



POA VALIDATION REPORT

Methane Capture, Combustion and Possible Electricity Generation from AWMS in Mexico

REPORT No. 2012-0185

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Client: Financiera Rural	Client ref.: Pablo Obrador	

Summary

Title of PoA: Methane Capture, Combustion and Possible Electricity Generation from AWMS in Mexico

Host country: Mexico

Methodologies: AMS-III.D. "Methane recovery in animal manure management systems" version 18, AMS-I.D. "Grid connected renewable electricity generation" version 17 and AMS-III.F. "Avoidance of methane emissions through composting" version 10

GHG reducing Measure/Technology: Animal waste management

ER estimate of PoA: 100 000 tCO₂e per year (average)

Sizes

☐ Large Scale ☒ Small Scale

Validation Phases:

☒ Desk Review

☒ Follow up interviews

☒ Resolution of outstanding issues

Validation Status

☐ Corrective Actions Requested

☐ Clarifications Requested

☒ Full Approval and submission for registration

☐ Negative validation opinion

In summary, it is DNV's opinion that the "Methane Capture, Combustion and Possible Electricity Generation from AWMS in Mexico", as described in the PoA-DD version 6 of 4 December 2012 meets all relevant UNFCCC requirements for the CDM and correctly applies the baseline and monitoring methodologies AMS-III.D., version 18, AMS-I.D., version 17 and AMS-III.F., version 10. DNV thus requests the registration of the project as a CDM programme of activities.

Report No.: 2012-0185	Date of this revision: 20 December 2012	Rev. No. 02
Report title: Methane Capture, Combustion and Possible Electricity Generation from AWMS in Mexico		
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Work verified by: Chandrashekara Kumaraswamy, Fernando Sasdelli, Michael Lehmann		

Key words:

Programme of Activities (PoA)

Clean Development Mechanism (CDM)

Climate Change

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Abbreviations

ATTRA	U.S.A. National Sustainable Agriculture Information Service
AWMS	Animal Waste Management System
BANCOMEXT	Banco Nacional de Comercio Exterior (National Exterior Commerce Bank)
BOD	Biochemical Oxygen Demand
CAR	Corrective Action Request
CDM	Clean Development Mechanism
CDM-CPA-DD	CDM Programme Activity Design Document
CDM-POA-DD	CDM Programme Of Activities Design Document
CER	Certified Emission Reduction(s)
CFE	Comisión Federal de Electricidad (Federal Electricity Commission)
CH ₄	Methane
CICESE	Centro de Investigación Científica y de Educación Superior de Ensenada, Baja California (Center for Scientific Research and Higher Education at Ensenada, Baja California)
CL	Clarification request
CME	Coordinating/Managing Entity of the PoA
CO ₂	Carbon Dioxide
CO _{2e}	Carbon Dioxide Equivalent
CONAGUA	Comisión Nacional del Agua (National Commission of Water)
CPA	CDM Programme Activity
CRE	Comisión Reguladora de Energía (Energy Regulatory Commission)
DNA	Designated National Authority
DNV	Det Norske Veritas
EFM	Environmental Fabrica de Mexico
EPA	U.S.A. Environmental Protection Agency
FAR	Forward Action Request
FIRA	Fideicomisos Instituidos en Relacion con La Agricultura (Trust Funds for Rural Development)
FIRCO	Fideicomiso de Riesgo Compartido (Shared Risk Trust)
FOMECAR	Fondo Mexicano de Carbono (Mexican Carbon Fund)
GHG	Greenhouse Gas(es)
GWP	Global Warming Potential
HDPE	High-Density Polyethylene
HRT	Hydraulic Retention Time
INEGI	Instituto Nacional de Estadística y Geografía (National Institute of Statistics and Geography)
IPCC	Intergovernmental Panel on Climate Change
LGEEPA	Lei General del Equilibrio Ecológico y la Protección al Ambiente (General Law for Ecological Equilibrium and Environmental Protection)
LoA	Letter of Approval
N ₂ O	Nitrous Oxide
NGO	Non-governmental Organisation
ODA	Official Development Assistance
PDD	Project Design Document



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PoA	Programme of activities
PROVAR	Proyecto de Apoyo al Valor Agregado de Agronegocios con esquemas de Riesgo Compartido (Added Value Agribusiness Support Project with Shared-Risk Schemes)
PSU	Primary Sampling Unit
REMBIO	Red Mexicana de Bioenergía (Mexican Bioenergy Network)
SAGARPA	Secretaría de Agricultura, Ganadería, Desarrollo Rural, Pesca y Alimentación (Ministry of Agriculture, Livestock, Rural Development, Fisheries and Food)
SEMARNAT	Secretaría de Medio Ambiente y Recursos Naturales (Ministry of Environment and Natural Resources)
SENER	Secretaría de Energía (Mexican Secretariat of Energy)
SSU	Secondary Sampling Unit
SUSCON	Sustainable Conservation Organization
tCO ₂ e	Tonnes of CO ₂ Equivalent
TN	Total Nitrogen
TSU	Tertiary Sampling Unit
UNFCCC	United Nations Framework Convention on Climate Change
USDA	United States Department of Agriculture
VOC	Volatile Organic Compounds



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1 EXECUTIVE SUMMARY – VALIDATION OPINION

DNV Climate Change Services AS (DNV) has performed a validation of the small-scale programme of activity (PoA) titled “Methane Capture, Combustion and Possible Electricity Generation from AWMS in Mexico” and the PoA specific CDM-SSC-CPA-DD with generic information relevant to all CDM programme 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) criteria, 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 Mexico. The Party fulfils the participation criteria and has approved the project and authorized the project participants. The DNA from Mexico confirmed that the project assists in achieving sustainable development.

The project correctly applies AMS-III.D. “Methane recovery in animal manure management systems”, version 18, AMS-I.D. “Grid connected renewable electricity generation”, version 17 and AMS-III.F. “Avoidance of methane emissions through composting”, version 10.

By capturing and burning the biogas generated through the decomposition of the swine manure produced at selected swine farms, the project results in reductions of CH₄ emissions that are real, measurable and give long-term benefits to the mitigation of climate change. It is demonstrated that the project is not a likely baseline scenario. Emission reductions attributable to the project are hence additional to any that would occur in the absence of the project activity.

Adequate training and monitoring procedures have been described.

In summary, it is DNV’s opinion that the PoA titled “Methane Capture, Combustion and Possible Electricity Generation from AWMS in Mexico”, as described in the CDM-SSC-PoA-DD version 6 of 4 December 2012, meets all relevant UNFCCC requirements for a PoA under the CDM and correctly applies the baseline and monitoring methodologies AMS-III.D., version 18, AMS-I.D., version 17 and AMS-III.F., version 10.

DNV thus requests the registration of the PoA titled “Methane Capture, Combustion and Possible Electricity Generation from AWMS in Mexico” as a PoA under the CDM.

Rio de Janeiro and Oslo, 20 December 2012

Gabriel Baines
Validator
DNV Rio de Janeiro, Brazil

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



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2 INTRODUCTION

Financiera Rural has commissioned DNV Climate Change Services AS (DNV) to perform a validation of the small-scale CDM Programme of Activities (PoA) with the title “Methane Capture, Combustion and Possible Electricity Generation from AWMS in Mexico” (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 programme 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 and demonstration of additionality of CPAs, the programme's baseline determination, monitoring plan, and the programme's compliance with relevant UNFCCC and host Party 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 methodologies AMS-III.D., AMS-I.D. and AMS-III.F.

The validation of the programme has also considered the completed CDM-SSC-CPA-DD for the CPA with the title “Methane Capture, Combustion and Possible Electricity Generation from AWMS in Mexico – CPA 001” 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.



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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/ Financiera Rural: *CDM-SSC-PoA-DD for PoA titled "Methane Capture, Combustion and Possible Electricity Generation from AWMS in Mexico"*, version 1 dated 15 July 2011 and version 6 dated 4 December 2012.
- /2/ Financiera Rural: *Generic CDM-SSC-CPA-DD for the PoA "Methane Capture, Combustion and Possible Electricity Generation from AWMS in Mexico"*, version 1 dated 15 July 2011 and version 5 dated 7 December 2012.
- /3/ Financiera Rural: *CPA-001 CDM-SSC-CPA-DD for CPA titled "Methane Capture, Combustion and Possible Electricity Generation from AWMS in Mexico – CPA 001"*, version 1 dated 15 July 2011 and version 5 dated 8 December 2012.
- /4/ Financiera Rural: *ER calculation spreadsheet*, version 3 dated 8 December 2012.
- /5/ Financiera Rural: *Grid emission factor calculation spreadsheet*, version 2 dated 13 January 2012.
- /6/ Financiera Rural: *Formulated Feed Ration (FFR) calculation spreadsheet*, version 1 dated 15 July 2011.
- /7/ Financiera Rural: *Flow Lagoons & HRT spreadsheet*, version 1 dated 15 July 2011.
- /8/ Financiera Rural: *Number of heads and average weights spreadsheet*, version 1 of 15 July 2011.
- /9/ Financiera Rural: *NPV calculation spreadsheet*, version 2 dated 13 January 2012.
- /10/ Financiera Rural: *Barrier Analysis spreadsheet "e_Tech_Barrier_05_FIRCO_FIRCO beneficiaries 2010.xlsx"* version 1 of 26 September 2011.
- /11/ Environmental Fabrics de Mexico: *Biodigesters lifetime estimation "e_Tech_10_EFM_Estimation on lifetime of biodigesters_20101118.PDF"* version 1 of 18 November 2010.
- /12/ Environmental Fabrics de Mexico: *Monitoring System and Biogas Control "e_Tech_09_EFM_SMCB information_20110406.doc"*. version 1 of 6 June 2011
- /13/ Sage Metring, Inc.: *Integral style industrial in-line mass flowmeter specifications "e_Tech_08_INTEGRAL IN-LINE MASS FLOWMETER_20081021.pdf"* version 1 of 12 October 2008.
- /14/ Sage Metring, Inc.: *"Sage Prime" Industrial & Environment thermal mass flow meter*



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- "e_Tech_07_SAGE_THERMAL MASS FLOW METER_20081008.pdf"* version 1 of 8 October 2008.
- /15/ Sage Metring, Inc.: *"Sage Prime" Industrial & Environment thermal mass flow meter operations and instruction manual "e_Tech_06_SAGE flow meter O&M manual_20090616.pdf"* version 1 of 16 June 2009.
- /16/ Environmental Fabrics de Mexico: *Operation and maintenance manual "e_Tech_05_EFM_Flare O&M Manual_200910.pdf"* version 1 of 9 October 2009.
- /17/ Environmental Fabrics de Mexico: *Stainless steel two cameras flare characteristics "e_Tech_04_EFM_Flare characteristics_20090813.pdf"* version 1 of 13 August 2009.
- /18/ Mopesa: *Electric Plants "e_Tech_02_MOPESA_Electrical Plants_20090810.pdf"* version 1 of 10 August 2009.
- /19/ Environmental Fabrics de Mexico: *Biodigester sheets "e_Tech_01_EFM_Biodigester sheets El Topete_20110609.pdf"* version 1 of 9 June 2011.
- /20/ MGM Innova: *Capture and use of methane from agricultural waste in Mexico "i_Stkholder_05_Financiera Rural_PoA Workshop SHC_20110316.pptx"* version 1 of 16 March 2011.
- /21/ Financiera Rural: *Stakeholders consultancy list "i_Stkholder_04_Financiera Rural_Guest lists_20110316.xlsx"* version 1 of 16 March 2011.
- /22/ Financiera Rural: *Email from Financiera Rural to MGM Innova inviting for the stakeholder's consultation "i_Stkholder_03_Financiera Rural_SHC Invitation_20110316.pdf"* sent on 11 March 2011.
- /23/ Financiera Rural: *Stakeholder's comments regarding the project "Methane Capture, Combustion and Possible Electricity Generation from AWMS in Mexico" "i_Stkholder_02_Financiera Rural_Surveys_20110316.pdf"* version 1 of 16 March 2011.
- /24/ Financiera Rural: *Press release for the project "Methane Capture, Combustion and Possible Electricity Generation from AWMS in Mexico" "i_Stkholder_01_Financiera Rural_Press Release March 16th 2011 FR PoA_20110316.pdf"* version 1 of 16 March 2011.
- /25/ Mexican Environmental Legislation:
- Mexican Environment and Natural Resources Secretariat: *NOM-004-SEMARNAT-2002 – Sludges and biosolids. Specifications and maximum contaminant limits for its use and disposal "j_Environmt_09_SEMARNAT_NOM-004-SEMARNAT_n.a.pdf"* version 1 of 15 August 2003.
 - Mexican Environment and Natural Resources Secretariat: *NOM-003-SEMARNAT-1997 – Standard that establishes the maximum contaminant limits for treated wastewater reuse in service to the public "j_Environmt_08_SEMARNAT_NOM-003-SEMARNAT_n.a.pdf"* version 1 of 21 September 1998.
 - Mexican Environment and Natural Resources Secretariat: *NOM-002-SEMARNAT-1996 – Standard that establishes the permissible maximum limits of contaminants in the discharges of sewage to the urban or municipal sewer system "j_Environmt_07_SEMARNAT_NOM-002-SEMARNAT_n.a.pdf"* version 1 of 3 June 1998.



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- Mexican Environment and Natural Resources Secretariat: *NOM-001-SEMARNAT-1996 – Standard that establishes the permissible maximum limits of contaminants in the discharges of sewage in water and national goods* “j_Environmt_06_SEMARNAT_NOM-001-SEMARNAT_1996.pdf” version 1 of 24 June 1996.
- Mexican Environment and Natural Resources Secretariat: *Official Mexican norms ordered by subject for the setting of conditions on wastewater discharges* version 1 from 18 October 1993 to 30 December 2010. Available at : <http://web.archive.org/web/20110716103304/http://www.semarnat.gob.mx/leyesynormas/normas/Pages/normasoficialesmexicanasvigentes.aspx>
- Mexican Environment and Natural Resources Secretariat: *Environment applicable legislation* “j_Environmt_05_Applicable Legislation_n.a.pdf” version 1 of 26 September 2011
- Mexican Environment and Natural Resources Secretariat: *LGEEPA: Law establishing that wastewater discharges from the agriculture and livestock sector are subject to federal and local regulation history* version 1 from 28 January 1988 to 30 August 2011 <http://www.diputados.gob.mx/LeyesBiblio/ref/lgeepa.htm>
- United States of Mexico – Mexican Congress: *Federal Law of Rights* “j_Environmt_04_DOE_Ley Federal de Derechos_20101118.pdf” version 1 of 31 December 1981 (Revision of 18 November 2010).
- United States of Mexico – Mexican Congress: *Law regarding water in Mexican territory* “j_Environmt_03_DOE_Ley de Aguas Nacionales_20080418.pdf” version 1 of 1 December 1992 (Revision of 18 April 2008).

/26/ Average temperatures:

- CONAGUA: *Average temperature for 2011* “c_CER_18_CONAGUA_MAT 2011_20110715.pdf” version 1 of 15 July 2011.
- CONAGUA: *Average temperature for 2010* “c_CER_17_CONAGUA_MAT 2010_20110715.pdf” version 1 of 15 July 2011.

/27/ Performance controls:

- PigCHAMP: *Performance control from July to December 2010* “c_CER_15_Financiera Rural_PIGCHAMP registries(Jul-Dic10)_201107151.jpg” version 1 of 15 July 2011.
- PigCHAMP: *Performance control from January to June 2010* “c_CER_14_Financiera Rural_PIGCHAMP registries(Jan-Jun10)_201107151.jpg” version 1 of 15 July 2011.

/28/ Electricity sector prospectives:

- United States of Mexico: *Electricity sector prospective from 2010 to 2025* “c_CER_11_SENER_Propectiva Sector Electrico 2010-2025_2011.pdf” version 1 of 2011.
- United States of Mexico: *Electricity sector prospective from 2009 to 2024* “c_CER_10_SENER_Propectiva Sector Electrico 2009-2024_2010.pdf” version 1 of 2010.
- United States of Mexico: *Electricity sector prospective from 2008 to 2017* “c_CER_09_SENER_Propectiva Sector Electrico 2008-2017_2009.pdf”



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- version 1 of 2009.
- Unites States of Mexico: *Electricity sector prospective from 2007 to 2016* “c_CER_08_SENER_Prospectiva Sector Electrico 2007-2016_2008.pdf” version 1 of 2008.
- Unites States of Mexico: *Electricity sector prospective from 2006 to 2015* “c_CER_01_SENER_Prospectiva Sector Electrico 2006-2015_2007.pdf” version 1 of 2007.
- Unites States of Mexico: *Electricity sector prospective from 2005 to 2014* “c_CER_07_SENER_Prospectiva Sector Electrico 2005-2014_2006.pdf” version 1 of 2006.
- Unites States of Mexico: *Electricity sector prospective from 2004 to 2013* “c_CER_06_SENER_Prospectiva Sector Electrico 2004-2013_2005.pdf” version 1 of 2005.
- /29/ EPA: *Managing Manure with Biogas Recovery Systems* “c_CER_04_EPA_Managing Manure with Biogas Recovery Systems_20020211.pdf” version 1 of 11 February 2002.
- /30/ Guidelines for National GHG Inventories:
 - IPCC: *Guidelines for National GHG Inventories, chapter 10* “c_CER_03_IPCC_2006 IPCC Guidelines for National GHG Inventories. Chapter 10_20110715.Pdf” version 1 of 15 July 2011.
 - IPCC: *Guidelines for National GHG Inventories, chapter 1* “c_CER_02_IPCC_2006 IPCC Guidelines for National GHG Inventories. Chapter 1_20110715.Pdf” version 1 of 15 July 2011.
- /31/ SAGARPA: *Manual of good production practices in hog farms* “e_Tech_Barrier_15_SAGARPA_Manual de buenas prácticas de producción en granjas porcícolas_20050530.pdf” version 1 of 30 May 2005.
- /32/ ATTRA: *Anaerobic Digestion of Animal Wastes: Factors to Consider* “e_Tech_Barrier_14_ATTRA_Anaerobic Digestion of Animal_2006.pdf” version 1 of 2006.
- /33/ INEGI: *Production units according to pig husbandry and age by entity and municipality in 2007* “e_Tech_Barrier_13_INEGI_INEGI Livestock Census_2007.pdf” version 1 of 2007.
 INEGI: *Production units and cattle stocks according to production system by state* “e_Tech_Barrier_12_INEGI_INEGI Livestock Census_2007.pdf” version 1 of 2007.
 Available at: <http://www.inegi.org.mx/est/contenidos/proyectos/agro/default.aspx>
- /34/ FIRA: *Agricultural Census Summary* “e_Tech_Barrier_11_FIRA_Resumen Censo Agropecuario 2007.pdf” version 1 of 2007.
- /35/ SAGARPA: *Prospectives and Actual Situation of the pig meat production in Mexico in 2009* “e_Tech_Barrier_09_SAGARPA_Prospectives and Actual Situation 2009_20091015.pdf” version 1 of 15 October 2009.
- /36/ SAGARPA: *Adoption of successful models of renewable energy and energy efficiency in small and medium scale* “e_Tech_Barrier_08_PROVAR_PROVAR Statistics_201005.pdf” version 1 of May 2010.
- /37/ SUSCON: *Biomethane from Diary Waste: A Sourcebook for the production and Use of Renewable Natural Gas in California* “e_Tech_Barrier_07_Sustainable Conservation_Production of biogas by Anaerobic Digestion_20051031.pdf” version 1



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- of 13 October 2005.
- /38/ Financiera Rural: *Work Plan for the implementation of programmatic CDM “e_Tech_Barrier_06_Financiera Rural_Financiera Rural Financing percentage_20110309.pdf”* version 1 of 9 March 2011.
 - /39/ SAGARPA: *Beneficiaries list “e_Tech_Barrier_04_FIRCO beneficiaries 2009.pdf”* version 1 of 31 December 2009.
 - /40/ FIRA: *Financing of Biodigesters and electricity generation projects “e_Tech_Barrier_03_FIRA Financing percentage_200807.pdf”* version 1 of July 2008.
 - /41/ EPA US: *Development Document for the Proposed Revisions to the National Pollutant Discharge Elimination System Regulation and the Effluent Guidelines for Concentrated Animal Feeding Operations “e_Tech_Barrier_02_EPA_Development Document CAFO EPA_200101.pdf”* version 1 of January 2001.
 - /42/ Financiera Rural: *CDM Pipeline “e_Tech_Barrier_01_CDMPipeline_20110601.xlsx”* version 1 of 10 June 2011.
 - /43/ SAGARPA: *PROVAR Guidelines for 2010 “d_InvInputs_06_FIRCO_USD\$103813_20100707.pdf”* version 1 of 7 July 2010.
 - /44/ USDA: *An Analysis of Energy Production Costs from Anaerobic Digestion Systems on U.S. Livestock Production Facilities “d_InvInputs_04_USDA_(0.058percent)_20071001.pdf”* version 1 of 1 October 2007.
 - /45/ MOPESA: *Engine generator price “d_InvInputs_03_MOPESA_USD\$49127.79_20110413.pdf”* version 1 of 13 April 2011.
 - /46/ CFE: *Electricity bill for “El Topete” farm “d_InvInputs_02_CFE_USD\$0.123 per KWh & 185 MWh per yr_20110221.pdf”* version 1 of 12 February 2011.
 - /47/ EFM: *Farm biodigester building list in “El Topete” Farm in Pénjamo, Guanajuato “d_InvInputs_01_EFM_USD\$118887.38_20111104.pdf”* version 1 of 4 November 2011.
 - /48/ Grupo Nu-3: *Animal Nutrition and structure of the company*, dated 9 January 2012.
 - /49/ Calidad Suprema: *Certificates of Quality in production of swines to Grupo Galeón and farm El Topete*, dated 19 March 2009 and 30 November 2010.
 - /50/ MOPESA: *Lifetime of a generator*, dated 30 May 2011.
 - /51/ Financiera Rural: *Memorandum of Understanding:*
 - Generic model, version 1, dated 1 May 2011.
 - Signed with Agropecuaria Piedadense (1st CPA), version 1, dated 4 May 2011.
 - /52/ REMBIO: *Mexican situation of Biogas (thematic areas)* – dated 2011.
Available at:
<http://www.rembio.org.mx/2011/Areas-Tematicas/biogas.php>
Last accessed on 10 December 2012.
 - /53/ CICESE: *Status of wastewater treatment in dairy farms in Tijuana and their limiting factors for their technification*. Dated 2010.

3.1.2 Letters of approval

- /54/ SEMARNAT (DNA of Mexico): *“3_Mexican_LoA.pdf”* version 1; 12 October 2011



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

- /55/ CDM Executive Board: *Validation and Verification Manual*, version 1.2
- /56/ CDM Executive Board: *Baseline and monitoring methodology AMS-III.D.*, version 18 valid from 13 October 2011 "*Methane recovery in animal manure management systems*".
CDM Executive Board: *Baseline and monitoring methodology AMS-I.D.*, version 17 valid since 17 June 2011 "*Grid connected renewable electricity generation*".
CDM Executive Board: *Baseline and monitoring methodology AMS-III.F.*, version 10 valid since 4 March 2011 "*Avoidance of methane emissions through composting*".
- /57/ CDM Executive Board: "*Tool for the demonstration and assessment of additionality*" version 6.1.0 of 13 September 2012.
CDM Executive Board: "*Project Emissions from flaring*", version 02.0.0, previously called "*Tool to determine project emissions from flaring gases containing methane*" version 1 of 15 December 2006.
CDM Executive Board: "*Tool to calculate the emission factor for an electricity system*" version 2.2.0 of 3 June 2011.
CDM Executive Board: "*Tool to calculate baseline, project and/or leakage emissions from electricity consumption*", version 1.
CDM Executive Board: "*Tool to determine the mass flow of a greenhouse gas in a gaseous stream*", version 2.
- /58/ CDM Executive Board: "*Draft Guidelines for the demonstration of additionality for CDM programme of activities*", dated 4 December 2009.
- /59/ CDM Executive Board: "*Guidelines on the Assessment of Investment Analysis*", version 5.0, adopted at EB62 Annex 5 of 15 July 2011."
- /60/ CDM Executive Board: "*Guidelines on Assessment of Debundling for SSC Project Activities*", version 3.1, adopted at EB54 Annex 13 of 17 November 2011.
- /61/ CDM Executive Board: "*General Guidelines for Sampling and Surveys for Small-Scale CDM Projects*", version 1, adopted at EB50 Annex 10 of 16 October 2009.

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

- /62/ CDM Executive Board: "Methane Capture, Combustion and Possible Electricity Generation from AWMS in Mexico": Validation page, dated 28 September 2011.
Available at:
<http://cdm.unfccc.int/ProgrammeOfActivities/Validation/DB/E7UHQBUNNTIJF6B DL5S9DQX85S2A11/view.html>
- /63/ FIRCO: Provider of the "Added Value Agribusiness Support Project with Shared-Risk Schemes" (PROVAR according to its Spanish acronym) checked on 9 March 2012
<http://www.firco.gob.mx/Paginas/default.aspx>
- /64/ Mexican Legislation: *Consultation regarding the lack of laws that regulates the treatment of wastes related to livestock activities* version 1 of June 2012
<http://www.diputados.gob.mx/LeyesBiblio/gobiernos.htm>
- /65/ SEMARNAT: *Special Program in Climate Change from 2009 to 2012*



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- http://web.archive.org/web/20110421020613/http://www.semarnat.gob.mx/temas/ca_mbioclimatico/Paginas/pecc.aspx
- /66/ FIRCO: *Criteria for participation on the PROVAR program* version 1 of 11 November 2010
http://www.firco.gob.mx/proyectos/provar/Paginas/provar_2.aspx
- /67/ CD₄CDM: *Verification of the quantity of projects, which use anaerobic digesters, cited on the CDM-PoA-DD* version 1 of 1 March 2012
<http://cd4cdm.org/>
- /68/ FIRCO: *FIRCO's Anaerobic Digester Roll check of reliability* version 1 checked on 9 March 2012
http://proyectodeenergiarenovable.com/Empresas/Padron_Biodigestores/
- /69/ United States of Mexico: *Ley General del Equilibrio al Ambiente (General Law of Ecological Balance and Environmental Protection), Section V, Art. 28* revision 20 of 30 August 2011
<http://www.diputados.gob.mx/LeyesBiblio/pdf/148.pdf>
- /70/ SAGARPA: *Report of the Mexican agricultural production from 1996 to 2006*, version 1 checked on 9 March 2012
http://www.campomexicano.gob.mx/portal_siap/Integracion/EstadisticaDerivada/ComercioExterior/Estudios/Perspectivas/maiz96-12.pdf
- /71/ BANCOMEXT: *Project stakeholder's website* checked on 9 March 2012
<http://www.bancomext.com/Bancomext/secciones/home.html>
- /72/ CRE: *Concession of permit for CDM activities to Financiera Rural* version 1 of 24 November 2004
<http://www.cre.gob.mx/documento/770.pdf>
- /73/ CFE: *Concession of permit for project financing to Financiera Rural* version 1 of 28 June 2006
<http://www.cfe.gob.mx/QuienesSomos/MarcoLegalYNormativo/Documents/Reglamento%20de%20la%20Ley%20Federal%20de%20Presupuesto%20y%20Responsabilidad%20Hacendaria.pdf>
- /74/ Planetware: *Political division of the United States of Mexico* checked on 12 March 2012
<http://www.planetware.com/i/map/MEX/mexico-mexican-states-map.jpg>
- /75/ Whatguanajuato: *Guanajuato's average temperature during the year* checked on 14 March 2012
<http://www.whatguanajuato.com/weather-guanajuato.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:

- Corrective actions and clarifications related to the CAR's/CL's described in Appendix A of this report.

3.2 Follow-up Interviews with Programme Stakeholders

The below listed persons have been interviewed and/or provided additional information to the presented documentation.



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	Date	Name	Organization	Topic
/76/	30 September 2011	Israel Victor Ballesteros	Financiera Rural	• Project Design and adopted technology
/77/		Eduardo Rivera	Financiera Rural	• Determination of baseline scenario
/78/		Darlene Frias Ruelas	Nu-3 Co.	• Demonstration of additionality
/79/		Nicolas Correnti	KfW Bankengruppe	• Emission reduction calculations
/80/		Carlos González	CO ₂ Solutions	• Application of monitoring methodology as well as design and application of the monitoring plan • Assessment of environmental impacts, environmental licenses and legal compliance • Stakeholders consultation process

3.3 Resolution of outstanding issues

The objective of this phase of the validation is to resolve any outstanding issues which need 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 "Methane Capture, Combustion and Possible Electricity Generation from AWMS in Mexico" 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 CDM-SSC-POA-DD submitted for registration.



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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.



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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-SSC-PoA-DD	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



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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 13.2 and 15.2	TA 1.2	Financial expertise
Team leader (Validator) from 8 June 2011 to 8 May 2012	Tavares	Luis Filipe	Brazil	✓		✓	✓		✓	✓	
Team leader (Validator) from 8 May 2012	Baines	Gabriel	Brazil	✓		✓	✓		✓	✓	
Validator	Díaz	Danae	Mexico	✓	✓				✓		
Expert	Rosas	Frederico	Brazil								✓
Technical reviewer	Kumaraswamy	Chandrashekara	India					✓	✓	✓	
Person with sectoral competence assisting technical reviewer	Sasdelli	Fernando	Brazil						✓		
Technical reviewer	Lehmann	Michael	Norway					✓		✓	

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



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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 4 December 2012 /1/.

4.1 Participation requirements

The project participant is Financiera Rural of host Party of Mexico. Financiera Rural is the Coordinating Entity of the PoA and will communicate with the Executive Board. The host Party (Mexico) meets all relevant participation requirements.

A letter of approval (LoA) was issued by DNA of Mexico on 12 October 2011 /54/, authorizing Financiera Rural of Mexico as project participant and confirming that the project assists in achieving sustainable development.

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 /55/.

There is no public funding from Parties included in Annex I of the UNFCCC in the sense of any deviation of funds for Official Development Assistance (ODA). The entity involved with the funds is the coordinating entity of the PoA, Financiera Rural. Other sources of financing or rural projects in Mexico are FIRA and FIRCO, both Mexican entities – thus there is no deviation of funds for Official Development Assistance (ODA).

4.2 Programme design

The proposed programme for all CPAs in this PoA on AWMS in swine and cattle production envisages the capturing and flaring/utilizing biogas produced by fermentation of organic material in the anaerobic digesters. The project activity consists of substituting the business as usual of open-air lagoons with the installed anaerobic digester system /16/ /19/, flaring system /17/ and in some cases electricity generation system. On each CPA, an anaerobic digester lagoon with a cover will be constructed. Pre-project lagoons could be adapted to operate as anaerobic digesters or as secondary open lagoons. This anaerobic digester would be designed to receive the daily volume of organic waste, within the anaerobic digester, organic matter will be degraded by means of methanogenic bacteria. The anaerobic digester will be designed by the technology provider according the hydraulic retention time (HRT) /7/ and the organic matter loading rate (volatile solids) of each CPA. The HRT represents the time the manure remains inside the digester, allowing the bacteria to decompose the organic matter. The volatile solids load rate represents the amount of organic matter required per unit volume in order to enhance proper degradation and efficient biogas generation rates.

In general, the basic digester design will include:

- Geo-membrane: waterproof, high-density polyethylene (HDPE) membrane to prevent leachate from infiltrating the underground aquifer;
- Floating cover: gas tight, high-density polyethylene (HDPE) membrane to avoid the release of biogas into the atmosphere;
- Sludge extraction pipes; and



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- Biogas extraction pipes.

Since biogas generation will vary according to the characteristics of each CPA /29/, Financiera Rural has defined two possible scenarios for CPAs within the program:

Scenario A: CPAs in which the captured biogas, composed mainly of CH₄ and CO₂, will be sent to flares /17/ where the CH₄ oxidizes to CO₂. The biogas flaring system consists of an enclosed, high-efficient flare, where the CH₄ oxidizes to CO₂, thus reducing GHG emissions. The flare is built of stainless steel, a highly thermo-resistant material. Ventilation devices regulate air flow to allow the complete combustion of methane. The average temperature considered for carbon crediting in the operation of the enclosed flare must be within a minimum of 500° Celsius and a maximum of 800° Celsius. The temperature is set as outlined by the manufacturer for security /16/.

Scenario B: CPAs in which the captured biogas will be sent to biogas generators in order to generate the electricity to satisfy the energy demands of the farm facilities, reducing the consumption of electricity from grid or from onsite generators using fossil fuels. The remaining biogas will be sent to a flaring system. Flaring system will have the same characteristics in both scenarios. The technology for generating electricity that will be implemented will consist of an internal combustion engine with a generator. The predicted gas flow rate and the operating plan will be used to size the electricity generation equipment. The electricity generated will be consumed at the CPA farm facilities. However, if a surplus power is generated, farm owners are allowed to:

- a) utilize it in other facilities by means of electricity portage or
- b) sell it to the National Grid.

In the case of a) and/or in case of b), the emission reductions resulting from supplying surplus electricity to/via the national grid will not be claimed. The proper procedures will be realized in order to obtain appropriate permits from the Federal Electricity Commission (CFE) /73/ and the Energy Regulatory Commission (CRE).

In both project activity scenarios, the lagoons from the pre-project situation could be used as anaerobic digesters or as secondary open lagoons where the effluent of the new digester lagoons will be directed to.

The effluent from the latter lagoon would be disposed of through surface spread and is used to humidify arable land for farming purposes in the surrounding areas of the project site, proper procedures will be carried on to avoid methane emissions.

The sludge deposited in the anaerobic digester will be drained using the sludge removal system included in the anaerobic digester installation.

The sludge generated in the anaerobic digester and lagoons will be removed periodically; and will be used for soil applications in surrounding croplands. Proper conditions and procedures for the sludge will be applied in order to avoid any methane emissions from these activities.

PoA will be implemented within the geographical boundary of Mexico, where all CPAs associated with the “Methane Capture, Combustion and Possible Electricity Generation from AWMS in Mexico” will be implemented.

The programme’s starting date was defined in the CDM-SSC-PoA-DD as 30 August 2011, the date of publication for Global Stakeholders Consultation. The programme’s crediting time is 28 years.



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Special training in the anaerobic digestion operation system will be provided to the CDM-SSC-CPA-DD participants by the technology providers which will be complemented with the manual prepared by Financiera Rural. CDM-SSC-CPA-DD participants will be responsible for maintenance of the anaerobic digester and electricity generation systems, the CDM-SSC-CPA-DD participant shall request calibration and maintenance services to the technology provider. The technology suppliers will provide the maintenance and calibration services to the anaerobic digester and flaring system on request of the CDM-SSC-CPA-DD and such information will be delivered to the CME for internal auditions purposes as well. They will also provide training to the project participant's personnel to ensure proper operation of the anaerobic digester, flaring and monitoring equipment.

DNV considers that the description of the project contained in the CDM-SSC-PoA-DD to be complete and accurate and the CDM-SSC-PoA-DD complies with the relevant forms and guidance for completing the CDM-SSC-PoA-DD.

4.3 Criteria for inclusion of CDM Programme Activities

The criteria for enrolling a CPA in the PoA are the following:

1. Each SSC-CPA will be implemented within the geographical boundary of Mexico;
2. Each SSC-CPA is able to participate voluntarily in the SSC-PoA whether or not requires financial help from Financiera Rural or receives financial help from another entity.
3. SSC-CPAs to be included shall consist of the implementation of anaerobic digestion as wastewater treatment /32/, an enclosed flaring system /17/ and for CPAs corresponding to scenario B also an electricity generation system /18/;
4. SSC-CPAs will have anaerobic lagoons as baseline scenario treatment;
5. SSC-CPAs corresponding to project activity scenario A shall comply with the requirements of *AMS-III.D., "Methane recovery in animal manure management systems"* version 18. CPAs corresponding to project activity scenario B shall comply with the requirements of *AMS-III.D., "Methane recovery in animal manure management systems"* version 18 and *AMS-I.D. "Grid connected renewable electricity generation"*, version 17;
6. A de-bundling check shall be assessed, according to Annex 13 of EB 54, for SSC-CPA to be included in the PoA;
7. The coordinating entity will ensure that all CPAs under its PoA are neither registered as an individual CDM project activity nor included in another registered PoA, and that the CPA is subscribed to the PoA;
8. SSC-CPAs shall have a project starting date after the PoA-DD is submitted to Global Stakeholders Consultation;
9. The SSC-CPAs shall be in line with national and local regulations available at the time of inclusion into the SSC-PoA. If an Environmental Impact Assessment (EIA) is mandated for a CPA, such an EIA must be undertaken at the CPA level prior to the inclusion of the CPA in the PoA. In addition, it is indicated to the SSC-CPAs that stakeholder consultations has been done at PoA level, hence, there is no need to undertake a local stakeholder consultations;



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10. The SSC-CPAs shall demonstrate that they are not viable without CDM revenues, through investment analysis as described in section E.5.2 of the PoA-DD.
11. The SSC-CPA will stay within the small scale threshold criteria of the Type I (i.e < 15 MW) and Type III (i.e < 60,000 CERs per year) components of the project activity and will remain within those thresholds throughout the crediting period of the CPA.
12. Each SSC-CPA will either not involve funding from Annex I parties, or if any funding from Annex I parties is involved, it will not result in a diversion of official development assistance.

The identified criteria for the CPA to be included under the PoA have been found to be adequate and appropriate to the intent of the PoA.

4.4 Operational, management and verification plan

Financiera Rural will be responsible for the PoA.

General data and monitoring data from each CPA will be uploaded into the PoA electronic database managed by Financiera Rural; therefore a record of each CPA will be kept during the program /12/.

To avoid double accounting, producers that are interested to participate in the PoA shall demonstrate that the CPA has not been registered as a CDM project activity or as a CPA of another PoA. Double counting will be avoided by the specific tagging of SSC-CPA. The below unique references of each SSC-CPA under this PoA are:

- a. Farm name
- b. Farm owner
- c. Type of livestock (s) at the farm
- d. Location: town/state, and physical address of the farm where the anaerobic digester will be installed.
- e. GPS Coordinates
- f. Anaerobic digester's ID number

A de-bundling check will be assessed for each CPA to be included in this PoA in accordance to Annex 13 of EB 54 /60/ to demonstrate that the SSC-CPA included in the PoA is not a de-bundled component of another CDM programme activity (CPA) or CDM project activity. To ensure that those operating the CPAs are aware of and have agreed that their activity is being subscribed to the PoA, all CPAs included in the PoA shall previously sign a Memorandum of Understanding /51/ that states that the participation is voluntary and explaining what are the responsibilities of each party.

The CPAs that will be included in the PoA are those that are promoted by the project participants and that have signed the Memorandum of Understanding /51/. Hence, it can be assumed that the CPA implementers are aware and have agreed that their activity is being subscribed to the PoA.

Financiera Rural in collaboration with the technology providers is developing a monitoring manual that establishes the proper procedures that shall be followed in order to operate and maintain the technology in a proper way fulfilling the data accuracy and control requirements. The SSC-CPA participant will be responsible for the operation of the anaerobic digestion



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system. Special training in the anaerobic digestion operation system will be provided to the SSC-CPA participants by the technology providers which will be complemented with the manual prepared by Financiera Rural. SSC-CPA participants will be responsible for maintenance of the anaerobic digester and electricity generation systems, the SSC-CPA participant shall request calibration and maintenance services to the technology provider. Performance of the calibration as well as maintenance of the main equipment used in the operation of the anaerobic digester will be part of the monitoring plan. These data will be available to Financiera Rural for internal audits purposes at any moment. In the case data of calibration or no performance of such events were available from the CPAs, as a conservativeness purposes it shall be used in the calculations the maximum error range of the corresponding instrument in the ER calculations respectively. In case of lack of data, no emission reductions will be claimed for the period where the data is not available. The technology suppliers will provide the maintenance and calibration services to the anaerobic digester and flaring system on request of the SSC-CPA and such information will be delivered to the CME for internal audits purposes as well. They will also provide training to the project participant's personnel to ensure proper operation of the anaerobic digester, flaring and monitoring equipment.

The PoA considers a sampling method to be used for verification of the CPAs. The Coordinating Entity (Financiera Rural) will implement sampling rules according to EB 50 Report, Annex 30 "*General Guidelines for Sampling and Surveys for Small-Scale CDM Projects*" /61/. Since the PoA will cover the entire Mexican territory, CPAs will be geographically dispersed, therefore and according to the "*General Guidelines for Sampling and Surveys for Small-Scale CDM Projects*" /61/, Financiera Rural will use a multi-stage sampling approach to address sampling for the verification of the CPAs included in the PoA.

All CPAs included in the PoA shall monitor the data and parameters included in section E.6.3. of the PoA-DD. Also, monitoring reports will be prepared separately for all CPAs included in the PoA, however only the sample will be verified by the DOE /12/. Monitored data and monitoring reports will be stored in the PoA's electronic database which will be managed by Financiera Rural in order to ensure that each CPA and its owner is identified and logged for monitoring and verification purposes. Annual monitoring reports and CERs calculations will derive from this data /12/.

In multi-stage sampling, the units (referred to as primary sampling units - PSUs) in the population are divided into smaller sub-units (referred to as secondary sampling units - SSUs) and can be extended further to three or more stages. Data is verified for only a sample of the sub-units. In the PoA, population will be divided into 31 PSUs, each corresponding to a Mexican State where the individual elements – the CPAs – are implemented. Federal District of Mexico City is not considered a PSU since no livestock activities are developed within the territory. Each CPA can be assigned to only one PSU.

In the PoA, PSUs (Mexican States) are divided into two smaller sub-units. The defined scenarios for CPAs addressed in section A.2. of the PoA-DD are considered the SSUs within the PoA.



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CPAs within the SSUs are considered the tertiary sampling units (TSUs). CPAs will be selected according to the procedure described below and will constitute a sample.

In order to constitute the sample, the following steps were followed:

1. Calculation of adequate sample size n^i , for an infinite population according to equation 1 below;
2. Utilize the sample size value, n^i , to calculate the sample size for finite population, n^{ii} , according to equation 2. Selection of PSUs;
3. Selection of CPAs from Scenario A within the selected PSU;
4. Selection of CPAs from Scenario B within the selected PSU unit;
5. Constitution of the representative sample with the selected CPAs.

As a first step, Financiera Rural will calculate an adequate sample size which will be defined upon general statistical methods like the one described on the equations below. As a first step, a sample size for infinite population must be estimated with the following equation:

Equation 1: Infinite Population (Very Large or Unknown Population)

$$n^i = \left(\frac{(T * CV)}{rp} \right)^2$$

Where:

- n^i = Sample size for infinite population
- T = Confidence interval (1.645 for 90%)
- CV = Coefficient of variation (Usually between 0.5 and 1)
- rp = Relative precision (0.1)

The “General Guidelines for Sampling and Surveys for Small-Scale CDM Project Activities” /61/ states the following: “Where there is no specific guidance in the applicable methodology, project proponents shall use 90/10 confidence/precision as the criteria for reliability of sampling efforts. This reliability specification shall be applied to determine the sampling requirements for each individual parameter value determined through a sampling effort”. This implies to determine the sample size with 90% probability of falling in the range of $\pm 10\%$ of the true population value (often denoted as 90/10 precision).

The sample size for infinite population is later adjusted according to the following equation in order to estimate the sample size of the finite population:

Equation 2: Finite Population (Small population)

$$n^{ii} = \frac{n^i}{\left(1 + \left(\frac{n^i}{N}\right)\right)}$$



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Where:

- n^{ii} = Sample size for finite population
 N = Population size
 n^i = Sample size for infinite population

Once defined the sample size, Financiera Rural will select PSUs. CPAs from Scenario A and Scenario B, developed within the selected PSUs, will be randomly selected and will constitute the sample to be checked by the verifying DOE.

The project database will record the start and end dates of each monitoring period, and record the emission reductions attributable to each monitoring period. Appropriate record keeping procedures will be implemented to ensure that each monitoring period data set can be transparently attributed to its corresponding CPA, preventing any occurrences of double counting.

The number of CPAs to be monitored by the coordinating entity will be determined through the sampling method above so as to achieve 90% confidence level with 10% precision. DNV has verified and found that the sampling plan described is in accordance with the “*General Guidelines for Sampling and Surveys for Small-Scale CDM Projects*” /61/. Thus DNV considers this to be logical and adequate to the purpose of the PoA.

4.5 Baseline identification

For the proposed PoA, two project activity scenarios for CPAs are contemplated.

Scenario A: Project activity scenario A comprises the CPAs in which all biogas generated is collected and conducted to a flaring system /17/.

Scenario B: Project activity scenario B corresponds to the CPAs in which the captured biogas is utilized for electricity generation /18/, with surplus sent to a flare.

The project activity of scenario A is developed using the approved methodology *AMS-III.D.*, “*Methane recovery in animal manure management systems*” version 18. Also, methodologies *AMS-I.D.* “*Grid connected renewable electricity generation*”, version 17 and *AMS-III.F.*, “*Avoidance of methane emissions through composting*”, version 10 are applied for the estimation of project emissions from electricity consumption and the estimation of project emissions from incremental transportation respectively.

The following tools are also used in accordance with the methodologies:

- “*Project Emissions from flaring*” (version 2), previously called “*Tool to determine project emissions from flaring gases containing methane*” /57/ as referenced to in the methodology.
- “*Tool to calculate the emission factor for an electricity system*” (version 2.2.0) /57/ for project emissions resulting from grid power consumption.
- “*Tool to calculate baseline, project and/or leakage emissions from electricity consumption*” (version 1) /57/.
- “*Tool to determine the mass flow of a greenhouse gas in a gaseous stream*” (version 2) /57/.

The project activity of scenario B is developed using the approved methodologies:



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AMS-III.D., “Methane recovery in animal manure management systems”, version 18.

AMS-I.D. “Grid connected renewable electricity generation”, version 17 for the estimation of baseline and project emissions from renewable energy generation.

Tools for CPAs from Scenario A and *AMS-III.F.* are also applied to Scenario B.

CPAs from Scenario A

Methodology *AMS-III.D.* was chosen since it covers project activities involving the replacement or modification of anaerobic animal manure management systems in livestock farms to achieve methane recovery and destruction by flaring/combustion or gainful use of the recovered methane.

This methodology is only applicable under the following conditions:

Applicability criteria	Outcome
The livestock population in the farm is managed under confined conditions.	Only farms with livestock populations managed under confined conditions will be considered for the programme.
Manure or the streams obtained after treatment are not discharged into natural water resources (e.g. river or estuaries), otherwise <i>AMS-III.H</i> .Methane recovery in wastewater treatment shall be applied.	Only livestock farms where manure is not discharged into natural water resources (e.g. rivers or estuaries) will be considered for the programme.
The annual average temperature of baseline site where anaerobic manure treatment facility is located is higher than 5°C.	Only farms with annual average temperature on the site higher than 5°C will be considered for the programme /26/ /75/.
In the baseline scenario the retention time of manure waste in the anaerobic treatment system is greater than one month, and in case of anaerobic lagoons in the baseline, their depths are at least 1 m.	Only livestock farms with anaerobic lagoons operating as waste treatment in the baseline will be considered for the programme. The HRT of manure in the lagoons is greater than one month and the lagoons have a minimum depth of 1 m.
No methane recovery and destruction by flaring, combustion or gainful use takes place in the baseline scenario.	Only farms that do not destruct, combust or utilize the methane produced in the lagoons will be considered for the programme.
The residual waste from the animal manure management system shall be handled aerobically; otherwise the related emissions shall be taken into account as	The mineralized sludges will be handled aerobically, and the final application will be made in the proper conditions in order to avoid methane emissions.



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per relevant procedures of AMS-III.AO. Methane recovery through controlled anaerobic digestion. In case of soil application, proper conditions and procedures (not resulting in methane emissions) must be ensured.	
Technical measures shall be used (including a flare for exigencies) to ensure that all biogas produced by the digester is used or flared.	The project activity will replace the current open anaerobic lagoons with new closed anaerobic digesters that will capture the generated biogas in order to burn it through an enclosed flare; in case the production of biogas is considerable, it will be utilized for electricity generation; therefore all methane will be used or flared.
The storage time of the manure after removal from the animal barns, including transportation, should not exceed 45 days before being fed into the anaerobic digester.	Only livestock farms in which the storage time of the manure after removal from the barns does not exceed 45 days will be considered for the programme.

Given there is electricity consumption of the grid by the electrical equipment installed due to the implementation of the proposed project activity (either for Scenario A or Scenario B), its emissions are calculated according to “*Tool to calculate baseline, project and/or leakage emissions from electricity consumption*” /57/.

According to AMS-III.D., project emissions from incremental transportation distances are determined as per the procedures described in AMS-III.F., “*Avoidance of methane emissions through composting*”, therefore, the methodology is applied to the project activity.

The applicability conditions provided in the related “*Project Emissions from flaring*”, previously called “*Tool to determine project emissions from flaring gases containing methane*” /57/ are also fulfilled:

Methane is the component with the highest concentration in the flammable residual gas;	Biogas generated from anaerobic treatment typically consists of mainly methane (CH ₄). It can also contain smaller fractions of nitrogen (N ₂), hydrogen (H ₂), hydrogen sulphide (H ₂ S) and Oxygen (O ₂).
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The source of the residual gas is coal mine methane or a gas from a biogenic source (e.g. biogas, landfill gas or wastewater treatment gas).	The residual gas stream to be flared will be obtained from the treatment of manure through closed anaerobic digesters, thus it comes from a biogenic source.
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Typical applications of the *“Tool to determine the mass flow of a greenhouse gas in a gaseous stream”* /57/ are methodologies where the flow and composition of residual or flared gases or exhaust gases are measured for the determination of baseline or project emissions, which is the case of methodology *AMS-III.D*.

According to *AMS-I.D.*, the emission factor is calculated in a transparent and conservative manner according to the procedures prescribed in the *“Tool to calculate the emission factor for an electricity system”* /57/.

The tool in its version 2.2.0 states that: *“this tool is also referred to (...) for the purpose of calculating project and leakage emissions in case where a project activity consumes electricity from the grid or results in increase of consumption of electricity from the grid outside the project boundary”*, and the project activity will consume electricity from the grid, it is concluded that this tool is applicable to the project activity.

Thus, DNV considers methodologies /56/ and tools /57/ are applicable for the PoA in scenario A.

CPAs from Scenario B

For CPAs corresponding to Scenario B, emission reductions from methane recovery in animal manure management systems are determined following methodology *AMS-III.D*. As demonstrated above, the activity fulfills all the methodology requirements, therefore can be applied to the project activity. According to *AMS-III.D.*, project emissions from incremental transportation distances are determined as per the procedures described in *AMS-III.F.*, *“Avoidance of methane emissions through composting”*, therefore, the methodology is applied to the project activity.

This category of CPAs will claim emission reductions from the electricity generation through biogas (ERs will be claimed only for the energy generated for auto-consumption in the same farms; if power is generated over to the needs of the farm and supplied to another consumer facility via national grid or sold to the national grid, these ERs will not be claimed), these emissions are calculated following methodology *AMS-I.D*.

This methodology is only applicable under the following conditions:

This methodology is applicable to project activities that (a) install a new power plant at a site where there was no renewable energy power plant operating prior to the implementation of the project activity (Greenfield plant); (b) involve a	The CPAs project activity falls in category (a) since a new power plant will be installed at sites where there was no renewable energy power plant operating before the implementation of the PoA.
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capacity addition; (c) involve a retrofit of (an) existing plant(s); or (d) involve a replacement of (an) existing plant (s).	
Hydro power plants with reservoirs that satisfy at least one of the following conditions are eligible to apply this methodology.	The project is not a hydro power plant.
If the new unit has both renewable and non-renewable components (e.g., a wind/diesel unit), the eligibility limit of 15 MW for a small-scale CDM project activity applies only to the renewable component. If the new unit co-fires fossil fuel, the capacity of the entire unit shall not exceed the limit of 15 MW.	There are no renewable and non-renewable components in the CPAs units.
Combined heat and power (co-generation) systems are not eligible under this category.	CPAs will only generate electricity; therefore it is not applicable to the project activity.
In the case of project activities that involve the addition of renewable energy generation units at an existing renewable power generation facility, the added capacity of the units added by the project should be lower than 15 MW and should be physically distinct from the existing units.	There is no existing renewable power generation facility.
In the case of retrofit or replacement, to qualify as a small-scale project, the total output of the retrofitted or replacement unit shall not exceed the limit of 15 MW.	The project is not a case of retrofit or replacement.

The applicability conditions provided in the related “*Project Emissions from flaring*”, previously called “*Tool to determine project emissions from flaring gases containing methane*” are also fulfilled:



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Methane is the component with the highest concentration in the flammable residual gas;	Biogas generated from anaerobic treatment typically consists of mainly methane (CH ₄). It can also contain smaller fractions of nitrogen (N ₂), hydrogen (H ₂), hydrogen sulphide (H ₂ S) and Oxygen (O ₂).
The source of the residual gas is coal mine methane or a gas from a biogenic source (e.g. biogas, landfill gas or wastewater treatment gas).	The residual gas stream to be flared will be obtained from the treatment of manure through closed anaerobic digesters, thus it comes from a biogenic source.

Typical applications of the “*Tool to determine the mass flow of a greenhouse gas in a gaseous stream*” /57/ are methodologies where the flow and composition of residual or flared gases or exhaust gases are measured for the determination of baseline or project emissions, which is the case of methodology *AMS-III.D*.

According to *AMS-I.D.*, the emission factor is calculated in a transparent and conservative manner according to the procedures prescribed in the “*Tool to calculate the emission factor for an electricity system*”.

The tool in its version 2.2.0 states that: “*this tool is also referred to (...) for the purpose of calculating project and leakage emissions in case where a project activity consumes electricity from the grid or results in increase of consumption of electricity from the grid outside the project boundary*”, and the project activity will consume electricity from the grid, it is concluded that this tool is applicable to the project activity.

Thus, DNV considers methodologies /56/ and tools /57/ are applicable for the PoA in scenario B.

In the absence of the PoA, the swine farms included in the PoA would continue to emit methane to the atmosphere at historical average levels. Currently in Mexico there are no legislation or mandatory rules /64/ to collect and burn the methane produced by the decay of swine manure. Since no regulation exists, the common practice, as demonstrated in the common practice analysis, below, in the host country is to manage the manure by different systems in which the methane gas produced by the organic decomposition is emitted to the atmosphere.

The manure management system identified as the baseline scenario for this PoA is the anaerobic lagoon.

The baseline scenario for this project activity is defined as the volume of methane gas that would be emitted, from the anaerobic lagoons, into the atmosphere during the crediting period in the absence of the project activity.

The approved baseline methodology *AMS-III.D*. has been correctly applied to identify a complete list of realistic and credible baseline scenarios, and two possible scenarios were identified (“proposed project activity undertaken without being registered as a CDM project



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activity” and “continuation of the current situation”). 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-SSC-DD /1/ and/or supporting documents /4/ to /50/. All documentation relevant for establishing the baseline scenario are correctly quoted and interpreted in the PoA-SSC-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-SSC-DD.

Thus it is DNV’s opinion that “continuation of the current situation”, has been reasonably selected as the baseline for the PoA. 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. It is DNV’s our opinion the arguments made by Financiera Rural are reasonable.

4.6 Project boundary

As per the applied methodologies, all CPAs associated with the “Methane Capture, Combustion and possible electricity generation from AWMS in Mexico” PoA will be implemented within the geographical boundary of Mexico. As per *AMS-III.D.*, the programme correctly defines the project boundaries the physical, geographical site(s) of the livestock, animal manure management systems and facilities which recover and flare/combust or use methane:

Baseline and project emissions for CPAs from Scenario A:

	Source	Gas	Justification/Explanation
Baseline emissions	Direct emissions from uncovered anaerobic lagoon	CO ₂	Excluded for simplification. This is conservative
		CH ₄	Anaerobic lagoon corresponds to the major source of emissions in the baseline
		N ₂ O	Excluded for simplification. This is conservative
	Emissions from electricity/thermal energy consumption	CO ₂	Excluded for simplification. This is conservative.
		CH ₄	Excluded for simplification. This is conservative
		N ₂ O	Excluded for simplification. This is conservative
Project emissions	Emissions from physical leakage	CO ₂	This is a negligible emission source. Excluded for simplification.



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		CH ₄	The anaerobic digester is the major source of methane emissions. Minor CH ₄ emissions from secondary anaerobic lagoon are accounted.
		N ₂ O	This is a negligible emission source. Excluded for simplification
	Emissions from flaring biogas	CO ₂	Emissions from the flaring or combustion of biogas
		CH ₄	This is a negligible emission source. Excluded for simplification
		N ₂ O	This is a negligible emission source. Excluded for simplification
	Emissions from on-site electricity consumption	CO ₂	To be included when the project operation involves emissions from electricity consumption of installed equipment because of the implementation of the proposed project activity.
		CH ₄	This is a negligible emission source. Excluded for simplification
		N ₂ O	This is a negligible emission source. Excluded for simplification
	Emissions from incremental transportation distances	CO ₂	Project emissions from incremental transportation distances are determined as per the procedures described in <i>AMS-III.F.</i> , "Avoidance of methane emissions through composting", version 10.
		CH ₄	This is a negligible emission source. Excluded for simplification
		N ₂ O	This is a negligible emission source. Excluded for simplification

Baseline and project emissions for CPAs from Scenario B:

For CPAs from Scenario B, baseline and project emissions are the same as per CPAs from Scenario A, plus the following emissions:

	Source	Gas	Included?	Justification/Explanation
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Baseline emissions	Emissions from electricity generation in the Project Activity	CO ₂	Yes	According to <i>AMS-I.D.</i> , version 17, the baseline scenario is the electricity delivered to the grid by the project activity that otherwise would have been generated by the operation of grid-connected power plants.
		CH ₄	No	This is a negligible emission source. Excluded for simplification
		N ₂ O	No	This is a negligible emission source. Excluded for simplification
Project emissions	Emissions from electricity generation in the Project Activity	CO ₂	No	According to <i>AMS-I.D.</i> , $PE_y = 0$
		CH ₄	No	This is a negligible emission source. Excluded for simplification
		N ₂ O	No	This is a negligible emission source. Excluded for simplification

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 /4/ as a result of the implementation of the proposed project activity which is expected to contribute more than 1% of the overall expected average annual emission reduction, which are not addressed by *AMS-III.D.*, version 18.

4.7 Additionality

4.7.1 Additionality of the programme

The PoA is implementing a voluntary coordinated action, and DNV thus validated that it would not be implemented in the absence of the PoA. The starting date of the Programme of Activities is 30 August 2011, when the PoA-DD was submitted to Global Stakeholders Consultation.

The additionality is demonstrated using the CDM Methodological Tool: “*Tool for the demonstration and assessment of additionality*” /57/: “*Project participants can use either investment analysis or barrier analysis step. They may, if they so wish, use both investment and barrier analysis step*”. Financiera Rural chose to prove the project’s additionality by barrier analysis, using both investment barrier and barrier due to prevailing practice.



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The additionality of the programme is demonstrated considering that currently in Mexico there are no legislation or mandatory rules /64/ to collect and burn the methane produced by the decay of swine manure. The common practice in swine farms in Mexico is use the anaerobic lagoon in order to decay the manure, as demonstrated in the common practice analysis, below,. The PoA is a voluntary action, coordinated and implemented by the Coordinating Entity, Financiera Rural, to supply and finance anaerobic digesters to provide a better waste management system to livestock producers in Mexico and to reduce GHG emissions.

Steps of the “*Tool for the demonstration and assessment of additionality*” /57/ were used:

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

Sub-step 1a: Define alternatives to the project activity

In sub-step 1a, two scenarios were defined: “the proposed project activity undertaken without being registered as a CDM project activity” and “the continuation of the current situation”. DNV consider these scenarios are logical and adequate to the purpose of the PoA.

Sub-step 1b: Consistency with mandatory laws and regulatory

In sub-step 1b, it was demonstrated that neither scenarios are consistent with mandatory laws and current regulations on wastewater discharge /25/ /64/, and noncompliance with those requirements are widespread in the region, as demonstrated in SUSCON’s study /37/ about the average concentration of BOD and TN in wastewater from livestock activities. Meeting such regulations would require additional treatment steps in both baseline alternatives considered. The PoA thus goes beyond the established legislation to treat swine manure and will lead to a greater level of enforcement of the existing mandatory policy/regulation. Hence the project is in line with sustainability police of host country.

Step 2: Investment Analysis

In step 2, Financiera Rural chose to use barriers instead of investment analysis.

Step 3: Barrier Analysis

Sub-step 3a: Identify barriers that would prevent the implementation of the proposed project activity

In sub-step 3a, it is demonstrated that the project activity under the proposed PoA faces the barriers described below:

a. Investment barrier

Implementation costs of the project at a farm almost reaches the same costs as the costs of the implementation of one 3 000 swine warehouse /36/ /37/, so farmers prefer to invest into increasing their production capacity which will provide them with increased revenue. This



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condition could be replicated for electricity generation, where the investment of a generator is 40% of a biodigester /44/, and the electricity saved needs more than 10 years to be recovered. Thus, it is not expected to have producers investing in advanced animal waste management systems.

The implementation of anaerobic digestion technology for manure treatment in Mexico is supported by three government entities through financing services and subsidies given to the producers. The program, which supports the proposed PoA is PROVAR /43/ /63/ (“Added Value Agribusiness support Project with Shared Risk Schemes”) provided by FIRCO (“Shared Risk Trust”) /63/. FIRCO financial support for digester construction is limited to half of the total investment costs or one million Mexican pesos if the total costs exceed two million Mexican pesos. In order to qualify for the subsidy for anaerobic digester construction, the producer must meet six requirements.

- i. The farm/dairy farm production systems are carried out intensively, with animal confinement and manure handling allows its use for biogas generation;
- ii. Have a livestock inventory of at least 300 head of dairy cattle or 200 swine sows within its production unit;
- iii. Have the necessary physical space within the production unit for the digester installation;
- iv. Ensure conditions of biosafety after digester installation;
- v. Have an existing lagoon that allows establishing the baseline scenario according to the related CDM methodologies.
- vi. The farm is a large-scale production operation or is part of a group of operational units that allow the integration of a CDM project in order to minimize investment costs for the project implementation and transaction costs for registration and supervision of CERs, as well as to facilitate monitoring procedures.

These requirements show that to be granted the subsidy, the proposed project activity must be a CDM project activity and present a significant amount of emission reductions that can be certified and sold, in order to make the project financially attractive.

The second government entity is FIRA (“The Trust Funds for Rural Development”), which offers financing up to 80% /40/ of the total investment requirements for the implementation of anaerobic digestion technology. It is not a requirement for FIRA that the project have conditions to apply for CDM credits.

The third and final government entity is Financiera Rural itself, which also offers up to 80% /38/. It expects to obtain CERs in order to finance anaerobic digesters to producers. By gathering small-scale projects under a programme of activities with a financial incentive it is easier to make them viable and is vital since the amount of projects would make it difficult to manage on a project-by-project basis. Its strategy consists in utilizing CER revenues to promote, operate and monitor the PoA and to finance the CPAs. However, it is not feasible for Financiera Rural to support the implementation of all the projects within the PoA due to the size of the programme /33/ and the high costs of the technology involved /32/.

The high investment cost for the proposed project activity makes it unfeasible in the absence of CDM approval since it is not financially attractive compared to the open air lagoons, as the latter needs no additional investment.

The implementation of biogas collection and combustion system needs the action of voluntary coordination of the Coordinating Entity, Financiera Rural in order to be implemented, and the likely baseline scenario for swine farmers is to continue to discharge the swine manure into



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the anaerobic lagoon. The PoA is thus implementing a voluntary coordinated action not required by legislation and that would not be implemented in the absence of the PoA.

However, each CPA is able to participate in the PoA whether or not it requires financial help from Financiera Rural or receive financial help from another entity. Furthermore, additionality of each CPA shall be demonstrated through investment analysis, according to eligibility criterion number 10 described in section A.4.2.2. of the CDM-SSC-PoA-DD, in order to evidence that implementation is not feasible without the CDM revenues.

This eventually corroborates the fact that the project proponents have to go for providing long term loan facility for the farmers, as stated in the CDM-SSC-PoA-DD, for implementing the methane capture, combustion and possible electricity generation system. Thus DNV considers that investment barrier exists for the PoA.

b. Prevailing practice barrier

According to INEGI's Livestock Census /33/, there were 1 129 217 cattle farms and 979 348 swine farms /34/ with a total of 9.021 million head of swine and 23.3 million head of cattle in Mexico as of September 2007. DNV confirmed via INEGI's home page /33/ that this was the latest available information at the time of webhosting the CDM-SSC-PoA-DD for global stakeholders consultation.

According to MGM Innova /20/, in 2004 80% of pig farms in Mexico used to collect pig manure through a sweeping and moving system, which made it easier to recover solid waste for feeding purposes. DNV confirmed that this was the latest available information at the time of webhosting the CDM-SSC-PoA-DD for global stakeholders consultation. However, this practice was questionable because taking into account the nutritious value of manure and the time it takes to fatten a pig to reach the market weight, it may be concluded that it is inefficient. Practices for cattle manure included the removal from sheds and the drying process (in open air) for its use as land fertilizer. Current common practice in swine farms is having pig manure removal by scraping, and its use as animal feed being replaced by removal by water and treatment in an open anaerobic lagoon /31/.

According to FIRCO, PROVAR /43/ /66/ /67/ supported the implementation of 45 anaerobic digesters in 2008 /36/, 102 anaerobic digesters in 2009 /39/, and 74 anaerobic digesters in 2010 /10/ making a total of 221 anaerobic digesters implemented in Mexico with FIRCO support. Financiera Rural has granted loans for the implementation of 3 anaerobic digesters. And FIRA has granted loans for the implementation of 30 anaerobic digesters, as of 2010 /40/.

Thus, a total of 254 anaerobic digesters with biogas capture have been implemented in Mexico with government economic support. Of these 254 anaerobic digesters, 46 have requested CDM registration /42/. Thus, the number of anaerobic digesters supported with government resources is a fraction of the 2 million cattle and swine production units.

More than 150 projects involving anaerobic digestion with biogas capture with flaring and/or use have applied for registration under the CDM in Mexico /42/. As of 1 May 2011, 4 projects have been withdrawn, 48 projects have finished validation (without requesting registration), 8



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projects are at validation and 91 projects have been registered. Statistical information about livestock wastewater treatment in Mexico is not available; therefore CDM information was utilized for the analysis of manure practices in Mexico.

Within the 150 projects applying for registration under the CDM are included more than 700 anaerobic digesters /42/.

Moreover, of the 91 projects which have been registered, as of 1 May 2011 only 34 projects were fully implemented and currently are in operation /42/. Only 16 projects have presented Monitoring Reports but have not been able to request for issuance of CERs. And 41 projects might not have been fully implemented since no Monitoring Report was submitted in the following 24 months after the project registration.

Financiera Rural is seeking to develop the same project concept under a programmatic approach with the hope of being able to introduce biodigesters at a significant number of animal farms, Financiera Rural as the Coordinating Entity of the program would ensure that the technology implementation, operation and maintenance are carried out successfully. Thus DNV considers that prevailing practice barrier exists for the PoA.

Sub-step 3b: Show that the identified barriers would not prevent the implementation of at least one of the alternatives (except the proposed project activity)

In sub-step 3b, it is demonstrated that there is only one feasible alternative besides the project activity, which is the continuation of current practice, since it does not require investments.

Step 4: Common practice analysis

As per the “*Tool for the demonstration and assessment of additionality*” /57/, the following steps were followed:

Step 1: *Calculate applicable output range as +/-50% of the design output or capacity of the proposed project activity;*

Step 2: *In the applicable geographical area, identify all plants that deliver the same output or capacity, within the applicable output range calculated in Step 1, as the proposed project activity and have started commercial operation before the start date of the project. Note their number N_{all} . Registered CDM project activities and projects activities undergoing validation shall not be included in this step;*

For both Steps 1 and 2, the scenarios presented in the PoA use as output the animal manure treatment system for animals in the farms. The PPs considered all the swine and cattle production units in Mexico due to the quantity of animals per production unit is not publicly available.

Considering the livestock from INEGI's Livestock Census /33/, as of September 2007 there were 1 129 217 cattle farms and 979 348 swine farms; making a total of 2 108 565 production units, with a total of 9.021 million heads of swine and 23.3 million heads of cattle in Mexico.



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Public information does not provide details for every farm, PPs considered all the production units (100%). Hence, $N_{all} = 2\,108\,565$. DNV considers this approach is conservative.

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

As per REMBIO /52/, 8% of the swine farms have biodigestors as the animal manure treatment system. Therefore, 92% of these farms apply different technologies than the proposed PoA, i.e.: $979\,348 * 0.92 = 901\,000$ swine farms use biodigestors. In addition, as per CICESE /53/, 7% of the cattle farms use biodigestors as the animal manure treatment system. Therefore, 93% of these farms apply different technologies that the proposed PoA, i.e.: $1\,129\,217 * 0.93 = 1\,050\,172$ cattle farms use biodigestors.

Hence, $N_{diff} = 901\,000 + 1\,050\,172 = \mathbf{1\,951\,172}$.

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

Calculation of the Factor F is: $F = 1 - N_{diff}/N_{all}$

Where:

$N_{diff} = 1\,951\,172$

$N_{all} = 2\,108\,565$

Therefore, $F = 1 - (1\,951\,172 / 2\,108\,565) = \mathbf{0.075}$

The proposed project activity is a “common practice” within a sector in the applicable geographical area if both the factor F is greater than 0.2 and $N_{all} - N_{diff}$ is greater than 3.

F factor is 0.075 (thus is less than 0.2) and $N_{all} - N_{diff}$ is $2\,108\,565 - 1\,951\,172 = 157\,393$, thus greater than 3. It is concluded that anaerobic digestion is not common practice for AWMS in Mexico.

Conclusion: DNV cross-checked the data used in calculations with public available data /33/ /52/ /53/ and considers that the PoA faces investment and prevailing practice barriers which are not prevalent for the baseline case and the CDM revenue will alleviate these barriers. Hence the PoA is additional.

4.7.2 Additionality of typical CPA

As described in the previous section, the additionality of a typical CPA is demonstrated through a barrier analysis for:

- Investment barrier



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- Prevailing practice barrier

However, as the key criteria for additionality demonstration of a CPA described in Section E.5.2 of the PoA-DD, additionality shall be demonstrated through investment analysis /9//10/, according to eligibility criterion number 10 described in section A.4.2.2. of the PoA-DD /1/ (*"The SSC-CPAs shall evidence that are not viable without CDM revenue, demonstrating through investment analysis as described in section E.5.2. of the PoA-DD."*), in order to evidence that implementation is not feasible without the CDM revenues.

The PoA faces financial barriers /9/ as well as barriers due to prevailing practice /10/ and has no intention to implement the CPA without the additional carbon revenue.

The *"Tool for the demonstration and assessment of additionality"* /57/ allows additionality to be demonstrated based on investment analysis, barrier analysis or both. Investment Analysis has not been used for the assessment of additionality of the proposed PoA. Barrier Analysis /9//10/ was used to demonstrate the additionality.

CPAs thus face any or all the stated barriers, and these barriers are not prevalent for the baseline scenario - CPAs complying with the eligibility criteria of this PoA can thus be considered additional.

4.7.3 Approach for demonstrating additionality of CPAs

The SSC-CPAs to be implemented under the PoA "Methane Capture, Combustion and Possible Electricity Generation from AWMS in Mexico" are component project activities that promote multiple biodigester systems with geographical widespread across Mexico. As per *"Draft Guidelines for the demonstration of additionality for CDM programme of activities"* /58/, a full additionality assessment would not be required in the context of the CPA, but to the means of the eligibility criteria stated on Section 4.3, the CPAs of the PoA have applied the *"Tool for the demonstration and assessment of additionality"* /57/, to confirm its additionality. In accordance with *"Tool for the demonstration and assessment of additionality"* /57/, the eligibility criteria defined in Section A.4.2.2 of the CDM-SSC-PoA-DD and the key criteria for additionality demonstration of a CPA described in Section E.5.2 of the CDM-SSC-PoA-DD are derived from the relevant requirements of Attachment A of Appendix B of the Simplified modalities and procedures for small-scale CDM project activities. The confirmation of additionality for CPAs is ensured as shown below through the following eligibility criteria defined in Section A.4.2.2 of the PoA-DD:

Eligibility criteria	What this implies to?
1. Each SSC-CPA will be implemented within the geographical boundary of Mexico.	This criterion implies that only farms located in Mexico will be developed under the Financiera Rural PoA, hence assuming that the CPA faces the same kinds of barriers presented: a) investment barrier and b) prevailing practice barrier.
2. Each SSC-CPA is able to participate voluntarily in the SSC-PoA whether or not requires financial help from	This criterion implies that a farm that will have the project implemented to be part of the PoA, not necessarily receives financing from



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Financiera Rural or receives financial help from another entity.	Financiera Rural. Still, in case that no financial help is requested, the developer can ask voluntarily to participate as a CPA for the present PoA scheme with the benefits of the carbon credits. However, criterion 10 (investment analysis) needs to be fulfilled.
3. SSC-CPAs to be included shall consist of the implementation of anaerobic digestion as wastewater treatment /32/, an enclosed flaring system /17/ and for CPAs corresponding to scenario B also an electricity generation system /18/;	This criterion implies that all CPAs participating in the PoA will have the same biodigester, flaring and electricity generation (for scenario B farms) system, which present a) investment barrier and b) prevailing practice barrier to be implemented.
4. SSC-CPAs will have anaerobic lagoons as baseline scenario treatment;	This criterion implies that all CPAs participating in the PoA present the same baseline scenario, i.e.: anaerobic lagoons were used as treatment of manure prior to the implementation of the project, which would not be substituted by biodigester, flaring and electricity generation (for scenario B farms) system if would not participate in the PoA.
5. SSC-CPAs corresponding to project activity scenario A shall comply with the requirements of <i>AMS-III.D.</i> , “Methane recovery in animal manure management systems” version 18. CPAs corresponding to project activity scenario B shall comply with the requirements of <i>AMS-III.D.</i> , “Methane recovery in animal manure management systems” version 18 and <i>AMS-I.D.</i> “Grid connected renewable electricity generation”, version 17;	This criterion implies that all CPAs participating in the PoA will comply with the same methodologies, thus fulfilling the same eligibility criteria of the methodologies.
6. A de-bundling check shall be assessed, according to Annex 13 of EB 54, for SSC-CPA to be included in the PoA;	This criterion implies that paragraph 2 of Annex 13 of EB 54 will be followed: “A proposed small-scale project activity shall be deemed to be a debundled component of a large project activity if there is a registered small-scale CDM project activity or an application to register another small-scale CDM project activity: (a) With the same project participants; (b) In the same project category and technology/measure; and



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	<p>(c) Registered within the previous 2 years; and</p> <p>(d) Whose project boundary is within 1 km of the project boundary of the proposed small-scale activity at the closest point.”</p>
<p>7. The coordinating entity will ensure that all CPAs under its PoA are neither registered as an individual CDM project activity nor included in another registered PoA, and that the CPA is subscribed to the PoA;</p>	<p>This criterion implies that no farm that participates in other CDM projects or PoAs will be included in this proposed PoA as a CPA. Each CPA will have the following references controlled, in order to avoid double counting:</p> <ul style="list-style-type: none"> a. Farm name b. Farm owner c. Type of livestock (s) at the farm d. Location: town/state, and physical address of the farm where the anaerobic digester will be installed. e. GPS Coordinates f. Anaerobic digester’s ID number
<p>8. SSC-CPAs shall have a project starting date after the PoA-DD is submitted to Global Stakeholders Consultation;</p>	<p>This criterion implies that only farms which present a starting date after than 30 August 2011 will be eligible to be included as CPAs in this PoA.</p>
<p>9. The SSC-CPAs shall be in line with national and local regulations available at the time of inclusion into the SSC-PoA. If an Environmental Impact Assessment (EIA) is mandated for a CPA, such an EIA must be undertaken at the CPA level prior to the inclusion of the CPA in the PoA. In addition, it is indicated to the SSC-CPAs that stakeholder consultations has been done at PoA level, hence, there is no need to undertake a local stakeholder consultations;</p>	<p>This criterion implies that all farms face the same baseline scenario: not consistent with mandatory laws and current regulations on wastewater discharge /25/ /64/, and noncompliance with those requirements are widespread in the region, as demonstrated in SUSCON’s study /37/ about the average concentration of BOD and TN in wastewater from livestock activities. Meeting such regulations would require additional treatment steps in both baseline alternatives considered. The PoA thus goes beyond the established legislation to treat swine manure and will lead to a greater level of enforcement of the existing mandatory policy/regulation. Hence the project is in line with sustainability police of host country.</p>
<p>10. The SSC-CPAs shall demonstrate that they are not viable without CDM revenues, through investment analysis as described in section E.5.2 of the</p>	<p>This criterion implies that each farm participating in the PoA shall apply the “Guidelines on the Assessment of Investment Analysis” /59/, in order to demonstrate that the implementation of the CPA is not</p>



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PoA-DD.	financially feasible without the CDM revenues.
11. The SSC-CPA will stay within the small scale threshold criteria of the Type I (i.e < 15 MW) and Type III (i.e < 60,000 CERs per year) components of the project activity and will remain within those thresholds throughout the crediting period of the CPA.	This criterion implies that each CPA shall not surpass the limit for small scale projects.
12. Each SSC-CPA will either not involve funding from Annex I parties, or if any funding from Annex I parties is involved, it will not result in a diversion of official development assistance.	This criterion implies that all there cannot be funding from official development assistance.

4.8 Monitoring plan

The PoA and each CPA applies the approved monitoring methodology *AMS-III.D.*, “*Methane recovery in animal manure management systems*” version 18. According to *AMS-III.D.*, the monitoring consists of direct measurement of the amount of methane captured and flared or utilized for electricity generation.

The implementation of the biodigester requires labour activities such as:

Daily Operation: Performed by the farm personnel of each SSC-CPA participant.

Biodigester operations: Each SSC-CPA participant and their farm operators will be responsible for proper maintenance and operation of the biodigester system. The Coordinating Entity (Financiera Rural), in collaboration with the technology providers, will develop a monitoring manual that establishes the proper procedures that shall be followed in order to operate and maintain the technology in a proper way fulfilling the data accuracy and control requirements.

Responsibilities are:

- **Financiera Rural (as Coordinating Entity):** Financiera Rural will be responsible for the implementation and accomplishment of the monitoring procedures in the CPAs by performing randomly internal audits to the CPAs. It will be responsible to start-up, supervise and coordinate the Program. Also, it will be responsible to promote the Program at national level. It will be also responsible to standardize the types of technologies to be used for the Program. This entity will recompile all the data generated from all the SSC-CPA participants in their proposed project activities for the elaboration of monitoring reports and emissions reduction calculations for verification purposes. Performance of the calibration as well as maintenance of the main equipment used in the operation of the



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anaerobic digester will be part of the monitoring plan. These data will be available to Financiera Rural for internal audits purposes at any moment. In the case data of calibration or no performance of such events were available from the CPAs, as a conservativeness purposes it shall be used in the calculations the maximum error range of the corresponding instrument in the ER calculations respectively. In case of lack of data, no emission reductions will be claimed for the period where the data is not available.

In each SSC-CPA participant;

- **Operational Manager:** Responsible for coordination of environmental and maintenance activities. He will coordinate the monitoring activities together with the Supervisor to ensure that the monitoring plan is performed according to the methodology. This includes also the supervision of the monitoring procedures and the responsibility for the data transfer to an integrated database for CER verification. He is also responsible for periodic inspections at the farm.
- **Maintenance and Operations Supervisor:** Responsible for maintenance and operation of biodigester, flare and other associated equipment. He will take the lead for prevention and attention of problems that may occur in relation with the equipment and request external maintenance and calibration support according to the manufacturer's recommendation.
- **Technology supplier:** Will provide the maintenance and calibration services to the biodigester, flaring system and other associated equipment on request of the Operational Manager. They will also provide training to the SSC-CPA participants' personnel to ensure proper operation of biodigester, flaring, generators and monitoring equipment.
- **Operator for biodigester and flaring systems:** Responsible of the biodigester and flaring systems (piping, biodigestion, measurements, torch, etc). He will identify the needs of calibration and maintenance of the equipment and manage their calibrations in order to obtain the proper documentation.
- **Operator for the electricity generation system:** Responsible of the operation of the electricity generation system (piping, measurements, interconnection to the national grid, etc). He will identify the needs of calibration and maintenance of the equipment and manage their calibrations in order to obtain the proper documentation.
- **Personnel of each farm:** They will support the operation of the biodigester and monitoring procedures. In addition, these personnel are responsible of the manure cleaning system that will be sent to the biodigester. Also, they will confirm if 100% of the manure has been sent to the biodigester.

The monitoring plan shall include on-site inspections in order to guarantee correct data collection and monitoring performance during the crediting period. A typical checklist would include the following tasks:

- General cleaning in the biodigester area;
- Maintenance of the pipes that conduct manure to the biodigester;
- Maintenance of pumps;
- Calibration of the control and measurement equipment;
- Leak checks; and

Maintenance of all related equipment.



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It is DNV's opinion, that the project participants are able to implement the monitoring plan.

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

As discussed in section 4.5 of this report, the project activities are developed using the approved methodology *AMS-III.D.*, "Methane recovery in animal manure management systems" version 18. Also, methodologies *AMS-I.D.* "Grid connected renewable electricity generation", version 17 and *AMS-III.F.*, "Avoidance of methane emissions through composting", version 10 are applied for the estimation of project emissions from electricity consumption and the estimation of project emissions from incremental transportation respectively.

Emissions Reduction for CPAs from Scenario A

According to the methodology *AMS-III.D.*, version 18, the formulae to calculate the baseline emissions, leakage emissions and project emissions are described below:

Baseline emissions

Baseline emissions (BE_y) are calculated by using one of the following two options:

- Using the amount of the waste or raw material that would decay anaerobically in the absence of the project activity, with 2006 IPCC tier 2 /30/. For this calculation, information about the characteristics of the manure and of the management systems in the baseline is required. Manure characteristics include the amount of volatile solids (VS) produced by the livestock and the maximum amount of methane that can be potentially produced from that manure (B_o);
- Using the amount of manure that would decay anaerobically in the absence of the project activity based on direct measurement of the quantity of manure treated together with its specific volatile solids (SVS) content.

For the project activity option (a) is chosen, therefore the baseline emissions are calculated as follows:

$$BE_y = GWP_{CH_4} \times D_{CH_4} \times UF_b \times \sum_{j,LT} MCF_j \times B_{0,LT} \times N_{LT,y} \times VS_{LT,y} \times MS\%_{BL,j}$$

Where:

$BE_{y,y}$ = Baseline emissions in year y. y = 2010.(tCO₂e/y)

GWP_{CH_4} = Global Warming Potential (GWP) of CH₄ (21 tCO₂e/tCH₄)

D_{CH_4} = CH₄ density (0.00067 tonne/m³ at room temperature (20°C) and 1 atm pressure)

LT = Index for all types of livestock

j = Index for animal waste management system

MCF_j = Annual methane conversion factor (MCF) for the baseline animal waste



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management system j . No country-specific data is available; therefore the value was selected from the 2006 IPCC Guidelines.

- $B_{O,LT}$ = Maximum methane producing potential of the volatile solids generated for animal type LT ($\text{m}^3 \text{CH}_4/\text{kg dm}$).
- $N_{LT,y}$ = Annual average number of animals of type LT in year y
- $VS_{LT,y}$ = Volatile solids for livestock type LT entering the animal manure management system in year y (on a dry matter weight basis, kg dm/animal year).
- $MS\%_{Bl,j}$ = Fraction of manure handled in baseline animal manure management system j
- UF_b = Model correction factor to account for model uncertainties (0.94)

Since no country-specific data is available for the parameter $B_{O,LT}$ and VS_{default} , the values were selected from the 2006 IPCC Guidelines /30/. The chosen values correspond to Latin American values or North American values, according to each CPA livestock characteristics /27/.

Since annual methane conversion factor (MCF) for the baseline animal waste management system data is not available in the host country, values are sourced from the 2006 IPCC Guidelines /30/ according to livestock and average temperature:

	Market Swine			Breeding Swine		
Region	W_{default} (kg)	$B_{O,LT}$ ($\text{m}^3 \text{CH}_4/\text{kg dm}$)	VS_{default} (kg-dm/animal/yr)	W_{default} (kg)	$B_{O,LT}$ ($\text{m}^3 \text{CH}_4/\text{kg dm}$)	VS_{default} (kg-dm/animal/yr)
Latin America	28	0.29	0.3	28	0.29	0.3
North America	46	0.48	0.27	198	0.48	0.5

Market and breeding swine default values

	Dairy Cattle			Other Cattle		
Region	W_{default} (kg)	$B_{O,LT}$ ($\text{m}^3 \text{CH}_4/\text{kg dm}$)	VS_{default} (kg-dm/animal/yr)	W_{default} (kg)	$B_{O,LT}$ ($\text{m}^3 \text{CH}_4/\text{kg dm}$)	VS_{default} (kg-dm/animal/yr)
Latin America	400	0.13	2.9	305	0.1	2.5
North America	604	0.24	5.4	389	0.19	2.4

Dairy and other cattle default values

$$VS_{LT,y} = \left(\frac{W_{\text{site}}}{W_{\text{default}}} \right) \times VS_{\text{default}} \times nd_y$$

Where:

- W_{site} = Average animal weight of a defined livestock population at the project site (kg)



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- $W_{default}$ = Default average animal weight of a defined population, this data is sourced from IPCC 2006 (kg)
 $VS_{default}$ = Default value for the volatile solid excretion rate per day on a dry-matter basis for a defined livestock population (kg dm/animal/day)
 nd_y = Number of days in year y where the treatment plant was operational.

The annual average number of animals of type LT in year y ($N_{LT,y}$) is determined as follows:

$$N_{LT,y} = N_{da,y} \times \left(\frac{N_{p,y}}{365} \right)$$

Where:

- $N_{da,y}$ = Number of days animal is alive in the farm in the year y (numbers). This data is available Average animal weight of a defined livestock population in the Project Proponent farm inventories.
 $N_{p,y}$ = Number of animals produced annually of type LT for the year y (numbers). This data is available in the Project Proponent farm inventories.

Project emissions

The project activity emissions consist of:

- Physical leakage of biogas in the manure management system which includes production, collection and transport of biogas to the point of flaring/combustion or gainful use ($PE_{PL,y}$);
- Emissions from flaring or combustion of the gas stream ($PE_{flare,y}$);
- CO₂ emissions from use of fossil fuels or electricity for the operation of all the installed facilities ($PE_{power,y}$);
- CO₂ emissions from incremental transportation distances ($PE_{transp,y}$);
- Emissions from the storage of manure before being fed into the anaerobic digester ($PE_{storage,y}$).

$$PE_y = PE_{PL,y} + PE_{flare,y} + PE_{power,y} + PE_{transp,y} + PE_{storage,y}$$

- PE_y = Project emissions in year y (tCO₂e)
 $PE_{PL,y}$ = Emissions due to physical leakage of biogas in year y (tCO₂e)
 $PE_{flare,y}$ = Emissions from flaring or combustion of the biogas stream in the year y (tCO₂e)
 $PE_{power,y}$ = Emissions from the use of fossil fuel or electricity for the operation of the installed facilities in the year y (tCO₂e)
 $PE_{transp,y}$ = Emissions from incremental transportation in the year y (tCO₂e), as per relevant paragraph in AMS-III.F.
 $PE_{storage,y}$ = Emissions from the storage of manure (tCO₂e)



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a) Physical leakage of biogas emissions in the AWMS:

Project emissions due to physical leakage of biogas from the animal manure management system used to produce, collect and transport the biogas to the point of flaring or gainful use are estimated as 10% of the maximum methane producing potential of the manure fed into the management systems implemented by the project activity as follows:

$$PE_{PL,y} = 0.10 \times GWP_{CH_4} \times D_{CH_4} \times \sum_{i,LT} B_{o,LT} \times N_{LT,y} \times VS_{LT,y} \times MS\%_{i,y}$$

Where:

$PE_{PL,y}$ = Emissions due to physical leakage of biogas in year y (tCO₂e)

GWP_{CH_4} = Global warming potential (GWP) of CH₄ (21 tCO₂e/tCH₄)

D_{CH_4} = CH₄ density (0.00067 tonne/m³ at room temperature (20°C) and 1 atm pressure)

LT = All types of livestock

j = Animal waste management systems

$B_{o,LT}$ = Maximum methane producing potential of the volatile solids generated for animal type LT (m³ CH₄/kg dm)

$N_{LT,y}$ = Annual average number of animals of type LT in year y

$VS_{LT,y}$ = Volatile solids for livestock type LT entering the animal manure management system in year y (on a dry matter weight basis, kg dm/animal year)

$MS\%_{Bl,j}$ = Fraction of manure handled in baseline animal manure management system j

a.1) Physical leakage of biogas emissions in the secondary treatment:

In case of sequential treatment stages, the reduction of the volatile solids during a treatment stage is estimated based on referenced data for different treatment types but with volatile solids adjusted for the reduction from the previous treatment stages by multiplying by $(1 - RVS) / 41$.

Variable	Value	Units	Description
RVS	80	%	Relative reduction of volatile solids from the previous stage. Sourced from the table in annex 1 from the applied methodology.

Values applied for the determination of physical leakage of biogas in the secondary treatment

Emissions from the next treatment stage are then calculated with the following equation:

$$VS_{LT,y} = \left(\frac{W_{site}}{W_{default}} \right) \times VS_{default} \times nd_y \times (1 - RVS)$$

Where:

W_{site} = Average animal weight of a defined livestock population at the project site (kg)



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$W_{default}$	=	Default average animal weight of a defined population, this data is sourced from IPCC 2006 (kg)
$VS_{default}$	=	Default value for the volatile solid excretion rate per day on a dry-matter basis for a defined livestock population (kg dm/animal/day)
nd_y	=	Number of days in year y where the treatment plant was operational.
RVS	=	The relative reduction of volatile solids from the previous stage. A value of 80% was chosen.

Once estimated the $VS_{LT,y}$, Project Emission ($PE_{PL,y}$) are then calculated following the approach outlined above.

b) Flaring emissions

For the flaring /16/ /17/ of biogas, project emissions are estimated using the procedures described in the tool “*Project emissions from flaring*”, previously called “*Tool to determine project emissions from flaring gases containing methane*”, making differentiation between open and enclosed flares (only enclosed flares will be used in the CPAs, as determined in eligibility criterion 3).

The tool involves the following steps:

STEP 1: Determination of the methane mass flow of the residual gas.

STEP 2: Determination of the flare efficiency.

STEP 3: Calculation of project emissions from flaring

STEP 1: Determination of the methane mass flow rate of the residual gas

The “*Tool to determine the mass flow of a greenhouse gas in a gaseous stream*” /57/ shall be used to determine the parameter $F_{CH_4, m}$.

In each CPA-DD, it will be demonstrated which option of the “*Tool to determine the mass flow of a greenhouse gas in a gaseous stream*” /57/ will be applied considering the characteristics of the biogas flowmeter(s) to be installed for the implementation of the project activity.

The density of the residual gas is determined based on the volumetric fraction of all components in the gas. As per the tool, a simplified approach will be used and only the volumetric fraction of methane shall be taken into account, and the difference is considered to be Nitrogen (an inert gas).

$F_{CH_4, m}$, which is measured as the mass flow during minute m , shall then be used to determine the mass of methane in kilograms fed to the flare in minute m ($F_{CH_4, RG, m}$). $F_{CH_4, m}$ shall be determined on a dry basis.

The components present in the residual gas (biogas) produced at anaerobic digesters are mainly CH_4 and CO_2 /29/. It can be assumed that a typical biogas composition consists of 60 to 70% of CH_4 /29/. However, for *ex-ante* estimation and according to the tool simplified



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approach /57/, it was assumed that the residual gas composition consists of 60% CH₄ in volume and 40% N₂.

The flow rate of the biogas on dry basis at normal conditions depends on the number of animals, and the type of livestock and manure system.

The total volumetric flow rate of the biogas on dry basis at normal conditions FV_{biogas} can be estimated for *ex-ante* purposes only as follows, as per formula proposed by the PP:

$$FV_{biogas} = \frac{\sum_{j,LT} MCF_j \times B_{o,LT} \times N_{LT,y} \times VS_{LT,y} \times MS\%_{BL,y}}{w_{CH_4} \times nd_y \times 24}$$

MCF_j for anaerobic digestion was estimated assumed to be 100% as a conservative approach, since according to IPCC Guidelines this value varies between 0 and 100%.

Variable	Value	Units	Description
MCF	100%	%	Annual methane conversion factor (MCF) for the baseline animal waste management system
minutes	525 600	mins/yr	Number of minutes per year

Values applied for the determination of the mass flow rate of the residual gas

As mentioned in the tool: "As a simplified approach, project participants may only measure the volumetric fraction of methane and consider the difference to 100% as being nitrogen (N₂)".

Variable	Value	Variable	Value
Volumetric fraction of methane	0.60	Volumetric fraction of nitrogen	0.40
Molecular mass of methane	16.04	Molecular mass of nitrogen	28.02

Values applied for the determination of the mass flow rate of the residual gas that is flared

STEP 2: Determination of the flare efficiency

As per tool "Project emissions from flaring" /57/, for enclosed flares that are defined as low height flares (enclosed flares for which the flame enclosure has a height between 10 and two times the diameter of the enclosure), the flare efficiency in the minute m ($\eta_{flare,m}$) shall be adjusted, as a conservative approach, by subtracting 0.1 from the efficiency as determined in Options A or B. For example, the default value applied should be 80%, rather than 90%, and if for example the measured value was 99%, then the value to be used shall correspond to 89%.

Hence, for enclosed flares, the Tool proposes two options to determine the flare efficiency:



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(a) Option A: Apply a default value for flare efficiency.

The flare efficiency for the minute m ($\eta_{\text{flare},m}$) is 90% when the following two conditions are met to demonstrate that the flare is operating:

1. The temperature of the flare ($T_{\text{EG},m}$) and the flow rate of the residual gas to the flare ($F_{\text{RG},m}$) is within the manufacturer's specification for the flare ($\text{SPEC}_{\text{flare}}$) in minute m ; and
2. The flame is detected in minute m (Flame_m).

Otherwise $\eta_{\text{flare},m}$ is 0%.

(b) Option B: Measure the flare efficiency.

The flare efficiency in the minute m is a measured value ($\eta_{\text{flare},m} = \eta_{\text{flare,calc},m}$) when the following two conditions are met to demonstrate that the flare is operating:

1. The temperature of the flare ($T_{\text{EG},m}$) and the flow rate of the residual gas to the flare ($F_{\text{RG},m}$) is within the manufacturer's specification for the flare ($\text{SPEC}_{\text{flare}}$) in minute m ; and
2. The flame is detected in minute m (Flame_m).

Otherwise $\eta_{\text{flare},m}$ is 0%.

In applying Option B, the project participants may choose to determine $\eta_{\text{flare,calc},m}$ using either Option B.1 or Option B.2. Under Option B.1 (Biannual measurement of the flare efficiency) the measurement is conducted by an accredited entity on a biannual basis and under Option B.2 the flare efficiency is measured in each minute.

The PoA will use option A for enclosed flares: default value for flare efficiency.

STEP 3. Calculation of project emissions from flaring

For option A, project emissions from flaring are calculated as the sum of emissions for each minute m in year y , based on the methane mass flow rate in the residual gas ($F_{\text{CH}_4,m} = F_{\text{CH}_4,\text{RG},m}$) and the flaring efficiency ($\eta_{\text{flare},m}$), as follows:

$$PE_{\text{flaring},y} = PE_{\text{flare},y} = GWP_{\text{CH}_4} \times \sum_{m=1}^{525,600} F_{\text{CH}_4,\text{RG},m} \times (1 - \eta_{\text{flare},m}) \times 10^{-3}$$

Where:

$PE_{\text{flare},y}$	Project emissions from flaring of the residual gas in year y (tCO ₂ e)
GWP_{CH_4}	Global Warming Potential of methane valid for the commitment period
$F_{\text{CH}_4,\text{RG},m}$	Mass flow rate of methane in the residual gas in the minute m (kg)



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$\eta_{flare,m}$ Flare efficiency in minute m

c) Emissions from the use of fossil fuel or electricity for the operation of the installed facilities in the year y (tCO₂e)

No emissions from the use of fossil fuel for the operation of the installed facilities will occur, since no extra equipment with fossil fuel consumption will be used.

Given there is electricity consumption of the grid by the electrical equipment installed due to the implementation of the proposed project activity (either for Scenario A or Scenario B), its emissions are calculated according to “*Tool to calculate baseline, project and/or leakage emissions from electricity consumption*” /57/.

$$PE_{power,y} = \sum_j EC_{PJ,j,y} * EF_{CO2,grid,y} * (1 + TDL_{j,y})$$

Where:

$PE_{power,y}$	Are the project emissions from electricity consumption by the operation of all installed equipment in the year y (tCO ₂ / yr)
$EC_{PJ,j,y}$	Quantity of net electricity consumed by the project electricity consumption source j in year y (MWh/yr)
$EF_{CO2,grid,y}$	Is the emission factor of the national grid (tCO ₂ /MWh).
$TDL_{j,y}$	Is the average technical transmission and distribution losses for providing electricity to source j in year y (%)

According to the methodology *AMS-III.D.*, version 18 /57/, “*The annual fossil fuel or electricity used to operate the facility or power auxiliary equipment shall be monitored. Alternatively it shall be assumed that all relevant electrical equipment operate at full rated capacity, plus 10% to account for distribution losses, for 8760 hours per annum*”.

For the cases where the second approach is chosen, the electricity consumption will be estimated as follows:

$$EC_{PJ,j,y} = CP_{i,j} * (1 + 10\%) * 8760$$

Where:

$EC_{PJ,j,y}$	Quantity of net electricity consumed by the project electricity consumption source j in year y (MWh/yr)
$CP_{i,j}$	Rated capacity of electrical equipment i used for project activity in year y (MW)



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A.1

And therefore, emissions from the use of electricity for the operation of the installed facilities using the second approach can be calculated as:

$$PE_{power,y} = \sum_j \{CP_{i,j} * (1 + 10\%) * 8760\} * EF_{CO2,grid,y} * (1 + TDL_{j,y})$$

According to *AMS-I.D.*, the grid emission factor is calculated in a transparent and conservative manner according to the procedures prescribed in the “*Tool to calculate the emission factor for an electricity system*” /57/.

The tool in its version 2.2.0 states that: *this tool is also referred (...) for the purpose of calculating project and leakage emissions in case where a project activity consumes electricity from the grid or results in increase of consumption of electricity from the grid outside the project boundary*”.

The combined margin calculated with this tool will be used for when project activity is consuming energy from the grid in order to meet project energy demand. In order to calculate the combined margin CO₂ emission factor, the tool establishes the following six steps:

- STEP 1. Identify the relevant electricity systems.
- STEP 2. Choose whether to include off-grid power plants in the project electricity system (optional).
- STEP 3. Select a method to determine the operating margin (OM).
- STEP 4. Calculate the operating margin emission factor according to the selected method.
- STEP 5. Calculate the build margin (BM) emission factor.
- STEP 6. Calculate the combined margin (CM) emissions factor.

STEP 1. Identification of the relevant electric power system.

The grid emission factor is calculated based on the last version of the “Electricity Sector Prospective” developed by the Mexican Secretary of Energy (SENER) /5/ /28/.

The relevant power system is the one physically connected to the farms. This comprises the complete Mexican interconnected power grid, except Baja California and Baja California South, both geographical regions with an isolated system that is not connected to the national power grid.

STEP 2. Choice to include off-grid power plants in the project electricity system (optional).

Under this tool, the emission factor for the project electricity system can be calculated either for grid power plants only or, as an option, can include off-grid power plants. It was chosen not to include off-grid power plants.

STEP 3. Selection of an operating margin



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Four different procedures are indicated for determining the operating margin emission factor ($EF_{grid,OM,y}$). These are denominated:

- (a) Simple Operating Margin.
- (b) Simple Adjusted Operating Margin.
- (c) Dispatch Data Analysis Operating Margin.
- (d) Average Operating Margin.

The tool also states that the Simple Operating Margin method can only be used where low-cost/must run resources constitute less than 50% of total grid generation in: 1) average of the five most recent years, or 2) based on long-term normals for hydroelectricity production.

The project applies the Simple OM method, which is applicable since low-cost/must-run resources in Mexico constitute less than 50% of the total grid generation in average /28/ .

Type	Low cost or must run	2005	2006	2007	2008	2009
Conventional thermoelectric	no	65 077	51 931	49 482	43 325	43 112
Dual	no	14 275	13 875	13 375	6 883	12 299
Combined cycle	no	73 381	91 064	102 674	107 830	113 900
Gas turbine	no	1 358	1 523	2 666	2 802	3 735
Internal combustion	no	780	854	1 139	1 234	1 241
Hydroelectric	yes	27 611	30 305	27 042	38 892	26 445
Coal	no	18 380	17 931	18 101	17 789	16 886
Nuclear	yes	10 805	10 866	10 421	9 804	10 501
Geothermal	yes	7 299	6 685	7 404	7 056	6 740
Wind	yes	5	45	248	255	249

Power generation in Mexico

	2005	2006	2007	2008	2009
Total generation (GWh)	218 971	225 079	232 552	235 870	235 108
Low cost/must run generation (GWh)	45 720	47 901	45 115	56 007	43 935
Low cost/must run generation	20.88%	21.28%	19.40%	23.74%	18.69%
Average low cost/must run generation	20.80%				

Low cost/must run generating percentage in the total electricity generation in Mexico

The tool states that the operating margin emission factor can be calculated using one of the following data vintages:

- *Ex ante option:* A 3-year generation-weighted average, based on the most recent data available at the time of submission of the CDM-SSC-PoA-DD to the DOE for validation, without requirement to monitor and recalculate the emissions factors during the crediting period, or
- *Ex-post option:* The year, in which project activity displaces grid electricity, requiring the emissions factor to be updated annually during monitoring. If the data required to



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calculate the emission factor for year y is usually only available later than six months after the end of year y, alternatively the emission factor of the previous year (y-1) may be used. If the data is usually only available 18 months after the end of year y, the emission factor of the year proceeding the previous year (y-2) may be used. The same data vintage (y, y-1 or y-2) should be used throughout all crediting periods.

In this PoA DD the ex-ante option is selected. As a consequence, the operating margin emission factor is calculated ex-ante and will remain fixed during the first crediting period.

STEP 4. Calculation of the operating margin emission factor according to the selected method.

As shown in step 3, the operating margin calculation /5/ method chosen was Simple OM (method a).

For calculating the operating margin emission factor, the generation-weighted average CO₂ emissions per unit net electricity generation (tCO₂/MWh) of all generating power plants serving the system excluding the low-cost/must run generation units is considered.

Also, the tool gives two different options to calculate OM emission factor, as follows:

Option A. Calculation based on average efficiency and electricity generation of each plant

Option B. Calculation based on total fuel consumption and electricity generation of the system

Option B was used, because only net electricity generation and fuel consumption of the electricity system data is available /5/. The OM emission factor is given by the formula:

$$EF_{grid,OMsimple,y} = \frac{\sum_i FC_{i,y} \times NCV_{i,y} \times EF_{CO_2,i,y}}{EG_y}$$

Where:

- $EF_{grid,OMsimple,y}$ = Simple operating margin CO₂ emission factor in year y (tCO₂/MWh)
- $FE_{i,y}$ = Amount of fossil fuel type i consumed in the project electricity system in year y (mass or volume unit)
- $NCV_{i,y}$ = Net calorific value (energy content) of fossil fuel type i in year y (GJ / mass or volume unit)
- $EF_{CO_2,i,y}$ = CO₂ emission factor of fossil fuel type i in year y (tCO₂/GJ)
- EG_y = Net electricity generated and delivered to the grid by all power sources serving the system, not including low-cost / must-run power plants / unit, in year y (MWh)
- i = All fossil fuel types combusted in power plant / unit m in year y
- y = Either the three most recent years for which data is available at the time of submission of the CDM-SSC-PoA-DD to the DOE for validation (ex-ante option) or the applicable year during monitoring (ex-post option), following the guidance on data vintage step 2



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For determining the operating margin emission factor, it is necessary to determine the electricity imports. Electricity exports are not subtracted from electricity generation data used for calculating the grid emission factor.

Year	2005	2006	2007	2008	2009
Total Exports	1 291	1 299	1 451	1 452	1 249
Total Imports	87	523	277	351	346
Net exchange	1 204	776	1 174	1 102	904

Electricity exportation and importation

There are no imports from other systems inside Mexico. For imports from connected electricity system located in another country, the emission factor is 0 tCO₂/MWh. Thus, the total generation of electricity considered in calculation of the operating margin emission factor results to be:

Year	2005	2006	2007	2008	2009
Total generation	218 971	225 079	232 552	235 870	235 108
Low cost/must run generation	45 720	47 901	45 115	56 007	43 935
Imports	87	523	277	351	346
Electricity generation for OM ($\sum_i GEN_i$)	173 388	177 701	187 714	179 512	190 827

Electricity generation for OM emission factor calculation (GWh)

	2007		2008	2009
	%	TJ/day	m ³ /day (natural gas) or tonne/year	m ³ /day (natural gas) or tonne/year
Diesel	0.50%	23	700	1 100
Coal (national)	18.50%	837	9 100 000	8 500 000
Coal (imported)			1 700 000	5 200 000
Natural gas	52.10%	2 359	71 900 000	76 600 000
Residual fuel oil	28.90%	1 308	29 000	26 500

Fossil fuel consumption for power generation

2006 IPCC Guidelines for National Greenhouse Gas Inventories provide values of carbon emissions from fuel combustion in terms of tonnes of C per TJ. Considering a factor of 44/12 to convert from C to CO₂ and the fraction of carbon oxidized ratio, also taken from IPCC, the CO₂ emissions corresponding to fuel consumption in Mexico's power sector can be estimated.

The CO₂ emission coefficient of each fuel is shown in the table below:

Fuel	CO ₂ emission factor ¹ (tCO ₂ /TJ)
Residual fuel oil	77.40
Natural gas	56.10

¹ 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Chapter 1, Table 1.4, Pages 1.23 and 1.24.



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Diesel	74.10
Coal	94.60

CO₂ emission coefficient of each fuel

Total CO₂ emissions from fuel combustion by the power plants, excluding low-operating cost and must-run power plants, are shown in the following table:

Year	CO ₂ emissions (tCO ₂ /year)
2009	115 865 082
2008	107 773 337
2007	110 757 851
2006	109 875 566

Total CO₂ emissions

Thus, the operating margin emission factor results to be:

	2007	2008	2009
Total CO ₂ emissions (tCO ₂)	110 757 851	107 773 337	115 865 082
Total generation (GWh)	232 552	235 870	235 108
Self consumption (GWh)	11 252	10 763	10 833
Net total generation (GWh)	221 300	225 107	224 275
Net total generation excluding low cost/must run (GWh)	178 368	171 656	182 364
Imports (GWh)	277	351	346
Electricity generation for OM (GWh)	178 091	171 305	182 018

Operating margin emission factor

DNV cross-checked the values and calculations used /5/ with official data /28/ and confirms that appropriate methods and formulae for calculating operating margin have been used.

STEP 5. Calculation of the build margin (BM) emission factor

In terms of vintage of data, project participants can choose between one of the following two options:

- *Option 1: For the first crediting period, calculate the build margin emission factor ex-ante based on the most recent information available on units already built for sample group m at the time of CDM-SSC-PoA-DD submission to the DOE for validation. For the second crediting period, the build margin emission factor should be updated based on the most recent information available on units already built at the time of submission of the requested for renewal of the crediting period to the DOE. For the third crediting period, the build margin emission factor calculated for the second crediting period should be used. This option does not require monitoring the emissions factor during the crediting period.*



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- *Option 2: for the first crediting period, the build margin emission factor shall be updated annually, ex-post, including those units built up to the year of registration of the project activity or, if information up to the year of registration is not available, including those units built up to the latest year for which information is available. For the second crediting period, the build margin emission factor shall be calculated ex-ante, as described in Option 1 above. For the third crediting period, the build margin emission factor calculated for the second crediting period should be used.*

In this PoA DD the ex-ante option is selected. As a consequence, the build margin emission factor is calculated ex-ante and will remain fixed during the first crediting period.

The sample group of power units *m* used to calculate the build margin /5/ is determined as per the following procedure, consistent with the data vintage selected above:

- a. Identify the set of five power units, excluding power units registered as CDM project activities, that started to supply electricity to the grid most recently ($SET_{5\text{-units}}$) and determine their annual electricity generation ($AEG_{SET\text{-}5\text{-units}}$, in MWh);



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SET ₅ UNITS							
Units	Plant	Unit	Capacity (MW)	Technology	Power generation (MWh)	Self consumption	Net power generation (MWh)
1	San Lorenzo Potencia	5	116.1	CC	235 000	2.20%	229 830
2	Humeros	8	5	GEO	40 125	0.00%	40 125
3	Rio Bravo (Emilio Portes Gil)	1	33.0	CC	17 307	2.78%	16 826
4		2	33.0	CC	17 307	2.78%	16 826
5		4	145.1	CC	76 099	2.78%	73 984
						AEG _{Set-5-units}	377 591

- b. Determine the annual electricity generation of the project electricity system, excluding power units registered as CDM project activities (AEG_{total}, in MWh). Identify the set of power units, excluding power units registered as CDM project activities, that started to supply electricity to the grid most recently and that comprise 20% of AEG_{total} (if 20% falls on part of the generation of a unit, the generation of that unit is fully included in the calculation) (SET_{≥20%}) and determine their annual electricity generation (AEG_{SET-≥20%}, in MWh);

As per Electricity sector prospectives, the annual electricity generation AEG_{SET-≥20%}, is 49 976 208 MWh.

- c. From SET_{5-units} and SET_{≥20%} select the set of power units that comprises the larger annual electricity generation (SET_{sample});

Identify the date when the power units in SET_{sample} started to supply electricity to the grid. Since none of the power units in SET_{sample} started to supply electricity to the grid more than 10 years ago, the SET_{sample} is used to calculate the build margin. Steps d, e and f are ignored.

The build margin emission factor is calculated as the generation-weighted average emission factor (tCO₂/MWh) of a sample of power plants, calculated in a similar way as the operating margin. The equation is given below:

$$EF_{grid,BM,y} = \frac{\sum_m EG_{m,y} \times EF_{EL,m,y}}{\sum_m EG_{m,y}}$$

Where:

- $EF_{grid,BM,y}$ = Build margin CO₂ emission factor in year y (tCO₂/MWh)
 $EG_{m,y}$ = Net quantity of electricity generated and delivered to the grid by power unit m in year y (MWh)
 $EF_{EL,m,y}$ = CO₂ emission factor of power unit m in year y (tCO₂/MWh)
 m = Power units included in the build margin
 y = Most recent historical year for which power generation data is available



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The CO₂ emission factor of each power unit m ($EF_{EL,m,y}$) is determined according to what the tool recommends /56/, i.e., “as per guidance in step 3 (a) for the simple OM”.

CO₂ emissions were calculated following the same procedure as has been done in estimating operating margin emission factor, as follows:

Total CO₂ emissions (tCO₂) $\sum EG_{m,y} \times EF_{EL,m,y}$	16 862 157
Electricity generation for BM (MWh) $\sum EG_{m,y}$	49 746 378
BM emission factor (tCO₂/MWh)	0.3390

Build margin emission factor

DNV cross-checked the values and calculations used /5/ with official data /28/ and confirms that appropriate methods and formulae for calculating build margin have been used.

STEP 6. Calculation of the combined margin (CM) emissions factor

The calculation of the combined margin (CM) emission factor is based on one of the following methods:

- Weighted average CM; or
- Simplified CM.

In this PoA DD option A is selected.

a. Weighted average CM

The tool /56/ provides the following formula:

$$EF_{grid,CM,y} = EF_{grid,OM,y} \times w_{OM} + EF_{grid,BM,y} \times w_{BM}$$

The default values $w_{OM} = 0.5$ and $w_{BM} = 0.5$ are used, thus, the combined margin is:

$$EF_{grid,CM,y} = 0.6293 \times 0.5 + 0.3390 \times 0.5 = 0.4841 \text{ tCO}_2 / \text{MWh}$$

DNV cross-checked the values and calculations used /5/ with official data /28/ and confirms that appropriate methods and formulae for calculating combined margin have been used.

d) Emissions due to incremental transport distances

Are calculated based on the incremental distances between:

- The collection points of biomass and/or manure and the compost treatment site as compared to the baseline solid waste disposal site or manure treatment site;



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- (ii) When applicable, the collection points of wastewater and treatment site as compared to baseline wastewater treatment site;
- (iii) Treatment sites and the sites for soil application, landfilling and further treatment of the produced compost

$$PE_{transp,y} = \frac{Q_y}{CT_y} \times DAF_w \times EF_{CO_2} + \frac{Q_{treatment,y}}{CT_{treatment,y}} \times DAF_{treatment} \times EF_{CO_2}$$

Where:

$PE_{transp,y}$ = Emissions due to incremental transport distances in year y (tCO₂e)

Q_y = Quantity of raw waste/manure treated and/or wastewater co-treated in the year y (tonnes)

CT_y = Average truck capacity for transportation (tonnes/truck)

DAF_w = Average incremental distance for raw solid waste/manure and/or wastewater transportation (km/truck)

EF_{CO_2} = CO₂ emission factor from fuel use due to transportation (kgCO₂/km, IPCC default values or local values may be used)

$Q_{treatment,y}$ = Quantity of compost produced in year y (tonnes)

$CT_{treatment,y}$ = Average truck capacity for compost transportation (tonnes/truck)

$DAF_{treatment}$ = Average distance for compost transportation (km/truck)

DNV cross-checked and confirms that appropriate methods and formulae for calculating transport emissions have been used.

e) Emissions from storage system

Project emissions on account of storage of manure before being fed into the anaerobic digester shall be considered if both condition (a) and condition (b) below are satisfied:

Condition (a): The storage time of the manure after removal from the animal barns, including transportation, exceeds 24 hours before being fed into the anaerobic digester; and

Condition (b): The dry matter content of the manure when removed from the animal barns is less than 20%.

The following method shall be used to calculate project emissions from manure storage:

$$PE_{storage,y} = GWP_{CH_4} * D_{CH_4} * \sum_{LT,l} \left[\frac{365}{AI_l} \sum_{d=1}^{AI_l} (N_{LT,y} * VS_{LT,d} * MS\%_l * (1 - e^{-k(AI_l-d)}) * MCF_l * B_{0,LT}) \right]$$

Where:

$PE_{storage,y}$ = Project emissions on account of manure storage in year y (tCO₂e)



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- AI_l = Annual average interval between manure collection and delivery for treatment at a given storage device l (days)
 $VS_{LT,d}$ = Amount of volatile solid production by type of animal LT in a day (kg VS/head/d)
 $MS\%_l$ = Fraction of volatile solids (%) handled by storage device l
 k = Degradation rate constant (0.069)
 MCF_l = Annual methane conversion factor for the project manure storage device l from Table 10.17, Chapter 10, Volume 4
 d = Days for which cumulative methane emissions are calculated; d can vary from 1 to 45 and to be run from 1 up to AI_l

DNV cross-checked and confirms that appropriate methods and formulae for calculating emissions from storage system have been used.

Leakage Emissions

As stated in applied methodology no leakage calculation is required.

Emission reductions (*ex-ante*) for scenario A:

The *ex-ante* annual emission reductions are calculated as below:

$$ER_{y,ex-ante} = BE_y - PE_y$$

Where:

$ER_{y,ex-ante}$ = Emission reductions in year y (tCO₂e)

BE_y = Baseline emissions in year y (tCO₂e)

PE_y = Project emissions in year y (tCO₂e)

Emission reductions (*ex-post*) for scenario A:

The emission reductions achieved in any year y of the project activity are the lowest value of the following:

$$ER_{y,ex-post} = \min [(BE_{y,ex-post} - PE_{y,ex-post}), (MD_y - PE_{power,y,ex-post})]$$

Where:

$ER_{y,ex-post}$ = Emission reductions achieved by the project activity based on monitored values for year y (tCO₂e)

$BE_{y,ex-post}$ = Baseline emissions calculated using equation 1 using *ex-post* monitored values of $N_{LT,y}$ and if applicable $VS_{LT,y}$

$PE_{y,ex-post}$ = Project emissions calculated using equation 4 using *ex-post* monitored values



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of $N_{LT,y}$, $MS\%_{i,y}$, $MS\%_{l}$, AI_l , and if applicable $VS_{LT,y}$

D_{CH_4} = CH₄ density (0.00067 tonne/m³ at room temperature (20°C) and 1 atm pressure)

$PE_{power,y,ex-post}$ = Emissions from the use of fossil fuel or electricity for the operation of the installed facilities based on monitored values in the year y (tCO₂e)

MD_y will be measured using the conditions of the flaring process:

$$MD_y = BG_{burnt,y} \times w_{CH_4,y} \times D_{CH_4} \times FE \times GWP_{CH_4}$$

Where:

$BG_{burnt,y}$ = Biogas flared or combusted in year y (m³)

$w_{CH_4,y}$ = Methane content in biogas in the year y (volume fraction)

Emissions Reduction for CPAs from Scenario B

The formulae to calculate the baseline emissions, leakage emissions and project emissions under the methodology AMS-III.D. follow the same procedures as for CPAs from Scenario A. Additionally to these, the procedures of methodology AMS-I.D. /56/ describe how emission reductions from renewable electricity are to be determined.

Baseline emissions

According to the methodology /56/ “The baseline scenario is the electricity delivered to the grid by the project activity that would have been otherwise generated by the operation of grid-connected power plants and by the addition of new generation sources into the grid”.

The baseline emissions are the product of electrical energy baseline $EG_{BL,y}$ expressed in MWh of electricity produced by the renewable generating unit multiplied by the grid emission factor.

$$BE_y = EG_{BL,y} * EF_{CO_2,grid,y}$$

Where:

BE_y = Baseline Emissions in year y (t CO₂)

$EG_{BL,y}$ = Quantity of net electricity supplied to the grid as a result of the implementation of the CDM project activity in year y (MWh)

$EF_{CO_2,grid,y}$ = CO₂ emission factor of the grid in year y (t CO₂/MWh)



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The purpose of the equation above (electricity generation) is for baseline calculation, and no ERs will be claimed from surplus of electricity sold to/via the National Grid (cases *a* and *b*) in Scenario B.

According to AMS-I.D. the emission factor shall be calculated based on the “*Tool to calculate the Emission Factor for an electricity system*” /56/.

Project emissions

For most renewable energy project activities: $PE_y = 0$

Leakage

The energy generating equipment is not transferred from another activity; therefore: $LE_y = 0$

Emission reductions

$$ER_y = BE_y - PE_y - LE_y$$

Where:

$ER_{y,y}$ = Emission reductions in year *y*. (tCO₂e/y)

$BE_{y,y}$ = Baseline emissions in year *y*. (tCO₂e/y)

$PE_{y,y}$ = Project emissions in year *y*. (tCO₂e/y)

$LE_{y,y}$ = Leakage emissions in year *y*. (tCO₂e/y)

Emission reductions (*ex-ante*):

The *ex-ante* annual emission reductions are calculated as below:

$$ER_{y,ex-ante} = BE_y - PE_y$$

Where:

$ER_{y,ex-ante}$ = Emission reductions in year *y* (tCO₂e)

BE_y = Baseline emissions in year *y* (tCO₂e)

$PE_{y,y}$ = Project emissions in year *y* (tCO₂e)

Emission reductions (*ex-post*):

The emission reductions achieved in any year *y* of the project activity are the lowest value of the following:

$$ER_{y,ex-post} = \min [(BE_{y,ex-post} - PE_{y,ex-post}), (MD_y - PE_{power,y,ex-post})]$$



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Where:

- $ER_{y,ex-post}$ = Emission reductions achieved by the project activity based on monitored values for year y (tCO₂e)
- $BE_{y,ex-post}$ = Baseline emissions calculated using equation 1 using *ex-post* monitored values of $N_{LT,y}$ and if applicable $VS_{LT,y}$
- $PE_{y,ex-post}$ = Project emissions calculated using equation 4 using *ex-post* monitored values of $N_{LT,y}$, $MS\%_{oi,y}$, $MS\%_{ol}$, AI_l , and if applicable $VS_{LT,y}$
- D_{CH_4} = CH₄ density (0.00067 tonne/m³ at room temperature (20°C) and 1 atm pressure)
- $PE_{power,y,ex-post}$ = Emissions from the use of fossil fuel or electricity for the operation of the installed facilities based on monitored values in the year y (tCO₂e)

MD_y will be measured using the conditions of the flaring process:

$$MD_y = BG_{burnt,y} \times w_{CH_4,y} \times D_{CH_4} \times FE \times GWP_{CH_4}$$

Where:

- $BG_{burnt,y}$ = Biogas flared or combusted in year y (m³)
- $w_{CH_4,y}$ = Methane content in biogas in the year y (volume fraction)

DNV cross-checked and confirms that appropriate methods and formulae for calculating emission reductions have been used.

4.8.2 Parameters determined ex-ante

The parameters used for the emission reduction calculations that are available *ex-ante* and listed in CDM-SSC-POA-DD include:

- GWP of CH₄ (GWP_{CH_4}) as 21 in accordance with AMS-III.D. version 18 /56/ in tCO₂e/tCH₄.
- Density of CH₄ (D_{CH_4}) as 0.00067 ³ at temperature 20°C and 1 atm pressure, in accordance with AMS-III.D. /56/ in tonne/m.
- Model correction factor to account for model uncertainties (UF_b) as 94% in accordance with AMS-III.D. /56/.
- Methane conversion factor for the baseline animal manure management system j , (MCF_j) according to table 10.17 of the IPCC 2006 – Guideline for National Greenhouse Gases Inventories /30/, will vary according to the local weather of each one of the project sites, in %;
- Maximum methane producing potential of the volatile solid generated for animal type LT ($B_{0,LT}$) as 0.29 considering the genetic used on swine farms from Latin America



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according to IPCC 2006 – Guideline for National Greenhouse Gases Inventories /27/ /30/ in $\text{m}^3\text{CH}_4/\text{kg dm}$;

- Default value for volatile solid excretion rate per day on a dry-matter basis for a defined livestock population ($\text{VS}_{\text{default}}$) according to IPCC 2006 – Guideline for National Greenhouse Gases Inventories /27/ /30/ in kg dm/hd/day ;
- Fraction of manure ($\text{MS}\%_{\text{BL},j}$) handled in baseline animal manure management system “j”. If not all the daily volume of manure is conducted to the lagoon(s), the CPA participant shall account and calculate the proper volume of manure through visual inspections or with registered data (when available). With this data, it will be calculated and determined the respective percentage of fraction of manure handled in baseline animal manure management system j in %;
- Default average animal weight of a defined population at the project site ($\text{W}_{\text{default}}$), considering breeding and market swine – according to IPCC 2006 – Guideline for National Greenhouse Gases Inventories /30/ in kg ;
- Average swine weight (W_{site}), will be determined considering the characteristics presented on each one of the project sites in kg ;
- Number of days that system is operational (nd_y) in days;
- Number of days animals are alive in the farm (Nda_y) in days;
- Number of animals produced (Np_y). The number of animals housed in the feedlots at farms in number;
- Operating margin CO_2 emission factor for the project electricity system in year y ($\text{EF}_{\text{grid,OM},y}$) in tCO_2/MWh ;
- Build margin CO_2 emission factor for the project electricity system in year y ($\text{EF}_{\text{grid,BM},y}$) in tCO_2/MWh ;
- Combined margin CO_2 emission factor for the project electricity system in year y ($\text{EF}_{\text{grid,CM},y}$) in tCO_2/MWh ;
- Rated capacity of electrical equipment i used for project activity in year y ($\text{CP}_{i,j}$) in MW ;
- Average technical transmission and distribution losses for providing electricity to source j in year y ($\text{TDL}_{j,y}$) in %;
- Manufacturer’s flare specifications for temperature and flow rate ($\text{SPEC}_{\text{flare}}$) /17/, in $^\circ\text{C}$ and kg/h or m^3/h .
- Volumetric flow rate of the biogas on dry basis at normal conditions ($\text{FV}_{\text{biogas}}$), in m^3/hr .

4.8.3 Parameters monitored ex-post

Data and parameters to be monitored by CPAs from Scenario A

- Quantity of biogas flared will be determined according to the characteristics presented on each one of the project sites (CPAs), and value will be measured to determine the flare efficiency ($\text{BG}_{\text{burnt},y}$);
- Temperature of biogas in $^\circ\text{C}$;
- Pressure of biogas in Pa ;



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- Methane content in biogas in the year y ($w_{CH_4,y}$) in %;
- Temperature in the exhaust gas of the enclosed flare in minute m ($T_{EG,m}$) in °C;
- Flame detection of flare in the minute m ($Flame_m$) – no unit;
- Flare efficiency in the year y (FE) in %;
- Fraction of manure handled in system i in year y ($MS\%_{i,y}$) in %;
- Annual average number of animals of type LT in year y ($N_{LT,y}$) in number;
- Number of days animals are alive in the farm ($N_{da,y}$) in days;
- Number of animals produced ($N_{p,y}$). The number of animals housed in the feedlots at farms in number;
- Default average animal weight of a defined population at the project site ($W_{default}$), considering breeding and market swine – according to IPCC 2006 – Guideline for National Greenhouse Gases Inventories /30/ in kg;
- Default value for volatile solid excretion rate per day on a dry-matter basis for a defined livestock population ($VS_{default}$) according to IPCC 2006 – Guideline for National Greenhouse Gases Inventories /30/ in kg/animal/day;
- Volatile solids on a dry matter weight basis for livestock LT entering the animal manure management system in year y ($VS_{LT,y}$) kg-dm/animal/year;
- Average swine weight in kg (W_{site}), will be determined considering the characteristics presented on each one of the project sites in kg;
- Number of days that system is operational (nd_y) in days;
- Relative reduction of volatile solids from the previous stage (RVS) /41/ in %;
- Formulated feed rations (FFR) – no unit;
- Genetic Source (GS) – no unit;
- Fraction of volatile solids handled by storage device l ($MS\%_l$) in %;
- Annual average interval between manure collection and delivery for treatment at a given storage device l (AI_l) in days;
- Quantity of solid waste(excluding manure), produced compost (Q_y , $Q_{treatment,y}$) in tonnes;
- Average truck capacity for transportation (CT_y , $CT_{treatment,y}$) in tonnes/truck;
- Average incremental distance for raw solid or product transportation (DAF_w , $DAF_{treatment,y}$) in km/truck;
- Sludge removal count (Proper soil application) in numeric frequency;
- Quantity of net electricity consumed by the project electricity consumption source j in year y ($EG_{PJ,j,y}$), in MWh/y;
- Volumetric flow of the gaseous stream in time interval t on a wet basis ($V_{t,wb}$), in m³ wet gas/h;
- Volumetric flow of the gaseous stream in time interval t on a dry basis ($V_{t,db}$), in m³ dry gas/h;
- Volumetric fraction of greenhouse gas i in a time interval t on a dry basis ($v_{i,t,db}$), in m³ gas i /m³ dry gas;



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- Volumetric fraction of greenhouse gas i in a time interval t on a wet basis ($v_{i,t,wb}$), in m^3 gas i/m^3 wet gas;
- Mass flow of the gaseous stream in time interval t on a wet basis ($M_{t,wb}$), in kg/h ;
- Mass flow of the gaseous stream in time interval t on a dry basis ($M_{t,db}$), in kg/h ;
- Temperature of the gaseous stream in time interval t (T_t), in K;
- Pressure of the gaseous stream in time interval t (P_t), in Pa;
- Saturation pressure of H_2O at temperature T_t in time interval t ($p_{\text{H}_2\text{O},t,\text{Sat}}$), in Pa;
- Volumetric fraction of gas k in the gaseous stream in time interval t on a dry basis ($v_{k,t,db}$), in m^3 gas k/m^3 dry gas;
- Volumetric fraction of gas k in the gaseous stream in time interval t on a wet basis ($v_{k,t,wb}$), in m^3 gas k/m^3 wet gas;

Data and parameters to be monitored by CPAs from Scenario B

Same data and parameters to be monitored by CPAs from scenario A, plus the following:

- Quantity of net electricity supplied to the grid in year y ($EG_{\text{facility},y}$, $EG_{\text{actual},y}$, $EG_{\text{add},y}$) in MWh/year;
- Biogas to electricity generation system (V_f) m^3 biogas/year;

4.8.4 Management system and quality assurance for monitoring and reporting

Responsibilities and authorities for project management, monitoring and reporting activities, measurement, training and reporting techniques and QA/QC procedures are defined in PoA /1/. Detailed procedures have been elaborated in section E.7.2 of the CDM-SSC-POA-DD. These will be maintained and implemented to enable subsequent verification of emission reductions.

The monitoring plan will include on-site inspections in order to guarantee correct data collection and monitoring performance during the crediting period. Checklists would include the following tasks:

- General cleaning in the biodigester area;
- Maintenance of the pipes that conduct manure to the biodigester;
- Maintenance of pumps;
- Calibration of the control and measurement equipment;
- Leak checks; and
- Maintenance of all related equipment.

Financiera Rural will be responsible for the implementation and accomplishment of the monitoring procedures in the CPAs by performing randomly internal audits to the CPAs.

With the access of Financiera Rural to the information compiled from the data stored electronically of the monitored parameters, the availability of daily registrations on the CPAs operation, maintenance, frequencies and execution of calibration of the instruments as well as the random internal audits to the CPAs, Financiera Rural will assess the CPA performance and make recommendations or actions to the management system in each CPA seeking proper functionality of the PoA.



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In case of lack of data, no emission reductions shall be claimed for the period where the data is not available.

The application of the monitoring methodology is transparent and DNV considers that Financiera Rural are able to implement the monitoring plan. In addition, it was verified that Financiera Rural, as responsible for operation and for the monitoring of the project, has enough resources and skills to assure adequate operation and monitoring of the mechanized composting system.

Several operational procedures were implemented in order to assure adequate operation and monitoring.

4.9 Environmental impacts

Mexican environmental legislation /25/ does not require an Environmental Impact Assessment for this type of activity in the case of existing facilities with starting date of operation before 1988.

For new facilities or expanding operations after this year, it is required a prior approval in environmental impact of the Environment and Natural Resources Ministry (SEMARNAT) as stated on the “Ley General del Equilibrio Ecológico y la Protección al Ambiente”, Section V, Art. 28 /69/.

The project will, by installing anaerobic digesters, enclosed flare systems and electricity generators in the farms taking part in the Program, reduce GHG emissions and environmental impacts of livestock production. The advanced livestock waste management system to be employed diminishes the risks of underground water contamination, improves air quality and reduces emissions of volatile organic compounds (VOCs); decreases odours, diseases among others, benefiting local people's health.

The PoA-DD /1/ on section C.1 defines that the Environmental Analysis is done at the CPA level.

4.10 Comments by local stakeholders

The local stakeholder consultation /21/ was carried out at the PoA level. As stated in the CDM-PoA-DD /1/, personnel from Financiera Rural, producers, technology providers and personnel from Federal public entities such as FIRCO /63/, SAGARPA /70/, SEMARNAT, BANCOMEXT /71/ and CRE /72/ were invited. The press was also invited to the event. The invitations were submitted via e-mail on 11 March 2011 /22/. The consultation was held in Fiesta Inn Hotel in Mexico City, on 16 March 2011.

During the consultation, a few positive comments were received /23/ and there were no negative comments regarding the project activity. Doubts were answered during the stakeholder's consultation.

DNV considers the comments were positive and no due action was needed from the PoA participants.



POA VALIDATION REPORT

4.11 Comments by Parties, stakeholders and NGOs

The CDM-SSC-PoA-DD /1/ version 1, dated 15 July 2011, the PoA specific CDM-SSC-CPA-DD /2/ dated 15 July 2011, with generic information relevant to all CPAs to be included in this PoA and the CDM-SSC-CPA-DD /3/ dated 15 July 2011, for the CPA with the title “Methane Capture, Combustion and Possible Electricity Generation from AWMS in Mexico” was made publicly available on the UNFCCC’s website (<http://cdm.unfccc.int/ProgrammeOfActivities/Validation/DB/E7UHQBUNNTIJF6BDL5S9DQX85S2A11/view.html>) and Parties, stakeholders and NGOs were through the CDM website invited to provide comments during a 30 days period from 30 August 2011 to 28 September 2011

The following comments were received:

Comment by: Darshan R.

☐ Accredited NGO

☐ Party

☒ Stakeholder

Inserted on: 22 September 2011

Subject: Inclusion criteria for CPAs

Comment: Inclusion criteria for CPA inclusion is not fully descriptive and adequate, must be enlarged and refined. The PoA to be webhosted for international stakeholder consultations again after modifying the relevant sections. DOE should not undertake the validation of this kind of PoA’s.

DNV considers the criteria for inclusion of CPAs to be included under the PoA is addressed in section A.4.2.2. of the webhosted CDM-SSC-PoA-DD and have been found to be adequate and appropriate to the intent of the PoA. Thus DNV validated it as described in section 4.3 of this report. No changes were needed in the webhosted CDM-SSC-PoA-DD regarding this issue.

Comment by: Darshan R.

☐ Accredited NGO

☐ Party

☒ Stakeholder

Inserted on: 22 September 2011

Subject: Total number of CPAs

Comment: “Number of CPAs to be included is not clear and more elaborate explanation is necessary. Please correct the same and webhost the project again for comments. DOE to ensure that the project is republished or internal stakeholder consultation process.”

Indeed the total estimate of CPAs was not addressed in the webhosted CDM-SSC-PoA-DD. Modifications were made by the project participant in the revised version of the CDM-SSC-PoA-DD to include the estimate number of CPAs to participate, which is 30. DNV validated it as described in this report. No changes were needed in the webhosted CDM-SSC-PoA-DD regarding this issue.



POA VALIDATION REPORT

Comment by: Darshan R.

☐ Accredited NGO

☐ Party

☒ Stakeholder

Inserted on: 22 September 2011

Subject: Baseline

Comment: “DOE must confirm the correct and conservative identification of the baseline. Baseline must be variable. Identification of baseline is not clear in all situations.”

DNV considers the identification of the baseline of the PoA is addressed in section E.1. of the webhosted CDM-SSC-PoA-DD is according to methodology AMS-III.D., version 18 /56/. Thus, DNV validated it as described in section 4.5 of this report. No changes were needed in the webhosted CDM-SSC-PoA-DD regarding this issue.

Comment by: Darshan R.

☐ Accredited NGO

☐ Party

☒ Stakeholder

Inserted on: 22 September 2011

Subject: Baseline

Comment: “Multiple site visits must be made by DOE to cross check and establish proper baselines”

Only one baseline is established for the PoA. DNV performed site visit in the PoA level, reviewed legislation and documentation and consider that baseline definition is addressed in section A.4.4.2. of the webhosted CDM-SSC-PoA-DD according to methodology AMS-III.D., version 18 /56/. Thus, DNV validated it as described in section 4.4 of this report. No changes were needed in the webhosted CDM-SSC-PoA-DD regarding this issue.

Comment by: Darshan R.

☐ Accredited NGO

☐ Party

☒ Stakeholder

Inserted on: 22 September 2011

Subject: Technology

Comment: “DOE to check for appropriate positioning of the PoA with regard to technological aspects.”

Technological aspects of the PoA are addressed in section A.4. of the webhosted CDM-SSC-PoA-DD according to “Validation and Verification Manual” /55/, and validated as described in section 4.4 of this report. No changes were needed in the webhosted CDM-SSC-PoA-DD regarding this issue.

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	No participating Annex I Party is yet identified.
2. The programme shall assist non-Annex I Parties in contributing to the ultimate objective of the UNFCCC.	Kyoto Protocol Art.12.2.	Table 2, Section A.2.
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	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	Table 2, Section A.4
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	The validation did not reveal any information that indicates that the project can be seen as a diversion of ODA funding towards Mexico.
6. Parties participating in the CDM shall designate a national authority for the CDM.	CDM Modalities and Procedures §29	The Mexican designated national authority for the CDM is the SEMARNAT - Secretaría de Medio Ambiente y Recursos Naturales (Ministry of Environment and Natural

Requirement	Reference	Conclusion
		Resources) /65/.
7. The host Party and the participating Annex I Party shall be a Party to the Kyoto Protocol.	CDM Modalities §30/31a	Mexico has ratified the Kyoto Protocol on 7 September 2000.
8. The participating Annex I Party's assigned amount shall have been calculated and recorded.	CDM Modalities and Procedures §31b	No participating Annex I Party is yet identified.
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	No participating Annex I Party is yet identified.
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)	Coordinating Entity is Financiera Rural.
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)	All CPAs associated with the "Methane Capture, Combustion and Possible Electricity Generation from AWMS in Mexico" PoA will be implemented within the geographical boundary of Mexico.
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	PoA Procedures § 2 (g)	Ten criteria were established.

Requirement	Reference	Conclusion
measurements) that shall be provided by each CPA in order to ensure its eligibility.		
14. The length of the PoA is not exceeding 28 years.	PoA Procedures § 2 (h)	The PoA has length of 28 years.
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
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	All CPAs consist on swine farms with less than 60 ktonCO ₂ /year of emission reduction.
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	Kyoto Protocol Art. 12.5c, CDM Modalities and Procedures §43 PoA Procedures § 2 (e)	Table 2, Section E.3

Requirement	Reference	Conclusion
(iii) that the PoA will lead to a greater level of enforcement of the existing mandatory policy /regulation.		
19. Additionality of a typical CPA is demonstrated by using the procedure provided in the baseline and monitoring methodology applied.	PoA Procedures § 2 (f)	Table 2, Section E.4
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	Table 2, Section E.1.1
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	Table 2, Section E.1
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)	Monitoring plan is in accordance to methodology AMS-III.D.
24. Provisions for monitoring, verification and reporting shall be in accordance with the modalities described in the Marrakech Accords and relevant decisions of the COP/MOP.	CDM Modalities and Procedures §37f	Table 2, Section E.9
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	Table 2, Section B.4 to B.7
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	CDM Modalities and Procedures §37c	<input type="checkbox"/> Analysis at PoA level <input checked="" type="checkbox"/> Analysis at CPA level

Requirement	Reference	Conclusion
environmental impact assessment in accordance with procedures as required by the Host Party shall be carried out.		
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 checked="" type="checkbox"/> Analysis at PoA level <input 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 CDM-SSC-POA-DD is included <input checked="" type="checkbox"/> Date of the CDM-SSC-POA-DD is included.		OK
A.1.2. Is the PoA-DD in accordance with the applicable requirements for completing PoA-DDs?	/1/	DR	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <i>If no, list where the CDM-SSC-POA-DD is not in accordance:</i> It is not clear in section A.4.2.2. of the CDM-SSC-PoA-DD /1/ if the requirements of methodologies mentioned in item 4 are further explained in section E.2 of the same document. It is not clear in the PoA the information about the total estimate number of CPAs participating in the programme and the total estimate ERs to be achieved during the length of the programme. It is not clear what are the possible uses of the pre-project lagoons, since it is said in the CDM-SSC-PoA-DD that: “On each CPA, an anaerobic digester lagoon with a cover will be constructed. Pre-project lagoons could be adapted to operate as anaerobic digesters.” and also that “In both project activity scenarios, the lagoons from	CL3 CL6 CL7	OK

* MoV = Means of Verification, DR= Document Review, I= Interview
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Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			<i>the pre-project situation could be used as secondary open lagoons where the effluent of the new digester lagoons will be directed to.”</i>		
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	“Methane Capture, Combustion and possible electricity generation from AWMS in Mexico” PoA will be implemented within the geographical boundary of Mexico.		OK
A.2.2. Are the programme’s system boundaries (components and facilities used to mitigate GHGs) clearly defined?	/1/	DR	As per <i>AMS-III.D.</i> , the programme correctly defines the project boundaries the physical, geographical site(s) of the livestock, animal manure management systems and facilities which recover and flare/combust or use methane.		OK
A.2.3. Can each CPA under the PoA be clearly identified individually including spatial boundaries (geographical) clearly defined?	/1/	DR	Each SSC-CPA will have specific tagging. The unique references of each SSC-CPA under this PoA will prevent double counting, as below: a. Farm name b. Farm owner c. Number of animals and type of livestock d. Location: town/state e. GPS Coordinates f. Anaerobic digester’s ID number However, one of the references of each CPA to avoid double counting is the register of	CL10	OK

* MoV = Means of Verification, DR= Document Review, I= Interview
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Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			number of animals and type of livestock. It is not clear how this is a unique reference as it is expected a changing number as the livestock numbers over time on a regular basis.		
A.2.4. Does the programme establish eligibility criteria for inclusion of a project as a CPA under the PoA?	/1/ /17/ /18/ /32/	DR	<p>The criteria for enrolling a CPA in the PoA are the following:</p> <ol style="list-style-type: none"> 1. Each SSC-CPA must be located within the geographical boundary of Mexico; 2. SSC-CPAs to be included shall consist of the implementation of anaerobic digestion as wastewater treatment, flaring system and for CPAs corresponding to scenario B also an electricity generation system; 3. SSC-CPAs will have anaerobic lagoons as baseline scenario treatment; 4. SSC-CPAs corresponding to project activity scenario A will follow and shall comply with the requirements of <i>AMS-III.D.</i>, “Methane recovery in animal manure management systems” version 18. CPAs corresponding to project activity scenario B will follow and shall comply with the requirements of <i>AMS-III.D.</i>, “Methane recovery in animal manure 	CL9	OK

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			<p><i>management systems</i>" version 18 and <i>AMS-I.D. "Grid connected renewable electricity generation"</i>, version 17;</p> <p>5. A de-bundling check shall be assessed, according to Annex 13 of EB 54, for SSC-CPA to be included in the PoA;</p> <p>6. The coordinating entity will ensure that all CPAs under its PoA are neither registered as an individual CDM project activity nor included in another registered PoA, and that the CPA is subscribed to the PoA;</p> <p>7. SSC-CPAs shall have a project starting date after the PoA-DD is submitted to Global Stakeholders Consultation;</p> <p>8. The SSC-CPAs shall be in line with national and local regulations available at the time of inclusion into the SSC-PoA;</p> <p>9. The SSC-CPAs shall evidence that are not viable without CDM revenue, demonstrating through investment analysis as described in section E.5.2 of the PoA-DD.</p> <p>It is not clear from the CDM-SSC-PoA-DD what are the reasons why a potential CPA would use Financiera Rural's financing</p>		

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			instead of other institutions (FIRCO and FIRA).		
A.3. Eligibility Criteria <i>Eligibility criteria to assess eligibility of CPAs to be included to PoA.</i>					
A.3.1. Are the geographical boundaries of the CPA including any time-induced boundary consistent with the geographical boundary set in the PoA?	/1/	DR	Yes, CPA can only start after starting of the PoA.		OK
A.3.2. Are there conditions that avoid double counting of emission reductions like unique identifications of product and end-user locations (e.g. programme logo)?	/1/	DR	Yes, double counting will be avoided by the specific tagging of SSC-CPA as described in A.2.3. above.		OK
A.3.3. Are there specifications of technology/measure including the level and type of service, performance specifications including compliance with testing/certifications?	/1/ /68/	DR	Yes, each SSC-CPA participant will choose the technology from a list of the FIRCO's Anaerobic Digester Roll.		OK
A.3.4. Are there conditions to check the start date of the CPA through documentary evidence?	/1/	DR	Yes, start date of CPAs will be demonstrated as the start of construction related to the project activity.		OK
A.3.5. Are there conditions that ensure compliance with applicability and other requirements of single or multiple methodology/ies applied by CPAs?	/1/	DR	Applicability conditions of each methodology are described for the PoA and CPA level. However, programme did not demonstrate that treated wastewater is not disposed directly into natural water bodies, as required in methodology <i>AMS-III.D.</i> /56/.	CAR3	OK
A.3.6. Are there conditions that ensure that CPAs meet the requirements pertaining to the demonstration of additionality of the PoA and typical CPA?	/1/	DR	Yes, conditions are demonstrated correctly in the CDM –SSC-PoA		OK

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
A.3.7. Are there PoA-specific requirements stipulated by the CMEs including any conditions related to undertaking local stakeholder consultations and environmental impact analysis?	/1/	DR	Yes, local stakeholder consultation is made in the PoA level and environmental impact analysis is made in the CPA level.		OK
A.3.8. 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/	DR	Yes, the target group is commercial rural grid connected direct installation farms.		OK
A.3.9. 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/ /61/	DR	<p>PoA considers a sampling method to be used for verification of the PoA. The Coordinating Entity (Financiera Rural) will implement sampling rules according to EB 50 Report, Annex 30 <i>“General Guidelines for Sampling and Surveys for Small-Scale CDM Projects”</i>. Since the PoA will cover the entire Mexican territory, CPAs will be geographically dispersed, therefore and according to the <i>“General Guidelines for Sampling and Surveys for Small-Scale CDM Projects”</i>, Financiera Rural will use a multi-stage sampling approach to address sampling for the verification of the CPAs included in the PoA.</p> <p>However, it is not clear how the sampling method will be used in the PoA level, since it is said in the CDM-SSC-PoA-DD in Section 4.4.2: <i>“This PoA considers a sampling method to be used for verification of the PoA”</i>.</p>	CL8	OK

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
A.3.10. 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/	DR	Yes, the project applies SSC methodologies with monitoring plans that will be verified.		OK
A.3.11. Where applicable, are there requirements for the de-bundling check, in case CPAs belong to small-scale (SSC) or microscale project categories?	/1/	DR	Yes, a de-bundling check shall be assessed, according to Annex 13 of EB 54, for SSC-CPA to be included in the PoA.		OK
A.3.12. 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/	DR	It is not clear from the CDM-SSC-PoA-DD what are the reasons why a potential CPA would use Financiera Rural's financing instead of other institutions (FIRCO and FIRA).	CL9	OK
A.4. Participation Requirements <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 Project participant is Financiera Rural. The host Party Mexico meets all relevant participation requirement. No participating Annex I Party is yet identified.		OK
A.4.2. Has the coordinating/managing entity of the programme been identified?	/1/	DR	Yes, it is Financiera Rural.		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/ /54/	DR	Yes, letter of approval from Mexican DNA was received.		OK

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
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/ /54/	DR	Yes, as demonstrated in the letter of approval from the Mexican DNA.		OK
A.4.5. Do all participating Parties fulfil the participation requirements as follows:	/1/	DR			
	Mexico (host)				OK
a) Party has ratified the Kyoto Protocol	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No				
b) Party has designated a Designated National Authority	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No				
c) The assigned amount has been determined	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No				
A.4.6. Do the letters of approval meet the following requirements?	/1/ /54/	DR			
	Mexico (host)			CAR2	OK
a) LoA confirms that Party has ratified the Kyoto Protocol	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No				
b) LoA confirms that participation is voluntary	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No				
c) The LoA confirms that the project contributes to the sustainable development of the host country?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No				
d) The LoA refers to the precise project activity title in the CDM-SSC-POA-DD	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No				
e) The LoA is unconditional with respect to (a) to (d) above	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No				
f) The LoA is issued by the respective Party's DNA	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No				
g) The LoA was received directly by the DNA or the PP	<input type="checkbox"/> DNA <input checked="" type="checkbox"/> 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	As required by Kyoto Protocol Art. 12.5a, CDM Modalities and Procedures §40a, the Letter of Approval issued by the Mexican DNA shall be presented.				

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
A.4.7. Does the programme make provisions for meeting training and maintenance needs?	/1/	DR	Yes. The SSC-CPA participant will be responsible for the operation of the anaerobic digestion system. Special training, in the anaerobic digestion operation system will be provided to the SSC-CPA participants by the technology providers which will be complemented with the manual prepared by Financiera Rural. The technology suppliers will provide the maintenance and calibration services to the anaerobic digester and flaring system on request of the SSC-CPA and such information will be delivered to the CME for internal auditions purposes as well. They will also provide training to the project participant's personnel to ensure proper operation of the anaerobic digester, flaring and monitoring equipment.		OK
A.5. Contribution to Sustainable Development <i>The project/programme's contribution to sustainable development is assessed.</i>	/1/	DR			
A.5.1. Has the host Party confirmed that the programme assists it in achieving sustainable development?	/1/ /54/	DR	Yes, as demonstrated in the letter of approval from the Mexican DNA.		OK
A.5.2. Will the programme create other environmental or social benefits than GHG emission reductions?	/1/	DR	Yes, the programme is expected to generate environmental benefits such as improving the air quality and reducing emissions of volatile organic compounds (VOCs); decreasing odours, diseases, among others, benefiting local people's health. Economic benefits are also achieved by creating job opportunities		OK

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Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			and increasing farmers' income. Environmentally friendly technologies in treating livestock wastes and associated utilization, which can be replicated on other livestock farms, which will dramatically reduce livestock-related GHG emissions.		
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	Yes, as it is demonstrated through the applicability criteria of the small scale methodologies used in the project: AMS-III.D., "Methane recovery in animal manure management systems" version 18, AMS-I.D. "Grid connected renewable electricity generation", version 17 and AMS-III.F., "Avoidance of methane emissions through composting", version 10.		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	The project database will record the start and end dates of each monitoring period, and record the emission reductions attributable to each monitoring period. Appropriate record keeping procedures will be implemented to ensure that each monitoring period data set can be transparently attributed to its corresponding CPA, preventing any occurrences of double counting.		OK

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
A.7.2. Do the operational and management arrangements established by the coordinating entity include a system/procedure to avoid including CPAs that have already been registered either as CDM project activity or as a CPA of another PoA?	/1/	DR	Double counting will be avoided by the specific tagging of SSC-CPA. Each SSC-CPA will have specific tagging. The unique references of each SSC-CPA under this PoA will prevent double counting, as below: a. Farm name b. Farm owner c. Number of animals and type of livestock d. Location: town/state e. GPS Coordinates f. Anaerobic digester's ID number. However, one of the references of each CPA to avoid double counting is the register of number of animals and type of livestock. It is not clear how this is a unique reference as it is expected a changing number as the livestock numbers over time on a regular basis.	CL10	OK
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	To ensure that those operating the CPAs are aware of and have agreed that their activity is being subscribed to the PoA, all CPAs included in the PoA shall monitor the data and parameters included in section E.6.3 of the PoA-DD. Producers that are interested in participate in the PoA shall demonstrate that the CPA has not been registered as a CDM project activity or as a CPA of another PoA.		OK
A.7.4. Does the monitoring plan include a description of	/1/	DR	The PoA considers a sampling method to be		OK

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
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?	/61/		used for verification of the PoA. The Coordinating Entity (Financiera Rural) will implement sampling rules according to EB 50 Report, Annex 30 “ <i>General Guidelines for Sampling and Surveys for Small-Scale CDM Projects</i> ”. Since the PoA will cover the entire Mexican territory, CPAs will be geographically dispersed, therefore and according to the “ <i>General Guidelines for Sampling and Surveys for Small-Scale CDM Projects</i> ”, Financiera Rural will use a multi-stage sampling approach to address sampling for the verification of the CPAs included in the PoA.		
B. Duration of the Programme of Activities, Crediting Period					
B.1.1. Are the programme starting date and length of the programme clearly defined and evidenced?	/1/	DR	Section B.1 of the CDM-SSC-PoA-DD, it is said that the start date of the PoA is “01/09/2012 When the CDM-SSC-PoA-DD is submitted to Global Stakeholders Consultation”. However, the CDM-SSC-PoA-DD was submitted to (published) Global Stakeholders Consultation on 30 August 2012.	CAR5	OK
B.1.2. Does the PoA design documentation confirm that the length of the PoA does not exceed 28 years?	/1/	DR	Yes, the programme’s length is defined as 28 years.		OK
C. Environmental Impacts <i>Documentation on the analysis of the environmental impacts will be assessed, and if deemed significant, an</i>			<input type="checkbox"/> Analysis at PoA level <input checked="" type="checkbox"/> Analysis at CPA level This section must only be completed if the		

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<i>EIA should be provided to the validator.</i>			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 analysis of environmental impacts is at CPA level.		OK
C.1.2. Are there any Host Party requirements for an Environmental Impact Assessment (EIA)?	/1/	DR	Not applicable, as analysis of environmental impacts is at CPA level.		OK
C.1.3. Will the programme create any adverse environmental effects?	/1/	DR	Not applicable, as analysis of environmental impacts is at CPA level.		OK
C.1.4. Are transboundary environmental impacts considered in the analysis?	/1/	DR	Not applicable, as analysis of environmental impacts is at CPA level.		OK
C.1.5. Have identified environmental impacts been addressed in the programme design?	/1/	DR	Not applicable, as analysis of environmental impacts is at CPA level.		OK
C.1.6. Does the programme comply with environmental legislation in the host country?	/1/	DR	Not applicable, as analysis of environmental impacts is 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 checked="" type="checkbox"/> Consultation at PoA level <input type="checkbox"/> Consultation at CPA level This section must only be completed if the analysis of environmental impacts is at PoA level.		
D.1.1. Have relevant stakeholders been consulted?	/1/ /21/ /22/ /63/ /70/ /71/ /72/	DR	Yes, the Coordinating Managing Entity of the PoA submitted the invitations via e-mail on 11 March 2011. Personnel from Financiera Rural, producers, technology providers and personnel from Federal public entities such as FIRCO, SAGARPA, SEMARNAT, BANCOMEXT and CRE were invited. The press was also convened to the event.		OK

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D.1.2. Have appropriate media been used to invite comments by local stakeholders?	/1/	DR	Yes. The Coordinating Entity of this PoA submitted the invitations via e-mail on 11 March 2011, which is deemed to be appropriate.		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	Mexican regulations do not define a methodology of how to carry out stakeholder's process.		OK
D.1.4. Is a summary of the stakeholder comments received provided?	/1/	DR	Yes, in section D.3. of the CDM SSC-PoA-DD.		OK
D.1.5. Has due account been taken of any stakeholder comments received?	/1/ /23/	DR	Received comments of the local stakeholder consultation were positive and no actions were required. Global stakeholders consultation received four comments, which were answered by DNV in Section 4.11 of this report.		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/	DR	Yes, the programme correctly applies methodologies: AMS-III.D., "Methane recovery in animal manure management systems" version 18, AMS-I.D. "Grid connected renewable	CAR6	OK

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			<i>electricity generation</i> ", version 17 and <i>AMS-III.F.</i> , " <i>Avoidance of methane emissions through composting</i> ", version 10.		
E.1.2. Are the applicability criteria in the baseline methodology all fulfilled?	/1/	DR	Criteria were answered and correctly fulfilled for the above methodologies, when applicable. However, programme did not demonstrate that treated wastewater is not disposed directly into natural water bodies, as required in methodology <i>AMS-III.D.</i> /56/.	CAR3	OK
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/	DR	The manure management system identified as the baseline scenario for this PoA is the anaerobic lagoon.		OK
E.2.2. What other alternative scenarios have been considered and why is the selected scenario the most likely one?	/1/	DR	The following were considered as the possible alternative baselines: i. The proposed project activity undertaken without being registered as a CDM project activity; and ii. Continuation of the current situation.		OK
E.2.3. Has the baseline scenario been determined according to the methodology?	/1/	DR	In the absence of the PoA/CPA, the existing facility would continue to emit methane to		OK

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			the atmosphere at historical average levels, considering that in Mexican swine activity, the common practice is use anaerobic open lagoon.		
E.2.4. Has the baseline scenario been determined using conservative assumptions where possible?	/1/	DR	See E.2.1.		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	Relevant national and/or sectoral policies and circumstances are considered and listed in the PoA-SSC-DD.		OK
E.2.6. Is the baseline scenario determination compatible with the available data and are all literature and sources clearly referenced?	/1/ /27/	DR	The baseline is the emissions of methane from anaerobic decay of swine manure, calculated in accordance with the most recent IPCC tier 2 approach (IPCC 2006 Guidelines) and applying IPCC default values for the parameters B ₀ and VS for Latin American values, North American values, values, according to each CPA livestock genetic source. However, evidences of composition of feed mentioned in the CDM-SSC-PoA-DD /1/ were not presented.	CL	OK
E.2.7. Have the major risks to the baseline been identified?	/1/	DR	See E.2.7.		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/ /64/	DR	The additionality of the programme is demonstrated considering that currently in Mexico there are no legislation or mandatory rules to collect and burn the methane produced by the decay of swine manure. The		OK

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			common practice in swine farms in Mexico is use the anaerobic lagoon in order to decay the manure. The PoA is a voluntary action, coordinated and implemented by the Coordinating Entity, Financiera Rural, to supply and finance anaerobic digesters to provide a better waste management system to livestock producers in Mexico and to reduce GHG emissions. The PoA is thus implementing a voluntary coordinated action not required by legislation and that would not be implemented in the absence of the PoA.		
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	Currently in Mexico there are no legislation or mandatory rules to collect and burn the methane produced by the decay of swine manure.		OK
E.3.3. Are all assumptions stated in a transparent and conservative manner?	/1/	DR	Yes, they are.		OK
E.3.4. Is sufficient evidence provided to support the relevance of the arguments made?	/1/ /10/ /20/ /31/ /32/ /33/ /34/ /36/	DR	The PoA is implementing a voluntary coordinated action, and DNV thus validated that it would not be implemented in the absence of the PoA. In section B.1 of the CDM-SSC-PoA-DD, it is said that the start date of the PoA is "01/09/2012 When the CDM-SSC-PoA-DD is submitted to Global Stakeholders Consultation". However, the CDM-SSC-PoA-DD was submitted to (published) Global	CAR4 CAR5 CL4 CL5	OK

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	/38/ /39/ /40/ /42/ /43/ /44/ /57/ /63/ /64/		<p>Stakeholders Consultation on 30 August 2012.</p> <p>The additionality is demonstrated using the CDM Methodological Tool: <i>“Tool for the demonstration and assessment of additionality”</i>: <i>“Project participants can use either investment analysis or barrier analysis step. They may, if they so wish, use both investment and barrier analysis step”</i>. Financiera Rural chose to prove the project’s additionality by barrier analysis, using both investment barrier and barrier due to prevailing practice.</p> <p>The additionality of the programme is demonstrated considering that currently in Mexico there are no legislation or mandatory rules to collect and burn the methane produced by the decay of swine manure. The common practice in swine farms in Mexico is use the anaerobic lagoon in order to decay the manure. The PoA is a voluntary action, coordinated and implemented by the Coordinating Entity, Financiera Rural, to supply and finance anaerobic digesters to provide a better waste management system to livestock producers in Mexico and to reduce GHG emissions.</p> <p>Steps of the <i>“Tool for the demonstration and</i></p>		

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			<p><i>assessment of additionality</i>" /57/ were used:</p> <p>In sub-step 1a, two scenarios were defined: "the proposed project activity undertaken without being registered as a CDM project activity" and "the continuation of the current situation". DNV consider these scenarios are logical and adequate to the purpose of the PoA.</p> <p>In sub-step 1b, it was demonstrated that neither scenarios are consistent with mandatory laws and current regulations on wastewater discharge /25/ /64/, and noncompliance with those requirements are widespread in the region, as demonstrated in SUSCON's study /37/ about the average concentration of BOD and TN in wastewater from livestock activities. Meeting such regulations would require additional treatment steps in both baseline alternatives considered. The PoA thus goes beyond the established legislation to treat swine manure and will lead to a greater level of enforcement of the existing mandatory policy/regulation. Hence the project is in line with sustainability police of host country.</p> <p>In step 2, Financiera Rural chose to use</p>		

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			<p>barriers instead of investment analysis</p> <p>In sub-step 3a, it is demonstrated that the project activity under the proposed PoA faces the barriers described below.</p> <p><i>Investment barrier</i></p> <p>Implementation of one 3 000 swine warehouse, so farmers prefer to invest into increasing their production capacity which will provide them with increased revenue. This condition could be replicated for electricity generation, where the investment of a generator is 40% of a biodigester, and the electricity saved needs more than 10 years to be recovered. Thus, it is expected to have producers investing in advanced animal waste management systems. Therefore, the only credible way of investing in this kind of project activity is by government support.</p> <p>The implementation of anaerobic digestion technology for manure treatment in Mexico is supported by three government entities through financing services and subsidies given to the producers. The program, which supports the proposed PoA is PROVAR (“Added Value Agribusiness support Project with Shared Risk Schemes”) provided by FIRCO (“Shared Risk Trust”). FIRCO financial support for digester construction is</p>		

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			<p>limited to half of the total investment costs or one million Mexican pesos if the total costs exceed two million Mexican pesos. In order to qualify for the subsidy for anaerobic digester construction, the producer must meet six requirements.</p> <ul style="list-style-type: none"> i. The farm/dairy farm production systems are carried out intensively, with animal confinement and manure handling allows its use for biogas generation; ii. Have a livestock inventory of at least 300 head of dairy cattle or 200 swine sows within its production unit; iii. Have the necessary physical space within the production unit for the digester installation; iv. Ensure conditions of biosafety after digester installation; v. Have an existing lagoon that allows establishing the baseline scenario according to the related CDM methodologies. vi. The farm is a large-scale production operation or is part of a group of operational units that allow the integration of a CDM project in order to minimize investment costs for the project implementation and transaction costs for registration and 		

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			<p>supervision of CERs, as well as to facilitate monitoring procedures.</p> <p>These requirements show that to be granted the subsidy, the proposed project activity must be a CDM project activity and present a significant amount of emission reductions that can be certified and sold, in order to make the project financially attractive.</p> <p>The second government entity is FIRA (“The Trust Funds for Rural Development”), which offers financing up to 80% of the total investment requirements for the implementation of anaerobic digestion technology. It is not a requirement for FIRA that the project have conditions to apply for CDM credits.</p> <p>The third and final government entity is Financiera Rural itself, which also offers up to 80%. It expects to obtain CERs in order to finance anaerobic digesters to producers. By gathering small-scale projects under a programme of activities with a financial incentive it is easier to make them viable and is vital since the amount of projects would make it difficult to manage on a project-by-project basis. Its strategy consists in utilizing CER revenues to promote, operate and monitor the PoA and to finance the CPAs. However, it is not feasible for Financiera Rural to support the implementation of all the</p>		

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			<p>projects within the PoA due to the size of the programme and the high costs of the technology involved.</p> <p>The high investment cost for the proposed project activity makes it unfeasible in the absence of CDM approval since it is not financially attractive compared to the open air lagoons, as the latter needs no additional investment.</p> <p>The implementation of biogas collection and combustion system needs the action of voluntary coordination of the Coordinating Entity, Financiera Rural in order to be implemented, and the likely baseline scenario for swine farmers is to continue to discharge the swine manure into the anaerobic lagoon. The PoA is thus implementing a voluntary coordinated action not required by legislation and that would not be implemented in the absence of the PoA.</p> <p>However, each CPA is able to participate in the PoA whether or not it requires financial help from Financiera Rural or receive financial help from another entity. Furthermore, additionality of each CPA shall be demonstrated through investment analysis, according to eligibility criteria number 10 described in section A.4.2.2. of the CDM-SSC-PoA-DD, in order to evidence that implementation is not feasible without the</p>		

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			<p>CDM revenues.</p> <p>This eventually corroborates the fact that the project proponents have to go for providing long term loan facility for the farmers, as stated in the CDM-SSC-PoA-DD, for implementing the methane capture, combustion and possible electricity generation system. Thus DNV considers that investment barrier exists for the PoA.</p> <p><i>Prevailing practice barrier</i></p> <p>According to INEGI's Livestock Census, there were 1 129 217 cattle farms and 979 348 swine farms with a total of 9.021 million head of swine and 23.3 million head of cattle in Mexico as of September 2007.</p> <p>According to MGM Innova, in 2004 80% of pig farms in Mexico used to collect pig manure through a sweeping and moving system, which made it easier to recover solid waste for feeding purposes. However, this practice was questionable because taking into account the nutritious value of manure and the time it takes to fatten a pig to reach the market weight, it may be concluded that it is inefficient.</p>		

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			<p>Practices for cattle manure included the removal from sheds and the drying process (in open air) for its use as land fertilizer.</p> <p>Current common practice in swine farms is having pig manure removal by scraping, and its use as animal feed being replaced by removal by water and treatment in an open anaerobic lagoon.</p> <p>According to FIRCO, PROVAR supported the implementation of 45 anaerobic digesters in 2008, 102 anaerobic digesters in 2009, and 74 anaerobic digesters in 2010 making a total of 221 anaerobic digesters implemented in Mexico with FIRCO support.</p> <p>Financiera Rural has granted loans for the implementation of 3 anaerobic digesters. And FIRA has granted loans for the implementation of 30 anaerobic digesters, as of 2010.</p> <p>Thus, a total of 254 anaerobic digesters with biogas capture have been implemented in Mexico with government economic support. Of these 254 anaerobic digesters, 46 have requested CDM registration. Thus, the number of anaerobic digesters supported with government resources is a fraction of the 2</p>		

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			<p>million cattle and swine production units.</p> <p>More than 150 projects involving anaerobic digestion with biogas capture with flaring and/or use have applied for registration under the CDM in Mexico. As of 1 May 2011, 4 projects have been withdrawn, 48 projects have finished validation (without requesting registration), 8 projects are at validation and 91 projects have been registered. Statistical information about livestock wastewater treatment in Mexico is not available; therefore CDM information was utilized for the analysis of manure practices in Mexico.</p> <p>Within the 150 projects applying for registration under the CDM are included more than 700 anaerobic digesters. Moreover, of the 91 projects which have been registered, as of 1 May 2011 only 34 projects were fully implemented and currently are in operation. Only 16 projects have presented Monitoring Reports but have not been able to request for issuance of CERs. And 41 projects might not have been fully implemented since no Monitoring Report was submitted in the following 24 months after the project registration.</p> <p>Financiera Rural is seeking to develop the</p>		

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			<p>same project concept under a programmatic approach with the hope of being able to introduce biodigestors at a significant number of animal farms, Financiera Rural as the Coordinating Entity of the program would ensure that the technology implementation, operation and maintenance are carried out successfully.</p> <p>Based on the “<i>Guidelines on the assessment of investment analysis</i>” /60/ evidences for salaries and civil works construction used in the financial analysis were not presented. It is not clear in the <i>NPV calculation spreadsheet</i> /9/ why cost of equity and cost of debt are swapped in tab “Discount rate”.</p> <p>Investment analysis assessment does not follow Paragraph 3 of the “<i>Guidelines on the Assessment of Investment Analysis</i>” /60/: “3. <i>The period of assessment should not be limited to the proposed crediting period of the CDM project activity. Both project IRR and equity IRR calculations shall as a preference reflect the period of expected operation of the underlying project activity (technical lifetime), or - if a shorter period is chosen - include the fair value of the project activity assets at the end of the assessment period. In general a minimum period of 10 years and a maximum of 20 years will be</i></p>		

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
			<i>appropriate.”</i>		
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/	DR	The additionality of the typical SSC-CPA of the PoA is demonstrated by the 10 criteria for inclusion of the CPAs in the PoA, especially criteria #10, which considers an investment analysis of each CPA to demonstrate the project would not be financially feasible without CDM revenues.		OK
E.4.2. Are specific criteria for demonstrating the additionality of a specific CPA included to the PoA?	/1/	DR	Yes, specific criteria to demonstrate the additionality of each SSC-CPA are clearly described in the PoA.		OK
E.4.3. Is the additionality of a typical CPA demonstrated?	/1/ /36/ /37/	DR	Yes, additionality is demonstrated through the 10 criteria for inclusion and will be treated in CPA level as well.		OK
E.5. Calculation of GHG Emission Reductions – Project emissions <i>It is assessed whether the procedure for calculating 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/ /4/	DR	Emission reduction calculations are transparently documented by Financiera Rural in spreadsheets.		OK
E.5.2. Have conservative assumptions been used when determining the procedure to be used to calculate	/1/	DR	See E.5.1.		OK

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	See E.5.1.		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/ /4/	DR	Considering the fact that not all the waste generated might reach the project activity, it is not describe in the monitoring plan of the CDM-SSC-PoA-DD /1/ how the difference will be measured and will impact the calculations of the emission reductions. It is not clear why MCF_j in CERs Calculation Spreadsheet /3/ for sheet AMS-I.D. is different from the value for MCF_j in 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Chapter 10 Table 10A-8.	CAR1 CL2	OK
E.6.2. Have conservative assumptions been used when determining the procedure to be used to calculate the baseline emissions?	/1/	DR	See E.6.1.		OK
E.6.3. Are uncertainties in the baseline emission estimates properly addressed?	/1/	DR	See E.6.1.		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</i>					

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<i>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/ /41/	DR	<p>Leakage is due to physical leakage included in project emissions:</p> <ul style="list-style-type: none"> - project emissions due to physical leakage of biogas from the animal manure management system used to produce, collect and transport the biogas to the point of flaring or gainful use are estimated as 10% of the maximum methane producing potential of the manure fed into the management systems implemented by the project activity; and - in case of sequential treatment stages, the reduction of the volatile solids during a treatment stage is estimated based on referenced data for different treatment types but with volatile solids adjusted for the reduction from the previous treatment stages by multiplying by (1 - RVS). Emissions from the next treatment stage are then calculated. 		
E.7.2. Have conservative assumptions been used when determining the procedure to be used to calculate the leakage emissions?	/1/	DR	Yes, see E.7.2.		OK
E.7.3. Are uncertainties in the leakage emission estimates properly addressed?			Yes, see E.7.2.		OK

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
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/ /4/	DR	Emission reduction calculations are transparently documented by Financiera Rural spreadsheets and in the CDM-SSC-CPA-DD. However, it is not clear why MCF_j in CERs Calculation Spreadsheet /3/ for sheet AMS-I.D. is different from the value for MCF_j in 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Chapter 10 Table 10A-8.	CL2	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/	DR	Monitoring plan is according to AMS-III.D., "Methane recovery in animal manure management systems" version 18. According to AMS-III.D., version 18 the monitoring consists of direct measurement of the amount of methane fueled or flared. However, considering the fact that not all the waste generated might reach the project activity, it is not describe in the monitoring plan of the CDM-SSC-PoA-DD /1/ how the difference will be measured and will impact the calculations of the emission reductions.	CAR1	OK

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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	Monitored data will be kept for two years after the end of the crediting period or the last issuance of CERs.		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/	DR	Yes, 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.		OK
E.10.2. Are the choices of programme GHG indicators reasonable and conservative?	/1/	DR	See E.10.1.		OK
E.10.3. Is the measurement method clearly stated for each GHG value to be monitored and deemed appropriate?	/1/	DR	See E.10.1.		OK
E.10.4. Is the measurement equipment described and deemed appropriate?	/1/ /13/ /14/ /15/	DR	The flow meters, sampling devices and gas analyzers are considered appropriate, including the monitoring and supervisor electronic system.		OK
E.10.5. Is the measurement accuracy addressed and deemed appropriate? Are procedures in place on how to deal with erroneous measurements?	/1/ /13/ /14/	DR	Accuracy is appropriately addressed for each equipment, as well as QA/QC procedures for measurements.		OK

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	/15/				
E.10.6. Is the measurement interval identified and deemed appropriate?	/1/	DR	Interval and frequencies are identified and deemed appropriate.		OK
E.10.7. Is the registration, monitoring, measurement and reporting procedure defined?	/1/	DR	Responsibilities and authorities for project management, monitoring and reporting activities, measurement and reporting techniques and QA/QC procedures are defined.		OK
E.10.8. Are procedures identified for maintenance of monitoring equipment and installations? Are the calibration intervals being observed?	/1/ /13/ /14/ /15/	DR	The flow meters, sampling devices and gas analyzers shall be subjected to regular maintenance, testing and calibration to ensure accuracy according to manufacturer specifications.		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/	DR	In the CDM-SSC-PoA-DD it is said that: <i>“SSC-CPA participants will be responsible for maintenance of the anaerobic digester and electricity generation systems, the SSC-CPA participant shall request calibration and maintenance services to the technology provider”</i> and <i>“Operator for the electricity generation system: Responsible of the operation of the electricity generation system (piping, measurements, interconnection to the national grid, etc). He will identify the needs of calibration and maintenance of the equipments and manage their calibrations in</i>	CLH	OK

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			<i>order to obtain the proper documentation”.</i> However, it is not stated in the PoA-DD what are the provisions that the monitoring plan has in terms of things that go wrong, i.e. date not available due to not proper monitoring of once of the CPAs and there is no information if the PoA is monitoring the CPA performance and the management system that is in place to run the PoA and to assure that the correct CPAs are actually included.		
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/	DR	Neither the simplified monitoring methodology <i>AMS-III.D.</i> nor the Mexican DNA require the monitoring of social and environmental indicators.		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	See E.11.1.		OK
E.11.3. Are the sustainable development indicators in line with stated national priorities in the Host Country?	/1/	DR	See E.11.1.		OK
E.12. Management System and Quality Assurance for Monitoring and Reporting <i>It is checked that programme implementation is</i>					

Checklist Question	Ref	MoV	Assessment by DNV	Draft Concl.	Final Concl.
<i>properly prepared for and that critical arrangements are addressed.</i>					
E.13.1. Is the authority and responsibility of overall programme management clearly described?	/1/	DR	The authority and responsibility of overall project management have been described.		OK
E.13.2. Are procedures identified for training of monitoring personnel?	/1/	DR	Technology supplier will provide training to the SSC-CPA participants' personnel to ensure proper operation of biodigester, flaring, generators and monitoring equipment. Responsibilities and authorities for project management, monitoring and reporting activities, measurement, training and reporting techniques and QA/QC procedures are defined in PoA		OK
E.13.3. Are procedures identified for emergency preparedness for cases where emergencies can cause unintended emissions?	/1/	DR	Not applicable.		OK
E.13.4. Are procedures identified for review of reported results/data?	/1/	DR	Procedures for review of reported results/data and for corrective actions in order to provide more accurate future monitoring and reporting have been established.		OK
E.13.5. Are procedures identified for corrective actions in order to provide for more accurate future monitoring and reporting?	/1/	DR	See E.13.4.		OK

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>CAR1</p> <p>Considering the fact that not all the waste generated might reach the project activity, it is not described in the monitoring plan of the CDM-SSC-PoA-DD /1/ how the difference will be measured and will impact the calculations of the emission reductions.</p>	<p>E.6.1</p> <p>E.9.1</p>	<p>Corrections were performed as follows:</p> <ol style="list-style-type: none"> 1. For El Topete farm, it has been recalculated the $MS\%_{Bl,j}$ in order to reflect the daily waste that is used for composting and/or that do not reach the anaerobic lagoon. In case of El Topete farm, actually 250 kilograms of daily volume of the manure is employed for composting purposes. This represents the 1.17% of the total daily volume of manure that will be discounted from the fraction of manure handled in the baseline animal manure management system j (j refers to the anaerobic lagoon system). 2. In section E.6.3 of the PoA, corrections on description for $MS\%_{Bl,j}$ and $MS\%_{i,y}$ were made (view page 70 and 77 respectively); particularly, and for the determination of the ERY <i>ex-post</i> calculations, the $MS\%_{i,y}$ will be subject to monitoring 	<p>DNV accessed the corrected CDM-SSC-CPA-DD /3/ and corrected CDM-SSC-PoA-DD /1/ and confirmed the corrections made to these documents. Therefore this CAR is closed.</p>

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		using proper instruments in order to determine the fraction of manure handled in system <i>i</i> in year <i>y</i> in comparison with the fraction on the baseline.	
CAR2 As required by Kyoto Protocol Art. 12.5a, CDM Modalities and Procedures §40a, the Letter of Approval issued by the Mexican DNA shall be presented.	A.4.6	The file “P099_VAL_162” contains the Letter of Approval issued by the Mexican DNA.	DNV has received and cross-checked the LoA /54/ with LoA of other projects in Mexico. DNV considers this LoA is authentic. Therefore this CAR is closed.
CAR3 Programme did not demonstrate that treated wastewater is not disposed directly into natural water bodies, as required in methodology <i>AMS-III.D.</i> /56/.	A.3.5 E.1.2	As reviewed in the site visit, interviewed personnel from El Topete farm indicated it is a common practice to use the wastewater for irrigations purposes on the lands next to the lagoon.	As checked during the site visit DNV confirmed the usage of wastewater for irrigations purposes on the lands next to the lagoon. Therefore this CAR is closed.
CAR4 Based on the “ <i>Guidelines on the assessment of investment analysis</i> ” /60/ evidences for salaries and civil works construction used in the financial analysis were not presented.	E.3.4	The file “P099_VAL_183” is presented as evidence for the salaries and civil works construction used in the financial analysis.	DNV has assessed the files regarding civil works used in the financial analysis of the PoA /45/ /47/ and cross-checked them with the information provided in the NPV spread sheet /9/. Therefore this CAR is closed.
CAR5 In section B.1 of the CDM-SSC-PoA-DD, it is said that the start date of the PoA is “01/09/2012 When the CDM-SSC-PoA-DD is submitted to Global Stakeholders Consultation”. However, the CDM-SSC-PoA-	B.1.1	Correction on PoA version 04 was made as follows: 30/08/2011. <i>When the PoA-DD is submitted to Global Stakeholders Consultation.</i>	DNV has assessed the revised version of the CDM-SSC-PoA-DD and confirmed the correct date (30 August 2011) was used. Therefore this CAR is closed.

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
DD was submitted to (published) Global Stakeholders Consultation on 30 August 2012.			
CAR6 Version 17 of methodology AMS-III.D. has expired.	E.1.1	Version of methodology AMS-III.D. was updated to version 18.	CDM-SSC-PoA-DD and CDM-SSC-CPA-DD were revised to version 18. DNV cross-checked the CDM-SSC-PoA-DD and CDM-SSC-CPA-DD with methodology and confirmed that it has been correctly applied and therefore this CAR is closed.
CL1 Evidences of composition of feed mentioned in the CDM-SSC-PoA-DD /1/ were not presented.	E.2.6	The files “P099_VAL_170” and “P099_VAL_171” contain the signed and dated document “ <i>Format P099_VAL_074.xls</i> ” regarding composition of feed.	DNV accessed the <i>Formulated Feed Ration (FFR)</i> /6/ and confirmed information is correctly applied in the CDM-SSC-PoA and therefore this CL is closed.
CL2 It is not clear why MCF_j in CERs Calculation Spreadsheet /3/ for sheet AMS-I.D. is different from the value for MCF_j in 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Chapter 10 Table 10A-8.	E.6.1 E.8.1	The parameter MCF_j is referred as the annual methane conversion factor for the baseline animal waste management system, and the percentage will depend on the average annual temperature for the project site. In case of El Topete farm the MAT is 19.5°C and, according to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Chapter 10 Table 10A-8, MCF_j shall be equal to 78% Therefore, the value presented in the mentioned sheet (77%) is considered as a miss type error and correct value shall	DNV has accessed the corrected CERs Calculation spreadsheet /3/ and the 2006 IPCC Guidelines Gas Inventories /30/ and confirmed the changes made in order to clarify the value presented for the MCF_j parameter are correct. Therefore this CL is closed.

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		be used instead (78%). According to the clarifications indicated, the corrections on the emission reductions calculations are presented in file “P099_VAL_197”	
CL3 It is not clear in section A.4.2.2. of the CDM-SSC-PoA-DD /1/ if the requirements of methodologies mentioned in item 4 are further explained in section E.2 of the same document.	A.1.2	It has been clarified in section A.4.2.2. of the PoA that the requirements of methodologies mentioned in item 4 are further explained in section E.2 of the same document. This clarification was also added in the generic CDM-SSC-CPA-DD format and the CDM-SSC-CPA-DD format for CPA-001 as well, in order to maintain the same coordination on the item.	DNV has accessed the corrected documents CDM-SSC-PoA-DD /1/, CDM-SSC-CPA-DD /2/ and CDM-SSC-CPA-DD format for CPA-001 /3/ and confirms the corrections were correctly applied by the project participant. Therefore this CL is closed
CL4 It is not clear in the <i>NPV calculation spreadsheet</i> /9/ why cost of equity and cost of debt are swapped in tab “Discount rate”.	E.3.4	After reviewing “Discount rate” tab of the investment analysis file and the proper percentages expressed, error was found in the titles of cells D15 and D17 and these were modified in order to maintain coherence with the cost of debt (12%) and the cost of equity (10.7%) respectively. View file “P099_VAL_188”	DNV accessed the CDM-SSC-CPA-DD format for CPA-001 /3/ and compared with the values on the corrected investment analysis /9/, confirming the modification. Therefor this CL is closed.
CL5 Investment analysis assessment does not follow Paragraph 3 of the “ <i>Guidelines on the Assessment of Investment Analysis</i> ” /60/: “3.	E.3.4	Investment analysis is following the Paragraph 3 of the guideline: The evaluation is considering the technical lifetime of the main equipment:	DNV has accessed the files regarding the lifetime of biodigesters /11/ and electrical generators /50/ and confirms a technical lifetime of 10 years for

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
<p><i>The period of assessment should not be limited to the proposed crediting period of the CDM project activity. Both project IRR and equity IRR calculations shall as a preference reflect the period of expected operation of the underlying project activity (technical lifetime), or - if a shorter period is chosen - include the fair value of the project activity assets at the end of the assessment period. In general a minimum period of 10 years and a maximum of 20 years will be appropriate.”</i></p>		<ul style="list-style-type: none"> • Such as for the biodigesters (view file “P099_VAL_105” - or name file /84/ “3_P099_VAL_105_EFM_Esti mation on lifetime of biodigesters_18NOV10.PDF” delivered to the DOE during August 2011), which is indicated a technical lifetime of 10 years. • As well as for the electrical generators (view file “P099_VAL_189.pdf”), which also indicates a technical lifetime of 10 years according to the provider. <p>For clarification purposes, it has been added in Table 4 of the CPA document a row where it is indicated that the period of assessment has been performed based on the technical lifetime of the main equipment,(as indicated previously).</p> <p>No fair value is assigned neither for the biodigesters or the generators, considering the Article 40 fraction XII of the Mexican Income Tax Law (available at</p>	<p>both main equipment. DNV also checked the corrected CDM-SSC-CPA-DD /2/ and the investment analysis /9/ confirming the modifications made by the project participant are correct. Therefore this CL is closed.</p>

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		< http://www.diputados.gob.mx/LeyesBiblio/pdf/82.pdf >), where depreciation on renewable energy machinery and/or equipment is 100% for the first year (operating as a minimum 5 years).	
CL6 It is not clear in the CDM-SSC-PoA-DD the information about the total estimate number of CPAs participating in the programme and the total estimate ERs to be achieved during the length of the programme.	A.1.2	Information has been added to the PoA version 04 in section A.2. as follows: <i>Preliminary, it is estimated a participation of 30 CPAs with a potential emission reductions of 100,000 tCO₂e per year.</i>	DNV has assessed the revised version of the CDM-SSC-PoA-DD and confirmed the information was added. Therefore this CL is closed.
CL7 It is not clear what are the possible uses of the pre-project lagoons, since it is said in the CDM-SSC-PoA-DD that: “ <i>On each CPA, an anaerobic digester lagoon with a cover will be constructed. Pre-project lagoons could be adapted to operate as anaerobic digesters.</i> ” and also that “ <i>In both project activity scenarios, the lagoons from the pre-project situation could be used as secondary open lagoons where the effluent of the new digester lagoons will be directed to.</i> ”	A.1.2	Correction on PoA version 04 section A.4.2.1 was made by adding in the same paragraph both sentences in order to clear out the possible uses of the pre-project lagoons.	DNV has assessed the revised version of the CDM-SSC-PoA-DD and confirmed that the correct information was added. Therefore this CL is closed.
CL8 It is not clear how the sampling method will be used in the PoA level, since it is said in the	A.3.9	Correction on PoA version 04 section A.4.4.2 was made as indicated.	DNV has assessed the revised version of the CDM-SSC-PoA-DD and confirmed that the term used was corrected to CPA.

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
CDM-SSC-PoA-DD in Section 4.4.2: <i>“This PoA considers a sampling method to be used for verification of the PoA”</i> .			Therefore this CL is closed.
CL9 It is not clear from the CDM-SSC-PoA-DD what are the reasons why a potential CPA would use Financiera Rural’s financing instead of other institutions (FIRCO and FIRA).	A.2.4 A.3.12	It is not intended to limit or force one way of financing mechanism to the developers but to offer a financial help. Still, in case that no financial help is requested, the developer can ask voluntarily to participate as a CPA for the present PoA scheme with the benefits of the carbon credits. To clarify this concept, it is indicating as a condition in section A.4.2.2 of the PoA and CPA documents: <i>“Each SSC-CPA is able to participate voluntarily in the SSC-PoA whether or not requires financial help from Financiera Rural or receive financial help from another entity.”</i>	DNV has assessed the revised version of the CDM-SSC-PoA-DD and confirmed that the eligibility criteria <i>“Each SSC-CPA is able to participate voluntarily in the SSC-PoA whether or not requires financial help from Financiera Rural or receive financial help from another entity.”</i> included clarifies that not necessarily an interested farm needs to use financing from Financiera Rural. Therefore this CL is closed.
CL10 One of the references of each CPA to avoid double counting is the register of number of animals and type of livestock. It is not clear how this is a unique reference as it is expected a changing number as the livestock numbers over time on a regular basis.	A.2.3 A.7.2	A.2 In order to maintain consistency, it has been modified the SSC-CPA identification criteria in section A.4.4.1 of the CDM SSC-PoA-DD document, in order to align it with the physical address of the farm and only the type of livestock involved in the CPA farm, in addition to the GPS coordinates, the farm name, the farm owner and a unique ID number of the anaerobic	DNV has assessed the revised version of the CDM-SSC-PoA-DD and confirmed that the tagging to prevent double counting has been satisfactorily addressed. Therefore this CL is closed.

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion
		digester to be installed as per the definition of the database of the Coordinating Entity, Financiera Rural.	
<p>CL11</p> <p>In the CDM-SSC-PoA-DD it is said that: <i>“SSC-CPA participants will be responsible for maintenance of the anaerobic digester and electricity generation systems, the SSC-CPA participant shall request calibration and maintenance services to the technology provider”</i> and <i>“Operator for the electricity generation system: Responsible of the operation of the electricity generation system (piping, measurements, interconnection to the national grid, etc). He will identify the needs of calibration and maintenance of the equipments and manage their calibrations in order to obtain the proper documentation”</i>. However, it is not stated in the PoA-DD what are the provisions that the monitoring plan has in terms of things that go wrong. i.e. date not available due to not proper monitoring of once of the CPAs and there is no information if the PoA is monitoring the CPA performance and the management system that is in place to run the PoA and to assure that the correct CPAs are actually included.</p>	E.10.9	<p>In case of lack of data, no emission reductions shall be claimed for the period where the data is not available. In addition, the CME has defined that it will perform randomly internal audits to the CPAs in order to verify that the monitoring plan has been performed as per the training given by the technologist and from the information contained in the manual delivered by the CME to the CPAs, as mentioned in the PoA as well.</p> <p>With the access of Financiera Rural to the information compiled from the data stored electronically of the monitored parameters, the availability of daily registrations on the CPAs operation, maintenance, frequencies and execution of calibration of the instruments as well as the random internal audits to the CPAs, the Financiera Rural will assure the CPA performance and proportionate recommendations or even courses of actions to the management system in each CPA to assure a proper functionality of the PoA.</p>	<p>DNV has assessed the revised version of the CDM-SSC-PoA-DD and confirmed that Section A.4.4.1 were satisfactorily addressed.</p> <p>Therefore this CL is closed.</p>

Corrective action and/ or clarification requests	Reference to Table 2	Response by project participants	Validation conclusion

Table 4 Forward action requests

Forward action request	Reference to Table 2	Response by project participants
FAR1 No FAR was identified in the validation process.	-	-

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>						
B.1.1	Has it been sufficiently justified that the CPA complies with “ <i>Each SSC-CPA must be located within the geographical boundary of Mexico.</i> ”?					
B.1.2	Each SSC-CPA is able to participate voluntarily in the SSC-CPA whether or not requires financial help from Financiera Rural or receives financial help from another entity.					
B.1.3	Has it been sufficiently justified that the CPA complies with “ <i>SSC-CPAs to be included shall consist of the implementation of anaerobic digestion as wastewater treatment, an enclosed flaring system and for CPAs corresponding to scenario B also an electricity generation system.</i> ”?					
B.1.4	Has it been sufficiently justified that the CPA complies with “SSC-CPAs will have anaerobic lagoons as baseline scenario treatment.” ?					
B.1.5	Has it been sufficiently justified that the CPA complies with “SSC-CPAs corresponding to project activity scenario A will follow and shall comply with the requirements of AMS-III.D. “Methane recovery in animal manure management systems” (version 18). CPAs corresponding to project activity scenario B will follow and shall comply with the requirements of AMS-III.D. “Methane recovery in animal manure management systems” (version 17) and AMS-I.D. “Grid connected renewable electricity generation” (version 17). Requirements of methodologies					

CHECKLIST QUESTION		Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
	mentioned are further indicated in section E.2. of the CDM SSC-PoA-DD document.” ?					
B.1.6	Has it been sufficiently justified that the CPA complies with “A de-bundling check shall be assessed, according to Annex 13 of EB 54, for SSC-CPA to be included in the PoA.” ?					
B.1.7	Has it been sufficiently justified that the CPA complies with “The coordinating entity will ensure that all CPAs under its PoA are neither registered as an individual CDM project activity nor included in another registered PoA, and that the CPA is subscribed to the PoA.” ?					
B.1.8	Has it been sufficiently justified that the CPA complies with “SSC-CPAs shall have a project starting date after the PoA-DD is submitted to Global Stakeholders Consultation.” ?					
B.1.9	Has it been sufficiently justified that the CPA complies with “The SSC-CPAs shall be in line with national and local regulations available at the time of inclusion into the SSC-PoA. If an Environmental Impact Assessment (EIA) is mandated for a CPA, such an EIA must be undertaken at the CPA level prior to the inclusion of the CPA in the PoA. In addition, it is indicated to the SSC-CPAs that stakeholder consultations has been done at PoA level, hence, there is no need to undertake a local stakeholder consultations”?					
B.1.10	Has it been sufficiently justified that the CPA complies with “The SSC-CPAs shall evidence					

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
that are not viable without CDM revenue, demonstrating through investment analysis as described in section E.5.2. of the PoA-DD" ?					
B.1.11 Has it been sufficiently justified that the CPA complies with "The SSC-CPA will stay within the small scale threshold criteria of the Type I (i.e < 15 MW) and Type III (i.e < 60,000 CERs per year) components of the project activity and will remain within those thresholds throughout the crediting period of the CPA"?					
B.1.12 Has it been sufficiently justified that the CPA complies with "Each SSC-CPA will either not involve funding from Annex I parties, or if any funding from Annex I parties is involved, it will not result in a diversion of official development assistance"?					
Investment analysis <i>The list of questions below must be adjusted to the parameters in the investment analysis relevant to the project under validation.</i> <u>All input parameters need to be assessed.</u>					
B.1.13 Does the CPA or any of the remaining alternatives generate revenues apart from CDM? Is this reflected in the PoA-DD/CPA-DD?					
B.1.14 Do any of the alternatives to the project activity involve investment? Is this reflected in the PoA-DD/CPA-DD?					
B.1.15 Is the choice of benchmark analysis, investment comparison or simple cost analysis correct?					
B.1.16 Is the benchmark/discount rate the latest available					

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
at the time of decision?					
B.1.17 What is the financial indicator? Is it on equity/project basis? Before/after tax? Is the financial indicator in correspondence with the benchmark?					
B.1.18 Are the underlying assumptions appropriate, e.g. what is considered as waste in the baseline is considered to have zero value?					
B.1.19 Does the income tax calculation take depreciation into account? Is the depreciation year in accordance with normal accounting practice in the host country?					
B.1.20 Is the time period of the investment analysis and operating time of the project realistic? Has salvage value been taken into account? Is working capital returned in the last year of operation?					
B.1.21 When a feasibility study report or similar approved by the government is used as the basis for the investment analysis: Can it be confirmed that the values used in the PDD are fully consistent with the FSR and is the period of time between finalization of the FSR and the investment decision adequate?					
B.1.22 How was the amount of output (e.g. sales of electricity) assessed?					
B.1.23 How was the output price (e.g. electricity price) assessed?					
B.1.24 How were the investment costs assessed? Were the data available and valid at the time of decision?					
B.1.25 How were the O&M costs assessed? Were the data available and valid at the time of decision?					
B.1.26 Describe the assessment of the other input parameters. Were the data available and valid at the					

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
time of decision?					
B.1.27 Was the financial calculation spreadsheet verified and found to be correct?					
B.1.28 Sensitivity analysis: Have the key parameters contributing to more than 20% of the revenue/costs during operating or implementation been identified? Has possible correlation between the parameters been considered?					
B.1.29 Sensitivity analysis: Is the range of variations is reasonable in the project context?					
B.1.30 Have the key parameters been varied to reach the benchmark and the likelihood of this to happen been justified to be small?					
B.2. Calculation of GHG Emission Reductions – Project emissions <i>It is assessed whether the project 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.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</i>					

CHECKLIST QUESTION		Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
<i>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 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						

CHECKLIST QUESTION		Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
<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?					
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					

CHECKLIST QUESTION		Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
	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?					
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?					

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
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>			<input type="checkbox"/> Analysis at PoA level <input type="checkbox"/> Analysis at CPA level This section must only be completed if the analysis of environmental impacts must be at CPA level.		
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)?					
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</i>			<input type="checkbox"/> Consultation at PoA level <input type="checkbox"/> Consultation at CPA level		

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
<i>in the development of the CPA.</i>			This section must only be completed if the analysis of environmental impacts is at PoA level.		
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

Luis Filipe Aboim Tavares

Mr. Luis Filipe Tavares holds a Technician's Degree in Chemistry and Bachelor's Degree in Metallurgical Engineering having an overall experience of thirty tree years.

Prior to joining DNV having around twenty three years of experience in steel production industry covering utilities (water, steam, wastewater treatment), environment control (atmosphere emissions, water emission and waste dumping).

His experience also covers the development of nitrification biological wastewater station as well as other activities as head of Utilities and Environmental Laboratory control.

He has also been actively involved in implementation of Management Systems such as ISO 9001 standard on coke oven department of steel industry as well as the ISO 140001 standard in all steel plant (the second steel company certified in the world) for more than three years.

He has experience of around 8 years in validation and verification of numerous CDM projects in DNV, both in Brazil & South America.

His qualification, industrial experience and experience in CDM demonstrate his sufficient sectorial competence in Iron and Steel; Metal production; Oil and Gas industry, CMM recovery and use; Generation from renewable energy sources; Waste handling and disposal and Animal waste management.

Gabriel Baines

Gabriel Baines holds a Bachelor's Degree in Environmental Engineering having an overall work experience of around 5 years. Prior to joining DNV, has had two and a half years of experience in the aluminium industry covering the areas of production and environment. His experience also covers the fields of environmental management and management systems such as ISO 14.001.

He has experience of around 2 years in validation and verification of numerous CDM projects in DNV, both in Brazil and abroad.

His qualification, industrial experience and experience in CDM demonstrate his sufficient sectorial competence in 9.1. metal production.

Danae Díaz

Danae Díaz is an Environmental Engineer with post graduate studies in Environmental Economics and Business Administration.

Her work experience includes more than 8 years, participating in consulting, project implementation with international organizations and carbon project implementation. She participated in consulting projects in the areas of wastewater and solid remediation. In the Ministry of Environment and Natural Resources of Mexico, she searched synergies and opportunities for the creation of sustainable development projects especially of Air Quality;

including the participation in transport projects, analysis of mobile and industrial sources and elaboration of federal rules among other activities.

Danae Díaz participated in the implementation of environmental projects for international environmental agreements such as the Montreal Protocol coordinating several activities to reduce the consumption of ozone layer depleting substances in Mexico through international agencies such as UNIDO, UNDP, WB, local NGOs, and academic institutions.

Her participation in CDM projects encompasses 3 years prior to joining DNV, particularly in Animal Waste Management Systems, landfills and wastewater treatments for the agro industrial and industrial sector in Mexico and Latin America as well as auditing activities.

At DNV she has experience in around 1.7 years in validation and verification of numerous CDM projects.

Her qualification and industrial experience in CDM projects demonstrate her sufficient sectoral competence in Waste Handling and Disposal as well as Animal Waste Management Sectoral Area.

Frederico Rosas

Frederico holds a Bachelor Degree in Management and a specialization in Business Administration.

He is professor at Fundação Getúlio Vargas, where he teaches financing, costs management, price management, investment analysis and controllership.

He has working experience of more than 15 years in companies of the area of finances, mining and cosmetics.

Kumaraswamy Chandrashekara

Kumaraswamy Chandrashekara holds a Bachelor's Degree in Chemical Engineering and has an overall experience of around 24 years. Prior to joining DNV, has worked for 11 years in the Chemical Process Industry covering Plant Operations, Technical Services and Process Design activities, primarily in the fertilisers and chemicals manufacturing sector. During this tenure of 11 years in the industry, responsibilities included production, process optimization, energy efficiency improvements, environmental performance, process design, energy auditing and technical auditing.

He has experience of around six years in the validation and verification of numerous CDM projects both in India and abroad. His qualification, industrial experience and experience in CDM sufficiently demonstrate his sectoral competence in the areas of chemical process industries, energy generation from renewable sources and waste handling & disposal

Fernando Sasdelli

Fernando Sasdelli holds a Bachelor's Degree in Mechanical Engineering from University of São Paulo and has a Specialization in Business Administration from Fundação Getúlio Vargas.

Prior to joining DNV Fernando has four years of experience in cogeneration projects, including project design and development for biomass and natural gas power plants. Fernando

has worked in middle and large size cogeneration projects, from hotels and commercial buildings to chemical industries and large sugar cane mills.

His qualification and industrial experience demonstrate his sufficient sectoral competence in thermal energy generation from fossil fuels and biomass.

Michael Lehmann

Michael Lehmann holds a Master Degree in Environmental Sciences with a specialisation in environmental chemistry. He has an overall working experience of around 13 years.

Since 1999 he has worked in the climate change field and has closely followed the international response to the climate change challenge (UNFCCC, Kyoto Protocol) and the responses by national governments (EU ETS, UK ETS) and business. He has managed the validation and verification of many CDM and JI projects and has carried out the technical review of numerous climate change project validations and verifications.

Through his extensive work with validation and verification of CDM and JI projects, he has acquired sectoral competence within energy generation from renewable energy sources.

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