CLEAN DEVELOPMENT MECHANISM
SMALL-SCALE PROGRAMME OF ACTIVITIES DESIGN DOCUMENT FORM
(CDM-SSC-PoA-DD) Version 01

CONTENTS

Annexes

NOTE:

(i) This form is for the submission of a CDM PoA whose CPAs apply a small scale approved methodology.

(ii) At the time of requesting registration this form must be accompanied by a CDM-SSC-CPA-DD form that has been specified for the proposed PoA, as well as by one completed CDM-SSC-CPA-DD (using a real case).

SECTION A. General description of small-scale programme of activities (PoA)

A.1 Title of the small-scale programme of activities (PoA):

Regional Biogas PoA
Version : 6.0
Date : 05/11/2012

A.2. Description of the small-scale programme of activities (PoA):

1. General operating and implementing framework of PoA

The proposed Programme of Activities (PoA) consists of implementation of biogas recovery, flaring and/or utilization systems in palm oil mills in Malaysia.

The proposed project activities will reduce greenhouse gas (GHG) emissions from palm oil mills by capturing the biogas generated in the open wastewater treatment systems treating palm oil mill effluent ("POME"), instead of allowing it to escape into the atmosphere.

The PoA and the inclusion of each CPA will be managed by Ably Carbon Sdn. Bhd. ("ACSB") as a coordinating / managing entity (CME). The palm oil mill or the mill owner, or other authorized third party, will sign an agreement with ACSB prior to the inclusion of the corresponding CPA in the PoA.

The CPAs themselves will be implemented by the CME, the CPA implementer, or any relevant third party, including the palm oil mill or mill owner. The PoA will be launched in Malaysia (host country).

The equipment that is planned to be installed in the proposed project activities includes *inter alia* new biogas treatment lagoon(s) or digester tank(s), flaring system, adapting biogas burner(s) to the biomass boiler(s) and/or a power plant consisting of a pre-treatment system and electricity generators.

2. Policy/measure or stated goal of the PoA

The proposed PoA will reduce the greenhouse gas (GHG) emissions from existing open lagoons treatment system of the palm oil mills, thanks to the installation of bio-digester (lagoon/reactor/digester) complete with biogas recovery system, where the recovered biogas will either be combusted for energy and/or heat generation and/or flaring depending on the demands and requirements of the mills, thus avoiding it to escape into the atmosphere. The recovered biogas may also combusting in biomass boiler for palm kernel shell (PKS) displacement but no emission reductions will be claimed as PKS is carbon neutral biomass. The installation of the biogas recovery system will result in a better POME treatment and management of the wastewater, through improved control of the anaerobic treatment conditions such as pH, temperature, organic loading rate. It wills also promote biogas utilization in the host country especially from palm oil industry.

The PoA will contribute to sustainable development in the host country. The benefits of the proposed project activity relating to the sustainable development, as compared to the baseline are the following:

Environmental criteria

- The reduction of CH_4 emissions will improve the quality of the air.
- The reduction of GHG emissions. as the results of utilizing the recovered biogas for energy and/or heat generation, will result in the preservation of the climate.
- Improvement in the quality of the discharge water due to better management, thanks to the better control of the anaerobic treatment conditions (such as pH, temperature, organic loading rate in order to achieve optimum anaerobic conditions) compared to the current practice of open lagoons wastewater treatment system at the palm oil mill, without much control of the anaerobic treatment conditions. Introducing such biogas recovery system will eventually improve the quality of the discharge wastewater and reduces the emission of GHG when the recovered biogas is flared, combusted for energy and/or heat.

Social criteria

- By reducing the methane emission, the project will contribute to the health of the population in the area and nearby.
- Besides providing job opportunities, the project will also set in motion a *demonstration effect* leading to other units adopting similar activity, which would go to improve the job opportunity;
- The increased job opportunity will reduce social disparity in the society and thereby contribute to peace in the society.

Economic criteria

- The project will encourage technology transfer and improvement of technology in the host country especially in the design of the bio-digester for biogas recovery and may also involve the energy generation facility. Indeed, the open anaerobic lagoons will be replaced by either bio-digester or covered lagoon (a transferred or an improvement in technology with expertise from either Annex 1 or within South East Asia countries) and biogas engines (if applicable) that are expected to be imported from Annex I country[1]. The specific country (ies) from where the technology (ies) is to be transferred to the host country (ies) will be specified in each SSC-CPA-DD during its inclusion to this PoA. This will enhance local technology when the development and construction of the project is carried out by the local contractors.
- Training will be provided to the locals to ensure them to be able to execute and manage the project. It leads to the increase of the local skills.
- Provide job opportunities especially for the local community nearby.

3. Confirmation that the proposed PoA is a voluntary action by the coordinating/managing entity.

This PoA is a voluntary action by the CME; the CME is not obliged to conduct the PoA by any local legislation and does not have any contractual obligation to implement the PoA.

A.3. Coordinating/managing entity and participants of SSC-POA:

[1] As planned at the time of PoA-DD writing, and subject to change according to development of future technology suppliers.

Ably Carbon Sdn. Bhd. will be the Coordinating / Managing Entity for the CDM Programme of Activities and will communicate with the CDM Executive Board. Ably Carbon Sdn. Bhd. also will act as Project Participant for Malaysia, while Felda Palm Industries Sdn. Bhd. will acts as Project Participant for Malaysia.

Name of Party involved ((host) indicates a host Party)	Private and/or public entity (ies) project participants (as applicable)	Kindly indicate if the Party wishes to be considered as project participant (Yes/No)
Malaysia (Host)	Private entities: Felda Palm Industries Sdn. Bhd. Ably Carbon Sdn. Bhd.	No
France	Private entity: Ably Carbon SAS	No

A.4. Technical description of the small-scale programme of activities:

A.4.1. Location of the programme of activities:

The PoA will cover all the states in Malaysia. The boundary of the PoA shall be amended post registration to include other countries subject to the conditions presented in Para 6 of Clarifications regarding the "Procedures for Registration of a Programme of Activities as a Single CDM Project Activity and Issuance of Certified Emission Reductions for a Programme Of Activities", Annex 26 of the EB 60 to this effect being met.

A.4.1.1. Host Party(ies):

Malaysia

A.4.1.2. Physical/ Geographical boundary:

The boundary of a PoA is defined as the geographical area within which all the CPAs included in the PoA will be implemented. The geographical boundary of the PoA will cover all the states in Malaysia. The consideration of all applicable national and/or sectoral policies and regulations of each host parties, within the boundary of this PoA shall be carried out at CPA level (Refer Section A.4.2.2).

Figure A.1: Map of Malaysia

A.4.2. Description of a typical small-scale CDM programme activity (CPA):

A typical CDM Programme Activity (CPA) consists of the bio-digester(s) or covered lagoon(s), flaring and/or biogas utilization systems.

A.4.2.1. Technology or measures to be employed by the SSC-CPA:

The project activity will apply AMS-III.H. "Methane recovery in wastewater treatment[2]", Version 16, under Type III (other project activities). Additional emission reductions may also be claimed under Type I (Renewable energy projects) at each project site depending on the technologies applied.

The principle technology and purpose of this PoA is to recover the biogas generated from wastewater (with or without sludge) treatment process, which would have otherwise been emitted into the atmosphere resulting in GHG emissions. It is worth noting that recovery of biogas from waste water is not mandatory, nor is it common practice, in the Host Country. A typical SSC-CPA would consist of the installation of biogas recovery system either bio-digester(s) or covered lagoon(s), flaring and/or biogas utilization systems at individual palm oil mill that will implement the project activity. Each SSC-CPA is expected to adopt technologies that have better performance in terms of efficiency, reliability and quality than the existing open lagoons treatment system, commonly used at the palm oil mill especially through the introduction of bio-digester with biogas recovery system[3]. It is expected that several technologies will be available to be considered for each SSC-CPA and each technology will comprise measures that recover, flare and/or utilize the biogas for heat/power generation based on the approved methodologies and the needs of each site. The recovered biogas may also combusting in biomass boiler for palm kernel shell (PKS) displacement but no emission reductions will be claimed as PKS is carbon neutral biomass.

Typically, the open anaerobic lagoons will be replaced by either bio-digester or covered lagoon (an improvement in technology with expertise from either Annex 1 or South East Asia countries). The main technology expected to be transferred to the host country will be the biogas engines (if applicable) that are

[2] Indicative simplified baseline and monitoring methodologies for selected small-scale CDM project activity categories. Type III-Other project activities: III.H/Version 16/Scope 13/EB 58

[3] A technical and economic Analysis biomethanation POME, page 20-63 (SD 41).

expected to be imported from Annex I country[4]. The specific country (ies) where the technology (ies) to be transferred to the host country (ies) will be specified in each SSC-CPA-DD during its inclusion to this PoA.

a) The biogas capture in bio-digester/covered lagoon:

The project activity will involve the introduction of either bio-digester(s) or covered lagoon(s) for the treatment of palm oil mill effluent (POME) for the biogas recovery and combustion. The main features of the anaerobic bio-digester / covered lagoon system is a vessel or lagoon to retain organic wastewater where biogas (comprise mainly of CH_4) is generated from the digestion of organic materials by the micro-organisms (anaerobes) under anaerobic conditions at slightly alkaline pH. The vessel / lagoon will typically be an in-ground anaerobic digester, but may include other configurations in order to suit the specific requirements of each project site such as above ground tanks.

The anaerobic bio-digester / covered lagoon system typically has the following features, but not be limited to:

i) A control system for distributing wastewater in the bio-digester / covered lagoon.
ii) A system for collecting and distributing the recovered biogas to flare(s) / biogas burner(s) / biogas engine(s).
iii) Biogas treatment systems for hydrogen sulphur and moisture removal (especially in cases where the recovered biogas is combusted in biogas engine(s) for electricity generation).
iv) Infrastructure to channel the treated effluent from the bio-digester(s) / covered lagoon(s) to existing open lagoons (either existing anaerobic lagoons or directly to aerobic/facultative/algae lagoons/bio-polishing) for further treatment before finally being discharged to a river or as land application. Existing open anaerobic lagoons may be closed depending on each site.

In case a CPA involves the installation of anaerobic digesters / covered lagoons for the POME treatment and biogas recovery, it may either be in the form of:

i) Replacing or modifying an existing open lagoon(s) with anaerobic digesters / covered lagoons coupled with biogas recovery
ii) Greenfield treatment system coupled with biogas recovery
iii) Capacity addition of wastewater treatment system coupled with biogas recovery

b) Flaring system:

An enclosed flare or open flare will be used to destroy the biogas in cases where a) no biogas engine(s) is/are installed for electricity generation or b) no biogas burner(s) is/are installed in the biomass boiler(s) for heat generation or c) to burn the excess biogas in case of maintenance of the gas engine(s)/biomass boiler(s) or d) during emergency. The size of the flare will be determined at CPA level, depending on the mill capacity and wastewater volume.

c) Gainful use of the recovered biogas comprises of one and more options listed below:

i) Recovered biogas may be combusted in biogas engine(s) for electricity generation and export to the grid / mini grid or supply to individual households / users; or

[4] As planned at the time of PoA-DD writing, and subject to change according to development of future technology suppliers.

ii) Recovered biogas may be combusted in existing or new biomass boiler(s) coupled with new biogas burner(s) for heat generation and Palm Kernel Shells (PKS) displacement, however no emission reductions will be claimed; or
iii) Recovered biogas may be combusted in new gas boiler(s) for heat generation and Palm Kernel Shells (PKS) displacement, however no emission reductions will be claimed; or
iv) Whenever required (maintenance or emergency), excess biogas will be combusted in an enclosed or open flare equipped with safety features.

Installed capacity for biogas engines / burners / flare will be determined at each CPA depending on the mill capacity and wastewater volume.

For each SSC-CPA, the emission reductions from Type III component will not exceed 60,000 tCO_{2e} annually, while for Type I component, the installed capacity will be less than 15 MWe (or 45MWth).

A.4.2.2. Eligibility criteria for inclusion of a SSC-CPA in the PoA:

To be part of this PoA, each CPA must meet the following criteria:

Table A.1: Eligibility Criteria for Inclusion of SSC-CPA in The PoA

N°	Criteria	Compliance Rationale	Evidence to be submitted
a	The geographical boundary of the CPA including any time-induced boundary consistent with the geographical boundary set in the PoA,	In each CPA-DD, it shall be demonstrated with GPS coordinates that the CPA does take place within the borders of Malaysia.	Declaration from CME or Operational and Management Plan from CME – that includes GPS coordinates of the proposed site, showing that it is inside the Host Country.
b	Conditions that avoid double counting of emission reductions like unique identifications of product and end-user locations (e.g. programme logo).	In each CPA-DD, it shall be confirmed that the CPA is not already included in another PoA or developed as a stand-alone CDM registered project. Detailed procedure to avoid double-counting is formulated in A.4.4.1 of the PoA-DD.	Documented evidence from the CME following the system/ procedure detailed in section A.4.4.1, including a list of PoAs, CPAs and PDDs reviewed in said CDM database, as well as the unique identification number of all included CPAs and a map showing all included CPAs.
c	The specifications of technology / measure including the level and type of service, performance specifications including compliance with testing / certifications.	The CPA shall demonstrate that the technology to be installed is biogas recovery and utilization for heat / electricity generation and/or flare, and will meet the host country or international standard/requirements in terms of testing/certifications.	Documented evidence from the CME (inter alia) for the main equipments to be installed: proposals, requests for quote, quotations, tender documents, project design diagram, project report, or equivalent documents provided by the CPA implementer.

d	Conditions to check the start date of the CPA through documentary evidence.	The start date of the CPA is the earliest date at which either the implementation or construction or real action of the CPA begins. It may be identified either as the date when the first contract for a main component is awarded, or when the work for a main component has started, or the planned date for starting the work on the main component (in case an investment decision for a main component has been taken but no work has started). In any case, such start date cannot be before 20/03/2012, date on which validation of started.	Documented evidence from the CME showing a start date after 20/03/2012, such as (inter alia): - investment decision from the CPA implementer, related to a main project component, including the planned date for starting the work - signed Contract documents related to a main project component - evidence that a main project component has started, collected during physical site visit by the CME. The main project components include, inter alia: a) interconnecting piping system for biogas plant; b) Piping system; c) Pumps; d) A system for collecting and distributing the recovered biogas to flare(s) / biogas burner(s) / biogas engine(s); e) Biogas treatment systems for hydrogen sulphur and moisture removal; f) Major earth/civil works for ponds/tanks.
e	Conditions that ensure compliance with applicability and other requirements of single or multiple methodologies applied by CPAs	Each CPA must meet the applicability conditions for methodology AMS-III.H, version 16 (as listed in section E.2 of the PoA DD) and for the relevant Type I methodology (ies), depending on the final usage of the recovered biogas.	All applicability conditions and requirements are listed in Section E.2 for AMS-III.H version 16 and for the relevant Type-I methodologies. CME shall issue a declaration of applicability after checking the applicability criteria for the applied methodology (ies). Evidences / documents required for the applicable criteria shall be substantiated accordingly.
f	The conditions that ensure that CPAs meet the requirements pertaining to the demonstration of additionality as specified in Section A of EB 65 Annex 3.	Each small-scale CPA shall meet the requirements of Guidelines On The Demonstration Of Additionality Of Small-Scale Project Activities, Annex 27 (version 09.0), EB 68 for the demonstration of additionality.	Refer Section E.5.1 and E.5.2 for details and corresponding supporting documents for each CPA.

g	The PoA-specific requirements stipulated by the CME including any conditions related to undertaking local stakeholder consultations and environmental impact analysis.	(1) Local stakeholders must have been consulted. (2) The CPA must be compliant with the Host Country requirements in terms of environmental impact analysis.	i) Invitation letters and/or newspaper advertisement and/or public notice for the invitation of local stakeholders. ii) Photographs and/or video evidence of stakeholder consultation iii) Attendance list of attended stakeholders iv) Q&A or Minutes Meeting of stakeholder consultation v) EIA exemption letter from Department of Environment or EIA report from authorized party, or letter from an environmental lawyer confirming that the EIA requirements, or equivalent is not necessary for the CPA.
h	Conditions to provide an affirmation that funding from Annex I parties, if any, does not result in a diversion of official development assistance	In each CPA-DD, it shall be confirmed by the Annex 1 Project Participant that the CPA does not involve any public funding from Annex 1 parties or that in case public funding is used a confirmation that official development assistance is not being diverted to the implementation of the PoA.	Documented evidence from the CME including: - a declaration from Annex 1 Project Participant that the CPA does not receive any public funding, or if it does receive public funding, such funding does not constitute ODA diversion. - a declaration from the CPA implementer that the CPA does not receive any public funding, or if it does receive public funding, such funding does not constitute ODA diversion.
i	Where applicable, target group (e.g. domestic / commercial / industrial, rural / urban, grid-connected / off-grid) and distribution mechanisms (e.g. direct installation).	The target group is prospective Palm oil mills in Malaysia. There are no specific distribution mechanisms.	Relevant documents to prove it is palm oil mill that processing fresh fruit bunches, such as Mill License, business license, etc.
j	Where applicable, the conditions related to sampling requirements for a PoA in accordance with the approved guidelines/standard from the Board pertaining to sampling and surveys.	For wastewater samples, specific guidance in the applicable methodology shall be followed. Refer to section A.4.4.2 for details.	For all wastewater sampling for COD tests, the samples and measurements shall ensure a 90/10 confidence/precision level as per AMS-III.H, version 16, Table III.H.2. A minimum once a month sample will be drawn for COD test.
k	Where applicable, the	Each small-scale CPA shall	For Type III, CERs calculation

	conditions that ensure that every CPA in aggregate meets the small-scale or microscale threshold criteria and remains within those thresholds throughout the crediting period of the CPA	meet the small-scale threshold criteria and remain within this threshold throughout the crediting period of the CPA (less than 60 $ktCO_2$ / year) for Type III and 15MW for Type I methodologies.	spreadsheet in the CPA shall confirm the threshold of 60k CER/year during validation. For Type I, documented evidence from the CME such as (inter alia) design document, request for quote, proposal, signed contract, approved board decision, or equivalent, showing that the installed capacity (or planned capacity) is below 15 MW.
l	Where applicable, the requirements for the debundling check, in case CPAs belong to small-scale (SSC) or microscale project categories.	The CPA implementer should be able to demonstrate that the CPA is not a debundled component of a large activity as described in the latest "Guidelines on assessment of debundling for SSC project activities" or equivalent guideline at the time of inclusion.	Documented evidence from the CME such as (inter alia): - Contractual agreement between CME and CPA implementer including confirmation with list of projects implemented by CPA Implementer that apply the same technology / measure. - if applicable, list of CPAs of a large scale PoA with the same CME applying the same technology / measure.
m	The consideration of all applicable national and/or sectoral policies and regulations of each host parties, within the boundary of all host country.	The consideration of all applicable national and/or sectoral policies and regulations of each host parties, within the boundary of this PoA shall be carried out at CPA level.	Documented evidence from the CME detailing the latest available national and/or sectoral policies and regulations and detailing how they apply (or not) to the CPA.

A.4.3. Description of how the anthropogenic emissions of GHG by sources are reduced by a SSC-CPA below those that would have occurred in the absence of the registered PoA (assessment and demonstration of additionality):

(i) The proposed PoA is a voluntary coordinated action;

The proposed PoA is a voluntary coordinated action from Ably Carbon Sdn. Bhd. to promote the implementation of biogas recovery and flaring and/or utilization systems.

(ii) If the PoA is implementing a voluntary coordinated action, it would not be implemented in the absence of the PoA;

As discussed in Section A.2. and A.4.3. (Item i), this PoA is a voluntary coordinated action from Ably Carbon Sdn. Bhd. as CME.

This is the additionality condition of each CPA and it will be demonstrated in each CPA-DD following the relevant methodology and tools requirements. Only the CPAs that have demonstrated to be additional will be included in the PoA, thus it can be concluded that none of the CPA's under the PoA would occur in the absence of CDM; therefore the entire programme would not be implemented in the absence of CDM.

The program has been developed by the CME specifically for CDM: carbon credits generated by the CPAs to be included in the programme are the only expected revenue that will go to the CME. Indeed it is unlikely that this voluntary coordinated action will be implemented by the CME in the absence of the CDM.

The demonstration of additionality for a typical CPA is detailed under Section E.5 of the PoA-DD.

(iii) If the PoA is implementing a mandatory policy/regulation, this would/is not enforced;

Not applicable as the proposed PoA is not implementing mandatory policies / regulations in the selected geographical boundary.

(iv) If mandatory policies/regulations are enforced, the PoA will lead to a greater level of enforcement of the existing mandatory policy/regulation.

Not applicable, as the proposed PoA is not implementing mandatory policies / regulations in the selected geographical boundary.

A.4.4. Operational, management and monitoring plan for the programme of activities (PoA):

A.4.4.1. Operational and management plan:

Ably Carbon Sdn. Bhd. is the coordinating / managing entity of the operation and management plan. The operational and management plan will be implemented by a project developer for each CPA, which may include Ably Carbon Sdn. Bhd. Contractual arrangements will be signed for each CPA with each participating site owner, technology provider and/or Ably Carbon and shall include a statement by the CME to the effect that the CPA conforms to eligibility criteria and the documents submitted in support thereof are credible and reliable. Also, the PP from Annex 1 country shall confirm, through a specific statement for each CPA, that the CPA is not diverting Official Development Assistance (ODA) funding from Annex I parties.

(i) Record keeping system for each CPA under the PoA,

Operation, monitoring and management of the projects will be at the CPA level:
All relevant parameters included in the monitoring plan shall be monitored and recorded in each CPA by maintaining a record keeping system supervised by the CME as specified in Section E below.

The CME will ensure that each CPA will maintain standard records and will be responsible for centralizing and archiving the monitored data.

The monitored data will be kept for the full crediting period, plus two years after the end of the crediting period or the last issuance of CERs for this CPA (whichever occurs later).

(ii) System/procedure to avoid double accounting e.g. to avoid the case of including a new CPA that has been already registered either as CDM project activity or as a CPA of another PoA,

Prior to including a new CPA under the proposed PoA, the CME will check the CPA and PoA databases in the UNFCCC website to ensure that the CPA has not been registered already.

Existing registered projects will be verified at the following links:
a) http://cdm.unfccc.int/Projects/registered.html
b) http://cdm.unfccc.int/ProgrammeOfActivities/registered.html

or any other link available at the time of inclusion

Each CPA included in this PoA will be provided with a unique identification number as a reference. To avoid double counting, each included CPA with its reference number will be linked with the geographic coordinates for each facility's specific site location and a map showing all included CPAs will be provided.

(iii) The SSC-CPA included in the PoA is not a de-bundled component of another CDM programme activity (CPA) or CDM project activity.

CME will apply "Guidance for determining the occurrence of de-bundling under a Programme of Activities (PoA)", version 03, Annex 13, EB 54 to ensure that the proposed CPA is not a de-bundled component of another CDM programme activity (CPA) or CDM project activity. Once it is confirmed that the CPA is not a de-bundled component of another CPA or CDM project activity, a contractual agreement between CME and CPA implementer will be signed.

(iv) The provisions to ensure that those operating the CPA are aware of and have agreed that their activity is being subscribed to the PoA;

To ensure that those operating the CPA are aware of and have agreed that their activity is being subscribed to the PoA, the CPA operator shall enter into a contractual arrangement with the coordinating entity including respective provisions that:

- The CPA has not been and will not be registered as a single CDM project activity or as a CPA under another PoA; and
- The project implementer is aware that the CPA will be subscribed to the present PoA.

(v) A clear definition of roles and responsibilities of personnel involved in the process of inclusion of the CPAs, including a review of their competencies.

The CME will undertake the process of inclusion of CPAs as follows:

- The CPA status will be checked by a project manager qualified for CDM processes as per the procedure to avoid double accounting described in the Point (ii) above.
- The CPA eligibility will be checked by a project manager qualified for CDM process and PoA guidelines and the CME will issue a statement of conformity of the CPA with the eligibility criteria.
- The General Manager or a director of the CME will sign a contractual agreement with the CPA implementer.

- The CME may appoint in-house staff or any relevant third party with CDM expertise (e.g. CDM consultant) to launch the inclusion process, including contracting a DOE, gathering the CPA information and preparing the relevant documentation.
- If the inclusion is carried out by a third party, the CME will be informed on a regular basis of the progress of the inclusion.
- A technical review will be conducted as described in the paragraph 8 of Operational and management plan.

The role, responsibilities and competency of personnel is summarized below:

Table A2: Role, responsibilities and competency of personnel

Personnel	Role and Responsibilities	Competency Requirement
Project Manager	- Check the CPA status - Check the eligibility of the CPA	Proven knowledge in climate change sector, including a minimum of 3 month experience in CDM
General Manager	- Technical review - Final decision to include the CPA - Appoint a consultant or in-house staff to proceed with the inclusion	Proven knowledge in climate change sector, including a minimum of 1 year experience in CDM
Third party: CDM consultant	CDM inclusion process	Track record in registration and issuance of CDM projects, including Programmatic CDM

The competency requirements of the personnel involved in the inclusion process will be verified through CV (including contact details of at least two reliable personal references, which may be checked by the CME) and/or information publicly available.

(vi) Records of arrangements for training and capacity development for personnel.

- Personnel will be trained on both operational and CDM aspects of the project.
- Training will be carried out internally and/or externally, either on site or remotely.
- The CME will provide guidance to the CPA implementing entity on how the monitoring should be conducted and data should be collected with regards to emission reduction calculations.

The training will take place at the time of commissioning and will consist of:
- Training on operational aspects to personnel involved in the operation of the power plant. The training will be carried out by qualified personnel from the plant manufacturer or from the CPA implementer, as relevant
- Training on CDM aspects to the CPA implementer and the personnel on site. The training will be carried out either by the CME or by a CDM consultant. The trainees will be informed on the implications and obligations due to a CDM status: for instance in terms of data handling, metering, calibration, certification etc.

(vii) Measures for continuous improvements of the PoA management system.

The PoA management will seek for continuous improvements such as:

- Allowing flexibility on the development of the PoA
- Ensuring a continuous update of the most recent UNFCCC guidelines
- Appointing CDM experts for inclusions of CPAs and/or training of personnel

A.4.4.2. Monitoring plan:

(i) Description of the proposed statistically sound sampling method/procedure to be used by DOEs for verification of the amount of reductions of anthropogenic emissions by sources or removals by sinks of greenhouse gases achieved by CPAs under the PoA.

All the CPAs will be verified and where applicable, samples and measurements for wastewater shall meets 90/10 confidence/precision level as per applied methodology AMS-III.H, version 16, Table III.H.2.

(ii) In case the coordinating/managing entity opts for a verification method that does not use sampling but verifies each CPA (whether in groups or not, with different or identical verification periods) a transparent system is to be defined and described that ensures that no double accounting occurs and that the status of verification can be determined anytime for each CPA;

All data collected as part of the monitoring will be archived electronically and be kept at least for 2 years after the end of the last crediting period. All measurements will be conducted with calibrated measurement equipment according to relevant industry standards and/or manufacturer specifications.

The monitoring plan for parameters included in section E.7.1 will be implemented for each CPA with assistance from the CME as follows:

- the CPA operator will implement its CPA
- the CPA operator or any relevant third party will monitor and record all parameters included in section E.7.1
- the CME (or any relevant subcontractor chosen by the CME for that purpose) will provide guidance to the CPA operator on how the monitoring should be conducted and data should be collected with regards to emission reduction calculations
- the CPA operator will provide data on monitored parameters and QA/QC procedures included in section E.7.1 to the CME either directly into a database provided by the CME or by sending the information to the CME.

A more detailed description of the monitoring plan for each CPA is elaborated in section E.7.2.

A.4.5. Public funding of the programme of activities (PoA):

The PoA has not received any public funding. Any public funding that may be provided to individual CPA will be described in the corresponding CPA-DD. In case public funding is received by a CPA, an affirmation will be provided that such funding does not result in a diversion of ODA.

SECTION B. Duration of the programme of activities (PoA)

B.1. Starting date of the programme of activities (PoA):

The starting date of the SSC-PoA-DD is 01/01/2013 or effective date of registration, whichever is later.

B.2. Length of the programme of activities (PoA):

The length of the PoA is 28 years.

SECTION C. Environmental Analysis

C.1. Please indicate the level at which environmental analysis as per requirements of the CDM modalities and procedures is undertaken. Justify the choice of level at which the environmental analysis is undertaken:

1. Environmental Analysis is done at PoA level ☐
2. Environmental Analysis is done at SSC-CPA level √

Individual CPAs under this PoA will be implemented at different geographical locations and involve different type of technologies. Environmental analysis will be conducted at individual CPA level.

C.2. Documentation on the analysis of the environmental impacts, including transboundary impacts:

Relevant documents for environmental analysis, if required to be conducted by the Host Party at the CPA level, will be included in the respective CPA-DD.

C.3. Please state whether in accordance with the host Party laws/regulations, an environmental impact assessment is required for a typical CPA, included in the programme of activities (PoA),:

See information regarding EIA requirements from the host Party described in eligibility criteria Item (g) in section above A.4.2.2. This will be determined at each CPA level.

SECTION D. Stakeholders' comments

D.1. Please indicate the level at which local stakeholder comments are invited. Justify the choice:

1. Local stakeholder consultation is done at PoA level ☐
2. Local stakeholder consultation is done at SSC-CPA level √

Stakeholder consultation will be undertaken at the CPA level and for each CPA so as to ensure that a wider group of stakeholders is reached since each CPA affects different geographical positions and different groups of stakeholders.

D.2. Brief description how comments by local stakeholders have been invited and compiled:

This will be described at CPA level.

D.3. Summary of the comments received:

This will be addressed at the CPA level.

D.4. Report on how due account was taken of any comments received:

This will be addressed at the CPA level.

SECTION E. Application of a baseline and monitoring methodology

This section shall demonstrate the application of the baseline and monitoring methodology to a typical SSC-CPA. The information defines the PoA specific elements that shall be included in preparing the PoA specific form used to define and include a SSC-CPA in this PoA (PoA specific CDM-SSC-CPA-DD).

E.1. Title and reference of the approved SSC baseline and monitoring methodology applied to a SSC-CPA included in the PoA:

Table E.1: Titles and references of methodologies applied to this project activity

Title	Reference	Version
Methane Recovery in Wastewater Treatment	AMS – III.H	Version 16, EB 58
Electricity generation by the user*	AMS – I.A	Version 14, EB 54
Thermal energy production with or without electricity*	AMS – I.C	Version 19, EB 61
Grid connected renewable electricity generation*	AMS – I.D	Version 17, EB 61
Renewable electricity generation for captive use and mini-grid*	AMS – I.F	Version 02, EB 61
Standard for demonstration of additionality, development of Eligibility criteria and application of multiple methodologies for Programme of activities	Annex 3	Version 01.0, EB 65
General Guidelines for SSC CDM methodologies	Annex 27	Version 19.0, EB 69
Tool to calculate baseline, project and/or leakage emissions from electricity consumption	Annex 7	Version 01, EB 39

Tool to determine project emissions from flaring gases containing methane	Annex 13	Version 1, EB 28
Guidelines on the Assessment of Investment Analysis	Annex 5	Version 05, EB 62
Non-binding best practice examples to demonstrate additionality for SSC project activities	Annex 34	EB 35
Guidelines On The Demonstration Of Additionality Of Small-Scale Project Activities	Annex 27	Version 09.0, EB 68
Guidelines on assessment of de-bundling for SSC project activities.	Annex 13	Version 03, EB 54

Note: * Choices of Type I methodology (ies) will be site specific based on the need for the gainfully use of recovered biogas.

E.2. Justification of the choice of the methodology and why it is applicable to a SSC-CPA:

Table E.2: Applicability Criteria for AMS-III.H, Version 16

Criteria	Reference	Comments
a) Substitution of aerobic wastewater or sludge treatment systems with anaerobic systems with biogas recovery and combustion; b) Introduction of anaerobic sludge treatment system with biogas recovery and combustion to a wastewater treatment plant without sludge treatment; c) Introduction of biogas recovery and combustion to a sludge treatment system; d) Introduction of biogas recovery and combustion to an anaerobic wastewater treatment system such as anaerobic reactor, lagoon, septic tank or an on-site industrial plant; e) Introduction of anaerobic wastewater treatment with biogas recovery and combustion, with or without anaerobic sludge treatment, to an untreated wastewater stream; f) Introduction of a sequential stage of wastewater treatment with biogas recovery and combustion, with or without sludge treatment, to an anaerobic wastewater treatment system without biogas recovery (e.g. introduction of treatment in an anaerobic reactor with biogas recovery as a sequential treatment step for the wastewater that is presently being treated in an	AMS – III.H., Point 1	Applicable. The SSC-CPA to be implemented under this PoA will involve biogas recovery from anaerobic digestion of POME wastewater (either existing or Greenfield). Therefore, Option (a), (b), (c) and (e) is not applicable. Only Option (d) and (f) is applicable depending on the design of wastewater treatment system of each CPA. The characteristics of the project activities will involve: - biogas recovery; - biogas combustion; - no sludge treatment.

anaerobic lagoon without methane recovery)		
In cases where baseline system is anaerobic lagoon the methodology is applicable if: (a) The lagoons are ponds with a depth greater than two meters, without aeration. The value for depth is obtained from engineering design documents, or through direct measurement, or by dividing the surface area by the total volume. If the lagoon filling level varies seasonally, the average of the highest and lowest levels may be taken. (b) Ambient temperature above 15°C, at least during part of the year, on a monthly average basis. (c) The minimum interval between two consecutive sludge removal events shall be 30 days	AMS – III.H., Point 2	Applicable. For SSC-CPA where the baseline system is anaerobic lagoon, it has to prove that it complies with Point 2 by: (a) Engineering design documents such as approval records from Department of Environment, etc or through direct measurement with photographic evidence, or by dividing the surface area by the total volume. (b) Based on available records from metrological department or websites. (c) Sludge removal records from mills
The recovered biogas from the above measures may also be utilised for the following applications instead of combustion/flaring:	AMS – III.H., Point 3	-
Thermal or mechanical, electrical energy generation directly.	AMS – III.H., Point 3(a)	Applicable. Besides combustion / flaring, SSC-CPAs which utilize recovered biogas for thermal and/or electrical energy generation are eligible under this SSC-PoA with relevant Type I methodologies, such as AMS-I.C, AMS-I.A, AMS-I.D, AMS-I.F.
Thermal or mechanical, electrical energy generation after bottling of upgraded biogas, in this case additional guidance provided in Annex 1 shall be followed	AMS – III.H., Point 3(b)	Not applicable. SSC-CPA does not involve the bottling of upgraded biogas.
Thermal or mechanical, electrical energy generation after upgrading and distribution, in this case additional guidance provided in Annex 1 shall be followed: (i) Upgrading and injection of biogas into a natural gas distribution grid with no significant transmission constraints; (ii) Upgrading and transportation of biogas via a dedicated piped network to a group of end users; or (iii) Upgrading and transportation of biogas (e.g. by trucks) to distribution points for end users.	AMS – III.H., Point 3(c)(i) AMS – III.H., Point 3(c)(ii) AMS – III.H., Point 3(c)(iii)	Not applicable. SSC-CPA does not involve the upgrading and distribution of biogas.
Hydrogen production	AMS – III.H., Point 3(d)	Not applicable, the proposed SSC-PoA does not include hydrogen

		production.
Use as fuel in transportation applications after upgrading.	AMS – III.H., Point 3(e)	Not applicable, the proposed SSC-PoA does not include use as fuel in transportation applications after upgrading.
If the recovered biogas is used for project activities covered under paragraph 3(a), that component of the project activity can use a corresponding methodology under Type I.	AMS – III.H., Point 4	One or combination of the Type I methodologies can be applied in the SSC-CPA to be implemented depending of the usage of recovered biogas as listed below: AMS-I.A is applicable if the SSC-CPA to be implemented involves the use of recovered biogas for electrical energy generation for individual households or users that mostly comprise of mill workers that live nearby the mill and who are not connected to the grid. AMS-I.C is applicable if the SSC-CPA to be implemented involves the use of recovered biogas in biomass boiler(s) for palm kernel shell (PKS) displacement. However, as PKS is carbon neutral biomass, therefore no emission reductions will be accounted. In case if real case SSC-CPA involves thermal energy generation that displaces fossil fuel. Emission reductions from fossil fuel displacement can be accounted for. AMS-I.D is applicable if the SSC-CPA to be implemented involves using of recovered biogas for electrical energy generation and export to national/regional grid. AMS-I.F is applicable if the SSC-CPA to be implemented involves using of recovered biogas for electrical energy generation and export to mini-grid or displace electricity from national/regional grid and/or captive fossil fuel electricity generation at the user end.

For project activities covered under paragraph 3(b), if bottles with upgraded biogas are sold outside the project boundary, the end-use of the biogas shall be ensured via a contract between the bottled biogas vendor and the end-user. No emission reductions may be claimed from the displacement of fuels from the end use of bottled biogas in such situations. If however the end use of the bottled biogas is included in the project boundary and is monitored during the crediting period CO_2 emissions avoided by the displacement of fossil fuel can be claimed under the corresponding Type I methodology, e.g. AMS-I.C "Thermal energy production with or without electricity".	AMS-III.H., points 5	Not applicable. The SSC-CPA does not involve selling bottles with upgraded biogas.
For project activities covered under paragraph 3(c)(i), emission reductions from the displacement of the use of natural gas are eligible under this methodology, provided the geographical extent of the natural gas distribution grid is within the host country boundaries.	AMS-III.H., points 6	Not applicable. The SSC-CPA does not involve distributing natural gas to a grid beyond host country boundaries.
For project activities covered under paragraph 3(c)(ii), emission reductions for the displacement of the use of fuels can be claimed following the provision in the corresponding Type I methodology, e.g. AMS-I.C.	AMS-III.H., points 7	Not applicable. The SSC-CPA does not involve fuels displacement with upgrading and transportation of biogas via a dedicated piped network to a group of end users.
In particular, for the case of 3(b) and (c)(iii), the physical leakage during storage and transportation of upgraded biogas, as well as the emissions from fossil fuel consumed by vehicles for transporting biogas shall be considered. Relevant procedures in paragraph 11 of Annex 1 of AMS-III.H. "Methane recovery in wastewater treatment" shall be followed in this regard.	AMS-III.H., points 8	Not applicable. The SSC-CPA does not involve biogas transportation via trucks/bottles.
For project activities covered under paragraph 3(b) and (c), this methodology is applicable if the upgraded methane content of the biogas is in accordance with relevant national regulations (where these exist) or, in the absence of national regulations, a minimum of 96% (by volume).	AMS-III.H., points 9	Not applicable. The SSC-CPA does not involve bottling of upgraded biogas and upgrading and distribution.
If the recovered biogas is utilized for the production of hydrogen (project activities covered under paragraph 3(d)), that component of the project activity shall use corresponding methodology AMS-III.O.	AMS-III.H., points 10	Not applicable, the proposed SSC-PoA does not include hydrogen production.
If the recovered biogas is used for project activities covered under paragraph 3(e), that	AMS-III.H., points 11	Not applicable, the proposed SSC-PoA does not include use as fuel in

component of the project activity shall use corresponding methodology AMS-III.AQ.		transportation applications after upgrading.
New facilities (Greenfield projects) and project activities involving a change of equipment resulting in a capacity addition of the wastewater or sludge treatment system compared to the designed capacity of the baseline treatment system are only eligible to apply this methodology if they comply with the relevant requirements in the "General guidelines to SSC CDM methodologies". In addition the requirements for demonstrating the remaining lifetime of the equipment replaced, as described in the general guidelines shall be followed.	AMS-III.H., points 12	Applicable. Greenfield projects and project activities involving a change of equipment resulting in a capacity addition of the wastewater treatment system need to comply with relevant requirements in the "General guidelines to SSC CDM methodologies" and to requirements for demonstrating the remaining lifetime of the equipment replaced.
The location of the wastewater treatment plant as well as the source generating the wastewater shall be uniquely defined and described in the PDD.	AMS-III.H., point 13	Applicable. The palm oil mill is the only source which generates the wastewater. The location of each SSC-CPA will be identified by address, map and GPS coordinates in each SSC-CPA-DD. A diagram will be included in each SSC-CPA-DD to show the source of POME wastewater and its treatment process for baseline and project activity.
Measures are limited to those that result in aggregate emissions reductions of less than or equal to 60 $ktCO_2$ equivalent annually from all Type III components of the project activity.	AMS-III.H., point 14	Applicable. The emission reductions for each SSC-CPA-DD to be included into SSC-PoA-DD for the type III component will remain below 60 $ktCO_{2e}$/yr throughout the entire crediting period.

Table E.2.A: Applicability Criteria for AMS-I.A, Version 14

Criteria	Reference	Comments
This category comprises renewable electricity generation units that supply individual households /users or groups of households/users included in the project boundary. The applicability is limited to individual households and users that do not have a grid connection except when; a) A group of households or users are supplied electricity through a standalone minigrid powered by renewable energy generation unit(s) where the capacity of the generating units does not exceed 15 MW (i.e., the sum of installed capacities of all renewable	AMS – I.A, Point 1	Applicable. The SSC-CPA to be implemented under this PoA may include individual households / users, mostly mill workers that live nearby the mill, who are not grid connected. a) The capacity of the renewable energy generating units will never exceed 15 MW. This will be assured at every real case CPA level.

energy generators connected to the mini-grid is less than 15 MW) e.g., a community based stand-alone off-the-grid renewable electricity systems; or b) The emissions reduction per renewable energy based lighting system is less than 5 tonnes of CO_{2e} a year and where it can be shown that fossil fuel would have been used in the absence of the project activity by; (i) A representative sample survey (90% confidence interval, ±10% error margin) of target households; or (ii) Official statistics from the host country government agencies. The renewable energy generation units include technologies such as solar, hydro, wind, biomass gasification and other technologies that produce electricity all of which is used onsite/locally by the user, e.g., solar home systems, wind battery chargers . The renewable generating units may be new installations (Greenfield) or replace existing onsite fossil-fuel-fired generation. To qualify as a smallscale project, the total output of the unit(s) shall not exceed the limit of 15 MW.		b) Not applicable for this PoA. CPA which will apply this methodology must meet the below criteria: i) The renewable electricity is generated by combustion of recovered biogas in biogas engine(s), where the generated renewable electricity is supply to individual households / users, thus displacing fossil fuel used in genset(s). ii) Biogas engine(s) can be new installation (Greenfield) where existing fossil fuel fired genset(s) can act as standby unit(s) or replace existing onsite fossil fuel fired gensets(s). iii) The total installed capacity of the biogas engine(s) must not exceed 15 MW.
Hydro power plants with reservoirs that satisfy at least one of the following conditions are eligible to apply this methodology: • The project activity is implemented in an existing reservoir with no change in the volume of reservoir; • The project activity is implemented in an existing reservoir, where the volume of reservoir is increased and the power density of the project activity, as per definitions	AMS – I.A, Point 2	Not applicable. The SSC-CPA to be implemented under this PoA do not include hydro power plant.

given in the Project Emissions section, is greater than 4 W/m^2; • The project activity results in new reservoirs and the power density of the power plant, as per definitions given in the Project Emissions section, is greater than 4 W/m^2.		
Combined heat and power (cogeneration) systems are not eligible under this category.	AMS – I.A, Point 3	The SSC-CPA to be implemented under this PoA and using this methodology will not include any cogeneration system, hence applicable.
If the unit added has both renewable and non-renewable components (e.g., a wind/diesel unit), the eligibility limit of 15 MW for a small-scale CDM project activity applies only to the renewable component. If the unit added co-fires fossil fuel, the capacity of the entire unit shall not exceed the limit of 15 MW.	AMS – I.A, Point 4	Applicable. The SSC-CPA to be implemented under this PoA will be limited to 15 MW capacity for renewable component, if the CPA involves adding units with non-renewable components. Co-fires unit cannot be included in this PoA.
Project activities that involves retrofit or replacement of an existing facility for renewable energy generation are included in this category. To qualify as a small-scale project, the total output of the modified or retrofitted unit shall not exceed the limit of 15 MW.	AMS – I.A, Point 5	Not applicable for retrofit of existing facility for renewable energy generation.
In the case of project activities that involve the addition of renewable energy generation units at an existing renewable power generation facility, the added capacity of the units added by the project should be lower than 15 MW and should be physically distinct from the existing units.	AMS – I.A, Point 6	Not applicable. SSC-CPA to be included in this PoA will not involve addition of renewable energy generation units at an existing renewable power generation facility.

Table E.2.C: Applicability Criteria for AMS-I.C, Version 19

Criteria	Reference	Comments
This methodology comprises renewable energy technologies that supply users with thermal energy that displaces fossil fuel use. These units include technologies such as solar thermal water heaters and dryers, solar cookers, energy derived from renewable biomass and other technologies that provide thermal energy that displaces fossil fuel.	AMS – I.C., Point 1	Applicable. The SSC-CPA to be implemented under this PoA will use recovered biogas in biomass boiler(s) for thermal energy generation that displaces palm kernel shell (PKS). However, as PKS is carbon neutral biomass, no emission reductions will be accounted. In case if real case SSC-CPA involves thermal energy generation that displaces fossil fuel. Emission reductions from

		fossil fuel displacement can be accounted for.
Biomass-based co-generating systems are included in this category. For the purpose of this methodology "cogeneration" shall mean the simultaneous generation of thermal energy and electrical energy in one process. Project activity that produces heat and power in separate element processes (for example, heat from a boiler and electricity from biogas engine) does not fit under the definition of co-generation project.	AMS – I.C., point 2	Not applicable. The SSC-CPA to be implemented under this PoA and using this methodology will not include any co-generating system.
Emission reductions from a biomass cogeneration system can accrue from one of the following activities: (a) electricity supply to a grid; (b) electricity and/or thermal energy (steam/heat) production for on-site consumption or for consumption by other facilities; (c) combination of (a) and (b).	AMS – I.C., point 3	Not applicable. The SSC-CPA to be implemented under this PoA and using this methodology will not include any co-generating system.
The total installed/rated thermal energy generation capacity of the project equipment is equal to or less than 45 MW thermal (see paragraph 6 for the applicable limits for cogeneration project activities).	AMS – I.C., Point 4	Applicable. The SSC-CPA to be implemented under this PoA will have thermal energy generation capacity lower than 45 MW.
For co-fired systems, the total installed thermal energy generation capacity of the project equipment, when using both fossil and renewable fuel shall not exceed 45 MW thermal (see paragraph 6 for the applicable limits for cogeneration project activities).	AMS-I.C, point 5	Not applicable. The SSC-CPA to be implemented under this PoA will not involve co-firing.
The following capacity limits apply for biomass cogeneration units: (a) if the project activity includes emission reductions from both the thermal and electrical energy components, the total installed energy generation capacity (thermal and electrical) of the project equipment shall not exceed 45 MW thermal. For the purpose of calculating this capacity limit the conversion factor of 1:3 shall be used for converting electrical energy to thermal energy (i.e. for renewable energy project activities, the maximal limit of 15 MW(e) is equivalent to 45 MW thermal output of the equipment or the plant); (b) if the emission reductions of the cogeneration project activity are solely on account of thermal energy production (i.e., no emission reductions	AMS-I.C., point 6	Not applicable. The SSC-CPA to be implemented under this PoA and using this methodology will not include any co-generating system.

accrue from electricity component), the total installed thermal energy production capacity of the project equipment of the cogeneration unit shall not exceed 45 MW thermal; (c) if the emission reductions of the cogeneration project activity are solely on account of electrical energy production (i.e., no emission reductions accrue from thermal energy component), the total installed electrical energy generation capacity of the project equipment of the cogeneration unit shall not exceed 15 MW.		
The capacity limits specified in the above paragraphs apply to both new facilities and retrofit projects. In the case of project activities that involve the addition of renewable energy units at an existing renewable energy facility, the total capacity of the units added by the project should comply with capacity limits in paragraphs 4 to 6, and should be physically distinct from the existing units.	AMS-I.C., point 7	Applicable for new facilities: the capacity limits specified above will be applied for new facilities. Applicable for project activities involving capacity addition compared to the baseline scenario and need to comply with relevant requirements in the "General guidelines to SSC CDM methodologies" Not applicable for cases of retrofit, since the CPA to be implemented under this PoA do not include retrofit projects.
Project activities that seek to retrofit or modify an existing facility for renewable energy generation are included in this category.	AMS-I.C., point 8	Not applicable. The SSC-CPA to be implemented under this PoA do not include retrofit of an existing facilities for renewable energy generation.
New Facilities (Greenfield projects) and project activities involving capacity additions compared to the baseline scenario are only eligible if they comply with the related and relevant requirements in the "General Guidelines to SSC CDM methodologies".	AMS-I.C., point 9	Applicable. Greenfield projects and project activities involving capacity additions compared to the baseline scenario need to comply with relevant requirements in the "General Guidelines to SSC CDM methodologies"
If solid biomass fuel (e.g. briquette) is used, it shall be demonstrated that it has been produced using solely renewable biomass and all project or leakage emissions associated with its production shall be taken into account in the emissions reduction calculation.	AMS-I.C., point 10	Not applicable. The SSC-CPA to be implemented under this PoA will not use solid biomass fuel.
Where the project participant is not the producer of the processed solid biomass fuel, the project participant and the producer are bound by a contract that shall enable the project participant	AMS-I.C., point 11	Not applicable. The SSC-CPA to be implemented under this PoA will not use solid biomass fuel.

to monitor the source of the renewable biomass to account for any emissions associated with solid biomass fuel production. Such a contract shall also ensure that there is no double-counting of emission reductions.		
If electricity and/or steam/heat produced by the project activity is delivered to a third party i.e. another facility or facilities within the project boundary, a contract between the supplier and consumer(s) of the energy will have to be entered into that ensures there is no double-counting of emission reductions.	AMS-I.C., point 12	Not applicable. The SSC-CPA to be implemented under this PoA will not involve delivering heat to a third party.
If the project activity recovers and utilizes biogas for power/heat production and applies this methodology on a stand alone basis i.e. without using a Type III component of a SSC methodology, any incremental emissions occurring due to the implementation of the project activity (e.g. physical leakage of the anaerobic digester, emissions due to inefficiency of the flaring), shall be taken into account either as project or leakage emissions.	AMS-I.C., point 13	Not applicable. The SSC-CPA to be implemented under this PoA will combine Type III methodology (AMS-III.H) and relevant Type I methodologies, therefore it is not a stand alone project activity.
Charcoal based biomass energy generation project activities are eligible to apply the methodology only if the charcoal is produced from renewable biomass sources provided: (a) Charcoal is produced in kilns equipped with methane recovery and destruction facility; or (b) If charcoal is produced in kilns not equipped with a methane recovery and destruction facility, methane emissions from the production of charcoal shall be considered. These emissions shall be calculated as per the procedures defined in the approved methodology AMS-III.K. Alternatively, conservative emission factor values from peer reviewed literature or from a registered CDM project activity can be used, provided that it can be demonstrated that the parameters from these are comparable e.g. source of biomass, characteristics of biomass such as moisture, carbon content, type of kiln, operating conditions such as ambient temperature.	AMS-I.C, point 14	Not applicable. The SSC-CPA to be implemented under this PoA will not involve using charcoal based biomass.

Table E.2.D: Applicability Criteria for AMS-I.D, Version 17

Criteria	Reference	Comments
This methodology comprises renewable energy	AMS-I.D.,	Applicable.

generation units, such as photovoltaic, hydro, tidal/wave, wind, geothermal and renewable biomass: a) Supplying electricity to a national or a regional grid; b) Supplying electricity to an identified consumer facility via national/regional grid through a contractual arrangement such as wheeling.	point 1	The SSC-CPA to be included in this PoA involves installation of biogas engine(s) and the generated power will be exported to national or regional grid. The SSC-CPA may also supply the generated renewable energy to an identified consumer facility via national regional grid, provided that a contractual arrangement is signed.
This methodology is applicable to project activities that: (a) Install a new power plant at a site where there was no renewable energy power plant operating prior to the implementation of the project activity (Greenfield plant); (b) Involve a capacity addition; (c) Involve a retrofit of (an) existing plant(s); (d) Involve a replacement of (an) existing plant(s).	AMS-I.D., point 3	Applicable. The SSC-CPA to be included in this PoA will involve the installation of new power plant (Greenfield) only.
Hydro power plants with reservoirs that satisfy at least one of the following conditions are eligible to apply this methodology. - The project activity is implemented in an existing reservoir with no change in the volume of reservoir; - The project activity is implemented in an existing reservoir, where the volume of reservoir is increased and the power density of the project activity, as per definitions given in the project emissions section, is greater than 4 W/m^2; - The project activity results in new reservoirs and the power density of the power plant, as per definitions given in the project emissions section, is greater than 4 W/m^2.	AMS-I.D., point 4	Not applicable. The SSC-CPA to be included in this PoA is a biogas recovery and utilization project.
If the new unit has both renewable and non-renewable components (e.g. a wind/diesel unit), the eligibility limit of 15MW for a small-scale CDM project activity applies only to the renewable component. If the new unit co-fires fossil fuel, the capacity of the entire unit shall not exceed the limit of 15MW.	AMS-I.D., point 5	The SSC-CPA to be implemented under this PoA is limited to 15 MW capacity for renewable component, shall the CPA involve added units with both renewable and non-renewable components (such as new biogas engine(s) and new fossil fuel fired genset(s) acting as standby unit). Co-firing is not applicable for the

		SSC-CPA in this PoA.
Combined heat and power (co-generation) systems are not eligible under this category.	AMS-I.D., point 6	Applicable. The SSC-CPA to be implemented under this PoA cannot be a cogeneration system.
In the case of project activities that involve the addition of renewable energy generation units at an existing renewable power generation facility, the added capacity of the units added by the project should be lower than 15 MW and should be physically distinct from the existing units.	AMS-I.D., point 7	Not applicable. SSC-CPA to be included in this PoA will not involve addition of renewable energy generation units at an existing renewable power generation facility.
In the case of retrofit or replacement, to qualify as a small-scale project, the total output of the retrofitted or replacement unit shall not exceed the limit of 15 MW.	AMS-I.D., point 8	Not applicable. The SSC-CPA to be included in this PoA involves new installation (Greenfield) for renewable energy generation.

Table E.2.F: Applicability Criteria for AMS-I.F, Version 02

Criteria	Reference	Comments
This methodology comprises renewable energy generation units, such as photovoltaic, hydro, tidal/wave, wind, geothermal and renewable biomass that supply electricity to user(s). The project activity will displace electricity from an electricity distribution system that is or would have been supplied by at least one fossil fuel fired generating unit i.e. in the absence of the project activity, the users would have been supplied electricity from one or more sources listed below: (a) A national or a regional grid (grid hereafter); (b) Fossil fuel fired captive power plant; (c) A carbon intensive mini-grid.	AMS-I.F, point 1	SSC-CPA to be included in this PoA involves installation of biogas engine(s) and the generated power will be exported to mini grid or displacement of electricity from national/regional grid/mini grid or fossil fuel fired captive power plant.
For the purpose of this methodology, a mini-grid is defined as small-scale power system with a total capacity not exceeding 15 MW (i.e. the sum of installed capacities of all generators connected to the mini-grid is equal to or less than 15 MW) which is not connected to a national or a regional grid.	AMS-I.F, point 2	If the SSC-CPA exports or displaces renewable electricity to mini grid, the total capacity of the mini grid shall not exceed 15 MW, and shall not be connected to national / regional grid.
Hydro power plants with reservoirs that satisfy at least one of the following conditions are eligible to apply this methodology: • The project activity is implemented in an existing reservoir with no change in the volume of reservoir;	AMS-I.F, point 4	Not applicable. The SSC-CPA to be included in this PoA is a biogas recovery and utilization project.

• The project activity is implemented in an existing reservoir, where the volume of reservoir is increased and the power density of the project activity, as per definitions given in the project emissions section, is greater than 4 W/m^2; • The project activity results in new reservoirs and the power density of the power plant, as per definitions given in the project emissions section, is greater than 4 W/m^2.		
For biomass power plants, no other biomass other than renewable biomass are to be used in the project plant.	AMS-I.F, point 5	Applicable. Biogas generated from degradation of POME in anaerobic condition is the renewable biomass to be used in SSC-CPA.
This methodology is applicable for project activities that: (a) Install a new power plant at a site where there was no renewable energy power plant operating prior to the implementation of the project activity (Greenfield plant); (b) Involve a capacity addition, (c) Involve a retrofit of (an) existing plant(s); or (d) Involve a replacement of (an) existing plant(s).	AMS-I.F, point 6	Applicable. SSC-CPA to be included in this PoA will involve the installation of new power plant (Greenfield) only.
In the case of project activities that involve the capacity addition of renewable energy generation units at an existing renewable power generation facility, the added capacity of the units added by the project should be lower than 15 MW and should be physically distinct from the existing units.	AMS-I.F, point 7	Not applicable. SSC-CPA to be included in this PoA will not involves capacity addition of renewable energy generation units at an existing renewable power generation facility.
In the case of retrofit or replacement, to qualify as a small-scale project, the total output of the retrofitted or replacement unit shall not exceed the limit of 15 MW.	AMS-I.F, point 8	Not applicable. The SSC-CPA that to be included in this PoA involves new installation (Greenfield) for renewable energy generation.
If the unit added has both renewable and non-renewable components (e.g. a wind/diesel unit), the eligibility limit of 15 MW for a small-scale CDM project activity applies only to the renewable component. If the unit added co-fires fossil fuel, the capacity of the entire unit shall not exceed the limit of 15 MW.	AMS-I.F, point 9	Applicable. The SSC-CPA to be implemented under this PoA is limited to 15 MW capacity for renewable component, shall the CPA involve added units with both renewable and non-renewable components (such as new biogas engine(s) and new fossil fuel fired genset(s) that acts as standby unit). Co-fires unit is not applicable for the SSC-CPA in this PoA.
Combined heat and power (co-generation) systems	AMS-I.F,	Applicable. The SSC-CPA to be

are not eligible under this category.	point 10	implemented under this PoA cannot be a cogeneration system.
If electricity and/or steam/heat produced by the project activity is delivered to a third party i.e. another facility or facilities within the project boundary, a contract between the supplier and consumer(s) of the energy will have to be entered that ensures that there is no double counting of emission reductions.	AMS-I.F, point 11	For SSC-CPA that deliver renewable electricity to third party within the project boundary, a contract between the supplier and consumer(s) of the energy will have to be entered into before the inclusion in this PoA, to avoid double counting of emission reductions.

E.3. Description of the sources and gases included in the SSC-CPA boundary

For AMS-III.H, version 16, the project boundary is defined as the physical, geographical site where the wastewater treatment takes place in the baseline and project situation. It covers all facilities affected by the project activity including sites where the processing, transportation and application or disposal of waste products as well as biogas takes place.

For AMS-I.A, version 14, the project boundary is the physical, geographical site of the renewable energy generating unit and the equipment that uses the electricity produced delineates the project boundary.

For AMS-I.C, version 19, the spatial extent of the project boundary encompasses:

a) All plants generating power and/or heat located at the project site, whether fired with biomass, fossil fuels or a combination of both;
b) All power plants connected physically to the electricity system (grid) that the project plant is connected to;
c) Industrial, commercial or residential facility, or facilities, consuming energy generated by the system and the processes or equipment affected by the project activity;
d) The processing plant of biomass residues, for project activities using solid biomass fuel (e.g. briquette), unless all associated emissions are accounted for as leakage emissions;
e) The transportation itineraries, if the biomass is transported over distances greater than 200 kilometres, unless all associated emissions are accounted for as leakage emissions;
f) The site of the anaerobic digester in the case of project activity that recovers and utilizes biogas for power/heat production and applies this methodology on a stand alone basis i.e. without using a Type III component of a SSC methodology.

For AMS-I.D, version 17, the project boundary is the spatial extent of the project boundary includes the project power plant and all power plants connected physically to the electricity system that the CDM project power plant is connected to.

For AMS-I.F, version 02, the project boundary is the spatial extent of the project boundary includes industrial, commercial facilities consuming energy generated by the system. In the case of electricity generated and supplied to distributed users (e.g. residential users) via mini/isolated grid(s) the project boundary may be confined to physical, geographical site of renewable generating units. The boundary also extends to the project power plant and all power plants connected physically to the electricity system that the CDM project power plant is connected to.

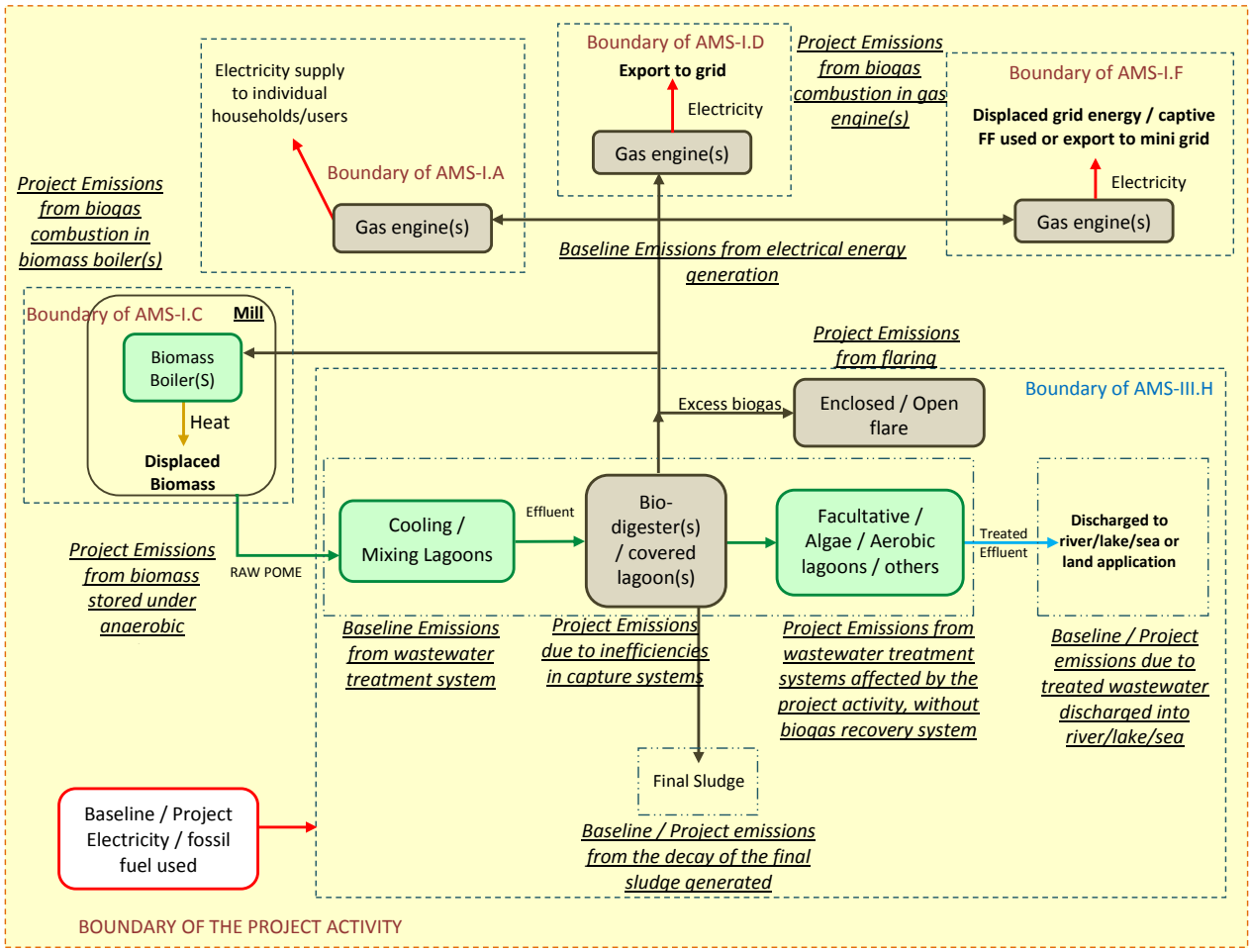


Figure E.1: Project Boundary

Table E.6: Sources and gases to be included in the SSC-CPA boundary

	Source	Gas	Included	Justification / Explanation
Baseline	Emissions due to electricity or fossil fuel used	CO_2	Yes	Main source of emission
		CH_4	No	Not significant. Excluded for simplification and conservativeness
		N_2O	No	Not significant. Excluded for simplification and conservativeness
	Emissions from wastewater treatment system	CO_2	No	Neutral CO_2 emissions from biomass decaying
		CH_4	Yes	Methane emissions from anaerobic treatment process
		N_2O	No	Not significant. Excluded for simplification and conservativeness
	Emissions due to treated wastewater discharged into river/lake/sea	CO_2	No	Neutral CO_2 emissions from biomass decaying
		CH_4	Yes	Methane emissions from degradable organic carbon
		N_2O	No	Not significant. Excluded for simplification and conservativeness
	Emissions from the	CO_2	No	Neutral CO_2 emissions from biomass decaying

	decay of the final sludge generated	CH_4	Yes	Methane emissions from decay of final sludge generated
		N_2O	No	Not significant. Excluded for simplification and conservativeness
	Emissions from electrical energy generation	CO_2	Yes	Main source of emission
		CH_4	No	Not significant. Excluded for simplification and conservativeness
		N_2O	No	Not significant. Excluded for simplification and conservativeness
Project Activity	Emissions from electricity and fuel used by the project facilities	CO_2	Yes	Main source of emission
		CH_4	No	Not significant. Excluded for simplification and conservativeness
		N_2O	No	Not significant. Excluded for simplification and conservativeness
	Emissions from wastewater treatment systems affected by the project activity, without biogas recovery system	CO_2	No	Neutral CO_2 emissions from biomass decaying
		CH_4	Yes	Methane emissions from the treatment process
		N_2O	No	Not significant. Excluded for simplification and conservativeness
	Emissions due to treated wastewater discharged into river/lake/sea	CO_2	No	Neutral CO_2 emissions from biomass decaying
		CH_4	Yes	Methane emissions from degradable organic carbon
		N_2O	No	Not significant. Excluded for simplification and conservativeness
	Emissions from the decay of the final sludge generated	CO_2	No	Neutral CO_2 emissions from biomass decaying
		CH_4	Yes	Methane emissions from decay of final sludge generated
		N_2O	No	Not significant. Excluded for simplification and conservativeness
	Emissions due to inefficiencies in capture systems	CO_2	No	Neutral CO_2 emissions from biomass decaying
		CH_4	Yes	Inefficiency in methane capture of the biogas recovery system
		N_2O	No	Not significant. Excluded for simplification and conservativeness
	Gas engine(s) (biogas combustion)	CO_2	No	Neutral CO_2 emissions from biogas combustion
		CH_4	No	Not significant and excluded from calculation. Biogas combustion efficiency is considered 100%[5]
		N_2O	No	Not significant. Excluded for simplification and conservativeness
	Biomass boilers (biogas combustion)	CO_2	No	Neutral CO_2 emissions from biogas combustion
		CH_4	No	Not significant and excluded from calculation. Biogas combustion efficiency is considered 100% in boiler[6].
		N_2O	No	Not significant. Excluded for simplification and

[5] AMS-III.H, paragraph 35

[6] AMS-III.H, paragraph 35

				conservativeness
	Enclosed/open flaring system	CO_2	No	Neutral CO_2 emissions from biogas combustion
		CH_4	Yes	CH_4 emissions due to incomplete combustion in enclosed / open flare
		N_2O	No	Not significant. Excluded for simplification and conservativeness
	Emissions from biomass stored under anaerobic conditions	CO_2	No	Neutral CO_2 emissions from biogas combustion
		CH_4	Yes	CH_4 emissions due to the storage of biomass displaced under anaerobic conditions
		N_2O	No	Not significant. Excluded for simplification and conservativeness

Leakage emissions associated with CPAs will be accounted for in accordance with the requirements of the baseline and monitoring methodology.

E.4. Description of how the baseline scenario is identified and description of the identified baseline scenario:

The PoA and consequently each CPA applies the simplified baseline methodology for selected small-scale CDM project activity AMS-III.H "Methane recovery in wastewater treatment" Version 16.

Baseline shall be established for each CPA and the identified baseline must be in accordance with the procedures provided in the approved methodology of AMS-III.H. The Small-Scale CDM Programme Activity Design Document (CDM-SSC-CPA-DD) version 01, will describe in detail the baseline for each CPA after the baseline scenario has been identified.

For the avoidance of doubt, the baseline scenario corresponds to the existing wastewater treatment system without biogas recovery facility and without sludge treatment[7]. The anaerobic lagoons comply with the following characteristics[8]:

- their depth is 2.00 meters and they are not equipped with aerators;
- the ambient temperature is above 15°C (tropical area);
- the minimum interval between two (2) consecutive sludge removal events is greater than 30 days.

Baseline emissions for the systems affected by the project activity may consist of:

(i) Emissions on account of electricity or fossil fuel used ($BE_{power,y}$)
(ii) Methane emissions from baseline wastewater treatment systems ($BE_{ww,treatment,y}$)
(iii) Methane emissions from baseline sludge treatment systems ($BE_{s,treatment,y}$)
(iv) Methane emissions on account of inefficiencies in the baseline wastewater treatment systems and presence of degradable organic carbon in the treated wastewater discharged into river/lake/sea ($BE_{ww,discharge,y}$)
(v) Methane emissions from the decay of the final sludge generated by the baseline treatment systems ($BE_{s,final,y}$)

[7] AMS-III.H, Para 1(f) and 17.
[8] AMS-III.H, version 16, para 2

Historical records of at least one year prior to the project implementation shall be used for baseline data where this is available[9]. This shall include the COD removal efficiency of the wastewater treatment systems, the amount of dry matter in sludge, power and electricity consumption per m^3 of wastewater treated, the amount of final sludge generated per tonne of COD removed and all other parameters required for determination of baseline emissions.

For wastewater treatment plant that has been operating for at least three years and if one year historical data is not available, the following procedures shall be followed[10]:

(a) All the available data in determining the required parameters (COD removal efficiency, specific energy consumption and specific sludge production) shall be used to determine the baseline emissions in year *y*;
(b) An *ex ante* measurement campaign shall be implemented to determine the required parameters (COD removal efficiency, specific energy consumption and specific sludge production). The measurement campaign shall be implemented in the baseline wastewater systems for at least 10 days. The measurements should be undertaken during a period that is representative for the typical operation conditions of the systems and ambient conditions of the site (temperature, etc). Average values from the measurement campaign shall be used and the result shall be multiplied by 0.89 to account for the uncertainty range (30% to 50%). The parameters from the measurement campaign are used to calculate the baseline emission in year *y*
(c) The baseline emissions in year *y* is taken as the minimum between the result of (a) and (b).

In the case of Greenfield and capacity addition projects, or existing plant without three year operating history, the following procedures shall be used to determine the baseline emissions:

(1) For existing plant without three year operating history, procedures in paragraph 27 of AMS-III.H (version 16) shall be followed.
(2) For Greenfield and capacity addition projects, one of the following procedures shall be used:

    (a) Value obtained from a measurement campaign in a comparable existing wastewater treatment plant i.e. having similar environmental and technological circumstances for example treating similar type of wastewater. Average values from the measurement campaign shall be used and the result shall be multiplied by 0.89 to account for the uncertainty range (30% to 50%) associated with this approach. The treatment plant and wastewater source can be considered as similar as the baseline plant, whereby the measurement campaign can be implemented when following conditions can be fulfilled:

        (i) The two sources of wastewater (wastewater treated in the selected plant and from the project activity) are of the same type, e.g. either domestic or industrial wastewater;
        (ii) The selected plant and the baseline plants employ the same treatment technology (e.g. anaerobic lagoons or activated sludge), and the hydraulic retention times in their biological and physical treatment systems do not vary by more than 20%; and
        (iii) For project activity treating industrial wastewater, both industries have the same raw material and final products, and apply the same industrial technology. Alternatively,

[9] AMS-III.H, version 16, para 26
[10] AMS-III.H, version 16, para 27

different industrial wastewaters may be considered as similar if the following requirements are fulfilled:

- The ratio COD/BOD (related to the proportion of biodegradable organic matter) does not differ by more than 20%; and
- The ratio [total COD] / [soluble COD] (related to the proportion of suspended organic matter, and therefore to the sludge generation capacity) does not differ by more than 20%.

(b) Value provided by the manufacturer/designer of a Greenfield wastewater treatment plant using the same technology, demonstrated to be conservative, e.g. average values from the top 20 percent plants with lowest emission rate per ton COD removed among the plants installed in the last five years designed for the same country/region to treat the same type of wastewaters as the project activity.

E.5. Description of how the anthropogenic emissions of GHG by sources are reduced below those that would have occurred in the absence of the SSC-CPA being included as registered PoA (assessment and demonstration of additionality of SSC-CPA): >>

E.5.1. Assessment and demonstration of additionality for a typical SSC-CPA:

Prior consideration of the CDM

CPAs to be included in the SSC-PoA-DD shall be after the Global Stakeholder Consultation date of 20/03/2012. Each SSC-CPA must provide either signed Contract documents to show the implementation or construction or real action of a project activity begin or can be checked during physical site visit for projects where construction has not started yet, as per Eligibility Criteria Item (d) under Section A.4.2.2.

As per Clarifications regarding the "Procedures for Registration of a Programme of Activities as a Single CDM Project Activity and Issuance of Certified Emission Reductions for a Programme Of Activities", EB 60 Annex 26, Para 3, CPAs with start date after the publication of the global stakeholder consultation of the SSC-PoA-DD do not have to follow the "Guidelines for the Demonstration and Assessment of Prior Consideration of the CDM", version 04, Annex 13, EB62. However the start date shall be clearly defined as per CDM Glossary of Terms.

Additionality

The project is a small scale project activity. As such, the provisions of Guidelines on the Demonstration of Additionality of Small-Scale Project Activities, Version 09.0, Annex 27, EB 68 will apply to all CPAs to be included in this PoA-DD. The latest Methodological tool "*Demonstration and assessment of additionality*" (version 06.1.0, Annex 20, EB69) can also be used to demonstrate additionality but is not mandatory. Additionality will be assessed and demonstrated at the CPA level. Each CPA shall also refer to EB 62, Annex 5, version 05 (Guidelines on The Assessment of Investment Analysis) or the updated version in the future when demonstrating Investment Barrier.

The '*General Guidelines for SSC CDM methodologies*' (version 19.0, Annex 27, EB69) require the project proponents to demonstrate that the project activity would not have occurred anyway due to *at least one* of the four (4) listed barriers, namely Investment barrier, Technology barrier, Barrier due to prevailing practice and Other barriers. Each SSC-CPA is different and can face one or a mix of these

barriers. The retesting of these barriers would require specific assessments of each barrier for every SSC-CPA. In order to make the assessment of additionality as objective as possible, the CME will test the financial additionality of the SSC-CPA through an *Investment barrier* to demonstrate that the SSC-CPA is indeed additional and will lead to lower emissions. The procedure for conducting the Investment Barrier at SSC-CPA level is described in detail in section E.5.2.

E.5.2. Key criteria and data for assessing additionality of a SSC-CPA:

CPA implementers must demonstrate additionality based on the analysis contained in the previous section and should meet the Investment Barrier.

Investment analysis will be performed pursuant to Step 2 of the additionality tool (version 06.1.0, Annex 20, EB 69) for each SSC-CPA using either simple cost analysis, or benchmark analysis. If the proposed project activity generates no financial or economic benefits other than CDM related income, as in the case of recovery of biogas and flaring it, then simple cost analysis (Option I) will be applied. Otherwise, benchmark analysis (Option III) will be applied.

For Option I (Simple Cost Analysis) and Option III (Benchmark Analysis) , realistic and credible alternative(s) available to the project participants or similar project developers that provide outputs or services comparable with the proposed CDM project activity will be provided as per Para 26, Annex 21, EB 65 and the financial viability of each SSC-CPA will be compared with alternative(s) to demonstrate that there is at least one alternative, for the project activity.

These alternatives will include *inter alia*:

(a) The proposed project activity undertaken without being registered as a CDM project activity.
(b) Continuation of the current situation (no project activity or other alternatives undertaken), if it conforms to local regulations.

For Benchmark Analysis, Project or Equity IRR (without CDM revenues) will be used as financial indicators and the IRR will be compared with a benchmark to demonstrate the project is not economically and financially not viable without CER income . This benchmark represents the minimum Project/Equity IRR that is required for the project to be financially viable.

Benchmark

All financial information used for the benchmark determination will be sourced from independently verifiable public sources and chosen as per the date of investment decision. Depending on the type of financing (debt & equity / Equity), local commercial lending rates from Central Bank or weighted average costs of capital (WACC)/Internal company benchmark will be applied as benchmark for Project IRR. Required/expected returns on equity will be used as benchmarks for Equity IRR. The values in the table of Appendix A (EB62, Annex 5, version 05 or its latest version) may also be used as a simple default option for internal company benchmark or as cost of equity.

Project/Equity IRR calculation

Project/Equity IRR calculations will be based on a list of financial parameters provided by the CPA implementer that are available at the time of making the investment decision. This list of parameters includes, but not limited to:

Table E.7: Parameters for calculation of project IRR

Sl No	Description	Documents to be submitted
1	Budgeted CAPEX: - Bioreactor & accessories - Open or Enclose Flare - Gas engine(s) - Boiler adaptation cost (if biogas sent to biomass boiler(s) for heat generation) - Cabling, transformer cost for grid export if applicable - Consultancy cost, if applicable - Others CAPEX, if applicable	Documented evidence from the CME, such as (inter alia) - Proposals / quotations / tender documents - Award letter / Acceptance Letter - Purchased order
2	Financing pattern - Term loan - Equity	Loan sanction letter from bank (if the project is 100% financed by equity then a declaration from CPA to that effect will be submitted)
3	Terms of loan - Rate of interest - Repayment period - Initial grace period	Loan sanction letter from bank
4	Energy generated from biogas	Based on detailed calculations, which will form part of emission reduction caculation
5	Electricity generation	Calculated by taking into account biogas generated, calorific value of biogas, capacity of biogas engine/s, efficiency of engine/s and working hours. A detailed calculation sheet will be submitted
6	Annual Operational & maintenance costs	Documented evidence from the CME based on similar projects implemented by PP, such as (inter alia): - Quotation / costs by technology supplier(s) - Costs based on similar projects implemented by PP - References from journal for the technologies used. O&M will be indexed using the consumer price index

7	Manpower cost.	Documented evidence from the CME, such as (inter alia): - Manpower requirement as estimated by the technology supplier - letter issued by PP with ruling wage/salary structure of the company - market rate of wages and salaries in the host country Manpower cost is subjected to annual increment
8	Escalation in Salary	Documented evidence from the CME, viz., - letter issued by PP detailing the salary escalation based on 3 to 5 years; - market survey report available in public domain
9	Price of Biomass ex-factory/Furance oil/diesel, if applicable	Documented evidence from the CME, such as (inter alia): - Records from the mill (invoice/contracts) - Third party invoices, in case the project is a new
10	RE tariff export to grid, if applicable	To confirm if E- policy is applicable - latest available rate based on the rate published by the government agency/utilities company.
11	Industrial/resdidential/commercialelectricity tariff, if applicable	If it involves electricity displacement from grid/mini grid, based on current tariff the mill/resident/commercial establishment (electric bill) or current tariff approved by the utilities company / government agency.
12	Diesel /Furnace oil/biomass cost, if applicable	Based on mill's records/market survey/national records
13	Laboratory Cost	Quotations/proposals from accredited laboratory in the host country.
14	Insurance premium per year (% of CAPEX)	Existing mill's insurance policy / proposal for biogas plant
15	Inflation Rate / Consumer Price Index (%)	Based on available information

		from government agencies / reports from the central bank
16	Escalation in biomass/fossil fuel cost (%)	Based on available information from mill's records/market report/information from Govt. agencies
17	Depreciation	Income Tax Act
18	Project technical life time	As per manufacturer specification / expert's opinion / Tool to determine the remaining lifetime of equipment (Version 01, Annex 15, EB50)
19	Residual value / fair value.	10% of the initial investment cost.
20	Biogas engine/s capacity	Documentary evidence such as offer letter, purchase order or FSR
21	Biogas engine PLF	Documentary evidence conforming to Ex-ante definition of the plant load factors as per Para 3a and 3b of Annex 11 (version 01), EB48.
22	Boiler capacity	Documentary evidence such as offer letter, purchase order or FSR
23	Other parameters that deem necessary for the SSC-CPA	To be determined by CME and confirmed by DOE during the inclusion to PoA.
24	Corporate tax (%)	Income Tax Act

Currency to be applied in the Investment Analysis will be MYR unless specifically stated. For equipment that is quoted in foreign currency, the conversion rate to MYR (or vice versa) will be based on reliable sources or reference such as Central Bank / Oanda[11], etc. prevailing at the time of decision making.

Sensitivity analysis

A sensitivity analysis will be conducted to test the robustness of the conclusions drawn. Following factors have been identified as critical parameters, viz., Project cost, O&M cost, Project Revenues (which depends on the final usage of recovered biogas – export to grid / biomass displacement / Electricity displacement / Fossil Fuel displacement). For Project Revenues that export electricity to grid or grid displacement, the revenue depends on the electricity tariff and the quantity of electricity generated.

Besides the above mentioned variables, any variables identified at the CPA level that constitute more than 20% of either total project costs or total project revenues will also be subjected to +/- 10% variation. Where the DOE considers that a variable which constitute less than 20% has a material impact on the

[11] http://www.oanda.com/

analysis, such parameters will also be subjected to sensitivity analysis. The results of sensitivity analysis will be given transparently in the following tabular format :

Table E.8: Sensitivity Analysis

FACTORS	PROJECT / EQUITY IRR		
	-10%	0%	+10%
Project cost			
O & M cost			
Project Revenues			
Diesel/FO/Biomass cost			
Power tariff			

If the IRR exceeds the benchmark in one or more of the identified parameters considered for the sensitivity analysis, the CME shall provide evidences that this is unlikely to happen. If no sufficient proof is provided, the CPA will be considered as non-additional.

A template has been prepared for computation of IRR, in which by filling in the input parameters, financial indicator gets automatically calculated, with minimal manual intervention.

E.6. Estimation of Emission reductions of a CPA:

E.6.1. Explanation of methodological choices, provided in the approved baseline and monitoring methodology applied, selected for a typical SSC-CPA:

The methodological choices that will be applied in relation to each of the CPAs to be developed under this PoA are based on the methodology AMS-III.H. (Version 16) and referred tools (see Section E.1 of this PoA-DD).

An *ex ante* estimate of emissions reductions should be provided in the CPA-DD. This requires projecting the future GHG emissions of the wastewater for the calculation of baseline emissions.

Determination of Baseline Emissions

In the context of this PoA, the methodology AMS-III.H. (Version 16) is applicable when the baseline scenario is NOT wastewater and sludge treatment systems equipped with a biogas recovery facility. In determining and identifying the baseline scenarios, Section E.4 has to be followed.

The *ex-ante* baseline emissions are calculated by taking into account of:

Source of baseline emissions	Justification
Wastewater and sludge treatment systems equipped with a biogas recovery facility shall be excluded from the baseline	No biogas recovery in the baseline scenario for wastewater treatment system.
Emissions on account of electricity or	If applicable, shall follow the procedures described in the

fossil fuel used ($BE_{power,y}$)	"Tool to calculate baseline, project and/or leakage emissions from electricity consumption" and "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion".
Methane emissions from baseline wastewater treatment systems ($BE_{ww,treatment,y}$)	Baseline wastewater system is not equipped with biogas recovery system, thus results in GHG emissions. Baseline emissions will account for this source of emissions. Determine based on COD removal efficiency of the baseline treatment system.
Methane emissions from baseline sludge treatment systems ($BE_{s,treatment,y}$)	Not applicable in this PoA. Only involves wastewater treatment system.
Methane emissions on account of inefficiencies in the baseline wastewater treatment systems and presence of degradable organic carbon in the treated wastewater discharged into river ($BE_{ww,discharge,y}$)	If treated wastewater is being discharged to sea/river/lake, baseline emissions due to it will be accounted.
Methane emissions from the decay of the final sludge generated by the baseline treatment systems ($BE_{s,final,y}$)	If the final sludge is decay under anaerobic conditions which will leads to methane generation, emissions due to the activity will be accounted.
If the baseline wastewater treatment system is different from the treatment system in the project scenario, the sludge generation rate (amount of sludge generated per unit of COD removed) in the baseline may differ significantly from that of the project scenario.	Will be assessed in each CPA. Should the treatment system is different in baseline and project scenario, the sludge generation rate will be determined according to the Section E.4.

The *ex-post* baseline emissions will be calculated based on monitoring of the amount of methane captured, flared and/or gainfully used for thermal/power generation in year *y* and based on the amount of electricity generated using the biogas in year *y*.

Determination of Project Emissions

Project activity emissions from the systems affected by the project activity are:

Source of project activity emission	Justification
CO_2 emissions on account of power and fossil fuel used by the project activity facilities ($PE_{power,y}$)	If applicable, shall follow the procedures described in the "Tool to calculate baseline, project and/or leakage emissions from electricity consumption" (version 01, Annex 7, EB39) and "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion" (version 02, Annex 11, EB41).
Methane emissions from wastewater treatment systems affected by the project activity, and not equipped with biogas recovery in the project situation ($PE_{ww,treatment,y}$)	For CPA that having the wastewater treatment system that is not equipped with biogas recovery, it will leads to GHG emissions. Project emissions will be accounted for this source of emissions.

Methane emissions from sludge treatment systems affected by the project activity, and not equipped with biogas recovery in the project situation ($PE_{s,treatment,y}$)	Not Applicable in this PoA. Only involves wastewater treatment system.
Methane emissions on account of inefficiency of the project activity wastewater treatment systems and presence of degradable organic carbon in treated wastewater ($PE_{ww,discharge,y}$)	For CPA that discharge wastewater that still contain COD into sea/river/lake, project emissions will be accounted for the presence of degradable organic carbon in treated wastewater.
Methane emissions from the decay of the final sludge generated by the project activity treatment systems ($PE_{s,final,y}$)	For CPA that allows final sludge to decay under anaerobic conditions that will leads to biogas generation, project emissions will be accounted for this source of emissions.
Methane fugitive emissions on account of inefficiencies in capture systems ($PE_{fugitive,y}$)	Project emissions due to inefficiencies of the biogas recovery system, either default value of 90% for CFE or default value of 0.05 m^3 biogas leaked/m^3 biogas produced to be used.
Methane emissions due to incomplete flaring ($PE_{flaring,y}$)	The project emissions related to flaring will be determined *ex-post* using the *Tool to determine project emissions from flaring gases containing methane*.
Methane emissions from biomass stored under anaerobic conditions which does not take place in the baseline situation ($PE_{biomass,y}$)	For CPA that store biomass under anaerobic conditions which does not take place in the baseline situation, "Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site" will be used in this regard.

Determination of Leakage

If the technology is using equipment transferred from another activity, leakage effects at the site of the other activity are to be considered and estimated (LE_y). But it is also noted that leakage from equipment transferred from within to outside the project boundary may be excluded from consideration in SSC methodologies.

Calculation of Emissions Reductions

Emission Reductions are calculated by subtracting project emissions from baseline emissions.

Project activities under PoA

In case the project activity involves the replacement of equipment, and the leakage effect of the use of the replaced equipment in another activity is neglected, because the replaced equipment is scrapped, an independent monitoring of scrapping of replaced equipment needs to be implemented. The monitoring should include a check if the number of project activity equipment distributed by the project and the number of scrapped equipment correspond with each other. For this purpose scrapped equipment should be stored until such correspondence has been checked. The scrapping of replaced equipment should be documented and independently verified.

E.6.2. Equations, including fixed parametric values, to be used for calculation of emission reductions of a SSC-CPA:

Baseline emissions

Source of baseline emissions	Reference
Wastewater and sludge treatment systems equipped with a biogas recovery facility shall be excluded from the baseline	AMS-III.H Point 17
Emissions on account of electricity or fossil fuel used ($BE_{power,y}$)	AMS-III.H Point 18 (i)
Methane emissions from baseline wastewater treatment systems ($BE_{ww,treatment,y}$)	AMS-III.H Point 18 (ii)
Methane emissions from baseline sludge treatment systems ($BE_{s,treatment,y}$)	AMS-III.H Point 18 (iii)
Methane emissions on account of inefficiencies in the baseline wastewater treatment systems and presence of degradable organic carbon in the treated wastewater discharged into river ($BE_{ww,discharge,y}$)	AMS-III.H Point 18 (iv)
Methane emissions from the decay of the final sludge generated by the baseline treatment systems ($BE_{s,final,y}$)	AMS-III.H Point 18 (v)

$BE_y = (BE_{power,y}) + (BE_{ww,treatment,y}) + (BE_{s,treatment,y}) + (BE_{ww,discharge,y}) + (BE_{s,final,y})$		**Equation 1**
Where	*Description*	*Units*
BE_y	Baseline emissions in the 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 into sea/river/lake in year *y*	tCO_{2e}
$BE_{s,final,y}$	Baseline methane emissions from anaerobic decay of the final sludge produced in year *y*	tCO_{2e}

Baseline emissions from electricity and fossil fuel consumption ($\boldsymbol{BE_{power,y}}$) are determined:

As per the procedures described in the "*Tool to calculate baseline, project and/or leakage emissions from electricity consumption*" (version 01, Annex 7, EB39) and "*Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion*" (version 02, Annex 11, EB41). The energy consumption shall include all equipment/devices in the baseline wastewater and sludge treatment facility. If recovered biogas in the baseline is used to power auxiliary equipment it should be taken into account accordingly, using zero as its emission factor.

$BE_{ww,treatment,y} = \sum_i (Q_{ww,i,y} * COD_{inflow,i,y} * \eta_{COD,BL,i} * MCF_{ww,treatment,BL,i}) * B_{o,ww} * UF_{BL} * GWP_{CH4}$		**Equation 2**
Where	*Description*	*Units*
$Q_{ww,i,y}$	Volume of wastewater treated in baseline wastewater treatment system *i* in year *y*	m^3 / year
$COD_{inflow,i,y}$	Chemical oxygen demand of the wastewater inflow to the baseline treatment system *i* in year *y*	$tCOD/m^3$
$\eta_{COD,BL,i}$	COD removal efficiency of the baseline treatment system *i*	-
$MCF_{ww,treatment,BL,i}$	Methane correction factor for baseline wastewater treatment systems *i* (MCF values as per table III.H.1.)	-
i	Index for baseline wastewater treatment system	-
$B_{o,ww}$	Methane producing capacity of wastewater (IPCC 2006 of 0.25)	$kgCH_4$ / kgCOD
UF_{BL}	Model correction factor to account for model uncertainties (0.89)	-
GWP_{CH4}	Global Warming Potential for methane (21)	-

$BE_{s,treatment,y} = \sum_j S_{j,BL,y} * MCF_{s,treatment,BL,j} * DOC_s * UF_{BL} * DOC_f * F * 16/12 * GWP_{CH4}$		**Equation 3**
Where	*Description*	*Units*
$S_{j,BL,y}$	Amount of dry matter in the sludge that would have been treated by the sludge treatment system *j* in the baseline scenario	mt / year
j	Index for baseline sludge treatment system	-
$MCF_{s,treatment,BL,j}$	Methane correction factor for the baseline sludge treatment system *j* (MCF values as per Table III.H.1)	-
DOC_s	Degradable organic content of the untreated sludge generated in the year *y* (fraction, dry basis). Default values of 0.5 for domestic sludge and 0.257 for industrial sludge shall be used	-
UF_{BL}	Model correction factor to account for model uncertainties (0.89)	-
DOC_f	Fraction of DOC dissimilated to biogas (IPCC default value of 0.5)	-
F	Fraction of CH_4 in biogas (IPCC default of 0.5)	-
GWP_{CH4}	Global Warming Potential for methane (21)	-

If the sludge is composted, the following equation shall be applied:

$BE_{s,treatment,y} = \sum_j S_{j,BL,y} * EF_{composting} * GWP_{CH4}$		**Equation 4**
Where	*Description*	*Units*
$S_{j,BL,y}$	Amount of dry matter in the sludge that would have been treated by the sludge treatment system *j* in the baseline scenario	mt / year
$EF_{composting}$	Emission factor for composting organic waste (tCH_4 / t waste treated). Emission factors can be based on facility/site-specific	-

	measurements, country specific values or IPCC default values (Table 4.1, chapter 4, Volume 5, 2006 IPCC Guidelines for National Greenhouse Gas Inventories). IPCC default value is 0.01 tCH4 / t sludge treated on a dry weight basis.	
GWP_{CH4}	Global Warming Potential for methane (21)	-

If the baseline wastewater treatment system is different from the treatment system in the project scenario, the sludge generation rate (amount of sludge generated per unit of COD removed) in the baseline may differ significantly from that of the project scenario. The monitored values of the amount of sludge generated during the crediting period will be used to estimate the amount of sludge generated in the baseline, as follows:

$S_{j,BL,y} = S_{l,PJ,y} * SGR_{BL} / SGR_{PJ}$		**Equation 5**
Where	*Description*	*Units*
$S_{l,PJ,y}$	Amount of dry matter in the sludge treated by the sludge treatment system *l* in year *y* in the project scenario	mt / year
SGR_{BL}	Sludge generation ratio of the wastewater treatment plant in the baseline scenario (t of dry matter in sludge / t COD removed). This ratio will be determined as per paragraphs 26, 27 or 28.	-
SGR_{PJ}	Sludge generation ratio of the wastewater treatment plant in the project scenario (t of dry matter in sludge / t COD removed). Calculated using the monitored values of COD removal and sludge generation in the project scenario.	-

$BE_{ww,discharge,y} = Q_{ww,y} * GWP_{CH4} * B_{o,ww} * UF_{BL} * COD_{ww,discharge,BL,y} * MCF_{ww,BL,discharge}$		**Equation 6**
Where	Description	Units
$Q_{ww,y}$	Volume of treated wastewater discharged in year *y*	m^3 / year
GWP_{CH4}	Global warming potential of methane	-
$B_{o,ww}$	Methane producing capacity of wastewater (IPCC 2006 of 0.25)	$kgCH_4$ / kgCOD
UF_{BL}	Model correction factor to account for model uncertainties (0.89)	-
$COD_{ww,discharge,BL,y}$	Chemical oxygen demand of the treated wastewater discharged into sea, river or lake in the baseline situation in the year *y* (tonnes/m^3). If the baseline scenario is the discharge of untreated wastewater, the COD of untreated wastewater shall be used	tonnes COD/m^3
$MCF_{ww,BL,discharge}$	Methane correction factor based on discharge pathway in the baseline situation (e.g. into sea, river or lake) of the wastewater (fraction) (MCF values as per table III.H.1)	-

$BE_{s,final,y} = S_{final,BL,y} * DOC_s * UF_{BL} * MCF_{s,BL,final} * DOC_f * F * 16/12 * GWP_{CH4}$	**Equation 7**

Where	*Description*	*Units*
$S_{final,BL,y}$	Amount of dry matter in the final sludge generated by the baseline wastewater treatment systems in the year *y*. If the baseline wastewater treatment system is different from the project system, it will be estimated using the monitored amount of dry matter in the final sludge generated by the project activity ($S_{final,PJ,y}$) corrected for the sludge generation ratios of the project and baseline systems as per equation 5.	mt / year
$MCF_{s,BL,final}$	Methane correction factor of the disposal site that receives the final sludge in the baseline situation, estimated as per the procedures described in the "Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site".	-
DOC_s	Degradable organic content of the untreated sludge generated in the year *y* (fraction, dry basis). Default values of 0.5 for domestic sludge and 0.257 for industrial sludge9 shall be used	-
DOC_f	Fraction of DOC dissimilated to biogas (IPCC default value of 0.5)	-
F	Fraction of CH_4 in biogas (IPCC default of 0.5)	-
UF_{BL}	Model correction factor to account for model uncertainties (0.89)	-
GWP_{CH4}	Global Warming Potential for methane (21)	-

Project activity emissions:

The project activity emission sources as per the methodology and their relevance with respect to the proposed CDM project activity are given below in a tabular format:

Source of project activity emission	Reference
CO_2 emissions on account of power and fossil fuel used by the project activity facilities ($PE_{power,y}$)	AMS-III.H, point 29(i)
Methane emissions from wastewater treatment systems affected by the project activity, and not equipped with biogas recovery in the project situation ($PE_{ww,treatment,y}$)	AMS-III.H, point 29 (ii)
Methane emissions from sludge treatment systems affected by the project activity, and not equipped with biogas recovery in the project situation ($PE_{s,treatment,y}$)	AMS-III.H, point 29 (iii)
Methane emissions on account of inefficiency of the project activity wastewater treatment systems and presence of degradable organic carbon in treated wastewater ($PE_{ww,discharge,y}$)	AMS-III.H, point 29 (iv)
Methane emissions from the decay of the final sludge generated by the project activity treatment systems ($PE_{s,final,y}$)	AMS-III.H, point 29 (v)
Methane fugitive emissions on account of inefficiencies in capture systems ($PE_{fugitive,y}$)	AMS-III.H, point 29 (vi)
Methane emissions due to incomplete flaring ($PE_{flaring,y}$)	AMS-III.H, point 29 (vii)
Methane emissions from biomass stored under anaerobic conditions which does not take place in the baseline situation ($PE_{biomass,y}$)	AMS-III.H, point 29 (viii)

Hence the formula for estimation of project activity emissions is:

$PE_y = PE_{power,y} + PE_{ww,treatment,y} + PE_{s,treatment,y} + PE_{ww\ discharge,\ y} + PE_{s,final,y} + PE_{fugitive,\ y} + PE_{biomass,y} + PE_{flaring,\ y}$		**Equation 8**
Where	*Description*	*Units*
PE_y	Project activity emissions in the year *y*	tCO_{2e}
$PE_{power,y}$	CO_2 emissions on account of power and fuel used by the project activity facilities	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 which would not have occurred in the baseline situation	tCO_{2e}
$PE_{flaring\ y}$	Methane emissions due to incomplete flaring	tCO_{2e}

Where:

Project emissions from electricity and fossil fuel consumption ($BE_{power,y}$) are determined:

As per the procedures described in the "*Tool to calculate baseline, project and/or leakage emissions from electricity consumption*" (version 01, Annex 7, EB39) and "*Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion*" (version 02, Annex 11, EB41).

$PE_{ww,treatment,\ y} = Q_{ww,k,y} * COD_{inflow,k\ ,y} * \eta_{PJ,k,y} * MCF_{ww,treatment,PJ,k)} * B_{o,ww} * UF_{PJ} * GWP_{CH4}$		**Equation 9**
Where	*Description*	*Units*
$Q_{ww,k,y}$	Volume of wastewater treated in project activity wastewater treatment system *k* in year *y*	m^3 / year
$COD_{inflow,k,y}$	Chemical oxygen demand of the wastewater inflow to the project activity treatment system *k* in year *y*	$tCOD/m^3$
$\eta_{PJ,k,y}$	Chemical oxygen demand removal efficiency of the project wastewater treatment system *k* in year *y* (t/m3), measured based on inflow COD and outflow COD in system *k*	-
$MCF_{ww,treatment,PJ,k}$	Methane correction factor for project wastewater treatment system *k* (MCF values as per table III.H.1.)	-

k	Index for project activity wastewater treatment system	-
$B_{o,ww}$	Methane producing capacity of wastewater (IPCC 2006 of 0.25)	$kgCH_4$ / kgCOD
UF_{PJ}	Model correction factor to account for model uncertainties (1.12)	-
GWP_{CH4}	Global Warming Potential for methane (21)	-

$PE_{s,treatment,\,y} = S_{l,PJ,y} * MCF_{s,treatment,l} * DOC_s * UF_{PJ} * DOC_f * F * 16/12 * GWP_{CH4}$		**Equation 10**
Where	*Description*	*Units*
$S_{l,PJ,y}$	Amount of dry matter in the sludge treated by the sludge treatment system *l* in the project scenario in year *y*	mt / year
l	Index for project activity sludge treatment system	-
$MCF_{s,treatment,l}$	Methane correction factor for the project sludge treatment system *l* (MCF values as per Table III.H.1)	-
DOC_s	Degradable organic content of the untreated sludge generated in the year *y* (fraction, dry basis). Default values of 0.5 for domestic sludge and 0.257 for industrial sludge9 shall be used	-
UF_{PJ}	Model correction factor to account for model uncertainties (1.12)	-
DOC_f	Fraction of DOC dissimilated to biogas (IPCC default value of 0.5)	-
F	Fraction of CH_4 in biogas (IPCC default of 0.5)	-
GWP_{CH4}	Global Warming Potential for methane (21)	-

If the sludge is composted, the following equation shall be applied:

$PE_{s,treatment,\,y} = S_{l,PJ,y} * EF_{composting} * GWP_{CH4}$		**Equation 11**
Where	*Description*	*Units*
$S_{l,PJ,y}$	Amount of dry matter in the sludge that would have been treated by the sludge treatment system *l* in the project scenario in year *y*	mt / year
$EF_{composting}$	Emission factor for composting organic waste (tCH_4 / t waste treated). Emission factors can be based on facility/site-specific measurements, country specific values or IPCC default values (Table 4.1, chapter 4, Volume 5, 2006 IPCC Guidelines for National Greenhouse Gas Inventories). IPCC default value is 0.01 tCH4 / t sludge treated on a dry weight basis.	-
GWP_{CH4}	Global Warming Potential for methane (21)	-

$PE_{ww,discharge,y} = Q_{ww,y} * GWP_{CH4} * B_{o,ww} * UF_{PJ} * COD_{ww,discharge,PJ,y} * MCF_{ww,PJ,discharge}$		**Equation 12**
Where	*Description*	*Units*
$Q_{ww,y}$	Quantity of wastewater treated in year *y*	m^3 / year
$COD_{ww,discharge,PJ,,}$	Chemical oxygen demand of the treated wastewater discharged into sea, river or lake in the project scenario in year *y*	Tonnes COD / m^3

$MCF_{ww,PJ,discharge}$	Chemical oxygen demand of the treated wastewater discharged into the sea, river or lake in the project scenario in year *y*	-
$B_{o,ww}$	Methane producing capacity of the treated wastewater (IPCC 2006 of 0.25)	$kgCH_4$ / kgCOD
UF_{PJ}	Model correction factor to account for model uncertainties (1.12)	-
GWP_{CH4}	Global warming potential of methane (21)	-

$PE_{s,final,y} = S_{final,PJ,y} * DOC_s * UF_{PJ} * MCF_{s,PJ,final} * DOC_F * F * 16/12 * GWP_{CH4}$		**Equation 13**
Where	*Description*	*Units*
$S_{final,PJ,y}$	Amount of dry matter in final sludge generated by the project wastewater treatment systems in the year *y*	mt / year
$MCF_{s,PJ,final}$	Methane correction factor of the disposal site that receives the final sludge in the project situation, estimated as per the procedures described in the "*Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site*".	-
DOC_s	Degradable organic content of the untreated sludge generated in the year *y* (fraction, dry basis). Default values of 0.5 for domestic sludge and 0.257 for industrial sludge9 shall be used	-
DOC_F	Fraction of DOC dissimilated to biogas (IPCC default value of 0.5)	-
F	Fraction of CH_4 in biogas (IPCC default of 0.5)	-
UF_{PJ}	Model correction factor to account for model uncertainties (1.12)	-
GWP_{CH4}	Global Warming Potential for methane (21)	-

For $\underline{PE_{fugitive,y}}$, option of a default value of 0.05 m^3 biogas leaked / m^3 biogas produced may be used as an alternative to calculations per equation 14 – 18 listed below:

$PE_{fugitive,y} = PE_{fugitive,ww,y} + PE_{fugitive,s,y}$		**Equation 14**
Where	*Description*	*Units*
$PE_{fugitive,ww,y}$	Fugitive emissions through capture inefficiencies in the anaerobic wastewater treatment systems in the year *y*	tCO_{2e}
$PE_{fugitive,s,y}$	Fugitive emissions through capture inefficiencies in the anaerobic sludge treatment systems in the year *y*	tCO_{2e}

$PE_{fugitive,ww,y} = (1 - CFE_{ww}) * MEP_{ww,treatment,y} * GWP_{CH4}$		**Equation 15**
Where	*Description*	*Units*
CFE_{ww}	Capture efficiency of the biogas recovery equipment in the wastewater treatment systems (default value of 0.9)	-
$MEP_{ww,treatment,y}$	Methane emission potential of wastewater treatment systems equipped with biogas recovery system in year *y*	Tonnes

GWP_{CH4}	Global warming potential of methane (21)	-

$MEP_{ww,treatment,y} = Q_{ww,y} * B_{o,ww} * UF_{PJ} * (COD_{removed,PJ,k,y} * MCF_{ww,treatment,PJ,k})$		**Equation 16**
Where	*Description*	*Units*
$Q_{ww,y}$	Quantity of wastewater treated in year *y*	m^3 / yr
$B_{o,ww}$	Methane producing capacity of the treated wastewater (IPCC 2006 of 0.25)	$kgCH_4$ / kgCOD
$COD_{removed, PJ,k,y}$	The chemical oxygen demand removed by the treatment system *k* of the project activity equipped with biogas recovery in the year *y*	tCOD / m^3
$MCF_{ww,treatment,PJ,k}$	Methane correction factor for the wastewater treatment system *k* equipped with methane recovery and combustion / flare / utilization equipment (MCF values table III.H.1)	-
UF_{PJ}	Model correction factor to account for model uncertainties (1.12)	-

$PE_{fugitive,s,y} = (1 – CFE_s) * MEP_{s,treatment,y} * GWP_{CH4}$		**Equation 17**
Where	*Description*	*Units*
CFE_s	Capture efficiency of the biogas recovery equipment in the sludge treatment systems (default value of 0.9)	-
$MEP_{ww,treatment,y}$	Methane emission potential of sludge treatment systems equipped with a biogas recovery system in year *y*	Tonnes
GWP_{CH4}	Global warming potential of methane (21)	-

$MEP_{s,treatment,y} = (S_{l,PJ,y} * MCF_{s,treatment,PJ,l}) * DOC_s * UF_{PJ} * DOC_F * F * 16/12$		**Equation 18**
Where	*Description*	*Units*
$S_{l,PJ,y}$	Amount of sludge treated in the project sludge treatment system *l* equipped with a biogas recovery system (on a dry basis) in year *y*	mt / yr
$MCF_{s,treatment,PJ,l}$	Methane correction factor for the sludge treatment system equipped with biogas recovery equipment (MCF values as per Table III.H.1)	-
DOC_s	Degradable organic content of the untreated sludge generated in the year *y* (fraction, dry basis). Default values of 0.5 for domestic sludge and 0.257 for industrial sludge9 shall be used	-
UF_{PJ}	Model correction factor to account for model uncertainties (1.12)	-
DOC_F	Fraction of DOC dissimilated to biogas (IPCC default value of 0.5)	-
F	Fraction of CH_4 in biogas (IPCC default of 0.5)	-

Ex-ante calculation of $PE_{flaring,y}$

$PE_{flaring,y} = TM_{flared,y} * (1 - \eta_{flare,y}) * GWP_{CH4}$		**Equation 19**
Where	*Description*	*Units*

$PE_{flaring,y}$	Methane emissions due to incomplete flaring	tCO_{2e}/year
$TM_{flared,y}$	Quantity of methane flared in the year *y*	tonnes CH_4
$\eta_{flare,y}$	Flare efficiency during year *y*	%
GWP_{CH4}	Global warming potential of methane (21)	-

Where:

$TM_{flared,y} = BE_{ww,treatment,y} / GWP_{CH4}$		**Equation 20**
Where	*Description*	*Units*
$BE_{ww,treatment,y}$	Baseline emissions of the wastewater treatment systems affected by the project activity in year *y*	tCO_{2e}
GWP_{CH4}	Global warming potential of methane (21)	-

Ex-post calculation of $PE_{flaring,y}$

$PE_{flaring,y} = \sum_{h=1}^{8,760}\{ TM_{flared,h} * (1 - \eta_{flare,h}) * GWP_{CH4}\}$		**Equation 21a[12]**
Where	*Description*	*Units*
$PE_{flaring,y}$	Methane emissions due to incomplete flaring	tCO_{2e}/year
$TM_{flared,h}$	Mass flow rate of methane flared in the hour *h*	tCH_4/hour
$\eta_{flare,h}$	Flare efficiency in hour *h* based on default values for open flare	%
GWP_{CH4}	Global Warming Potential (GWP) of methane (21)	tCO_{2e}/tCH_4

$TM_{flared,h} = FV_{flared,h} * fv_{CH4,h} * \rho_{CH4,n} / 1,000$		**Equation 21b**
Where	*Description*	*Units*
$TM_{flared,h}$	Mass flow rate of methane flared in the hour *h*	tCH_4/hour
$FV_{flared,h}$	Volumetric flow rate of the biogas gas at normal conditions in hour *h*	Nm^3 biogas/hr
$fv_{CH4,h}$	Volumetric fraction of methane in the biogas gas in hour *h*	%
$\rho_{CH4,n}$	Density of methane at normal conditions	$kgCH_4$ / Nm^3CH_4

For $PE_{biomass,y}$, will be determined by using "Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site" if storage of biomass under anaerobic conditions takes place in the project and does not occur in the baseline.

[12] "Tool to determine project emissions from flaring gases containing methane", Annex 13, EB 28.

Leakage emission:

If the used technology is equipment transferred from another activity, leakage effects at the site of the other activity are to be considered and estimated (LE_y).

If the project activity involves the replacement of equipment, the leakage due to the replacement in another activity is neglected as the replaced equipment will be scrapped. This will includes in the monitoring protocol. For this purpose scrapped equipment should be stored until it has been verified.

Emission reduction:

$ER_{y,ex\ ante} = BE_{y,ex\ ante} - (PE_{y,ex\ ante} + LE_{y,ex\ ante})$		**Equation 22**
Where	*Description*	*Units*
$ER_{y\ ex\ ante}$	*Ex ante* emission reduction in year *y*	tCO_{2e}
$BE_{y,ex\ ante}$	*Ex ante* baseline emissions in year *y*	tCO_{2e}
$PE_{y,ex\ ante}$	*Ex ante* project emissions in year *y*	tCO_{2e}
$LE_{y,ex\ ante}$	*Ex ante* leakage emissions in year *y*	tCO_{2e}

E.6.3. Data and parameters that are to be reported in CDM-SSC-CPA-DD form:

Part or all of the parameters listed below may be applicable for different CPAs that are to be included into this PoA, depending on the scenario of the CPA.

Data / Parameter:	**GWP_{CH4}**
Data unit:	tCO_2/tCH_4
Description:	Global Warming Potential, the equivalent in CO_2 of the effect of methane gas to the atmosphere
Source of data used:	IPCC 2006
Value applied:	21 for the first commitment period
Justification of the choice of data or description of measurement methods and procedures actually applied :	Global warming potential for methane gas since this is a methane capture project
Any comment:	Shall be updated according to future COP/MOP decisions.

Data / Parameter:	**$Q_{ww,i,y}$**
Data unit:	m^3 / month
Description:	The flow of wastewater entering the baseline treatment system
Source of data used:	Based on 10 days measuring campaign or 1 year historical records
Value applied:	To be determined in each CPA
Justification of the choice of data or description of measurement methods and	As per methodology AMS-III.H

procedures actually applied:	
Any comment:	

Data / Parameter:	**$MCF_{ww,treatment,BL,i}$**
Data unit:	Fraction
Description:	Methane correction factor for baseline wastewater treatment systems *i*
Source of data used:	Table III.H.1, AMS III.H version 16
Value applied:	Based on type of treatment systems
Justification of the choice of data or description of measurement methods and procedures actually applied :	Table III.H.1, AMS III.H version 16
Any comment:	

Data / Parameter:	**$MCF_{ww,BL,discharge}$**
Data unit:	Fraction
Description:	Methane correction factor based on discharge pathway in the baseline situation of the wastewater
Source of data used:	Table III.H.1, AMS III.H version 16
Value applied:	Based on type of discharge pathway
Justification of the choice of data or description of measurement methods and procedures actually applied :	Table III.H.1, AMS III.H version 16
Any comment:	

Data / Parameter:	**$B_{0,ww}$**
Data unit:	$kgCH_4$ / kgCOD
Description:	Methane generation capacity of treated wastewater
Source of data used:	IPCC 2006
Value applied:	0.25
Justification of the choice of data or description of measurement methods and procedures actually applied :	Default value as prescribed in the methodology
Any comment:	

Data / Parameter:	**UF_{BL}**
Data unit:	-
Description:	Model correction factor to account for model uncertainties (baseline)
Source of data used:	AMS III.H. version 16
Value applied:	0.89
Justification of the choice of data or description of measurement methods and procedures actually applied :	As per methodology AMS-III.H, point 24
Any comment:	-

Data / Parameter:	**UF_{PJ}**
Data unit:	-
Description:	Model correction factor to account for model uncertainties (project activity)
Source of data used:	AMS III.H. version 16
Value applied:	1.12
Justification of the choice of data or description of measurement methods and procedures actually applied :	As per methodology AMS-III.H, point 30(a)
Any comment:	-

Data / Parameter:	**CFE_{ww}**
Data unit:	Fraction
Description:	Capture efficiency of the biogas recovery equipment in the wastewater treatment system
Source of data used:	AMS III.H. version 16
Value applied:	0.9
Justification of the choice of data or description of measurement methods and procedures actually applied :	A default value of 0.9 has been used as per the guidance in the methodology
Any comment:	

Data / Parameter:	**$MCF_{ww,treatment,PJ,k}$**
Data unit:	Fraction
Description:	Methane correction factor for the project wastewater treatment system equipped with biogas recovery equipment
Source of data used:	Table III.H.1, AMS III.H version 16
Value applied:	Based on type of treatment systems
Justification of the choice of data or description of measurement methods and procedures actually applied :	Table III.H.1, AMS III.H version 16
Any comment:	

Data / Parameter:	**$COD_{inflow,i,y}$**
Data unit:	tCOD / m^3
Description:	Raw COD of wastewater entering the baseline treatment system
Source of data used:	Laboratory (internal and external) based on 10 days measurement campaign or 1 year historical records
Value applied:	To be determined in each CPA
Justification of the choice of data or description of measurement methods and procedures actually applied:	10 days measurement campaign or 1 year historical records
Any comment:	

Data / Parameter:	$\eta_{COD,BL,i}$
Data unit:	%
Description:	COD removal efficiency of the baseline system *i*
Source of data used:	10 days measurement campaign or 1 year historical records
Value applied:	10 days measurement campaign or 1 year historical records
Justification of the choice of data or description of measurement methods and procedures actually applied :	10 days measurement campaign or 1 year historical records
Any comment:	This data will be used for *ex post* emission reduction calculation

Data / Parameter:	NCV_{CH4}
Data unit:	MJ/kg
Description:	Net Calorific Value of methane
Source of data used:	IPCC 2006 Default Value
Value applied:	50.4
Justification of the choice of data or description of measurement methods and procedures actually applied:	IPCC 2006 value is used; Volume 2, Chapter 1, Table 1.2
Any comment:	

Data / Parameter:	NCV_{FF}
Data unit:	MJ/kg
Description:	Net Calorific Value of fossil fuel
Source of data used:	IPCC 2006 Default Value
Value applied:	Depend on type of fossil fuel
Justification of the choice of data or description of measurement methods and procedures actually applied:	IPCC 2006 value is used; Volume 2, Chapter 1, Table 1.2
Any comment:	

Data / Parameter:	DOC_s
Data unit:	fraction
Description:	Degradable organic content of the untreated sludge generated in the year *y* (dry basis)
Source of data used:	Default value, AMS-III.H. ver 16
Value applied:	Refer to CPA
Justification of the choice of data or description of measurement methods and procedures actually applied:	As per methodology.
Any comment:	

Data / Parameter:	DOC_F
Data unit:	fraction
Description:	Fraction of degradable organic content dissimilated to biogas

Source of data used:	Default value, AMS-III.H. ver 16
Value applied:	0.5
Justification of the choice of data or description of measurement methods and procedures actually applied:	As per methodology.
Any comment:	

Data / Parameter:	**F**
Data unit:	fraction
Description:	Fraction of CH4 in biogas
Source of data used:	Default value, AMS-III.H. ver 16
Value applied:	0.5
Justification of the choice of data or description of measurement methods and procedures actually applied:	As per methodology.
Any comment:	

Data / Parameter:	**$EF_{composting}$**
Data unit:	t CH4/t waste (sludge) treated
Description:	Emission factor for composting organic waste
Source of data used:	Default value, AMS-III.H. ver 16
Value applied:	0.01 (dry weight basis)
Justification of the choice of data or description of measurement methods and procedures actually applied:	As per methodology.
Any comment:	Emission factors can be based on facility/site-specific measurements, country specific values or IPCC default values (Table 4.1, chapter 4, Volume 5, 2006 IPCC Guidelines for National Greenhouse Gas Inventories)

Data / Parameter:	**$EF_{FF,CO2,y}$**
Data unit:	tCO_{2e}/MWh or tCO_{2e}/GJ
Description:	Baseline emission factor for electricity or thermal energy generation
Source of data used:	The emission factor will depend on the baseline determined for the project activity in relation to electricity or thermal energy generation. The emission factor will be determined for each CPA, if applicable.
Value applied:	To be determined
Justification of the choice of data or description of measurement methods and procedures actually applied :	As per the requirement of the baseline and monitoring methodology
Any comment:	

Data / Parameter:	**$MCF_{s,BL,final}$**
Data unit:	Fraction

Description:	Methane correction factor of the disposal site that receives the final sludge in the baseline situation.
Source of data used:	Estimated as per procedures described in the "Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site"
Value applied:	Will be based on type of sludge disposal site in the baseline scenario
Justification of the choice of data or description of measurement methods and procedures actually applied :	As per the requirement of the baseline and monitoring methodology
Any comment:	

Data / Parameter:	**$MCF_{ww,PJ,discharge}$**
Data unit:	Fraction
Description:	Methane correction factor based on discharge pathway in the project situation of the wastewater
Source of data used:	Table III.H.1, AMS III.H version 16
Value applied:	Based on type of discharge pathway
Justification of the choice of data or description of measurement methods and procedures actually applied :	Table III.H.1, AMS III.H version 16
Any comment:	

Data / Parameter:	**$MCF_{s,PJ,final}$**
Data unit:	Fraction
Description:	Methane correction factor of the disposal site that receives the final sludge in the project situation.
Source of data used:	Estimated as per procedures described in the methodological tool "*Emissions from solid waste disposal sites*" (version 06.0.0, Annex 19, EB65).
Value applied:	Will be based on type of sludge disposal site in the project scenario
Justification of the choice of data or description of measurement methods and procedures actually applied :	As per the requirement of the monitoring methodology
Any comment:	

Data / Parameter:	**$MCF_{s,PJ,final}$**
Data unit:	Fraction
Description:	Methane correction factor of the disposal site that receives the final sludge in the project situation.
Source of data used:	Estimated as per procedures described in the methodological tool "*Emissions from solid waste disposal sites*" (version 06.0.0, Annex 19, EB65).
Value applied:	Will be based on type of sludge disposal site in the project scenario
Justification of the choice of data or description of measurement methods and procedures actually applied :	As per the requirement of the monitoring methodology

Any comment:	

Data / Parameter:	**SGR_{BL}**
Data unit:	Tonne of dry matter in sludge/t COD removed
Description:	Sludge generation ratio of wastewater treatment plant in baseline scenario
Source of data used:	To be determined based on the each CPA, if applicable. Paragraph 26, 27 or 28 of AMS-III.H (version 16) will be used.
Value applied:	To be determined
Justification of the choice of data or description of measurement methods and procedures actually applied :	As per the requirement of the monitoring methodology
Any comment:	

Data / Parameter:	**ρ_{sludge}**
Data unit:	kg/m^3
Description:	Density of sludge
Source of data used:	Zahrim, Y. A. (2007). Sludge Composting: A case study on palm oil mill sludge (POME). AJCHE 2007, Vol. 7, No. 2, p102-107, available at http://aseanjche.ugm.ac.id/ojs/index.php/jce/article/view/127/128
Value applied:	1,100
Justification of the choice of data or description of measurement methods and procedures actually applied :	-
Any comment:	This parameter is required where the amount of dry matter in the sludge is measured in volume units.

E.7. Application of the monitoring methodology and description of the monitoring plan:

E.7.1. Data and parameters to be monitored by each SSC-CPA:

Data / Parameter:	**$Q_{ww,y}$**
Data unit:	m^3 / month
Description:	The flow of wastewater entering the wastewater treatment system
Source of data to be used:	Measurement by project participant by using a flowmeter
Value of data applied for the purpose of calculating expected emission reductions in section B.5	To be determined in each CPA
Description of measurement methods and procedures to be applied:	The flow is measured with an online flow meter or equivalent
QA/QC procedures to be applied:	• Data are monitored continuously and recorded periodically (monthly or at shorter interval) in a data log file (DLF). • Uncertainty level of data: low • Maintenance and calibration as per manufacturer's specifications or at

	least once every three (3) years
Any comment:	

Data / Parameter:	**$COD_{ww,untreated,y}$**
Data unit:	tCOD / m^3
Description:	Raw COD of wastewater entering the wastewater treatment system
Source of data to be used:	Laboratory (internal and external)
Value of data applied for the purpose of calculating expected emission reductions in section B.5	To be determined in each CPA
Description of measurement methods and procedures to be applied:	Measure of COD according to national or international standards. COD is measure through representative sampling.
QA/QC procedures to be applied:	• Minimum once a month COD sampling to ensure a 90/10 confidence/precision level • COD reports are recorded manually • Uncertainty level of data: low • Maintenance and calibration as per manufacturer's specifications or at least once every three (3) years for internal laboratory equipment
Any comment:	

Data / Parameter:	**$COD_{ww,treated,y}$**
Data unit:	tCOD / m^3
Description:	COD of treated wastewater leaving the wastewater treatment system
Source of data to be used:	Laboratory (internal and external)
Value of data applied for the purpose of calculating expected emission reductions in section B.5	To be determined in each CPA
Description of measurement methods and procedures to be applied:	Measure of COD according to national or international standards. COD is measure through representative sampling.
QA/QC procedures to be applied:	• Minimum once a month COD sampling to ensure a 90/10 confidence/precision level • COD reports are recorded manually • Uncertainty level of data: low • Maintenance and calibration as per manufacturer's specifications or at least once every three (3) years for internal laboratory equipment
Any comment:	

Data / Parameter:	**$COD_{ww,\ discharge,y}$**
Data unit:	tCOD / m^3
Description:	COD of treated wastewater discharge by treatment system
Source of data to be used:	Laboratory (internal and external)
Value of data applied for the purpose of calculating expected emission reductions	To be determined in each CPA

in section B.5	
Description of measurement methods and procedures to be applied:	Measure of COD according to national or international standards. COD is measure through representative sampling.
QA/QC procedures to be applied:	• Minimum once a month COD sampling to ensure a 90/10 confidence/precision level • COD reports are recorded manually • Uncertainty level of data: low • Maintenance and calibration as per manufacturer's specifications or at least once every three (3) years for internal laboratory equipment
Any comment:	

Data / Parameter:	$S_{j,PJ,y}$
Data unit:	mt
Description:	Amount of dry matter in the sludge treated by the sludge treatment system in the project scenario
Source of data to be used:	Measured during the project activity
Value of data applied for the purpose of calculating expected emission reductions in section B.5	To be determined in each CPA
Description of measurement methods and procedures to be applied:	Monitoring of 100% of the sludge amount through continuous or batch measurements and moisture content through representative sampling
QA/QC procedures to be applied:	• Sampling to ensure a 90/10 confidence/precision level • The volume (m^3) and density or direct weighing may be used to determine the sludge amount • Representative samples are taken to determine the moisture content to calculate the total sludge amount on dry basis • Uncertainty level of data: low • Maintenance and calibration as per manufacturer's specifications or at least once every three (3) years for internal laboratory equipment
Any comment:	- If the methane emissions from anaerobic decay of the final sludge are to be neglected because the sludge is controlled, combusted, disposed of in a landfill with methane recovery, or used for soil application, then the end-use of the final sludge will be monitored during the crediting period - If the baseline emissions include the anaerobic decay of final sludge generated by the baseline treatment systems in a landfill without methane recovery, the baseline disposal site shall be clearly defined, and verified by the DOE

Data / Parameter:	$S_{final,PJ,y}$
Data unit:	mt
Description:	Amount of dry matter in the final sludge generated by the project activity
Source of data to be used:	Measured during the project activity
Value of data applied for the purpose of calculating	To be determined in each CPA

expected emission reductions in section B.5	
Description of measurement methods and procedures to be applied:	Monitoring of 100% of the sludge amount through continuous or batch measurements and moisture content through representative sampling
QA/QC procedures to be applied:	• Sampling to ensure a 90/10 confidence/precision level • The volume (m^3) and density or direct weighing may be used to determine the sludge amount • Representative samples are taken to determine the moisture content to calculate the total sludge amount on dry basis • Uncertainty level of data: low • Maintenance and calibration as per manufacturer's specifications or at least once every three (3) years for internal laboratory equipment
Any comment:	- If the methane emissions from anaerobic decay of the final sludge are to be neglected because the sludge is controlled, combusted, disposed of in a landfill with methane recovery, or used for soil application, then the end-use of the final sludge will be monitored during the crediting period - If the baseline emissions include the anaerobic decay of final sludge generated by the baseline treatment systems in a landfill without methane recovery, the baseline disposal site shall be clearly defined, and verified by the DOE

Data / Parameter:	**End-use of the final sludge**
Data unit:	–
Description:	The final sludge generated by the project activity will be sent to control landfill site, if any
Source of data to be used:	By project participant
Value of data applied for the purpose of calculating expected emission reductions in section B.5	To be determined in each CPA
Description of measurement methods and procedures to be applied:	The final disposal of the sludge will be monitored during the crediting period, if any. For each disposal of the sludge, the following will be recorded; disposal site and date of disposal.
QA/QC procedures to be applied:	
Any comment:	

Data / Parameter:	**$FV_{flared,h}$**
Data unit:	Nm^3 / hour
Description:	Volumetric flow of biogas recovered and flared at normal conditions in the hour *h*
Source of data to be used:	Measured during the project activity
Value of data applied for the purpose of calculating expected emission reductions in section B.5	To be determined in each CPA
Description of measurement	The volume of biogas will be measured with a normalised flow meter or

methods and procedures to be applied:	calculated from the volumetric flow, pressure, temperature. Biogas volume and methane content measurements shall be on the same basis (wet or dry).
QA/QC procedures to be applied:	• The biogas flow is monitored continuously, recorded and stored electronically in a data log file (DLF) (monthly or at shorter interval). • Uncertainty level of data: low • Maintenance and calibration as per manufacturer's specifications or at least once every 3 years
Any comment:	

Data / Parameter:	**$FV_{fuelled,h}$**
Data unit:	Nm^3 / hour
Description:	Volumetric flow of biogas recovered and fuelled at normal conditions in the hour *h*
Source of data to be used:	Measured during the project activity
Value of data applied for the purpose of calculating expected emission reductions in section B.5	To be determined in each CPA
Description of measurement methods and procedures to be applied:	The volume of biogas will be measured with a normalised flow meter or calculated from the volumetric flow of biogas, pressure, temperature. Biogas volume and methane content measurements shall be on the same basis (wet or dry).
QA/QC procedures to be applied:	• The biogas flow is monitored continuously, recorded and stored electronically in a data log file (DLF) (monthly or at shorter interval). • Uncertainty level of data: low • Maintenance and calibration as per manufacturer's specifications or at least once every 3 years
Any comment:	

Data / Parameter:	**$w_{CH4,h}$**
Data unit:	%
Description:	Methane content in biogas in same basis (wet/dry) as the biogas flows in year *y*
Source of data to be used:	By project participant using a gas analyzer
Value of data applied for the purpose of calculating expected emission reductions in section B.5	To be determined in each CPA
Description of measurement methods and procedures to be applied:	Using calibrated gas analyzer either continuous or periodical measurement at confidence/precision level of 90/10.
QA/QC procedures to be applied:	• In case a continuous gas analyser is used, data will be recorded and stored electronically in a data log file (DLF) every hour or at shorter interval. • Uncertainty level of data: low • Maintenance and calibration as per manufacturer's specifications or at

	least once every 3 years.
Any comment:	• See also clarification by EB Meth Panel, 30/10/2009 – SSC_360. http://cdm.unfccc.int/UserManagement/FileStorage/AM_CLAR_QS83SX5B7WM6UGZE31JYQEQ4F65F6V • The biogas flow and the methane content measurements shall be carried out close to each others

Data / Parameter:	**T_{biogas}**
Data unit:	°C
Description:	Temperature of biogas
Source of data to be used:	Temperature probe
Value of data applied for the purpose of calculating expected emission reductions in section B.5	To be determined in each CPA
Description of measurement methods and procedures to be applied:	By project participant
QA/QC procedures to be applied:	• Shall be measured and recorded at the same time when methane content in biogas is measured. • Uncertainty level of data: low • Maintenance and calibration as per manufacturer's specifications or at least once every 3 years.
Any comment:	Pressure and temperature are required to determine the density of the methane. If the biogas flow meter employed measures flow, pressure and temperature and displays/outputs normalised flow of biogas, there is no need to separate monitoring of pressure and temperature of the biogas.

Data / Parameter:	**P_{biogas}**
Data unit:	Bar(g)
Description:	Pressure of biogas
Source of data to be used:	Measured during the project activity
Value of data applied for the purpose of calculating expected emission reductions in section B.5	To be determined in each CPA
Description of measurement methods and procedures to be applied:	Pressure measurement device
QA/QC procedures to be applied:	• Shall be measured and recorded at the same time when methane content in biogas (ID8) is measured. • Uncertainty level of data: low • Maintenance and calibration as per manufacturer's specifications or at least once every three (3) years
Any comment:	• Pressure and temperature are required to determine the density of the methane. If the biogas flow meter employed measures flow, pressure and temperature and displays/outputs normalised flow of biogas, there is no need to separate monitoring of pressure and temperature of the

	biogas. • Shall be measured at the same time when methane content in biogas is measured

Data / Parameter:	$\eta_{flare,h}$
Data unit:	%
Description:	Flare efficiency in the hour *h*
Source of data to be used:	Calculated
Value of data applied for the purpose of calculating expected emission reductions in section B.5	To be determined in each CPA
Description of measurement methods and procedures to be applied:	This yearly efficiency will be based on hourly flare efficiencies calculated as per the provisions in the "Tool to determine project emissions from flaring gases containing methane".
QA/QC procedures to be applied:	• Data are logged hourly in a data log file (DLF). • Uncertainty level of data: low
Any comment:	

Data / Parameter:	$EG_{BL,y}$
Data unit:	MWh
Description:	Quantity of net electricity generated and send to grid in year
Source of data to be used:	Measured during the project activity
Value of data applied for the purpose of calculating expected emission reductions in section B.5	To be determined in each CPA
Description of measurement methods and procedures to be applied:	The electricity generated or send to 3rd party is measured continuously with an energy meter (cumulative readings). Measurement results shall be cross-checked with records of sold / purchased electricity (e.g. invoices/receipts)
QA/QC procedures to be applied:	• Data are monitored continuously and recorded periodically (yearly or at shorter interval) in a data log file (DLF). • Uncertainty level of data: low • Maintenance and calibration as per manufacturer's specifications or at least once every 3 years.
Any comment:	

Data / Parameter:	$EC_{PJ,y}$
Data unit:	MWh
Description:	The yearly grid electricity consumption of the project activity for the year '*y*'
Source of data to be used:	Measured during the project activity
Value of data applied for the purpose of calculating expected emission reductions in section B.5	To be determined in each CPA

Description of measurement methods and procedures to be applied:	The electricity consumed is measured continuously with an energy meter (cumulative readings).
QA/QC procedures to be applied:	• Data are monitored continuously and recorded periodically (yearly or at shorter interval) in a data log file (DLF). • Uncertainty level of data: low • Maintenance and calibration as per manufacturer's specifications or at least once every 3 years.
Any comment:	

Data / Parameter:	**Displacement of Biomass**
Data unit:	Mt
Description:	Total amount of biomass (PKS and mesocarp fibre) displaced due to the project activity
Source of data to be used:	Weighing bridge or equivalent
Value of data applied for the purpose of calculating expected emission reductions in section B.5	To be determined in each CPA
Description of measurement methods and procedures to be applied:	All biomass (PKS and/or mesocarp fibre) displaced due to the project activity will be weighed
QA/QC procedures to be applied:	• Monthly calculation based on every single trip of trucks recorded • Data is recorded manually in a data log file based on the weighing records • Maintenance and calibration as per manufacturer's specifications • Uncertainty level of data: low
Any comment:	Will determine the storage conditions in both baseline and project activity.

Data / Parameter:	**$EG_{mill,y}$**
Data unit:	MWh
Description:	Quantity of annual output of renewable energy sent to the mill in year *y*
Source of data to be used:	By project participant
Value of data applied for the purpose of calculating expected emission reductions in section B.5	To be determined in each CPA
Description of measurement methods and procedures to be applied:	The electricity generated and sent to mill to displace diesel use in diesel gensets is measured continuously with an energy meter (cumulative readings).
QA/QC procedures to be applied:	• Data are monitored continuously and recorded periodically (yearly or at shorter interval) in a data log file (DLF). • Uncertainty level of data: low • Maintenance and calibration as per manufacturer's specifications or at least once every 3 years.
Any comment:	As per AMS-I.A

Data / Parameter:	$FC_{FF,y}$
Data unit:	Liter
Description:	Fossil fuel usage due to the project activity
Source of data to be used:	Measured during the project activity
Value of data applied for the purpose of calculating expected emission reductions in section B.5	To be determined in each CPA
Description of measurement methods and procedures to be applied:	The fossil fuel usage for project activity is monitored and recorded based on fuel meter reading / direct measurement into log book. Counter check with purchasing invoice of fossil fuel.
QA/QC procedures to be applied:	• Data are recorded manually and stored electronically in a data log file (DLF). • Data are aggregated monthly or at shorter interval • Uncertainty level of data: low • Maintenance and calibration as per manufacturer's specifications
Any comment:	As per "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion" (version 02, Annex 11, EB41).

E.7.2. Description of the monitoring plan for a SSC-CPA:

Obligations of the CME

The CME is responsible for the development and implementation of a management and operational system for a CPA that will meet the requirements of the MP. The monitoring plan details the necessary actions to monitor and record all the data parameters required by the applied methodology for each CPA. It will describe the management systems and procedures to be implemented by CME upon implementation of each CPA. Monitoring will be carried out by the site operators (or any third party, as relevant) at each individual site and CME will ensure consistency in monitoring, processing and reporting of data required for the calculation of emission reductions achieved by each CPA. The CME will act as overall supervisor of CPA implementers and will carry out data checking of the monitored data by CPA implementers, analyzing and preparing a monitoring report. Details of the CPA monitoring plans will be described in each CPA-DD.

The CME will be in charge of communication with DOE during the verification. The CME may appoint a CDM consultant or any third party, as relevant, to perform the verification. CPA implementers will be responsible for implementing appropriate operation and maintenance procedures to ensure the monitoring equipment meet the CDM requirements and to submit a periodic report on the monitored parameters to CME. Clear roles and responsibilities of the key persons involved in the CPA will be defined in each SSC-CPA-DD.

MONITORING PARAMETERS

The MP will identify the various data parameters to be monitored in order to calculate the emission reductions. Data parameters which need to be monitored will be recorded in each MP of the particular CPA.

DATA LOGGING, TRANSMISSION AND STORAGE

Data to be monitored is defined in section E.7.1 and applicable parameters as per the relevant project scenario to be monitored in each SSC-CPA-DD will be recorded at the appropriate frequency during the crediting period. CPA implementer will record and store the primary data while CME will process the primary data and store the processed data in an electronic central database. The CME will be responsible for managing the collection, storage and archiving of all pertinent CDM data and records.

Detailed description of the data collection and recording measures to be implemented for each CPA:

- ✓ The data measured by the instruments will be collected and stored in a data logging system at each site. The data will be retrieved remotely by modem or directly on site by CPA implementer and/or CME.
- ✓ If automatic data logging failed, the data will be recorded manually, if possible.
- ✓ If data cannot be retrieved from site, and no back up is available, no emissions reductions will be claimed for the period of data failure.
- ✓ The data collected will be stored in a central data base by CME. Access to production data will be restricted.
- ✓ All such data will be archived electronically and regularly backed-up.
- ✓ Copies of the files will be stored up to two years after the end of the crediting period or the last issuance of CERs for this project activity whichever occurs later.

CALIBRATION AND MAINTENANCE PROCEDURES, MALFUNCTION OF EQUIPMENT

Maintenance includes all preventive and corrective actions necessary for the good functioning of the equipment, such as:

- ✓ Visual control of the equipment state and real-time check of displayed parameters,
- ✓ Cleaning up the equipment and the sensors,
- ✓ Adding lubricant,
- ✓ Replacement and change of defective parts.

Calibration of equipment consists in verifying, by comparison with a standard, the accuracy of a measuring instrument. Measuring instruments will be periodically and appropriately calibrated according to the procedures, timing and methods recommended by the manufacturer or national/international standards, as available.

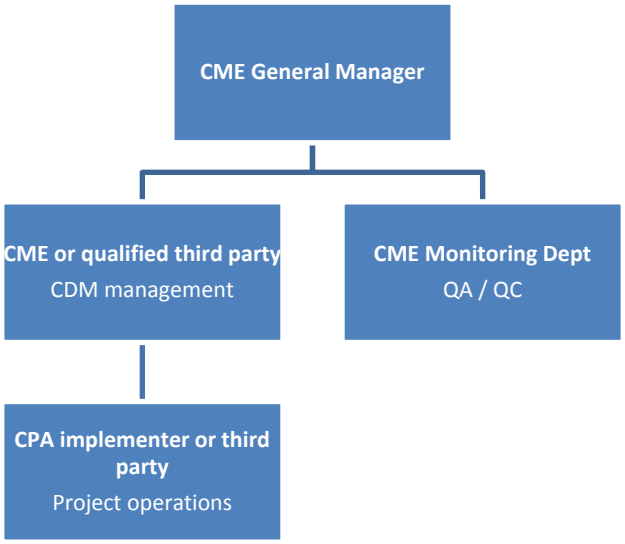
General malfunction of equipment:
Spare units and spare parts of certain monitoring instruments will be kept at each site. If the equipment fails, site operator will attempt to repair and fix the faulty equipment. If the equipment cannot be repair, then the supplier will be notified and repairs will be carried out. If the damaged equipment cannot be repaired, it will be replaced at the earliest by the same or an equivalent unit. In some cases, portable tools will be used in order to carry out daily monitoring of the missing parameter(s). This data will be recorded manually.

Discrepancies:
Discrepancies between projected data in the DDs and actual data (e.g. due to deferred starting date, malfunction of equipment) will be analyzed, in particular cross-checks between internal meter readings and external sources (e.g. electricity invoices) will be carried out. Any source of inconsistencies will be clarified.

MANAGERIAL RESPONSIBILITIES

The CME will be responsible for the CDM aspects of the project. The CME may outsource some CDM tasks.

The CPA implementer will be responsible for the operation of the project.
See more details in section A.4.4.1 and A.4.4.2 above.



QUALITY ASSURANCE & QUALITY CONTROL

- ✓ The Monitoring Department will be responsible for the monitoring report. As such, it will be empowered to control consistency of monitored data by any means, such as on-site audit, visual control of data on the server, cross-checking of data on the server with data provided by the field technician and/or the maintenance director and/or the monitoring director.

- ✓ Proper management processes and systems records will be kept by the monitoring director. The auditors can require copies of such records to judge compliance with the required management processes.

- ✓ Procedures to discount conservatively the emissions reductions from the SSC-CPA will be defined, in the event either the project implementer or the CME detects any distortion or malfunction of the monitoring equipment.

EMERGENCY

For the case of emergency (earthquakes, explosions, fires etc.), an emergency preparedness plan will be adapted to the DM project activity, by the time of commissioning of the plant. All employees involved in the CDM project on-site will be trained in the code of conduct and required actions at time of commissioning of the plant.

TRAINING OF MONITORING PERSONNEL

Employees involved in the monitoring will be trained internally and/or externally. Training will include:

a) Review of equipment and sensors
b) Calibration / maintenance requirement
c) Configuration of monitoring equipment

INDEPENDENT MONITORING OF SCRAPPING OF REPLACED EQUIPMENTS

In case project activity involves replacement of equipment, and leakage effect of the use of replaced equipment in another activity is neglected, because the replaced equipment is scrapped, an independent monitoring of scrapping of replaced equipment to be implemented. The monitoring should include a check if the number of project activity equipment distributed by the project and the number of scrapped equipment correspond with each other. For this purpose scrapped equipment should be stored until such correspondence has been checked. The scrapping of replaced equipment should be documented and independently verified.

E.8 Date of completion of the application of the baseline study and monitoring methodology and the name of the responsible person(s)/entity(ies)

The baseline study and monitoring methodology was completed on 12/03/2012 by:

Sim Kean Hong
Project Manager

Ably Carbon Sdn. Bhd.
No. 17, Jalan Ipoh Kecil,
50350, Kuala Lumpur,
Malaysia.

Ably Carbon Sdn. Bhd. is the CME and Project Participant.

Annex 1

CONTACT INFORMATION ON COORDINATING/MANAGING ENTITY and PARTICIPANTS IN THE PROGRAMME of ACTIVITIES

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Department:	
Mobile:	
Direct FAX:	
Direct tel:	
Personal E-Mail:	anne-sophie.zirah@ably-carbon.com

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

The PoA has not received any public funding. Any public funding that may be provided to individual CPA will be described in the corresponding CPA-DD. In case public funding is received for a CPA, an affirmation will be provided that such funding does not result in a diversion of ODA.

Annex 3

BASELINE INFORMATION

This will be provided at CPA level.

Annex 4

MONITORING INFORMATION

Please refer to section E.7.2. - Description of the monitoring plan for the CPA