s specifications, or at least once in three years.</td></tr>
<tr><td>Purpose of data/parameter</td><td>Calculation of baseline and project emissions</td></tr>
<tr><td>Additional comments</td><td>The FM1 was replaced by the new meter with the same model due to error recording on 20/12/2019.
For the FM1 the calibration gaps of 15/05/2015 to 09/10/2016 and 08/10/2017 to 09/09/2019 were identified. While the FM2 the calibration gaps of 07/11/2015 to 09/10/2016 and 08/10/2017 to 30/03/2019. The maximum permissible error as per equipment specification of 0.5% has been applied to the monitored value. The lower value was used for baseline emission, while higher value was used for the project emission calculation. This approach is conservative.</td></tr>
</table>

Data/Parameter	**$COD_{ww,untreated,y}$**
Unit	$tCOD/m^3$

<table>
<tr><td>Description</td><td>COD of wastewater entering the anaerobic digester system</td></tr>
<tr><td>Measured/calculated/ default</td><td>Measured</td></tr>
<tr><td>Source of data</td><td>Laboratory testing</td></tr>
<tr><td>Value(s) of monitored parameter</td><td>
<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>0.0682</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>
</td></tr>
<tr><td>Monitoring equipment</td><td>The result of COD analysis refers two data sources: internal and external lab. For the internal lab the equipment detail can be found as follow.
<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>
<tr><td>Calibration frequency</td><td>Once a year</td></tr>
<tr><td>Calibration date</td><td>Validity of calibration as per the certificates</td></tr>
<tr><td>16/10/2015,
26/10/2017,
14/09/2018,
16/08/2019,
28/07/2020</td><td>15/10/2016,
25/10/2018,
13/09/2019,
15/08/2020,
27/07/2021</td></tr>
</table>
The COD testing has been sent out for analysis at two accredited labs;

Dynakey Laboratories Sdn. Bhd.[9]
KL-Kepong (Sabah) Sdn. Bhd.[10]

</td></tr>
<tr><td>Measuring/reading/recording frequency</td><td>COD sample should be tested and recorded once every two weeks. Even though there were some longer gap before next COD analysis, the average value of COD was selected for the emission reduction calculation and a 90/10 confidence/precision level was ensured for samples and measurements. The method used for COD analysis were according to international standard and/ or national standard.</td></tr>
<tr><td>Calculation method (if applicable)</td><td>N/A</td></tr>
<tr><td>QA/QC procedures</td><td>The COD testing was carried out by an accredited laboratory. Data is kept electronically in a systematic and transparent manner during the crediting period and for two years after the crediting period.</td></tr>
<tr><td>Purpose of data/parameter</td><td>Calculation of baseline and project emissions</td></tr>
<tr><td>Additional comments</td><td>Standard Test Methods for COD ananlysis at Dynakey Laboratories was done through the international accepted method using spectrophotometer[11], DL-LAB-TM02 (based on MN Method[12] 0-26, 0-28, 0-29), while KL-Kepong (Sabah) Sdn. Bhd used DOE [13] Standard Methods (which is nationally accepted method) for Analysis of Rubber & Palm Oil Mill Effluents 2011 (ALT) measurement for the analysis.
The calibration gap has been identified from project commissioning to 16/10/2015 and form 16/10/2016 to 26/10/2017. The maximum error as per the manufacturer 0.33% has been applied to the monitoring data during the year 2015 and 2016 to 2017. The lower value has been selected for the baseline emission calculation, while the higher value has been selected for the project emission calculation. This approach is conservative.</td></tr>
</table>

[9] http://www.jsm.gov.my/documents/11396/300433/SAMM0576
[10] http://www.jsm.gov.my/documents/11396/300433/SAMM0094
[11] http://www.astm.org/cgi-bin/resolver.cgi?D1252-00
[12] MN Method refers to Test Method of Macherey-Nagel Manual for NANOCOLOR Spectrophotometers, 2010
[13] DOE: Department of Environment, Malaysia

Data/Parameter	$COD_{ww,treated,y}$
Unit	$tCOD/m^3$
Description	COD of wastewater exiting the anaerobic digester system
Measured/calculated/ default	Measured
Source of data	Laboratory testing
Value(s) of monitored parameter	See table below
Monitoring equipment	Please see "$COD_{ww,untreated,y}$"
Measuring/reading/recording frequency	COD sample should be tested and recorded once every two weeks. Even though there were some longer gap before next COD analysis, the average value of COD was selected for the emission reduction calculation and a 90/10 confidence/precision level was ensured for samples and measurements. The method used for COD analysis were according to international standard and/ or national standard.
Calculation method (if applicable)	N/A
QA/QC procedures	The COD testing was carried out by an accredited laboratory. Data is kept electronically in a systematic and transparent manner during the crediting period and for two years after the crediting period.
Purpose of data/parameter	Calculation of baseline and project emissions
Additional comments	Please see "$COD_{ww,untreated,y}$"

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

Data/Parameter	$COD_{ww,discharge,PJ,y}$
Unit	$tCOD/m^3$
Description	COD of wastewater leaving the final discharge point
Measured/calculated/ default	Measured
Source of data	Laboratory testing
Value(s) of monitored parameter	See table below
Monitoring equipment	Please see "$COD_{ww,untreated,y}$"
Measuring/reading/recording frequency	COD sample should be tested and recorded once every two weeks. Even though there were some longer gap before next COD analysis, the average value of COD was selected for the emission reduction calculation and a 90/10 confidence/precision level was ensured for samples and measurements. The method used for COD analysis were according to international standard and/ or national standard.
Calculation method (if applicable)	N/A
QA/QC procedures	The COD testing was carried out by an accredited laboratory. Data would be kept electronically in a systematic and transparent manner during the crediting period and for two years after the crediting period.

Monitoring period	Monitored Value	
	Lower	Higher
15/05/2015 to 31/12/2015	0.0005	0.0007
01/01/2016 to 31/12/2016	0.0003	0.0021
01/01/2017 to 31/12/2017	0.0005	0.0006
01/01/2018 to 31/12/2018	0.0005	0.0006
01/01/2019 to 31/12/2019	0.0005	0.0006

Purpose of data/parameter	N/A
Additional comments	Please see "**$COD_{ww,untreated,y}$**"

Data/Parameter	**$BG_{burnt,y}$**
Unit	Nm^3
Description	Amount of biogas fuelled or flared in year, y
Measured/calculated/ default	Calculated
Source of data	Calculated as the summation of **$BG_{fuelled,y}$** and **$BG_{flared,y}$** data from gas flow meter
Value(s) of monitored parameter	**Monitoring period** / **Calculated – lower 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
Monitoring equipment	Please see **$BG_{fuelled,y}$** and **$BG_{flared,y}$**
Measuring/reading/recording frequency	Please see **$BG_{fuelled,y}$** and **$BG_{flared,y}$**
Calculation method (if applicable)	Calculated as the summation of **$BG_{fuelled,y}$** and **$BG_{flared,y}$**
QA/QC procedures	Please see **$BG_{fuelled,y}$** and **$BG_{flared,y}$**
Purpose of data/parameter	Please see **$BG_{fuelled,y}$** and **$BG_{flared,y}$**
Additional comments	Please see **$BG_{fuelled,y}$** and **$BG_{flared,y}$**

Data/Parameter	**$BG_{fuelled,y}$**
Unit	Nm^3
Description	Amount of biogas fuelled in the gas engine and/or boiler in year,*y*
Measured/calculated/ default	Measured
Source of data	Gas flow meter
Value(s) of monitored parameter	**Monitoring period** / **Calculated lower 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 **Biogas fuelled** **Monitoring period** / **Monitored value** (**BG to gas engine** / **BG to boiler**) 15/05/2015 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

Monitoring equipment

Gas meter at the gas engine

There were two gas meters being implemented at the gas engine: main line and sub line.

For the main line, the meter detail can be found as follows.

Manufacturer	Mercoid old PT		Mercoid old DP	
Model	3200G-1-FM-1-1-LCD		3100D-3-FM-1-1-LCD	
Serial Number	DWY3200-11131602		DWY3100-1140338	
Equipment type	Pressure transmitter		DP flow meter	
Period of utilisation	Commissioning to 20/12/2019			
Accuracy	0.2%[14]		0.2%	
Calibration frequency	At least once in three years			
Calibration	**Calibration dates**	**Validity as per the certificates**	**Calibration dates**	**Validity as per the certificates**
	26/03/2014, 09/10/2016, 30/03/2019	25/03/2015 08/10/2017 29/03/2020	26/03/2014, 09/10/2016, 30/03/2019	25/03/2015 08/10/2017 29/03/2020

The replacement of the meter was due to intermittent issues noted on some days between October 2019 to December 2019. The replacement was conducted on 20/12/2019 same as other meters.

Manufacturer	Siemens new PT	Siemens new DP
Model	7MF4033-1BA10-2AC1	7MF4433-1DA22-2AC1-A01+A40
Serial Number	N1K4039000039	N1K0039120020
Equipment type	Pressure transmitter	DP flow meter
Period of utilisation	20/12/2019 to present	
Accuracy	0.2%[15]	0.25%
Calibration frequency	At least once in three years	
Latest Calibration	26/11/2019	26/11/2019
Validity of calibration as per the certificates	25/11/2020	25/11/2020

Manufacturer	DYWER
Model	659RTD-1
Serial number	N/A
Equipment type	Temperature transmitter
Period of utilisation	Commissioning to present
Accuracy	0.2%[16]
Calibration frequency	At least once in three years
Calibration date	**Validity as per the certificates**
27/03/2014 09/10/2016, 30/03/2019	26/10/2015, 08/10/2017, 29/03/2020

[14] As per manufacturing specification
[15] https://www.nexinstrument.com/assets/images/pdf/7MF4033-1GA10-2AB6-ZA01.pdf
[16] https://www.dwyer-inst.com/Product/Temperature/Transmitters/SeriesTTW#specs

The sub line (Bypass line) meter detail can be found as follows.

Manufacturer	Mercoid		Mercoid	
Model	3200G-1-FM-1-1-LCD		3100D-3-FM-1-1-LCD	
Serial Number	DWY3200-12130957		DWY3100-1140343	
Equipment type	Pressure transmitter		DP flowmeter	
Period of utilisation	Commissioning to 20/12/2019			
Accuracy	0.2%		0.2%	
Calibration frequency	At least once in three years			
Calibration	**Calibration dates**	**Validity as per the certificates**	**Calibration dates**	**Validity as per the certificates**
	25/03/2014, 09/10/2016, 30/03/2019	24/03/2015 08/10/2017 29/03/2020	26/03/2014, 09/10/2016, 30/03/2019	25/03/2015 08/10/2017 29/03/2020

The replacement of the intermittent issues noted on some days between October 2019 to December 2019. The replacement was conducted on 20/12/2019 same as other meters.

Manufacturer	Siemens new PT	Siemens new DP
Model	7MF4033-1BA10-2AC1	7MF4433-1DA22-2AC1-Z
Serial Number	N1K4039000040	N1K4039120025
Equipment type	Pressure transmitter	DP flow meter
Period of utilisation	20/12/2019 to present	
Accuracy	0.2%	0.2%
Calibration frequency	At least once in three years	
Latest Calibration	26/11/2019	26/11/2019
Validity of calibration as per the certificates	25/11/2020	25/11/2020

Manufacturer	DYWER
Model	659RTD-1
Serial number	N/A
Equipment type	Temperature transmitter
Period of utilisation	Commissioning to present
Accuracy	0.2%
Calibration frequency	Once in three years
Calibration date	**Validity as per the certificates**
27/03/2014, 09/10/2016 30/03/2019	26/10/2015, 08/10/2017, 29/03/2020

Gas meter at the boiler

Manufacturer	Mercoid-DP transmitter		Mercoid-PTold	
Model	3100D-3-FM-1-1-LCD		3200G-1-FM-1-1-LCD	
Serial Number	DWY3100-1140341		DWY3200-11131603	
Equipment type	DP flowmeter		Pressure transmitter	
Period of utilisation	Commissioning to present		Commissioning to 20/12/2019	
Accuracy	0.2%		0.2%	
Calibration frequency	At least once in three years			
Calibration	**Calibration dates**	**Validity as per the certificates**	**Calibration dates**	**Validity as per the certificates**
	17/10/2016, 30/03/2019	16/10/2017 29/03/2020	26/03/2014	25/03/2015

<table>
<tr><td></td><td>There was replacement of an equipment for PT meter, the management team has decided to replace such equipment in order to keep up with the meter performance and the replacement was conduct on 20/12/2019.
<table>
<tr><td>Manufacturer</td><td colspan="2">Siemens -PT^{new}</td><td colspan="2">DYWER</td></tr>
<tr><td>Model</td><td colspan="2">7MF4033-1BA10-2AC1</td><td colspan="2">659RTD-1</td></tr>
<tr><td>Serial number</td><td colspan="2">N1K4039000036</td><td colspan="2">N/A</td></tr>
<tr><td>Equipment type</td><td colspan="2">Pressure transmitter</td><td colspan="2">Temperature transmitter</td></tr>
<tr><td>Period of utilisation</td><td colspan="2">20/12/2019 to present</td><td colspan="2">Commissioning to present</td></tr>
<tr><td>Accuracy</td><td colspan="2">0.2%</td><td colspan="2">0.2%</td></tr>
<tr><td>Calibration frequency</td><td colspan="4">At least once in three years</td></tr>
<tr><td rowspan="2">Calibration</td><td>Calibration dates</td><td>Validity as per the certificates</td><td>Calibration dates</td><td>Validity as per the certificates</td></tr>
<tr><td>26/11/2019</td><td>25/11/2020</td><td>27/03/2014,
10/10/2016,
19/01/2018,
30/03/2019</td><td>26/03/2015
09/10/2017
18/01/2019
29/03/2020</td></tr>
</table></td></tr>
<tr><td>Measuring/reading/recording frequency</td><td>The biogas flow, temperature and pressure were measured continuously using calibrated volumetric flow meters, and a cumulative normalised flow (Nm^3) of the biogas was calculated continuously by a flow meter or flow calculator.</td></tr>
<tr><td>Calculation method (if applicable)</td><td>Sum of biogas sent to the gas engine and/or boiler</td></tr>
<tr><td>QA/QC procedures</td><td>The meters underwent maintenance/calibration as per the manufacturer’s specifications, or at least once every three years.</td></tr>
<tr><td>Purpose of data/parameter</td><td>Calculation of baseline emissions</td></tr>
<tr><td>Additional comments</td><td>The calibration gap has been identified from the validity of the calibration certificates.
Gas engine - Main line: Calibration gap are from 25/03/2015 to 09/10/2016 and 08/10/2017 to 30/03/2019. The maximum error as found in the calibration certificates of 2.00% has been applied to the monitoring data of 25/03/2015 to 09/10/2016, while the maximum as found in the calibration certificate of 0.78% has been applied to the monitoring data during the 08/10/2017 to 30/03/2019.
Gas Engine - Bypass or Sub line: Calibration gap are from 24/03/2015 to 09/10/2016 and 08/10/2017 to 30/03/2019.
While the burner line the calibration gap has been identified from PT as 25/03/2015 to 20/12/2019 and DPFM as 16/10/2017 to 30/03/2019. The longest gap has been selected and applied to the monitoring data.
The lower value has been used for the baseline emission calculation. This is conservative.</td></tr>
</table>

Data/Parameter	**$BG_{flared,y}$**
Unit	Nm^3
Description	Amount of biogas flared in year, *y*
Measured/calculated/ default	Measured
Source of data	Gas flow meter

Value(s) of monitored parameter

Monitoring period	Lower value	Higher value
15/05/2015 to 31/12/2015	5,321	5,621
01/01/2016 to 31/12/2016	7,693	8,127
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

<table>
<tr><td>Monitoring equipment</td><td>
<table>
<tr><td>Manufacturer</td><td colspan="2">Mercoid</td><td>Mercoid</td></tr>
<tr><td>Model</td><td colspan="2">3200G-1-FM-1-1-LCD</td><td>3100D-3-FM-1-1-LCD</td></tr>
<tr><td>Serial number</td><td colspan="2">DWY3200-121-30958</td><td>DWY3100-11-40336</td></tr>
<tr><td>Equipment type</td><td colspan="2">Pressure transmitter</td><td>DP Flowmeter</td></tr>
<tr><td>Period of utilisation</td><td colspan="3">Commissioning to 20/12/2019</td></tr>
<tr><td>Accuracy</td><td colspan="2">0.2%</td><td>0.2%</td></tr>
<tr><td>Calibration frequency</td><td colspan="3">At least once in three years</td></tr>
<tr><td rowspan="2">Calibration</td><td>Calibration dates</td><td>Validity as per the certificates</td><td>Calibration dates</td><td>Validity as per the certificates</td></tr>
<tr><td>25/03/2014, 09/10/2016, 30/03/2019</td><td>24/03/2015, 08/10/2017, 29/03/2020</td><td>26/03/2014, 09/10/2016, 30/03/2019</td><td>24/03/2015, 08/10/2017, 29/03/2020</td></tr>
</table>

There was replacement of two equipment for flaring system, the management team has decided to replace such equipment in order to keep up with the meter performance and the replacement was conduct on 20/12/2019.
<table>
<tr><td>Manufacturer</td><td>Siemens new PT</td><td>Siemens new DP</td></tr>
<tr><td>Model</td><td>7MF4033-1BA10-2AC1</td><td>7MF4433-1BA22-2AC1-Z</td></tr>
<tr><td>Serial Number</td><td>N1K4039000038</td><td>N1K4039120024</td></tr>
<tr><td>Equipment type</td><td>Pressure transmitter</td><td>DP flow meter</td></tr>
<tr><td>Period of utilisation</td><td colspan="2">20/12/2019 to present</td></tr>
<tr><td>Accuracy</td><td>0.2%</td><td>0.2%</td></tr>
<tr><td>Calibration frequency</td><td colspan="2">At least once in three years</td></tr>
<tr><td>Latest Calibration</td><td>26/11/2019</td><td>26/11/2019</td></tr>
<tr><td>Validity of calibration as per the certificates</td><td>25/11/2020</td><td>25/11/2020</td></tr>
</table>

<table>
<tr><td>Manufacturer</td><td>DYWER</td></tr>
<tr><td>Model</td><td>659RTD-1</td></tr>
<tr><td>Serial number</td><td>N/A</td></tr>
<tr><td>Period of utilisation</td><td>Commissioning to present</td></tr>
<tr><td>Accuracy</td><td>0.2%</td></tr>
<tr><td>Calibration frequency</td><td>At least once in three years</td></tr>
<tr><td>Calibration date</td><td>Validity as per the certificates</td></tr>
<tr><td>27/03/2014, 09/10/2016, 30/03/2019</td><td>26/03/2015 08/10/2017, 29/03/2020</td></tr>
</table>
</td></tr>
<tr><td>Measuring/reading/recording frequency</td><td>The biogas flow, temperature and pressure were measured continuously using calibrated volumetric flow meters, and a cumulative normalised flow (Nm^3) of the biogas was calculated continuously by a flow meter or flow calculator.</td></tr>
<tr><td>Calculation method (if applicable)</td><td>N/A</td></tr>
<tr><td>QA/QC procedures</td><td>The meters would undergo maintenance/calibration as per the manufacturer’s specifications, or at least once every three years.</td></tr>
<tr><td>Purpose of data/parameter</td><td>Calculation of baseline and project emissions</td></tr>
<tr><td>Additional comments</td><td>The calibration gap has been identified from the validity of the calibration certificates. Calibration gap are from 24/03/2015 to 09/10/2016 and 08/10/2017 to 30/03/2019. The maximum error as found in the calibration certificates of 2.75% has been applied to the monitoring data of 24/03/2015 to 09/10/2016, while the maximum error of the equipment specification of 0.2% has been applied to the monitoring data during the 08/10/2017 to 30/03/2019.
The lower value has been used for the baseline emission, while the higher value is used for the project emission calculation. This is conservative.</td></tr>
</table>

<table>
<tr><td>Data/Parameter</td><td>$w_{CH4,y}$</td></tr>
<tr><td>Unit</td><td>%</td></tr>
<tr><td>Description</td><td>Methane content in biogas in the year y</td></tr>
<tr><td>Measured/calculated/ default</td><td>Measured</td></tr>
<tr><td>Source of data</td><td>Continuous analyzer</td></tr>
<tr><td>Value(s) of monitored parameter</td><td>
<table>
<tr><th rowspan="2">Monitoring period</th><th colspan="2">Monitored value</th></tr>
<tr><td>Gas engine</td><td>Before flaring</td></tr>
<tr><td>15/05/2015 to 31/12/2015</td><td>64%</td><td>68%</td></tr>
<tr><td>01/01/2016 to 31/12/2016</td><td>65%</td><td>69%</td></tr>
<tr><td>01/01/2017 to 31/12/2017</td><td>65%</td><td>68%</td></tr>
<tr><td>01/01/2018 to 31/12/2018</td><td>62%</td><td>Data package incomplete</td></tr>
<tr><td>01/01/2019 to 31/12/2019</td><td>63%</td><td>68%</td></tr>
</table>
</td></tr>
<tr><td>Monitoring equipment</td><td>There were two meters’ location at the project activity; one at the gas engine and before flaring. Both meters were replaced due to the management team’s decision in keeping up its performance.

For the meter implemented before flaring, the meter detail is as follows;
<table>
<tr><td>Manufacturer</td><td>Edinburg Sensor (old)</td></tr>
<tr><td>Model</td><td>200950</td></tr>
<tr><td>Serial Number</td><td>5320</td></tr>
<tr><td>Equipment type (if applicable)</td><td>Continuous analyzer</td></tr>
<tr><td>Period of utilisation</td><td>Commissioning to 19/12/2019</td></tr>
<tr><td>Accuracy</td><td>+/- 0.2%[17]</td></tr>
<tr><td>Calibration frequency</td><td>At least once in three years</td></tr>
<tr><td>Calibration date</td><td>Validity as per the certificates</td></tr>
<tr><td>10/12/2013,
24/11/2016,
30/03/2019</td><td>09/12/2014
23/11/2017
29/03/2020</td></tr>
</table>
<table>
<tr><td>Manufacturer</td><td>Edinburg Sensor (new)</td></tr>
<tr><td>Model</td><td>200960</td></tr>
<tr><td>Serial Number</td><td>13753</td></tr>
<tr><td>Equipment type (if applicable)</td><td>Continuous analyzer</td></tr>
<tr><td>Period of utilisation</td><td>19/12/2019 to present</td></tr>
<tr><td>Accuracy</td><td>+/- 0.2%[18]</td></tr>
<tr><td>Calibration frequency</td><td>At least once in three years</td></tr>
<tr><td>Calibration date</td><td>Validity as per the certificates</td></tr>
<tr><td>24/04/2018
30/03/2019</td><td>23/04/2019
29/03/2020</td></tr>
</table>
</td></tr>
</table>

[17] https://edinburghsensors.com/products/gas-monitors/guardian-ng/
[18] https://edinburghsensors.com/products/gas-monitors/guardian-ng/

<table>
<tr><td></td><td>The detail of meter implemented at gas engine is as follows.

<table>
<tr><td>Manufacturer</td><td>Edinburg Sensor (old)</td></tr>
<tr><td>Model</td><td>200950</td></tr>
<tr><td>Serial Number</td><td>6737</td></tr>
<tr><td>Equipment type (if applicable)</td><td>Continuous analyzer</td></tr>
<tr><td>Period of utilisation</td><td>Commissioning to 19/12/2019</td></tr>
<tr><td>Accuracy</td><td>+/- 0.2%</td></tr>
<tr><td>Calibration frequency</td><td>Atleast once in three years</td></tr>
<tr><td>Calibration date</td><td>Validity as per the certificates</td></tr>
<tr><td>10/12/2013,
24/11/2016</td><td>09/12/2014
23/11/2017</td></tr>
</table>

<table>
<tr><td>Manufacturer</td><td>Edinburg Sensor (new)</td></tr>
<tr><td>Model</td><td>200960</td></tr>
<tr><td>Serial Number</td><td>16810</td></tr>
<tr><td>Equipment type (if applicable)</td><td>Continuous analyzer</td></tr>
<tr><td>Period of utilisation</td><td>19/12/2019 to present</td></tr>
<tr><td>Accuracy</td><td>+/- 0.2%</td></tr>
<tr><td>Calibration frequency</td><td>Atleast once in three years</td></tr>
<tr><td>Latest Calibration</td><td>26/11/2019</td></tr>
<tr><td>Validity of calibration as per the certificates</td><td>25/11/2020</td></tr>
</table>
</td></tr>
<tr><td>Measuring/reading/recording frequency</td><td>Measured with a continuous analyzer or, alternatively, with periodical measurements at a 90/10 confidence/precision level. The recording has been done on a daily basis.</td></tr>
<tr><td>Calculation method
(if applicable)</td><td>N/A</td></tr>
<tr><td>QA/QC procedures</td><td>The analyzer underwent maintenance/calibration as per the manufacturer’s specifications, but at least once every three years.</td></tr>
<tr><td>Purpose of data/parameter</td><td>Calculation of baseline and project emissions</td></tr>
<tr><td>Additional comments</td><td>The methane content for the baseline calculation has been selected from the instrument implemented at the gas engine. Since the main purpose of the biogas was to be utilized for electricity generation. These approaches are consistent with the methodology as the measurement directly measured methane content before flaring and was carried out close to a location in the system where biogas flow measurement taken place.

In year 2016 & 2018 the methane recording were done periodical. The 90/10 confidence/precision level has been applied to the monitored value. The lower value was selected for the baseline emission calculation, while higher value was selected for the project emission.

The calibration gaps have also been identified as below.
Methane analyzer before flaring:
The calibration gap has been identified from 10/12/2014 to 24/11/2016 and 24/11/2017 to 19/12/2019. The maximum permissible of 0.2% as per equipment specification has been applied to the average value of the monitoring data.
Methane analyzer at the gas engine:
The calibration gap has been identified from 10/12/2014 to 24/11/2016 and 24/11/2017 to 19/12/2019. The maximum permissible error of 0.2% has been applied to the average value of the monitoring data.
The higher value was selected for the project emission calculation. This is conservative.</td></tr>
</table>

Data/Parameter	**T_{flare}**
Unit	°Celsius

<table>
<tr><td>Description</td><td>Temperature in the exhaust gas of the flare</td></tr>
<tr><td>Measured/calculated/ default</td><td>Measured</td></tr>
<tr><td>Source of data</td><td>Thermocouple in the enclosed flare; Type N</td></tr>
<tr><td>Value(s) of monitored parameter</td><td>
<table>
<tr><th>Monitoring period</th><th>Monitored value</th></tr>
<tr><td>15/05/2015 to 31/12/2015</td><td>Data package incomplete</td></tr>
<tr><td>01/01/2016 to 31/12/2016</td><td>Data package incomplete</td></tr>
<tr><td>01/01/2017 to 31/12/2017</td><td>Data package incomplete</td></tr>
<tr><td>01/01/2018 to 31/12/2018</td><td>Data package incomplete</td></tr>
<tr><td>01/01/2019 to 31/12/2019</td><td>Data package incomplete</td></tr>
</table>
</td></tr>
<tr><td>Monitoring equipment</td><td>Upper
<table>
<tr><td>Manufacturer</td><td>Autonics</td></tr>
<tr><td>Model</td><td>TK4S-ACN</td></tr>
<tr><td>Equipment type (if applicable)</td><td>Type N</td></tr>
<tr><td>Period of utilization</td><td>Commissioning to present</td></tr>
<tr><td>Accuracy</td><td>0.5%[19]</td></tr>
<tr><td>Calibration date</td><td>Validity as per the certificates</td></tr>
<tr><td>09/10/2016,
27/09/2017,
16/07/2018,
30/03/2019</td><td>08/10/2017
26/09/2018
15/06/2019
29/03/2020</td></tr>
</table>
Lower
<table>
<tr><td>Manufacturer</td><td>Autonics</td></tr>
<tr><td>Model</td><td>TK4S-ACN</td></tr>
<tr><td>Equipment type (if applicable)</td><td>Type N</td></tr>
<tr><td>Period of utilization</td><td>Commissioning to present</td></tr>
<tr><td>Accuracy</td><td>0.5%</td></tr>
<tr><td>Calibration date</td><td>Validity as per the certificates</td></tr>
<tr><td>09/10/2016,
27/09/2017,
16/07/2018,
30/03/2019</td><td>08/10/2017,
26/09/2018
15/06/2019
29/03/2020</td></tr>
</table>
</td></tr>
<tr><td>Measuring/reading/recording frequency</td><td>The temperature of the exhaust gas stream in the flare was measured by a Type N thermocouple. A temperature above 500 ºC indicates that a significant amount of gas is still being burnt and that the flare is operating.</td></tr>
<tr><td>Calculation method (if applicable)</td><td>N/A</td></tr>
<tr><td>QA/QC procedures</td><td>Thermocouples should be replaced or calibrated every year.</td></tr>
<tr><td>Purpose of data/parameter</td><td>N/A</td></tr>
<tr><td>Additional comments</td><td>The value was mentioned as “data package incomplete” because the plant could not measure temperature in the exhaust gas of the flare in accordant with “Tool to determine project emissions from flaring gases containing methane, (Version 1, EB 28)” The flare efficiency was chosen as “0%” for the whole monitoring period. This approach is conservative.</td></tr>
</table>

Data/Parameter	$\eta_{flare,h}$
Unit	%
Description	Flare efficiency in hour, h
Measured/calculated/ default	Default
Source of data	N/A

[19] https://autonics.se/wp-content/uploads/2018/03/tk_en_manual_170829_hw.pdf

Value(s) of monitored parameter	<table><tr><th>Monitoring period</th><th>Monitored value</th></tr><tr><td>15/05/2015 to 31/12/2015</td><td>0</td></tr><tr><td>01/01/2016 to 31/12/2016</td><td>0</td></tr><tr><td>01/01/2017 to 31/12/2017</td><td>0</td></tr><tr><td>01/01/2018 to 31/12/2018</td><td>0</td></tr><tr><td>01/01/2019 to 31/12/2019</td><td>0</td></tr></table>
Monitoring equipment	N/A
Measuring/reading/recording frequency	Default flare efficiency for enclosed flare was estimated based on hourly flaring efficiency: • 0% if the temperature in the exhaust gas of the flare (T_{flare}) is below 500 °C for more than 20 minutes during the hour h. • 50%, if the temperature in the exhaust gas of the flare (T_{flare}) is above 500 °C for more than 40 minutes during the hour h, but the manufacturer's specifications on proper operation of the flare are not met at any point in time during the hour h. • 90%, if the temperature in the exhaust gas of the flare (T_{flare}) is above 500 °C for more than 40 minutes during the hour h and the manufacturer's specifications on proper operation of the flare are met continuously during the hour h. Since there is no monitoring data of temperature in hour, the flare efficiency of 0% is selected. This is conservative and it is as per "Tool to determine project emissions from flaring gases containing methane (Version 1, EB 28)"
Calculation method (if applicable)	N/A
QA/QC procedures	N/A
Purpose of data/parameter	Calculation of baseline and project emissions
Additional comments	-

Data/Parameter	**$S_{final,PJ,y}$**
Unit	tonnes
Description	End use of final sludge from the digester system
Measured/calculated/ default	Measured
Source of data	Records/ log sheet
Value(s) of monitored parameter	<table><tr><th>Monitoring period</th><th>Monitored value</th></tr><tr><td>15/05/2015 to 31/12/2015</td><td>529.74</td></tr><tr><td>01/01/2016 to 31/12/2016</td><td>876.24</td></tr><tr><td>01/01/2017 to 31/12/2017</td><td>1,037.73</td></tr><tr><td>01/01/2018 to 31/12/2018</td><td>1,908.22</td></tr><tr><td>01/01/2019 to 31/12/2019</td><td>1,069.17</td></tr></table>

<table>
<tr><td>Monitoring equipment</td><td>
<table>
<tr><td>Manufacturer</td><td>Avery</td></tr>
<tr><td>Model</td><td>ZM305</td></tr>
<tr><td>Serial number</td><td>007242</td></tr>
<tr><td>Period of utilization</td><td>Commissioning to present</td></tr>
<tr><td>Accuracy</td><td>+/- 10kg</td></tr>
<tr><td>Calibration frequency</td><td>Annually</td></tr>
<tr><td>Calibration date</td><td>Validity as per the certificates</td></tr>
<tr><td>22/04/2015,
19/04/2016,
20/04/2017,
16/05/2018,
01/02/2020</td><td>21/04/2016
18/04/2017
19/04/2018
15/05/2019
31/01/2021</td></tr>
</table>
</td></tr>
<tr><td>Measuring/reading/recording frequency</td><td>The sludge removed periodically from the digester was sent to the palm plantation as soil application and applied in a thin layer under aerobic conditions. Records of when sludge was removed and where the sludge was applied have been kept.</td></tr>
<tr><td>Calculation method
(if applicable)</td><td>N/A</td></tr>
<tr><td>QA/QC procedures</td><td>-</td></tr>
<tr><td>Purpose of data/parameter</td><td>-</td></tr>
<tr><td>Additional comments</td><td>In any event of removal of sludge and soil application, the process was monitored to ensure aerobic conditions. Eventhough there was calibration gap, but there was no use of the quantity of end use sludge in the emission reduction calculation. Thus, the calibration gap does not affect the calculation.</td></tr>
</table>

D.3. Implementation of sampling plan

>> There is no sampling plan. This is not applicable for the project activity.

SECTION E. Calculation of emission reductions or net anthropogenic removals

E.1. Calculation of baseline emissions or baseline net removals

>> Baseline emissions are calculated as follows;

$BE_y = \{BE_{power,y} + BE_{ww,treatment,y} + BE_{s,treatment,y} + BE_{ww,discharge,y} + BE_{s,final,y}\}$		
Parameter	**Description**	**Unit**
BE_y	Baseline emissions in year *y*	tCO_2e
$BE_{power,y}$	Baseline emissions from electricity or fuel consumption in year *y*	tCO_2e
$BE_{ww,treatment,y}$	Baseline emissions of the wastewater treatment systems affected by the project activity in year *y*	tCO_2e
$BE_{s,treatment,y}$	Baseline emissions of the sludge treatment systems affected by the project activity in year *y*	tCO_2e
$BE_{ww,discharge,y}$	Baseline methane emissions from degradable organic carbon in treated wastewater discharged to plantation for land irrigation in year *y*	tCO_2e
$BE_{s,final,y}$	Baseline methane emissions from anaerobic decay of the final sludge produced in year y. Since the sludge was used for soil application in the baseline scenario, this term has been ignored.	tCO_2e

(a) Baseline emissions from electricity consumption ($BE_{power,y}$)

The treatment systems (anaerobic ponds, aerobic ponds, settling ponds, polishing plant) affected by project activity biogas recovery would continue to operate with the same operational characteristics as in the baseline scenario. Furthermore, power supply to the baseline wastewater treatment system is from the mill's biomass boiler. Thus, the baseline electricity consumption,

$BE_{power,y} = 0$.

(b) Baseline emissions of the wastewater treatment systems affected by the proposed project activity ($BE_{ww,treatment,y}$)

The baseline treatment systems consist of anaerobic ponds and aerobic ponds.

The MCF for baseline aerobic wastewater treatment is zero, for well managed aerobic ponds (Table III.H.1. of AMS-III.H, Version 16.0). Therefore, the baseline emissions from the aerobic wastewater treatment = 0.

The baseline emissions of the anaerobic wastewater treatment systems are determined as:

$BE_{ww,treatment,y} = (Q_{ww,,y} * COD_{inflow,y} * \eta_{COD,BL} * MCF_{ww,treatment,BL,}) * B_{o,ww} * UF_{BL} * GWP_{CH4}$		
Parameter	**Description**	**Unit**
$BE_{ww,treatment,y}$	Baseline emissions of the wastewater treatment systems affected by the project activity in year y	tCO_2e
$Q_{ww,y}$	Volume of wastewater treated in baseline wastewater treatment system i in year y.	m^3
$COD_{inflow,y}$	Chemical oxygen demand of the wastewater inflow to the baseline anaerobic treatment system (System-anaerobic) in year y. Average value was used through sampling with the confidence/ precision level 90/10.	t/m^3
$\eta_{COD,BL}$	COD removal efficiency of the baseline anaerobic treatment system (System-anaerobic – 98%), determined as per the paragraphs 26, 27 or 28 in AMS III.H (Version 16).	%
$MCF_{ww,treatment,BL}$	Methane correction factor for baseline wastewater treatment systems (System-anaerobic - 0.8)	
$B_{o,ww}$	Methane producing capacity of the wastewater (0.25)	tCH_4/ tCOD
UF_{BL}	Model correction factor to account for model uncertainties (0.89)	
GWP_{CH4}	Global Warming Potential of methane (25)	tCO_2/ tCH_4

(c) Baseline emissions of the sludge treatment systems affected by the project activity ($BE_{treatment,s,y}$)

The baseline scenario does not involve sludge treatment. Therefore, on this basis $BE_{treatment,s,y} = 0$.

(d) Baseline methane emissions from degradable organic carbon in treated wastewater discharged into sea/river/lake in year y ($BE_{ww,discharge,y}$)

The baseline scenario, the final treated wastewater is used for land irrigation which indicates well managed aerobic treatment. Therefore, on this basis $BE_{ww,\ discharge,y} = 0$.

(e) Baseline methane emissions from anaerobic decay of the final sludge produced ($BE_{s,final.y}$)

In the baseline scenario, sludge is periodically removed from the anaerobic open ponds and sent to the plantation for soil application. All sludge removed is used for soil application under aerobic conditions. Therefore, on this basis $BE_{s,final,y} = 0$.

As per equation 16 in AMS III.H. (Version 16.0), in case of flaring/combustion, MD_y was measured using the conditions of the flaring process:

$MD_y = BG_{burnt,y} * w_{CH4,y} * D_{CH4,} * FE * GWP_{CH4}$		
Parameter	**Description**	**Unit**
MD_y	Methane captured and destroyed/gainfully used by the project activity in year y	tCO_2e
$BG_{burnt,y}$	Amount of biogas fuelled or flared in year y	m^3
$w_{CH4,y}$	Methane content in the biogas in the year y	%
D_{CH4}	Density of methane at the temperature and pressure of the biogas in the year y (0.00072)	ton/m^3

FE	Flare efficiency in year y (fraction). In the case that biogas is destructed for gainful purpose, e.g., fed to the engine, an efficiency of 100% is to be applied. $DE_{gas\ engine/\ boiler}$ = 100% FE_{flare} = 0%	%
GWP_{CH4}	Global Warming Potential of methane (25)	tCO_2/tCH_4

Table of calculation of baseline emissions (tCO_2e)

Baseline emissions	**2015**	**2016**	**2017**	**2018**	**2019**
	15/05 to 31/12	**01/01 to 31/12**	**01/01 to 31/12**	**01/01 to 31/12**	**01/01 to 31/12**
$BE_{power,y}$	0	0	0	0	0
$BE_{ww,treatment,y}$	23,849	36,495	46,140	44,843	27,374
$BE_{s,treatment,y}$	0	0	0	0	0
$BE_{ww,discharge,y}$	0	0	0	0	0
$BE_{s,final,y}$	0	0	0	0	0
BE_y [20]	**23,849**	**36,495**	**46,140**	**44,843**	**27,374**
MD_y	**17,637**	**23,304**	**33,282**	**23,952**	**37,991**

E.2. Calculation of project emissions or actual net removals

>> As per AMS-III.H. (Version 16) project emissions are calculated using the following formula.

$PE_y = \{PE_{power,y} + PE_{ww,treatment,y} + PE_{s,treatment,y} + PE_{ww,discharge,y} + PE_{s,final,y} + PE_{fugitive,y} + PE_{biomass,y} + PE_{flaring,y}\}$		
Parameter	**Description**	**Unit**
PE_y	Project activity emissions in the year y	tCO_2e
$PE_{power,y}$	Emissions from electricity or fuel consumption in the year y	tCO_2e
$PE_{ww,treatment,y}$	Methane emissions from wastewater treatment systems affected by the project activity, and not equipped with biogas recovery, in year y	tCO_2e
$PE_{s,treatment,y}$	Methane emissions from sludge treatment systems affected by the project activity, and not equipped with biogas recovery, in year y	tCO_2e
$PE_{ww,discharge,y}$	Methane emissions from degradable organic carbon in treated wastewater in year y	tCO_2e
$PE_{s,final,y}$	Methane emissions from anaerobic decay of the final sludge produced in year y	tCO_2e
$PE_{fugitive,y}$	Methane emissions from biogas release in capture systems in year y	tCO_2e
$PE_{biomass,y}$	Methane emissions from biomass stored under anaerobic conditions	tCO_2e
$PE_{flaring,y}$	Methane emissions due to incomplete flaring in year y as per the "Tool to determine project emissions from flaring gases containing methane" These emissions are accounted for when the flare was in use.	tCO_2e

Project activity emission from fuel consumption ($PE_{power,y}$)

The auxiliary power consumption for project activity is sourced from electricity generated from biogas engine. In the event the electricity generated by the biogas engine is less than the auxiliary power consumption, the remaining electricity would be supplied by the mill.

The mill's primary electricity supply is from biomass turbines. During this monitoring period, the amount of electricity generated by the project activity is more than the electricity consumption.

Therefore, $PE_{power,y}$ = 0.

Methane emissions from wastewater treatment systems affected by the proposed project activity, and not equipped with biogas recovery in the project situation ($PE_{ww,treatment,y}$)

[20] Rounded down to nearest integer

Wastewater treatment systems (aerobic ponds) affected by the project activity that are not equipped with biogas recovery, have continued to be the same as in the baseline scenario. As per Table III.H.1, the MCF values are zero for aerobic treatment (well managed ponds). The implementation of the project activity does not change the operational characteristics of the aerobic ponds.

Therefore, $PE_{ww,treatment,y} = 0$.

Methane emissions from sludge treatment systems affected by the project activity, and not equipped with biogas recovery ($PE_{s,treatment,y}$)

In the proposed project activity sludge from the wastewater ponds has been used for land application which is an aerobic process. Therefore on this basis $PE_{s,treatment,y} = 0$.

Methane emissions from degradable organic carbon in treated wastewater ($PE_{ww, discharge, y}$)

In the project activity, the final treated effluent has been 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 Table III.H.1 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 was sent to the palm plantation as soil application and applied in a thin layer under aerobic conditions.

Therefore, on this basis; $PE_{s,final,y} = 0$.

Methane emissions from biogas release in capture systems ($PE_{fugitive,y}$)

$PE_{fugitive,y} = PE_{fugitive,ww,y} + PE_{fugitive,s,y}$		
Parameter	**Description**	**Unit**
$PE_{fugitive,ww,y}$	Fugitive emissions through capture inefficiencies in the anaerobic wastewater treatment systems in year y	tCO_2e
$PE_{fugitive,s,y}$	Fugitive emissions through capture inefficiencies in the anaerobic sludge treatment systems in year y In the project activity, there is no sludge treatment as sludge was used as fertilizer. Therefore, on this basis $PE_{fugitive,s,y} = 0$.	tCO_2e
$PE_{fugitive,y} = PE_{fugitive,ww,y}$ **$PE_{fugitive,ww,y} = (1\text{-}CFE_{ww}) * MEP_{ww,treatment,y} * GWP_{CH4}$**		
CFE_{ww}	Capture efficiency of the biogas recovery equipment in the wastewater treatment systems	
$MEP_{ww,treatment,y}$	Methane emission potential of wastewater treatment systems equipped with biogas recovery system in year y	tonnes
$MEP_{ww,treatment,y} = Q_{ww,y} * B_{o,ww} * UF_{PJ} * \Sigma_k COD_{removed,PJ,k,y} * MCF_{ww,treatment,PJ,k}$		
$Q_{ww,y}$	Volume of wastewater treated in baseline wastewater treatment system i in year y.	m^3
$COD_{removed,PJ,k,y}$	The chemical oxygen demand removed by the treatment system k of the project activity equipped with biogas recovery in the year y. Average value has been applied with the confidence/ precision level 90/10.	t/m^3
$MCF_{ww,treatment,BL}$	Methane correction factor for the project wastewater treatment system k equipped with biogas recovery equipment (MCF values as per table III.H.1) (0.8)	
$B_{o,ww}$	Methane producing capacity of the wastewater (0.25)	tCH_4/ tCOD
UF_{PJ}	Model correction factor to account for model uncertainties (1.12)	

Methane emissions from biomass stored under anaerobic conditions ($PE_{biomass}$)

Storage of biomass under anaerobic conditions would not take place due to the proposed project activity, therefore on this basis; $PE_{Biomass} = 0$.

Methane emissions due to incomplete flaring ($PE_{flare,y}$)

The main purpose of generated biogas is to be used in the biogas engines for electricity generation. Excess biogas was combusted at biomass boiler system and/or flared using an enclosed flare system. In this situation, any methane emissions that occur due to incomplete flaring would be calculated as per the "Tool to determine project emissions from flaring gases containing methane" (Version 1, EB 28).

The flare installed in the project activity is an enclosed flare. In accordance with section II, step 6 of the "Tool to determine project emissions from flaring gases containing methane" (Version 1, EB28), a default value of 0% efficiency was applied during this monitoring period because the temperature of flare has not been recorded to ensure a conservative approach.

Calculation of annual project emission from flaring

Project emissions from flaring are calculated as the sum of emissions from each hour h, based on the methane flow rate in the residual gas ($TM_{RG,h}$) and the flare efficiency during each hour h ($\eta_{flare,h}$) as follows;

$PE_{flare} = \sum_{h=1}^{8760} TM_{RG,h} * (1-\eta_{flare,h}) * (GWP_{CH4}/1000)$		
Parameter	**Description**	**Unit**
PE_{flare}	Project emission from flaring of methane in the residual gas in year y	tCO_2e
$TM_{RG,}$[21]	Mass flow rate of methane	Nm^3
$\eta_{flare,h}$	Flare efficiency in hour h (0%)	%
GWP_{CH4}	Global Warming Potential of methane (25)	tCO_2/tCH_4
$TM_{RG,h} = FV_{RG,h} * fv_{CH4,RG,h} * \rho_{CH4,n}$		
$FV_{RG,h}$	Volumetric flow rate of the residual gas in dry basis at normal conditions in hour h	m^3/h
$fv_{CH4,RG,h}$	Volumetric fraction of methane in the residual gas on dry basis in hour h	%
$\rho_{CH4,n}$	Density of methane at normal conditions (0.716)	kg/m^3

Table of calculation of project emissions (tCO_2e)

Project emissions	**2015**	**2016**	**2017**	**2018**	**2019**
	15/05 to 31/12	**01/01 to 31/12**	**01/01 to 31/12**	**01/01 to 31/12**	**01/01 to 31/12**
$PE_{power,y}$	0	0	0	0	0
$PE_{ww,treatment,y}$	0	0	0	0	0
$PE_{s,treatment,y}$	0	0	0	0	0
$PE_{ww,discharge,y}$	0	0	0	0	0
$PE_{s,final,y}$	0	0	0	0	0
$PE_{fugitive,y}$	3,335	5,360	6,656	6,594	3,228
$PE_{biomass,y}$	0	0	0	0	0
$PE_{flaring,y}$	69	101	24	0	26
PE_y [22]	**3,404**	**5,461**	**6,680**	**6,594**	**3,254**

[21] Recogized as $BG_{flare,y}$ in the ER calculation sheet
[22] Rounded up to nearest integer

E.3. Calculation of leakage emissions

>> As per AMS-III.H.(Version 16, EB 58), paragraph 31, there is no leakage expected from the proposed project activity as the technology and equipment used is not transferred from another activity.

E.4. Calculation of emission reductions or net anthropogenic removals

	Baseline GHG emissions or baseline net GHG removals (t CO_2e)	Project GHG emissions or actual net GHG removals (t CO_2e)	Leakage GHG emissions (t CO_2e)	GHG emission reductions or net anthropogenic GHG removals (t CO_2e)			
				Before 01/01/ 2013	From 01/01/ 2013 until 31/12/ 2020	From 01/01/ 2021	Total amount
Total	125,549	3,254	0	0	122,295	0	122,295

E.5. Comparison of emission reductions or net anthropogenic removals achieved with estimates in the registered PDD

Amount achieved during this monitoring period (t CO_2e)	Amount estimated ex ante for this monitoring period in the PDD (t CO_2e)
122,295	223,175

E.5.1. Explanation of calculation of "amount estimated ex ante for this monitoring period in the PDD"

>> This first monitoring period spans from 15/05/2015 to 31/12/2019. The calculation of the ex-ante is based on maximum processing capacity of the palm oil mill. The key parameters are the estimated wastewater generation and quantity of COD expected to be generated during this monitoring period. The other assumption follows the same calculation approach described in the registered PRC PDD. The estimated ex ante for this monitoring period is calculated by multiplying the ex-ante amount by 4 years and 231 days in 2015; thus, the estimated ex-ante for this monitoring period is 223,175 tCO_2e

E.6. Remarks on increase in achieved emission reductions

>> The actual GHG emission reductions achieved during this monitoring period are lower than the amount based on the ex-ante estimation in the registered PRC PDD. Thus, this section is not applicable.

E.7. Remarks on scale of small-scale project activity

>> This monitoring period spans from 15/05/2015 to 31/12/2019. The emission reduction achieved by the project activity during this period is 122,295 tCO_2e. The actual emission reduction achieved yearly under this monitoring period remains under the limit of Type III small-scale project activity (60,000 tCO_2e). The following table demonstrates the emission reduction the project has achieved on a yearly basis.

Parameter	Description	Monitoring period	Value
$ER_{y,expost}$	Minimum of biogas recovered and fuelled or flared, and ex-post calculated baseline, project and leakage emissions in tCO_2e based on actual monitored data	15/05/2015 to 31/12/2015	**17,637**
		01/01/2016 to 31/12/2016	**23,304**
		01/01/2017 to 31/12/2017	**33,282**
		01/01/2018 to 31/12/2018	**23,952**
		01/01/2019 to 31/12/2019	**24,120**
		Total	**122,295**

- - - - -

Document information

Version	*Date*	*Description*
08.0	6 April 2021	Revision to: • Reflect the “Clarification: Regulatory requirements under temporary measures for post-2020 cases” (CDM-EB109-A01-CLAR).
07.0	31 May 2019	Revision to: • Ensure consistency with version 02.0 of the “CDM project standard for project activities” (CDM-EB93-A04-STAN); • Add a section on remarks on the observance of the scale limit of small-scale project activity during the crediting period; • Add "changes specific to afforestation or reforestation project activity" as a possible post-registration changes; • Clarify the reporting of net anthropogenic GHG removals for A/R project activities between two commitment periods; • Make editorial improvements.
06.0	7 June 2017	Revision to: • Ensure consistency with version 01.0 of the “CDM project standard for project activities” (CDM-EB93-A04-STAN); • Make editorial improvements.
05.1	4 May 2015	Editorial revision to correct version numbering.
05.0	1 April 2015	Revisions to: • Include provisions related to delayed submission of a monitoring plan; • Provisions related to the Host Party; • Remove reference to programme of activities; • Overall editorial improvement.
04.0	25 June 2014	Revisions to: • Include the Attachment: Instructions for filling out the monitoring report form (these instructions supersede the "Guideline: Completing the monitoring report form" (Version 04.0)); • Include provisions related to standardized baselines; • Add contact information on a responsible person(s)/ entity(ies) for completing the CDM-MR-FORM in A.6 and Appendix 1; • Change the reference number from *F-CDM-MR* to *CDM-MR-FORM*; • Editorial improvement.
03.2	5 November 2013	Editorial revision to correct table in page 1.
03.1	2 January 2013	Editorial revision to correct table in section E.5.
03.0	3 December 2012	Revision required to introduce a provision on reporting actual emission reductions or net GHG removals by sinks for the period up to 31 December 2012 and the period from 1 January 2013 onwards (EB 70, Annex 11).

Version	*Date*	*Description*
02.0	13 March 2012	Revision required to ensure consistency with the "Guidelines for completing the monitoring report form" (EB 66, Annex 20).
01.0	28 May 2010	EB 54, Annex 34. Initial adoption.

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Document Type: Form
Business Function: Issuance
Keywords: monitoring report