CLEAN DEVELOPMENT MECHANISM
PROGRAM ACTIVITY DESIGN DOCUMENT FORM (CDM-CPA-DD)
Version 01

CONTENTS

NOTE:

(i) This form is for the submission of CPAs that apply a large scale methodology using provisions of the proposed PoA.

(ii) The coordinating/managing entity shall prepare a CDM Programme Activity Design Document (CDM-CPA-DD)[1,2] that is specified to the proposed PoA by using the provisions stated in the PoA DD. At the time of requesting registration the PoA DD must be accompanied by a CDM-CPA-DD form that has been specified for the proposed PoA, as well as by one completed CDM-CPA-DD (using a real case). After the first CPA, every CPA that is added over time to the PoA must submit a completed CDM-CPA-DD.

[1] The latest version of the template form CDM-CPA-DD is available on the UNFCCC CDM web site in the reference/document section.

[2] At the time of requesting validation/registration, the coordinating managing entity is required to submit a completed CDM-POA-DD, the PoA specific CDM-CPA-DD, as well as one of such CDM-CPA-DD completed (using a real case).

SECTION A. General description of CDM programme activity (CPA)

A.1. Title of the CPA:

Title: TBEC Biogas Programme for South East Asia CPA#[Insert CPA Number & CPA Descriptor]
Version: [Insert Version Number]
Date: [Insert Date]

A.2. Description of the CPA:

The CPA will involve the installation of [insert type of wastewater treatment, energy generation equipment and flare] at a [insert facility type] facility where the existing wastewater treatment system consists of [insert treatment system description]. In [insert host country] the standard treatment system for wastewater produced by [insert facility type] is the use of [insert treatment system description]. This system will treat the wastewater in a manner that enables the biogas to be collected and extracted for combustion. The biogas will be used to [insert description of biogas usage]. Excess biogas will be [insert description of method to dispose excess biogas].

The anaerobic wastewater treatment system design consists of [insert details of technology/measure to allow understanding of the CPA, which may include details of the designer or history of technology application]. The biogas system will also include use of the following technology aspects:

- [insert details of control system for distributing wastewater in the digestion vessel]
- [insert details of biogas treatment systems]
- [insert details of equipment for combusting the collected methane which may include, biogas engines for electricity generation, burners for heat generation and flares for destruction of excess biogas]
- [insert details of system to distribute the treated wastewater from the biogas system to open lagoons or aerobic treatment (this may include land application)]

The Technical Specifications for the [relevant technology installed] is as follows:

[insert table with technical details of the relevant technology installed]
Table A.2: Technical Specifications of [relevant technology]

[Insert information summarising a description regarding how environmentally safe and sound technology (ies) is applied by the CPA and details on know-how transfer to the host country].

The baseline scenario is [insert summary of baseline scenario as it relates to the host factory open lagoons and if the scenario existing prior to the start of the implementation of the project activity is the same as the baseline scenario].

The project activity involves [include summary of project, how it complies with Scenario 1 of the methodology, and summary of how the CPA will alter the pre-project scenario]

Contribution to Sustainable Development

[Insert summary of the CPAs contribution to sustainable development].

1. Environment and Natural Resources
   - [insert details of sustainable development relating to environment and natural resources]
2. Social
   - [insert details of sustainable development relating to social development]
3. Economic
   - [insert details of sustainable development relating to economics]
4. Technology
   - [insert details of sustainable development relating to technology]

A.3. Entity/individual responsible for CPA:

The entity responsible for the CPA is: Thai Biogas Energy Company Limited (TBEC)

A.4. Technical description of the CPA:

A.4.1. Identification of the CPA:

The CPA will be uniquely identified by a unique CPA identification number contained within the CPA project title. The unique CPA identification number together with the GPS co-ordinates and physical address recorded in section A.4.1.2 allows the CPA to be uniquely identified.

CPA Title: "TBEC Biogas Programme for South East Asia" CPA#[Insert CPA Number & Descriptor as provided by the CME]
Unique identification number: CPA#[Insert CPA Number as provided by the CME]

A.4.1.1. Host Party:

[Insert Host Party]

A.4.1.2. Geographic reference of other means of identification allowing the unique identification of the CPA (maximum one page):

The physical location of the biogas plant is [insert physical address]

Nominal GPS co-ordinates for the project site are: [GPS co-ordinates].

A map of the project location is show in the figure below.

[Insert Location Map]

Figure A.4.1.2.a: Map of project location

A.4.2. Duration of the CPA:

A.4.2.1. Starting date of the CPA:

Start date of CPA: [Insert Start Date DD/MM/YYYY]

A.4.2.2. Expected operational lifetime of the CPA:

Project Lifetime: [Insert Operation Lifetime] years

Justification of the operational lifetime may be provided through one of the following:

Option	Selection
Letter of statement (or specification) from system designer or technology provider	☐

A.4.3. Choice of the crediting period and related information:

The crediting period may be selected from one of the options below:

Option	Selection
Renewable crediting period	☐
Fixed Crediting Period	☐

A.4.3.1. Starting date of the crediting period:

Start Date of Crediting Period: [Insert Start Date of Crediting Period DD/MM/YYYY]

A.4.3.2. Length of the crediting period, first crediting period if the choice is renewable CP:

[Insert length of crediting period]

A.4.4. Estimated amount of emission reductions over the chosen crediting period:

Years	Annual estimation of emission reductions in tonnes of CO_2 e
[Insert year]	[Insert amount in tCO_2e]
[Insert year]	[Insert amount in tCO_2e]
.....	.....
.....	.....
[Insert year]	[Insert amount in tCO_2e]
[Insert year]	[Insert amount in tCO_2e]
Total estimated reductions (tonnes of CO_2 e)	[Insert amount in tCO_2e]
Total number of crediting years	[Insert total years]
Annual average over the crediting period of estimated reductions (tonnes of CO_2 e)	[Insert amount in tCO_2e]

A.4.5. Public funding of the CPA:

The funding sources are confirmed by the CPA implementer as follows:

Option	Selection
The project is implemented entirely with commercial funding; no public funding is used by the project. Written confirmation is provided by the implementer of the CPA.	☐
The project makes use of public funding as detailed in Annex 2.	☐

A.4.6. Confirmation that CPA is neither registered as an individual CDM project activity nor is part of another Registered PoA:

The CPA is neither registered as an individual CDM project activity nor is part of another registered PoA.
Confirmation is provided as follows:

Option	Selection
For CPA's implemented by TBEC, a written statement is provided by TBEC	☐

SECTION B. Eligibility of CPA and Estimation of emissions reductions

B.1. Title and reference of the Registered PoA to which CPA is added:

Title: TBEC Biogas Programme for South East Asia
Version: 03.4
Date: 16/08/2012

B.2. Justification of the why the CPA is eligible to be included in the Registered PoA:

Eligibility criteria are specified in the "TBEC Biogas Programme for South East Asia" PoA-DD. Confirmation that the CPA is in accordance with these criteria is provided below.

#	Eligibility	Description	Confirmation and Reference/Supporting Document
1	The CPA implementer is identified in the CPA-DD	The CPA implementer must be identified in the CPA-DD and recorded in the CME database	Confirm the CPA implementer is recorded in this CPA-DD.
2	The wastewater treatment technology implemented by the CPA conforms to the Project Activity described in the methodology ACM0014 Version 04.1.0.	The CPA wastewater treatment technology involves the installation of an anaerobic digester with methane recovery.	Confirm via one of the following: (a) Project Investment Memorandum (b) Project Feasibility Study (c) Project Design Drawings
3	The methane destruction technology implemented by the CPA conforms to the Project Activity described in the methodology ACM0014 Version 04.1.0.	The CPA achieves destruction of recovered methane through one or more of the following options: (1) Flare(s) (2) Electricity generation equipment. (3) Heat generation equipment (i.e. boiler with gas burner or other types suitable to individual CPAs)	Confirm via one of the following: (d) Project Investment Memorandum (e) Project Feasibility Study (f) Project Design Drawings
4	The CPA conforms to all applicability conditions and other requirements of the methodology and tools applied by the CPA.	The CPA will conform to all applicability conditions and other requirements of the methodologies and tools listed in section E.1.	The additional table in Section B.2 below confirms all applicability conditions and all necessary supporting

			documents are submitted.
5	The CPA is located in the physical geographical boundary described in the PoA-DD.	The PoA will commence with projects located in Thailand.	Confirm GPS-co-ordinates of CPA site location are provided in this CPA-DD
6	The CPA is uniquely identifiable.	Each CPA must be assigned a unique identification number and be recorded in the CMEs database.	(a) This CPA-DD has a unique Identification Number of #[insert unique Identification Number] recorded in this CPA-DD Specific (b) Confirm the same is held in the CME's PoA database
7	The CPA does not result in double accounting of greenhouse gases.	CPA implementer will provide a written statement to confirm that the CPA is not registered either as a CDM project activity or as a CPA of another PoA. The CME will also review the UNFCCC CDM online database verifying this CPA is not registered either as a CDM project activity or as a CPA of another PoA.	Confirm with signed declaration by CPA implementer. Review of the UNFCCC CDM online database verifying this CPA is not registered either as a CDM project activity or as a CPA of another PoA.
8	The CPA conforms to specifications of technology/ measure including the level and type of service, performance specifications including compliance with testing/certifications.	The CPA measure is: Methane destruction, and if applicable, with energy production. The CPA technology is: Biogas capture for destruction and/or energy production The CPA service is: Recovery and combustion of methane at an industrial wastewater treatment facility, and if applicable, energy production. With reference to the relevant regulations in section A.4.1.2 there are no national standards for level of service, performance specification or compliance with testing/certifications. However, TBEC will comply with all	The project process flow diagram confirms the project involves methane destruction for [insert type of energy] energy production from wastewater treatment facility at [insert type of facility] facility. The design specification provided by [insert engineering consultant name] demonstrates conformance with the level of service. If the CPA is in operation at the time of

		regulations and have established the following criteria: Level of service: Production of energy in the form of biogas with methane content greater than 40% and COD removal ratio greater than 50% between the anaerobic digester inlet and outlet. At the time of CPA inclusion, testing/certification is not required due to the nature of the CPA projects which will involve construction of site specific processing facilities at industrial installations. The design process flow diagram and design specifications provided by engineering consultants or equipment suppliers is sufficient to demonstrate compliance with the above level of service. Any COD tests carried out by TBEC will be conducted to international standards. TBEC's will utilize the Hach meter (or equivalent) following international COD standard method 5220 D. Due to the variable nature of wastewater from industrial facilities, the above criteria will only be considered to be applicable when the biogas facility is operating at a level consistent with the normal design parameters for the specific site. As such, the above criteria are not relevant when the industrial plant is shut down or during start-up periods.	inclusion, COD will be tested according to national or international standards.
9	The PoA will involve CPAs under the direct management of TBEC.	The CPA implementer identified in the CPA-DD will be TBEC.	Confirm through contractual agreement regarding implementation of the CPA.

10	The CPA implementer is aware that they have agreed that their activity is being subscribed to the PoA.	The CME must receive a signed declaration from the CPA implementer confirming that they are aware and have agreed that their activity is being subscribed to the PoA	Confirm through a signed declaration that the CPA implementer is aware that they have agreed that their activity is being subscribed to the PoA.
11	The CPA implementer is undertaking a voluntary action and is not implementing a mandatory policy/regulation	The CME must receive a signed declaration from the CPA implementer confirming that they are undertaking a voluntary action and not implementing a mandatory policy/regulation. The CME will also cross-check against local regulations to ensure that the CPA is not implementing a mandatory policy/regulation, this will be recorded in the CPA-DD.	(a) Confirm through signed declaration that this CPA is a voluntary initiative. (b) summarise details of relevant policy/regulations such as in Thailand Regulation notification No. 2 of the Thai Ministry of Industry (B.E. 2539) regarding wastewater from industrial factory does not prevent discharge of wastewater into open lagoons and does not specify that biogas capture systems at industrial facilities is mandatory.
12	The CPA is additional.	The additionality of each CPA will be demonstrated by establishing that in the absence of CDM, none of the implemented CPAs would occur. The PoA will include large scale projects as CPAs and therefore will apply the additionality requirements of the large scale methodology ACM0014 which specifies that the additionality will be demonstrated by applying the "Tool for the demonstration and assessment of additionality", Version 6.0.0, EB65. The additionality will be assessed and demonstrated at the CPA level and each CPA will provide	Confirm the additionality is demonstrated in section B.3. below in accordance with the following guidelines: "Tool for the demonstration and assessment of additionality" Version 6.0.0, EB65, Annex 21 "Guidelines on the assessment of investment analysis" Version 5.0.0., EB62, Annex 5

		an explanation of how the above procedures have been applied to the specific CPA project situation. In the assessment of Step 1 in section E.5.1 below, the key criteria to be applied shall be in accordance with the "Procedure for the identification of the most plausible baseline scenario" in ACM0014, Version 4.1.0, EB58. In the assessment of Step 2 in section E.5.1 below, the key criteria to be applied shall be in accordance with the "Guidelines on the assessment of investment analysis" Version 5.0.0., EB62, Annex 5. In the assessment of Step 3 in section E.5.1 below, the key criteria to be applied shall be in accordance with the "Guidelines for objective demonstration and assessment of barriers", Version 1.0, EB50 Annex 13. In the assessment of Step 4 in section E.5.1 below, the key criteria to be applied shall be in accordance with paragraphs 6,7,8,9 and 47 of the "Tool for the demonstration and assessment of additionality" Version 6.0.0, EB65, Annex 21.	"Guidelines for objective demonstration and assessment of barriers", Version 1.0, EB50 Annex 13. Compliance with the above requirements will be recorded in the CPA-DD Specific and the supporting documents to justify the same will be submitted to the DOE for validation.
13	The CPA start date is not prior to the start date of validation of the PoA.	The earliest date at which either the implementation or construction or real action of the CPA is not prior to the start date of validation of the PoA which was 21/12/2011.	Confirm project start date is after 21/12/2011 Project Start Date of this CPA is [insert Start Date DD/MM/YYYY], confirmed via Purchase Orders and Equipment Contracts associated with construction or real

			action.
14	Local stakeholder comments have been invited at the CPA level.	A local stakeholder consultation meeting will be organized and documented in the CPA-DD.	Confirm Section D.2 of this CPA-DD summarises the Local Stakeholder Consultation and a report documenting the consultation has been completed.
15	The environmental analysis has been performed at the CPA level.	An environmental analysis will be organized and documented in the CPA-DD.	Confirm that the Environmental Analysis has been performed and evidenced in Section C of this CPA.
16	The CPA crediting period does not exceed the PoA end date.	Each CPA crediting period will be defined in the CPA-DD together with a statement that the CPA crediting period will not exceed the PoA end date.	Confirm the crediting period is specified in Section A.4.3 and provide a statement that the CPA crediting period will not exceed the PoA end date.
17	Funding from Annex I parties, if any, does not result in a diversion of official development assistance;	Funding for each CPA will not result in a diversion of official development assistance;	Confirm through a written affirmation that the funding for this CPA does not result in a diversion of official development assistance.
18	CPA shall be approved by the CME.	The CME shall official approve each CPA for inclusion in the PoA.	Confim through a written affirmation that this CPA is approved for inclusion in the PoA by the CME.
19	The CPA is implemented within the PoA target group.	The PoA target group includes all installations with an industrial wastewater treatment facility.	This CPA is implemented within the target group by using wastewater within a [insert industrial facility type eg palm oil, starch etc] industrial facility. Supporting documents to justify the same will be submitted to the DOE during the CPA inclusion process.
20	The CPA technology will treat	Wastewater treated by the CPA	Confirm COD tests

	high strength organic rich wastewater.	technology will have a COD greater than 2,000 mg/l.	Confirm if results from 3rd party laboratory for incoming COD (as per $COD_{in,x}$ described in Section B.6.1) is greater than 2,000 mg/l.

In addition, the eligibility criteria of the methodology and relevant Tools are confirmed below:

	Criteria	**Typical CPA**
ACM0014 "Mitigation of greenhouse gas emissions from treatment of industrial wastewater"		
1	The methodology is applicable to the scenarios described in Table 1 of the methodology. The description of the baseline situation and project activity conforms to **SCENARIO (1)**.	**SCENARIO 1** **Description of the Baseline Situation (Scenario 1):** The wastewater is not treated, but directed to open lagoons that have clearly anaerobic conditions. In cases where solid materials are separated before directing the wastewater to the open lagoons, the solid materials have a different treatment than the wastewater. Confirm the description of the baseline is in accordance with Scenario 1 through review of the open lagoons design drawings from the existing facility and physical inspection of the lagoons (evidenced by photos showing the anaerobic conditions, i.e. methane bubbles). In the case of Greenfields projects, the proposed site should be inspected to confirm that an existing facility does not exist and the procedure for the identification of the most plausible baseline scenario in ACM0014 as outlined in Section E.4 will be applied. In the case that any solid materials are separated before directing the wastewater to open lagoons the presence of a different treatment process should be confirmed through inspection. **Description of the Project Activity (Scenario 1):** In a typical CPA, the wastewater is treated in a new anaerobic digester. In cases where solid materials are separated from the wastewater (both in the project and baseline scenarios), they will be treated separately and not treated with the new anaerobic digester employed for treatment of liquid effluents. The biogas extracted from the anaerobic digester and, if applicable, biogas

		generated from the treatment of solid materials, is flared and/or used to generate electricity and/or heat. The residual from the anaerobic digester, after treatment, is directed to open lagoons or is treated under clearly aerobic conditions (e.g. dewatering and land application). The description of the project should be recorded in this CPA-DD and confirmed in accordance with Scenario 1 through the project design drawings of the anaerobic digester and, if the project has started, the purchase orders of equipment required to construct the anaerobic digester.
2	The average depth of the open lagoons or sludge pits in the baseline scenario is at least 1 m.	This should be confirmed through review of the open lagoons design drawings from the existing facility and physical inspection of the lagoons (evidenced by photos showing the measurement of the depth of the open lagoons). In the case of Greenfields projects, the procedures explained in the section "Identification of alternative scenarios" of the methodology ACM0014 shall be applied.
3	Heat and electricity requirements per unit input of the water treatment facility remain largely unchanged in the baseline scenario and the project activity;	Confirm if heat and electricity requirements per unit input of the water treatment facility remain largely unchanged in the baseline scenario and the project activity. Equipment installed under the project scenario which is required for the capture, treatment and utilization of biogas is not part of the water treatment process. Electricity requirements of the existing wastewater facility should be determined from design drawings (if available) or alternatively from the specifications of the existing equipment (i.e. pumps). Electricity requirements of the wastewater treatment system installed as part of the project activity should be determined from process design drawing and equipment specifications. From these documents it should be determined that the heat and electricity requirements per unit input of the water treatment facility remain largely unchanged.
4	Data requirements as laid out in the methodology (ACM0014) are fulfilled.	Confirm that the data requirements as laid out in the methodology ACM0014 version 04.1 are fulfilled. Record data from this CPA project site and where relevant public data sources in Section B.5 and B.6 of this CPA-DD. Original

		documents that could be used include but are not limited to: test reports, design drawings, equipment specifications, financial records, board minutes, purchase orders and equipment contracts will be retained in the CME filing system in soft copy format in an electronic filing system managed by the CME.
5	**For Scenario 1, the following applies:** The residence time of the organic matter in the open lagoon system should be at least 30 days;	The residence time of the organic matter in the open lagoon system is calculated from the open anaerobic lagoon design drawings and input volume of wastewater flow. The resulting residence time is calculated as [insert calculated number of days and confirm it is at least 30 days].
6	**For Scenario 1, the following applies:** Local regulations do not prevent discharge of wastewater in open lagoons.	In Thailand local regulations do not prevent discharge of wastewater into open lagoons. Notification No. 2 of the Thai Ministry of Industry (B.E. 2539) regarding wastewater from industrial factory does not prevent discharge of wastewater into open lagoons.
7	**For Scenario 1, the following applies:** Inclusion of solid materials in the project activity is only applicable where: (i) Such solid materials are generated by the industrial facility producing the wastewater, and (ii) The solid materials would be generated both in the project and in the baseline scenario.	Confirm if this CPA includes solid materials. If the CPA uses solid materials, confirm that: (i) Such solid materials are generated by the industrial facility producing the wastewater, and (ii) The solid materials would be generated both in the project and in the baseline scenario. The design of the CPA project activity (substantiated from the technology process flow diagram) should be utilised to demonstrate whether solid materials are included in the process design. Any solid materials indicated for use in the process flow diagram will be confirmed to be: (i) Generated by the industrial facility producing the wastewater through onsite observation of the process equipment and photographic evidence, (ii) The solid materials would be generated both in the project and in the baseline scenario through review of both the project process design and the existing facility design.
Tool for the demonstration and assessment of additionality		
8	**Applicable geographical area** covers the entire host country as a default; if the technology applied in the project is not country specific, then the applicable geographical area should be extended to other countries. Project participants may provide justification that the applicable geographical	The applicable geographic area of this CPA and PoA applies to the entire host country of Thailand.

	area is smaller than the host country for technologies that vary considerably from location to location depending on local conditions.	
9	**Measure** (for emission reduction activities) is a broad class of greenhouse gas emission reduction activities possessing common features. Four types of measures are currently covered in the framework: (a) Fuel and feedstock switch; (b) Switch of technology with or without change of energy source (including energy efficiency improvement as well as use of renewable energies); (c) Methane destruction; (d) Methane formation avoidance.	Confirm this CPA involves technology which achieves measure (c) methane destruction through the project design drawings (e.g. process flow diagram). If the project has started, also substantiate via purchase orders for equipment required to construct the anaerobic digester.
10	This tool does not replace the need for the baseline methodology to provide a step-wise approach to identify the baseline scenario. Project participants that propose new baseline methodologies shall ensure consistency between the determination of additionality of a project activity and the determination of a baseline scenario. Project participants can also use the combined tool to identify the baseline scenario and demonstrate additionality.	Confirm Section B.2 applies ACM0014 baseline methodology step-wise approach to identify the baseline scenario.
Tool to determine project emissions from flaring gases containing methane		
11	This tool is applicable under the following conditions: • The residual gas stream to be flared contains no other combustible gases than methane, carbon monoxide and hydrogen; • The residual gas stream to be flared shall be obtained from decomposition of organic material (through landfills, bio-digesters or anaerobic lagoons, among others) or from gases vented in coal mines (coal mine methane and coal bed methane).	Confirm via project design drawings (eg process flow diagram) that residual gas stream to be flared by the project activity is obtained from the decomposition of organic material.
Tool to calculate the emission factor for an electricity system		
12	This tool may be applied to estimate the OM, BM and/or CM when calculating baseline emissions for a project activity that substitutes grid electricity, i.e. where a project activity supplies electricity to a grid or a project activity that results in savings of electricity that would have been provided by the grid	Confirm if the project generates electricity from the destruction of methane for sale to the electricity grid through the design drawings of the project and: (a) if the project sells electricity to the grid, a review of the Power Purchase Agreement (if available) for sale of electricity to the grid (b) In the case that the project supplies

	(e.g. demand-side energy efficiency projects).	electricity to a user that would otherwise be provided by the grid, review of electricity purchase receipts and/or physical inspection of the grid connection will be performed. For Greenfields projects, a review of design drawings should be conducted.
13	Under this tool, the emission factor for the project electricity system can be calculated either for grid power plants only or, as an option, can include off-grid power plants. In the latter case, the conditions specified in "Annex 2 - Procedures related to off-grid power generation" should be met. Namely, the total capacity of off-grid power plants (in MW) should be at least 10% of the total capacity of grid power plants in the electricity system; or the total electricity generation by off-grid power plants (in MWh) should be at least 10% of the total electricity generation by grid power plants in the electricity system; and that factors which negatively affect the reliability and stability of the grid are primarily due to constraints in generation and not to other aspects such as transmission capacity.	Confirm Annex 3 summarises the Grid Emission Factor calculations and states if it is calculated for grid power plants only.
14	In case of CDM projects the tool is not applicable if the project electricity system is located partially or totally in an Annex I country.	This CPA is implemented in Thailand. The Thailand grid is not located partially or totally in an Annex I country.
Tool to calculate baseline, project and/or leakage emissions from electricity consumption		
15	The tool is only applicable if one out of the following three scenarios applies to the sources of electricity consumption: Scenario A: **Electricity consumption from the grid.** The electricity is purchased from the grid only. Either no captive power plant is installed at the site of electricity consumption or, if any on-site captive power plant exits, it is not operating or it can physically not provide electricity to the source of electricity consumption. Scenario B: **Electricity consumption from (an) off-grid fossil fuel fired captive power plant(s).** One or more fossil fuel fired captive power plants are installed at the site of the electricity consumption source and supply the source with electricity. The captive power	Determine whether the project will consume electricity from the grid and, if relevant, confirm Scenario A through review of the project design drawings and through inspection of the project site to confirm that a grid connection is possible at the project site.

	plant(s) is/are not connected to the electricity grid. Scenario C: **Electricity consumption from the grid and (a) fossil fuel fired captive power plant(s).** One or more fossil fuel fired captive power plants operate at the site of the electricity consumption source. The captive power plant(s) can provide electricity to the electricity consumption source. The captive power plant(s) is/are also connected to the electricity grid.	
16	This tool is not applicable in cases where captive renewable power generation technologies are installed to provide electricity in the project activity, in the baseline scenario or to sources of leakage. The tool only accounts for CO_2 emissions.	Confirm if this CPA involves captive renewable power generation or not through inspection of the project site to confirm availability of the grid connection.
Tool to calculate project or leakage CO2 emissions from fossil fuel combustion		
17	This tool provides procedures to calculate project and/or leakage CO_2 emissions from the combustion of fossil fuels. It can be used in cases where CO_2 emissions from fossil fuel combustion are calculated based on the quantity of fuel combusted and its properties.	Confirm if the CPA will combust fossil fuels (confirmed via project design drawings). In the case this CPA does combust fossil fuels then the CO2 emissions from fossil fuel combustion are calculated based on the quantity of fuel combusted and its properties.

ACM0014 outlines the procedure for identification of the most plausible baseline scenario through the following four steps outlined in the PoA-DD:
Step 1: Identification of alternative scenarios
Step 2: Eliminate alternatives that are not complying with applicable laws and regulations
Step 3: Eliminate alternatives that face prohibitive barriers
Step 4: Compare economic attractiveness of remaining alternatives

Step 1: Identification of alternative scenarios
The relevant baseline components for wastewater treatment are listed in the PoA.

W1: The use of open lagoons for the treatment of the wastewater;
W2: Direct release of wastewaters to a nearby water body;
W3: Aerobic wastewater treatment facilities (e.g., activated sludge or filter bed type treatment);
W4: Anaerobic digester with methane recovery and flaring;
W5: Anaerobic digester with methane recovery and utilization for electricity or heat generation;
W6: Wastewater is directed to land application without dewatering;
W7: Wastewater is dewatered and directed to land application/used as fuel in energy applications.

[Confirm if the project does not involve (a) the generation of heat, (b) the treatment of solid materials which are separated in the baseline, and (c) the generation of electricity. If so, the baseline components of Heat Generation, Sold Materials and Generation of Electricity are not relevant.

If the project activity includes heat generation with biogas from a new anaerobic digester, summarise how plausible alternative scenarios are relevant (or not):
H1: Co-generation of heat using fossil fuels in a captive cogeneration power plant;
H2: Heat generation using fossil fuels in a boiler;
H3: Heat generation using renewable sources.

If the project involves the treatment of solid materials which are separated in the baseline, summarise how plausible alternative scenarios are relevant (or not):
SM1: The solid materials are dumped or left to decay under anaerobic or aerobic conditions;
SM2: The solid materials are used as animal fodder;
SM3: The solid materials are burnt in an uncontrolled manner without utilizing it for energy purposes;
SM4: The solid materials are burnt for energy purposes.

If the project activity includes electricity generation with biogas from a new anaerobic digester, summarise how plausible alternative scenarios are relevant:
E1: Power generation using fossil fuels in a captive power plant;
E2: Electricity generation in the grid;
E3: Electricity generation using renewable sources.]

Step 2: Eliminate alternatives that are not complying with applicable laws and regulations
As described in the POA-DD, W2, W6 and W7 are not complying with applicable laws and are eliminated.

[Summarise how other remaining plausible alternative scenarios comply or do not comply with applicable laws and regulations.]

The remaining alternatives after Step 2 are:
W1: The use of open lagoons for the treatment of the wastewater;
W3: Aerobic wastewater treatment facilities (e.g., activated sludge or filter bed type treatment);
W4: Anaerobic digester with methane recovery and flaring;
W5: Anaerobic digester with methane recovery and utilization for electricity or heat generation;
[list other remaining alternatives together with justification on the eliminated alternatives as to their non-compliance with applicable laws and regulations.]

Step 3: Eliminate alternatives that face prohibitive barriers
In accordance with the PoA-DD, W3 may be eliminated due to technological barrier of technological failure risk, as the process/technology failure risk of aerobic treatment is significantly greater than for the comparable common practice treating wastewater open anaerobic lagoons. This is demonstrated by relevant scientific literature that indicates that the COD of high strength industrial organic rich wastewater is far too high to treat in aerobic process[3]. In addition, aerobic treatment systems are more complicated due to inherent difficulties like oxygen transfer problem, high waste sludge produces and

[3] E. Roberts Alley, *'Water Quality Control Handbook 2007'*, published by McGraw Hill in 2007 (page 10.65). This reference indicates an aerobic treatment process should be considered first if the raw COD concentration of a wastewater is less than 1,000 to 2,000 mg/l and that anaerobic systems for these low COD concentrations would not be economic. [Ensure each CPAs involve biogas plants with higher COD concentrations than 2,000mg/l].

settling problem[4]. This barrier is inherent to the nature of the high strength industrial organic rich wastewater and as such may eliminate the baseline alternative W3 in accordance with the "Guidelines for objective demonstration and assessment of barriers" because regardless of the financial/technical capacity of the companies involved, the nature of the wastewater stream to be treated cannot be mitigated by additional financial means.

[Analyse the remaining wastewater scenarios that may be eliminated depending on the specific details of this CPA site:
W1. The use of open lagoons for the treatment of the wastewater;
W4: Anaerobic digester with methane recovery and flaring;
W5. Anaerobic digester with methane recovery and utilization for electricity or heat generation.

Summarise any technology barriers that may be faced for electricity generation depending on the circumstances of this CPA. Indicative circumstances may include, but are not limited to:

(1) Sites which do not contain a captive power plant (but instead have a grid connection) will face barriers to power generation using fossil fuels (E1);
(2) Remote sites which do not have access to grid connections will face a technology barrier to accessing electricity from the grid (E2);
(3) Sites which do not contain sources of renewable energy will face the technology barrier to accessing eelectricity generation from renewable sources (E3).

Summarise any technology barriers that may be faced for heat generation depending on the circumstances of this CPA. Indicative circumstances may include, but are not limited to:

(1) Sites which do not contain a captive cogeneration power will face barriers to co-generation of heat using fossil fuels (H1);
(2) Sites which do not contain fossil fuel boilers will face barriers to heat generation in fossil fuel boilers (H2);
(3) Sites which do not contain renewable energy boilers will face barriers to heat generation in fossil fuel boilers (H3);

Summarise any barriers that may be faced by solid material use depending on the circumstances of this CPA. Indicative circumstances may include, but are not limited to:

(1) Sites which do not include technology configured to remove solid materials from the wastewater will face the technology barrier to the solid materials being dumped or left to decay under anaerobic or aerobic conditions (SM1);
(2) Sites which do not include technology configured to remove solid materials from the wastewater will face the technology barrier to solid materials being used as animal fodder (SM2);
(3) Sites which do not include technology configured to remove solid materials from the wastewater will face the technology barrier to solid material being burnt in an uncontrolled manner without utilizing it for energy purposes (SM3);
(4) Sites which do not include technology configured to remove solid materials from the wastewater will face the technology barrier to solid materials being burnt for energy purposes (SM4);]

[4] Francisco J. Cervantes, Spyros G. Pavlostathis, Adrianus C. van Handeel, *'Advanced biological treatment processes for industrial wastewaters, Principles and Applications'* published by IWA in 2006 (page 259)

Step 4: Compare economic attractiveness of remaining alternatives

[Determine if only one alternative remains, if so, this can be considered the baseline for W, E, H and SM. If more than one alternative remains after step 3, then this Step 4 must be applied.

The economic attractiveness without revenues from CERs for all alternatives that are remaining should be compared by applying Step 2 of the "Tool for the demonstration and assessment of additionality", Version 6.0.0, EB65 applying the investment analysis using IRR as the indicator. The following parameters should be explicitly documented in this CPA-DD:

- Land cost;
- Engineering, Procurement and Construction cost;
- Labour cost;
- Operation and Maintenance cost;
- Administration cost;
- Fuel cost;
- Capital cost and interest;
- Revenue from electricity sales;
- All other costs of implementing the technology of the each alternative option;
- All revenues generated by the implementation of the proposed technology except for carbon credits revenues (including energy savings due to captive use of biogas as fuel for either electricity or heat generation at the project site). .

In the case that there are several alternatives remaining after Step 2 and that at least two alternatives are associated with costs, an investment comparison analysis should be conducted. In doing so, compare the IRR (or equivalent financial indicator) of the different alternatives and select the most cost-effective alternative (e.g. with the highest IRR) as the baseline scenario. Include a sensitivity analysis applying Sub-step 2d of the "Tool for the demonstration and assessment of additionality", Version 6.0.0, EB65. The investment comparison analysis provides a valid argument that the most cost-effective scenario is the baseline scenario if it consistently supports (for a realistic range of assumptions) this conclusion. In case the sensitivity analysis is not fully conclusive, select the baseline scenario alternative with least emissions among the alternatives that are the most economically attractive according to the investment analysis and the sensitivity analysis. If the project undertaken without being registered as a CDM project activity is the only remaining alternative with associated costs, a benchmark analysis is to be used to demonstrate its profitability or non-profitability.

If the project is profitable, it is to be considered as the baseline scenario. If not, the continuation of the current situation is the baseline.

Summarise the relevant baseline scenarios for the electricity generation (where applicable), heat generation (where applicable), use of solid material (where applicable).

The scenarios identified above will be considered the baseline.]

B.3. Assessment and demonstration of additionality of the CPA, as per eligibility criteria listed in the Registered PoA:

The POA-DD states that the additonality will be demonstrated by applying the "Tool for the demonstration and assessment of additionality", Version 6.0.0, EB65 as shown below:

Step 1: Identification of alternatives to the project activity consistent with current laws and regulations

According to the 'Guidelines for Completing CDM PDDs V7.0 (EB41) Section B.4 and B.5 (in CPA-DD Section B.2 and B.3) are complimentary and the same information need not be replicated in both sections. Hence, the realistic and credible scenarios from section B.2 above will be applied, that is:
[Insert list of realistic and credible scenarios from section B.2]

[In accordance with Step 1 of the "Tool for the demonstration and assessment of additionality", choose whether to proceed to Step 2 (Investment analysis) or Step 3 (Barrier analysis) or whether to complete both Steps 2 and 3. Document the steps for Steps 2 and 3 following the procedures outlined in Section E.5.1 of the PoA-DD]

[Confirm outcome of Step 3, that is, are both Sub-steps 3a and 3b satisfied? If so, proceed to Step 4 (Common practice analysis). If one of the Sub-steps 3a or 3b are not satisfied, the project activity is not additional and the CPA is not eligible to be included in the PoA.]

Step 4: Common practice analysis
As per paragraph 6, 7, 8 and 9 of the "Tool for the demonstration and assessment of additionality" the common practice is applied as follows:

Paragraph 6: The project is a measure (c) Methane destruction, and if applicable, with energy production.
Paragraph 7: The output is [Insert Output of CPA]
Paragraph 8: Different technologies in the context of "first of its kind" [are/are not] applicable [insert description if relevant]
Paragraph 9: Different technologies in the context of common practice technologies are technologies that deliver the same output and differ by at least one of the following (as appropriate in the context of the measure applied in the proposed CDM project and applicable geographical area):

(a) Energy source/fuel;
(b) Feed stock;
(c) Size of installation

Therefore the steps outlined in paragraph 47 are outlined below, and the full spreadsheet with the Common Practice analysis is prepared with this CPA-DD and summarised below:

[Step 1: Calculate applicable output range as +/-50% of the design output or capacity of the proposed CPA.

Step 2: In the applicable geographical area, identify all plants that deliver the same output or capacity, within the applicable output range calculated in Step 1, as the proposed project activity and have started commercial operation before the start date of the project. Note their number N_{all}. Registered CDM

project activities and project activities undergoing validation shall not be included in this step [describe the data applied in the analysis];

Step 3: Within plants identified in Step 2, identify those that apply technologies different that the technology applied in the proposed project activity. [Describe the method applied in the analysis]. Note their number N_{diff}.

Step 4: Calculate factor $F=1-N_{diff}/N_{all}$ representing the share of plants using technology similar to the technology used in the proposed project activity in all plants that deliver the same output or capacity as the proposed project activity.

The proposed CPA is a common practice within a sector in the applicable geographical area if both the following conditions are fulfilled:

(a) the factor F is greater than 0.2, and
(b) $N_{all}-N_{diff}$ is greater than 3.]

$N_{all} - N_{diff}$ is [insert outcome of steps above] and F is [insert outcome of steps above], therefore the proposed project activity [is/is not] "common practice" and therefore the project [is/is not] additional.

B.4. Description of the sources and gases included in the project boundary and proof that the CPA is located within the geographical boundary of the registered PoA.

The project boundary of the CPA is as follows:

[Insert project boundary diagram, including the relevant elements of : (a) the anaerobic digester, (b) the treatment system which receives effluent form the digester, (c) the final discharge location of effluent (d) the equipment associated with production, collection cleaning and distribution of biogas, (e) the equipment associated with destruction and gainful use of biogas, and (f) equipment used to supply electricity/energy to the project equipment. If the CPA includes solid materials that are part of the waste stream within the project boundary, no baseline emissions (either for the methane avoidance or for any energy generation) is accounted for in the baseline scenario (as per footnote 6 of ACM14). If the CPA involves the sale of electricity to the national electricity grid system, the grid system will also be included in the spatial boundary.]

The sources and gases included in the project boundary are summarised in table B.4 below.

	Source	Gas		Justification / Explanation
Baseline	Wastewater treatment processes or sludge disposal	CH_4	Included	The major source of emissions in the baseline from open lagoons (Scenario 1) [Confirm if any of the methane emissions are from solid materials and, if so, ensure they are excluded].
		N_2O	Excluded	Excluded for simplification. This is conservative
		CO_2	Excluded	CO_2 emissions from the decomposition of organic waste are not accounted for

	Source	Gas		Justification / Explanation
	Electricity consumption / generation	CO_2	Included	[Assess if this is an applicable emissions source for this CPA, Confirm if electricity is consumed for the operation of the wastewater treatment system in the baseline scenario and claimed. Confirm if electricity is generated with biogas from an anaerobic digester under the project activity, electricity generation in the grid or on-site is displaced by the project activity. Assess if any electricity is generated from solid materials, and if so, ensure emissions are excluded.]
		CH_4	Excluded	Excluded for simplification. This is conservative
		N_2O	Excluded	Excluded for simplification. This is conservative
	Thermal energy generation	CO_2	Included	[Assess if this is an applicable emissions source for this CPA, that is if thermal energy is generated with biogas from an anaerobic digester under the project activity and if on-site thermal energy generation is displaced by the project activity. Assess if any heat is generated from solid materials, and if so, ensure emissions are excluded.]
		CH_4	Excluded	Excluded for simplification. This is conservative
		N_2O	Excluded	Excluded for simplification. This is conservative
Project Activity	Wastewater treatment processes or sludge treatment process	CH_4	Included	The treatment of wastewater or sludge under the project activity may cause different emissions (include applicable sources from list below): (i) Methane emissions from the lagoons (if effluent from the treatment under the project activity is directed to lagoons); (ii) Physical leakage of methane from the digester system; (iii) Methane emissions from flaring (if biogas from the digester is flared); (iv) Methane emissions from land application of wastewater/sludge; (v) Methane emissions from wastewater removed in the dewatering process
		CO_2	Excluded	CO_2 emissions from the decomposition of organic waste are not accounted for
		N_2O	Included	[Assess if this is an applicable emissions source for this CPA, if the projects involve land application of sludge.]
	On-site electricity use	CO_2	Included	[Assess if this is an applicable emissions source for this CPA. If electricity is generated with biogas from an anaerobic digester, these emissions are not accounted for. Any on-site electricity consumption should be subtracted from the electricity generation of the digester.]
		CH_4	Excluded	Excluded for simplification. This emission source is assumed to be very small

	Source	Gas		Justification / Explanation
		N_2O	Excluded	Excluded for simplification. This emission source is assumed to be very small
	On-site fossil fuel consumption	CO_2	Included	[Assess if this is an applicable emissions source for this CPA.]
		CH_4	Excluded	Excluded for simplification. This emission source is assumed to be very small
		N_2O	Excluded	Excluded for simplification. This emission source is assumed to be very small

Table B.4: Sources and Gases included in the project boundary

In reference to the GPS co-ordinates and map provided in section A.4.1.2.,[confirm that the CPA is located within the geographic boundary of the registered PoA].

B.5. Emission reductions:

B.5.1. Data and parameters that are available at validation:

Only the applicable ex-ante parameters are chosen from the exhaustive list in the PoA-DD.
[Choose applicable parameters from those listed below]

Data / Parameter:	$COD_{out,x}$ $COD_{in,x}$
Data unit:	ton COD/unit of time (year, month)
Description:	COD of the effluent in the period x COD directed to the open lagoons (Scenario 1) in the period x
Source of data used:	For existing plants: one year of historical data. If no data is available the COD inflow to and effluent from the lagoon during a measurement campaign of at least 10 days. For Greenfield projects: use the design COD inflow for COD in and the design effluent COD flow for COD out corresponding to the design features of the lagoon system identified in the procedure for the selection of the baseline scenario. The measurements should be undertaken during a period that is representative for the typical operation conditions of the plant and ambient conditions of the site (temperature, etc). The average COD_{in} and COD_{out} values from the measurement campaign shall be used and the result shall be multiplied by 0.89 to account for the uncertainty range (of 30% to 50%) associated with this approach as compared to one-year historical data
Value applied:	[insert value for this CPA if appropriate]
Justification of the choice of data or description of measurement methods and procedures	In line with the requirements of the baseline methodology

actually applied :	
Any comment:	x = Representative historical reference period (at least one year). Fixed *ex-ante*.

Data / Parameter:	B_o
Data unit:	$tCH_4/tCOD$
Description:	Maximum methane producing capacity, expressing the maximum amount of CH_4 that can be produced from a given quantity of chemical oxygen demand (COD)
Source of data used:	2006 IPCC Guidelines
Value applied:	No measurement procedures. The default IPCC value for B_o is 0.25 kg CH_4/kg COD. If the methodology is used for wastewater containing materials not akin to simple sugars, a CH_4 emissions factor different from 0.21 $tCH_4/tCOD$ has to be estimated and applied
Justification of the choice of data or description of measurement methods and procedures actually applied :	In line with the requirements of the baseline methodology
Any comment:	Taking into account the uncertainty of this estimate, project participants should use a value of 0.21 kg CH_4/kg COD as a conservative assumption for B_o Fixed *ex-ante*.

Data / Parameter:	f_d
Data unit:	-
Description:	Factor expressing the influence of the depth of the lagoon on methane generation
Source of data used:	Default values prescribed in the baseline methodology
Value applied:	Apply the following values for the corresponding average depth of the open lagoon Depth > 5 m: 70% Depth 1 – 5 m: 50% Depth < 1 m: 0%
Justification of the choice of data or description of measurement methods and procedures actually applied :	In line with the requirements of the baseline methodology
Any comment:	Applicable to the methane conversion factor method. In the case of projects activities implemented in Greenfield facilities where the baseline is a new to be built anaerobic lagoon, use the depth as defined in the baseline lagoon design in the section "Identification of alternative scenarios" Fixed *ex-ante*.

Data / Parameter:	$f_{COD,aerobic}$
Data unit:	t COD/ha yr
Description:	Quantity of chemical oxygen demand degraded to CO_2 under aerobic conditions per surface area of the lagoon
Source of data used:	Default values prescribed in the baseline methodology
Value applied:	Suggested value: 92.7 t COD / ha yr (= 254 kg COD/ha day)
Justification of the choice of data or description of measurement methods and procedures actually applied :	In line with the requirements of the baseline methodology
Any comment:	Applicable to the organic removal ratio method Fixed *ex-ante*.

Data / Parameter:	D
Data unit:	M
Description:	Average depth of the lagoon
Source of data used:	For existing plants: Conduct measurements For project activities implemented in Greenfield facilities: As per the baseline lagoon design as identified in Step 1 of the section "Procedure for the identification of the most plausible baseline scenario Identification of alternative scenarios"
Value applied:	[insert value for this CPA if appropriate]
Justification of the choice of data or description of measurement methods and procedures actually applied :	In line with the requirements of the baseline methodology
Any comment:	Fixed *ex-ante*. Determine the average depths of the whole lagoon under normal operating conditions.

Data / Parameter:	EC_{BL}
Data unit:	MWh/yr
Description:	Annual quantity of electricity that would be consumed in the absence of the project activity for the treatment of the wastewater (Scenario 1)
Source of data used:	In case of existing plants: Historical records of the average electricity during the most recent three years prior to the implementation of the project activity; In case of project activities implemented in Greenfield facilities: according to the baseline lagoon design as identified in Step 1 of the section "Procedure for the identification of the most plausible baseline scenario" Historical records must correspond to measurements whereby electricity meters undergo maintenance/calibration subject to appropriate industry standards. The accuracy of the meter readings will be verified by receipts issued by the purchasing power company. Uncertainty of the meters to be obtained from the manufacturers
Value applied:	[insert value for this CPA if appropriate]
Justification of the choice of data or description of measurement methods and procedures actually applied :	In line with the requirements of the baseline methodology
Any comment:	Only relevant if electricity emissions are included in the baseline. Fixed *ex-ante*.

Data / Parameter:	$EF_{grid,y}$ $EF_{BL,EL,y}$
Data unit:	tCO_2/MWh
Description:	Grid emission factor in year *y* ;Baseline emission factor for electricity generated and/or consumed in the absence of the project activity in year *y* (tCO_2/MWh)
Source of data used:	Calculated in accordance with the latest approved version of the "Tool to calculate the emission factor for an electricity system", Version 2.2.1, EB63
Value applied:	[insert value for this CPA if appropriate]
Justification of the choice of data or description of measurement methods and procedures actually applied :	In line with the requirements of the baseline methodology
Any comment:	Fixed *ex-ante*.

Data / Parameter:	$EF_{CO2,FF,captive}$ $EF_{CO2,FF,boiler}$
Data unit:	tCO2/GJ
Description:	CO_2 emission factor of the fossil fuel type used in the captive power plant; CO_2 emission factor of the fossil fuel type used in the boiler for heat generation in the absence of the project activity
Source of data used:	Actual measured or local data is to be used. If not available, regional data should be used and, in its absence, IPCC defaults can be used from the most recent version of IPCC Guidelines for National Greenhouse Gas Inventories
Value applied:	[insert value for this CPA if appropriate]
Justification of the choice of data or description of measurement methods and procedures actually applied :	In line with the requirements of the baseline methodology
Any comment:	Only relevant if baseline emissions from captive power (electricity/heat) sources are calculated. If the measurement results differ significantly from previous measurements or other relevant data sources, conduct additional measurements. Double-checked against IPCC defaults (for consistency) if data is local or regional Fixed *ex-ante*.

Data / Parameter:	$\eta_{EL,captive}$ $\eta_{BL,boiler}$
Data unit:	%
Description:	Efficiency of the fossil fuel fired captive power plant; Efficiency of the boiler that would be used for heat generation in the absence of the project activity
Source of data used:	Depending on which option is chosen, the source will be either of the following: • Measured efficiency prior to project implementation; • Measured efficiency during monitoring; • Manufacturer nameplate data for efficiency of the existing equipment
Value applied:	[insert value for this CPA if appropriate]
Justification of the choice of data or description of measurement methods and procedures actually applied :	In line with the requirements of the baseline methodology
Any comment:	Only relevant if baseline emissions from captive power (electricity/heat) sources are calculated. Fixed *ex-ante*.

Data / Parameter:	$FL_{biogas,digest}$
Data unit:	m³ biogas leaked/m³ biogas produced
Description:	Fraction of biogas that leaks from the digester
Source of data used:	IPCC (2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 5, Chapter 4, Page 4.4)
Value applied:	Use default leak factor of 0.05 m³ biogas leaked/m³ biogas produced
Justification of the choice of data or description of measurement methods and procedures actually applied :	In line with the requirements of the baseline methodology
Any comment:	Where project participants wish to use lower values of physical leakage, they should request for revision of the methodology with the procedure to monitor the methane leak from the digester Fixed *ex-ante*.

Data / Parameter:	$EF_{N2O,LA,sludge}$
Data unit:	t N_2O/t N
Description:	N_2O emission factor for nitrogen from sludge applied to land
Source of data used:	Stehfest, E. and Bouwman, A.F. N_2O and NO emission from agricultural fields and soils under natural vegetation: summarizing available measurement data and modelling of global annual emissions. Nutr. Cycl. 29 Agroecosyst., in press. The average emission factor used is 0.01 kg N_2O-N / kg N (= 0.016 kg N_2O / kg N)
Value applied:	0.016
Justification of the choice of data or description of measurement methods and procedures actually applied :	In line with the requirements of the baseline methodology
Any comment:	Applicable if sludge is applied on lands under the project activity Fixed *ex-ante*.

Data / Parameter:	$EF_{N2O,LA,ww}$
Data unit:	t N_2O/t N
Description:	N_2O emission factor for nitrogen from wastewater applied to land
Source of data used:	Stehfest, E. and Bouwman, A.F. N_2O and NO emission from agricultural fields and soils under natural vegetation: summarizing available measurement data and modelling of global annual emissions. Nutr. Cycl. 29 Agroecosyst., in press. The average emission factor used is 0.01 kg N_2O-N / kg N (= 0.016 kg N_2O / kg N)
Value applied:	Value to be applied: 0.016
Justification of the	In line with the requirements of the baseline methodology

choice of data or description of measurement methods and procedures actually applied :	
Any comment:	Applicable if sludge is applied on lands under the project activity Fixed *ex-ante*.

Data / Parameter:	$MCF_{sludge,LA}$
Data unit:	-
Description:	Methane conversion factor for the application of sludge to lands
Source of data used:	In line with the requirements of the baseline methodology
Value applied:	Value to be applied 0.05
Justification of the choice of data or description of measurement methods and procedures actually applied :	In line with the requirements of the baseline methodology
Any comment:	Applicable if sludge is applied on lands under the project activity Fixed *ex-ante*.

Data / Parameter:	$MCF_{ww,LA}$
Data unit:	-
Description:	Methane conversion factor for the application of wastewater to lands
Source of data used:	In line with the requirements of the baseline methodology
Value applied:	Value to be applied 0.05
Justification of the choice of data or description of measurement methods and procedures actually applied :	In line with the requirements of the baseline methodology
Any comment:	Fixed *ex-ante*.

Data / Parameter:	GWPCH4
Data unit:	tCO2e/tCH4
Description:	Global warming potential for CH4
Source of data used:	IPCC
Value applied:	Default to be applied: 21 for the first commitment period
Justification of the choice of data or description of measurement methods and procedures actually applied :	In line with the requirements of the baseline methodology
Any comment:	Shall be updated according to any future COP/MOP decisions

Data / Parameter:	GWPN2O
Data unit:	$tCO2e/tN_2O$
Description:	Global warming potential for N_2O
Source of data used:	IPCC
Value applied:	Default to be applied: 296 for the first commitment period
Justification of the choice of data or description of measurement methods and procedures actually applied :	In line with the requirements of the baseline methodology
Any comment:	Shall be updated according to any future COP/MOP decisions

Data / Parameter:	Rs
Data unit:	t COD/t substance
Description:	Specific reduction in chemical oxygen demand by substance *s*
Source of data used:	The most conservative default value from review of published literature
Value applied:	[insert value for this CPA if appropriate]
Justification of the choice of data or description of measurement methods and procedures actually applied :	In line with the requirements of the baseline methodology
Any comment:	Substance is very likely to be SO4 Fixed *ex-ante*.

Data / Parameter:	A
Data unit:	Unit of area (ha)
Description:	Surface of the lagoon
Source of data used:	Actual measurements in case of existing lagoons. In case of project activities implemented in Greenfield facilities: According to the baseline lagoon design as identified in Step 1 of the section "Procedure for the identification of the most plausible baseline scenario"
Value applied:	[insert value for this CPA if appropriate]
Justification of the choice of data or description of measurement methods and procedures actually applied :	In line with the requirements of the baseline methodology
Any comment:	Fixed *ex-ante*.

Data / Parameter:	EF_i
Data unit:	tCO2/GJ

Description:	Specific production emission factor of type of animal feed which is used to replace the solid materials
Source of data used:	Use relevant emission factors based on lifecycle analysis studies, for type *i* of animal feed used to replace the solid materials (e.g. from scientific literature, industry sources or manufacturers). Alternatively, identify average lifecycle emissions per animal feed produced (e.g. calculations based on national/international statistics or estimated by external research institutes or national agencies responsible for GHG inventory)
Value applied:	[insert value for this CPA if appropriate]
Justification of the choice of data or description of measurement methods and procedures actually applied :	In line with the requirements of the baseline methodology
Any comment:	Applicable if leakage occurs due to displacement of animal fodder. In case the production of animal fodder in the region has an impact on deforestation, emissions associated with the deforestation need to be included in the estimations

Data / Parameter:	f_i
Data unit:	Fraction GJ/GJ (%)
Description:	Fraction of animal feed type *i* compared to the total mix of animal feed which is used to replace the solid materials on dry basis
Source of data used:	Interviews with existing customers of solid materials type *k* and/or regional/national market statistics on animal feed use, which can be statistically significant (representative sampling with 95% confidence interval)
Value applied:	[insert value for this CPA if appropriate]
Justification of the choice of data or description of measurement methods and procedures actually applied :	In line with the requirements of the baseline methodology
Any comment:	Applicable if leakage occurs due to displacement of animal fodder. In case of variation in the data, apply a conservative approach (i.e. the largest fraction for the most GHG intensive animal fodder etc.)

Data / Parameter:	NCV_k
Data unit:	GJ/ton of dry matter
Description:	Net calorific value of the solid materials type *k*
Source of data used:	Measurements shall be carried out at qualified laboratories and according to relevant national or international standards. Measure the NCV based on dry matter
Value applied:	[insert value for this CPA if appropriate]
Justification of the choice of data or	In line with the requirements of the baseline methodology

description of measurement methods and procedures actually applied :	
Any comment:	Applicable if leakage occurs due to displacement of animal fodder

Data / Parameter:	TDLj,y
Data unit:	-
Description:	Average technical transmission and distribution losses for providing electricity to source *j*,
Source of data used:	Tool to calculate baseline, project and/or leakage emissions from electricity consumption,Version 01, EB39
Value applied:	20%
Justification of the choice of data or description of measurement methods and procedures actually applied :	Default value provided in Tool for project electricity consumption sources.
Any comment:	

B.5.2. Ex-ante calculation of emission reductions:

Emission reductions are calculated by subtracting the project emissions from the baseline emissions.
Emission reductions are calculated by subtracting project emissions from baseline emissions.
$ER_y = BE_y - PE_y \{-LE_y\}$

Parameter	Description of Value Applied	Value	Units
BE_y	Calculated as shown below	[insert]	tCO_2e/yr
PE_y	Calculated as shown below	[insert]	tCO_2e/yr
LE_y	Calculated as shown below, if appropriate	[insert]	tCO_2e/yr
ER_y	Calculated as $BE_y - PE_y - LE_y$	[insert]	tCO_2e/yr

Baseline Emissions
Baseline emissions are calculated as follows:
$BE_y = BE_{CH4} + BE_{EL,y} + BE_{HG}$

Parameter	Description of Value Applied	Value	Units
$BE_{CH4,y}$	Calculated as per ORR method or MCF method of ACM0014, as per below in Step 1	[insert]	tCO_2e/yr
$BE_{EL,y}$	Calculated as per ACM0014, shown below in Step 2	[insert]	tCO_2e/yr
$BE_{HG,y}$	Calculated as per ACM0014, shown below in Step 3	[insert]	tCO_2e/yr

BE_y	Calculated as $BE_{CH4} + BE_{EL,y} + BE_{HG}$	[insert]	tCO_2e/yr

The baseline emissions are calculated in three steps as follows:
Step 1: Calculation of baseline emissions from anaerobic treatment of the wastewater ($BE_{CH4,y}$);
Step 2: Calculation of baseline emissions from generation and consumption of electricity ($BE_{EL,y}$);
Step 3: Calculation of baseline emissions from heat generation ($BE_{HG,y}$);

Step 1: Calculation of baseline emissions from anaerobic treatment of the wastewater

The methodology proposes two alternative methods for the estimation of methane emissions from open lagoons:

Baseline Emissions from Anaerobic Treatment of Wastewater

Option	Selection
Methane Conversion Method	☐
Organic Removal Ratio Method	☐

[Select option above and include equation and input value tables appropriate to choices applied]

Step 2 Baseline Emissions from Generation and Consumption of Electricity

Baseline emissions from the following two sources of electricity are considered:

1) Consumption of electricity associated with the treatment of wastewater in the Baseline.
2) Electricity generation from biogas from a new anaerobic digester under the project activity

Option	Selection
Both sources are excluded from the baseline	☐
ONLY consumption of electricity associated with the treatment of wastewater is included in the Baseline.	☐
ONLY electricity generation from biogas from a new anaerobic digester under the project activity is included in the Baseline.	☐
Both sources are included in the baseline	☐

[Select option above and include equation and input value tables appropriate to choices applied, including summary of calculation of Grid Emission Factor.]

Step 3 Baseline Emissions from Generation of Heat

Option	Selection
This source is not applicable and is excluded from the baseline because the project does not intend to supply biogas for heat generation	☐
Baseline emissions are calculated due to displacement of fossil fuels from the generation of heat in boilers	☐

[Select option above and include equation and input value tables appropriate to choices applied]

Project Emissions
Project emissions are calculated as follows:

$PE_y = PE_{CH4,effluent} + PE_{CH4,digest} + PE_{flare} + PE_{sludge,LA} + PE_{ww,LA,y} + PE_{FC,y} + PE_{EC}$

Parameter	Description of Value Applied	Value	Units
$PE_{CH4,effluent,y}$	Calculated with the ORR or MC method of ACM0014	[insert]	tCO_2e/yr
$PE_{CH4,digest,y}$	Calculated as per ACM0014, shown below	[insert]	tCO_2e/yr
$PE_{flare,y}$	Project emissions from flaring of biogas generated in the anaerobic digester in year *y*	[insert]	tCO_2e/yr
$PE_{sludge,LA,y}$	Project emissions from land application of sludge	[insert]	tCO_2e/yr
$PE_{ww,LA,y}$	Project emissions from land application of wastewater	[insert]	tCO_2e/yr
$PE_{EC,y}$	Project emissions from electricity consumption	[insert]	tCO_2e/yr
$PE_{FC,y}$	Project emissions from fossil fuel consumption	[insert]	tCO_2e/yr
PE_y	Calculated as $PE_{CH4,effluent} + PE_{CH4,digest} + PE_{flare} + PE_{sludge,LA} + PE_{ww,LA,y} + PE_{FC,y} + PE_{EC}$	[insert]	tCO_2e/yr

[Include equation and input value tables appropriate to the method applied]

Leakage

Option	Selection
No leakage emissions are calculated because no solid materials are used in the digestor for which the most plausible baseline is use as animal fodder.	☐
Leakage emissions are calculated for solid materials used in the digestor because the solid materials are used as animal fodder in the most plausible baseline.	☐

[Select option above and include equation and input value tables appropriate to the choices applied]

B.5.3. Summary of the ex-ante estimation of emission reductions:

Year	Estimation of project activity emissions (tonnes of CO_2 e)	Estimation of baseline emissions (tonnes of CO_2 e)	Estimation of leakage (tonnes of CO_2 e)	Estimation of overall emission reductions (tonnes of CO_2 e)
Year A	[Insert tCO_2e]	[Insert tCO_2e]	[Insert tCO_2e]	[Insert tCO_2e]
Year B	[Insert tCO_2e]	[Insert tCO_2e]	[Insert tCO_2e]	[Insert tCO_2e]
Year C	[Insert tCO_2e]	[Insert tCO_2e]	[Insert tCO_2e]	[Insert tCO_2e]
Year …	[Insert tCO_2e]	[Insert tCO_2e]	[Insert tCO_2e]	[Insert tCO_2e]
Total (tonnes of CO_2 e)	[Insert tCO_2e]	[Insert tCO_2e]	[Insert tCO_2e]	[Insert tCO_2e]

B.6. Application of the monitoring methodology and description of the monitoring plan:

B.6.1. Description of the monitoring plan:

Only the applicable parameters are chosen from the exhaustive list in the PoA-DD.
[Choose applicable parameters from those listed below]

Data / Parameter:	$F_{PJ,dig,m}$
Data unit:	m³/month
Description:	Quantity of wastewater that is treated in the anaerobic digester in the project activity in month *m*
Source of data to be used:	Measured and calculated
Value of data applied for the purpose of calculating expected emission reductions in section B.5	[insert value of data for this CPA]
Description of measurement methods and procedures to be applied:	Parameter monitored continuously using flow meters but aggregated annually for calculations
QA/QC procedures to be applied:	The equipment will be calibrated in accordance with manufacturer's requirements or once per year if no guidelines are provided by the manufacturer. Equipment will be calibrated prior to or during installation. [insert additional QA/QC procedures for this CPA if appropriate]
Any comment:	In case of Scenario 1, if the solid materials are also treated in the baseline and project scenario, the $F_{PJ,dig,m}$ does not account the amount of solid materials treated or separated from the wastewater stream in the anaerobic digester, if applicable

	$w_{COD,dig,m}$
Data unit:	t COD/m³
Description:	Average chemical oxygen demand in the wastewater that is treated in the anaerobic digester in the project activity in month *m*
Source of data to be used:	Measurements
Value of data applied for the purpose of calculating expected emission reductions in section B.5	[insert value of data for this CPA]
Description of measurement methods and procedures to be applied:	Regularly, calculate average monthly and annual values. Measure the COD according to national or international standards
QA/QC procedures to be applied:	The equipment will be calibrated in accordance with manufacturer's requirements or once per year if no guidelines are provided by the manufacturer. Equipment will be calibrated prior to or during installation. [insert additional QA/QC procedures for this CPA if appropriate]
Any comment:	In case of Scenario 1, if the solid materials are also treated in the baseline and project scenario, the $w_{COD,dig,m}$ is not calculated for the solid materials treated or separated from the wastewater stream in the anaerobic digester, if applicable

Data / Parameter:	$w_{S,y}$
Data unit:	Kg/m³
Description:	Average concentration of chemical oxidative substance s in the wastewater \treated in the digester in year *y*
Source of data to be used:	Measurements
Value of data applied for the purpose of calculating expected emission reductions in section B.5	[insert value of data for this CPA]

Description of measurement methods and procedures to be applied:	Regularly, calculate average monthly and annual values. Measure the COD according to national or international standards
QA/QC procedures to be applied:	The equipment will be calibrated in accordance with manufacturer's requirements or once per year if no guidelines are provided by the manufacturer. Equipment will be calibrated prior to or during installation. [insert additional QA/QC procedures for this CPA if appropriate]
Any comment:	Organic removal ratio (baseline emissions) Applicable if chemical oxidative substance are present in the wastewater

Data / Parameter:	$T_{2,m}$
Data unit:	K
Description:	Average temperature at the project site in month *m*
Source of data to be used:	National or regional weather statistics
Value of data applied for the purpose of calculating expected emission reductions in section B.5	[insert value of data for this CPA]
Description of measurement methods and procedures to be applied:	Continuously, aggregated in monthly average values
QA/QC procedures to be applied:	Statistical data, QA/QC not relevant
Any comment:	Applicable for the methane conversion factor method

Data / Parameter:	**$EG_{PJ,y}$**
Data unit:	MWh
Description:	Net quantity of electricity generated in year y with biogas from the new anaerobic biodigester (Net electricity sold to the grid)
Source of data to be used:	Measured with electricity meters
Value of data applied for the purpose of calculating expected emission reductions in section B.5	[insert value of data for this CPA]
Description of measurement methods and procedures to be applied:	Measured continuously with an electricity meter and monitored daily. The meter will measure electricity sold to the grid and represent net electricity sold to the grid.
QA/QC procedures to be applied:	The meters will be calibrated as per the manufacturer's recommendation or once per year. As a backup, in case the meters for net electricity fail, the net electricity will be calculated as Gross generation (monitored by internal meters); minus electricity consumed by the Auxiliary load of the biogas plant.
Any comment:	The net electricity sold to the grid will be cross checked against invoices from the power company. Biogas generated from solid materials is to be separately monitored in order to discount the part of renewable electricity generation from $EG_{PJ,y}$ caused by digestion of solid materials. Total net exported heat/power shall be multiplied with a ratio $R_{biogas,SM,y}$ in order to determine only the relevant amount of baseline heat/power emissions for calculation of emission reductions, where: $$R_{biogas,SM,y} = \frac{F_{biogas,y} \times w_{CH4,biogas,y} - F_{biogas,SM,y} \times w_{CH4,biogas,SM,y}}{F_{biogas,y} \times w_{CH4,biogas,y}}$$

Data / Parameter:	$HG_{PJ,y}$
Data unit:	GJ/year
Description:	Net quantity of heat generated in year *y* with biogas from the new anaerobic digester
Source of data to be used:	Measured from the heat received by the heated process; else: Calculated on the basis of measurement of the volume of biogas captured and used for heat generation multiplied by the methane content of the gas, CV methane, and the efficiency of the boiler during the project (i.e. with biogas)
Value of data applied for the purpose of calculating expected emission reductions in section B.5	[insert value of data for this CPA]

Description of measurement methods and procedures to be applied:	Monitored daily
QA/QC procedures to be applied:	The equipment will be calibrated in accordance with manufacturer's requirements or once per year if no guidelines are provided by the manufacturer. Equipment will be calibrated prior to or during installation. [insert additional QA/QC procedures for this CPA if appropriate]
Any comment:	Biogas generated from solid materials is to be separately monitored in order to discount the part of heat generated from $HG_{PJ,y}$, caused by digestion of solid materials. Total net exported heat/power shall be multiplied with a ratio $R_{biogas,SM,y}$ in order to determine only the relevant amount of baseline heat/power emissions for calculation of emission reductions, where: $R_{biogas,SM,y} = \frac{F_{biogas,y} \times w_{CH4,biogas,y} - F_{biogas,SM,y} \times w_{CH4,biogas,SM,y}}{F_{biogas,y} \times w_{CH4,biogas,y}}$

Data / Parameter:	$F_{PJ,effl,dig,m}$ $F_{PJ,effl,lag,m}$
Data unit:	m³/month
Description:	Quantity of effluent from the digester in month *m;* Quantity of effluent from the open lagoon or dewatering facility in which the effluent from the digester is treated in month *m*
Source of data to be used:	Measured
Value of data applied for the purpose of calculating expected emission reductions in section B.5	[insert value of data for this CPA]
Description of measurement methods and procedures to be applied:	Parameter monitored continuously but aggregated monthly for calculations
QA/QC procedures to be applied:	The equipment will be calibrated in accordance with manufacturer's requirements or once per year if no guidelines are provided by the manufacturer. Equipment will be calibrated prior to or during installation. [insert additional QA/QC procedures for this CPA if appropriate]
Any comment:	*m* = Months of year *y* of the crediting period

Data / Parameter:	$S_{LA,m}$ $DWW_{LA,m}$
Data unit:	t/month

Description:	Amount of sludge applied to land in month *m* Amount of dewatered wastewater applied to land in month *m*
Source of data to be used:	Measured
Value of data applied for the purpose of calculating expected emission reductions in section B.5	[insert value of data for this CPA]
Description of measurement methods and procedures to be applied:	Parameter monitored continuously but aggregated monthly for calculations
QA/QC procedures to be applied:	[define QA/QC procedures appropriate for this CPA]
Any comment:	

Data / Parameter:	$W_{COD,effl,dig,m}$ $W_{COD,effl,lag,m}$
Data unit:	t COD/m³
Description:	Average chemical oxygen demand in the effluent from the digester in month *m* Average chemical oxygen demand in the effluent from the open lagoon or dewatering facility in which the effluent from the digester is treated in month *m*
Source of data to be used:	Measurements
Value of data applied for the purpose of calculating expected emission reductions in section B.5	[insert value of data for this CPA]
Description of measurement methods and procedures to be applied:	Sampled and tested regularly, calculate average monthly and annual values. Measure the COD according to national or international standards
QA/QC procedures to be applied:	The equipment will be calibrated in accordance with manufacturer's requirements or once per year if no guidelines are provided by the manufacturer. Equipment will be calibrated prior to or during installation. [insert additional QA/QC procedures for this CPA if appropriate]
Any comment:	-

Data / Parameter:	$W_{sludge,COD,LA,m}$

Data unit:	t COD/t sludge
Description:	Average chemical oxygen demand in the sludge applied to land after the dewatering process in month *m*
Source of data to be used:	Measurements
Value of data applied for the purpose of calculating expected emission reductions in section B.5	[insert value of data for this CPA]
Description of measurement methods and procedures to be applied:	Sampled and tested regularly, calculate average monthly and annual values. Measure the COD according to national or international standards
QA/QC procedures to be applied:	The equipment will be calibrated in accordance with manufacturer's requirements or once per year if no guidelines are provided by the manufacturer. Equipment will be calibrated prior to or during installation. [insert additional QA/QC procedures for this CPA if appropriate]
Any comment:	-

Data / Parameter:	$W_{ww,COD,LA,m}$
Data unit:	t COD/t dewatered wastewater
Description:	Average chemical oxygen demand in the dewatered wastewater in month *m*
Source of data to be used:	Measurements
Value of data applied for the purpose of calculating expected emission reductions in section B.5	[insert value of data for this CPA]
Description of measurement methods and procedures to be applied:	sampled and tested regularly, calculate average monthly and annual values. Measure the COD according to national or international standards
QA/QC procedures to be applied:	The equipment will be calibrated in accordance with manufacturer's requirements or once per year if no guidelines are provided by the manufacturer. Equipment will be calibrated prior to or during installation. [insert additional QA/QC procedures for this CPA if appropriate]
Any comment:	-

Data / Parameter:	$w_{S,effl,y}$
Data unit:	Kg/m³
Description:	Average concentration of chemical oxidative substance *s* in the effluent from the digester in year *y*
Source of data to be used:	Measurements
Value of data applied for the purpose of calculating expected emission reductions in section B.5	[insert value of data for this CPA]
Description of measurement methods and procedures to be applied:	Regularly, calculate average monthly and annual values
QA/QC procedures to be applied:	The equipment will be calibrated in accordance with manufacturer's requirements or once per year if no guidelines are provided by the manufacturer. Equipment will be calibrated prior to or during installation. [insert additional QA/QC procedures for this CPA if appropriate]
Any comment:	Organic removal ratio method

Data / Parameter:	$w_{N,sludge,m}$
Data unit:	t N/t sludge
Description:	Mass fraction of nitrogen in the sludge applied to land in month *m*
Source of data to be used:	Measurements
Value of data applied for the purpose of calculating expected emission reductions in section B.5	[insert value of data for this CPA]
Description of measurement methods and procedures to be applied:	Measured regularly, calculate average monthly
QA/QC procedures to be applied:	The equipment will be calibrated in accordance with manufacturer's requirements or once per year if no guidelines are provided by the manufacturer. Equipment will be calibrated prior to or during installation. [insert additional QA/QC procedures for this CPA if appropriate]
Any comment:	-

Data / Parameter:	$w_{N,ww,m}$
Data unit:	t N/t dewatered wastewater
Description:	Mass fraction of nitrogen in the wastewater applied to land in month *m*
Source of data to be used:	Measurements
Value of data applied for the purpose of calculating expected emission reductions in section B.5	[insert value of data for this CPA]
Description of measurement methods and procedures to be applied:	Regularly, calculate average monthly
QA/QC procedures to be applied:	The equipment will be calibrated in accordance with manufacturer's requirements or once per year if no guidelines are provided by the manufacturer. Equipment will be calibrated prior to or during installation. [insert additional QA/QC procedures for this CPA if appropriate]
Any comment:	-

Data / Parameter:	$SM_{PJ,k,y}$
Data unit:	tons of dry matter
Description:	Quantity of solid materials type *k* during the year *y*
Source of data to be used:	On-site measurements
Value of data applied for the purpose of calculating expected emission reductions in section B.5	[insert value of data for this CPA]
Description of measurement methods and procedures to be applied:	Use weight meters and adjust for the moisture content in order to determine the quantity of dry matter. Measured daily, calculate monthly and annual values
QA/QC procedures to be applied:	Meters will undergo maintenance/calibration subject to appropriate industry standards. The frequency of calibration and control procedures would be different for each application. The equipment will be calibrated in accordance with manufacturer's requirements or once per year if no guidelines are provided by the manufacturer. Equipment will be calibrated prior to or during installation. [insert additional QA/QC procedures for this CPA if appropriate]
Any comment:	Applicable if leakage occurs due to displacement of animal fodder

Data / Parameter:	$F_{biogas,y}$
Data unit:	m^3/yr
Description:	Total amount of biogas collected in the outlet of the new digester in year *y*
Source of data to be used:	Measured
Value of data applied for the purpose of calculating expected emission reductions in section B.5	[insert value of data for this CPA]
Description of measurement methods and procedures to be applied:	Parameter monitored continuously but aggregated annually for calculations
QA/QC procedures to be applied:	Flow meters will undergo maintenance/calibration subject to appropriate industry standards. The frequency of calibration and control procedures would be different for each application. This maintenance/calibration practice should be clearly stated in the CPA-DD. Equipment will be calibrated prior to or during installation. [insert additional QA/QC procedures for this CPA if appropriate]
Any comment:	Applied to estimate emissions associated with physical leakage from the digester. When biogas is generated from solid materials in a Scenario 1 project, this is to be separately monitored as $F_{biogas,SM,y}$ but included in the total amount of biogas monitored for the purpose of determining physical leakage and flaring emissions

Data / Parameter:	$F_{biogas,SM,y}$
Data unit:	m^3/yr
Description:	Amount of biogas collected in the outlet of the new digester that is generating biogas from solid materials only in year *y*
Source of data to be used:	Measured
Value of data applied for the purpose of calculating expected emission reductions in section B.5	[insert value of data for this CPA]
Description of measurement methods and procedures to be	Parameter monitored continuously but aggregated annually for calculations

applied:	
QA/QC procedures to be applied:	Flow meters will undergo maintenance/calibration subject to appropriate industry standards. The frequency of calibration and control procedures would be different for each application. This maintenance/calibration practice should be clearly stated in the CPA-DD [insert additional QA/QC procedures for this CPA if appropriate]
Any comment:	Only applicable for Scenario 1 type projects that include digestion of solid materials in the project scenario. Biogas generated from solid materials is to be separately monitored in order to discount the part of exported heat/power caused by digestion of solid materials. Total net exported heat/power shall be multiplied with a ratio $R_{biogas,SM,y}$ in order to determine only the relevant amount of baseline heat/power emissions for calculation of emission reductions, where: $R_{biogas,SM,y} = \frac{F_{biogas,y} \times w_{CH4,biogas,y} - F_{biogas,SM,y} \times w_{CH4,biogas,SM,y}}{F_{biogas,y} \times w_{CH4,biogas,y}}$

Data / Parameter:	$w_{CH4,biogas,y}$
Data unit:	kg CH_4 / m³
Description:	Concentration of methane in the total biogas supply in the outlet of the new digester
Source of data to be used:	Measured
Value of data applied for the purpose of calculating expected emission reductions in section B.5	[insert value of data for this CPA]
Description of measurement methods and procedures to be applied:	Either with continuous analyser or alternatively with periodical measurement at 95% confidence level
QA/QC procedures to be applied:	The project proponents shall define the error for different levels of measurement frequency in the CPA-DD. The level of accuracy will be deducted from average concentration of measurement. The equipment will be calibrated in accordance with manufacturer's requirements or once per year if no guidelines are provided by the manufacturer. Equipment will be calibrated prior to or during installation. [insert additional QA/QC procedures for this CPA if appropriate]
Any comment:	-

Data / Parameter:	$w_{CH4,biogas,SM,y}$
Data unit:	kg CH_4 / m³
Description:	Concentration of methane in the biogas in the outlet of the new digester that is

	generating biogas from solid materials only, in year *y*
Source of data to be used:	Measured
Value of data applied for the purpose of calculating expected emission reductions in section B.5	[insert value of data for this CPA]
Description of measurement methods and procedures to be applied:	Either with continuous analyser or alternatively with periodical measurement at 95% confidence level
QA/QC procedures to be applied:	The equipment will be calibrated in accordance with manufacturer's requirements or once per year if no guidelines are provided by the manufacturer. Equipment will be calibrated prior to or during installation. [insert additional QA/QC procedures for this CPA if appropriate] The error for different levels of measurement frequency shall be defined. The level of accuracy will be deducted from average concentration of measurement
Any comment:	Used to determine $R_{biogas,SM,y}$ in order to discount the heat/power generated by the solid materials. Although biogas created from the solid materials can be expected to be similar to biogas generated from the wastewater in terms of methane content, monitoring the methane content of the biogas of the solid materials is used to correct for any methane concentration fluctuations

Data / Parameter:	$COD_{PJ,sedim,y}$
Data unit:	t COD/yr
Description:	Amount of chemical oxygen demand lost through sedimentation in the lagoon under the project activity
Source of data to be used:	Measurements
Value of data applied for the purpose of calculating expected emission reductions in section B.5	[insert value of data for this CPA]
Description of measurement methods and procedures to be applied:	Sampling procedures described in section E.6.2 of the PoA-DD.
QA/QC procedures to be applied:	The COD will be tested by an external accredited laboratory.
Any comment:	-

Data / Parameter:	**$FV_{RG,h}$**
Data unit:	Nm^3/hr
Description:	Biogas sent to flare, (Volumetric flow rate of the residual gas in dry basis at normal conditions in the hour *h*.)
Source of data to be used:	Measured with a flow meter.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	[insert value of data for this CPA]
Description of measurement methods and procedures to be applied:	Measured continuously and averaged hourly. Ensure that it is measured on the same basis (wet or dry) as the volumetric fraction.
QA/QC procedures to be applied:	The equipment will be calibrated in accordance with manufacturer's requirements or once per year if no guidelines are provided by the manufacturer. Equipment will be calibrated prior to or during installation. [insert additional QA/QC procedures for this CPA if appropriate]
Any comment:	-

Data / Parameter:	**$fv_{i,h}$**

Data unit:	
Description:	Volumetric fraction of component i in the residual gas in the hour *h* where *i* = CH_4
Source of data to be used:	Measured continuously with a gas analyser.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	[insert value of data for this CPA]
Description of measurement methods and procedures to be applied:	Continuously using a gas analyser. Values to be averaged hourly or at a shorter time interval. Ensure that the same basis (dry or wet) is considered for this measurement and the measurement of the volumetric flow rate of the residual gas ($FV_{RG,h}$) when the residual gas temperature exceeds 60 ºC
QA/QC procedures to be applied:	The equipment will be calibrated in accordance with manufacturer's requirements, or once per year if no guidelines are provided by the manufacturer. A zero check and a typical value check should be performed by comparison with a standard certified gas. Equipment will be calibrated prior to or during installation. [insert additional QA/QC procedures for this CPA if appropriate]
Any comment:	As a simplified approach only the concentration of methane is measured and the remaining part is considered as N_2

Data / Parameter:	**Other flare operation parameters – Flame detector**
Data unit:	On/Off or numeric value indicating On/Off
Description:	Detection unit
Source of data to be used:	Measured
Value of data applied for the purpose of calculating expected emission reductions in section B.5	[insert value of data for this CPA]
Description of measurement methods and procedures to be applied:	Continuously. The Sensor will be linked to the data logger linked up to an alarm. If the flame goes out, the shift leader/process operator will immediately attend and re-ignite the flame. If the flame is not re-ignited within 20mins, then the emission from that hour will not be included.
QA/QC procedures to be applied:	The detector will be calibrated by the manufacturer and checked on a quarterly basis to ensure that it is operational and functioning correctly.

Any comment:	Used for open flare, as per "Tool to determine project emissions from flaring gases containing Methane", Version 1.0, EB28. Used to demonstrate that the flare is operational (e.g. through a flame detection system reporting electronically on continuous basis)). If the flare is not operational for more than 20 mins the default value to be adopted for flare efficiency is 0%. This parameter is only relevant for open flares. In case of enclosed flared, the parameter T_{flare} is used to indicate that the flare is operating.

Data / Parameter:	T_{flare}
Data unit:	°C
Description:	Temperature in the exhaust gas of the flare
Source of data to be used:	Measurements by project participants
Value of data applied for the purpose of calculating expected emission reductions in section B.5	[insert value of data for this CPA]
Description of measurement methods and procedures to be applied:	Continuously. Measure the temperature of the exhaust gas stream in the flare by a Type N thermocouple. A temperature above 500 ºC indicates that a significant amount of gases are still being burnt and that the flare is operating.
QA/QC procedures to be applied:	Thermocouples should be replaced or calibrated every year.
Any comment:	Used for default efficiency for enclosed flare. An excessively high temperature at the sampling point (above 700 ºC) may be an indication that the flare is not being adequately operated or that its capacity is not adequate to the actual flow.

Data / Parameter:	**Flare efficiency**
Data unit:	%
Description:	Flare efficiency of the flare
Source of data to be used:	"Tool to determine project emissions from flaring gases containing methane"
Value of data applied for the purpose of calculating expected emission reductions in section B.5	[insert value of data for this CPA] If the project has an enclosed flare, the 90% default value from the "Tool to determine project emissions from flaring gases containing methane" may be applied. If the project has an open flare, the 50% default value from the "Tool to determine project emissions from flaring gases containing methane" may be applied.
Description of measurement methods and procedures to be applied:	Use of the default factor for enclosed flare or open flare.
QA/QC procedures	

to be applied:	
Any comment:	

Data / Parameter:	$E_{CPJ,j,y}$
Data unit:	MWh
Description:	Quantity of electricity consumed by the project electricity consumption sourced from the grid.
Source of data to be used:	Tool to calculate baseline, project and/or leakage emissions from electricity consumption, Version 1, EB39
Value of data applied for the purpose of calculating expected emission reductions in section B.5	[insert value of data for this CPA]
Description of measurement methods and procedures to be applied:	Monitored continuously using electricity meters
QA/QC procedures to be applied:	The equipment will be calibrated in accordance with manufacturer's requirements or once per year if no guidelines are provided by the manufacturer. Equipment will be calibrated prior to or during installation. [insert additional QA/QC procedures for this CPA if appropriate]
Any comment:	

A monitoring plan will implemented for each individual CPA by the operator of the project.
[Insert additional information on the monitoring plan and QA/QC procedures for this CPA if appropriate]

Data Monitored Sources

Section B.6.1 above describes the data and parameters that may be monitored for each CPA. Data for each parameter will be monitored at a frequency described in the relevant table of section B.6.1. The main equipment used for monitoring is:

- Wastewater flow meters
- Biogas flow meters
- Gas analyser for measuring the methane content in biogas
- Flame detector Temperature sensor for flare monitoring
- [Electricity meters if applicable]
- COD laboratory test results.
- Operational logbook of sludge removal events

Monitoring Procedures

Monitoring data will be recorded/downloaded monthly and stored electronically in a database. Any problems with the monitoring equipment will be noted in an operation and maintenance log and entered into the database. Monitoring reports will be produced at a frequency determined by the implementer containing the monthly monitoring data files and details of any equipment faults and/or loss of data. The monitoring report will be submitted to the project participants for review and acceptance.

Monitoring Period

The CPA implementer will select a suitable monitoring period on a case by case basis for the purpose of preparing monitoring reports for verification.

Data Storage

All records will be retained for at least two years after the end of the crediting period during which the data was recorded. All electronic monitoring data will be stored in spreadsheets. Documents and Records will be stored on TBECs server and with the necessary infrastructure for managing document security, access and version control. All records will be retained for at least two years after the end of the crediting period during which the data was recorded. All electronic data will be backed up electronically on a secondary storage device.

Emergency Procedures

If only partial data are available, the monitoring report will be finalized by either make the most conservative assumption theoretically possible or by raising a request for deviation prior to submitting request for issuance, if appropriate. If the calibration requirements of the monitoring plan are not met, the "Guidelines for assessing compliance with the calibration frequency requirements" (Version 01.0 EB52) will be applied.

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:

☐ Please select if this information is provided at the PoA level. In this case sections C.2. and C.3. need not be completed in this form.

☐ Please select if this information is provided at the CPA level. In this case, sections C.2 and C.3 are to be completed in this form.

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

An analysis of environmental impacts has been performed in accordance with the regulations/guidelines of the host country. All of the environmental impacts were assessed to be low [except for the impacts listed below for which mitigation measures have been designed].

[Insert details of any impacts not categorised as a low impact and the mitigation methods applied]

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),:

In accordance with [Insert details of the relevant Host Party laws/regulations] the project [SELECT: is/is not] required to perform an Environmental Impact Assessment.

SECTION D. Stakeholders' comments

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

☐ Please tick if this information is provided at the PoA level. In this case sections D.2. to D.4. need not be completed in this form.

☐ Please select if this information is provided at the CPA level. In this case, sections D.2 to D.4 are to be completed in this form.

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

A stakeholder consultation meeting was held on [Insert date] at [Insert location] to enable local stakeholders to comment on the project. Invitations to the meeting were provided through [Insert method used to invite stakeholders]. A wide range of stakeholders were invited from [Insert details of the

locations from which stakeholders were invited]. Stakeholders who were directly invited include: [Insert details of the stakeholders directly invited]. In addition, stakeholders were made aware of the meeting through [Insert additional details of methods used to make stakeholders aware of the meeting]. During the meeting there were a total of [Insert number of participants] participants in attendance.

D.3. Summary of the comments received:

During the consultation meeting, local stakeholders were given an opportunity to ask questions and give comment on the project. Relevant stakeholder comments are summarised as follows:

[Insert list of comments received]

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

The project developer provided answers to each question/comment during the meeting as per the details below.

[Insert list of explanation provided in response to questions and comments recorded in Section D.3.]

Annex 1

CONTACT INFORMATION ON ENTITY/INDIVIDUAL RESPONSIBLE FOR THE CPA

Organization:	[Insert Details]
Street/P.O.Box:	[Insert Details]
Building:	[Insert Details]
City:	[Insert Details]
State/Region:	[Insert Details]
Postfix/ZIP:	[Insert Details]
Country:	[Insert Details]
Telephone:	[Insert Details]
FAX:	[Insert Details]
E-Mail:	[Insert Details]
URL:	[Insert Details]
Represented by:	[Insert Details]
Title:	[Insert Details]
Salutation:	[Insert Details]
Last Name:	[Insert Details]
Middle Name:	[Insert Details]
First Name:	[Insert Details]
Department:	[Insert Details]
Mobile:	[Insert Details]
Direct FAX:	[Insert Details]
Direct tel:	[Insert Details]
Personal E-Mail:	[Insert Details]

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

In accordance with section A.4.5, the sources of funding are detailed below.

Option	Selection
Written confirmation is provided by the implementer of the CPA that no public funding is used by the project.	☐
The project makes use of public funding as detailed below.	☐

Annex 3

BASELINE INFORMATION

[Insert Details, depending on CPA details, such as input parameters for pond system, details of pond dimensions and retention time, measurement campaign laboratory results, electricity details, summary of information on grid emissions factor]

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Annex 4

MONITORING INFORMATION

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