



POA VALIDATION REPORT

Recovery and Avoidance of Methane from Industrial Wastewater Treatment Projects in Indonesia

REPORT NO. 2011-9765

REVISION NO. 01

DET NORSKE VERITAS



POA VALIDATION REPORT

Date of first issue: 2 December 2011	ConCert Project No.: PRJC-342292-2011-CCS-MYS
Approved by: Michael Lehmann	Organisational unit: DNV KEMA Energy & Sustainability Accredited Climate Change Services
Client: Knowledge Integration Services (Singapore) Pte Ltd	Client ref.: K.R. Raghunath

DNV CLIMATE CHANGE
SERVICES AS
Climate Change Services
Veritasveien 1,
1322 HØVIK, Norway
Tel: +47 67 57 99 00
Fax: +47 67 57 99 11
http://www.dnv.com
Org. No: NO 994 774 352 MVA

Summary:

Title of PoA: Recovery and Avoidance of Methane from Industrial Wastewater Treatment Projects

Country: Indonesia

Methodology: AMS-III.H

Version: 16

GHG reducing Measure/Technology: Methane recovery in wastewater treatment, Sectoral Scope 13

ER estimate of PoA: 3 891 300 tCO₂e per year (average)

Size

☐ Large Scale

☒ Small Scale

Validation Phases:

☒ Desk Review

☒ Follow up interviews

☒ Resolution of outstanding issues

Validation Status

☐ Corrective Actions Requested

☐ Clarifications Requested

☒ Approval and submission for registration

☐ Rejected

In summary, it is DNV's opinion that the programme of activities "Recovery and Avoidance of Methane from Industrial Wastewater Treatment Projects" in Indonesia, as described in the PoA-DD version 09 dated 5 September 2012, meets all relevant UNFCCC requirements for CDM programme of activities and correctly applies the baseline and monitoring methodology AMS-III.H version 16. DNV thus requests the registration of the programme of activities as a CDM programme of activities.

Report No.: 2011-9765	Subject Group: Environment
Report title: "Recovery and Avoidance of Methane from Industrial Wastewater Treatment Projects" in Indonesia	
Work carried out by: Fathullah Akmal Khalid, Wan Hasliza SM Jamaluddin	
Work verified by: Simon Wong Yon-Sing	
Date of this revision: 18 October 2012	Rev. No.: 01
Number of pages: 61	

Indexing terms

Key words

Climate Change

Kyoto Protocol

Validation

Clean Development Mechanism

☒ No distribution without permission from the client or responsible organisational unit

☐ free distribution within DNV after 3 years

☐ Strictly confidential

☐ Unrestricted distribution

© 2009 Det Norske Veritas AS

All rights reserved. This publication or parts thereof may not be reproduced or transmitted in any form or by any means, including photocopying or recording, without the prior written consent of Det Norske Veritas AS.



POA VALIDATION REPORT

Abbreviations

CAR	Corrective Action Request
CDM-CPA-DD	CDM component project activity design document
CDM-POA-DD	CDM programme of activities design document
CH ₄	Methane
CL	Clarification Request
CME	Coordinating/Managing Entity
CO ₂	Carbon Dioxide
CO ₂ e	Carbon Dioxide Equivalent
COD	Chemical Oxygen Demand
CPA	CDM component project activity
CPO	Crude Palm Oil
CSTR	Continuous Stirred Tank Reactor
DNA	Designated National Authority
DNV	Det Norske Veritas
DOE	Designated Operational Entity
EFB	Empty Fruit Bunch
EIA	Environmental Impact Assessment
EPC	Engineering, Procurement and Construction
FAR	Forward Action Request
FFB	Fresh Fruit Bunch
GHG	Greenhouse Gas(es)
GPS	Global Positioning System
GWP	Global Warming Potential
IPCC	Intergovernmental Panel on Climate Change
IRR	Internal Rate of Return
MCF	Methane Correction Factor
MP	Monitoring Plan
NGO	Non-governmental Organisation
O&M	Operating and Maintenance
ODA	Official Development Assistance
PKS	Palm Kernel Shell
PoA	Programme of activities
POME	Palm Oil Mill Effluent
SME	Small and Medium Enterprise
SSC-CDM	Small Scale Clean Development Mechanism
SWDS	Solid Waste Disposal Site
UNFCCC	United Nations Framework Convention on Climate Change
WACC	Weighted Average Cost of Capital



POA VALIDATION REPORT

<i>Table of Content</i>	<i>Page</i>
1 EXECUTIVE SUMMARY – VALIDATION OPINION	1
2 INTRODUCTION	3
2.1 Objective	3
2.2 Scope	3
3 METHODOLOGY	4
3.1 Desk review of the programme design documentation	4
3.2 Follow-up Interviews with Programme Stakeholders	7
3.3 Resolution of outstanding issues	7
3.4 Internal quality control	10
3.5 Validation team	10
4 VALIDATION FINDINGS	11
4.1 Participation requirements	11
4.2 Programme design	11
4.3 Criteria for inclusion of CDM Programme Activities	12
4.4 Operational, management and verification plan	27
4.5 Baseline identification	28
4.6 Project boundary	32
4.7 Additionality	34
4.8 Monitoring plan	42
4.9 Environmental impacts	61
4.10 Comments by local stakeholders	61
4.11 Comments by Parties, stakeholders and NGOs	61
Appendix A: Validation Protocol	
Appendix B: Protocol for Assessing Compliance of Specific CDM Programme Activities with the Programme of Activities	
Appendix C: Curricula vitae of the validation team members	



1 EXECUTIVE SUMMARY – VALIDATION OPINION

DNV Climate Change Services AS (DNV) has performed a validation of the small-scale programme of activity (PoA) titled “Recovery and Avoidance of Methane from Industrial Wastewater Treatment Projects” in Indonesia and the PoA specific CDM-SSC-CPA-DD with generic information relevant to all CDM component project activities (CPAs) to be included in this PoA.

The validation was performed on the basis of UNFCCC criteria for programme of activities under the Clean Development Mechanism (CDM) as well as criteria given to provide for consistent project operations, monitoring and reporting.

The review of the project design documentation and the subsequent follow-up interviews have provided DNV with sufficient evidence to determine the fulfilment of stated criteria.

The host Party is Indonesia and there is no Annex I Party identified. Indonesia fulfils the participation criteria and has approved the PoA and authorized the project participant PT. Knowledge Integration Services Indonesia. The DNA of Indonesia confirms that the project assists in achieving sustainable development.

The PoA correctly applies the baseline and monitoring methodology AMS-III.H “Methane recovery in wastewater treatment”, version 16. The programme involves the recovery of methane generated from industrial wastewater to avoid GHG emissions.

The monitoring plan provides for the monitoring of the PoA’s emission reductions. The monitoring arrangements described in the monitoring plan are feasible within the PoA design, and it is DNV’s opinion that the project participants are able to implement the monitoring plan.

By capturing methane generated from the decomposition of industrial wastewater, the PoA results in reductions of CH₄ emissions that are real, measureable and give long-term benefits to the mitigation of climate change. It is demonstrated that a typical CPA is not likely a baseline scenario. Emission reductions attributable to the PoA are hence additional to any that would occur in the absence of the project activity.

The total emission reductions of all CPAs expected to be included to the PoA are estimated to be on the average 3 891 300 tCO_{2e} per year.

The monitoring plan provides for the monitoring of the PoA’s emission reductions. The monitoring arrangements described in the monitoring plan are feasible within the PoA design and it is DNV’s opinion that the project participants are able to implement the monitoring plan.



In summary, it is DNV's opinion that the PoA titled "Recovery and Avoidance of Methane from Industrial Wastewater Treatment Projects" in Indonesia, as described in the CDM-SSC-PoA-DD of 5 September 2012, meets all relevant UNFCCC requirements for a PoA under the CDM and correctly applies the baseline and monitoring methodology AMS-III.H, version 16. DNV thus requests the registration of the PoA titled "Recovery and Avoidance of Methane from Industrial Wastewater Treatment Projects" as a PoA under the CDM.

Kuala Lumpur and Oslo, 18 October 2012

Wan Hasliza SM Jamaluddin
Validator
DNV Kuala Lumpur, Malaysia

Michael Lehmann
Director of Services and Technologies
DNV Climate Change Services AS



2 INTRODUCTION

Knowledge Integration Services (Singapore) Pte Ltd has commissioned DNV Climate Change Services AS (DNV) to perform a validation of the small-scale CDM Programme of Activities (PoA) with the title “Recovery and Avoidance of Methane from Industrial Wastewater Treatment Projects” in Indonesia (hereafter called “the PoA”). This report summarises the findings of the validation of the PoA and the PoA specific small-scale CDM programme activities Design Document (CDM-SSC-CPA-DD) with generic information relevant to all CDM component project activities (CPAs) to be included in this PoA. The validation was performed on the basis of UNFCCC criteria for the PoAs under the CDM, as well as criteria given to provide for consistent project operations, monitoring and reporting. UNFCCC criteria refer to Article 12 of the Kyoto Protocol, the CDM modalities and procedures, the simplified modalities and procedures for small-scale CDM project activities, the procedures for registration of a programme of activities and the subsequent decisions by the CDM Executive Board.

2.1 Objective

The purpose of a validation is to have an independent third party assess the small-scale PoA design document (CDM-SSC-PoA-DD) and the PoA specific CDM-SSC-CPA-DD with generic information relevant to all CPAs to be included in this PoA. In particular, the eligibility criteria for inclusion of CPAs, the programme's baseline determination, monitoring plan, and the programme's compliance with relevant UNFCCC criteria are validated in order to confirm that the programme design, as documented, is sound and reasonable and meets the identified criteria. Validation is a requirement for all CDM PoAs and is seen as necessary to provide assurance to stakeholders of the quality of the programme and its intended generation of certified emission reductions (CERs).

2.2 Scope

The validation scope is defined as an independent and objective review of the CDM-SSC-PoA-DD and the PoA specific CDM-SSC-CPA-DD with generic information relevant to all CPAs to be included in this PoA. The CDM-SSC-PoA-DD and CDM-SSC-CPA-DD were reviewed against the criteria stated in Article 12 of the Kyoto Protocol, the CDM modalities and procedures as agreed in the Marrakech Accords, the simplified modalities and procedures for small-scale CDM project activities, the procedures for registration of a programme of activities as a single CDM project activity and the relevant decisions by the CDM Executive Board, including the approved baseline and monitoring methodology AMS-III.H /22/.

The validation of the programme has also considered the completed CDM-SSC-CPA-DD for the CPA with the title “Recovery and Avoidance of Methane from Industrial Wastewater Treatment Projects – CPA No.001” /3/ submitted together with the CDM-SSC-CPA-DD.

The validation is not meant to provide any consulting towards the programme participants. However, stated requests for clarifications and/or corrective actions may have provided input for improvement of the project design.



3 METHODOLOGY

The validation consisted of the following three phases:

- I a desk review of the CDM-SSC-PoA-DD and the PoA specific CDM-SSC-CPA-DD with generic information relevant to all CPAs to be included in this PoA
- II follow-up interviews with programme stakeholders
- III the resolution of outstanding issues and the issuance of the final validation report and opinion.

The following sections outline each step in more detail.

3.1 Desk review of the programme design documentation

The following table lists the documentation that was reviewed during the validation:

3.1.1 Documentation provided by the project participants

- /1/ PT. Knowledge Integration Services (Indonesia): *CDM-SSC-PoA-DD for PoA titled "Recovery and Avoidance of Methane from Industrial Wastewater Treatment Projects"*, version 01 dated 29 September 2011 for desk review and version 09 dated 5 September 2012
- /2/ PT. Knowledge Integration Services (Indonesia): *Generic CDM-SSC-CPA-DD for PoA titled "Recovery and Avoidance of Methane from Industrial Wastewater Treatment Projects"*, Version 01 dated 29 September 2011 and version 09 dated 5 September 2012
- /3/ PT. Knowledge Integration Services (Indonesia): *CDM-SSC-CPA-DD for CPA titled "Recovery and Avoidance of Methane from Industrial Wastewater Treatment Projects – CPA No.001"*, Version 01 dated 29 September 2011 and version 09 dated 5 September 2012
- /4/ PT. Knowledge Integration Services (Indonesia): *ER Calculation Spreadsheet*, dated 29 September 2011 for desk review and 11 June 2012
- /5/ PT. Knowledge Integration Services (Indonesia): *Financial Calculation Spreadsheet*, dated 29 September 2011 and version 2 dated 14 August 2012
- /6/ PT. Agro Muko: *Environmental Impact Analysis*, dated 14 November 2005
- /7/ PT. Agro Muko: *Layout of Palm Oil Mill Wastewater Treatment Plant*, dated 14 January 2008
- /8/ Microtech Boilers Pvt. Ltd.: *Letter regarding biomass savings from the biogas system*, dated 23 April 2011
- /9/ PT. Agro Muko: *Report on Local Stakeholders Meeting*, dated 30 June 2011
- /10/ Sucofindo: *Wastewater Test Certificates for the 10-day measurement campaign*, dated July 2011
- /11/ PT. Knowledge Integration Services (Indonesia): *Standard Operation Manual for KIS Biogas System*, dated 26 August 2011
- /12/ PT. Agro Muko: *Report of Sludge Removal Activities*, dated September 2011
- /13/ Knowledge Integration Services (Singapore) Pte Ltd: *Technical Proposal Biogas-CDM Project for PT. Agro Muko*, dated September 2011
- /14/ PT. Knowledge Integration Services (Indonesia): *Project Drawing Plan*, dated 3



October 2011

- /15/ PT. Agro Muko: *Minutes of Meeting on CDM project at PT. Agro Muko*, held on 10 November 2011
- /16/ PT. Agro Muko: *CDM (Clean Development Mechanism) project development Agreement between PT. AGRO MUKO, and Knowledge Integration Services (Singapore) Pte Ltd. & PT. Knowledge Integration Services Indonesia*, dated 14 November 2011
- /17/ Lars Enviro Private Limited: *Letter regarding anaerobic tank reactor lifetime*, dated 24 November 2011
- /18/ Perenia Carbon Pte Ltd: *PoA Development and Implementation*, version 2.0 dated September 2012
- /19/ Perenia Carbon Pte Ltd: *CDM PoA Framework Agreement between Perenia Carbon Pte Ltd, Knowledge Integration Services Singapore Pte Ltd and PT Knowledge Integration Services Indonesia*, dated 20 July 2012

3.1.2 Letters of approval

- /20/ National Committee on CDM of the Republic of Indonesia (DNA of Indonesia): *Letter of Approval*, dated 6 March 2012

3.1.3 Methodologies, tools and other guidance by the CDM Executive Board

- /21/ CDM Executive Board: *Validation and Verification Manual*, EB55 Annex 1 version 1.2
- /22/ CDM Executive Board: *Baseline and monitoring methodology AMS-III.H*, EB58 version 16
- /23/ CDM Executive Board: *Standard for Demonstration of Additionality of GHG Emission Reductions Achieved by a Programme of Activities*, EB 63 Annex 2 Version 01.0
- /24/ CDM Executive Board: *Standard for the Development of Eligibility Criteria for the Inclusion of a Project Activity as a CPA under the PoA*, EB 63 Annex 3 Version 01.0
- /25/ CDM Executive Board: *Standard for Demonstration of Additionality, Development of Eligibility Criteria and Application of Multiple Methodologies for Programme of Activities*, EB 65 Annex 3 Version 01.0
- /26/ CDM Executive Board: *Information on Additionality (Attachment A to Appendix B)*, EB68 Annex 27 Version 09.0
- /27/ CDM Executive Board: *Tool to determine project emissions from flaring gases containing methane*, EB28 Annex 13 Version 01
- /28/ CDM Executive Board: *Guidelines for Objective Demonstration and Assessment of Barriers*, EB50 Annex 13 Version 01
- /29/ CDM Executive Board: *Guidelines on Assessment of Debundling for SSC Project Activities*, EB54 Annex 13 Version 03
- /30/ CDM Executive Board: *General Guidelines to SSC CDM methodologies*, EB69 Annex 27 Version 19.0
- /31/ CDM Executive Board: *Tool to calculate baseline, project and/or leakage emissions from electricity consumption*, EB39 Annex 7 Version 01
- /32/ CDM Executive Board: *Tool to calculate project or leakage CO₂ emissions from fossil*



- fuel combustion*, EB41 Annex 11 Version 02
- /33/ CDM Executive Board: *Guidelines on the Assessment of Investment Analysis*, EB62 Annex 02 Version 05.0
- /34/ CDM Executive Board: *Guidelines for Demonstrating Additionality of Microscale Project Activities*, EB63 Annex 23 Version 03
- /35/ CDM Executive Board: *Emissions from solid waste disposal sites*, EB65 Annex 19 Version 06.0.0
- /36/ UNFCCC CDM website: *Recovery and Avoidance of Methane from Industrial Wastewater Treatment Projects*,
<http://cdm.unfccc.int/ProgrammeOfActivities/Validation/DB/W7E1P44T8CEH3904D3RQR7YEL6YY78/view.html> last accessed 12 December 2011.
- /37/ CDM Executive Board: *Best Practice Examples Focusing on Sample Size and Reliability Calculation*, EB67 Annex 6 Version 01
- /38/ CDM Executive Board: *Non-binding best practice examples to demonstrate additionality for SSC projects*, EB35 Annex 34
- /39/ CDM Executive Board: *Standard for Sampling and Surveys for CDM Project Activities and Programme of Activities*, EB69 Annex 4 Version 03.0

3.1.4 Documentation used by DNV to validate / cross-check the information provided by the project participants

- /40/ The State Minister of Environment: *Decree No. 51/1995 about Liquid Waste Discharge Standards of Industrial Activity*, year 1995
- /41/ Laws of the Republic of Indonesia: *Rules and Regulations number 9 of year 1995 about Small and Medium Enterprises*, year 1995
- /42/ The State Minister of Environment: *Decree No. 11/2006 about Business and/or activity type which require an Environmental Impact Assessment*, year 1995
- /43/ The State Minister of Environment: *Decree No. Kep-13/MENLH/3/1995 regarding Emission Standard for Stationary Sources*, implemented in year 1995
- /44/ The State Minister of Environment: *Decree No. Kep-45/MENLH/10/1997 regarding Air Pollution Standard Index*, implemented in year 1997
- /45/ Pablo Fernandez, IESE Business School – University of Navarra: *Valuing Companies by Cash Flow Discounting – Ten Methods and Nine Theories*, published in January 2002 and revised in January 2006
- /46/ Government of Indonesia (Agriculture Department): *Pedoman Pengelolaan Limbah Industri Kelapa Sawit [Guidances on Palm Oil Mill Effluent Treatment and Handling]*, 2006
- /47/ Government of Indonesia: *Law No. 36/2008 and Fourth Amendment of Law No. 7/1983 on Income Tax*, year 2008
- /48/ Meteorology, Climatology and Geophysical Body of Indonesia: *Average Monthly Air Temperature in Bengkulu*, <http://iklim.bmg.go.id/image/BENGKULU.jpg> last accessed 15 November 2011.
- /49/ PwC Indonesia: *Indonesian Pocket Tax Book 2011*, published in 2011
- /50/ ClimateTemp.info: *Indonesia Climate*, <http://www.climatetemp.info/indonesia/> last accessed 12 June 2012.



/51/ UNFCCC: *Project page*, last accessed 12 June 2012 (<http://cdm.unfccc.int/index.html>)

The main changes between the version of the CDM-SSC-PoA-DD published for the 30 days stakeholder commenting period and the final version submitted for registration are:

- Resolution of CARs and CLs raised in the list of findings (Table 3)
- The CDM-SSC-PoA-DD has been updated to meet the Standard for Demonstration of Additionality, Development of Eligibility Criteria and Application of Multiple Methodologies for Programme of Activities, EB 65 Annex 3 /25/.

3.2 Follow-up Interviews with Programme Stakeholders

On 24 November 2011, DNV visited the Agro Muko palm oil mill in Bengkulu, Sumatra, Indonesia and performed interviews with project stakeholders.

	Date	Name	Organization	Topic
/52/	2011-11-24	K. R. Raghunath Sunil K. M. Ranganath K. J.	Knowledge Integration Services	<ul style="list-style-type: none"> ➤ Project technology ➤ Project participants ➤ Management of PoA ➤ Additionality ➤ Emission reduction calculations ➤ Stakeholder consultation process ➤ Financial analysis ➤ Emission reduction calculations
/53/	2011-11-24	Periasamy Sarwedi Sitorus	PT. Agro Muko	<ul style="list-style-type: none"> ➤ Plant tour and site visit ➤ Project location ➤ Mill licenses ➤ Historical production data ➤ Legal and environmental issues

3.3 Resolution of outstanding issues

The objective of this phase of the validation was to resolve any outstanding issues which needed to be clarified prior to DNV's positive conclusion on the PoA. In order to ensure transparency a validation protocol was customised for the project. The protocol shows in a transparent manner the criteria (requirements), means of verification and the results from validating the identified criteria. The validation protocol serves the following purposes:

- It organises, details and clarifies the requirements a CDM project is expected to meet;



- It ensures a transparent validation process where the validator will document how a particular requirement has been validated and the result of the validation.

The validation protocol consists of four tables. The different columns in these tables are described in the figure below. The completed validation protocol for the programme of activity “Recovery and Avoidance of Methane from Industrial Wastewater Treatment Projects” is enclosed in Appendix A to this report.

Table 2 of the validation protocol documents the findings of the desk review of the project design documentation and follow-up interviews with project stakeholders. Any findings raised in Table 2 are listed in Table 3 of the protocol, and changes to the description of the project design as a result of these findings will be addressed in Table 3. Table 2 thus may not reflect all aspects of the project as described in the final PDD submitted for registration.

A corrective action request (CAR) is raised if one of the following occurs:

- (a) The project participants have made mistakes that will influence the ability of the project activity to achieve real, measurable additional emission reductions;
- (b) The CDM requirements have not been met;
- (c) There is a risk that emission reductions cannot be monitored or calculated.

A clarification request (CL) is raised if information is insufficient or not clear enough to determine whether the applicable CDM requirements have been met.

A forward action request (FAR) is raised during validation to highlight issues related to project implementation that require review during the first verification of the project activity. FARs shall not relate to the CDM requirements for registration.



Validation Protocol Table 1: Mandatory Requirements for CDM Programme of Activities				
Requirement	Reference	Conclusion		
The requirements the project must meet.	Gives reference to the legislation or agreement where the requirement is found.	This is either acceptable based on evidence provided (OK), a Corrective Action Request (CAR) due to non-compliance with stated requirements or a request for Clarification (CL) where further clarifications are needed.		

Validation Protocol Table 2: Requirement Checklist				
Checklist question	Reference	Means of verification (MoV)	Assessment by DNV	Draft and/or Final Conclusion
The various requirements in Table 1 are linked to checklist questions the project should meet. The checklist is organised in different sections, following the logic of the CDM-PDD	Gives reference to documents where the answer to the checklist question or item is found.	Means of verification (MoV) are document review (DR) , interview (I) or any other follow-up actions (e.g., on site visit and telephone or email interviews) and cross-checking (CC) with available information relating to projects or technologies similar to the proposed CDM project activity under validation.	The discussion on how the conclusion is arrived at and the conclusion on the compliance with the checklist question so far.	OK is used if the information and evidence provided is adequate to demonstrate compliance with CDM requirements. A corrective action request (CAR) is raised when project participants have made mistakes, the CDM requirements have not been met or there is a risk that emission reductions cannot be monitored or calculated. A clarification request (CL) is raised if information is insufficient or not clear enough to determine whether the applicable CDM requirements have been met. A forward action request (FAR) during validation is raised to highlight issues related to project implementation that require review during the first verification of the project activity.

Validation Protocol Table 3: Resolution of Corrective Action and Clarification Requests			
Corrective action and/or clarification requests	Ref. to checklist question in table 2	Response by project participants	Validation conclusion
The CARs and/or CLs raised in Table 2 are repeated here.	Reference to the checklist question number in Table 2 where the CAR or CL is explained.	The responses given by the project participants to address the CARs and/or CLs .	The validation team's assessment and final conclusions of the CARs and/or CLs .

Validation Protocol Table 4: Forward Action Requests		
Forward action request	Ref. to checklist question in table 2	Response by project participants
The FARs raised in Table 2 are repeated here.	Reference to the checklist question number in Table 2 where the FAR is explained.	Response by project participants on how forward action request will be addressed prior to first verification.

Figure 1 Validation protocol tables



3.4 Internal quality control

The validation report underwent a technical review performed by a technical reviewer qualified in accordance with DNV's qualification scheme for CDM validation and verification.

3.5 Validation team

<i>Role</i>	<i>Last Name</i>	<i>First Name</i>	<i>Country</i>	<i>Type of involvement</i>						
				Desk review	Site visit / Interviews	Reporting	Supervision of work	Technical review	TA 13.1 competence	Financial expertise
Team leader (Validator)	SM Jamaluddin	Wan Hasliza	Malaysia	✓	✓	✓	✓		✓	
Assessor under training	Khalid	Fathullah Akmal	Malaysia	✓	✓	✓				✓
Technical reviewer	Wong	Simon Yon-Sing	Malaysia					✓	✓	

The qualification of each individual validation team member is detailed in Appendix C to this report.



4 VALIDATION FINDINGS

The findings of the validation are stated in the following sections. The validation criteria (requirements), the means of verification and the results from validating the identified criteria are documented in more detail in the validation protocol in Appendix A.

The final validation findings relate to the programme design as documented and described in the PoA design documentation dated 5 September 2012 /1/.

4.1 Participation requirements

The coordinating/managing entity (CME) of the PoA and the project participant is PT. Knowledge Integration Services (Indonesia). The Host Party of the project is Indonesia. The Host Party (Indonesia) meets all relevant participation requirements. No Annex I Party has been nominated for this project.

At the time of validation, the programme has one participant which is PT. Agro Muko. The participant has implemented a small-scale CDM programme activity (CPA) titled “Recovery and Avoidance of Methane from Industrial Wastewater Treatment Projects – CPA No.001.” The CPA-DD /3/ of this CPA was made publicly available together with the PoA-DD.

A letter of approval (LoA) /20/ was issued by the DNA of Indonesia on 6 March 2012, authorizing PT. Knowledge Integration Services (Indonesia) as project participant and confirming that the project assists in achieving sustainable development.

There is no Annex I Party identified yet for the programme.

The letter of approval was received from the project participant. DNV does not doubt the authenticity of the letter of approval. DNV considers the letter is in accordance with paragraphs 45 – 48 of the VVM /21/.

It is confirmed that no public funding from Annex I Party is used for the development of this programme. This was clarified in the interview held during the site visit /52/. The main source of investment for the programme comes from KIS Singapore as evidenced from the CDM project development agreement between the CME and the CPA /16/.

4.2 Programme design

The programme involves the recovery of methane gas from agricultural product based industrial wastewater (also referred to as “industrial wastewater”) treatment which would have been emitted to the atmosphere in the absence of the PoA. The recovered methane may be used for energy generation in a gas combustion facility, flaring (open or enclosed) or a combination of both (co-generation). Energy generation includes heat generation in a burner, steam generation in a boiler or electricity generation in a gas engine. However, no CERs will be claimed under this PoA from the use of recovered biogas (i.e. Type I project activities). DNV has confirmed that this is permitted under paragraph 4 of the approved methodology AMS-III.H version 16 /22/.

Under the programme, both the anaerobic digester treatment system as well as the biogas management system will be under the control of the CPA implementer. Internal procedures in the PoA management system /18/ have been developed to ensure that due diligence is performed prior to CPA inclusion. This ensures that the CPA implementer has the required competency to monitor and operate the CPA. DNV has reviewed these procedures and



concluded that the measures specified in the management system are adequate. During the operation of the project activity, the CME will place a Manager at site to assist the CPA in operations and management as evidenced in the agreement between the CPA and CME /16/.

Each participant under the programme involves the installation of anaerobic digesters with methane recovery systems. The technology/measure used in this programme is treatment of industrial wastewater using anaerobic tank based technologies/system and recovery of biogas. This programme applies the approved methodology AMS-III.H version 16 /22/. It is concluded that the technology used in the programme is able to meet the requirements of the programme design. Specifically, it allows the recovery of methane gas from industrial anaerobic wastewater.

A typical CPA under this PoA is limited to the following:

- **Replacement CPA** – replacing an existing anaerobic wastewater treatment system without biogas recovery with a new treatment system, i.e. anaerobic digestion using anaerobic tank based technologies/system coupled with biogas recovery
- **Greenfield CPA** – greenfield wastewater treatment system, i.e. a new anaerobic digestion using anaerobic tank based technologies/system coupled with biogas recovery.

Provisions for meeting training and maintenance needs are reflected in an operating manual developed by the CME /11/. This will be used as basis for operating and monitoring personnel. It covers topics such as the basics of anaerobic treatment, treatment process, equipment commissioning, reactor operation and control, troubleshooting and safety. Therefore, it is concluded that training needs to assure appropriate operation and maintenance is sufficient.

The programme's spatial boundary has been clearly defined as the boundary of Indonesia. All CPA under this PoA will be located in Indonesia.

The starting date of the programme is the date when the PoA-DD /1/ was uploaded on the CDM UNFCCC website for global stakeholder's consultation. This date is 13 October 2011 /36/. The length of this programme is 28 years. Therefore, it is concluded that the starting date of the programme and the duration of the crediting period are clearly defined.

4.3 Criteria for inclusion of CDM Programme Activities

The eligibility criteria for including CPAs are in accordance with section B of the "Standard for demonstration of additionality, development of eligibility criteria, and application of multiple methodologies for programme of activities" /25/.

In addition, the PoA-DD has defined two sets of eligibility criteria applicable to two types of projects:

- 1) **Replacement CPAs** – involves the substitution of existing anaerobic wastewater treatment system without biogas recovery with anaerobic digester and methane recovery.
- 2) **Greenfield CPAs** – involves introduction of a new anaerobic digester system with methane recovery.

The eligibility criteria for inclusion of a **Replacement CPA** in the PoA are validated as follows:

- 1) *Each CPA must be located in Indonesia.*



This eligibility criterion requires that the CPA must be physically located in Indonesia. Therefore, it is concluded that the geographical boundary of the CPA has been specified. However, no time-induced boundary has been defined for this project. This is acceptable as the programme does not make use of parameters that are dependent on the state or regional boundaries of Indonesia. Therefore, it is concluded that paragraph 14(a) of the Standard for Demonstration of Additionality, Development of Eligibility Criteria and Application of Multiple Methodologies for Programme of Activities /25/ has been complied. Compliance with this criterion is checked against CPA location details such as address and GPS coordinates provided by the CPA prior to inclusion. This information will be checked through site visit.

2) *Conditions to avoid double counting:*

- *Each CPA to be uniquely identified based on the location of the CPA and its GPS coordinates.*
- *The CME before adding a CPA under this PoA shall review the project activity database on the UNFCCC website to ensure that the CPA is not already registered as a CDM project or a CPA of another PoA.*

This eligibility criterion provides unique identification of the CPA based on the location of the CPA and its GPS coordinates. The CME is responsible to perform a background check to ensure that the CPA is not already registered as a CDM project or a CPA of another PoA /51/. Therefore, it is concluded that paragraph 14(b) of the Standard for Demonstration of Additionality, Development of Eligibility Criteria and Application of Multiple Methodologies for Programme of Activities /25/ has been complied.

3) *Specification of technology/measures proposed to be implemented under the CPA. The CPA-DD shall incorporate relevant details on the technological specifications, including level and type of service, performance specifications including compliance with testing/certifications. Technology /measures proposed to be employed under each CPA to be in compliance with Section A.4.2.1 of the PoA-DD.*

This eligibility criterion requires each CPA to comply with the technology/measures listed in Section A.4.2.1 of the PoA-DD /1/. Section A.4.2.1 of the PoA-DD mentions a single technology/measure, which is the installation of anaerobic digesters for treatment of wastewater and recovery of biogas. The purpose of this programme is to recover methane generated from industrial wastewater treatment processes, which would have been emitted to the atmosphere resulting in GHG emissions in the absence of the PoA. DNV considers that this PoA applies a single methodology which is AMS-III.H and the principal technology/measure is biogas recovery from an anaerobic digester. This is in accordance to paragraph 29 (b) of the Standard for Demonstration of Additionality, Development of Eligibility Criteria and Application of Multiple Methodologies for Programme of Activities /25/. Therefore, it is concluded that paragraph 14(c) of the Standard /25/ has been complied. Compliance with this criterion is checked from the specifications of the CPA as per the signed contract documents related to the project activity. Alternatively, if a contract is not yet available, specifications of the CPA are obtained from the proposals received by the CPA implementer.



- 4) *Each CPA to provide documentary evidence to demonstrate start date. Start date of CPA is the earliest date of real action or construction or implementation of the CPA.*

This eligibility criterion requires each CPA to provide documentary evidences to define the start date of the CPA. The PoA-DD defines the start date of the CPA as the earliest of the date of real action, construction or implementation of the CPA. Therefore, it is concluded that paragraph 14(d) of the Standard for Demonstration of Additionality, Development of Eligibility Criteria and Application of Multiple Methodologies for Programme of Activities /25/ has been complied. Compliance with this criterion is checked from the contracts signed in relation to the CPA project such as the Engineering, Procurement and Construction (EPC) contract for implementing the project.

- 5) *The principal methodology applicable to each CPA under the PoA is AMS-III.H (version 16). Following applicability conditions under AMS-III.H (version 16) to be complied by each CPA:*

- *A CPA shall comprise measures that recover biogas from biogenic organic matter in wastewater by means of one, or a combination, of the following options:*
 - *Substitution of aerobic wastewater with anaerobic systems with biogas recovery and combustion;*
 - *Introduction of biogas recovery and combustion to an anaerobic wastewater treatment system such as anaerobic reactor, lagoon, septic tank or an on-site industrial plant;*
 - *Introduction of anaerobic wastewater treatment with biogas recovery and combustion, with or without anaerobic sludge treatment, to an untreated wastewater stream;*
 - *Introduction of a sequential stage of wastewater treatment with biogas recovery and combustion, with or without sludge treatment, to an anaerobic wastewater treatment system without biogas recovery (e.g. introduction of treatment in an anaerobic reactor with biogas recovery as a sequential treatment step for the wastewater that is presently being treated in an anaerobic lagoon without methane recovery).*

Compliance with these applicability criteria is checked against the existing drawings, designs and plans of the wastewater treatment system.

- *Each CPA shall provide necessary information to demonstrate compliance with the following applicability conditions. In cases where baseline system under the CPA is anaerobic lagoon:*
 - *The lagoons are ponds with a depth greater than two meters, without aeration. The value for depth is obtained from engineering design documents, or through direct measurement, or by dividing the surface area by the total volume. If the lagoon filling level varies seasonally, the average of the highest and lowest levels may be taken;*
 - *Ambient temperature above 15 °C, at least during part of the year, on a monthly average basis;*



- *The minimum interval between two consecutive sludge removal events shall be 30 days.*

Compliance with the lagoon depth is checked against the design and drawings of the existing baseline system. Compliance with the ambient temperature is checked against publicly available data on ambient temperature and the sludge removal interval is checked against past records on wastewater treatment operations.

- *The recovered biogas from the above measures may also be utilised for the following applications instead of combustion/flaring:*
 - *Thermal or mechanical, electrical energy generation directly; or*
 - *Thermal or mechanical, electrical energy generation after bottling of upgraded biogas;*

The PoA-DD does not claim CERs from the use of recovered biogas in a CPA and no emission reductions will be claimed under any Type I component of the SSC CDM methodologies. This is permissible under paragraph 4 of the approved methodology AMS-III.H version 16 /22/. However, the PoA-DD requires the use of recovered biogas to be documented in the CPA-DD.

- *A CPA shall provide detailed description of the wastewater treatment plant as well as the source generating the wastewater shall be uniquely defined and described in the CPA-DD.*

This will be checked against the technical design, diagrams, and plans of the existing wastewater treatment plant as well as the source generating the wastewater. These evidences are sourced from the CPA implementer.

- *Aggregate emissions reductions are less than or equal to 60 ktCO₂ equivalent annually from all Type III components of the CPA.*

Prior to inclusion, each CPA must show that the aggregate emissions reductions are less than or equal to 60 ktCO₂ equivalent. This will be ensured by the CME. DNV considers this to be in compliance with the requirements of paragraph 14(k) of the Standard for Demonstration of Additionality, Development of Eligibility Criteria and Application of Multiple Methodologies for Programme of Activities /25/.

This criterion has outlined conditions to ensure compliance with applicability and other requirements of AMS-III.H version 16 /22/. Therefore, it is concluded that paragraph 14(e) of the Standard for Demonstration of Additionality, Development of Eligibility Criteria and Application of Multiple Methodologies for Programme of Activities /25/ has been complied.

- 6) *Conditions for demonstration of additionality: Section E.5 of the PoA-DD provides on how additionality of a typical CPA will be demonstrated. Each CPA shall comply with the requirements of section E.5 of the PoA-DD.*

This eligibility criterion requires each CPA to demonstrate additionality as per Section E.5 of the PoA-DD /1/. The additionality of each CPA will be determined prior to its inclusion



in the PoA. As per Section E.5 of the PoA-DD, each CPA is required to demonstrate that the project faces an investment barrier, technological barrier or barriers due to prevailing practice. In addition, CPAs that are categorized as a micro-scale project such as Small and Medium Enterprises (SMEs) are eligible to demonstrate additionality in accordance with the Guidelines for Demonstrating Additionality of Micro-scale Project Activities /34/. The definition of Small and Medium Enterprise under Indonesian law is taken from the Rules and Regulations number 9 of year 1995 about Small and Medium Enterprises /41/.

The investment barrier is demonstrated by a) providing an explanation to show that a more financially viable alternative to the CPA or the continuation of the current baseline scenario of the CPA (which requires no additional investment) would lead to higher emissions; b) showing that similar activities have only been implemented with grants or other non-commercial finance terms; or c) providing evidence to show that the institution/investor providing financing for the CPA had considered CDM benefits into consideration for financing the CPA.

The technological barrier is demonstrated by a) providing an explanation to show that a less technological advanced alternative to the project involve lower risk (on account of performance uncertainty), however, leads to higher emission; b) showing that the process/technology failure risk in the local circumstances is significantly greater than of other technologies that provides services or outputs comparable to those of the proposed CPA; c) showing that the particular technology used in the proposed CPA is not available in the relevant region; or d) showing that the technology implemented for the CPA has marginal penetration in the current market scenario.

Barriers due to prevailing practice are demonstrated by employing the test to show that the CPA is first of its kind in the region. In this PoA, the applicable region is defined as the boundary of Indonesia.

Technological barriers or barriers due to prevailing practices may be demonstrated using the following data sources: a) publicly available information; b) national/regional data; c) local expert; d) surveys; e) past historical performance data of the existing facility; f) past historical performance data of a comparable facility in the country; or g) estimation by the CPA implementer.

Therefore, it is concluded that paragraph 14(f) of the Standard for Demonstration of Additionality, Development of Eligibility Criteria and Application of Multiple Methodologies for Programme of Activities /25/ has been complied. Compliance with this criterion is checked against the project barrier assessment prepared by the CPA implementer in accordance to Section E.5 of the PoA-DD /1/.

7) *Local stakeholder consultation: Each CPA to conduct an independent local stakeholder consultation and relevant details on such consultation to be incorporated in the respective CPA-DD.*

This eligibility criterion requires each CPA to conduct an independent local stakeholder consultation prior to inclusion. The independent local stakeholder consultation is to encourage local community participation. Details of the stakeholder consultation session are required to be included in the CPA-DD. DNV considers this to be a PoA-specific requirement. Therefore, it is concluded that paragraph 14(g) of the Standard for Demonstration of Additionality, Development of Eligibility Criteria and Application of



Multiple Methodologies for Programme of Activities /25/ has been complied. Compliance with this criterion is checked against the public notification or invitation to potential stakeholders, minutes of stakeholder meeting and the stakeholder meeting attendance sheet.

- 8) *Environmental impact assessment: Each CPA to assess independently whether an environmental impact assessment is required to be conducted for the project as per the applicable regulatory framework. If such requirement does exist, relevant details on such environmental impact assessment to be incorporated in the respective CPA-DD.*

This eligibility criterion requires each CPA to make an independent assessment on the environmental impact of the CPA. The PoA requires the CPA to conduct an environmental impact assessment if this is required by the applicable regulatory framework. The relevant decree by the Indonesian State Minister of Environment /42/ has been reviewed and it was found that only projects involving large scale wastewater treatment plants and renewable energy generation of more than 10MW require an EIA to be prepared. In this context, the scale of a wastewater treatment plant is dependent on the region where it is located as each city/region/province has its own definition of a large scale wastewater treatment plant. DNV considers this to be a PoA-specific requirement. Therefore, it is concluded that paragraph 14(g) of the Standard for Demonstration of Additionality, Development of Eligibility Criteria and Application of Multiple Methodologies for Programme of Activities /25/ has been complied. Compliance with this criterion is checked by the CME which will assess the need for the CPA to prepare an Environmental Impact Assessment (EIA). If an EIA is required as per the prevailing regulations, the EIA report is required prior to inclusion.

- 9) *Compliance with de-bundling requirement: Section A.4.4.1 of the PoA-DD provides the process which the CME will follow to determine whether a proposed CPA is a de-bundled project or not.*

This eligibility criterion requires each CPA to comply with de-bundling rules. This is applicable as potential CPAs may belong to a small-scale or micro scale project category. Therefore, it is concluded that paragraph 14(l) of the Standard for Demonstration of Additionality, Development of Eligibility Criteria and Application of Multiple Methodologies for Programme of Activities /25/ has been complied. Compliance with this criterion will be checked by the CME using the database of PoAs and CDM projects available in the UNFCCC website to ensure that the CPA is not a de-bundled project.

- 10) *Each CPA to demonstrate that funding from Annex-I Parties, if any, does not result in diversion of official development assistance.*

This eligibility criterion requires each CPA to provide an affirmation that funding from Annex I parties. Therefore, it is concluded that paragraph 14(h) of the Standard for Demonstration of Additionality, Development of Eligibility Criteria and Application of Multiple Methodologies for Programme of Activities /25/ has been complied. Compliance with this criterion is checked against the documentation on the actual funding for the CPA. Should the funding arrangement is not finalized at the time of inclusion, internal minutes of meeting or any board resolution passed by the CPA implementers on the proposed financing arrangement for the CPA are taken as evidence of CPA funding.



11) Each CPA must be approved by the CME and DOE prior to its incorporation into the PoA.

This eligibility criterion requires each CPA to be approved by the CME and the DOE prior to inclusion. DNV considers this to be a PoA-specific requirement. Therefore, it is concluded that paragraph 14(g) of the Standard for Demonstration of Additionality, Development of Eligibility Criteria and Application of Multiple Methodologies for Programme of Activities /25/ has been complied. Compliance with this criterion is checked against the signed agreement between the CME and the CPA implementers to develop the project as a CPA under the PoA. Approval from the DOE is evidenced from the positive validation report.

12) Each CPA is to subscribe to the PoA.

This eligibility criterion requires each CPA to commit itself to the PoA by complying with PoA rules. DNV considers this to be a PoA-specific requirement. Therefore, it is concluded that paragraph 14(g) of the Standard for Demonstration of Additionality, Development of Eligibility Criteria and Application of Multiple Methodologies for Programme of Activities /25/ has been complied. Compliance with this criterion is checked against the signed agreement between the CME and the CPA implementers.

13) The CPA implementer shall waive its right to proceed in getting the CPA registered as an independent CDM project or as a CPA to another PoA which may result in double counting of credits.

This eligibility criterion requires each CPA to waive its right to claim emission reductions by registering itself as an independent CDM project or participate in another PoA. This criterion is introduced to prevent double counting of credits throughout the lifetime of the CPA. It is concluded that paragraph 14(b) of the Standard for Demonstration of Additionality, Development of Eligibility Criteria and Application of Multiple Methodologies for Programme of Activities /25/ has been complied. Compliance with this criterion is checked against the signed agreement between the CME and the CPA implementers.

14) For each CPA it will be checked if it is required to comply with any CDM eligibility requirement(s) lay down by the host country DNA.

This eligibility criterion requires each CPA to be checked against the CDM eligibility requirements specified by the host country of Indonesia. At the time of validation, there is not specific CDM eligibility requirements laid down by the Indonesian DNA. DNV considers this to be a PoA-specific requirement. Therefore, it is concluded that paragraph 14(g) of the Standard for Demonstration of Additionality, Development of Eligibility Criteria and Application of Multiple Methodologies for Programme of Activities /25/ has been complied. Should such a requirement exist in the future, compliance will be checked against appropriate supporting documents which is verified by the CME.

15) The baseline shall be in compliance with all mandatory applicable legal and regulatory requirements, even if these laws and regulations have objectives other than GHG reductions, e.g. to mitigate local air pollution. If the baseline scenario does not comply



with all mandatory applicable legislation and regulations, then it has to be demonstrated that, based on an examination of current practice in the country or region in which the law or regulation applies, those applicable legal or regulatory requirements are systematically not enforced and that non-compliance with those requirements is widespread in the country or region.

This eligibility criterion prevents the inclusion of CPAs which are not in compliance with mandatory applicable legal and regulatory requirements. This needs to be assessed prior to inclusion. DNV considers this to be a PoA-specific requirement by reviewing the latest compliance report submitted by the CPA implementer to the relevant government department. In case these regulatory requirements are systematically not enforced, compliance with this criterion will be demonstrated based on the publicly available information on the current practice in the country or region. Therefore, it is concluded that paragraph 14(g) of the Standard for Demonstration of Additionality, Development of Eligibility Criteria and Application of Multiple Methodologies for Programme of Activities /25/ has been complied. Compliance with this criterion is checked against the latest compliance report submitted by the CPA implementer to the relevant government department. In the case that the regulatory requirements are not enforced, this needs to be demonstrated based on publicly available information on the current practice in Indonesia.

16) The CPA implementer shall document in the CPA-DD how the remaining lifetime of the existing equipment has been determined. It will include a check on the existing system whether it has the capacity to treat the expected waste water volume.

This eligibility criterion requires each CPA to document the remaining lifetime of the existing wastewater treatment equipment. In addition, the capacity of the existing wastewater treatment system to treat future waste water volume will be checked. DNV considers this to be a PoA-specific requirement. Therefore, it is concluded that paragraph 14(g) of the Standard for Demonstration of Additionality, Development of Eligibility Criteria and Application of Multiple Methodologies for Programme of Activities /25/ has been complied. Compliance with this criterion is checked against the technical specifications of the equipment, the past operational records of the baseline equipment and future anticipated wastewater loads.

17) The existing wastewater treatment system shall not be covered lagoon/covered tank nor be equipped with methane recovery system.

This eligibility criterion prevents the inclusion of CPAs which have already implemented a methane recovery system in the current existing wastewater treatment system. DNV considers this to be a PoA-specific requirement. Therefore, it is concluded that paragraph 14(g) of the Standard for Demonstration of Additionality, Development of Eligibility Criteria and Application of Multiple Methodologies for Programme of Activities /25/ has been complied. Compliance with this criterion is checked through layout diagrams or pictures of the baseline system.

18) The existing wastewater treatment system shall not be only mechanical aerobic system.

This eligibility criterion prevents the inclusion of CPAs which are implementing mechanical aerobic system in the existing wastewater treatment system. DNV considers



this to be a PoA-specific requirement. Therefore, it is concluded that paragraph 14(g) of the Standard for Demonstration of Additionality, Development of Eligibility Criteria and Application of Multiple Methodologies for Programme of Activities /25/ has been complied. Compliance with this criterion is checked through layout diagrams or pictures of the baseline system.

The eligibility criteria for inclusion of a **Greenfield CPA** in the PoA are validated as follows:

1) *Each CPA must be located in Indonesia.*

This eligibility criterion requires that the CPA must be physically located in Indonesia. Therefore, it is concluded that the geographical boundary of the CPA has been specified. However, no time-induced boundary has been defined for this project. This is acceptable as the programme does not make use of parameters that are dependent on the state or regional boundaries of Indonesia. Therefore, it is concluded that paragraph 14(a) of the Standard for Demonstration of Additionality, Development of Eligibility Criteria and Application of Multiple Methodologies for Programme of Activities /25/ has been complied. Compliance with this criterion is checked against CPA location details such as address and GPA coordinates provided by the CPA prior to inclusion. This information will be checked through site visit.

2) *Conditions to avoid double counting:*

- *Each CPA to be uniquely identified based on the location of the CPA and its GPS coordinates.*
- *The CME before adding a CPA under this PoA shall review the project activity database on the UNFCCC website to ensure that the CPA is not already registered as a CDM project or a CPA of another PoA.*

This eligibility criterion provides unique identification of the CPA based on the location of the CPA and its GPS coordinates. The CME is responsible to perform a background check to ensure that the CPA is not already registered as a CDM project or a CPA of another PoA /51/. Therefore, it is concluded that paragraph 14(b) of the Standard for Demonstration of Additionality, Development of Eligibility Criteria and Application of Multiple Methodologies for Programme of Activities /25/ has been complied.

3) *Specification of technology/measures proposed to be implemented under the CPA. The CPA-DD shall incorporate relevant details on the technological specifications, including level and type of service, performance specifications including compliance with testing/certifications. Technology /measures proposed to be employed under each CPA to be in compliance with Section A.4.2.1 of the PoA-DD.*

This eligibility criterion requires each CPA to comply with the technology/measures listed in Section A.4.2.1 of the PoA-DD /1/. Section A.4.2.1 of the PoA-DD mentions a single technology/measure, which is the installation of anaerobic digesters for treatment of wastewater and recovery of biogas. The purpose of this programme is to recover methane generated from industrial wastewater treatment processes, which would have been emitted to the atmosphere resulting in GHG emissions in the absence of the PoA. DNV considers



that this PoA applies a single methodology which is AMS-III.H and the principal technology/measure is biogas recovery from an anaerobic digester. This is in accordance to paragraph 29 (b) of the Standard for Demonstration of Additionality, Development of Eligibility Criteria and Application of Multiple Methodologies for Programme of Activities /25/. Therefore, it is concluded that paragraph 14(c) of the Standard /25/ has been complied. Compliance with this criterion is checked from the specifications of the CPA as per the signed contract documents related to the project activity. Alternatively, if a contract is not yet available, specifications of the CPA are obtained from the proposals received by the CPA implementer.

- 4) *Each CPA to provide documentary evidence to demonstrate start date. Start date of CPA is the earliest date of real action or construction or implementation of the CPA.*

This eligibility criterion requires each CPA to provide documentary evidences to define the start date of the CPA. The PoA-DD defines the start date of the CPA as the earliest of the date of real action, construction or implementation of the CPA. Therefore, it is concluded that paragraph 14(d) of the Standard for Demonstration of Additionality, Development of Eligibility Criteria and Application of Multiple Methodologies for Programme of Activities /25/ has been complied. Compliance with this criterion is checked from the contracts signed in relation to the CPA project such as the Engineering, Procurement and Construction (EPC) contract for implementing the project.

- 5) *The principal methodology applicable to each CPA under the PoA is AMS-III.H (version 16). Following applicability conditions under AMS-III.H (version 16) to be complied by each CPA:*

- *A CPA shall comprise measures that recover biogas from biogenic organic matter in wastewater by means of one, or a combination, of the following options:*
 - *Substitution of aerobic wastewater with anaerobic systems with biogas recovery and combustion;*
 - *Introduction of biogas recovery and combustion to an anaerobic wastewater treatment system such as anaerobic reactor, lagoon, septic tank or an on-site industrial plant;*
 - *Introduction of anaerobic wastewater treatment with biogas recovery and combustion, with or without anaerobic sludge treatment, to an untreated wastewater stream;*
 - *Introduction of a sequential stage of wastewater treatment with biogas recovery and combustion, with or without sludge treatment, to an anaerobic wastewater treatment system without biogas recovery (e.g. introduction of treatment in an anaerobic reactor with biogas recovery as a sequential treatment step for the wastewater that is presently being treated in an anaerobic lagoon without methane recovery).*

Compliance with these applicability criteria is checked against the design document and layout plans from the consultant/technology provider for the industrial facility on the wastewater treatment system.



- *Each CPA shall provide necessary information to demonstrate compliance with the following applicability conditions. In cases where baseline system under the CPA is anaerobic lagoon:*
 - *The lagoons are ponds with a depth greater than two meters, without aeration. The value for depth is obtained from engineering design documents. If the lagoon filling level varies seasonally, the average of the highest and lowest levels may be taken;*
 - *Ambient temperature above 15 °C, at least during part of the year, on a monthly average basis;*
 - *The minimum interval between two consecutive sludge removal events shall be 30 days.*

Compliance with the lagoon depth is checked against the design document and layout plans from the consultant or technology provider for the industrial facility on the effluent treatment system, other practices on treatment of similar effluent in the region and industrial guidelines for treatment of similar effluent. Compliance with the ambient temperature is checked against publicly available data on ambient temperature. The sludge removal interval is checked against the design document, layout plans from the consultant or technology provider for the industrial facility on the effluent treatment system, other practices on treatment of similar type of wastewater in the region and industrial guidelines for treatment of similar type of wastewater.

- *The recovered biogas from the above measures may also be utilised for the following applications instead of combustion/flaring:*
 - *Thermal or mechanical, electrical energy generation directly;*
 - *Thermal or mechanical, electrical energy generation after bottling of upgraded biogas; or*

The PoA-DD does not claim CERs from the use of recovered biogas in a CPA and no emission reductions will be claimed under any Type I component of the SSC CDM methodologies. This is permissible under paragraph 4 of the approved methodology AMS-III.H version 16 /22/. However, the PoA-DD requires the use of recovered biogas to be documented in the CPA-DD.

- *New facilities (Greenfield projects) and CPAs involving a change of equipment resulting in a capacity addition of the wastewater and/or sludge treatment system compared to the designed capacity of the baseline treatment system shall comply with the relevant requirements in the “General guidelines to SSC CDM methodologies”. In addition the requirements for demonstrating the remaining lifetime of the equipment replaced, as described in the general guidelines shall also be followed.*

The relevant requirements refer to paragraph 22 of the General Guidelines to SSC CDM methodologies /30/. It requires an assessment to identify the most plausible baseline scenario. Section E.4 of the PoA-DD /1/ specifies the various sources from



which data can be sourced for barrier demonstration. DNV considers this to be correct and this meets the relevant requirement from the general guidelines.

- *A CPA shall provide detailed description of the wastewater treatment plant as well as the source generating the wastewater shall be uniquely defined and described in the CPA-DD.*

The design documents, layout plans from the consultant and technology provider for the industrial facility are used as evidence. The description covers the technology specification implemented by the CPA and information pertaining to the baseline of the CPA as well as how the baseline has been determined.

- *Aggregate emissions reductions are less than or equal to 60 ktCO₂ equivalent annually from all Type III components of the CPA.*

Prior to inclusion, each CPA must show that the aggregate emissions reductions are less than or equal to 60 ktCO₂ equivalent. This will be ensured by the CME. DNV considers this to be in compliance with the requirements of paragraph 14(k) of the Standard for Demonstration of Additionality, Development of Eligibility Criteria and Application of Multiple Methodologies for Programme of Activities /25/.

This criterion has outlined conditions to ensure compliance with applicability and other requirements of AMS-III.H version 16 /22/. Therefore, it is concluded that paragraph 14(e) of the Standard for Demonstration of Additionality, Development of Eligibility Criteria and Application of Multiple Methodologies for Programme of Activities /25/ has been complied.

- 6) *Conditions for demonstration of additionality: Section E.5 of the PoA-DD provides on how additionality of a typical CPA will be demonstrated. Each CPA shall comply with the requirements of section E.5 of the PoA-DD.*

This eligibility criterion requires each CPA to demonstrate additionality as per Section E.5 of the PoA-DD /1/. The additionality of each CPA will be determined prior to its inclusion in the PoA. As per Section E.5 of the PoA-DD, each CPA is required to demonstrate that the project faces an investment barrier, technological barrier or barriers due to prevailing practice. In addition, CPAs that are categorized as a micro-scale project such as Small and Medium Enterprises (SMEs) are eligible to demonstrate additionality in accordance with the Guidelines for Demonstrating Additionality of Micro-scale Project Activities /34/. The definition of Small and Medium Enterprise under Indonesian law is taken from the Rules and Regulations number 9 of year 1995 about Small and Medium Enterprises /41/.

The investment barrier is demonstrated by a) providing an explanation to show that a more financially viable alternative to the CPA or the continuation of the current baseline scenario of the CPA (which requires no additional investment) would lead to higher emissions; b) showing that similar activities have only been implemented with grants or other non-commercial finance terms; or c) providing evidence to show that the institution/investor providing financing for the CPA had considered CDM benefits into consideration for financing the CPA.



The technological barrier is demonstrated by a) providing an explanation to show that a less technological advanced alternative to the project involve lower risk (on account of performance uncertainty), however, leads to higher emission; b) showing that the process/technology failure risk in the local circumstances is significantly greater than of other technologies that provides services or outputs comparable to those of the proposed CPA; c) showing that the particular technology used in the proposed CPA is not available in the relevant region; or d) showing that the technology implemented for the CPA has marginal penetration in the current market scenario.

Barriers due to prevailing practice are demonstrated by employing the test to show that the CPA is first of its kind in the region. In this PoA, the applicable region is defined as the boundary of Indonesia.

Technological barriers or barriers due to prevailing practices may be demonstrated using the following data sources: a) publicly available information; b) national/regional data; c) local expert; d) surveys; e) past historical performance data of the existing facility; f) past historical performance data of a comparable facility in the country; or g) estimation by the CPA implementer.

Therefore, it is concluded that paragraph 14(f) of the Standard for Demonstration of Additionality, Development of Eligibility Criteria and Application of Multiple Methodologies for Programme of Activities /25/ has been complied. Compliance with this criterion is checked against the project barrier assessment prepared by the CPA implementer in accordance to Section E.5 of the PoA-DD /1/.

- 7) *Local stakeholder consultation: Each CPA to conduct an independent local stakeholder consultation and relevant details on such consultation to be incorporated in the respective CPA-DD.*

This eligibility criterion requires each CPA to conduct an independent local stakeholder consultation prior to inclusion. The independent local stakeholder consultation is to encourage local community participation. Details of the stakeholder consultation session are required to be included in the CPA-DD. DNV considers this to be a PoA-specific requirement. Therefore, it is concluded that paragraph 14(g) of the Standard for Demonstration of Additionality, Development of Eligibility Criteria and Application of Multiple Methodologies for Programme of Activities /25/ has been complied. Compliance with this criterion is checked against the public notification or invitation to potential stakeholders, minutes of stakeholder meeting and the stakeholder meeting attendance sheet.

- 8) *Environmental impact assessment: Each CPA to assess independently whether an environmental impact assessment is required to be conducted for the project as per the applicable regulatory framework. If such requirement does exist, relevant details on such environmental impact assessment to be incorporated in the respective CPA-DD.*

This eligibility criterion requires each CPA to make an independent assessment on the environmental impact of the CPA. The PoA requires the CPA to conduct an environmental impact assessment if this is required by the applicable regulatory framework. The relevant decree by the Indonesian State Minister of Environment /42/ has been reviewed and it was found that only projects involving large scale wastewater



treatment plants and renewable energy generation of more than 10MW require an EIA to be prepared. In this context, the scale of a wastewater treatment plant is dependent on the region where it is located as each city/region/province has its own definition of a large scale wastewater treatment plant. DNV considers this to be a PoA-specific requirement. Therefore, it is concluded that paragraph 14(g) of the Standard for Demonstration of Additionality, Development of Eligibility Criteria and Application of Multiple Methodologies for Programme of Activities /25/ has been complied. Compliance with this criterion is checked by the CME which will assess the need for the CPA to prepare an Environmental Impact Assessment (EIA). If an EIA is required as per the prevailing regulations, the EIA report is required prior to inclusion.

- 9) *Compliance with de-bundling requirement: Section A.4.4.1 of the PoA-DD provides the process which the CME will follow to determine whether a proposed CPA is a de-bundled project or not.*

This eligibility criterion requires each CPA to comply with de-bundling rules. This is applicable as potential CPAs may belong to a small-scale or micro scale project category. Therefore, it is concluded that paragraph 14(l) of the Standard for Demonstration of Additionality, Development of Eligibility Criteria and Application of Multiple Methodologies for Programme of Activities /25/ has been complied. Compliance with this criterion will be checked by the CME using the database of PoAs and CDM projects available in the UNFCCC website to ensure that the CPA is not a de-bundled project.

- 10) *Each CPA to demonstrate that funding from Annex-1 Parties, if any, does not result in diversion of official development assistance.*

This eligibility criterion requires each CPA to provide an affirmation that funding from Annex I parties. Therefore, it is concluded that paragraph 14(h) of the Standard for Demonstration of Additionality, Development of Eligibility Criteria and Application of Multiple Methodologies for Programme of Activities /25/ has been complied. Compliance with this criterion is checked against the documentation on the actual funding for the CPA. Should the funding arrangement is not finalized at the time of inclusion, internal minutes of meeting or any board resolution passed by the CPA implementers on the proposed financing arrangement for the CPA are taken as evidence of CPA funding.

- 11) *Each CPA must be approved by the CME and DOE prior to its incorporation into the PoA.*

This eligibility criterion requires each CPA to be approved by the CME and the DOE prior to inclusion. DNV considers this to be a PoA-specific requirement. Therefore, it is concluded that paragraph 14(g) of the Standard for Demonstration of Additionality, Development of Eligibility Criteria and Application of Multiple Methodologies for Programme of Activities /25/ has been complied. Compliance with this criterion is checked against the signed agreement between the CME and the CPA implementers to develop the project as a CPA under the PoA. Approval from the DOE is evidenced from the positive validation report.

- 12) *Each CPA is to subscribe to the PoA.*



This eligibility criterion requires each CPA to commit itself to the PoA by complying with PoA rules. DNV considers this to be a PoA-specific requirement. Therefore, it is concluded that paragraph 14(g) of the Standard for Demonstration of Additionality, Development of Eligibility Criteria and Application of Multiple Methodologies for Programme of Activities /25/ has been complied. Compliance with this criterion is checked against the signed agreement between the CME and the CPA implementers.

13) The CPA implementer shall waive its right to proceed in getting the CPA registered as an independent CDM project or as a CPA to another PoA which may result in double counting of credits.

This eligibility criterion requires each CPA to waive its right to claim emission reductions by registering itself as an independent CDM project or participate in another PoA. This criterion is introduced to prevent double counting of credits throughout the lifetime of the CPA. It is concluded that paragraph 14(b) of the Standard for Demonstration of Additionality, Development of Eligibility Criteria and Application of Multiple Methodologies for Programme of Activities /25/ has been complied. Compliance with this criterion is checked against the signed agreement between the CME and the CPA implementers.

14) For each CPA it will be checked if it is required to comply with any CDM eligibility requirement(s) lay down by the host country DNA.

This eligibility criterion requires each CPA to meet the CDM eligibility requirements specified by the host country of Indonesia. At the time of validation, there is not specific CDM eligibility requirements laid down by the Indonesian DNA. DNV considers this to be a PoA-specific requirement. Therefore, it is concluded that paragraph 14(g) of the Standard for Demonstration of Additionality, Development of Eligibility Criteria and Application of Multiple Methodologies for Programme of Activities /25/ has been complied. Should such a requirement exist in the future, compliance will be checked against appropriate supporting documents which is verified by the CME.

By reviewing specific conditions of the PoA and through discussions with the project participants /52/, DNV concludes that paragraph 14(i) of the Standard for Demonstration of Additionality, Development of Eligibility Criteria and Application of Multiple Methodologies for Programme of Activities /25/ is not applicable to this PoA. This PoA is developed for a single target group, which is industrial wastewater treatment.

DNV also confirms that paragraph 14(j) of the Standard for Demonstration of Additionality, Development of Eligibility Criteria and Application of Multiple Methodologies for Programme of Activities /25/ is not applicable to this PoA. The PoA proposes to have all CPAs under this PoA to be independently verified as stated in Section A.4.4.2 of the PoA-DD /1/. Therefore, no sampling procedures have been proposed by the project proponent.

In addition, DNV has also reviewed internal procedures of the PoA management system developed by the CME /18/. These eligibility criteria will be checked during the due diligence stage by a competent team. DNV deems this to be acceptable.

In conclusion, DNV confirms that the eligibility criteria are verifiable, sufficiently objective and comprehensive to permit the assessment of the inclusion of CPAs in the PoA. The eligibility criteria meet the minimum requirements specified in paragraph 14 of the Standard



for Demonstration of Additionality, Development of Eligibility Criteria and Application of Multiple Methodologies for Programme of Activities /25/. Since the PoA consists of micro scale project activities such as SMEs, the eligibility criteria are derived from the relevant requirements of the Guidelines for Demonstrating Additionality of Microscale Project Activities /34/.

4.4 Operational, management and verification plan

A record keeping system has been established under the operational and management plan of the PoA-DD. The CME is required to maintain records pertaining to each CPA as follows:

- a) Name of entity implementing the CPA.
- b) Description of the technology specification implemented under the CPA.
- c) Location of the CPA.
- d) Date of commissioning of the CPA.
- e) Information pertaining to the baseline alternatives (including specifications) which would have been implemented in the absence of the CPA and how the baseline scenario has been determined.
- f) Data pertaining to all parameters required for baseline emission, project emission and leakage emission calculation.
- g) Relevant information for the purpose of verification and CER issuance.

In addition, a generic CDM-SSC-CPA-DD for the programme /2/ has been developed by the project proponent. This form needs to be filled in by CPA implementers to provide all relevant information to the CME. It has been checked to meet the applicable requirements for completeness. This document has been made available to the public.

Operational and management arrangements have been established to include a system/procedure to avoid including CPAs that have already been registered. The CME is responsible to perform a check on the PoA/CDM database on the UNFCCC website. In addition, the CME is required to obtain from the CPA a declaration that there is no double counting of carbon credits.

The programme has taken steps to ensure that all participants are not a de-bundled component of another CPA or CDM project activity. Specifically, EB guidance titled “Guidance for Determining the Occurrence of Debundling under a Programme of Activities (PoA)” /29/ has been adopted by the CME.

As part of the eligibility criteria, a de-bundling check has been performed on the programme participant, PT. Agro Muko. By checking the PoA/CDM database on the UNFCCC website, it was found that the CPA implementer does not have another CDM activity being implemented. During the site visit /52/

- | | | | |
|--------------|-----------------|---------------|----------------------------------|
| ➤ 2011-11-24 | Periasamy | PT. Agro Muko | ➤ Plant tour and site visit |
| /53/ | Sarwedi Sitorus | | ➤ Project location |
| | | | ➤ Mill licenses |
| | | | ➤ Historical production data |
| | | | ➤ Legal and environmental issues |



, it was confirmed that there is no CDM project activity within 1 km of the boundary of the proposed small-scale CPA, at the closest point. Therefore, it is concluded that the CPA is not a de-bundled component of another CPA or CDM project activity.

Each CPA is required to enter into an agreement with the CME prior to its inclusion in the programme. In addition, a written document in the form of an authorization letter is to be provided by the CPA. These agreement and authorization letters represent the CPA implementer's awareness and agreement that the activity is being subscribed to the programme. Therefore, it is concluded that provisions are in place to ensure that those operating the CPA are aware of and have agreed that their activity is being subscribed to the programme.

The monitoring plan proposes to have all CPAs to be independently verified. Therefore, no sampling procedures have been proposed for verification. This results in transparent system that avoids double counting of CERs.

4.5 Baseline identification

The programme applies the baseline methodology AMS-III.H version 16 /22/. Cross-checking has been done with UNFCCC to ensure that the methodology is approved and the version is correct.

The applicability of AMS-III.H version 16 /22/ is addressed as follows:

1. *This methodology comprises measures that recover biogas from biogenic organic matter in wastewater by means of one, or a combination, of the following options:*
 - a. *Substitution of aerobic wastewater or sludge treatment systems with anaerobic systems with biogas recovery and combustion;*
 - b. *Introduction of anaerobic sludge treatment system with biogas recovery and combustion to a wastewater treatment plant without sludge treatment;*
 - c. *Introduction of biogas recovery and combustion to a sludge treatment system;*
 - d. *Introduction of biogas recovery and combustion to an anaerobic wastewater treatment system such as anaerobic reactor, lagoon, septic tank or an on-site industrial plant*
 - e. *Introduction of anaerobic wastewater treatment with biogas recovery and combustion, with or without anaerobic sludge treatment, to an untreated wastewater stream;*
 - f. *Introduction of a sequential stage of wastewater treatment with biogas recovery and combustion, with or without sludge treatment, to an anaerobic wastewater treatment system without biogas recovery (e.g. introduction of treatment in an anaerobic reactor with biogas recovery as a sequential treatment step for the wastewater that is presently being treated in an anaerobic lagoon without methane recovery).*

Compliance with this applicability criterion has been ensured in the PoA. The PoA requires each proposed CPA to involve the recovery of methane (biogas) from anaerobic treatment of industrial wastewater in an anaerobic digester system. Without the project, biogas would have been emitted into the atmosphere.

2. *In cases where baseline system is anaerobic lagoon the methodology is applicable if:*
 - a. *The lagoons are ponds with a depth greater than two meters, without aeration.*



- b. Ambient temperature above 15°C, at least during part of the year, on a monthly average basis;*
- c. The minimum interval between two consecutive sludge removal events shall be 30 days*

Prior to CPA inclusion, the CME will ensure that the lagoons are with a depth greater than 2 meters, without aeration. The average ambient temperature in Indonesia is 27.7 °C, which is above the required temperature of 15 °C. DNV has confirmed this by reviewing publicly available information regarding the climate in Indonesia /48//50/. Compliance with the minimum interval between sludge removal events is checked against past records on wastewater treatment operations (for existing facilities) or the design document (for Greenfield projects), layout plans from the consultant or technology provider for the industrial facility on the effluent treatment system, other practices on treatment of similar type of wastewater in the region and industrial guidelines for treatment of similar type of wastewater. Therefore, DNV considers compliance with this eligibility criterion is met.

3. *The recovered biogas from the above measures may also be utilized for the following applications instead of combustion/flaring:*
 - a. Thermal or electrical energy generation directly; or*
 - b. Thermal or electrical energy generation after bottling of upgraded biogas;*

The applicability criterion is not applicable as the PoA does not claim emission reductions from the use of the recovered biogas in the CPA.

The following measures are excluded because they are not feasible as the PoA does not include biogas distribution, hydrogen production or biogas use as fuel in transportation:

- *Thermal or electrical energy generation after upgrading and distribution:*
 - i. Upgrading and injection of biogas into a natural gas distribution grid with no significant transmission constraints;*
 - ii. Upgrading and transportation of biogas via a dedicated piped network to a group of end users; or*
 - iii. Upgrading and transportation of biogas (e.g. by trucks) to distribution points for end users.*
- *Hydrogen production*
- *Use as fuel in transportation application after upgrading*

4. *If the recovered biogas is used for project activities covered under paragraph 3 (a), that component of the project activity can use a corresponding methodology under Type I.*

The applicability criterion is not applicable as the PoA does not claim emission reductions from the use of the recovered biogas in the CPA.

5. *For project activities covered under paragraph 3 (b), if bottles with upgraded biogas are sold outside the project boundary, the end-use of the biogas shall be ensured via a contract between the bottled biogas vendor and the end-user. No emission reductions may be claimed from the displacement of fuels from the end use of bottled biogas in such situations. If however the end use of the bottled biogas is included in the project boundary and is monitored during the crediting period CO₂ emissions avoided by the displacement of fossil fuel can be claimed under the corresponding Type I methodology, e.g. AMS-I.C “Thermal energy production with or without electricity”.*



The applicability criterion is not applicable as the PoA does not claim emission reductions from the use of the recovered biogas in the CPA. In addition, the option for biogas upgrading and bottling is not feasible for this PoA.

6. *For project activities covered under paragraph 3 (c) (i), emission reductions from the displacement of the use of natural gas are eligible under this methodology, provided the geographical extent of the natural gas distribution grid is within the host country boundaries.*

The applicability criterion is not applicable as the PoA does not claim emission reductions from the use of the recovered biogas in the CPA. In addition, the option for biogas injection into a natural gas distribution grid is not feasible for this PoA.

7. *For project activities covered under paragraph 3 (c) (ii), emission reductions for the displacement of the use of fuels can be claimed following the provision in the corresponding Type I methodology, e.g. AMS-I.C.*

The applicability criterion is not applicable as the PoA does not claim emission reductions from the use of the recovered biogas in the CPA. In addition, the option for biogas transportation via a dedicated piped network is not feasible for this PoA.

8. *In particular, for the case of 3 (b) and (c) (iii), the physical leakage during storage and transportation of upgraded biogas, as well as the emissions from fossil fuel consumed by vehicles for transporting biogas shall be considered. Relevant procedures in paragraph 11 of Annex 1 of AMS III.H “Methane recovery in wastewater treatment” shall be followed in this regard.*

The applicability criterion is not applicable as the PoA does not claim emission reductions from the use of the recovered biogas in the CPA. In addition, the option for biogas transportation to distribution points is not feasible for this PoA.

9. *For project activities covered under paragraph 3 (b) and (c), this methodology is applicable if the upgraded methane content of the biogas is in accordance with relevant national regulations (where these exist) or, in the absence of national regulations, a minimum of 96% (by volume).*

The applicability criterion is not applicable as the PoA does not claim emission reductions from the use of the recovered biogas in the CPA. In addition, the option for biogas upgrading is not feasible for this PoA.

10. *If the recovered biogas is utilized for the production of hydrogen (project activities covered under paragraph 3 (d)), that component of the project activity shall use the corresponding methodology AMS III.O “Hydrogen production using methane extracted from biogas”.*

The applicability criterion is not applicable as the PoA does not claim emission reductions from the use of the recovered biogas in the CPA. In addition, the option for biogas utilization for hydrogen production is not feasible for this PoA.

11. *If the recovered biogas is used for project activities covered under paragraph 3 (e), that component of the project activity shall use corresponding methodology AMS-III.AQ “Introduction of Bio-CNG in road transportation”.*



The applicability criterion is not applicable as the PoA does not claim emission reductions from the use of the recovered biogas in the CPA. In addition, the option for biogas as transportation fuel is not feasible for this PoA.

12. New facilities (Greenfield projects) and project activities involving a change of equipment resulting in a capacity addition of the wastewater or sludge treatment system compared to the designed capacity of the baseline treatment system are only eligible to apply this methodology if they comply with the relevant requirements in the “General guidelines to SSC CDM methodologies”. In addition the requirements for demonstrating the remaining lifetime of the equipment replaced, as described in the general guidelines shall be followed.

The PoA has defined a set of eligibility criteria for Greenfield CPAs. In addition, the CME will also ensure that the requirements of the “General guidelines to SSC CDM methodologies” are fulfilled. Therefore, DNV considers the requirement of this eligibility criterion is met.

13. The location of the wastewater treatment plant as well as the source generating the wastewater shall be uniquely defined and described in the PDD.

Each CPA is required to provide the location of the wastewater treatment plant as well as the source generating the wastewater. This has been specified in the eligibility criteria for inclusion of a SSC-CPA in the PoA. Therefore, DNV considers the requirement of the eligibility criterion is met.

14. Measures are limited to those that result in aggregate emissions reductions of less than or equal to 60 000 tCO₂e annually from all Type III components of the project activity.

The eligibility criteria for inclusion of a SSC-CPA in the PoA have been clearly defined to exclude measures that result in aggregate emissions reductions of more than 60 000 tCO₂e per annum. Therefore, DNV considers the requirement of the eligibility criterion is met.

In case of existing industrial wastewater treatment facilities, the baseline scenario is the continuation of the existing system for wastewater treatment. For greenfield industrial wastewater treatment facilities, the baseline scenario has been specified to be one of the following:

- Aerobic wastewater treatment system without biogas recovery
- Anaerobic wastewater treatment system without biogas recovery
- Untreated wastewater stream

For these cases, the General Guidelines to SSC CDM methodologies /30/ is applied to demonstrate the most plausible baseline scenario as follows:

Step 1:

Identifying the various alternatives available to the CPA implementer that deliver comparable level of service including the proposed CPA undertaken without being added under the PoA.

Step 2:



If any of the identified baseline scenarios is not in compliance with the local regulations then it will be excluded from further analysis.

Step 3:

Elimination and ranking alternatives identified in Step 2 taking into account barrier tests. Section E.5.1 (of the PoA-DD /1/) provides detailed description on the different type barriers applicable and the various sources from which barrier specific data can be collected for elimination and ranking of alternatives.

Step 4:

If only one alternative remains that is:

- *Not the proposed CPA undertaken without being added under the PoA; and*
- *It corresponds to one of the baseline scenarios provided in the methodology; then the project activity is eligible under the methodology.*

If more than one alternative remain that correspond to the baseline scenarios provided in the methodology, then the CME will choose the alternative with the least emissions, as the baseline.

Discussions with the CME /52/ revealed that any prospective CPA is able to use untreated wastewater stream as the baseline scenario. However, it must be demonstrated that the untreated wastewater stream does not result in non-compliance with local laws and regulations. In addition, relevant national policies, macro-economic trends and political aspirations will be taken into account.

In conclusion, the programme has outlined guidelines for baseline identification and determination to be applied by CPA implementers. Specific baseline scenario determination is done at CPA level.

The approved baseline methodology has been correctly applied to identify a complete list of realistic and credible baseline scenarios, and the identified baseline scenario most reasonably represents what would occur in the absence of the proposed CDM project activity.

All the assumption and data used by the project participants are listed in the PoA-DD and/or supporting documents. All documentation relevant for establishing the baseline scenario and correctly quoted and interpreted in the PoA-DD. Assumptions and data used in the identification of the baseline scenario are justified appropriately, supported by evidence and can be deemed reasonable. Relevant national and/or sectoral policies and circumstances are considered and listed in the PoA-DD.

4.6 Project boundary

The programme's spatial boundary has been clearly defined as the boundary of Indonesia. All CPA under this PoA will be located in Indonesia.

The programme's system boundary has been clearly specified as follows:

- The location of the wastewater treatment plant
- Sites related to the processing, transportation and disposal of the waste product
- Sites related to the processing, transportation and application of biogas



A summary of GHGs involved in the system boundaries is presented as follows:

	<i>GHGs involved</i>	<i>Description</i>
<i>Baseline emissions</i>	<i>CH₄</i>	<ul style="list-style-type: none"> <i>Emissions from the baseline wastewater treatment system</i> <i>Emissions from the discharge of the effluent into river/lake/sea</i> <i>Emissions from anaerobic decay of final sludge</i>
	<i>CO₂</i>	<ul style="list-style-type: none"> <i>Emissions on account of electricity or fossil fuel used</i>
<i>Project emissions</i>	<i>CH₄</i>	<ul style="list-style-type: none"> <i>Emissions from wastewater treatment system affected by the project activity and not equipped with biogas recovery</i> <i>Emissions from the discharge of the effluent into river/lake/sea</i> <i>Emissions from biogas release in capture systems</i> <i>Emissions due to incomplete flaring of biogas</i> <i>Emissions from biomass stored under anaerobic conditions</i> <i>Emissions from anaerobic decay of the final sludge</i>
	<i>CO₂</i>	<ul style="list-style-type: none"> <i>Emissions from electricity or fuel consumption in the project activity</i>
<i>Leakage</i>	<i>CO₂</i>	<i>Leakage effects is considered and estimated if the equipment is transferred from another activity.</i>

The project boundary has been assessed by DNV during the site visit to the location of the first CPA implementer, PT. Agro Muko. Using information obtained during the site visit and the reviewed plant drawings, it is confirmed that the project boundary falls within the premises of the CPA implementer. In addition, the operation of equipment and its subsequent release of greenhouse gases in the project boundary are subject to the discretion of the CPA implementer. Therefore, it can be concluded that:

- Anthropogenic emissions of greenhouse gases within the project boundary fall under the control of the CPA implementer.
- These emissions are significant and reasonably attributable to the project activity.
- The project boundary is limited to the physical project activity.

The identified boundary and selected sources and gases are justified for the project activity. The validation of the project activity did not reveal other greenhouse gas emissions occurring



within the proposed CDM project activity boundary as a result of the implementation of the proposed project activity which are expected to contribute more than 1% of the overall expected average annual emission reduction, which are not addressed by AMS-III.H (version 16) /22/.

4.7 Additionality

4.7.1 Additionality of the programme

The proposed programme aims to assist industrial wastewater treatment plants in Indonesia to become more sustainable by the introduction of sustainable waste management practices and preventing the release of greenhouse gas to the atmosphere. Specifically, it targets to introduce the practice of the recovery of methane gas from industrial wastewater treatment process which would be emitted to the atmosphere in the absence of the PoA. It is noted that there are no mandatory laws or regulations in Indonesia preventing the release of greenhouse gases from anaerobic digestion to the atmosphere /43//44/.

Therefore, it is concluded that the proposed PoA is a voluntary coordinated action and not implementing a mandatory policy/regulation. The project proponent has argued that without the PoA, industrial wastewater treatment practices employing the anaerobic wastewater treatment system will continue to be business-as-usual, thus releasing methane to the atmosphere. This is supported by the fact that the proposed recovery of methane gas from industrial wastewater treatment system requires additional investment that does not directly lead to increase in production and profitability. Therefore, it is concluded that the voluntary coordinated action implemented by the PoA would not be implemented in its absence.

Based on the arguments made, it is established that in the absence of CDM, none of the implemented CPAs would occur. Hence, the programme is considered to be additional. For each CPA, additionality will be determined at CPA level (c.f. Section 4.7.3).

4.7.2 Additionality of typical CPA

A typical CPA under the PoA is defined as an industrial wastewater treatment system implementing methane capture from the anaerobic digestion of organic materials. For **Replacement CPAs**, this would replace the existing legally compliant wastewater management system such as the aerobic wastewater treatment system without biogas recovery, anaerobic wastewater treatment system without biogas recovery and untreated wastewater stream. If the baseline scenario does not comply with all mandatory applicable legislation and regulations, then it has to be demonstrated that the non-compliance is widespread in the country or region. For **Greenfield CPAs**, this would aid the adoption of methane capture technologies in new systems instead of other alternatives that would result in higher emissions such as such as the aerobic wastewater treatment system without biogas recovery, anaerobic wastewater treatment system without biogas recovery and untreated wastewater stream. The CME has also raised eligibility criterion number 15 which is applicable to **Replacement CPAs** to ensure that CPAs participating in the PoA meets current laws and regulations prior to inclusion in the programme as evidenced from the latest monitoring report sent to the relevant government department. Therefore, this strengthens the argument for additionality.

To meet the requirements of the PoA, a typical CPA needs to invest in capital to purchase technology and equipment related to the new industrial wastewater treatment system involving methane capture. It is noted that the proposed programme does not result in direct



increase in the production or profitability of the industrial process. No additional income or cost savings is expected if the CPA decides to destroy the captured methane by flaring. However, the captured methane can also be utilised as a cost-saving measure.

For each CPA, the project owner has a choice whether to invest capital and participate in the programme or not to invest and continue with the current industrial wastewater treatment system (**Replacement CPAs**) or invest in another alternative that would result in higher emissions (**Greenfield CPAs**) while meeting the existing environmental standards and legislation. Therefore, it is concluded that without the PoA, a typical CPA faces a barriers to implementation and these barriers can be uplifted by the inclusion of the CPA in the PoA.

The demonstration of additionality of typical CPAs to be included to the PoA is in accordance with section A of the “Standard for demonstration of additionality, development of eligibility criteria, and application of multiple methodologies for programme of activities” /25/.

4.7.3 Approach for demonstrating additionality of CPAs

As the PoA consists of small-scale projects, the eligibility criteria have included all the relevant requirements of the Attachment A to Appendix B of the Simplified modalities and procedures for small-scale CDM project activities /26/. This meets the requirements of paragraph 9 of the Standard for Demonstration of Additionality, Development of Eligibility Criteria and Application of Multiple Methodologies for Programme of Activities /25/.

According to the Attachment A to Appendix B of the Simplified modalities and procedures for small-scale CDM project activities /26/, investment barrier, technological barrier, barrier due to prevailing practice or other barrier may be used for demonstrating additionality.

Investment Barrier

CPAs selecting to demonstrate additionality using the investment barrier are required to provide an explanation to show that a more financially viable alternative to the CPA would lead to higher emissions, demonstrate that similar activities have only been implemented with grants or other non-commercial finance terms and the institution/investor providing financing for the CPA had considered CDM benefits into consideration. The demonstration of the investment barrier is done using the investment comparison analysis, benchmark analysis or simple cost analysis, as per the requirements of the Guidelines on the Assessment of Investment Analysis /33/.

For the post-tax project Internal Rate of Return (IRR) analysis, the respective benchmark rate is determined using a weighted average cost of capital (WACC) method. WACC is determined as per the formula specified in the PoA-DD /1/, as follows:

$$WACC = K_u(1 - \frac{DT}{E + D}) + \frac{D}{E + D}(K_d - R_f)(1 - T)$$

Where:

D = value of debt

E = value of equity

K_d = cost of debt

K_u = cost of unlevered equity

R_f = risk-free rate

T = corporate tax rate



To ascertain the WACC formula, DNV has reviewed information from independent sources /45/. Hence, DNV finds the WACC formula to be acceptable.

Data used to determine the benchmark is determined from parameters that are standard in the market. Specific funding arrangements or parameters applicable to the CPA are not taken into account in determining the benchmark. DNV considers this to be consistent with paragraph 13 of the Guidelines on the Assessment of Investment Analysis /33/. Data sources are validated as follows:

Parameter	Proposed Value	DNV's Assessment
<i>Required return on Equity (Ku)</i>	12.5%	This is selected from the default values for the expected return on equity for Group 1 (Energy Industries and Waste handling and disposal) of Indonesia as specified in Appendix A of the Guidelines on the Assessment of Investment Analysis /33/. DNV has cross-checked this document to verify the proposed value. Therefore, DNV considers the proposed value of 12.5% for the required return on equity to be acceptable.
<i>Value of Debt (D)</i>	0% or 50% Determined at CPA level.	This parameter is determined from parameters that are standard in the market based on the financing structure of the CPA. If the CPA is fully financed internally, a value of 0% shall be applied. On the other hand, if the project is financed by debt and equity, a debt value of 50% shall be used as the default structure. DNV considers this to be in accordance with the default financing structure as stated in paragraph 18 of the Guidelines on the Assessment of Investment Analysis /33/.
<i>Value of Equity (E)</i>	100% or 50% Determined at CPA level.	This parameter is determined from parameters that are standard in the market based on the financing structure of the CPA. If the CPA is fully financed internally, a value of 100% shall be applied. On the other hand, if the project is financed by debt and equity, an equity value of 50% shall be used as the default structure. DNV considers this to be in accordance with the default financing structure as stated in paragraph 18 of the Guidelines on the Assessment of Investment Analysis /33/.



Parameter	Proposed Value	DNV's Assessment
<i>Cost of debt (Kd)</i>	Determined at CPA level	This parameter is obtained from the average cost of debt (investment loans) made available by Bank Indonesia (http://www.bi.go.id) at the time of investment decision. Since this parameter is dependent on the time of investment decision of the CPA, it is not possible to determine this value at PoA level. Therefore, this parameter is determined based on parameters that are standard in the market at the time of CPA inclusion. This is deemed to be acceptable.
<i>Risk free Rate (R_F)</i>	3%	This is selected from the risk-free rate based on the long-term average returns of US treasury bonds as specified in Appendix A of the Guidelines on the Assessment of Investment Analysis /32/. DNV has cross-checked this document to verify the proposed value. Therefore, DNV considers the proposed value of 3.0% for the risk-free rate to be acceptable.
<i>Tax (T)</i>	25%	By reviewing publicly available information /47/, DNV confirms that the corporate tax rate applicable at the time of investment decision. Therefore, the corporate tax rate of 25% is deemed acceptable for all CPAs under this PoA.

The financial analysis calculations of the first CPA "Recovery and Avoidance of Methane from Industrial Wastewater Treatment Projects – CPA No.001" were provided and transparently presented in the spreadsheet /4/, which has been checked for the accuracy and reproducibility of the calculations. The assumptions and calculations were verified and found to be correct by DNV. Data sources for CPA specific assumptions used in the investment barrier assessment are validated as follows:

Parameter	Proposed Value	DNV's Assessment
<i>Value of Debt</i>	Determined at CPA level.	This parameter is determined based on the financing structure of the CPA. It is noted that CPAs participating in the programme require investment. Thus, for a typical CPA, debt financing and equity financing are available. Since the financing structure of the CPA varies from one another, the value of this parameter has to be determined at CPA level. In particular, eligibility criterion 10 requires each CPA to reveal funding arrangements to the CME prior to inclusion. Therefore, DNV considers the determination of this parameter at CPA level to be acceptable.
<i>Cost of debt</i>	Determined at	For CPAs which have finalized debt arrangements, the



Parameter	Proposed Value	DNV's Assessment
(Kd)	CPA level	actual cost of debt is used. If a commercial debt arrangement is not in place, then the average cost of debt from local banks in the country at the time of investment decision is used. Since this parameter differs from one CPA to another, DNV considers the determination of this parameter at CPA level to be acceptable.
Tax (T)	25%	By reviewing publicly available information /47/, DNV confirms that the corporate tax rate applicable at the time of investment decision. Therefore, the corporate tax rate of 25% is deemed acceptable for all CPAs under this PoA.
Capital cost	Determined at CPA level	<p>This value of this parameter is different for each CPA. Therefore, the PoA-DD has specified sources where this information can be obtained in order of priority:</p> <ul style="list-style-type: none"> • The actual contract for the CPA • Quotes from the manufacturers/technology providers • Feasibility Study <p>DNV considers that these documents are reliable sources for the capital cost of the CPA and thus accepts the proposed method in determining the capital cost.</p> <p>For Greenfield CPAs which demonstrate additionality using the investment comparison analysis, the capital cost of the baseline system will also be identified. This is to allow a fair comparison against the capital cost of the proposed CPA system.</p>
Life of the project activity	Determined at CPA level	The lifetime of the project activity is taken from the technology provider. Since this differs for each CPA, it is not possible to specify this value at the PoA level. Therefore, DNV considers the method specified in the PoA-DD to determine the lifetime of the project activity to be reasonable.
Depreciation	Determined at CPA level	The PoA-DD has specified that a straight line method of depreciation will be used to calculate annual depreciation expenses. DNV considers this to be consistent with normal practice in Indonesia /49/.
Period of assessment	Minimum 10 years and maximum 20 years. Determined at CPA level	The PoA-DD has specified a minimum period of assessment of 10 years and a maximum period of assessment of 20 years. DNV considers this to be consistent with the general guidance provided in paragraph 3 of the Guidelines on the Assessment of Investment Analysis /33/.
Salvage value of CPA's	Determined at CPA level	The salvage value of a CPA is only considered in case the period of assessment is smaller than the lifetime of the



Parameter	Proposed Value	DNV's Assessment
<i>assets</i>		CPA. In this case, the remaining book value of the CPA's assets plus reasonable expectation of profit/loss on the realization of the assets are recorded as salvage value. DNV considers this to be a fair estimation of the salvage value of the CPA's assets.
<i>CDM verification expenses</i>	Determined at CPA level	CDM verification expenses are estimated at the time of CPA inclusion. This expense is dependent on the specific individual circumstances of the CPA and also the prevailing market conditions. This is not considered in the financial analysis to demonstrate additionality without CDM benefits. Therefore, DNV considers this to be acceptable.
<i>Operation and maintenance cost</i>	Determined at CPA level	<p>The operation and maintenance (O&M) cost will be determined independently for each CPA. For the cost of manpower, the amount of manpower required to operate the CPA is determined from the technology provider. This is deemed to be acceptable as the technology provider has the experience and expertise in estimating the amount of manpower required by the project. On the other hand, the CPA implementer's salary structure is used to determine employee salary applicable to the CPA. Only if this information is not available, publicly available salary surveys can be used instead.</p> <p>The costs for chemicals consumed in the CPA, maintenance and upkeep of the CPA assets are obtained from the technology provider. DNV considers this to be a reliable source of information for the O&M cost applicable to the CPA.</p> <p>For Greenfield CPAs which demonstrate additionality using the investment comparison analysis, the O&M cost of the baseline system will also be identified. This is to allow a fair comparison against the O&M cost of the proposed CPA system.</p> <p>Considering that the technology and the location of the CPA implemented may differ, DNV considers that it is reasonable to determine the O&M cost at the inclusion of subsequent CPA, accepts the method specified in the PoA-DD to determine the O&M cost of the CPA.</p>
<i>Estimated cost savings/revenues from the CPA</i>	Determined at CPA level	Cost savings from this project activity comes from three sources. Firstly, if the CPA implementer has an existing biomass boiler, the project activity would reduce the amount of biomass. Therefore, the quantity of biomass saved is determined based on the CPA implementer's own estimations. If this is not available, the CPA implementer



Parameter	Proposed Value	DNV's Assessment
		<p>is able to use data from the technology provider. The price of biomass is determined from third party buyer quotation in the region.</p> <p>The second source of cost savings is the reduced consumption of fossil fuel. This is applicable if the captured biogas is used to replace fossil fuel burners such as a diesel engine. The amount of fossil fuel saved is determined as per the CPA's implementers estimations evidenced by historical data. If this information is not available, data from the technology provider shall be used. The price of diesel is determined from invoices of fossil fuel purchase by the CPA implementer.</p> <p>Thirdly, if the biogas is used for in-house electricity generation which otherwise would have been imported from the grid, the estimated amount of electricity savings is included in the financial analysis. The amount of electricity saved is obtained from the historical data on the electricity consumption of the facility or the installed capacity of the newly installed in-house electricity generation unit. If this information is not available, the PP may use data from the technology provider to estimate the amount of electricity generated by the project. The price of electricity is taken from the electricity tariff expected to be paid by the CPA implementer.</p> <p>DNV considers that cost savings from the reduced usage of biomass, fossil fuel and electricity are potential financial benefit to the CPA aside from CDM revenues. Sources of information provided in the PoA-DD are reliable and allow the cost savings to be determined objectively. It is noted that it is not possible to determine the cost savings at PoA level. Therefore, the method specified in the PoA-DD to determine the cost savings of the CPA is accepted.</p>

CPAs selecting the investment analysis are also required to perform the financial model in real terms. The financial analysis shall be supplemented by a sensitivity analysis to demonstrate how variations of $\pm 10\%$ in key parameters affecting the financial analysis for the CPA.

Technological Barrier

Alternatively, CPAs may choose to demonstrate additionality using the technological barrier. Technological barriers have been listed in the PoA-DD as follows:



- There exists a less technological advance alternative to the project which involves lower risks and this alternative leads to higher emissions.
- The technology to be employed by the CPA has a low market share.
- The technology to be employed by the CPA has a higher risk of technological failure than another alternative. This alternative leads to higher emissions. This is demonstrated using relevant scientific literature or information from the technology manufacturer.
- The technology to be employed by the CPA is not available in the relevant region.

Barriers due to Prevailing Practices

The CPA implementer is required to show that the CPA is the first of its kind in the region. This barrier can only be used by the first CPA in a given industrial sector for demonstrating additionality. DNV confirms that this is in accordance with the Non-binding best practice examples to demonstrate additionality for SSC projects /38/.

Technological barriers and barriers due to prevailing practices will be demonstrated using reliable data sources as evidence. They will be provided during the due diligence stage prior to CPA inclusion. The following data sources are accepted:

- Publicly available information
- National/regional data
- Local experts
- Surveys
- Past historical performance data of the existing facility
- Past historical performance data of a comparable facility in the country
- Estimation by the CPA implementer

Additionality of micro-scale CPAs

Micro-scale projects are defined as projects with emission reductions resulting from the methane recovery activity at a scale of not more than 20 ktCO₂e per year. For these CPAs, additionality is demonstrated in accordance with the Guidelines for Demonstrating Additionality of Microscale Project Activities /34/. A CPA under this category is considered to be additional if each independent subsystem/measure in the CPA achieves an estimated annual emission reduction equal or less than 600 tCO₂e per year and the end users of the subsystem or measure are households/communities/SMEs.

DNV has considered the possibility that a CPA under this PoA falls under the category of micro scale projects and concluded that this is possible. Discussions with the CME revealed that the PoA accepts SMEs as participants. Participants that meet the definition of a SME as per the Small Enterprise Act No. 9 of 1995 are eligible to use the Guidelines for Demonstrating Additionality of Microscale Project Activities /34/. It has been clarified that households or communities are not eligible to participate in the PoA. Therefore, DNV accepts this approach for demonstrating additionality for CPAs that fall under the micro scale category.



In conclusion, these barriers have been reviewed by DNV and it is concluded that a CPA under the PoA may face these barriers in implementing the project activity. It is not possible to assess these barriers objectively at PoA level as this PoA covers many kinds of industries which produces agricultural product based industrial wastewater. Hence, the barriers will depend on the industry sector where a CPA may be implemented. These barriers will thus only be assessed if a CPA takes this alternative to demonstrate additionality. However, the PoA-DD has provided clear guidelines based on Attachment A to Appendix B of the Simplified modalities and procedures for small-scale CDM project activities /26/ and the Standard for Demonstration of Additionality, Development of Eligibility Criteria and Application of Multiple Methodologies for Programme of Activities /25/ for a CPA to demonstrate additionality. The CPA implementer's compliance to these guidelines and approach in demonstrating the additionality of the CPA shall be assessed at the time of CPA inclusion.

4.8 Monitoring plan

A monitoring plan has been included in the SSC-CDM-PoA-DD /1/. It is based on the approved simplified monitoring methodology AMS-III.H version 16 /22/ which is applied to the proposed CDM programme activity.

4.8.1 Methodological choices and equations to be used for calculation of emission reductions of a CPA

Baseline Emissions

Methods to calculate baseline emissions of an individual CPA have been specified in the PoA. Equations used for calculation of baseline emissions of a SSC-CPA are specified as follows:

- Baseline emissions from electricity or fuel consumption (i.e. energy consumption of the equipment/devices in the baseline wastewater facility)
- Baseline emissions from the wastewater treatment systems affected by the CPA
- Baseline methane emissions from degradable organic carbon in treated wastewater discharged into sea/river/lake
- Baseline methane emissions from anaerobic decay of final sludge produced

Baseline emissions are calculated using equation 1 of AMS-III.H version 16.

$$BE_y = BE_{power,y} + BE_{ww,treatment,y} + BE_{ww,discharge,y} + BE_{s,final,y}$$

where:

BE_y	Baseline emissions in year y (tCO ₂ e)
$BE_{power,y}$	Baseline emissions from electricity or fuel consumption in year y (tCO ₂ e)
$BE_{ww,treatment,y}$	Baseline emissions of the wastewater treatment systems affected by the CPA in year y (tCO ₂ e)
$BE_{ww,discharge,y}$	Baseline methane emissions from degradable organic carbon in treated wastewater discharged into sea/river/lake in year y (tCO ₂ e).



$BE_{s,final,y}$ Baseline methane emissions from anaerobic decay of the final sludge produced in year y (tCO₂e).

Baseline emissions of the wastewater treatment systems affected by the CPA are calculated using equation 2 of AMS-III.H version 16.

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

where:

$Q_{ww,i,y}$	Volume of wastewater treated in baseline wastewater treatment system i in year y which is affected by the CPA (m ³ /year)
$COD_{inflow,i,y}$	Chemical Oxygen Demand of the wastewater inflow to the baseline treatment system i in year y (t/m ³)
$\eta_{COD,BL,i}$	COD removal efficiency of the baseline treatment system i , determined as per the paragraphs 26, 27 or 28 of AMS-III.H version 16
$MCF_{ww,treatment,BL,i}$	Methane correction factor for the baseline wastewater treatment system i (MCF value can be obtained from Table III.H.1 in AMS-III.H version 16)
$B_{o,ww}$	Methane producing capacity of the wastewater (IPCC default value of 0.25 kg CH ₄ /kg COD)
UF_{BL}	Model correction factor to account for model uncertainties (0.89)
GWP_{CH4}	Global warming potential for methane (value of 21)

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

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

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

- For existing plant without three year operating history, procedures in paragraph 27 of AMS-III.H version 16 /22/ shall be followed;
- For Greenfield and capacity addition projects, one of the following procedures shall be used:



- (a) Value obtained from a measurement campaign in a comparable existing wastewater treatment plant i.e. having similar environmental and technological circumstances for example treating similar type of wastewater. Average values from the measurement campaign shall be used and the result shall be multiplied by 0.89 to account for the uncertainty range (30% to 50%) associated with this approach. The treatment plant and wastewater source can be considered as similar as the baseline plant, whereby the measurement campaign can be implemented when following conditions can be fulfilled:
- (i) The two sources of wastewater (wastewater treated in the selected plant and from the project activity) are of the same type, e.g. either domestic or industrial wastewater;
 - (ii) The selected plant and the baseline plants employ the same treatment technology (e.g. anaerobic lagoons or activated sludge), and the hydraulic retention times in their biological and physical treatment systems do not vary by more than 20%; and
 - (iii) For project activity treating industrial wastewater, both industries have the same raw material and final products, and apply the same industrial technology. Alternatively, different industrial wastewaters may be considered as similar if the following requirements are fulfilled:
 - The ratio COD/BOD (related to the proportion of biodegradable organic matter) does not differ by more than 20%; and
 - The ratio total COD / soluble COD (related to the proportion of suspended organic matter, and therefore to the sludge generation capacity) does not differ by more than 20%.
- (b) Value provided by the manufacturer/designer of a Greenfield wastewater treatment plant using the same technology, demonstrated to be conservative, e.g. average values from the top 20 percent plants with lowest emission rate per ton COD removed among the plants installed in the last five years designed for the same country/region to treat the same type of wastewaters as the project activity.

Baseline methane emissions from degradable organic carbon in treated wastewater discharged into sea/river/lake are calculated using equation 6 of AMS-III.H version 16.

$$BE_{ww,discharge,y} = Q_{ww,y} * GWP_{CH4} * B_{o,ww} * UF_{BL} * COD_{ww,discharge,BL,y} * MCF_{ww,BL,discharge}$$

where:

$Q_{ww,y}$	Volume of treated wastewater discharged in year y (m ³)
$COD_{ww,discharge,BL,y}$	Chemical oxygen demand of the treated wastewater discharged into sea, river or lake in the baseline situation in the year y (t/m ³). If the baseline scenario is the discharge of untreated wastewater, the COD of untreated wastewater will be used.
$MCF_{ww,BL,discharge}$	Methane correction factor based on the discharge pathway in the baseline situation (e.g. into sea, river or lake) of the wastewater (MCF values as per Table III.H.1 of AMS-III.H version 16)



Baseline emissions from anaerobic decay of the final sludge produced are calculated from equation 7 of AMS-III.H version 16.

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

where:

$S_{final,BL,y}$	Amount of dry matter in the final sludge generated by the baseline wastewater treatment systems in the year y (t)
$MCF_{s,BL,final}$	Methane correction factor of the disposal site that receives the final sludge in the baseline situation
DOC_s	Degradable organic content of the untreated sludge generated in the year y (fraction, dry basis). Default value 0.257 for industrial sludge will be used
DOC_F	Fraction of DOC dissimilated to biogas (IPCC default of 0.5)
F	Fraction of CH ₄ in biogas (IPCC default of 0.5)

The calculation of the methane correction factor of the disposal site that receives the final sludge ($MCF_{s,BL,final}$) is as follows:

1. In case of a water table above the bottom of the SWDS (for example, due to using waste to fill inland water bodies, such as ponds, rivers or wetlands), the MCF should be determined as:

$$MCF_y = MAX \left\{ \left(1 - \frac{2}{d_y} \right), \frac{h_{w,y}}{d_y} \right\}$$

where:

MCF_y	Methane correction factor for year y
$h_{w,y}$	Height of water table measured from the base of the SWDS (m)
d_y	Depth of SWDS (m)

2. In other situations, the MCF should be selected as a default value ($MCF_y = MCF_{default}$)

Baseline emissions from electricity consumption is calculated using the Tool to calculate baseline, project and/or leakage emissions from electricity consumption /31/

One of the following scenarios may be applicable to a CPA:

Scenario A: Electricity consumption from the grid. Baseline emissions will be calculated as:

$$BE_{EC,y} = \sum_k EC_{BL,k,y} * EF_{EL,k,y} * (1 + TDL_{k,y})$$

where:

$EC_{BL,k,y}$	Quantity of electricity that would be consumed by the baseline electricity consumption source k in year y (MWh/yr)
$EF_{EL,k,y}$	Emission factor for electricity generation for source k in year y (tCO ₂ /MWh)
$TDL_{k,y}$	Transmission and distribution losses

$EF_{EL,k,y}$ will be the combined margin emission factor of the applicable electricity system.



Scenario B: Electricity consumption from an off-grid fossil fuel fired captive power plant. 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 plant(s) is/are not connected to the electricity grid. Baseline emissions will be calculated as:

$$BE_{EC,y} = \sum_k EC_{BL,k,y} * EF_{EL,k,y} * (1 + TDL_{k,y})$$

$EF_{EL,k,y}$ will be the default value of:

- (a) 1.3 tCO₂/MWh if the electricity consumption source is a baseline electricity consumption source; and the electricity consumption of all baseline electricity consumptions sources at the site of the captive power plant(s) is less than the electricity consumption of all project electricity consumption sources at the site of the captive power plant(s); or
- (b) 0.4 tCO₂/MWh if the electricity consumption source is a baseline electricity consumption source

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. Baseline emissions will be calculated as:

$$BE_{EC,y} = \sum_k EC_{BL,k,y} * EF_{EL,k,y} * (1 + TDL_{k,y})$$

$EF_{EL,k,y}$ will be the lowest of the emission factor determined under Scenario A and Scenario B.

Baseline emissions from fossil fuel consumption is calculated using the Tool to calculate project or leakage emissions from electricity consumption /32/

$$BE_{FC,k,y} = \sum_i FC_{i,k,y} * COEF_{i,y}$$

$$COEF_{i,y} = NCV_{i,y} * EF_{CO2,i,y}$$

where:

$BE_{FC,k,y}$	The CO ₂ emissions from fossil fuel combustion in process k during the year y (tCO ₂ /yr)
$FC_{i,j,y}$	Quantity of fuel type i combusted in process k during the year y (mass or volume unit/yr).
$COEF_{i,y}$	CO ₂ emission coefficient of fossil fuel type i in year y (tCO ₂ /mass or volume unit).



$NCV_{i,y}$	Weighted average net calorific value of the fuel type i in the year y (GJ/mass or volume unit).
$EF_{CO_2,i,y}$	Weighted average CO ₂ emission factor of fuel type i in year y (tCO ₂ /GJ).
i	Fuel type combusted in process j during the year y .

It is concluded that procedures to calculate baseline emissions of an individual CPA have been specified in the PoA.

Project Emissions

Methods to calculate project emissions of an individual CPA have been specified in the PoA. Equations used for calculation of project emissions of a SSC-CPA are specified as follows:

- Project activity emissions from the systems affected by the project activity are calculated using equation 8 of AMS-III.H version 16.
- Project emissions from wastewater treatment systems affected by the project activity are calculated using equation 2 of AMS-III.H version 16. The uncertainty factor and the data applied have been changed to be applicable to the project situation.
- Project emissions on account of inefficiency of the project activity wastewater treatment systems and presence of degradable organic carbon in treated wastewater are calculated using equation 6 of AMS-III.H version 16. The uncertainty factor and the data applied have been changed to be applicable to the project situation.
- Project emissions from the decay of the final sludge generated by the project activity treatment systems are calculated using equation 7 of AMS-III.H version 16. The uncertainty factor and the data applied have been changed to be applicable to the project situation.
- Project emissions due to inefficiencies in capture systems are calculated using equations 10 and 11 of AMS-III.H version 16.

Project activity emissions from the systems affected by the project activity are calculated as follows:

$$PE_y = PE_{power,y} + PE_{ww,treatment,y} + PE_{ww,discharge,y} + PE_{s,final,y} + PE_{fugitive,y} + PE_{biomass,y} + PE_{flaring,y}$$

where:

PE_y	Project activity emissions from the systems affected by the project activity
$PE_{power,y}$	CO ₂ emissions from the electricity and fuel used by the CPA
$PE_{ww,treatment,y}$	Methane emissions from wastewater treatment systems affected by the CPA, and not equipped with biogas recovery in the project scenario
$PE_{ww,discharge,y}$	Methane emissions on account of inefficiency of the CPA wastewater treatment systems and presence of degradable organic carbon in treated wastewater
$PE_{s,final,y}$	Methane emissions from anaerobic decay of the final sludge
$PE_{fugitive,y}$	Methane emissions from biogas release in capture systems
$PE_{biomass,y}$	Methane emissions due to incomplete flaring



$PE_{flaring,y}$ Methane emissions from biomass stored under anaerobic conditions which would not have occurred in the baseline situation

Project emissions from electricity consumption

This is calculated using the Tool to calculate baseline, project and/or leakage emissions from electricity consumption /31/. One of the following scenarios may be applicable to a CPA:

Scenario A: Electricity consumption from the grid. Project emissions will be calculated as:

$$PE_{EC,y} = \sum_j EC_{PJ,j,y} * EF_{EL,j,y} * (1 + TDL_{j,y})$$

where:

$EC_{PJ,j,y}$	Quantity of electricity that would be consumed by the project electricity consumption source j in year y (MWh/yr)
$EF_{EL,j,y}$	Emission factor for electricity generation for source j in year y (tCO ₂ /MWh)
$TDL_{j,y}$	Transmission and distribution losses

$EF_{EL,j,y}$ will be the combined margin emission factor of the applicable electricity system.

Scenario B: Electricity consumption from an off-grid fossil fuel fired captive power plant. 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 plant(s) is/are not connected to the electricity grid. Project emissions will be calculated as:

$$PE_{EC,y} = \sum_j EC_{PJ,j,y} * EF_{EL,j,y} * (1 + TDL_{j,y})$$

$EF_{EL,j,y}$ will be the default value of:

- (a) 1.3 tCO₂/MWh if the electricity consumption source is a project or leakage electricity consumption source; or
- (b) 0.4 tCO₂/MWh if the electricity consumption source is a project electricity consumption source and the electricity consumption of all baseline electricity consumptions sources at the site of the captive power plant(s) is greater than the electricity consumption of all project electricity consumption sources at the site of the captive power plant(s).

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. Project emissions will be calculated as:



$$PE_{EC,y} = \sum_j EC_{PJ,j,y} * EF_{EL,j,y} * (1 + TDL_{j,y})$$

$EF_{EL,j,y}$ will be the higher of the emission factor determined under Scenario A and Scenario B.

Project emissions from fossil fuel consumption

This is calculated as per the Tool to calculate project or leakage emissions from electricity consumption /32/ as follows:

$$PE_{FC,j,y} = \sum_i FC_{i,j,y} * COEF_{i,y}$$

$$COEF_{i,y} = NCV_{i,y} * EF_{CO2,i,y}$$

where:

$PE_{FC,j,y}$	The CO ₂ emissions from fossil fuel combustion in process j during the year y (tCO ₂ /yr)
$FC_{i,j,y}$	Quantity of fuel type i combusted in process j during the year y (mass or volume unit/yr).
$COEF_{i,y}$	CO ₂ emission coefficient of fossil fuel type i in year y (tCO ₂ /mass or volume unit).
$NCV_{i,y}$	Weighted average net calorific value of the fuel type i in the year y (GJ/mass or volume unit).
$EF_{CO2,i,y}$	Weighted average CO ₂ emission factor of fuel type i in year y (tCO ₂ /GJ).
i	Fuel type combusted in process j during the year y .

Project emissions from wastewater treatment systems affected by the project activity

$PE_{ww,treatment,y}$ will be calculated as that of $BE_{ww,treatment,y}$ using an uncertainty factor of 1.12 and data applicable to the project situation ($MCF_{ww,treatment,PJ,k}$ and $\eta_{PJ,k,y}$) and with the following changed definition of parameters:

$MCF_{ww,treatment,PJ,k}$	Methane correction factor for project wastewater treatment system k (MCF values as per Table III.H.1 of AMS-III.H version 16)
$\eta_{PJ,k,y}$	COD removal efficiency of the project wastewater treatment system k in year y (t/m ³)

Project emissions on account of inefficiency of the CPA wastewater treatment systems and presence of degradable organic carbon in treated wastewater

$PE_{ww,discharge,y}$: Methane emissions from degradable organic carbon in treated wastewater in year y (tCO₂e). These emission will be calculated as that for $BE_{ww,discharge,y}$, using uncertainty factor of 1.12 and data applicable to the project conditions ($COD_{ww,discharge,PJ,y}$ and $MCF_{ww,PJ,discharge}$) and with the following changed definition of parameters:



$COD_{ww,discharge,PJ,y}$	Chemical oxygen demand of the treated wastewater discharged to the sea, river or lake in the project scenario in year y (t/m^3)
$MCF_{ww,PJ,discharge}$	Methane correction factor based on the discharge pathway of the wastewater in the project scenario (e.g. into the sea, river or lake) (MCF values as per Table III.H.1)

Project emissions from the decay of the final sludge generated by the CPA treatment systems

$PE_{s,final,y}$ Methane emissions from anaerobic decay of the final sludge produced in year y (tCO_2e). These emissions will be calculated as that for $BE_{s,final,y}$, using an uncertainty factor of 1.12 as data applicable to the project conditions ($MCF_{s,PJ,final}$ and $S_{final,PJ,y}$). If the sludge is controlled combusted, disposed in a landfill with biogas recovery or used for soil application in aerobic conditions in the CPA, this term will be neglected and the sludge treatment and/or use and/or final disposal will be monitored during the crediting period with the following definition of the parameters:

$MCF_{s,PJ,final}$	Methane correction factor of the disposal site that receives the final sludge in the project situation, estimated as per the procedures described in the methodological tool emissions from solid waste disposal sites /35/
$S_{final,PJ,y}$	Amount of dry matter in final sludge generated by the project wastewater treatment systems in the year y (t)

The calculation of the methane correction factor of the disposal site that received the final sludge ($MCF_{s,PJ,final}$) is determined as per provided in the baseline emissions calculations.

Project emissions due to inefficiencies in capture systems

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

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

where:

$PE_{fugitive,ww,y}$ Fugitive emissions through capture inefficiencies in the anaerobic wastewater treatment systems in the year y (tCO_2e)

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

where:

CFE_{ww} Capture efficiency of the biogas recovery equipment in the wastewater treatment systems (a value of 0.9 is used, as per AMS-III.H version 16)

$MEP_{ww,treatment,y}$ Methane emission potential of wastewater treatment systems equipped with biogas recovery system in year y (ton)



$$MEP_{ww,treatment,y} = Q_{ww,i,y} * B_{o,ww} * UF_{PJ} * COD_{removed,PJ,k,y} * MCF_{ww,treatment,PJ,k}$$

where:

$Q_{ww,i,y}$	Amount of wastewater to be treated in the wastewater treatment system (m ³ /year)
$COD_{removed,PJ,k,y}$	The Chemical Oxygen Demand removed by the treatment system k of the CPA equipped with biogas recovery in the year y (t/m ³)
$MCF_{ww,treatment,PJ,k}$	Methane correction factor for the project wastewater treatment system k equipped with biogas recovery equipment
UF_{PJ}	Model correction factor to account for model uncertainties

Project emissions due to incomplete flaring

$PE_{flaring,y}$ Methane emissions due to incomplete flaring. For *ex-ante* estimation, baseline emission calculation for $BE_{ww,treatment,y}$ will be used without the consideration of GWP of CH₄. However, the *ex-post* emission reduction will be calculated as per the “Tool to determine project emissions from flaring gases containing methane /27/” as follows:

Project emissions from flaring of methane will be calculated as:

$$PE_{flare,y} = \sum_{h=1}^{8760} TM_{RG,h} * (1 - \eta_{flare,h}) * GWP_{CH4} / 1,000$$

where:

$PE_{flare,y}$	Project emissions from flaring of the residual gas stream in year y (tCO ₂ e)
$TM_{RG,h}$	Mass flow rate of methane in the residual gas in the hour h (kg/h)
$\eta_{flare,h}$	Flare efficiency in hour h
GWP_{CH4}	Global Warming Potential of methane valid for commitment period (IPCC default value of 21)

Determining flare efficiency for open flare:

In case of open flares, the flare efficiency cannot be measured in a reliable manner (i.e. external air will be mixed and will dilute the remaining methane) and a default value of 50% will be used provided that it can be demonstrated that the flare is operational (e.g. through a flame detection system reporting electronically on continuous basis). If the flare is not operational the default value to be adopted for flare efficiency is 0%.

Determining flare efficiency for enclosed flaring:

Use a 90% default value. Continuous monitoring of compliance with manufacturer's specification of flare (temperature, flow rate of residual gas at the inlet of the flare) will be performed. If in a specific hour any of the parameters are out of the limit of manufacturer's specifications, a 50% default value for the flare efficiency will be used for the calculations for that specific hour.



If there is no record of the temperature of the exhaust gas of the flare or if the recorded temperature is less than 500 °C for any particular hour, it will be assumed that during that hour the flare efficiency is zero.

Mass flow rate of methane in the residual gas in the hour h (kg/h) ($TM_{RG,h}$):

The quantity of methane in the residual gas flowing into the flare is the product of the volumetric flow rate of the residual gas ($FV_{RG,h}$), the volumetric fraction of methane in the residual gas ($f_{VCH4,RG,h}$) and the density of methane ($\rho_{CH4,n,h}$) in the same reference conditions (normal conditions and dry or wet basis).

Both measurements (flow rate of the residual gas and volumetric fraction of methane in the residual gas) will be referred to the same reference condition that may be dry or wet basis. If the residual gas moisture is significant (temperature greater than 60 °C), the measured flow rate of the residual gas that is usually referred to wet basis will be corrected to dry basis due to the fact that the measurement of methane is usually undertaken on a dry basis (i.e. water is removed before sample analysis).

$$TM_{RG,h} = FV_{RG,h} * f_{VCH4,RG,h} * \rho_{CH4,n}$$

where:

$TM_{RG,h}$	Mass flow rate of methane in the residual gas in the hour h (kg/h)
$FV_{RG,h}$	Volumetric flow rate of the residual gas in dry basis at normal conditions in hour h (m ³ /h)
$f_{VCH4,RG,h}$	Volumetric fraction of methane in the residual gas on dry basis in hour h
$\rho_{CH4,n,h}$	Density of methane at normal conditions (0.716 kg/m ³)

Project emissions from biomass stored under anaerobic conditions

$PE_{biomass,y}$ Methane emissions from biogas stored under anaerobic conditions. If storage of biomass under anaerobic conditions takes place in the project scenario and does not occur in the baseline scenario, methane emissions due to anaerobic decay of the biomass will be considered and be determined as per the procedure in the methodological tool emissions from solid waste disposal sites /35/. Application B of the tool is appropriately used as the project activity involves the disposal of waste at a SWDS as follows:

$$PE_{biomass,y} = \varphi_y \cdot (1 - f_y) \cdot GWP_{CH4} \cdot (1 - OX) \cdot \frac{16}{12} \cdot F \cdot DOC_{f,y} \cdot MCF_y \cdot \sum_{x=1}^y \sum_j W_{j,x} \cdot DOC_j \cdot e^{-k_j \cdot (y-x)} \cdot (1 - e^{-k_j})$$

where:

φ_y	Model correction factor to account for model uncertainties for year y
f_y	Fraction of methane captured at the SWDS and flared, combusted or used in another manner that prevents the emissions of methane to the atmosphere in year y
GWP_{CH4}	Global Warming Potential of methane



OX	Oxidation factor (reflecting the amount of methane from SWDS that is oxidised in the soil or other material covering the waste)
F	Fraction of methane in the SWDS gas (volume fraction)
MCF_y	Methane correction factor for year y
DOC_j	Fraction of degradable organic carbon in the waste type j (weight fraction)
k_j	Decay rate for the waste type j (1 / year)
j	Type of residual waste or types of waste in the MSW
x	Years in the time period in which waste is disposed at the SWDS, extending from the first year in the time period ($x = 1$) to year y ($x = y$).
y	Year of the crediting period for which methane emissions are calculated (y is a consecutive period of 12 months)
$DOC_{f,y}$	Fraction of degradable organic carbon (DOC) that decomposes under the specific conditions occurring in the SWDS for year y (weight fraction)
$W_{j,x}$	Amount of solid waste type j disposed or prevented from disposal in the SWDS in the year x (t)

As the tool is applied to a residual waste, the CPA shall determine $DOC_{f,y}$ based on measurements of the biochemical methane potential of the residual waste type j (BMP_j), as follows:

$$DOC_{f,y} = DOC_{f,m} = 0.7 \cdot \frac{12}{16} \cdot \frac{BMP_j}{F \cdot DOC_j}$$

where:

$DOC_{f,y}$	Fraction of degradable organic carbon (DOC) that decomposes under the specific conditions occurring in the SWDS for year y (weight fraction)
BMP_j	Biochemical methane potential for the residual waste type j disposed or prevented from disposal (tCH ₄ /t waste)
F	Fraction of methane in the SWDS gas (volume fraction)
DOC_j	Fraction of degradable organic carbon in the waste type j (weight fraction)
j	Residual waste type applied to the tool
y	Year of the crediting period for which methane emissions are calculated (y is a consecutive period of 12 months)
m	Month of the crediting period for which methane emissions are calculated

It is concluded that procedures to calculate project emissions of an individual CPA have been specified in the PoA.

Leakage Emissions

If the CPA implements equipment transferred from another facility, leakage effects at the site of the other activity are to be considered and estimated as LE_y . In conclusion, the PoA-DD has correctly identified leakage requirements needed to be calculated based on the requirements of AMS-III.H version 16 /22/.



In conclusion, the PoA-DD has outlined steps to calculate emission of an individual CPA. They are complete, transparent and in accordance with the approved methodology.

4.8.2 Parameters determined ex-ante

Data and parameters listed here are determined only once when validation is undertaken. They are not monitored and thus remain fixed throughout the crediting period.

The list of parameters determined *ex-ante* is as follows:

- Global Warming Potential for methane, GWP_{CH_4} , 21
- Methane producing capacity of the wastewater, $B_{o,ww}$, 0.25 kgCH₄/kg COD
- Degradable organic content of the untreated sludge generated, DOC_s , 0.09 (wet basis) and 0.257 (dry basis). The default value for industrial sludge is appropriately used.
- Fraction of degradable organic content dissimilated to biogas, DOC_F , 0.5
- Fraction of CH₄ in biogas, F , 0.5
- Capture efficiency of the biogas recovery equipment in the wastewater treatment systems, CPE_{ww} , 0.9
- Density of methane at normal conditions, $\rho_{CH_4,\eta}$, 0.716 kg/m³
- 10-day measurement campaign factor to account for the uncertainty range (30% to 50%), DF , 0.89
- Model correction factors to account for model uncertainties, UF_{BL} 0.89 and UF_{PJ} 1.12.
- Flare efficiency of the biogas used for gainful purpose, $FE_{combusted}$, 100%
- Default value for the model correction factor to account for model uncertainties, $\phi_{default}$, 1
- Oxidation factor (reflecting the amount of methane from SWDS that is oxidized in the soil or other material covering the waste), OX , 0.1

These parameters have been verified to be taken from default values of the methodology AMS-III.H version 16 /22/ and the referred methodological tools. They are applied correctly in the PoA-DD.

The following parameters will be determined at CPA level:

- Methane correction factor for baseline wastewater treatment system i , $MCF_{ww,treatment, BL,i}$, no unit
- Methane correction factor based on the discharge pathway in the baseline situation (e.g. into sea, river or lake) of the wastewater, $MCF_{ww,BL,discharge}$, no unit
- Chemical oxygen demand of treated wastewater discharged into sea, river or lake, $COD_{ww,discharge,BL,y}$, unit: t/m³
- Methane correction factor of the disposal site that receives the final sludge in the baseline situation, $MCF_{s,BL,final}$, no unit
- COD removal efficiency of the baseline treatment system i , $\eta_{COD,BL,i}$, unit: %
- Amount of dry matter in the final sludge generated by the baseline wastewater treatment systems in the year y , $S_{final,BL,y}$, unit: tons



- Quantity of electricity that would be consumed by the baseline electricity consumption source k in year y , $EC_{BL,k,y}$, unit MWh/yr
- Emission factor for electricity generation for source k in year y , $EF_{EL,k,y}$, unit: tCO₂/MWh
- Quantity of fuel type i combusted in process k during the year y , $FC_{i,k,y}$, unit: mass or volume per year
- Methane correction factor for the solid waste disposal site, $MCF_{default}$, no unit
- Methane correction factor for project wastewater treatment system k , $MCF_{ww,treatment,PJ,k}$, no unit
- Methane correction factor based on the discharge pathway of the wastewater in the project scenario (e.g. into sea, river or lake), $MCF_{ww,PJ,discharge}$, no unit
- Methane correction factor of disposal site that receives the final sludge in the project situation, $MCF_{s,PJ,final}$, no unit
- COD removal efficiency of the project treatment system j , $\eta_{COD,PJ,j}$, unit: %
- Emission factor for electricity generation for source j in year y , $EF_{EL,j,y}$, unit: tCO₂/MWh
- Flare efficiency in hour h , $\eta_{flare,h}$, unit: %
- Fraction of degradable organic carbon in the waste type j (weight fraction), DOC_j , no unit
- Decay rate for the waste type j , k_j , unit: 1/year
- Biochemical methane potential (BMP) of MSW or the residual waste type j disposed or prevented from disposal, BMP_j , unit: t CH₄/t waste

4.8.3 Parameters monitored ex-post

The following parameters are monitored for the emission reduction estimation:

- The monthly volume of the wastewater entering the treatment system (inflow), $Q_{ww,i}$. Unit: m³/month. Measurements are taken using a flow meter. This parameter is measured continuously. Equipment calibration is done as per vendor's specification or at least once every 3 years, whichever is less.
- The monthly flow of treated wastewater discharged, Q_{ww} . Unit: m³/month. Measurements are taken using a flow meter. This parameter is measured continuously. Equipment calibration is done as per vendor's specification or at least once every 3 years, whichever is less.
- Chemical oxygen demand of the wastewater entering the project treatment system, $COD_{untreated,y}$. Unit: tCOD/m³. Measurement is done through representative sampling according to national or international standards using in-house and/or by an accredited laboratory. The representative sample size is determined as per "Best Practice Examples Focusing on Sample Size and Reliability Calculations", EB67 Annex 6 /37/ and "Standard for Sampling and Surveys for CDM Project Activities and Programme of Activities", EB69 Annex 4 /39/. The sample size is expected to achieve a confidence/precision level of 90/10. This has been summarised in Annex 4 of the PoA-DD /1/.



- Combined margin emission factor for the grid in year y , $EF_{grid,CM,y}$. Unit: tCO_2/MWh . This is applicable to scenarios A and C for calculation emissions from electricity consumption.
- Average technical transmission and distribution losses for providing electricity to source j , k in year y , $TDL_{j,y}$ $TDL_{k,y}$, no unit. Zero transmission loss will be assumed in cases where electricity supply is from a captive unit. This parameter is estimated from the distribution and transmission networks of the electricity grid of the same voltage as the connection where the proposed CDM project activity is connected to. The technical distribution losses should not contain other types of grid losses (e.g. commercial losses/theft). The distribution losses can either be calculated by the CME/CPA implementer or be based on references from utilities, network operators or other official documentation.
- Chemical oxygen demand of the treated wastewater leaving the project treatment system, $COD_{ww,treated,y}$. Unit: $tCOD/m^3$. Measurement is done through representative sampling according to national or international standards using in-house and/or by an accredited laboratory. The representative sample size is determined as per “Best Practice Examples Focusing on Sample Size and Reliability Calculations”, EB67 Annex 6 /37/ and “Standard for Sampling and Surveys for CDM Project Activities and Programme of Activities”, EB69 Annex 4 /39/. The sample size is expected to achieve a confidence/precision level of 90/10. This has been summarised in Annex 4 of the PoA-DD /1/.
- Chemical oxygen demand of the treated wastewater leaving the wastewater treatment systems affected by the project activity and not equipped with biogas recovery, $COD_{PJ,outflow,k}$. Unit: $tCOD/m^3$. Measurement is done through representative sampling according to national or international standards using in-house and/or by an accredited laboratory. The representative sample size is determined as per “Best Practice Examples Focusing on Sample Size and Reliability Calculations”, EB67 Annex 6 /37/ and “Standard for Sampling and Surveys for CDM Project Activities and Programme of Activities”, EB69 Annex 4 /39/. The sample size is expected to achieve a confidence/precision level of 90/10. This has been summarised in Annex 4 of the PoA-DD /1/. This is applicable for cases where the baseline scenario is the use of open anaerobic lagoons and the project scenario is the introduction of anaerobic digester prior to the existing lagoons.
- Chemical oxygen demand of the treated wastewater discharged to river/water/lake, $COD_{ww,discharge,y}$. Unit: $tCOD/m^3$. Measurement is done through representative sampling according to national or international standards using in-house and/or by an accredited laboratory. The representative sample size is determined as per “Best Practice Examples Focusing on Sample Size and Reliability Calculations”, EB67 Annex 6 /37/ and “Standard for Sampling and Surveys for CDM Project Activities and Programme of Activities”, EB69 Annex 4 /39/. The sample size is expected to achieve a confidence/precision level of 90/10. This has been summarised in Annex 4 of the PoA-DD /1/.
- Amount of dry matter in final sludge, $S_{final,PJ,y}$. Unit: tons. Measure the total quantity of sludge on a wet basis. The volume and density or direct weighing will be used to determine the sludge amount (wet basis). Representative samples are taken to



determine the moisture content to calculate the total sludge amount on dry basis. This is monitored through continuous or batch measurements by representative sampling to ensure 90/10 confidence/precision level. If the methane emissions from anaerobic decay of the final sludge are to be neglected because the sludge is controlled combusted, disposed of in a landfill with methane recovery, or used for soil application, then the end-use of the final sludge will be monitored during the crediting period. If the baseline emissions include the anaerobic decay of final sludge generated by the baseline treatment systems in a landfill without methane recovery, the baseline disposal site shall be clearly defined, and verified. The representative sample size is determined as per “Best Practice Examples Focusing on Sample Size and Reliability Calculations, EB67 Annex 6 /37/. This has been summarised in Annex 4 of the PoA-DD /1/.

- Annual volume of biogas combusted, $BG_{burnt,y}$. Unit: m^3 . Measured continuously using a flow meter. This equipment is calibrated as per manufacturer’s specification or at least once in 3 years, whichever is less. In all cases, the amount of biogas recovered, fuelled, flared or otherwise utilized (e.g. injected into a natural gas distribution grid or distributed via a dedicated piped network) shall be measured using continuous flow meters. If the biogas streams flared and fuelled (or utilized) are monitored separately, the two fractions can be added together to determine the total biogas recovered, without the need to monitor the recovered biogas before separation.
- Methane content in biogas, $w_{CH_4,y}$. Unit: volume fraction. Measured using a continuous gas analyser. Alternatively, periodical measurements are taken once per month provided that it meets the confidence/precision level of 90/10. The equipment must be able to directly measure methane content in the biogas and measurement is carried out close to the location where the biogas flow measurement takes place. This equipment is calibrated as per the vendor’s specifications or at least once every 3 years, whichever is less.
- Temperature of the biogas recovered, T . Unit: $^{\circ}C$. This parameter is measured continuously. This is to determine the density of the methane combusted. If the biogas flow meter employed measures flow, pressure and temperature and displays or outputs the normalized flow of biogas, then there is no need for separate monitoring of pressure and temperature of the biogas. Calibration is done as per vendor’s specifications or at least once every 3 years, whichever is less.
- Pressure of the biogas, P . Unit: Pa. This parameter is measured continuously. This is to determine the density of the methane combusted. If the biogas flow meter employed measures flow, pressure and temperature and displays or outputs the normalized flow of biogas, then there is no need for separate monitoring of pressure and temperature of the biogas. Calibration is done as per vendor’s specifications or at least once every 3 years, whichever is less.
- Quantity of electricity that would be consumed by the project electricity consumption source j in year y , $EC_{PJ,j,y}$. Unit: MWh/yr. This parameter is monitored continuously and aggregated monthly using an electricity meter. The accuracy and class of the meter will be as per industry standard. Calibration is done as per vendor’s specifications or at least once every 3 years, whichever is less.



- Quantity of fuel type i combusted in process j during the year y , $FC_{i,j,y}$, Unit: mass or volume per year. This is measured continuously using mass or volume meters. In cases where fuel is supplied from small daily tanks, rulers can be used to determine mass or volume of the fuel consumed, with the following conditions: The ruler gauge must be part of the daily tank and calibrated at least once a year and have a book of control for recording the measurements (on a daily basis or per shift). Accessories such as transducers, sonar and piezoelectronic devices are accepted if they are properly calibrated with the ruler gauge and receiving a reasonable maintenance. In case of daily tanks with pre-heaters for heavy oil, the calibration will be made with the system at typical operational conditions. The consistency of metered fuel consumption quantities should be cross-checked by an annual energy balance that is based on purchased quantities and stock changes. Where the purchased fuel invoices can be identified specifically for the CPA, the metered fuel consumption quantities should also be cross-checked with available purchase invoices from the financial records.
- Average net calorific value of the fuel type i used by the project power unit(s) in year y , $NCV_{i,y}$, Unit: GJ per mass or volume. This is taken from the IPCC default values at the upper limit of the uncertainty at a 95% confidence interval as provided in Table 1.2 of Chapter 1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories. Future revisions of this document will be taken into account.
- Emission factor for fuel f , $EF_{CO_2,i,y}$, Unit: tCO₂/GJ. This is taken from the IPCC default values at the upper limit of the uncertainty at a 95% confidence interval as provided in Table 1.2 of Chapter 1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories. Future revisions of this document will be taken into account.
- Volumetric fraction of component i in the residual gas in the hour h where $i = CH_4$, $fv_{i,h}$, no unit. Measured using a continuous gas analyser. Alternatively, periodical measurements are taken according to the 90/10 confidence/precision level. The equipment must be able to directly measure methane content in the biogas and measurement is carried out close to the location where the biogas flow measurement takes place. The accuracy and class of the equipment will be as per applicable industry standard. This equipment is calibrated as per the vendor's specifications or at least once every 3 years, whichever is less. A zero check and a typical value check may be performed by comparison with a standard certified gas.
- Volumetric flow rate of the residual gas in dry basis at normal conditions in the hour h , $FV_{RG,h}$, Unit: m³/h. This parameter is monitored using a flow meter. Both measurements (flow rate of the residual gas and volumetric fraction of methane in the residual gas) will be measured with the same reference condition that may be dry or wet basis. If the residual gas moisture is significant (temperature greater than 60 °C), the measured flow rate of the residual gas will be corrected to dry basis. The parameter will be monitored on continuous basis. Values will be averaged hourly or at a shorter time interval. Calibration of the flow meter will be done periodically according to the manufacturer's recommendation or once every 3 years, whichever is less. The accuracy and class of the meter will be as per applicable industry standard.
- Temperature in the exhaust gas of the flare, T_{flare} , Unit: °C. This is measured continuously using a Type N thermocouple. A temperature above 500 °C indicates that



a significant amount of gases are still being burnt and that the flare is operating. The monitoring of this parameter is applicable in case of enclosed flaring. An excessively high temperature at the sampling point (above 700 °C) may be an indication that the flare is not being adequately operated or that its capacity is not adequate to the actual flow. The thermocouple is replaced or calibrated yearly.

- Other flare operation parameters. This should include all data and parameters that are required to monitor whether the flare operates within the range of operating conditions according to the manufacturer's specifications including a flame detector in case of open flares. For enclosed flares, the flare efficiency in an hour is 0% if the temperature in the exhaust gas is below 500 °C for more than 20 minutes, 50% if the temperature in the exhaust gas is above 500 °C for more than 40 minutes but the manufacturer's specifications on proper operation of the flare are not met at any point in time during the hour, 90% if the temperature in the exhaust gas is above 500 °C for more than 40 minutes and the manufacturer's specifications on proper operation of the flare are met continuously during the hour. On the other hand, for open flares, the flare efficiency in the hour is 0% if the flare is not detected for more than 20 minutes or 50% if the flare is detected for more than 20 minutes during the hour.
- Fraction of methane captured at the SWDS and flared, combusted or used in another manner that prevents the emissions of methane to the atmosphere in year y , f_y , no unit. This parameter is monitored annually. This meets the requirements of application B as per the tool titled Emissions from solid waste disposal sites /35/. The maximum value from the contract/regulation requirements specifying the amount of methane that must be destroyed/used or the historical data on the amount captured.
- Total amount of waste disposed in a SWDS in year x or month i , $W_{j,x}$, Unit: tons. This is measured continuously on wet basis and aggregated at least annually.
- Depth of SWDS, d_y , Unit: m. This is measured at the monitoring well that his also used to measure the height of the water table ($h_{w,y}$). Average annual values to be used in the case of application of the yearly model. This parameter needs to be monitored to identify whether the SWDS has a water table above the bottom of the SWDS, such as due to using waste to fill inland water bodies, such as ponds, rivers or wetlands. If the SWDS does have a water table above the bottom of the SWDS, then this parameter is used to determine the MCF.
- Height of the water table in the SWDS, $h_{w,y}$, Unit: m. Measured at the monitoring well with average annual values will be used in the case of application of the yearly model. This parameter needs to be monitored to identify whether the SWDS has a water table above the bottom of the SWDS, such as due to using waste to fill inland water bodies, such as ponds, rivers or wetlands. If the SWDS does have a water table above the bottom of the SWDS, then this parameter is used to determine the MCF.

The PoA has also included an independent monitoring of scrapping of replaced equipment. In case the CPA involves replacement of equipment, and leakage effect of the use of replaced equipment in another activity is neglected, because the replaced equipment is scrapped, an independent monitoring of scrapping of replaced equipment to be implemented. The monitoring should include a check if the number of project activity equipment distributed by the project and the number of scrapped equipment correspond with each other. For this



purpose scrapped equipment should be stored until such correspondence has been checked. The scrapping of replaced equipment should be documented and independently verified. Since it is not possible to determine whether a CPA would involve equipment replacement at PoA level, this will be determined during CPA inclusion. DNV considers this to be in accordance with paragraph 38 of AMS-III.H version 16 /22/.

For each monitored parameter, the measurement method, measuring equipment, measuring accuracy and the measurement interval are specific to individual CPA. These are determined at CPA level. Therefore, it is concluded that data and parameters required to be monitored by each CPA have been specified in the PoA.

4.8.4 Management system and quality assurance for monitoring and reporting

All monitored data required for verification and issuance will be archived for 2 years from the end of the crediting period or the last request for issuance. This has been clearly stated in the PoA-DD /1/.

The management of the PoA will be conducted as per the CDM PoA Framework Agreement between Perenia Carbon Pte Ltd, Knowledge Integration Services Singapore Pte Ltd and the CME /19/. The CME, with the assistance of Perenia Carbon Pte Ltd under the CDM PoA Framework Agreement, has developed a management system /18/ as per paragraph 17 of the Standard for the Demonstration of Additionality, Development of Eligibility Criteria and Application of Multiple Methodologies for Programme of Activities /25/. An assessment of the management plan is as follows:

- The management plan /18/ has defined the roles and responsibilities of various personnel involved in the process of the inclusion of CPAs. The required minimum competencies for all positions have been specified. In addition, an organization chart has been prepared to define roles, establish reporting lines and specify information flow. Therefore, it is concluded that this meets the requirements of 17(a) of the standard.
- Arrangements for training and capacity development for the personnel involved have been specified in the management plan /18/. It also states that training records will be kept and made available for inspection. Therefore, it is concluded that the requirements of paragraph 17(b) have been met.
- Procedures of technical review of inclusion of CPAs have been specified in the management plan /18/. The process for evaluation and inclusion of potential CPAs will be done in 5 stages. The management plan also documents the steps to be taken in every stage. In addition, a flow chart has been developed to summarise the review process. By this, it is concluded that the requirements of 17(c) of the standard have been met.
- The management plan /18/ covers procedures taken to avoid double counting of emission reductions. It requires every CPA to provide details of project location and GPS coordinates in order to allow unique identification of each CPA. Steps taken to avoid double counting have also been included in the cooperation agreement between the CPA and the CME /16/. Therefore, it is concluded that this meets the requirements of paragraph 17(d) of the standard.
- The management plan /18/ includes records and documentation control process for each CPA under the PoA. This is done to allow proper evaluation and validation of the CPA inclusion process. Therefore, it is concluded that the requirements of paragraph 17(e) have been met.



- Measures for continuous improvement to the PoA management system have been included in the management plan. Continuous improvement is achieved by implementing best practices. Guidelines for the management review meetings have also been presented. The management review meeting is employed to review the implementation of preventive and corrective actions as well as the implementation of improvements. It is concluded that this is in accordance with paragraph 17(f) of the standard.

In conclusion, the management system developed by the CME meets the requirements of paragraph 17 of the standard /25/. The management system /18/ has been made available to DNV at the time of validation for assessment as part of the validation of the PoA.

Monitoring of data parameters is carried out by the CPA implementer and supported by the CME from time to time. The agreement between the CME and the CPA implementer has also been reviewed /16/. From the agreement, the CME will place a Manager at site for operational and monitoring purposes. Due to this, DNV considers that the CME would have adequate control over the CPA implementer during the operation of the project activity to ensure emission reductions as per planned.

The monitoring plan is in compliance with the monitoring methodology AMS-III.H (version 16). It is DNV's opinion, that the project participants are able to implement the monitoring plan.

4.9 Environmental impacts

Environmental impacts are assessed at the CPA level.

4.10 Comments by local stakeholders

Local stakeholders are consulted at CPA level.

4.11 Comments by Parties, stakeholders and NGOs

The CDM-SSC-PoA-DD dated 29 September 2011, the PoA specific CDM-SSC-CPA-DD with generic information relevant to all CPAs to be included in this PoA and the CDM-SSC-CPA-DD for the CPA with the title Recovery and Avoidance of Methane from Industrial Wastewater Treatment Projects – CPA No.001 was made publicly available on the UNFCCC's website (<http://cdm.unfccc.int/ProgrammeOfActivities/Validation/DB/W7E1P44T8CEH3904D3RQR7YEL6YY78/view.html>) and Parties, stakeholders and NGOs were through the CDM website invited to provide comments during a 30 days period from 13 October 2011 to 11 November 2011.

No comments were received.

- oOo -

APPENDIX A

CDM VALIDATION PROTOCOL

Table 1 Mandatory Requirements for Clean Development Mechanism (CDM) Programmes of Activities

Requirement	Reference	Conclusion
About Parties		
1. The programme shall assist Parties included in Annex I in achieving compliance with part of their emission reduction commitment under Art. 3.	Kyoto Protocol Art.12.2	NA
2. The programme shall assist non-Annex I Parties in contributing to the ultimate objective of the UNFCCC.	Kyoto Protocol Art.12.2.	CAR-2 OK
3. The programme shall have the written approval of voluntary participation from the designated national authority of each Party involved.	Kyoto Protocol Art. 12.5a, CDM Modalities and Procedures §40a	CAR-2 OK
4. The programme shall assist non-Annex I Parties in achieving sustainable development and shall have obtained confirmation by the host country thereof.	Kyoto Protocol Art. 12.2, CDM Modalities and Procedures §40a	CAR-2 OK
5. In case public funding from Parties included in Annex I is used for the programme, these Parties shall provide an affirmation that such funding does not result in a diversion of official development assistance and is separate from and is not counted towards the financial obligations of these Parties.	Decision 17/CP.7, CDM Modalities and Procedures Appendix B, § 2	CAR-2 OK
6. Parties participating in the CDM shall designate a national authority for the CDM.	CDM Modalities and Procedures §29	OK
7. The host Party and the participating Annex I Party shall be a Party to the Kyoto Protocol.	CDM Modalities §30/31a	OK
8. The participating Annex I Party's assigned amount shall have been calculated and recorded.	CDM Modalities and Procedures §31b	NA
9. The participating Annex I Party shall have in place a national system for estimating GHG emissions and a national registry in accordance with Kyoto Protocol Article 5 and 7.	CDM Modalities and Procedures §31b	NA

Requirement	Reference	Conclusion
About Design of Programme		
10. The CDM-POA-DD sets a framework for the implementation of the PoA and defines unambiguously a CPA under the PoA.	PoA Procedures § 2	OK
11. The coordinating/managing entity shall be identified.	PoA Procedures § 2 (a)	OK
12. The boundary for the PoA in terms of a geographical area (e.g., municipality, region within a country, country or several countries) within which all CPAs included in the PoA will be implemented is defined.	PoA Procedures § 2 (b)	OK
13. Eligibility criteria are defined for inclusion of a project activity as a CPA under the PoA, which shall include criteria for demonstration of additionality, and the type and/or extent of information (e.g. criteria, indicators, variables, parameters or measurements) that shall be provided by each CPA in order to ensure its eligibility.	PoA Procedures § 2 (g)	CAR-1 OK
14. The length of the PoA is not exceeding 28 years.	PoA Procedures § 2 (h)	OK
15. The operational and management arrangements established by the coordinating/managing entity for the implementation of the PoA is described, including a description of a record keeping system for each CPA under the PoA, a system/procedure to avoid double accounting e.g. to avoid the case of including a new CPA that has been already registered either as CDM project activity or as a CPA of another PoA, the provisions to ensure that those operating the CPA are aware and have agreed that their activity is being subscribed to the PoA.	PoA Procedures § 2 (i)	OK
16. The proposed statistically sound sampling method/procedure to be used by DOEs for verification of the amount of emission reductions achieved by CPAs under the PoA is described. In case the coordinating/managing entity opts for a verification method that does not use sampling but verifies each CPA there is a transparent system defined and described that ensures that no double accounting occurs and that the status of verification can be determined anytime for each CPA.	PoA Procedures § 2 (k)	OK

Requirement	Reference	Conclusion
About small-scale programmes of activities (if applicable)		
17. The CPAs shall meet the eligibility criteria for small scale CDM project activities set out in § 6 (c) of the Marrakech Accords.	Simplified Modalities and Procedures for Small Scale CDM Project Activities §12a,c	OK
About additionality		
18. Additionality of the programme as a whole is demonstrated because in the absence of the CDM (i) the proposed voluntary measure would not be implemented, or (ii) the mandatory policy/regulation would be systematically not enforced and that non-compliance with those requirements is widespread in the country/region, or (iii) that the PoA will lead to a greater level of enforcement of the existing mandatory policy /regulation.	Kyoto Protocol Art. 12.5c, CDM Modalities and Procedures §43 PoA Procedures § 2 (e)	CAR-4 OK
19. Additionality of a typical CPA is demonstrated by using the procedure provided in the baseline and monitoring methodology applied.	PoA Procedures § 2 (f)	OK
About application of baseline and monitoring methodology		
20. The baseline and monitoring methodology shall be previously approved by the CDM Executive Board.	CDM Modalities and Procedures §37e	OK
21. A baseline shall be established on a project-specific basis, in a transparent manner and taking into account relevant national and/or sectoral policies and circumstances.	CDM Modalities and Procedures §45c,d	OK
22. The baseline methodology shall exclude to earn CERs for decreases in activity levels outside the project activity or due to force majeure.	CDM Modalities and Procedures §47	OK
23. The monitoring plan for a typical CPA is developed in accordance with the approved monitoring methodology, and identification of the monitoring provisions and data parameters a CPA has is to apply/monitor	PoA Procedures § 2 (j)	CAR-5 OK
24. Provisions for monitoring, verification and reporting shall be in accordance with	CDM Modalities and Procedures §37f	OK

Requirement	Reference	Conclusion
the modalities described in the Marrakech Accords and relevant decisions of the COP/MOP.		
About forecast emission reductions		
25. The emission reductions shall be real, measurable and give long-term benefits related to the mitigation of climate change.	Kyoto Protocol Art. 12.5b	OK
About environmental impacts		
26. Documentation on the analysis of the environmental impacts of the programme activity, including transboundary impacts, shall be submitted, and, if those impacts are considered significant by the programme participants or the Host Party, an environmental impact assessment in accordance with procedures as required by the Host Party shall be carried out.	CDM Modalities and Procedures §37c	<input type="checkbox"/> Analysis at PoA level <input checked="" type="checkbox"/> Analysis at CPA level
About stakeholder comments		
27. Comments by local stakeholders shall be invited, a summary of these provided and how due account was taken of any comments received.	CDM Modalities and Procedures §37b	<input type="checkbox"/> Analysis at PoA level <input checked="" type="checkbox"/> Analysis at CPA level
28. Parties, stakeholders and UNFCCC accredited NGOs shall have been invited to comment on the validation requirements for minimum 30 days, and the project design document and comments have been made publicly available.	CDM Modalities and Procedures §40	OK
Other		
29. The project design document shall be in conformance with the CDM-PoA-DD format.	CDM Modalities and Procedures Appendix B, EB Decision	OK

Table 2 Requirements Checklist

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
A. General Description of the Programme of Activities <i>The project design is assessed.</i>					
A.1. Title of the PoA					
A.1.1. Does section A.1 of the PoA-DD include a clearly identifiable project title, version number of the PoA-DD and date of the PoA-DD?	/1/	DR	<input checked="" type="checkbox"/> Clearly identifiable title of the project activity <input checked="" type="checkbox"/> Version number of the PDD is included <input checked="" type="checkbox"/> Date of the PDD is included.		OK
A.1.2. Is the PoA-DD is in accordance with the applicable requirements for completing PoA-DDs?	/1/	DR	<input checked="" type="checkbox"/> Yes The PoA-DD has been checked to be complete.		OK
A.2. Programme Boundaries <i>Programme Boundaries are the limits and borders defining the GHG emission reduction project.</i>					
A.2.1. Are the programme's spatial boundaries (geographical) clearly defined?	/1/	DR	The programme's spatial boundary has been clearly defined as the boundary of Indonesia. All CPA under this PoA will be located in Indonesia.		OK
A.2.2. Are the programme's system boundaries (components and facilities used to mitigate GHGs) clearly defined?	/1/	DR	The programme's system boundary has been clearly specified as follows: <ul style="list-style-type: none"> • The location of the wastewater treatment plant • Sites related to the waste product <ul style="list-style-type: none"> ○ Processing ○ Transportation ○ Disposal 		OK

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			<ul style="list-style-type: none"> Sites related to biogas <ul style="list-style-type: none"> Processing Transportation Application 		
A.2.3. Can each CPA under the PoA be clearly identified individually including spatial boundaries (geographical) clearly defined?	/1/ /2/	DR	Each CPA under the PoA can be clearly identified individually as the CPA is required to provide geographical information to the CME. This is evident from the template for CPA-DD.		OK
A.2.4. Does the programme establish eligibility criteria for inclusion of a project as a CPA under the PoA?	/1/	DR	The programme establishes eligibility criteria for inclusion of a project as a CPA under the PoA. This is defined in Table 1 under Section A.4.2.2.		OK
A.3. Eligibility Criteria <i>Eligibility criteria to assess eligibility of CPAs to be included to PoA.</i>					
A.2.1. Are the geographical boundary of the CPA including any time-induced boundary consistent with the geographical boundary set in the PoA?	/1/ /24/	DR I	The boundary of Indonesia has been specified as the geographical boundary of the CPA. It is not clear whether any time-induced boundary has been specified for the project.	CAR-1	OK
A.2.2. Are there conditions that avoid double counting of emission reductions like unique identifications of product and end-user locations (e.g. programme logo)?	/1/ /24/	DR	To avoid double counting of emission reductions, every CPA is required to waive its right in getting the project registered as an independent CDM project or as a CPA to another PoA. This is included in the eligibility criteria for inclusion.		OK

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
A.2.3. Are there specifications of technology/measure including the level and type of service, performance specifications including compliance with testing/certifications?	/1/ /24/	DR	<p>The technology/measure of each CPA has been specified as methane recovery in relation to wastewater treatment system. Specifically, the following measures have been specified:</p> <ul style="list-style-type: none"> • Substitution of aerobic wastewater treatment systems with anaerobic digester with biogas recovery and combustion • Introduction of anaerobic wastewater treatment with biogas recovery and combustion • Introduction of a sequential stage of system with biogas recovery. <p>In addition, each CPA is required to implement measures for biogas utilization or flaring.</p> <p>Compliance with testing/certifications by the CPA is not included in the eligibility criteria.</p>		OK
A.2.4. Are there conditions to check the start date of the CPA through documentary evidence?	/1/ /24/	DR	The eligibility criteria do not outline any conditions to check the start date of the CPA through documentary evidence.	CAR-1	OK
A.2.5. Are there conditions that ensure compliance with applicability and other requirements of single or multiple methodology/ies applied by CPAs?	/1/ /22/ /24/	DR	The eligibility criteria do not outline any conditions that ensure compliance with applicability and other requirements of AMS-III.H version 16.	CAR-1	OK
A.2.6. Are there conditions that ensure that CPAs meet	/1/	DR	The eligibility criteria do not outline any	CAR-1	OK

* MoV = Means of Verification, DR= Document Review, I= Interview

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
the requirements pertaining to the demonstration of additionality of the PoA and typical CPA?	/24/		conditions pertaining to the demonstration of additionality.		
A.2.7. Are there PoA-specific requirements stipulated by the CMEs including any conditions related to undertaking local stakeholder consultations and environmental impact analysis?	/1/ /24/	DR	There are no PoA-specific requirements specified by the CME.		OK
A.2.8. Where applicable, are the target group (e.g. domestic/commercial/industrial, rural/urban, grid-connected/off-grid) and distribution mechanisms (e.g. direct installation) specified?	/1/ /24/	DR	Not applicable as no target group has been specified.		OK
A.2.9. Where applicable, are there conditions related to sampling requirements for a PoA in accordance with the approved guidelines/standard from the Board pertaining to sampling and surveys?	/1/ /24/	DR	Not applicable as no conditions related to sampling requirements have been specified.		OK
A.2.10. Where applicable, are there conditions that ensure that CPA in aggregate meets the small-scale or micro-scale threshold criteria and remain within those thresholds throughout the crediting period of the CPA?	/1/ /24/	DR	Conditions that ensure that the CPA in aggregate meets the small-scale threshold criteria have been specified in the eligibility criteria. It is stated that aggregate emission reduction from each CPA should not exceed the limit of 60 000 tCO ₂ per year.		OK
A.2.11. Where applicable, are there requirements for the debundling check, in case CPAs belong to small-scale (SSC) or microscale project categories?	/1/ /24/	DR	Requirements for the debundling check have been specified in the eligibility criteria.		OK
A.2.12. Are there conditions to provide an affirmation that funding from Annex I parties, if any, does not result in a diversion of official development assistance?	/1/ /24/	DR	There are no conditions to provide an affirmation that funding from Annex I parties do not result in a diversion of official development assistance.	CAR-1	OK
A.4. Participation Requirements					

* MoV = Means of Verification, DR= Document Review, I= Interview
 CDM PoA Validation Protocol – Report No. 2011-9765, rev. 01

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
<i>Referring to Part A, Annex 1 and 2 of the PoA-DD as well as the CDM glossary with respect to the terms Party, Letter of Approval, Authorization and Project Participant.</i>					
A.4.1. Which Parties and programme participants are participating in the programme?	/1/	DR	The host party of Indonesia has been specified as a participant in the programme.		OK
A.4.2. Has the coordinating/managing entity of the programme been identified?	/1/	DR	PT. Knowledge Integration Services (Indonesia) from the host party of Indonesia has been specified as the Coordinating/Managing Entity and Participant in the Programme of Activities.		OK
A.4.3. Have all involved Parties provided a valid and complete letter of approval and have all private/public programme participants been authorized by an involved Party?	/1/	DR	Letter of Approval from the host party of Indonesia is pending.	CAR-2	OK
A.4.4. Do all participating Parties fulfil the participation requirements as follows: - Ratification of the Kyoto Protocol - Voluntary participation - Designated a National Authority?	/1/	DR	Letter of Approval from the host party of Indonesia is pending.	CAR-2	OK
A.4.5. Do all participating Parties fulfil the participation requirements as follows:	/1/	DR	Letter of Approval from the host party of Indonesia is pending.	CAR-2	OK
	Indonesia (host)				
a) Party has ratified the Kyoto Protocol	<input type="checkbox"/>	Yes	<input type="checkbox"/>	No	
b) Party has designated a Designated National Authority	<input type="checkbox"/>	Yes	<input type="checkbox"/>	No	
c) The assigned amount has been determined	<input type="checkbox"/>	Yes	<input type="checkbox"/>	No	

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
A.4.6. Do the letters of approval meet the following requirements?	/1/ /20/	DR	Letter of Approval from the host party of Indonesia is pending.	CAR-2	OK
a) LoA confirms that Party has ratified the Kyoto Protocol b) LoA confirms that participation is voluntary c) The LoA confirms that the project contributes to the sustainable development of the host country? d) The LoA refers to the precise project activity title in the PDD e) The LoA is unconditional with respect to (a) to (d) above f) The LoA is issued by the respective Party's DNA g) The LoA was received directly by the DNA or the PP h) In case of doubt regarding the authenticity of the letter of approval, describe how it was verified that the letter of approval is authentic	Indonesia (host) <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> DNA <input type="checkbox"/> PP				
A.4.7. Does the programme make provisions for meeting training and maintenance needs?	/1/	DR	Provisions for meeting training and maintenance needs are reflected in an operating manual developed by the CME. This will be used as basis for operating and monitoring personnel. It covers topics such as the basics of anaerobic treatment, treatment process, equipment commissioning, reactor operation and control, troubleshooting and safety. Therefore, it is concluded that training needs to assure appropriate operation and maintenance is sufficient.		OK
A.5. Contribution to Sustainable Development <i>The project/programme's contribution to sustainable development is assessed.</i>	/1/	DR			

* MoV = Means of Verification, DR= Document Review, I= Interview

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
A.5.1. Has the host Party confirmed that the programme assists it in achieving sustainable development?	/1/	DR	Letter of Approval from the host party of Indonesia is pending.	CAR-2	OK
A.5.2. Will the programme create other environmental or social benefits than GHG emission reductions?	/1/	DR	Other than GHG emission reductions, the programme creates other benefits such as: <ul style="list-style-type: none"> • Reduction of unpleasant odour from the uncontrolled release of biogas • Usage of the captured gas for energy generation • Improvement in local knowledge from technology transfer 		OK
A.6. Small scale programme activity <i>It is assessed whether the project qualifies as small-scale CDM project activity</i>					
A.6.1. Do CPAs under the programme qualify as small scale CDM project activities as defined in paragraph 6 (c) of decision 17/CP.7 on the modalities and procedures for the CDM?	/1/	DR	CPAs under the programme qualify as a small scale CDM project activity because it reduces anthropogenic emissions by sources and directly emit less than 60 ktCO ₂ e annually.		OK
A.7. Operational, management and monitoring plan for the programme					
A.7.1. Do the operational and management arrangements established by the coordinating entity include a record keeping system for each CPA under the programme?	/1/	DR	A record keeping system has been established under the operational and management plan of the PoA-DD. The CME is required to maintain records pertaining to each CPA.		OK
A.7.2. Do the operational and management arrangements established by the coordinating entity include a system/procedure to avoid	/1/	DR	Operational and management arrangements have been established to include a system/procedure to avoid including CPAs		OK

* MoV = Means of Verification, DR= Document Review, I= Interview
CDM PoA Validation Protocol – Report No. 2011-9765, rev. 01

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
including CPAs that have already been registered either as CDM project activity or as a CPA of another PoA?			that have already been registered. The CME is responsible to perform a check on the PoA/CDM database on the UNFCCC website. In addition, the CME is required to obtain from the CPA a declaration that there is no double counting of carbon credits.		
A.7.3. Do the operational and management arrangements established by the coordinating entity include provisions to ensure that CPA implementers are aware and have agreed that their activity is being subscribed to the PoA?	/1/	DR	The operational and management arrangements established by the CME include provisions to ensure that CPA implementers are aware and have agreed that their activity is being subscribed to the PoA. A written document in the form of an authorization letter will be obtained by the CME from the CPA.		OK
A.7.4. Does the monitoring plan include a description of a proposed statistically sound sampling method and procedure to be used by designated operational entities for verification of GHG emission reductions by CPAs under the programme? OR If the programme does not use verification method that applies a statistical method for sampling, has a system been defined to avoid double counting of CERs, and is the system transparent?	/1/	DR	The monitoring plan proposes to have all CPAs to be independently verified. Therefore, no sampling procedures have been proposed for verification. This results in transparent system that avoids double counting of CERs.		OK
B. Duration of the Programme of Activities, Crediting Period					
B.1.1. Are the programme starting date and length of the	/1/	DR	The starting date of the PoA is the date when		OK

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
programme clearly defined and evidenced?	/36/		the PoA-DD is uploaded on the CDM UNFCCC website for global stakeholder's consultation. This date is 13 October 2011.		
B.1.2. Does the PoA design documentation confirm that the length of the PoA does not exceed 28 years?	/1/	DR	It is confirmed that the length of the PoA does not exceed 28 years.		OK
C. Environmental Impacts <i>Documentation on the analysis of the environmental impacts will be assessed, and if deemed significant, an EIA should be provided to the validator.</i>			<input type="checkbox"/> Analysis at PoA level <input checked="" type="checkbox"/> Analysis at CPA level This section must only be completed if the analysis of environmental impacts is at PoA level.		
C.1.1. Has an analysis of the environmental impacts of the programme been sufficiently described?	/1/	DR	Not applicable as the analysis of the environmental impacts is done at CPA level.		OK
C.1.2. Are there any Host Party requirements for an Environmental Impact Assessment (EIA)?	/1/	DR	Not applicable as the analysis of the environmental impacts is done at CPA level.		OK
C.1.3. Will the programme create any adverse environmental effects?	/1/	DR	Not applicable as the analysis of the environmental impacts is done at CPA level.		OK
C.1.4. Are transboundary environmental impacts considered in the analysis?	/1/	DR	Not applicable as the analysis of the environmental impacts is done at CPA level.		OK
C.1.5. Have identified environmental impacts been addressed in the programme design?	/1/	DR	Not applicable as the analysis of the environmental impacts is done at CPA level.		OK
C.1.6. Does the programme comply with environmental legislation in the host country?	/1/	DR	Not applicable as the analysis of the environmental impacts is done at CPA level.		OK
D. Stakeholder Comments <i>The validator should ensure that stakeholder comments have been invited with appropriate media and that due account has been taken of any comments received.</i>			<input type="checkbox"/> Consultation at PoA level <input checked="" type="checkbox"/> Consultation at CPA level This section must only be completed if the analysis of environmental impacts is at PoA		

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			level.		
D.1.1. Have relevant stakeholders been consulted?	/1/	DR	Not applicable as the stakeholder consultation is done at CPA level.		OK
D.1.2. Have appropriate media been used to invite comments by local stakeholders?	/1/	DR	Not applicable as the stakeholder consultation is done at CPA level.		OK
D.1.3. If a stakeholder consultation process is required by regulations/laws in the host country, has the stakeholder consultation process been carried out in accordance with such regulations/laws?	/1/	DR	Not applicable as the stakeholder consultation is done at CPA level.		OK
D.1.4. Is a summary of the stakeholder comments received provided?	/1/	DR	Not applicable as the stakeholder consultation is done at CPA level.		OK
D.1.5. Has due account been taken of any stakeholder comments received?	/1/	DR	Not applicable as the stakeholder consultation is done at CPA level.		OK
E. Programme Baseline					
<i>The validation of the programme baseline establishes whether the selected baseline methodology is appropriate and whether the selected baseline represents a likely baseline scenario.</i>					
E.1. Baseline Methodology					
<i>It is assessed whether the programme applies an appropriate baseline methodology.</i>					
E.1.1. Does the programme apply an approved methodology and the correct version thereof?	/1/ /22/	DR CC	The programme applies the baseline methodology AMS-III.H version 16. Cross-checking has been done with UNFCCC to ensure that the methodology is approved and the version is correct.		OK
E.1.2. Are the applicability criteria in the baseline	/1/	DR	The PoA-DD does not address all of the	CAR-3	OK

* MoV = Means of Verification, DR= Document Review, I= Interview
 CDM PoA Validation Protocol – Report No. 2011-9765, rev. 01

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
methodology all fulfilled?	/22/		applicability of AMS-III.H version 16.		
E.2. Baseline Scenario Determination <i>The choice of the baseline scenario will be validated with focus on whether the baseline is a likely scenario, and whether the methodology to define the baseline scenario has been followed in a complete and transparent manner.</i>					
E.2.1. What is the baseline scenario?	/1/ /30/ /52/	DR I	<p>In case of existing industrial wastewater treatment facilities, the baseline scenario is the continuation of the existing system for wastewater treatment.</p> <p>For greenfield industrial wastewater treatment facilities and activities involving change of equipment resulting in capacity addition of the existing system, the baseline scenario has been specified to be one of the following:</p> <ul style="list-style-type: none"> • Aerobic wastewater treatment system without biogas recovery • Anaerobic wastewater treatment system without biogas recovery • Untreated wastewater stream <p>For these cases, the General Guidelines to SSC CDM methodologies is applied to demonstrate the most plausible baseline scenario.</p>		OK

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			Discussions with the CME revealed that any prospective CPA is able to use untreated wastewater stream as the baseline scenario. However, it must be demonstrated that the untreated wastewater stream does not result in noncompliance with local laws and regulations. In addition, relevant national policies, macro-economic trends and political aspirations will be taken into account.		
E.2.2. What other alternative scenarios have been considered and why is the selected scenario the most likely one?	/1/	DR	Not applicable as baseline scenario determination is done at CPA level.		OK
E.2.3. Has the baseline scenario been determined according to the methodology?	/1/ /22/	DR	The methodology has not specified any guidelines regarding the baseline scenario.		OK
E.2.4. Has the baseline scenario been determined using conservative assumptions where possible?	/1/	DR	Not applicable as baseline scenario determination is done at CPA level.		OK
E.2.5. Does the baseline scenario sufficiently take into account relevant national and/or sectoral policies, macro-economic trends and political aspirations?	/1/	DR	Not applicable as baseline scenario determination is done at CPA level.		OK
E.2.6. Is the baseline scenario determination compatible with the available data and are all literature and sources clearly referenced?	/1/	DR	Not applicable as baseline scenario determination is done at CPA level.		OK
E.2.7. Have the major risks to the baseline been identified?	/1/	DR	Not applicable as baseline scenario determination is done at CPA level.		OK
E.3. Additionality of the Programme of Activities					
E.3.1. Has it been demonstrated that the programme is a voluntary coordinated action that would not be implemented in the absence of CDM?	/1/ /40/	DR	It has been demonstrated that the programme is a voluntary coordinated action that would not be implemented in the absence of CDM.		OK

* MoV = Means of Verification, DR= Document Review, I= Interview
 CDM PoA Validation Protocol – Report No. 2011-9765, rev. 01

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			This is due to the fact that there is no specific regulatory requirement regarding methane recovery in the wastewater treatment system.		
E.3.2. If the programme is implementing a mandatory policy/regulation, has it been demonstrated whether the policy/regulation is being enforced? If it is enforced, has it been demonstrated that the programme will lead to a higher level of enforcement?	/1/	DR	Not applicable as the programme is not implementing a mandatory policy/regulation.		OK
E.3.3. Are all assumptions stated in a transparent and conservative manner?	/1/ /28/	DR	<p>In arguing for additionality of the PoA, the following assumptions have been made:</p> <ul style="list-style-type: none"> • There is no legal requirement for methane recovery in wastewater treatment. • The project activity requires high capital investment and there are no financial incentives available to the project participant. • The proposed project requires high technical know-how • The project activity poses an additional safety risk <p>Assumptions are not stated in a transparent and conservative manner, as per the Guidelines for Objective Demonstration and Assessment of Barriers.</p>	CAR-4	OK
E.3.4. Is sufficient evidence provided to support the relevance of the arguments made?	/1/ /40/	DR	The relevant environmental guideline from the government of Indonesia has been		OK

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			provided to support the assumptions made. This evidence is considered sufficient.		
E.4. Additionality of CPAs					
E.4.1. Is the approach described for demonstrating additionality of a CPA in accordance with the using the procedure provided in the baseline and monitoring methodology applied?	/1/ /22/	DR	The additionality of each CPA will be demonstrated in accordance with Attachment A to Appendix B of the simplified modalities and procedures for small-scale CDM project activities. This is in accordance with procedure provided in the baseline and monitoring methodology applied.		OK
E.4.2. Are specific criteria for demonstrating the additionality of a specific CPA included to the PoA?	/1/	DR	There are no specific criteria for demonstrating the additionality included in the PoA.		OK
E.4.3. Is the additionality of a typical CPA demonstrated?	/1/ /2/ /3/	DR	In demonstrating the additionality of a typical CPA, the investment barrier, the technological barrier and the lack of prevailing regulatory requirement have been presented to show that the project would not have occurred. It is not clearly stated whether the IRR presented in the PDD is pre-tax or post-tax, project-based or equity-based. In addition, sources of financial inputs in the IRR analysis are not presented in the PDD.	CL4	OK
E.5. Calculation of GHG Emission Reductions – Project emissions <i>It is assessed whether the procedure for calculating</i>					

* MoV = Means of Verification, DR= Document Review, I= Interview
CDM PoA Validation Protocol – Report No. 2011-9765, rev. 01

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
<i>project emissions is according to the methodology and whether the argumentation for the choice of default factors and values – where applicable – is justified.</i>					
E.5.1. Has the procedure to calculate project emissions of an individual CPA been documented according to the approved methodology and in a complete and transparent manner?	/1/ /22/ /52/	DR I	<p>Procedures to calculate project emissions of an individual CPA have been specified in the PoA. Equations used for calculation of project emissions of a SSC-CPA are specified as follows:</p> <ul style="list-style-type: none"> • Project activity emissions from the systems affected by the project activity are calculated using equation 8 of AMS-III.H version 16. • Project emissions from wastewater treatment systems affected by the project activity are calculated using equation 2 of AMS-III.H version 16. The uncertainty factor and the data applied have been changed to be applicable to the project situation. • Project emissions on account of inefficiency of the project activity wastewater treatment systems and presence of degradable organic carbon in treated wastewater are calculated using equation 6 of AMS-III.H version 16. The uncertainty factor and the data applied have been changed to be applicable to the project situation. 		OK

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			<ul style="list-style-type: none"> Project emissions from the decay of the final sludge generated by the project activity treatment systems are calculated using equation 7 of AMS-III.H version 16. The uncertainty factor and the data applied have been changed to be applicable to the project situation. Project emissions due to inefficiencies in capture systems are calculated using equations 10 and 11 of AMS-III.H version 16. <p>No equations have been provided to account for the following emissions:</p> <ul style="list-style-type: none"> Project emissions due to incomplete flaring. Project emissions from biomass stored under anaerobic conditions. <p>Discussions with the project participant revealed that every CPA will be required to refer to the latest EB guidance in order to calculate emissions from these sources. Therefore, the PoA-DD will not specify how these sources are calculated. As this ensures that emissions will be calculated according to the latest EB guidance, it is concluded that the exclusion of these equations is justified.</p>		
E.5.2. Have conservative assumptions been used when determining the procedure to be used to calculate	/1/	DR	Not applicable as calculation of project emission is not done at PoA level.		OK

* MoV = Means of Verification, DR= Document Review, I= Interview

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
the project emissions?					
E.5.3. Are uncertainties in the project emission calculation procedure properly addressed?	/1/	DR	Not applicable as calculation of project emission is not done at PoA level.		OK
E.6. Calculation of GHG Emission Reductions – Baseline emissions <i>It is assessed whether the procedure for calculating baseline emissions is according to the methodology and whether the argumentation for the choice of default factors and values – where applicable – is justified.</i>					
E.6.1. Has the procedure to calculate baseline emissions of an individual CPA been documented according to the approved methodology and in a complete and transparent manner?	/1/ /22/ /31/ /32/	DR	Procedures to calculate baseline emissions of an individual CPA have been specified in the PoA. Equations used for calculation of baseline emissions of a SSC-CPA are specified as follows: <ul style="list-style-type: none"> • Baseline emissions are calculated using equation 1 of AMS-III.H version 16. • Baseline emissions of the wastewater treatment systems affected by the project activity are calculated using equation 2 of AMS-III.H version 16. • Baseline methane emissions from degradable organic carbon in treated wastewater discharged into sea/river/lake are calculated using equation 6 of AMS-III.H version 16. • Baseline emissions from anaerobic decay of the final sludge produced are calculated from equation 7 of AMS-III.H 	CAR-5	OK

* MoV = Means of Verification, DR= Document Review, I= Interview
 CDM PoA Validation Protocol – Report No. 2011-9765, rev. 01

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			version 16. It is stated that emissions associated with electricity or fuel consumption in the baseline wastewater treatment system is calculated using the “Tool to calculate baseline, project and/or leakage emissions from electricity consumption” and/or “Tool to calculate project or leakage emissions for fossil fuel combustion.” The procedures specified in the “Tool to calculate project or leakage CO2 emissions from fossil fuel combustion” are not applicable in determining baseline emissions.		
E.6.2. Have conservative assumptions been used when determining the procedure to be used to calculate the baseline emissions?	/1/	DR	Not applicable as calculation of baseline emission is not done at PoA level.		OK
E.6.3. Are uncertainties in the baseline emission estimates properly addressed?	/1/	DR	Not applicable as calculation of baseline emission is not done at PoA level.		OK
E.7. Calculation of GHG Emission Reductions – Leakage <i>It is assessed whether the procedure for calculating leakage is according to the methodology and whether the argumentation for the choice of default factors and values – where applicable – is justified.</i>					
E.7.1. Has the procedure to calculate leakage emissions of an individual CPA been documented according to the approved methodology and in a complete and transparent manner?	/1/ /22/	DR	Procedures to calculate leakage emissions of an individual CPA have been specified in the PoA. They are complete, transparent and in accordance with the approved methodology.		OK

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
E.7.2. Have conservative assumptions been used when determining the procedure to be used to calculate the leakage emissions?	/1/	DR	Not applicable as calculation of leakage emission is not done at PoA level.		OK
E.7.3. Are uncertainties in the leakage emission estimates properly addressed?	/1/	DR	Not applicable as calculation of leakage emission is not done at PoA level.		OK
E.8. Emission Reductions <i>The emission reductions shall be real, measurable and give long-term benefits related to the mitigation of climate change.</i>					
E.8.1. Does the PoA-DD provide a clear and correct way of calculating the emission reductions from each CPA?	/1/ /22/	DR	Procedures to calculate emission reductions of an individual CPA have been specified in the PoA.		OK
E.9. Monitoring Methodology <i>It is assessed whether the project applies an appropriate monitoring methodology.</i>					
E.9.1. Is the monitoring plan documented according to the approved methodology and in a complete and transparent manner?	/1/ /22/ /52/	DR I	Data and parameters that are required to be monitored by each CPA have been specified in the PoA. Parameters related to emissions from electricity and/or fuel consumption, flare efficiency and methane emissions from biomass stored under anaerobic conditions which does not occur in the baseline scenario are not specified in the PoA-DD. Discussions with the project participant revealed that the participating CPA will be required to refer to the latest EB tools and guidance in order to		OK

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			monitor parameters related to these sources.		
E.9.2. Will all monitored data required for verification and issuance be kept for two years after the end of the crediting period or the last issuance of CERs, for this programme, whichever occurs later?	/1/	DR	All monitored data required for verification and issuance will be archived for 2 years from the end of the crediting period or the last request for issuance.		OK
E.10. Monitoring Plan <i>It is established whether the monitoring plan provides for reliable and complete emission data over time.</i>					
E.10.1. Does the monitoring plan provide for the collection and archiving of all relevant data necessary for estimation or measuring the greenhouse gas emissions within the programme boundary during the crediting period?	/1/ /18/	DR	The monitoring plan provides for the collection and archiving of all relevant data necessary for estimation or measuring the greenhouse gas emissions within the programme boundary during the crediting period. This is evident from the management system developed by the CME.		OK
E.10.2. Are the choices of programme GHG indicators reasonable and conservative?	/1/	DR	The GHG indicator used is the carbon dioxide equivalent. This choice is reasonable and conservative.		OK
E.10.3. Is the measurement method clearly stated for each GHG value to be monitored and deemed appropriate?	/1/	DR	The measurement method is specified at CPA level.		OK
E.10.4. Is the measurement equipment described and deemed appropriate?	/1/	DR	The measuring equipment is specified at CPA level.		OK
E.10.5. Is the measurement accuracy addressed and deemed appropriate? Are procedures in place on how to deal with erroneous measurements?	/1/	DR	The measurement accuracy is specified at CPA level.		OK

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
E.10.6. Is the measurement interval identified and deemed appropriate?	/1/	DR	The measurement interval is specified at CPA level.		OK
E.10.7. Is the registration, monitoring, measurement and reporting procedure defined?	/1/ /18/	DR	Registration, monitoring, measurement and reporting procedures are provided in the management system developed by the CME.		OK
E.10.8. Are procedures identified for maintenance of monitoring equipment and installations? Are the calibration intervals being observed?	/1/ /18/	DR	Procedures for maintenance of monitoring equipment and installation as well as calibration intervals are identified in the management and operational system developed by the CME.		OK
E.10.9. Are procedures identified for day-to-day records handling (including what records to keep, storage area of records and how to process performance documentation)	/1/ /18/	DR	Procedures for day-to-day records handling have been identified. This is evident from the management and operational system developed by the CME.		OK
E.11. Monitoring of Sustainable Development Indicators/ Environmental Impacts <i>It is assessed whether choices of indicators are reasonable and complete to monitor sustainable performance over time.</i>					
E.11.1. Is the monitoring of sustainable development indicators/ environmental impacts warranted by legislation in the host country	/1/ /40/	DR	The monitoring of sustainable development indicators or environmental impacts is not warranted by legislation in the host country of Indonesia.		OK
E.11.2. Does the monitoring plan provide for the collection and archiving of relevant data concerning environmental, social and economic impacts?	/1/	DR	The monitoring plan does not provide for the collection and archiving of relevant data concerning environmental, social and economic impacts.		OK

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
E.11.3. Are the sustainable development indicators in line with stated national priorities in the Host Country?	/1/	DR	Not applicable as sustainable development indicators are not monitored in the project.		OK
E.12. Management System and Quality Assurance for Monitoring and Reporting <i>It is checked that programme implementation is properly prepared for and that critical arrangements are addressed.</i>					
E.12.1. Is the authority and responsibility of overall programme management clearly described?	/1/ /18/	DR	The authority and responsibility of the overall programme management are clearly described in the management system and operational plan developed by the CME.		OK
E.12.2. Are procedures identified for training of monitoring personnel?	/1/ /18/	DR	Procedures for training of monitoring personnel have been identified. This is evident from the management system and operational plan developed by the CME.		OK
E.12.3. Are procedures identified for emergency preparedness for cases where emergencies can cause unintended emissions?	/1/ /18/	DR	Procedures for emergency preparedness for cases where emergencies can cause unintended emissions have been identified. This is evident from the management system and operational plan developed by the CME.		OK
E.12.4. Are procedures identified for review of reported results/data?	/1/ /18/	DR	Procedures for review of reported results/data have been specified in the management system and operational plan developed by the CME.		OK
E.12.5. Are procedures identified for corrective actions in order to provide for more accurate future monitoring and reporting?	/1/ /18/	DR	Procedures for corrective actions have been identified in order to provide for more accurate future monitoring and reporting.		OK

* MoV = Means of Verification, DR= Document Review, I= Interview
CDM PoA Validation Protocol – Report No. 2011-9765, rev. 01

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			This is included in the management system and operational plan developed by the CME.		

Table 3 Resolution of corrective action requests and clarification requests

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
<p>CAR 1</p> <p>The PoA is not fully in compliance with the “Standard for the Development of Eligibility Criteria for the Inclusion of a Project Activity as a CPA under the PoA” EB 63 Annex 3. In particular, the following requirements are not addressed in the PoA-DD:</p> <ul style="list-style-type: none"> • A management system for the PoA as per paragraph 9 of EB63 Annex 3 • The eligibility criteria as per paragraph 13 of EB63 Annex 13 	<p>A.2.1 A.2.4 A.2.5 A.2.6</p>	<p>The geographical boundary for each CPA will be confirmed in section A.4.1.2 of the respective CPA-DD. This is now not included as a separate eligibility criteria. Also, there is no time-induced boundary specified for any CPA under the PoA.</p> <p>The conditions to check the start date of the CPA through documentary evidence has been included as part of the eligibility criteria under “Table 1- Eligibility criteria for inclusion of a CPA under this PoA – “Replacement CPAs”” and “Table 2- Eligibility criteria for inclusion of a CPA under this PoA – “Greenfield CPAs””, under section A.4.2.2 of the PoA-DD.</p> <p>The conditions to ensure compliance with applicability and other requirements of the methodology (i.e. AMS-III.H version 16) applied by CPAs has been included as part of the eligibility criteria under “Table 1- Eligibility criteria for inclusion of a CPA under this PoA – “Replacement</p>	<p>The “Standard for the Development of Eligibility Criteria for the Inclusion of a Project Activity as a CPA under the PoA” EB 63 Annex 3 has been superseded by the “Standard for Demonstration of Additionality, Development of Eligibility Criteria and Application of Multiple Methodologies for Programme of Activities” EB 65 Annex 3.</p> <p>The CME has developed a management system as per paragraph 17 of the Standard for Demonstration of Additionality, Development of Eligibility Criteria and Application of Multiple Methodologies for Programme of Activities EB65 Annex 3 version 01.0. This document has been reviewed as part of the validation. An assessment of the management plan is as follows:</p> <ul style="list-style-type: none"> • The management plan has defined the roles and responsibilities of various personnel involved in the process of the inclusion of CPAs. The competencies of personnel involved are also included. Therefore, it is concluded that this

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		<p>CPAs”” and “Table 2- Eligibility criteria for inclusion of a CPA under this PoA – “Greenfield CPAs””, under section A.4.2.2 of the PoA-DD.</p> <p>The conditions to ensure that the CPA meet with the requirements for demonstration of additionality has been included as part of the eligibility criteria under “Table 1- Eligibility criteria for inclusion of a CPA under this PoA – “Replacement CPAs”” and “Table 2- Eligibility criteria for inclusion of a CPA under this PoA – “Greenfield CPAs””, under section A.4.2.2 of the PoA-DD.</p> <p><i>Management system:</i> Requirement on ‘management system’ are included under section “A.4.4.1. of the PoA-DD” Copy of the standard operating procedures developed and implemented by the Co-ordinating and/or managing entity (CME) as part of the management system are provided to the DOE separately.</p> <p><i>Requirement on Eligibility criteria:</i></p>	<p>meets the requirements of 17(a) of the standard.</p> <ul style="list-style-type: none"> • Arrangements for training and capacity development for the personnel involved have been specified in the management plan. It also states that training records will be kept and made available for inspection. Therefore, it is concluded that the requirements of paragraph 17(b) have been met. • Procedures of technical review of inclusion of CPAs have been specified in the management plan. The process for evaluation and inclusion of potential CPAs has been documented. In addition, a flow chart has been developed to summarise the review process. By this, it is concluded that the requirements of 17(c) of the standard have been met. • The management plan covers procedures taken to avoid double counting of emission reductions. It requires every CPA to be subjected to background checks against registered projects. Steps taken to avoid double counting have also been included in the declaration of

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		Eligibility criteria under section A.4.2.2 of the PoA-DD has been updated and the same is now in compliance with the “Standards for demonstration of additionality, development of eligibility criteria and application of multiple methodologies for programme of activities” (EB 65- Annex 3)	<p>no double counting of CERs. Therefore, it is concluded that this meets the requirements of paragraph 17(d) of the standard.</p> <ul style="list-style-type: none"> The management plan includes records and documentation control process for each CPA under the PoA. This is done through local and global databases which are used for monitoring purposes. Therefore, it is concluded that the requirements of paragraph 17(e) have been met. Measures for continuous improvement to the PoA management system have been included in the management plan. This is achieved through Management Review Meetings. It is concluded that this is in accordance with paragraph 17(f) of the standard. <p>This CAR is closed.</p>
CAR 2 Letter of Approval from the host party of Indonesia is pending.	A.4.3 A.4.4 A.4.5 A.4.6 A.5.1	Copy of the LoA has been provided to the DOE.	<p>Letter of Approval from the Host Party of Indonesia dated 6 March 2012 has been received from the client.</p> <p>This CAR is closed.</p>
CAR 3 The PoA-DD does not address all of the	E.1.2	Section E.2 of the PoA-DD (version 09) has been updated to address all of the	The revised PoA-DD has been reviewed and it was found that Table 2

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
applicability of AMS-III.H version 16.		applicability conditions under AMS-III.H version 16.	<p>(Applicability of AMS-III.H version 16 to a SSC-CPA) has been updated. All applicability conditions under AMS-III.H version 16 have been addressed. By reviewing the description of the programme, it is concluded that the approved baseline methodology AMS-III.H version 16 is applicable.</p> <p>This CAR is closed.</p>
<p>CAR 4</p> <p>In arguing for additionality of the PoA, the assumptions are not stated in a transparent and conservative manner, as per the “Guidelines for Objective Demonstration and Assessment of Barriers.”</p>	E.3.3	<p>Sub-section (A) under section “III-Requirements” of Annex-3, EB 65, provides the guidelines to be followed to demonstrate the additionality of a PoA.</p> <p>Section A.4.3 of the PoA-DD has been accordingly updated. The additionality of the PoA is now demonstrated in line with the aforesaid requirements.</p> <p>Quantitative details cannot be included at PoA level additionality demonstration because PoA is just a policy framework under which several CPAs can be implemented and quantitative information associated with each CPA may differ from one CPA to another CPA given the specific circumstances under which each CPA will be</p>	<p>To argue the additionality of the PoA, the project participant has included justification that methane recovery systems require high capital investment and cost savings or revenue from the project is not attractive. In addition, there is a need for additional provisions for operation and maintenance, more expensive plant designs and experienced staff. These barriers can be mitigated by additional financial means. Since quantitative details are not available at PoA level, the PoA-DD has been revised to require each CPA to quantify these barriers. These barriers will be assessed for each CPA prior to inclusion.</p> <p>This CAR is closed.</p>

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		<p>implemented. The “Guidelines for Objective Demonstration and Assessment of Barriers” is applicable to project/CPA level barrier demonstration and not PoA.</p> <p>Section A.4.3 of the PoA-DD has been updated to provide that the barriers identified at PoA level are to be justified and quantified by each CPA. In line with these requirements in the PoA-DD, the barriers have been justified and quantified, as relevant to each type of barrier identified in Section B.3 of the CPA-DD.</p> <p>For example, the CPA has demonstrated that it faces both investment technological barrier. The investment barrier has been quantified; post-tax equity IRR for the CPA is calculated and compared with the benchmark return on equity to demonstrate that the CPA is less financially attractive. Therefore, the CPA also complies with Guidance 4 of “Guidelines for Objective Demonstration and Assessment of Barriers”.</p>	
<p>CAR 5</p> <p>The “Tool to calculate project or leakage CO₂</p>	<p>E.6.1</p>	<p>This tool will be used in specific cases involving use of fossil fuels in the</p>	<p>The usage of this tool to determine baseline emissions from fossil fuel</p>

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
emissions from fossil fuel combustion” is not applicable in determining baseline emissions from electricity or fuel consumption.		<p>baseline, as explained further in sections E.3 and E.6.2 in the PoA-DD (version 02). This is as per paragraph 19 of AMS-III H (version 16).</p> <p>The emission reductions resulting from displacement of baseline electricity and fuel consumption in a CPA are not covered under this PoA. This is single methodology PoA, only AMS-III.H (version 16) is applicable to this PoA. No Type-I small-scale methodology is applicable to this PoA.</p> <p>Also refer to section A.4.3.1 of the PoA-DD which explains the technology and the methodology applicable to this PoA.</p>	<p>consumption is deemed to be acceptable as this is in accordance to paragraph 19 of AMS-III.H version 16. In addition, it has been clarified with the project proponent that the project does not cover emission reductions resulting from energy generation (type I component).</p> <p>This CAR is closed.</p>
<p>CL 1</p> <p>It is not clearly stated whether the IRR presented in the PDD is pre-tax or post-tax, project-based or equity-based. In addition, sources of financial inputs in the IRR analysis are not presented in the PDD.</p>	E.4.3	<p>Post-tax Equity IRR has been used.</p> <p>Relevant supporting documents related to sources of financial inputs used in the equity IRR calculations have been submitted to the DOE during and after validation site visit.</p> <p>Equity IRR is always post tax and that is the reason why it is not specifically stated in the CPA-DD. Cash flow</p>	<p>The revised CPA-DD has been reviewed and it mentions that the financial indicator is a post-tax equity IRR. The CPA-DD has also been updated to include sources of financial inputs to the IRR analysis.</p> <p>The following information is obtained from the technology supplier and is deemed acceptable:</p> <ul style="list-style-type: none"> • The cost breakup of the total maintenance work to be carried out

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		<p>available to equity is net of all allocations and appropriations (including tax). However, it has now been explicitly stated under section B.3 of the CPA-DD that equity IRR is post-tax.</p> <p>The CME has provided all supporting documents for the inputs used in the financial analysis, to the DOE.</p>	<p>under the CPA</p> <ul style="list-style-type: none"> • The estimated consumption of chemicals and consumables under the CPA • The project lifetime of 20 years, this is based on the expected operating lifetime of the main equipment of the project activity (anaerobic CSTR reactor). <p>These evidences to support the input values used in the financial analysis were provided and deemed acceptable:</p> <ul style="list-style-type: none"> • A letter /8/ to clarify that the biogas system would result in saving of 57% of palm kernel shells (PKS) and this would result in 7 500 tons per year for sale dated 23 April 2011. This is supported by a minutes of meeting of the CPA implementer dated 10 November 2011 /15/. • Employee salary slips and the minutes of meeting of the CPA implementer dated 10 November 2011 /15/. It shows the number of additional personnel required for the CPA and their applicable salary rate. <p>This CL is closed.</p>

Table 4 Forward action requests

Forward action request	Reference to Table 2	Response by project participants
<i>No FARs were raised.</i>		

APPENDIX B

PROTOCOL FOR ASSESSING COMPLIANCE OF SPECIFIC CDM PROGRAMME ACTIVITIES WITH THE PROGRAMME OF ACTIVITIES

CHECKLIST QUESTION		Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
A. General description of CPA						
A.1. Project boundaries						
A.1.1	Are the CPA's spatial boundaries (geographical) clearly defined, allowing the unique identification of the CPA?					
A.1.2	Are the CPA's system boundaries (components and facilities used to mitigate GHGs) clearly defined?					
A.1.3	Has it been demonstrated that the CPA is within the geographical borders of the PoA?					
A.1.4	Has it been confirmed that no part of the CPA is registered as a CDM project or included in a registered POA?					
A.2. Participation requirements						
A.2.1	Which Parties and CPA implementer are participating in the CPA? Are they included in the PoA?					
A.3. Duration of the CDM programme activity, Crediting Period						
A.3.1	Are the CPA's starting date and operational lifetime clearly defined and evidenced?					
A.3.2	Has the crediting period been clearly defined and is the start of the crediting period deemed to be reasonable?					
A.3.3	Has it been confirmed that the length of the CPA crediting period does not exceed the end of PoA?					
B. Eligibility of CPA and Estimation of Emission Reductions						
B.1. Eligibility criteria for CDM Programme Activities						
<i>It is assessed whether the CPA complies with the criteria for</i>						

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
<i>inclusion in the registered programme of activities.</i>					
<p>B.1.1 Has it been sufficiently justified that the CPA complies with eligibility criteria 1 of PoA:</p> <p><i>Each CPA must be located in Indonesia.</i></p>					
<p>B.1.2 Has it been sufficiently justified that the CPA complies with eligibility criteria 2 of PoA:</p> <p><i>Conditions to avoid double counting:</i></p> <ul style="list-style-type: none"> ○ <i>Each CPA to be uniquely identified based on the location of the CPA and its GPS coordinates.</i> ○ <i>The CME before adding a CPA under this PoA shall review the project activity database on the UNFCCC website to ensure that the CPA is not already registered as a CDM project or a CPA of another PoA.</i> 					
<p>B.1.3 Has it been sufficiently justified that the CPA complies with eligibility criteria 3 of PoA:</p> <p><i>Specification of technology/measures proposed to be implemented under the CPA. The CPA-DD shall incorporate relevant details on the technological specifications, including level and type of service, performance specifications including compliance with testing/certifications. Technology /measures proposed to be employed under each CPA to be in compliance with Section A.4.2.1 of the PoA-DD.</i></p>					
<p>B.1.4 Has it been sufficiently justified that the CPA complies with eligibility criteria 4 of PoA:</p>					

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
<i>Each CPA to provide documentary evidence to demonstrate start date. Start date of CPA is the earliest of the date of real action or construction or implementation of the CPA.</i>					
<p>B.1.5 Has it been sufficiently justified that the CPA complies with eligibility criteria 5 of PoA:</p> <p><i>The principal methodology applicable to each CPA under the PoA is AMS-III.H (version 16). Following applicability conditions under AMS-III.H (version 16) to be complied by each CPA:</i></p> <p><i>a) A CPA shall comprise measures that recover biogas from biogenic organic matter in wastewater by means of one, or a combination, of the following options:</i></p> <ul style="list-style-type: none"> <i>a. Substitution of aerobic wastewater or sludge treatment systems with anaerobic systems with biogas recovery and combustion;</i> <i>b. Introduction of anaerobic sludge treatment system with biogas recovery and combustion to a wastewater treatment plant without sludge treatment;</i> <i>c. Introduction of biogas recovery and combustion to a sludge treatment system;</i> <i>d. Introduction of biogas recovery and combustion to an anaerobic wastewater treatment system such as anaerobic reactor, lagoon, septic tank or an on site industrial plant;</i> <i>e. Introduction of anaerobic wastewater treatment with biogas recovery and combustion, with or without anaerobic sludge treatment, to an untreated wastewater stream;</i> <i>f. Introduction of a sequential stage of wastewater</i> 					

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
<p><i>treatment with biogas recovery and combustion, with or without sludge treatment, to an anaerobic wastewater treatment system without biogas recovery (e.g. introduction of treatment in an anaerobic reactor with biogas recovery as a sequential treatment step for the wastewater that is presently being treated in an anaerobic lagoon without methane recovery).</i></p> <p>b) <i>In cases where baseline system under the CPA is anaerobic lagoon:</i></p> <p>a. <i>The lagoons are ponds with a depth greater than two meters, without aeration. The value for depth is obtained from engineering design documents, or through direct measurement, or by dividing the surface area by the total volume. If the lagoon filling level varies seasonally, the average of the highest and lowest levels may be taken;</i></p> <p>b. <i>Ambient temperature above 15 °C, at least during part of the year, on a monthly average basis;</i></p> <p>c. <i>The minimum interval between two consecutive sludge removal events shall be 30 days.</i></p> <p>c) <i>The recovered biogas from the above measures may also be utilised for the following applications instead of combustion/flaring:</i></p> <p>a. <i>Thermal or mechanical, electrical energy generation directly;</i></p> <p>b. <i>Thermal or mechanical, electrical energy generation after bottling of upgraded biogas; or</i></p> <p>c. <i>Thermal or mechanical, electrical energy generation after upgrading and distribution, in this case</i></p>					

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
<p><i>additional guidance provided in Annex 1 shall be followed:</i></p> <ul style="list-style-type: none"> <i>i. Upgrading and injection of biogas into a natural gas distribution grid with no significant transmission constraints;</i> <i>ii. Upgrading and transportation of biogas via a dedicated piped network to a group of end users; or</i> <i>iii. Upgrading and transportation of biogas (e.g. by trucks) to distribution points for end users.</i> <p><i>d. Hydrogen production.</i></p> <p><i>e. Use as fuel in transportation applications after upgrading.</i></p> <p><i>d) New facilities (Greenfield projects) and CPAs involving a change of equipment resulting in a capacity addition of the wastewater and/or sludge treatment system compared to the designed capacity of the baseline treatment system shall comply with the relevant requirements in the “General guidelines to SSC CDM methodologies”. In addition the requirements for demonstrating the remaining lifetime of the equipment replaced, as described in the general guidelines shall also be followed.</i></p> <p><i>e) Detailed description of the wastewater treatment plant as well as the source generating the wastewater shall be uniquely defined and described in the CPA-DD.</i></p> <p><i>f) Aggregate emissions reductions are less than or equal to 60 kt CO₂ equivalent annually from all Type III components of the CPA.</i></p>					
<p>B.1.6 Has it been sufficiently justified that the CPA complies with eligibility criteria 6 of PoA:</p>					

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
<i>Section E.5 of the PoA-DD provides on how additionality of a typical CPA will be demonstrated. Each CPA shall comply with the requirements of section E.5 of the PoA-DD.</i>					
<p>B.1.7 Has it been sufficiently justified that the CPA complies with eligibility criteria 7 of PoA:</p> <p><i>Each CPA to conduct an independent local stakeholder consultation and relevant details on such consultation to be incorporated in the respective CPA-DD.</i></p>					
<p>B.1.8 Has it been sufficiently justified that the CPA complies with eligibility criteria 8 of PoA:</p> <p><i>Each CPA to assess independently whether an environmental impact assessment is required to be conducted for the project as per the applicable regulatory framework. If such requirement does exist, relevant details on such environmental impact assessment to be incorporated in the respective CPA-DD.</i></p>					
<p>B.1.9 Has it been sufficiently justified that the CPA complies with eligibility criteria 9 of PoA:</p> <p><i>Each CPA shall demonstrate compliance with the latest de-bundling guidelines applicable under PoA (Guidelines on assessment of de-bundling for SSC Project Activities)</i></p>					
<p>B.1.10 Has it been sufficiently justified that the CPA complies with eligibility criteria 10 of PoA:</p> <p><i>Each CPA to demonstrate that funding from Annex-1 parties, if any, does not result in diversion of official development assistance</i></p>					

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
<p>B.1.11 Has it been sufficiently justified that the CPA complies with eligibility criteria 11 of PoA:</p> <p><i>Each CPA must be approved by the CME and DOE prior to its incorporation into the PoA.</i></p>					
<p>B.1.12 Has it been sufficiently justified that the CPA complies with eligibility criteria 12 of PoA:</p> <p><i>Each CPA is to subscribe to the PoA.</i></p>					
<p>B.1.13 Has it been sufficiently justified that the CPA complies with eligibility criteria 13 of PoA:</p> <p><i>The CPA implementer shall waive its right to proceed in getting the CPA registered as an independent CDM project or as a CPA to another PoA which may result in double counting of credits.</i></p>					
<p>B.1.14 Has it been sufficiently justified that the CPA complies with eligibility criteria 14 of PoA:</p> <p><i>For each CPA it will be checked if it is required to comply with any CDM eligibility requirement(s) lay down by the host country DNA.</i></p>					
<p>B.1.15 Has it been sufficiently justified that the CPA (applicable to Replacement CPAs) complies with eligibility criteria 15 of PoA:</p> <p><i>The baseline shall be in compliance with all mandatory applicable legal and regulatory requirements, even if these laws and regulations have objectives other than GHG reductions, e.g. to mitigate local air pollution.</i></p> <p><i>If the baseline scenario does not comply with all mandatory</i></p>					

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
<i>applicable legislation and regulations, then it has to be demonstrated that, based on an examination of current practice in the country or region in which the law or regulation applies, those applicable legal or regulatory requirements are systematically not enforced and that non-compliance with those requirements is widespread in the country or region.</i>					
<p>B.1.16 Has it been sufficiently justified that the CPA (applicable to Replacement CPAs) complies with eligibility criteria 16 of PoA:</p> <p><i>The CPA implementer shall document in the CPA-DD how the remaining lifetime of the existing equipment has been determined as per the latest version of “tool to determine the remaining lifetime of the equipment”.</i></p>					
<p>B.1.17 Has it been sufficiently justified that the CPA (applicable to Replacement CPAs) complies with eligibility criteria 17 of PoA:</p> <p><i>The existing wastewater treatment system shall not be covered lagoon/covered tank nor be equipped with methane recovery system.</i></p>					
<p>B.1.18 Has it been sufficiently justified that the CPA (applicable to Replacement CPAs) complies with eligibility criteria 18 of PoA:</p> <p><i>The existing wastewater treatment system shall not be only mechanical aerobic system.</i></p>					
<p>B.2. Calculation of GHG Emission Reductions – Project emissions</p> <p><i>It is assessed whether the project emissions are stated according</i></p>					

CHECKLIST QUESTION		Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
<i>to the methodology and the PoA-DD and whether the argumentation for the choice of default factors and values – where applicable – is justified.</i>						
B.2.1	Is the calculation of project emissions of the CPA in accordance with the procedure described in the PoA-DD?					
B.2.2	Are CPA-specific conservative assumptions used when calculating the project emissions?					
B.2.3	Are CPA-specific uncertainties in the project emission estimates properly addressed?					
B.3. Calculation of GHG Emission Reductions – Baseline emissions <i>It is assessed whether the baseline emissions are stated according to the methodology and the PoA-DD and whether the argumentation for the choice of default factors and values – where applicable – is justified.</i>						
B.3.1	Is the calculation of baseline emissions of the CPA in accordance with the procedure described in the PoA-DD?					
B.3.2	Are CPA-specific conservative assumptions used when calculating the baseline emissions?					
B.3.3	Are CPA-specific uncertainties in the baseline emission estimates properly addressed?					
B.4. Calculation of GHG Emission Reductions – Leakage <i>It is assessed whether leakage emissions are stated according to the methodology and the PoA-DD and whether the argumentation for the choice of default factors and values – where applicable – is justified.</i>						
B.4.1	Is the calculation of leakage emissions of the					

CHECKLIST QUESTION		Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
	CPA in accordance with the procedure described in the PoA-DD?					
B.4.2	Are CPA-specific conservative assumptions used when calculating the leakage emissions?					
B.4.3	Are CPA-specific uncertainties in the leakage emission estimates properly addressed?					
B.5. Emission Reductions <i>The emission reductions shall be real, measurable and give long-term benefits related to the mitigation of climate change.</i>						
B.5.1	Has it been demonstrated that the total emission reductions of the CPA of activities will be real, measurable and give long-term benefits related to the mitigation of climate change?					
B.6. Monitoring Methodology <i>It is assessed whether the CPA applies an appropriate monitoring methodology.</i>						
B.6.1	Is the monitoring plan for the CPA documented according to the approved methodology, in accordance with the programme of activities and in a complete and transparent manner?					
B.6.2	Will all monitored data required for verification and issuance be kept for two years after the end of the crediting period or the last issuance of CERs, for this programme, whichever occurs later?					
B.7. Data and Parameters Available at Validation <i>It is established whether appropriate values were selected for parameters determined ex-ante.</i>						
B.7.1	Does the applied methodology allow determining the selected values ex-ante?					

CHECKLIST QUESTION		Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
B.7.2	Have adequate assumptions been used for determining the values and are underlying calculations correct?					
B.7.3	Has sufficient documentary evidence been presented to verify the selected values or to verify the input data used in the calculation of the values of the parameters determined ex-ante.					
B.8. Ex-Post Monitoring <i>It is established whether the monitoring plan provides for reliable and complete emission data over time.</i>						
B.8.1	Does the monitoring plan provide for the collection and archiving of all relevant data necessary for estimation or measuring the greenhouse gas emissions within the CPA boundary during the crediting period?					
B.8.2	Are the choices of CPA GHG indicators reasonable and conservative?					
B.8.3	Is the measurement method clearly stated for each GHG value to be monitored and deemed appropriate?					
B.8.4	Is the measurement equipment described and deemed appropriate?					
B.8.5	Is the measurement accuracy addressed and deemed appropriate? Are procedures in place on how to deal with erroneous measurements?					
B.8.6	Is the measurement <i>interval</i> identified and deemed appropriate?					
B.8.7	Is the <i>registration, monitoring, measurement and reporting</i> procedure defined?					

CHECKLIST QUESTION		Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
B.8.8	Are procedures identified for <i>maintenance</i> of monitoring equipment and installations? Are the calibration intervals being observed?					
B.8.9	Are procedures identified for day-to-day records handling (including what records to keep, storage area of records and how to process performance documentation)					
B.9. CPA Management Planning <i>It is checked that programme implementation is properly prepared for and that critical arrangements are addressed.</i>						
B.9.1	Is the authority and responsibility of overall CPA management clearly described?					
B.9.2	Are procedures identified for training of monitoring personnel?					
B.9.3	Are procedures identified for emergency preparedness for cases where emergencies can cause unintended emissions?					
B.9.4	Are procedures identified for review of reported results/data?					
B.9.5	Are procedures identified for corrective actions in order to provide for more accurate future monitoring and reporting?					
C. Environmental impacts <i>It is assessed whether environmental impacts of the CPA have been properly addressed.</i>						
C.1.1.	Has an analysis of the environmental impacts of the CPA been sufficiently described?					
C.1.2.	Are there any Host Party requirements for an Environmental Impact Assessment (EIA)?					

CHECKLIST QUESTION		Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
C.1.3.	Will the programme create any adverse environmental effects?					
C.1.4.	Are transboundary environmental impacts considered in the analysis?					
C.1.5.	Have identified environmental impacts been addressed in the programme design?					
C.1.6.	Does the programme comply with environmental legislation in the host country?					
D. Stakeholders' comments <i>It is assessed whether stakeholders have been properly consulted in the development of the CPA.</i>						
D.1.6.	Have relevant stakeholders been consulted?					
D.1.7.	Have appropriate media been used to invite comments by local stakeholders?					
D.1.8.	If a stakeholder consultation process is required by regulations/laws in the host country, has the stakeholder consultation process been carried out in accordance with such regulations/laws?					
D.1.9.	Is a summary of the stakeholder comments received provided?					
D.1.10.	Has due account been taken of any stakeholder comments received?					

APPENDIX C

CURRICULA VITAE OF THE VALIDATION TEAM MEMBERS

Wan Hasliza SM Jamaluddin holds a Bachelor's Degree in Chemical Engineering. She has an overall experience of around eleven years. Prior to joining DNV having four years in the field of project management for natural gas pipeline construction and four years on the implementation of Montreal Protocol for Malaysia. Her experience covers the fields of construction and environmental management.

She has experience of around three years in validation and verification of CDM projects in DNV in South East Asia region.

Her qualification, industrial experience and experience in CDM demonstrate her sufficient sectoral competence in "Waste Handling and Disposal" and "Energy Generation from Renewable Energy Sources".

Fathullah Akmal Khalid holds 2 Bachelor degrees majoring in both Chemical Engineering and Commerce from The University of Melbourne, Australia. Prior to joining DNV, Fathullah had experience in cement manufacturing as a manufacturing engineer in a few Malaysian cement plants. During the course of his previous employment, he was involved in a number of plant upgrading and improvement projects. Fathullah is also a member of The Institution of Chemical Engineers (IChemE) and Engineers Australia.

Simon Wong Yon Sing holds a Bachelor's Degree in Chemical Engineering with Environmental Engineering, with a year experience in the field of design and operation/maintenance of wastewater treatment as part of working in wastewater design & equipment supply services.

His experience in designing and maintaining the wastewater treatment systems covers the fields of various manufacturing and chemical industries in Malaysia.

He has experience of more than 5 years in validation and verification of numerous CDM projects in DNV, both in Malaysia and abroad. His qualification, industrial experience and experience in CDM demonstrate his sufficient sectoral competence in "Energy Generation from Renewable Energy Sources", "Waste Handling and Disposal" and "Animal Waste Management System".