Monitoring report form

(Version 05.1)

Complete this form in accordance with the Attachment "Instructions for filling out the monitoring report form" at the end of this form.

MONITORING REPORT		
Title of the project activity	Biogas recovery from wastewater treatment in Hargy Oil Palms Ltd Palm Oil Mill	
UNFCCC reference number of the project activity	9168	
Version number of the monitoring report	01	
Completion date of the monitoring report	01/06/2016	
Monitoring period number and duration of this monitoring period	Monitoring period number-01 Monitoring period-15/09/2014 to 30/04/2016	
Project participant(s)	Hargy Oil Palms Ltd	
Host Party	Papua New Guinea	
Sectoral scope(s)	Sectoral scope 13	
Selected methodology(ies)	Baseline and monitoring methodology applied: AMS-III.H "Methane recovery in wastewater treatment" (version 16)	
Selected standardized baseline(s)	Not applicable	
Estimated amount of GHG emission reductions or net GHG removals by sinks for this monitoring period in the registered PDD	63327 tCO_2e	
Total amount of GHG emission reductions or net GHG removals by sinks achieved in this monitoring period	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
	0 tCO_2e	19105 tCO_2e

SECTION A. Description of project activity

A.1. Purpose and general description of project activity

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The proposed small-scale project activity is the implementation of a sequential stage of anaerobic wastewater treatment system with biogas recovery in a palm oil mill. Both, the palm oil mill as well as the wastewater treatment system with biogas recovery is Greenfield projects. The palm oil mill is located at Barema Mill, Portion 2038, Milinch Ulawun, Foumil Talasea, Bialla District, West New Britain Province, Papua New Guinea. The designed production capacity of the mill is 45 tonnes/hr of fresh fruit bunch ("FFB"). The discharged POME, rich in organic content with Chemical Oxygen Demand (COD) value approximately 65,000 mg/l.

Degradation of organic content in the POME results in the generation of biogas (i.e. methane), which will be emitted into the atmosphere if not recovered. The purpose of the proposed project activity will be to treat the discharged POME in an anaerobic digester and to recover the biogas (i.e. methane), which would have otherwise been emitted to the atmosphere. The recovered biogas will be combusted by use in a boiler with any excess being flared (using open flaring). The use of the biogas is not part of the CDM project activity.

The construction for project activity started in August 2013, commissioning started in June 2014 and project become operational on 01/09/2015. The project was operational during current monitoring period i.e. from 15/09/2014 to 30/04/2016 the total quantity of POME treated during this verification period is 90691 m^3, which results to a net emission reduction of **19105**tCO_2e.

A.2. Location of project activity

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The Project Activity site located at Barema Mill, Portion 2038, Milinch Ulawun, Foumil Talasea, Bialla District, West New Britain Province, Papua New Guinea. The GPS coordinates of the project activity is as follows –

Latitude: 5°12' 39"S
Longitude: 151°07' 50" E

A.3. Parties and project participant(s)

Party involved ((host) indicates a host Party)	Private and/or public entity(ies) project participants (as applicable)	Indicate whether the Party involved wishes to be considered as project participant (yes/no)
Indonesia (host)	Private entity- Hargy Oil Palms Ltd	No
Australia	Private entity- Perenia Pty Ltd	No

A.4. Reference of applied methodology and standardized baseline

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The baseline and monitoring of this project activity is based on the following approved methodology, guidelines and tools:

***Methodology: AMS-III.H (version 16)**: "Methane recovery in wastewater treatment"*

Tools:

- *General guidelines for SSC CDM methodologies (Version 19.0);*
- *Tool to determine project emissions from flaring gases containing methane (EB 28, Annex 13)*

- *Tool to calculate baseline, project and/or leakage emissions from electricity consumption (EB 39, Annex 7)*

A.5. Crediting period of project activity

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This project activity has considered renewable crediting period of 3x7 years. The start date of the crediting period is from 15/09/2014 to 14/09/2021.

A.6. Contact information of responsible persons/entities

>>
Hargy Oil Palms Ltd, also a project participant; please see the contact details in Appendix-I.

SECTION B. Implementation of project activity

B.1. Description of implemented registered project activity

>>
The technology used in the project activity is from India and comprises of 3 (three) sub-activities:

. Upstream activities
. CDM project activity
. Downstream activities

The upstream activities involve (a) stabilization of the POME's flow, (b) cooling of the POME and (c) removal of suspended solids and emulsified oil. The purpose of these upstream activities is to prepare the POME for the subsequent process in the anaerobic digester. There will be no COD reduction in these upstream activities. The pre-treated POME is then be passed on to the CDM project activity sub-activity which comprises of an anaerobic digester.

ANAEROBIC CSTR REACTOR

It is non-media, Continuously Stirrer Tank Reactor. It is mesophillic reactor i.e. it operates best in temp range of 36 – 39 ^{O}C. In reactor the raw waste is introduced from top of the reactor. The recycled sludge is also introduced from the top of the reactor. This mixed liquor travels downward through the central shaft. In this central shaft, agitator provides adequate mixing of raw waste and recycled sludge. From central shaft liquor enters reactor near bottom of tank.

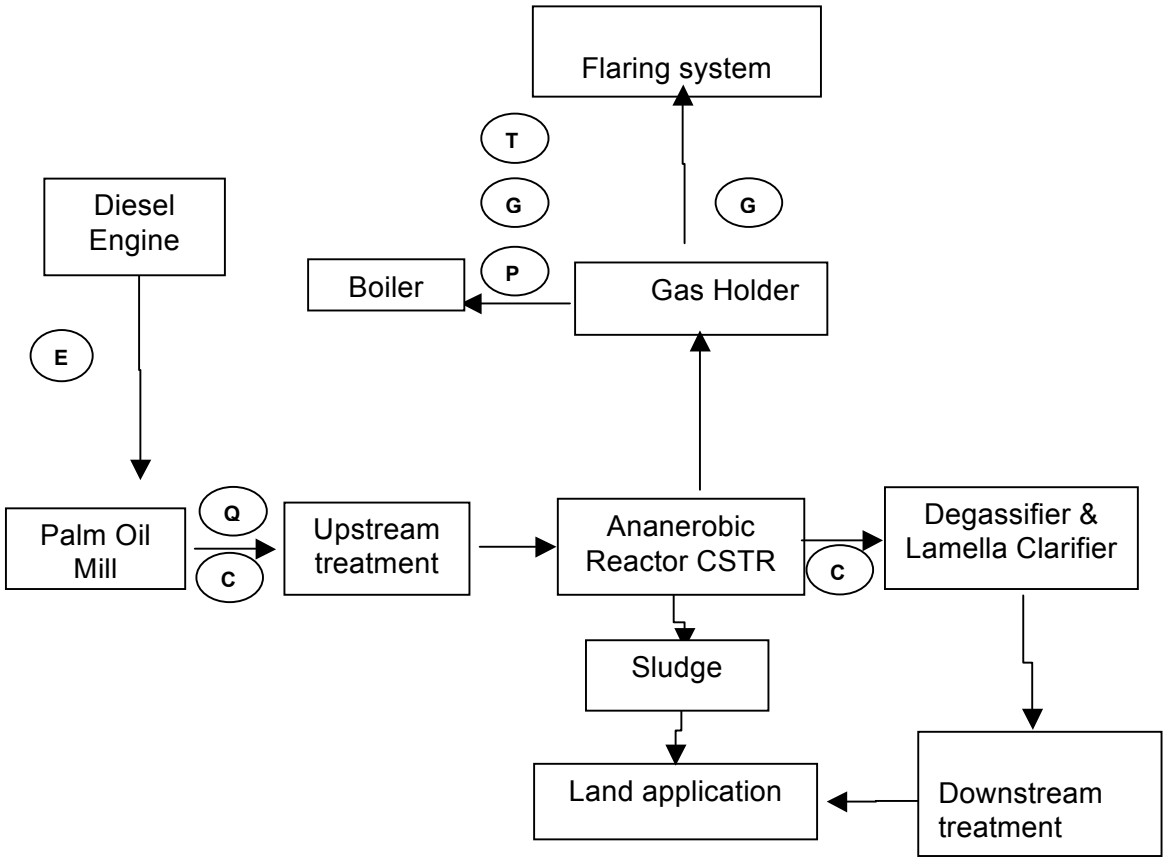
The solids are separated from the outlet of reactor in Lamella Clarifier and returned to the system by recirculation pumps. This recirculation of settled solids helps to maintain adequate population of active bacteria inside reactor.

The biogas produced by anaerobic digestion inside the reactor is collected from reactor roof. Biogas is then transferred to floating type gas holder. Biogas is then conveyed to blower for further utilization in boiler or biogas engines.

The specification of the anaerobic digester to be used in the project activity is as follows:

Model	: LESAR reactor
Digester type	: Continuously Stirrer Tank Reactor
Volume	: 5,648 m^3
Hydraulic retention time	: 10.5 days
Operating temperature	: 36-39^{o}C
Volume of biogas	: 0.5 ± 5% m^3/kg COD removed
Expected biogas CH_4 composition	: 60% methane
Design COD removal efficiency	: 85 %
Operational lifetime	: 20 years

The overall process flow diagram applied in the proposed project are shown in the figure below –



Process Flow Diagram

Q = Flow meter

G = Biogas Flow meter

T = Temp

P = Pressure

E = Electric meter

C = COD

The recovered biogas from the project activity is combusted together with biomass in a boiler. In case there is any excess of biogas, is flared in an open flare system.

The project activity was shut down for 220 days during current monitoring period for various reasons.

Except above mention details, the project activity was operational with scheduled operation and maintenance. The construction for project activity started in August 2013, commissioning started in June 2014 and the project activity has been commissioned on 01/09/2014.

B.2. Post-registration changes

B.2.1. Temporary deviations from registered monitoring plan, applied methodology or applied standardized baseline

>>
No temporary deviation taken place from registered monitoring plan or applied approved methodology during current monitoring period.

B.2.2. Corrections

>>
No corrections are applied in the registered PDD in this monitoring period.

B.2.3. Changes to start date of crediting period

>>
The crediting period start date has been changed from 30/11/2013 to 15/09/2014.

B.2.4. Inclusion of a monitoring plan to the registered PDD that was not included at registration

>>
There is no inclusion of monitoring plan to registered PDD.

B.2.5. Permanent changes from registered monitoring plan, applied methodology or applied standardized baseline

>>
There are no permanent changes from registered monitoring plan during current monitoring period.

B.2.6. Changes to project design of registered project activity

>>
There is no change in project design of registered project activity during current monitoring period.

B.2.7. Types of changes specific to afforestation or reforestation project activity

>>
Not applicable as the project activity is not an afforestation or reforestation project activity.

SECTION C. Description of monitoring system

>>
The PP has assigned operational team of the palm oil mill for data monitoring, archiving and analyzing and is reported to the plant's management team.

There is an operational and management team, which is responsible to operate and maintain the wastewater treatment system and implement the monitoring plan.

The team is responsible for daily monitoring of the processes in accordance to the quality assurance and control of each parameter as per the monitoring plan. In addition, a technician responsible in recording the monitored data and report any abnormalities to plant manager on daily basis. The aggregated monitored and recorded data will be stored electronically and in hard copy format up to 2 years after the end of crediting period or the last issuance of CERs, whichever is later. The monitored and recorded data is used and presented to DOE during CERs verification. The plant manager has reviewed the work performed by the technician and making final reporting to the management of the PP.

Quality assurance and quality control
Calibration has been carried out in accordance with the equipment manufacturer's recommendation as applicable depending upon the nature of the measurement equipment. There are measurement equipments, which need not be recalibrated during their entire life span. PP will take responsibility for the quality assurance and quality control for recording, maintaining and archiving all the data by appointing consultants and/or technical support team to carry out the system analysis, equipment calibration and overall maintenance on a regular basis throughout the crediting period. PP has provided necessary training on data monitoring and recording to all the staff personnel involved in the monitoring process, in order to improve the efficiency of their work.

Emergency procedure
PP has implement an Emergency Procedure in the plant, for which a detailed manual being developed. The manual contains instructions on how to handle an emergency situation in the plant, and measures to be taken to ensure that there is no unintended methane leakage from the system. All the plant operators have been familiarized on the procedure.

SECTION D. Data and parameters

D.1. Data and parameters fixed ex ante or at renewal of crediting period

Data/parameter:	**$MCF_{ww,treatment,BL,i}$**
Unit	Fraction
Description	Methane correction factor for baseline wastewater treatment system i
Source of data	Table III.H.1 in AMS-III.H (version 16)
Value(s) applied)	0.80
Choice of data or measurement methods and procedures	The default value for anaerobic deep lagoons with depth of more than 2 m
Purpose of data	Calculation of baseline emission
Additional comments	--

Data/parameter:	**$B_{o,ww}$**
Unit	kg CH_4/kgCOD
Description	Methane producing capacity of the wastewater
Source of data	Paragraph 19 of AMS-III.H (version 16)
Value(s) applied)	0.25
Choice of data or measurement methods and procedures	IPCC value, as per AMS-III.H (version 16) paragraph 19
Purpose of data	Calculations of baseline and project emissions
Additional comments	--

Data/parameter:	**UF_{BL}**
Unit	Fraction
Description	Model correction uncertainty factor to account for model uncertainties
Source of data	Paragraph 20 of AMS-III.H (version 16)
Value(s) applied)	0.89

Choice of data or measurement methods and procedures	As per paragraph 20 of AMS-III.H (version 16)
Purpose of data	Calculations of baseline emissions
Additional comments	--

Data / Parameter	GWP_{CH4}
Unit	-------
Description	Global warming potential of methane
Source of data	IPCC value as per paragraph 20 of AMS-III.H (version 16)
Value(s) applied	21
Choice of data Or measurement methods and procedures	As per paragraph 20 of AMS-III.H (version-16)
Purpose of data	Calculations of baseline and project emissions
Additional comment	--

Data / Parameter	$\eta_{COD,BL,i}$
Unit	%
Description	COD removal efficiency of the baseline treatment system i
Source of data	COD removal efficiency obtained from the result of the measurement campaign in a comparable wastewater treatment unit in Papua New Guinea, treating the same type of wastewaters (i.e. POME) as the project activity (i.e. Hargy Mill).
Value(s) applied	95.84
Choice of data Or measurement methods and procedures	The data has been determined (please refer to Annex-3) in line with the requirements of paragraph 28 (2) (a) of the baseline and monitoring methodology AMS-III.H (version 16).
Purpose of data	Calculations of baseline emissions
Additional comment	--

Data / Parameter	**DF**
Unit	--
Description	10-day measurement campaign factor to account for the uncertainty range (30% to 50%)
Source of data	As per AMS-III.H (version 16) paragraph 27
Value(s) applied	0.8
Choice of data Or measurement methods and procedures	In line with the requirement of the baseline monitoring methodology
Purpose of data	Calculations of project emissions
Additional comment	--

Data / Parameter	$MCF_{ww,treatment\ PJ,k}$
Unit	--
Description	Methane correction factor for project wastewater treatment system k
Source of data	Table 6.8 of Volume 5 Chapter 6 IPCC 2006 guideline

Value(s) applied	0.8
Choice of data Or measurement methods and procedures	The project activity wastewater treatment system is an anaerobic digester
Purpose of data	Calculations of project emissions
Additional comment	--

Data / Parameter	**UF_{PJ}**
Unit	--
Description	Model correction to account for model uncertainties
Source of data	Paragraph 30 of AMS-III.H (version 16)
Value(s) applied	1.12
Choice of data Or measurement methods and procedures	As per paragraph 30 of AMS-III.H (version 16)
Purpose of data	Calculations of project emissions
Additional comment	--

Data / Parameter	**ρ_{CH4}**
Unit	Kg/m^3
Description	Density of methane at normal conditions
Source of data	Page 9 of tool to determine project emissions from flaring gases containing methane (EB 28, Annex13)
Value(s) applied	0.716
Choice of data Or measurement methods and procedures	As per page 9 of the Tool to determine project emissions from flaring gases containing methane (EB 28, Annex13)
Purpose of data	Calculations of project emissions
Additional comment	--

Data / Parameter	**$\eta_{COD,PJ,j}$**
Unit	%
Description	COD removal efficiency of the project treatment system j.
Source of data	The COD removal efficiency is obtained from the supplier of the anaerobic digester.
Value(s) applied	85
Choice of data Or measurement methods and procedures	--
Purpose of data	Calculations of Project emissions
Additional comment	--

Data / Parameter	$EF_{EL,j,y}$
Unit	tCO2/MWh
Description	Emission factor for electricity generation for source j in year y, where j is the source of electricity consumption in the project

Source of data	Default value under option B2 of the "Tool to calculate baseline, project and/or leakage emissions from electricity consumption" (EB 39, Annex 7)
Value(s) applied	1.3
Choice of data Or measurement methods and procedures	This is in line with the baseline and monitoring methodology AMS-III.H (version 16).
Purpose of data	Calculations of Project emissions
Additional comment	--

Data / Parameter	η_{flare}
Unit	-
Description	Flare efficiency
Source of data	Default value for open flaring as per "Tool to determine project emissions from flaring gases containing methane"
Value(s) applied	0.5, if flare is detected for at least 20 minutes during an hour 0, otherwise
Choice of data Or measurement methods and procedures	The flaring system used in the project activity is open flaring. Default value of 50% flare efficiency can be used if the flare is detected for at least 20 minutes during an hour. Otherwise, the default efficiency to be considered as 0%.
Purpose of data	Calculation of project emissions
Additional comment	Flare detector will be installed and monitored in the project scenario.

D.2. Data and parameters monitored

Data/parameter:	$\mathbf{Q_{ww,i,y}}$
Unit	m^3
Description	Monthly volume of untreated wastewater entering (inflow) the anaerobic digester in project activity
Measured/calculated/default	Measured
Source of data	Measurements undertaken using flow meter.
Value(s) of monitored parameter	121298
Monitoring equipment	Measurements are undertaken by using flow meter at inlet of the anaerobic digester.
Measuring/reading/recording frequency:	Continuous monitoring, Hourly measurement, Monthly recording
Calculation method (if applicable):	Not applicable
QA/QC procedures:	The flowt is monitored continuously and based on hourly reading aggregated daily and monthly values. Calibration of the flow meters is conducted as specified by manufacturer i.e. once in 3 years.
Purpose of data:	Calculation of baseline emission
Additional comments:	Data will be archived for 2 years from the end of the crediting period or the last request for issuance whichever is later.

Data/parameter:	$COD_{untreated,i,y}$
Unit	$tCOD/m^3$
Description	Chemical Oxygen Demand of the wastewater entering the Anaerobic Digester
Measured/calculated/default	Calculated
Source of data	Representative Sampling by PP
Value(s) of monitored parameter	0.071655
Monitoring equipment	The measurement of COD is conducted as per standard practice. The COD measured through representative sampling on daily basis. The value has been cross-checked periodically through an accredited laboratory.
Measuring/reading/recording frequency:	Daily reading, monthly aggregation
Calculation method (if applicable):	The data is recorded on daily basis and monthly average has been taken for calculation of emission reduction.
QA/QC procedures:	Average value used through sampling with 90/10 confidence/precision level.
Purpose of data:	Calculation of baseline emission
Additional comments:	Data will be archived for 2 years from the end of the crediting period or the last request for issuance whichever is later.

Data/parameter:	$COD_{ww,treated,y}$
Unit	$tCOD/m^3$
Description	Chemical oxygen demand of the treated wastewater leaving the anaerobic digester
Measured/calculated/default	Measured
Source of data	Representative Sampling by PP
Value(s) of monitored parameter	0.013162
Monitoring equipment	The measurement of COD is conducted as per standard practice. The COD measured through representative sampling on daily basis. The value has been cross-checked periodically through an accredited laboratory.
Measuring/reading/recording frequency:	Daily reading, monthly aggregation
Calculation method (if applicable):	The data is recorded on daily basis and monthly average has been taken for calculation of emission reduction.
QA/QC procedures:	Average value used through sampling with 90/10 confidence/precision level.
Purpose of data:	Calculation of baseline emission
Additional comments:	Data will be archived for 2 years from the end of the crediting period or the last request for issuance whichever is later.

Data/parameter:	$F_{V,ih}$
Unit	-
Description	Volumetric fraction of component *i* in the residual gas in the hour *h* where *i* = CH_4
Measured/calculated/default	Measured
Source of data	Measured using a continuous analyser

Value(s) of monitored parameter	70.04
Monitoring equipment	Continuous gas analyser operating in dry-basis. Volumetric flow measurement refer to the actual pressure and temperature
Measuring/reading/recording frequency:	Continuous monitoring, Hourly measurement, Monthly recording
Calculation method (if applicable):	Not applicable
QA/QC procedures:	Calibration includes zero verification with an inert gas (e.g. N2) and at least one reading verification with a standard gas (single calibration gas or mixture calibration gas). All calibration gases have a certificate provided by the manufacturer and under their validity period.
Purpose of data:	Calculation of project emissions
Additional comments:	Data will be archived for 2 years from the end of the crediting period or the last request for issuance whichever is later.

Data/parameter:	**$FV_{RG,h}$**
Unit	m^3
Description	Volumetric flow rate of the residual gas in dry basis at normal conditions in the hour *h*
Measured/calculated/default	Measured
Source of data	Measurement by project proponent(s) by using flow meter
Value(s) of monitored parameter	3,065,642
Monitoring equipment	The volumetric flow measured using continuous analyser on hourly basis and monthly average taken for recording.
Measuring/reading/recording frequency:	Continuous monitoring, Hourly measurement, Monthly recording
Calculation method (if applicable):	Calculated based on the wet basis flow measurement plus water concentration measurement
QA/QC procedures:	Periodic calibration against a primary device provided by an independent accredited laboratory. Calibration and frequency of calibration is according to manufacturer's specifications.
Purpose of data:	Calculation of project emission
Additional comments:	Data will be archived for 2 years from the end of the crediting period or the last request for issuance whichever is later.

Data/parameter:	**$d_{flare,m}$**
Unit	minutes
Description	Duration of flare detected in the hour h
Measured/calculated/default	Measured
Source of data	Flare detection system
Value(s) of monitored parameter	110000
Monitoring equipment	Measure using a fixed installation optical flame detector
Measuring/reading/recording frequency:	Continuous monitoring, reading every minute
Calculation method (if applicable):	Not applicable

QA/QC procedures:	Calibration of the detector conducted according to the manufacturer's specification i.e. once every 3 years.
Purpose of data:	Calculation of project emission
Additional comments:	Applicable because open flare is used. Data will be archived for 2 years from the end of the crediting period or the last request for issuance whichever is later.

Data/parameter:	**T**
Unit	^{0}C
Description	Temperature of biogas
Measured/calculated/default	Measured
Source of data	Temperature meter
Value(s) of monitored parameter	41.5
Monitoring equipment	The temperature is recorded using thermo couple.
Measuring/reading/recording frequency:	Continuous monitoring, Hourly measurement
Calculation method (if applicable):	Monthly average taken.
QA/QC procedures:	Periodic calibration against a primary device provided by an independent accredited laboratory is mandatory. Calibration and frequency of calibration is according to manufacturer's specifications.
Purpose of data:	Calculation of baseline emission
Additional comments:	Data will be archived for 2 years from the end of the crediting period or the last request for issuance whichever is later.

Data/parameter:	**P**
Unit	Pa
Description	Pressure of the biogas
Measured/calculated/default	Measured
Source of data	Pressure transmitter
Value(s) of monitored parameter	1470
Monitoring equipment	Pressure transmitter
Measuring/reading/recording frequency:	Continuous monitoring, Hourly measurement, Monthly recording
Calculation method (if applicable):	Monthly average taken
QA/QC procedures:	Periodic calibration against a primary device must be performed periodically and records of calibration procedures must be kept available as well as the primary device and its calibration certificate. Pressure transducers (either capacitive or resistive) must be calibrated yearly.
Purpose of data:	Calculation of project emission
Additional comments:	Data will be archived for 2 years from the end of the crediting period or the last request for issuance whichever is later.

Data/parameter:	**$BG_{combusted,y}$**
Unit	m3

Description	Annual volume of biogas combusted in the boiler in year *y*
Measured/calculated/default	Measured
Source of data	Measured using continuous flow meters
Value(s) of monitored parameter	20,65,167
Monitoring equipment	Gas flow meter
Measuring/reading/recording frequency:	Continuous monitoring, Hourly measurement, Monthly recording
Calculation method (if applicable):	In all cases, the amount of biogas recovered, fuelled, flared has been monitored using continuous flow meters. The biogas streams flared and fuelled (or utilized) are monitored separately, the two fractions has been added together to determine the total biogas recovered, without the need to monitor the recovered biogas before the separation. The methane content measurement is carried out close to a location in the system where a biogas flow measurement takes place.
QA/QC procedures:	The flow is monitored continuously and based on hourly reading aggregated daily and monthly values. Calibration of the flow meters is conducted as specified by manufacturer i.e. once in 3 years.
Purpose of data:	Calculation of baseline emission
Additional comments:	Data will be archived for 2 years from the end of the crediting period or the last request for issuance whichever is later.

Data/parameter:	**$BG_{flared,y}$**
Unit	m3
Description	Annual volume of biogas flared in year *y*
Measured/calculated/default	Calculated
Source of data	Log book
Value(s) of monitored parameter	20,65,167
Monitoring equipment	Gas flow meter
Measuring/reading/recording frequency:	Monthly recording
Calculation method (if applicable):	In all cases, the amount of biogas recovered, fuelled, flared has been monitored using continuous flow meters. The biogas streams flared and fuelled (or utilized) are monitored separately, the two fractions has been added together to determine the total biogas recovered, without the need to monitor the recovered biogas before the separation.
QA/QC procedures:	The flow is monitored continuously and based on hourly reading aggregated daily and monthly values. Calibration of the flow meters is conducted as specified by manufacturer i.e. once in 3 years.
Purpose of data:	Calculation of baseline emission
Additional comments:	Data will be archived for 2 years from the end of the crediting period or the last request for issuance whichever is later.

Data/parameter:	**End use of final sludge**
Unit	-
Description	The final sludge produced from the project system will be applied as land application
Measured/calculated/default	Measured

Source of data	Sludge removal reports
Value(s) of monitored parameter	0
Monitoring equipment	Not applicable
Measuring/reading/recording frequency:	On each removal
Calculation method (if applicable):	NA
QA/QC procedures:	Sludge removal and its end-use is monitored whenever the sludge is removed from the drying bed and a record has been maintained in the plant. The sludge has been used for soil application under aerobic conditions.
Purpose of data:	Calculation of project emission
Additional comments:	Data will be archived for 2 years from the end of the crediting period or the last request for issuance whichever is later.

Data/parameter:	$w_{CH4,y}$
Unit	%
Description	Methane content in the biogas in year y.
Measured/calculated/default	Measured
Source of data	This parameter has not been monitored separately and value is taken similar to as fvi,h.
Value(s) of monitored parameter	70.05
Monitoring equipment	Gas analyser
Measuring/reading/recording frequency:	Daily mesurement, Monthly recording
Calculation method (if applicable):	The fraction of methane in the gas will be measured with a continuous analyser or, alternatively, with periodical measurements at a 90/10 confidence/precision level by appointed staff of the project owner. It will be measured using equipment that can directly measure methane content in the biogas - the estimation of methane content of biogas based on measurement of other constituents of biogas such as CO2 is not permitted. The methane content measurement shall be carried out close to a location in the system where a biogas flow measurement takes place.
QA/QC procedures:	The measurement will be monitored regularly and the analyser used will be calibrated periodically as per vendor's specifications.
Purpose of data:	Calculation of project emission
Additional comments:	Data will be archived for 2 years from the end of the crediting period or the last request for issuance whichever is later.

Data/parameter:	$EC_{project,y}$
Unit	MW
Description	Quantity of electricity consumed by the project activity which is generated by the fossil fuel (i.e. diesel) based back-up generator in the year *y*
Measured/calculated/default	Measured
Source of data	Electricity meter
Value(s) of monitored parameter	0

Monitoring equipment	Electricity meter, having accuracy class 0.5s.
Measuring/reading/recording frequency:	Continiuous monitoring, monthly recording
Calculation method (if applicable):	NA
QA/QC procedures:	Calibration of the meter is conducted according to the manufacturer's specification.
Purpose of data:	Calculation of project emission
Additional comments:	This parameter is only measured when back-up generator is used. Data will be archived for 2 years from the end of the crediting period or the last request for issuance whichever is later.

D.3. Implementation of sampling plan

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During monitoring period, the COD level has been determined through sampling. Representative sample size is taken to ensure the 90/10 confidence/precision level requirement. COD levels being monitored based on the table below.

Parameters for monitoring	Minimum sample size required for 90/10 confidence/precision level[1]	Actual sample size
COD of untreated, treated, and discharged wastewater	45 (based on a population of 52 samples)	85 (once every week)

SECTION E. Calculation of emission reductions or GHG removals by sinks

E.1. Calculation of baseline emissions or baseline net GHG removals by sinks

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Baseline emissions

The baseline emissions are calculated as follow:

$BE_y = BE_{ww,treatment,y}$

Baseline emissions from wastewater treatment system

$BE_{ww,treatment,y} = \Sigma(Q_{ww,i,y} * COD_{untreated,i,y} * \eta_{COD,BL,i} * DF * MCF_{ww,treatment,BL,i}) * B_{o,ww} * UF_{BL} * GWP_{CH4}$

Table 9: Value of parameters used in baseline emissions calculations

Parameters	Value	Source
$B_{o,ww}$	0.25 kg CH_4/kgCOD	Value as per AMS-III.H (version 16) paragraph 20.
$COD_{untreated,i,y}$	0.0716549 tCOD/m^3	The average value taken over current monitoring period i.e. 14/04/2015 to 30/04/2016
$\eta_{COD,BL,i}$	95.84%	Designed value as per manufacturer specification established in line with paragraph 28 (2) (b) of AMS-III.H version 16. Please refer Appendix-4 for details.
$Q_{ww,i,y}$	121298 m^3	Total volume treated during current monitoring period 14/04/2015 to 30/04/2016
$MCF_{ww,treatment,BL,i}$	0.8	IPCC value as per Table III.H.1 in AMS-III.H version

[1] "Easy Sample"- a sampling software used for determining sample size.

Parameters	Value	Source
		16. The plausible baseline scenario is the anaerobic lagoons with depth of more than 2m, therefore value of 0.8 is applied which is in line with the requirements of the methodology.
UF_{BL}	0.89	Value as per AMS-III.H (version 16) paragraph 20.
DF	0.89	Value as per AMS-III.H (version 16) paragraph 20.
GWP_{CH4}	25	IPCC default value

$BE_{ww,treatment,y}$ = 121,298*(0.0716549*95.84%*0.89*0.8)*0.25*0.89*21
= 27,712.48 tCO_2e

$BE_y = BE_{ww,treatment,y}$
= 27,712 tCO_2e (rounded down)

E.2. Calculation of project emissions or actual net GHG removals by sinks

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Project emissions

The emission from project activity is as follow:

$PE_y = PE_{power,y} + PE_{fugitive,y} + PE_{flaring,y}$

Project emissions calculations due to electricity consumption ($PE_{EC,y} = PE_{power,y}$)

$PE_{EC,y} = EC_{PJ,j,y} * EF_{EL,j,y} * (1 + TDL_{j,y})$
$PE_{EC,y}$ = 0 * 1.3 * 1
$PE_{EC,y}$ = 0 tCO_2e

Project emissions from the treated wastewater discharged

$PE_{ww,discharge,y}$ = *0, as used for land application*

Project emissions from biogas release in capture system

$MEP_{ww,treatment,y} = Q_{ww,i,y,} * B_{o,ww} * UF_{PJ} * COD_{removed,PJ,k,y} * MCF_{ww,treatment,PJ,k}$
= 121298*0.25*1.12*0.058493*0.8
= 1,589.29 tonnes CH_4

$PE_{fugitive,ww,y} = (1 - CFE_{ww}) * MEP_{ww,treatment,y} * GWP_{CH4}$
= (1 - 0.9) *1589.29* 21 = 3337.52 tCO_2e

$PE_{fugitive,y} = PE_{fugitive,ww,y}$ = 3337.52 tCO_2e

Value of parameters used in project emissions calculation

Parameter	Value	Source
$Q_{ww,i,y}$	121298 m^3	Total quantity of wastewater entering into system during current monitoring period i.e. 15/09/2014 to 30/04/2016
$COD_{removed,PJ,k,y}$	0.058493 tCOD/m^3	Average over crediting period for current monitoring period i.e. 15/09/2014 to 30/04/2016
$\eta_{COD,PJ}$	85 %	Designed value from manufacturer specification
$B_{o,ww}$	0.25 kg CH_4/kg COD	Value as per AMS-III.H (version 16) paragraph 20.
UF_{PJ}	0.89	Value as per AMS-III.H (version 16) paragraph 29.

Parameter	Value	Source
$MCF_{ww,treatment,PJ,k}$	0.80	IPCC value as per Table 6.8 Volume 5 Chapter 6 of IPCC 2006 Guideline for anaerobic reactor

Project emission due to flaring of biogas

$PE_{flaring,y} = \Sigma TM_{RG,h} * (1-\eta_{flare,h}) * GWP_{CH4}/1000$

Where, $TM_{RG,h} = FV_{RG,h} * fv_{CH4,RG,h} * \rho_{CH4,n}$

Parameter	Value	Unit	Source
η_{flare}	0.5	--	default value
$FV_{RG,h}$	1000475	m^3	Calculated by CPA implementer value taken as aggregate over period from 15/09/2014 to 30/04/2016
$fv_{CH4,RG,h}$	70.05%	--	Value monitored by CPA implementor on hourly basis and averaged over current moitoring period
$\rho_{CH4,n}$	0.716		IPCC default value
GWP_{CH4}	21	--	Default value

Hence, $PE_{flaring,y}$ = 1000475*70.05%%*0.716*(1-0.5)*21/1000

$PE_{flaring,y}$ = 5268.86 tCO_2e

$PE_y = PE_{power,y} + PE_{fugitive,y} + PE_{flaring,y}$
$PE_y = 0 + 3337.52 + 5268.86$
$PE_y = 8607$ tCO_2e (roundedup)

E.3. Calculation of leakage

>>
The project activity does not involve equipment transfer from another activity thus there are no leakages to be accounted for this project activity.
$LE_y = 0$

E.4. Summary of calculation of emission reductions or net GHG removals by sinks

Item	Baseline emissions or baseline net GHG removals by sinks (t CO_2e)	Project emissions or actual net GHG removals by sinks (t CO_2e)	Leakage (t CO_2e)	GHG emission reductions or net GHG removals by sinks (t CO_2e) achieved in the monitoring period		
				Up to 31/12/2012	From 01/01/2013	Total amount
Total	27712	8607	0	0	19105	19105

E.5. Comparison of actual emission reductions or net GHG removals by sinks with estimates in registered PDD

Item	Values estimated in ex ante calculation of registered PDD	Actual values achieved during this monitoring period
Emission reductions or GHG removals by sinks (t CO_2e)	63327	19105

E.6. Remarks on difference from estimated value in registered PDD

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There is a decrease of 69.83% from estimated ERs in registered PDD has been observed during this monitoring period (594 days). The palm oil mill was not operational for 220 days during current monitoring period resulting lower quantity of POME, which is main input to project activity.

Appendix 1. Contact information of project participants and responsible persons/entities

Project participant and/or responsible person/ entity	☒ Project participant ☐ Person/entity responsible for completing the CDM-MR-FORM
Organization name	Rohit Surfactants Private Limited
Street/P.O. Box	109/366
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Postcode	208012
Country	India
Telephone	+91 512 2551201
Fax	+91 512 2550832
E-mail	--
Website	www.gharidetergent.com
Contact person	
Title	President (Corporate) & Company Secretary
Salutation	Mr
Last name	Bajpai
Middle name	--
First name	Sushil
Department	--
Mobile	--
Direct fax	+91 512 2550832
Direct tel.	+91 512 2551201
Personal e-mail	sushilbajpai@gharidetergent.com

Project participant and/or responsible person/ entity	☐ Project participant ☒ Person/entity responsible for completing the CDM-MR-FORM
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Contact person	

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Document information

Version	*Date*	*Description*
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 (EB70, Annex 11).
02.0	13 March 2012	Revision required to ensure consistency with the "Guidelines for completing the monitoring report form" (EB 66, Annex 20).
01	28 May 2010	EB 54, Annex 34. Initial adoption.

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