VALIDATION REPORT

"BRASCARBON Methane Recovery Project BCA-BRA-09" in Brazil

REPORT NO. 2009-1410

REVISION NO. 01

DET NORSKE VERITAS

VALIDATION REPORT

DET NORSKE VERITAS
CERTIFICATION AS

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Approved by: Michael Lehmann	Organisational unit: Climate Change Services
Client: Brascarbon Consultoria, Projetos e Representação S/A	Client ref.: Luiz Lasas

Project Name: "BRASCARBON Methane Recovery Project BCA-BRA-09"
Country: Brazil
Methodology: AMS-III.D
Version:15
GHG reducing Measure/Technology: "*Methane recovery from animal manure management systems*"
ER estimate: 399 098 tCO_2e over 7 years (57 014 tCO_2e annually)
Size
☐ 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
☐ Rejected

This validation report summarizes the findings of the validation. In summary, it is DNV's opinion that the "BRASCARBON Methane Recovery Project BCA-BRA-09", as described in the PDD version 4 of 1 March 2010, meets all relevant UNFCCC requirements for the CDM and all relevant host Party criteria and correctly applies the baseline and monitoring methodology AMS-III.D version 15. DNV thus requests the registration of the project as a CDM project activity.
Prior to the submission of the final validation report to the CDM Executive Board, DNV will have to receive the written approval of voluntary participation from the DNA of Brazil, including the confirmation by the DNA of Brazil that the project assists it in achieving sustainable development.

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2009-1410	2010-03-30	01

Report title:
"BRASCARBON Methane Recovery Project BCA-BRA-09" in Brazil

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Key words:

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☐ Limited distribution

☐ Unrestricted distribution

Abbreviations

B_0	Maximum methane producing capacity of the manure (m^3CH_4/kg VS)
CAR	Corrective Action Request
CDM	Clean Development Mechanism
CEF	Carbon Emission Factor
CER	Certified Emission Reduction
CH_4	Methane
CL	Clarification request
CO_2	Carbon dioxide
CO_2e	Carbon dioxide equivalent
DNV	Det Norske Veritas
DNA	Designated National Authority
EB	Executive Board
GHG	Greenhouse gas(es)
GWP	Global Warming Potential
INPE	National Institute of Space Research
IPCC	Intergovernmental Panel on Climate Change
MP	Monitoring Plan
MCF	Methane Conversion Factor
NGO	Non-governmental Organisation
NPV	Net Present Value
ODA	Official Development Assistance
O&M	Operation and maintenance
PDD	Project Design Document
SELIC rate	Special System of Clearance and Custody
UNFCCC	United Nations Framework Convention on Climate Change
VS	Volatile Solids produced daily per head

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VALIDATION REPORT

1 EXECUTIVE SUMMARY – VALIDATION OPINION

Det Norske Veritas Certification AS (DNV) has performed a validation of the "BRASCARBON Methane Recovery Project BCA-BRA-09", located in the Mato Grosso do Sul State, Brazil. *The validation was performed on the basis of UNFCCC criteria for CDM project activities and relevant Brazilian criteria, as well as criteria given to provide for consistent project operations, monitoring and reporting.*

The project participant is Brascarbon Consultoria, Projetos e Representação S/A of Brazil. The host Party Brazil meets all relevant participation requirements of CDM project activity. No participating Annex I Party is yet identified.

The objective of the project is to capture and burn the biogas generated through the decomposition of the swine manure produced at selected swine farms.

By improving the environmental and working conditions for swine production, the project is in line with the current sustainable development priorities of Brazil.

The project applies the approved simplified baseline and monitoring methodology AMS-III.D, i.e. "Methane recovery in animal manure management systems" (version 15). The baseline methodology has been correctly applied and the assumptions made for the selected baseline scenario are sound. It is sufficiently demonstrated that the project is not a likely baseline scenario and that emission reductions attributable to the project are additional to any that would occur in the absence of the project activity.

The monitoring methodology has been correctly applied. The monitoring plan sufficiently specifies the monitoring requirements of the main project indicators.

By capturing and destroying biogas from swine manure, the project results in reductions of CO_2 emissions that are real, measurable and give long-term benefits to the mitigation of climate change. Emission reductions are directly monitored and calculated ex-post, using the approach given in AMS-III.D (version 15). The ex-ante estimation of emission reductions and the projected biogas generation from the swine manure was determined using the 2006 IPCC tier 2 approach.

In summary, it is DNV's opinion that the "BRASCARBON Methane Recovery Project BCA-BRA-09", as described in the revised project design document of 1 March 2010, meets all relevant UNFCCC requirements for the CDM and all relevant host Party criteria and correctly applies the baseline and monitoring methodology AMS-III.D (version 15). Hence, DNV will request the registration of the "BRASCARBON Methane Recovery Project BCA-BRA-09" as a CDM project activity.

Prior to the submission of the final validation report to the CDM Executive Board, DNV will have to receive the written approval of voluntary participation from the DNA of Brazil, including the confirmation by the DNA of Brazil that the project assists it in achieving sustainable development.

2 INTRODUCTION

Brascarbon Consultoria, Projetos e Representação S/A has commissioned Det Norske Veritas Certification AS (DNV) to perform a validation of the "BRASCARBON Methane Recovery Project BCA-BRA-09", located in the Mato Grosso do Sul State, Brazil. This validation report summarises the findings of the validation of the project, performed on the basis of UNFCCC criteria for the CDM, as well as criteria given to provide for consistent project operations, monitoring and reporting.

The validation team consisted of the following personnel:

				Type of involvement					
Role/Qualification	***Last Name***	***First Name***	***Country***	Desk review	Site visit / Interviews	Reporting	Supervision of work	Technical review	Expert input
CDM validator / technical team leader	Leiroz	Andrea	Brazil	x	x	x	x		
Sector expert	Tavares	Luis Filipe	Brazil	x					x
GHG auditor (applicant)	Philipi	Fabiana	Brazil	x					
Technical reviewer (applicant)	Ramachandran	Ramesh	India					x	
Technical reviewer	Lehmann	Michael	Norway					x	

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

2.1 Validation Objective

The purpose of a validation is to have an independent third party assess the project design. In particular, the project's baseline, monitoring plan, and the project's compliance with relevant UNFCCC and host Party criteria are validated in order to confirm that the project design, as documented, is sound and reasonable and meets the identified criteria. Validation is a requirement for all CDM projects and is seen as necessary to provide assurance to stakeholders of the quality of the project 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 project design document (PDD) **/1/**. The PDD is reviewed against the criteria stated in Article 12 of the Kyoto Protocol, the CDM modalities and procedures as agreed in the Marrakech Accords, and the relevant decisions by the CDM Executive Board, including the approved baseline and monitoring methodology AMS-III.D (version 15) **/21/**. The validation was based on the recommendations in the Validation and Verification Manual **/20/**.

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

3 METHODOLOGY

The validation consisted of the following three phases:

I a desk review of the project design documents

II follow-up interviews with project stakeholders

III the resolution of outstanding issues and the issuance of the final validation report and opinion.

3.1 Desk Review of the Project Design Documentation

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

/1/ Brascarbon Consultoria, Projetos e Representação S/A, Project Design Document for the "BRASCARBON Methane Recovery Project BCA-BRA-09". Version 1 of 12 January 2009, version 2 of 2 December 2009, version 3 of 13 January 2010 and version 4 of 1 March 2010.

/2/ Brascarbon Consultoria, Projetos e Representação S/A, Emission reduction calculation: spreadsheet PDD 9 – AMS III D – version 15.

/3/ Format Brascarbon 03.003 for swine population account

/4/
- Sow purchase receipt 7219 from Agroceres sold to Córrego Azul swine farms and letter from Marilena Lopes Siqueira dated 01 September 2009 confirming Agroceres genetic source for the following swine farms:Sítio Santa Izabel, Sítio São José, Sítio Paraíso and Sítio São José do Corrego da Anta.
- Letter from Cargill confirming Topigs genetic for the following swine farms: Lote Rural 37, 39 e 35, Lote Rural 56, Sítio Boa Esperança, Sítio Lote 1 Quadra 32, Lote 24 e 26, Sítio Lote 43, Sítio Lote 65, Sítio Lote 04 e 06, Sítio Lote 45 and Sítio Água Limpa. Dated 18 August 2009.

/5/ Swine food formulation from Cargill and Hofig
Cooasgo Cooperativa Agropecuária spreadsheet regarding food formulation.

/6/ Methane analyzer http://www.geotech.co.uk/Downloads/Portable_Biogas_datasheet.(NEW%202)pdf.pdf.

/7/
- Agrocerespic http://www.agrocerespic.com.br/quemsomos/index.html (joint venture of Agroceres and Pig Improvement co from UK; http://www.agroceresnutricao.com.br/principal_1024.jsp
- TOPIGS http://www.topigs.com/

/8/ Letter of Intent issued on 01 June 2007 by Climate Change Capital Ltd / Ecoprogresso to Brascarbon for purchasing of emissions reductions from piggery waste methane reductions projects in Brazil.

/9/ Farms Environment Licenses.

/10/ Construction schedule PDD 9.

/11/ Brascarbon Operation Procedures Manual:
POP 1 Combustion Temperature Monitoring Tf
POP 2 Rules of Town

POP 3 Swine Population Counting
POP 4 Biogas volume measuring Bg_{burnt}
POP 5 Methane Contend Monitoring W_{ch4}
POP 6 Biogas Temperature Monitoring
POP 7 Methane Density - Dch_4
POP 8 Flare Efficiency Timetable Fey
POP 9 Biodigestor Sludge Removal
POP 12 General Maintenance
POP 13 Biogas Pressure Monitoring
POP 14 Swine Feed Formulation
POP 15 Swine genetic source
POP 16 Swine Weight
POP 17 Ex-post yearly emission reductions

/12/ Mato Grosso do Sul State Annual average temperature: http://satelite.cptec.inpe.br/PCD/

/13/ ECOGAS enclosed flare specification

/14/ Electricity price in Brazil: http://www.aneel.gov.br/area.cfm?idArea=550

/15/ Brazilian Swine Producers Association
http://www.abcs.org.br/portal//mun_sui/producao/genetica/principais.jsp
http://www.aps.org.br/component/content/article/1-timas/357-a-energia-gerada-pela-suinocultura-.html

/16/ Brazilian swine producers and CDM developers
http://www.sadia.com.br/br/instituto/
http://www.perdigao.com.br/empresasperdigao/instituto1.cfm?codigo=15
http://www.agcert.com/
http://www.ecobiocarbon.com.br/

/17/ Brazilian government loan - SELIC
http://www.bcb.gov.br

/18/ Brazilian Water Environment Legislation
http://www.mma.gov.br/port/conama/res/res05/res35705.pdf

/19/ Practice of swine manure treatment
http://www.cnpsa.embrapa.br/down.php?tipo=publicacoes&cod_publicacao=186

/20/ CDM Executive Board: Validation and Verification Manual Version 01.
http://cdm.unfccc.int/EB/044/eb44_repan03.pdf

/21/ CDM Executive Board: Appendix B of the “Simplified modalities and procedures for small-scale CDM project activities”: Indicative simplified baseline and monitoring methodologies for selected small-scale CDM project activities. AMS-III.D – “Methane recovery in animal manure management systems” Version 15.

/22/ CDM Executive Board: Attachment A to the Appendix B of the “Simplified modalities and procedures for small-scale CDM project activities”: Indicative simplified baseline and monitoring methodologies for selected small-scale CDM project activities. Version 06 of 30 September 2005.

/23/ 2006 IPCC Guidelines for National Greenhouse Gas Inventories – Volume 4 Chapter 10

/24/ Brascarbon Consultoria, Projetos e Representação S/A, Financial analysis PDD 9

spreadsheet.

/25/ Stakeholders' consultation process: invitation letters sent to local stakeholders on 4 May 2009 and mail receipts.

/26/ Pictures of the farms provided by the project participant.

/27/ Swine manure project installed in Brazil:

- Project Design Document for the BRASCARBON Methane Recovery Project BCA-BRA-01 version 5a of 4 March 2009. UNFCCC ref. 2318.
- Project Design Document for the Project of treatment and swine's manure utilization at Ecobio Carbon – Swine Culture Nº 1 version 3 dated 2 December 2008. UNFCCC ref. 2939.
- Project Design Document for the Perdigão Sustainable Swine Production 01 – Methane capture and combustion version 04 of 1 June 2009. UNFCCC ref. 2249.

/28/ Investment analysis – input parameters:

- Biodigester costs:
  - Proposal from Vinimaster Ind. Com. E Confecções Ltda. Dated 18 January 2009.
  - Proposal from Construções Teixeira e Silva Ltda. Dated 22 January 2009.
  - Proposal from Cadesenhos Desenhos Técnicos e Serviços Topográficos. Dated 18 February 2009.
  - Proposal from A&P Pezzzato Construções Ltda – ME. Dated 19 February 2009.
- Flare costs:
  - Proposal from Ecogás. Dated 1 March 2009.
- Flow meter
  - Proposal from Endress + Hauser. Dated 29 May 2009.
- Electricity generator:
  - Proposal from Grupo Fockink – Energia Alternativa. Dated 11 March 2009.

Main changes between the version of the PDD published for the 30 days stakeholder consultation period and the final version of the PDD are as follows:

- More explanation on the investment barrier;
- Update crediting period starting date;
- Changes related to the CARs and CLs identified in the DNV's draft validation report.

3.2 Follow-up Interviews with Project Stakeholders

On 07 October 2009, DNV visited and assessed 4 farms (Sítio Santa Izabel, Sítio Paraíso, Fazenda Corrego Azul-Paredão 1 and Fazenda Corrego Azul-Paredão) of a total of 16 farms (a random sample of the square root of all farms) in order to verify that the current manure management practise is open anaerobic lagoons with depths greater than 1 meter. In addition, DNV performed interviews with project stakeholders to confirm selected information and to resolve issues identified in the document review. The baseline situation (i.e. open lagoons) of the others farms included in PDD was verified by assessing pictures provided by the project participant. Moreover, DNV was able to confirm that the usual practice is to use the anaerobic

open lagoon with methane emissions escaping to the atmosphere through reviewing the applicable environment legislation /18/ and the environment licenses of each farm /9/.

DNV deemed that the documentary evidences provided for all farms and the site visit performed to a random sample of the farms are sufficient to validate that the baseline situation at all farms is treatment of manure in open anaerobic lagoons with a depth of at least one meter.

The following representatives of the project participants were interviewed:

/29/ David Garcia – Ecoprogresso

/30/ Mario Pacífico da Silva – Brascarbon

/31/ Afonso Libero Rosalen – Brascarbon

The main topics of the interviews are summarized in the table below.

Organization	**Topic**
Ecoprogresso Brascarbon	• Additionality of the project • Project starting date • Monitoring plan • Baseline emission estimation • Historic average swine population • Environmental Licenses/legal compliance • Stakeholders consultation process • Baseline scenario (open anaerobic lagoon) • Operation and monitoring control (procedures)

3.3 Resolution of Outstanding Issues

The objective of this phase of the validation was to resolve any outstanding issues which needed to be clarified prior to DNV's positive conclusion on the project design. 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 three tables. The different columns in these tables are described in the figure below. The completed validation protocol for the "BRASCARBON Methane Recovery Project BCA-BRA-09" is enclosed in Appendix A to this report.

Findings established during the validation can either be seen as a non-fulfilment of CDM criteria or where a risk to the fulfilment of project objectives is identified. Corrective action requests (CAR) are issued, where:

i) The project participants have made mistakes that will influence the ability of the project activity to achieve real, measurable additional emission reductions;

ii) The CDM requirements have not been met;

iii) 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.

Validation Protocol Table 1: Mandatory Requirements for CDM Project 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)** of risk or 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)***	***Comment***	***Draft and/or Final Conclusion***
The various requirements in Table 2 are linked to checklist questions the project should meet. The checklist is organised in different sections, following the logic of the large-scale PDD template, version 03 - in effect as of: 28 July 2006. Each section is then further sub-divided.	*Gives reference to documents where the answer to the checklist question or item is found.*	*Explains how conformance with the checklist question is investigated. Examples of means of verification are document review (DR) or interview (I). N/A means not applicable.*	*The section is used to elaborate and discuss the checklist question and/or the conformance to the question. It is further used to explain the conclusions reached.*	*This is either acceptable based on evidence provided (**OK**), or a c**orrective action request (CAR)** due to non-compliance with the checklist question (See below). A request for clarification (CL) is used when the validation team has identified a need for further clarification.*

Validation Protocol Table 3: Resolution of Corrective Action and Clarification Requests			
Draft report clarifications and corrective action requests	***Ref. to checklist question in table 2***	***Summary of project owner response***	***Validation conclusion***
If the conclusions from the draft Validation are either a CAR or a CL, these should be listed in this section.	*Reference to the checklist question number in Table 2 where the CAR or CL is explained.*	*The responses given by the project participants during the communications with the validation team should be summarised in this section.*	*This section should summarise the validation team's responses and final conclusions. The conclusions should also be included in Table 2, under "Final Conclusion".*

Figure 1 Validation protocol tables

3.4 Internal Quality Control

The validation report underwent a technical review before requesting registration of the project activity. The technical review was performed by a technical reviewer qualified in accordance with DNV's qualification scheme for CDM validation and verification.

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 project design as documented and described in the revised project design documentation of 1 March 2010 /**1**/.

4.1 Participation Requirements

Brascarbon Consultoria, Projetos e Representação S/A is the project proponent from the Host party Brazil. The host Party Brazil meets all relevant participation requirements of CDM project activity. No participating Annex I Party is yet identified.

Brazil has ratified the Kyoto Protocol on 23 August 2002. The Brazilian designated national authority for the CDM is the Comissão Interministerial de Mudança Global do Clima.

Prior to the submission of the final validation report to the CDM Executive Board, DNV will have to receive the written approval of voluntary participation from the DNA of Brazil, including the confirmation by the DNA of Brazil that the project assists it in achieving sustainable development.

4.2 Project Design

The "BRASCARBON Methane Recovery Project BCA-BRA-09" consists of the implementation of anaerobic digesters at 16 farms located in the Mato Grosso do Sul State, Brazil. The installation of anaerobic digesters aim to treat the manure under controlled conditions as well as capture and burn the methane generated by the decay of swine manure from the farms.

The facility drains the overflow, with lower organic matter content, from anaerobic digesters to the existent open lagoon, which stores the effluents. Effluents are normally used for crop irrigation.

The project will initially only flare the biogas, but in case of favourable conditions at the farms in the future, biogas may also be utilized to generate electricity for own consumption (in accordance with AMS-III.D version 15). Nonetheless, page 7 of the PDD clearly states that if electricity will be generated, no CERs will be claimed from displacing grid electricity.

The project is expected to bring social, economic, technological and environmental benefits, thus contributing to sustainable development objectives of the Brazilian Government.

The starting date of the project activity is expected to be 18 January 2010, which will be the date of signing the construction contract for the first farm. DNV has verified the chronology and considers that the choice of starting date is appropriate and in line with the guidelines of EB 41. However, the actual project starting date will be subject to verification by the verifying DOE.

A 7-years renewable crediting period is selected (with the potential of being renewed twice), starting from 1 January 2011 or the date of registration project activity with an expected operational lifetime of 21 years.

No public funding is involved, and the validation did not reveal any information that indicates that the project can be seen as a diversion of ODA funding towards Brazil.

Although the project participant has other small scale projects with the same methodology, all farms included in these projects are at a distance of more than 1 km from the sites included in this project. The project includes farms in Mato Grosso do Sul State, at the municipalities of Brasilândia, Bataguassu and Glória de Dourados. PDD "BRASCARBON Methane Recovery Project BCA-BRA-10" also has some farms in the municipality of Brasilândia: Fazenda Córrego Azul – Paredão 2, Fazenda Córrego Azul – Progresso, Fazenda Córrego Azul – Laguna, Fazenda Córrego Azul – São José, Fazenda Córrego Azul – Acácia 1 e2, Fazenda Córrego Azul – Pontal, Fazenda Córrego Azul – União, Fazenda Córrego Azul – Conquista, Sítio Santa Luzia, Fazenda Jatiuca, Sítio Primavera, Fazenda São José, Sítio Estrela de Fogo II and Sítio Herança. The distance from the farms in Brasilândia of PDD "BRASCARBON Methane Recovery Project BCA-BRA-10" and the ones of PDD "BRASCARBON Methane Recovery Project BCA-BRA-09" were checked and they are all greater than 1 km.

PDD "BRASCARBON Methane Recovery Project BCA-BRA-10" also has a farm in the municipality of Glória de Dourados: Sítio Lote 26 Qda. 39. The distance from the farm in Glória de Dourados of PDD "BRASCARBON Methane Recovery Project BCA-BRA-10" and the ones of PDD "BRASCARBON Methane Recovery Project BCA-BRA-09" were checked and they are all greater than 1 km.

PDD "BRASCARBON Methane Recovery Project BCA-BRA-14" also has a farm in the municipality of Glória de Dourados: Sítio Lote 47, 49, 51. The distance from the farm in Glória de Dourados of PDD "BRASCARBON Methane Recovery Project BCA-BRA-14" and the ones of PDD "BRASCARBON Methane Recovery Project BCA-BRA-09" were checked and they are all greater than 1 km.

Hence, the project is not a de-bundled component of a larger project activity.

4.3 Baseline Determination

The project applies the simplified baseline methodology for selected small-scale CDM project activity AMS-III.D version 15 – "*Methane recovery in animal manure management systems*" **/21/**.

The project meets the applicability criteria of AMS-III.D version 15 as it is demonstrated that:

- The project activity recovers methane generated in the treatment of swine manure by installing methane recovery and combustion systems. The environmental legislation of Brazil does not permit discharge of effluent from swine farms to the water bodies **/18/**. The usual practice is to use the anaerobic open lagoon with methane emissions escaping to the atmosphere;
- The livestock population in the 15 farms is managed under confined conditions. This was verified through reviewing the environment licenses of each farm **/9/**;
- Manure or effluents generated after treatment in the anaerobic bio-digesters is not discharged into natural water resources. This was verified through reviewing the, applicable environment legislation **/18/** and the environment licenses of each farm **/9/**;
- The annual average temperature of baseline site (Mato Grosso do Sul State) is 23 – 25 °C and hence higher than the methodology stipulated temperature of 5°C. This was verified

through information available on INPE (National Institute of Space Research) web site **/12/**;

- The retention time of waste in the anaerobic open lagoons has been demonstrated to be greater than 1 month, as verified through environmental licenses of each farm **/9/**. The depth of the open lagoons is greater than 1 meter, as verified through the site visit at the Sítio Santa Izabel, Sítio Paraíso, Fazenda Corrego Azul-Paredão 1 and Fazenda Corrego Azul-Paredão swine farms **/29/-/31/** and pictures provided by the project participant for the remaining sites **/26/**;
- No methane recovery and destruction by flaring, combustion or gainful use takes place in the baseline scenario as verified by pictures provided by the project participant for all farms **/26/**;
- The project involves facilities to burn (flaring) all biogas generated by the digester;
- The estimated emissions reductions of 57 014 tCO_2e are lower than the limit 60 kt CO_2 equivalent **/2/**;
- The project involves the use of treated effluent for irrigation in farms and application of stabilized sludge on crops irrigation in farms, without any anaerobic conditions. The practice is to distribute the sludge over the field according the usual practice to improve the fertilization to the crop, as verified during the site visit at the Sítio Santa Izabel, Sítio Paraíso, Fazenda Corrego Azul-Paredão 1 and Fazenda Corrego Azul-Paredão swine farms **/29/-/31/** and based on DNV's experience with swine production in Brazil. This is the only possible application to the use of effluent and stabilized sludge for crops irrigation, since to drain the effluent into a river is not in compliance with environmental regulations and the effluent is a good fertilizer for crop.
- The storage time of the manure after removal from the animals barns should not exceed 24 hours before being fed into the anaerobic digester during the site visit **/29/-/31/**.

In the absence of the CDM project activity, the existing facility would continue to emit methane to the atmosphere at historical average levels.

In Brazilian swine farms, the environment legislation restricts discharging the manure into the water bodies. The common practice is to use anaerobic open lagoon, since the cost of biodigester is very high for swine farmers. The swine farmers therefore prefer to invest in increasing swine production, rather than in a project for capturing and destroying the methane gas.

The baseline is the emissions of methane from anaerobic decay of swine manure, calculated in accordance with the most recent IPCC tier 2 approaches (IPCC 2006 Guidelines). The IPCC default values for the parameters B_0 and VS were applied for Western Europe **/4/ /5/**. This is adequate as the main races used in Brazil for industrial purposes **/7/** are of Western European bread due to the easy management and high quality of meat, as described by Brazilian Association for Swine Culture **/15/** and as verified trough reviewing the letter issued by Cargill confirming Topigs genetic for some swine farms and receipts for sow purchase from Agrocerespic, the Brazilian joint venture from Agroceres and Pig Improvement Co. from UK **/4/ /7/**.

The MCF for open lagoon and ambient temperature for Brazil Central has been chosen from table 10.17 of 2006 IPCC Guidelines for National Greenhouse Gas Inventories according to INPE (National Institute of Space Research) for Mato Grosso do Sul State annual average temperature **/12/**.

The project is designed to be independent concerning electricity consumption. The biogas flow meter selected was thermal mass flow type. The electricity for the electronic monitoring control system is supplied from batteries charged by solar panels. The project design does not require any blowers and the manure is gravity fed to the digester.

The project boundary includes the GHG emissions that come from the animal waste practices, including the GHG resulting from the capture and combustion of biogas.

4.4 Additionality

The additionality of the project is demonstrated by applying requirements stipulated in the Attachment A to the Appendix B of the simplified modalities and procedures for CDM small-scale project activities.

4.4.1 CDM consideration and continued action to secure CDM status

The starting date of the project activity is expected to be 18 January 2010, the date of signing the construction agreement for the first farm. The validation started on 5 September 2009 when the PDD was published for global stakeholder consultation. Thus, in accordance with EB 48 Annex 61 for new project activities, since the PDD has been published for global stakeholder consultation before the project activity start date, it is not necessary to notify the host Party DNA and the UNFCCC secretariat.

Moreover, already in June 2007 a Letter of Intent was signed between Ecoprogresso and Brascarbon for purchasing the emissions reductions from methane avoidance of swine manure projects.

4.4.2 Investment barriers

In Brazil, there are 700 000 swine farmers and only 2 000 with biodigester **/15/**. All the biodigesters in swine farms are being developed only as CDM projects **/16/**. There are currently no direct subsidies or promotional support for the implementation of manure management or capture and destroying biogas. As there are higher costs required to install biodigesters and flare **/13/**, than what would be represented by the baseline scenario, the project faces investment barriers compared with the usual practice of open anaerobic lagoons.

- Identification of alternatives to the project activity

  Three alternative baseline scenarios to the project activity have been suitably identified and discussed.

  Scenario 1: Installation of an anaerobic digester plus flare;

  Scenario 2: Installation of an anaerobic digester plus flare and installation of 40 kW generators for utilization of biogas for generation of electricity;

  Scenario 3: Installation of the open anaerobic lagoons (baseline scenario).

- Choice of approach

  The project applies NPV analyses considering the investment of installing biodigesters, flares and electricity generators and the O&M costs for a scenario without and with generation of electricity. The scenario with electricity generation conservatively assumes utilization of 100% of biogas for electricity generation. All farms were analyzed proportionally to the swine population and consequent biodigester size.

- Discount rate selection

The basis for the discount rate is the SELIC rate set by the Central Bank of Brazil (http://www.bcb.gov.br) **/17/**. The chosen discount rate of 10.77% considered for 21 years represents the average SELIC rate (average from January 2009 to August 2009), when the PDD was submitted for global stakeholders consultation. This date was considered reasonable by DNV since the project was not yet implemented.

- Input parameters

  DNV has compared the main input parameters used in the financial analyses with the data reported for other similar projects recovering methane in animal manure management systems in Brazil (investment costs, applicable electricity tariff and operation and maintenance costs (O&M)) **/27/**. The assumed investment for the electric generator and the price of electricity saved was verified by comparing the values with similar electric generator implemented in similar swine manure project in Brazil and the electricity price was further cross-checked with commercial price of electricity in Brazil **/14/**. In addition to this, based on sectoral competence, DNV confirms that the input parameters used in the financial analysis are reasonable and adequately represent the economic situation of the project **/28/**.

- Calculation and conclusion

  The NPV calculations summarised in the PDD were provided in a excel spreadsheet **/24/**. The simple cost analysis considered for the scenario of simple capture and flaring demonstrated that the project has negative NPV.

  For the scenario where the swine farm implements an electricity generator to supply the internal demand, the project involves an average investment above US$ 106 000. The NPV analysis of the implementation of methane recovery system in the farms encompassed by the project demonstrates that such an investment is not financially attractive.

  The NPV values calculated with a discount rate of 10.77% indicate negative NPV values as showed in the table below.

Farm/Site	***Scenario 1: Digester + flare***	***Scenario 2: Digester + flare + electricity generation***	***Scenario 3: Anaerobic open lagoon***
Fazenda Corrego Azul - Paredão 1	-203 340	-217 217	-28 947
Fazenda Corrego Azul - Paredão 2	-197 924	-207 700	-27 593
Sitio Santa Izabel	-174 090	-165 824	-21 635
Sitio Paraíso	-175 499	-168 298	-21 987
Sítio Lote 43	-186 440	-187 523	-24 722
Sitio Lote 04 e 06	-186 440	-187 523	-24 722
Lote Rural 56	-186 440	-187 523	-24 722
Lote Rural 37, 39 e 35	-186 440	-187 523	-24 722

Sitio Lote 65	-186 440	-187 523	-24 722
Sitio Boa Esperança	-186 440	-187 523	-24 451
Lote 24 e 26	-186 440	-187 523	-24 722
Sitio Água Limpa	-186 440	-187 523	-24 451
Sitio Lote 1 Quadra 32	-186 440	-187 523	-28 785
Sitio Lote São José	-170 515	-159 542	-20 470
Sitio São João - Córrego da Anta	-170 515	-159 542	-20 741
Sitio Lote 45	-170 515	-159 542	-20 741

- Sensitivity analysis

  A sensitive analysis for the second scenario (digester + flare + electricity generation) considering variations of 10% in the total investments and electricity price demonstrates that this alternative has also a negative NPV when varying the total investment and electricity price within a reasonable range **/24/**.

  It is thus demonstrated that neither the project activity nor the utilization of biogas for electricity generation are not financially viable. The open lagoons are complying with environment legislation and have the most financially attractive NPV and are thus the most likely baseline scenario.

- *Technological barrier*: The implementation of biodigesters instead of open anaerobic lagoons requires special expertise with respect to design of facility, operation and maintenance of flare and operational control of biodigesters (pressure, temperature, flow etc). This expertise is not common with swine farm managers, thus requiring support of external technicians, considering that it is an entirely different activity from swine growing. Hence, the project would not be implemented without external support to overcome the technical difficulties related to the monitoring program to maintain system performance levels.
- *Barrier due to prevailing practice.* The Brazilian environment legislation requires the swine farms, to implement proper treatment of manure, without discharge into water bodies **/18/** and the common practice for treatment of effluents is the open lagoon (esterqueira) which avoids the water pollution and also produces fertilizer to be used for crops **/15//16//19/**. The use of biodigester is not common due to the high investment and the specific skill needed for its operation and maintenance as the anaerobic process to produce gas need proper chemical and biological control skills which is not commonly available among swine farm operators. This was verified during several verifications carried out by DNV in Brazil on implemented swine manure projects.

Given the above barriers, it is sufficiently demonstrated that the project is not a likely baseline scenario and that emission reductions thus are additional to what would otherwise have occurred.

4.5 Monitoring

The project applies the approved monitoring methodology AMS-III.D (version 15) "*Methane recovery in animal manure management systems*" **/21/**.

According to AMS-III.D version 15, the monitoring consists of direct measurement of the amount of methane flared or fueled, and concerning leakage, no sources of emission were identified.

4.5.1 Parameters monitored ex-ante

According to AMS-III.D version 15, the baseline emissions are calculated considering the estimated swine population hosted by each farm, and respective default values of MCF, VS and B_0 according to the 2006 IPCC Guidelines.

The parameters used for the emission reduction calculations that are available *ex ante* and listed in PDD include:

- Default of daily volatile solid excreted for livestock category T as IPCC 2006 (Vs);
- Methane conversion factor for management system S, climate region K ($MCF_{S,K}$) considering the temperature for central region **/12/**;
- Maximum methane production (B_0) according Western Genetic as IPCC 2006 and considering the Agroceres and Topigs genetic sources **/7//4/** used by swine producers **/4/**;
- Default average animal weight of a defined population at the project site ($W_{default}$) considering market swine as 50kg and breeding swine 198 kg, according IPCC 2006 and Western Europe genetic **/7//4/**;

4.5.2 Parameters monitored ex-post

Emission reduction calculations are transparently documented in accordance with AMS-III.D (version 15), and will be monitored and calculated ex-post. The data will be archived in electronic form and be kept for five years after the end of the last crediting period.

The parameters used for the *ex-post* emission reduction calculations that are available and listed in the PDD include:

- Combustion temperature of the flare (T_f), according to Monitoring Operational Procedure POP-01, which will be measured through the continuous temperature registration in the programmable logic controller (PLC);
- Inspection on the site considering relevant regulation and the infrastructure of the site according to Operational Procedure POP-02;
- Swine population ($N_{LT,y}$) according to Monitoring Operational Procedure POP-03;
- Average swine weight (W_{site}) according to Operational Procedure POP-16;
- Biogas flared or used as a fuel in the year y ($BG_{burnt,y}$) according to Monitoring Operational Procedure POP-04.The project specifies the biogas produced will be measured by cumulative flow meter and reported monthly by the regional technician;
- Fraction of methane in the biogas ($W_{CH4,y}$) be measured through Biogas/Geotech **/6/** at frequency established according statistical analyses in order to assure 95% confidence level according Monitoring operational procedure POP-05;

- Temperature of the biogas at ambient conditions (T_{biogas}) be measured through Biogas/Geotech **/6/** according Monitoring operational procedure POP-06;
- Pressure of the biogas at operation conditions (P_{biogas}) be measured through Biogas/Geotech **/6/** according Monitoring operational procedure POP-13, where the capture system of biogas from swine manure will operate without blower, and the biogas will be the measured at atmospheric pressure (1013 mb).
- Density of the methane combusted at operation conditions ($D_{CH4,y}$) according Monitoring operational procedure POP-07;
- Sludge soil application (Q_{DM}) according Monitoring operational procedure POP-09;
- Selection of the correct default Flare Efficiency (FE or $\eta_{flare,h}$) according to the combustion temperature of the flare (T_f) and Monitoring Operational Procedure POP-08 applying the programmable logic controller (PLC) which at flare operation above 500ºC will select a 90% flare efficiency and otherwise 50% flare efficiency;
- Comparison of the calculated emission reductions with the actual measured data ($ER_{y,ex-post}$) according to the operational procedure POP-17;
- Formulated Feed Rations (FFR) according operational procedure POP-14;
- Genetic source from annex I Party according operational procedure POP-15;
- Fraction of manure handled in project emissions in system "i", year "y" monitored through the annex attached at the operational procedure POP-02.
- Number of animals produced annually of type "LT" in year "y" and Number of days animal is alive in the farm, in year "y", according operational procedure POP-03 **/7/**;

The monitoring approaches are considered appropriate and effective and comply with AMS-III.D (version 15).

4.5.3 Management system and quality assurance

Responsibilities and authorities for project management, monitoring and reporting activities, measurement, training and reporting techniques and QA/QC procedures are defined. In addition, it was verified that Brascarbon, as responsible for operation of biogas capture and flaring and for the monitoring, have enough resources and skills to assure adequate operation and monitoring of the biodigesters and the biogas capture and flaring system.

Several operational procedures were implemented in order to assure adequate operation and monitoring **/11/**.

4.6 Estimate of GHG Emissions

Emission reduction calculations are transparently documented in the spreadsheet **/2/**, in line with AMS-III.D version 15 as follows:

$$ER_y = BE_y - PE_y - L_y$$

Therefore, the emission reductions of the proposed project are estimated as follows:

- $\boldsymbol{BE_y = GWP_{CH4} * D_{CH4} * UF_b * \sum MCF_j * B_{o.LT} * N_{LT.y} * VS_{LT.y} * MS\%_{BL.J}}$

Baseline emissions consider the IPCC 2006 Tier 2 approach and applicable default values as defaults values of Tables 10A-7 10A-8 **/23/**.

The Baseline emissions consider the factor $MS\%_{BL,j}$ as 100% of the manure will be handled per category T, system S and climate region k and on project emissions consider the MS% i,y as 90% of the manure be handled in system "i".

- $PE_y = PE_{PL.y} + PE_{flare.y} + PE_{power.y}$

The project emissions were calculated considering (a) the physical leakage from the system as 10% of maximum methane producing potential of the manure, (b) emission from flaring considering a default value of 90% for efficiency of flaring according to AMS-III.D and (c) emissions from electricity for the operation of the installed facilities. However, there are no emissions from electricity consumption of the project activity as the project is not expected to consume any grid electricity or electricity generated from fossil fuels.

No leakage effects are required to be considered for the project activity as per the methodology. Hence leakage is taken as zero, $L_y = 0$.

The estimated amount of GHG emission reductions from the project is 399 098 tCO_2e during the first crediting period (7 years).

The baseline emission estimate can be replicated using the data and parameter values provided in the PDD and supporting files submitted for registration. The data sources mentioned have been verified by DNV.

4.7 Environmental Impacts

As stated in the PDD, the project activities will reduce negative environment impacts, like the population of flies, possible spread of disease and odor **/9/**. Also, the environmental licenses for each farm were presented by the Project Proponent.

4.8 Comments by Local Stakeholders

Local stakeholders, such as the City Hall, Chamber of Councilors, the environmental state and local agencies, State and Federal Ministry Public, Legislative Assembly, NGO's and local community associations were invited to comment on the project, in accordance with the requirements of Resolution 7 of the Brazilian DNA. The invitation letters and the mail receipts were received from the project proponent **/25/**.

4.9 Comments by Parties, Stakeholders and NGOs

The PDD of 12 January 2009 was made publicly available on UNFCCC website and Parties, stakeholders and NGOs were through the CDM website invited to provide comments during a 30 days period from 5 September 2009 to 4 October 2009. No comments were received during this period.

APPENDIX A

CDM VALIDATION PROTOCOL

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

Requirement	Reference	Conclusion
About Parties		
1. The project shall assist Parties included in Annex I in achieving compliance with part of their emission reduction commitment under Art. 3.	2. Kyoto Protocol Art.12.2	Table 2, Section E.4.1. No participating Annex I Party is yet identified.
3. The project shall assist non-Annex I Parties in contributing to the ultimate objective of the UNFCCC.	4. Kyoto Protocol Art.12.2.	OK
5. The project shall have the written approval of voluntary participation from the designated national authority of each Party involved.	6. Kyoto Protocol Art. 12.5a, CDM Modalities and Procedures §40a	Prior to the submission of the final validation report to the CDM Executive Board, DNV will have to receive the written approval of voluntary participation from the DNA of Brazil, including the confirmation by the DNA of Brazil that the project assists it in achieving sustainable development.
7. The project 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	Prior to the submission of the final validation report to the CDM Executive Board, DNV will have to receive the written approval of voluntary participation from the DNA of Brazil, including the confirmation by the DNA of Brazil that the project assists it in achieving sustainable development.
8. In case public funding from Parties included in Annex I is used for the	Decision 17/CP.7,	The validation did not reveal any

Requirement	Reference	Conclusion
project activity, 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.	CDM Modalities and Procedures Appendix B, § 2	information that indicates that the project can be seen as a diversion of ODA funding towards Brazil.
9. Parties participating in the CDM shall designate a national authority for the CDM.	CDM Modalities and Procedures §29	The Brazilian designated national authority for the CDM is the Comissão Interministerial de Mudança Global do Clima.
10. The host Party and the participating Annex I Party shall be a Party to the Kyoto Protocol.	CDM Modalities §30/31a	Brazil has ratified the Kyoto Protocol on 23 August 2002.
11. 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.
12. 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 additionality		
13. 10 Reduction in GHG emissions shall be additional to any that would occur in the absence of the project activity, i.e. a CDM project activity is additional if anthropogenic emissions of greenhouse gases by sources are reduced below those that would have occurred in the absence of the registered CDM project activity.	Kyoto Protocol Art. 12.5c, CDM Modalities and Procedures §43	Table 2, Section B.3.1
About forecast emission reductions and environmental impacts		
14. 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
For large-scale projects only		
15. Documentation on the analysis of the environmental impacts of the project activity, including transboundary impacts, shall be submitted, and, if those	CDM Modalities and	Table 2, Section D.

Requirement	Reference	Conclusion
impacts are considered significant by the project participants or the Host Party, an environmental impact assessment in accordance with procedures as required by the Host Party shall be carried out.	Procedures §37c	
About small-scale project activities (if applicable)		
16. The proposed project activity shall meet the eligibility criteria for small scale CDM project activities set out in § 6 (c) of the Marrakech Accords and shall not be a debundled component of a larger project activity.	Simplified Modalities and Procedures for Small Scale CDM Project Activities §12a,c	Table 2, Section A.5.
17. The proposed project activity shall confirm to one of the project categories defined for small scale CDM project activities and use the simplified baseline and monitoring methodology for that project category.	Simplified Modalities and Procedures for Small Scale CDM Project Activities §22e	Table 2, Section A.5.
18. If required by the host country, an analysis of the environmental impacts of the project activity is carried out and documented.	Simplified Modalities and Procedures for Small Scale CDM Project Activities §22c	Table 2, Section D.
About stakeholder involvement		
19. 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	Table 2, Section E.
20. 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	The PDD of 12 January 2009 was made publicly available on UNFCCC website and Parties, stakeholders and NGOs were through the CDM website invited to provide comments during a 30 days period from 5 September 2009 to 4 October 2009. No comments were received during

Requirement	Reference	Conclusion
		this period.
Other		
21. The baseline and monitoring methodology shall be previously approved by the CDM Executive Board.	CDM Modalities and Procedures §37e	Table 2, Section B.1.1 and D.1.1
22. 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 B.2
23. 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	Table 2, Section B.2
24. The project design document shall be in conformance with the UNFCCC CDM-PDD format.	CDM Modalities and Procedures Appendix B, EB Decision	The project design document conforms to version 03 of the CDM-SSC-PDD.
25. 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 D

Table 2 Requirements Checklist

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
A. General Description of Project Activity *The project design is assessed.*					
A.1. Project Boundaries *Project Boundaries are the limits and borders defining the GHG emission reduction project.*					
A.1.1. Are the project's spatial boundaries (geographical) clearly defined?	**/1/**	DR	The project activity is located in the Mato Grosso do Sul State, Brazil. Project participant is requested to provide in section A.4.1.4 of the PDD the GPS coordinates of the farm Sitio São João – Córrego da Anta.	~~**CL 1**~~	OK
A.1.2. Are the project's system boundaries (components and facilities used to mitigate GHGs) clearly defined?	**/1/**	DR	The project boundary is defined as the project boundary considers the GHG emissions that come from the animal waste practices, including the GHG resulting from the capture and combustion of biogas, in accordance with AMS-III.D version 15.		OK
A.2. Participation Requirements *Referring to Part A, Annex 1 and 2 of the PDD as well as the CDM glossary with respect to the terms Party, Letter of Approval, Authorization and Project Participant.*					
A.2.1. Which Parties and project participants are participating in the project?	**/1/**	DR	The project participant is Brascarbon Consultoria, Projetos e Representação S/A of Brazil. The host Party Brazil meets all relevant participation requirements. No participating Annex I Party is yet identified.		OK

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

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
A.2.2. Have all involved Parties provided a valid and complete letter of approval and have all private/public project participants been authorized by an involved Party?	**/1/**	DR	Prior to the submission of the final validation report to the CDM Executive Board, DNV will have to receive the written approval of voluntary participation from the DNA of Brazil, including the confirmation by the DNA of Brazil that the project assists it in achieving sustainable development.	–	--
A.2.3. Do all participating Parties fulfil the participation requirements as follows: - Ratification of the Kyoto Protocol - Voluntary participation - Designated a National Authority	**/1/**	DR	Yes, Brazil fulfils all requirements of participation. Brazil has ratified the Kyoto Protocol on 23 August 2002. The Brazilian DNA is the Comissão Interministerial de Mudança Global do Clima. Prior to the submission of the final validation report to the CDM Executive Board, DNV will have to receive the written approval of voluntary participation from the DNA of Brazil, including the confirmation by the DNA of Brazil that the project assists it in achieving sustainable development.	–	--
A.2.4. Potential public funding for the project from Parties in Annex I shall not be a diversion of official development assistance.	**/1/**	DR	The validation did not reveal any information that indicates that the project can be seen as a diversion of ODA funding towards Brazil.		OK
A.3. Technology to be employed *Validation of project technology focuses on the project engineering, choice of technology and competence/ maintenance needs. The validator should ensure that environmentally safe and sound technology and know-how is used.*					

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CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
A.3.1. Does the project design engineering reflect current good practices?	**/1/**	DR	The installation of anaerobic digesters aims to treat the manure under controlled conditions as well as to capture and burn the methane generated by the decay of swine manure from the farms. The facility drains the overflow with lower organic content to the existing open lagoon, which stores the effluents. Effluents are normally used for crop irrigation. The project will flare the biogas, but in case of favourable conditions at the farms in the future, the biogas may be utilized to also generate electricity for own consumption in accordance with AMS-III.D version 15). Nonetheless, the PDD clearly states that if electricity will be generated, no CERs will be claimed from displacing grid electricity.		OK
A.3.2. Does the project use state of the art technology or would the technology result in a significantly better performance than any commonly used technologies in the host country?	**/1/**	DR	The implementation of biodigester instead of open lagoon needs special skills with respect to design of the facility and operation and maintenance of flare and operation control (pressure, temperature, flow etc). This skill is not common for swine farm managers and need support of external technicians. The project uses current available technology in the country for methane capture and destruction, however it is possible some farms want to invest to implement an electric generator to produce electricity to own consume. With regards to the electricity		OK

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CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
			generation, the content of H_2S on biogas arouses severe corrosion on equipment, which needs the installation of specific filter and routine maintenance in order to assure the necessary lifetime of equipment.		
A.3.3. Does the project make provisions for meeting training and maintenance needs?	**/1/**	DR	Brascarbon have enough resources and skills to assure adequate operation and monitoring of the biodigesters and the biogas capture and flaring system. The follow procedures were implemented in order to assure adequate operation and monitoring: POP 1 Combustion Temperature Monitoring Tf POP 2 Rules of Town POP 3 Swine Population Counting POP 4 Biogas volume measuring Bg_{burnt} POP 5 Methane Contend Monitoring W_{ch4} POP 6 Biogas Temperature Monitoring POP 7 Methane Density - Dch_4 POP 8 Flare Efficiency Timetable Fey POP 9 Biodigestor Sludge Removal POP 12 General Maintenance POP 13 Biogas Pressure Monitoring POP 14 Swine Feed Formulation POP 15 Swine genetic source POP 16 Swine Weight POP 17 Ex-post yearly emission reductions		OK
A.4. Contribution to Sustainable Development *The project's contribution to sustainable development is assessed.*					

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CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
A.4.1. Has the host country confirmed that the project assists it in achieving sustainable development?	**/1/**	DR	Prior to the submission of the final validation report to the CDM Executive Board, DNV will have to receive the written approval of voluntary participation from the DNA of Brazil, including the confirmation by the DNA of Brazil that the project assists it in achieving sustainable development.	–	--
A.4.2. Will the project create other environmental or social benefits than GHG emission reductions?	**/1/**	DR	The project is expected to bring social, economic, technological and environmental benefits, thus contributing to sustainable development objectives of the Brazilian Government.		OK
A.5. Small scale project activity *Tit is assessed whether the project qualifies as small-scale CDM project activity*					
A.5.1. Does the project qualify as a small scale CDM project activity as defined in paragraph 6 (c) of decision 17/CP.7 on the modalities and procedures for the CDM?	**/1/**	DR	The project applies the simplified baseline methodology for selected small-scale CDM project activity (AMS-III.D version 15) – "*Methane recovery in animal manure management systems"*		OK
A.5.2. Is the small scale project activity not a debundled component of a larger project activity?	**/1/**	DR	Although the project participant has other small scale projects with the same methodology, all farms included in these projects are at a distance of more than 1 km from the sites included in this project. The project includes farms in Mato Grosso do Sul State, at the municipalities of Brasilândia, Bataguassu and Glória de Dourados. PDD "BRASCARBON Methane Recovery Project		OK

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CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
			BCA-BRA-10" also has some farms in the municipality of Brasilândia: Fazenda Córrego Azul – Paredão 2, Fazenda Córrego Azul – Progresso, Fazenda Córrego Azul – Laguna, Fazenda Córrego Azul – São José, Fazenda Córrego Azul – Acácia 1 e2, Fazenda Córrego Azul – Pontal, Fazenda Córrego Azul – União, Fazenda Córrego Azul – Conquista, Sítio Santa Luzia, Fazenda Jatiuca, Sítio Primavera, Fazenda São José, Sítio Estrela de Fogo II and Sítio Herança. The distance from the farms in Brasilândia of PDD "BRASCARBON Methane Recovery Project BCA-BRA-10" and the ones of PDD "BRASCARBON Methane Recovery Project BCA-BRA-09" were checked and they are all greater than 1 km. PDD "BRASCARBON Methane Recovery Project BCA-BRA-10" also has a farm in the municipality of Glória de Dourados: Sítio Lote 26 Qda. 39. The distance from the farm in Glória de Dourados of PDD "BRASCARBON Methane Recovery Project BCA-BRA-10" and the ones of PDD "BRASCARBON Methane Recovery Project BCA-BRA-09" were checked and they are all greater than 1 km. PDD "BRASCARBON Methane Recovery Project BCA-BRA-14" also has a farm in the municipality of Glória de Dourados: Sítio		

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CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
			Lote 47, 49, 51. The distance from the farm in Glória de Dourados of PDD "BRASCARBON Methane Recovery Project BCA-BRA-14" and the ones of PDD "BRASCARBON Methane Recovery Project BCA-BRA-09" were checked and they are all greater than 1 km. Hence, the project is not a de-bundled component of a larger project activity.		
B. Project Baseline *The validation of the project baseline establishes whether the selected baseline methodology is appropriate and whether the selected baseline represents a likely baseline scenario.*					
B.1. Baseline Methodology *It is assessed whether the project applies an appropriate baseline methodology.*					
B.1.1. Does the project apply an approved methodology and the correct version thereof?	**/1/**	DR	The project applies the simplified baseline methodology for selected small-scale CDM project activity (AMS-III.D version 15) – "*Methane recovery in animal manure management systems"*		OK
B.1.2. Are the applicability criteria in the baseline methodology all fulfilled?	**/1/** **/2/** **/9/** **/12/** **/18/** **/26/**	DR	The project meets the applicability criteria of AMS-III.D version 15 as it is demonstrated that: - The project activity recovers methane generated in the treatment of swine manure by installing methane recovery and combustion systems. The environmental legislation of Brazil does		OK

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CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
			not permit discharge of effluent from swine farms to the water bodies **/18/**. The usual practice is to use the anaerobic open lagoon with methane emissions escaping to the atmosphere; - The livestock population in the 15 farms is managed under confined conditions. This was verified through reviewing the environment licenses of each farm **/9/**; - Manure or effluents generated after treatment in the anaerobic bio-digesters is not discharged into natural water resources. This was verified through reviewing the, applicable environment legislation **/18/** and the environment licenses of each farm **/9/**; - The annual average temperature of baseline site (Mato Grosso do Sul State) is 23 – 25 °C and hence higher than the methodology stipulated temperature of 5°C. This was verified through information available on INPE (National Institute of Space Research) web site **/12/**; - The retention time of waste in the anaerobic open lagoons has been demonstrated to be greater than 1 month, as verified through environmental licenses of each farm **/9/**. The depth of the open lagoons is greater than 1 meter, as		

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CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
			verified through the site visit at the Sítio Santa Izabel, Sítio Paraíso, Fazenda Corrego Azul-Paredão 1 and Fazenda Corrego Azul-Paredão swine farms and pictures provided by the project participant for the remaining sites **/26/**; - No methane recovery and destruction by flaring, combustion or gainful use takes place in the baseline scenario as verified by pictures provided by the project participant for all farms **/26/**; - The project involves facilities to burn (flaring) all biogas generated by the digester; - The estimated emissions reductions of 57 014 tCO_2e are lower than the limit 60 kt CO_2 equivalent **/2/**; - The project involves the use of treated effluent for irrigation in farms and application of stabilized sludge on crops irrigation in farms, without any anaerobic conditions. The practice is to distribute the sludge over the field according the usual practice to improve the fertilization to the crop, as verified during the site visit at the Sítio Santa Izabel, Sítio Paraíso, Fazenda Corrego Azul-Paredão 1 and Fazenda Corrego Azul-Paredão swine farms and based on DNV's experience with swine production in		

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CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
			Brazil. This is the only possible application to the use of effluent and stabilized sludge for crops irrigation, since to drain the effluent into a river is not in compliance with environmental regulations and the effluent is a good fertilizer for crop. The applicability of the methodology should be clearly described and justified in section B.2 of the PDD. In addition, as per AMS-III.D, project participant is requested to demonstrate that the storage time of the manure after removal from the animals barns should not exceed 24 hours before being fed into the anaerobic digester. Moreover, project participant is requested to provide documented evidences in order to justify the applicability criteria.	~~CL 3~~	
B.2. Baseline Scenario Determination *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.*					
B.2.1. What is the baseline scenario?	**/1/**	DR	The baseline is the emissions of methane from anaerobic decay of swine manure in open anaerobic lagoons.		OK
B.2.2. What other alternative scenarios have been considered and why is the selected scenario the most likely one?	**/1/**	DR	Consideration of alternative scenarios is not required for small scale methodologies.		OK

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B.2.3. Has the baseline scenario been determined according to the methodology?	**/1/**	DR	Yes. The baseline scenario been determined according to the methodology AMS-III.D version 15.		OK
B.2.4. Has the baseline scenario been determined using conservative assumptions where possible?	**/1/**	DR	Yes.		OK
B.2.5. Does the baseline scenario sufficiently take into account relevant national and/or sectoral policies, macro-economic trends and political aspirations?	**/1/**	DR	Yes.		OK
B.2.6. Is the baseline scenario determination compatible with the available data and are all literature and sources clearly referenced?	**/1/**	DR	Yes		OK
B.2.7. Have the major risks to the baseline been identified?	**/1/**	DR	Yes.		OK
B.3. Additionality Determination *The assessment of additionality will be validated with focus on whether the project itself is not a likely baseline scenario.*					
B.3.1. Is the project additionality assessed according to the methodology?	**/1/** **/15/** **/16/** **/13/** **/17/** **/14/** **/24/**	DR I	The additionality of the project is demonstrated by applying the Attachment A to the Appendix B of the simplified modalities and procedures for CDM small-scale project activities. The additionality claims of the project are based on the following barriers:		OK

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	/18/ /19/ /27/		*Investment barrier*: In Brazil, there are 700 000 swine farmers and only 2 000 with biodigester. All the biodigesters in swine farms are being developed only as CDM projects. There are currently no direct subsidies or promotional support for the implementation of manure management or capture and destroying biogas. As there are higher costs required to install biodigesters and flare, than what would be represented by the baseline scenario, the project faces investment barriers compared with the usual practice of open anaerobic lagoons. o Identification of alternatives to the project activity Three alternative baseline scenarios to the project activity have been suitably identified and discussed. Scenario 1: Installation of an anaerobic digester plus flare; Scenario 2: Installation of an anaerobic digester plus flare and installation of an electricity generator for utilization of biogas; Scenario 3: Installation of the open anaerobic lagoons (baseline scenario). o Choice of approach The project evidences the NPV analyses considering the investment		

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			of biodigester and flaring installation and O&M for scenario without and with generation of electricity with biogas. All farms were analyzed proportionally to the swine population and consequent biodigester size. o Benchmark selection The basis for the discount rate is the SELIC rate set by the Central Bank of Brazil (http://www.bcb.gov.br). As stated in the PDD, the chosen discount rate of 12.75% considered for 21 years represents the SELIC rate on 4 March 2009. However, DNV was able to check that this value does not match with the value mentioned in the Central Bank of Brazil web site. In addition, the value applied is not valid at the time of taking the investment decision by the project participants (i.e. project start date 1 May 2009). o Input parameters DNV has compared the main input parameters used in the financial analyses with the data reported for other similar projects recovering methane in animal manure management systems in Brazil (investment costs, applicable	~~CAR 2~~	

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
			electricity tariff and operation and maintenance costs (O&M)). The assumed investment for the electric generator and the price of electricity saved was verified by comparing the values with similar electric generator implemented in similar swine manure project in Brazil and the electricity price was further cross-checked with commercial price of electricity in Brazil. In addition to this, based on sectoral competence, DNV confirms that the input parameters used in the financial analysis are reasonable and adequately represent the economic situation of the project. o Calculation and conclusion The NPV calculations summarised in the PDD were provided in a excel spreadsheet. The simple cost analysis considered for the scenario of simple capture and flaring demonstrated that the project has negative result. For the scenario where the swine farm implements an electricity generator to supply the internal demand, the project involves an average investment above US$ 106 000. The NPV analysis of the implementation of methane recovery system in the		

<table>
<tr><th>CHECKLIST QUESTION</th><th>Ref.</th><th>MoV*</th><th>COMMENTS</th><th>Draft Concl.</th><th>Final Concl.</th></tr>
<tr><td></td><td></td><td></td><td>farms encompassed by the project demonstrates that such an investment is not financially attractive.

Documented evidences of the input data for the investment analysis need to be submitted to DNV for verification.

The NPV values calculated with a discount rate of 12.75% indicate negative NPV values as showed in the table below.

<table>
<tr><th>Farm/Site</th><th>Scenario 1: Digester + flare</th><th>Scenario 2: Digester + flare + electricity generation</th><th>Scenario 3: Anaerobic open lagoon</th></tr>
<tr><td>Fazenda Corrego Azul - Paredão 1</td><td>-186 584</td><td>-204 323</td><td>-27 593</td></tr>
<tr><td>Fazenda Corrego Azul - Paredão 2</td><td>-181 263</td><td>-195 396</td><td>-26 263</td></tr>
<tr><td>Sitio Santa Izabel</td><td>-157 848</td><td>-156 114</td><td>-20 409</td></tr>
<tr><td>Sitio Paraíso</td><td>-159 232</td><td>-158 436</td><td>-20 755</td></tr>
<tr><td>Sítio Lote 43</td><td>-169 981</td><td>-176 469</td><td>-23 443</td></tr>
<tr><td>Sitio Lote 04 e 06</td><td>-169 981</td><td>-176 469</td><td>-23 443</td></tr>
<tr><td>Lote Rural 56</td><td>-169 981</td><td>-176 469</td><td>-23 443</td></tr>
<tr><td>Lote Rural 37, 39 e 35</td><td>-169 981</td><td>-176 469</td><td>-23 443</td></tr>
<tr><td>Sitio Lote 65</td><td>-169 981</td><td>-176 469</td><td>-23 443</td></tr>
</table>
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Sitio Boa Esperança	-169 981	-176 469	-23 177
Lote 24 e 26	-169 981	-176 469	-23 443
Sitio Água Limpa	-169 981	-176 469	-23 177
Sitio Lote 1 Quadra 32	-169 981	-176 469	-27 434
Sitio Lote São José	-154 336	-150 222	-19 265
Sitio São João - Córrego da Anta	-128 740	-150 222	-7 212
Sitio Lote 45	-158 295	-156 864	-20 521

- Sensitivity analysis

  A sensitive analysis for the second scenario (digester + flare + electricity generation) considering variations of 10% in the total investments and electricity price demonstrates that this alternative has still a negative NPV.

  It is thus demonstrated that neither the project activity nor the utilization of biogas for electricity generation are not financially viable. The open lagoons are complying with environment legislation and have the most financially attractive NPV and are thus the most likely baseline scenario.

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			As verified by DNV, the financial analysis spreadsheet provided by project participant does not match with the NPV calculations summarised in the PDD. Project participant is requested to correct the PDD and excel spreadsheet. • *Technological barrier*: The implementation of biodigesters instead of open anaerobic lagoons requires special expertise with respect to design of facility, operation and maintenance of flare and operational control of biodigesters (pressure, temperature, flow etc). This expertise is not common with swine farm managers, thus requiring support of external technicians, considering that it is an entirely different activity from swine growing. Hence, the project would not be implemented without external support to overcome the technical difficulties. • *Barrier due to prevailing practice*. The Brazilian environment legislation requires the swine farms, to implement proper treatment of manure, without discharge into water bodies and the common practice for treatment of effluents is the open lagoon (esterqueira) which could avoid the water pollution and also produce fertilizer to be used on the crops.	~~CAR 3~~	

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			The use of biodigester is not common due to the high investment and the specific skill needed for its operation and maintenance as the anaerobic process to produce gas need proper chemical and biological control which is not commonly available among swine farm operators. This was verified during several verifications carried out by DNV in Brazil on implemented swine manure projects. Given the above barriers, it is sufficiently demonstrated that the project is not a likely baseline scenario and that emission reductions thus are additional to what would otherwise have occurred.		
B.3.2. Are all assumptions stated in a transparent and conservative manner?	**/1/** **/15/** **/16/** **/13/** **/17/** **/14/** **/24/** **/18/** **/19/** **/27/**	DR I	See B.3.1.	~~CAR 2~~ ~~CAR 3~~	OK
B.3.3. Is sufficient evidence provided to support the relevance of the arguments made?	**/1/**	DR I	See B.3.1.	~~CAR 2~~	OK

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CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
	/15/ **/16/** **/13/** **/17/** **/14/** **/24/** **/18/** **/19/** **/27/**			~~CAR 3~~	
B.3.4. If the starting date of the project activity is before the date of validation, has sufficient evidence been provided that the incentive from the CDM was seriously considered in the decision to proceed with the project activity?	**/1/**/	DR	The starting date of the project activity is in the initial PDD submitted for validation indicated 1 May 2009, the date of signing the construction agreement. The validation on 5 September 2009 when the PDD was published for global stakeholder consultation. As the project starting date is after 2 August 2008, in accordance with EB 48 Annex 61, the project participants must inform the Brazilian DNA and the UNFCCC secretariat in writing of the commencement of the project activity and their intention to seek CDM status. Since DNV was not able to find the notification in the UNFCCC website, project participant is requested to provide the confirmation from the UNFCCC secretariat that such a notification had been provided.	~~CAR 1~~	OK
B.4. Calculation of GHG Emission Reductions – Project emissions					

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It is assessed whether the project emissions are stated according to the methodology and whether the argumentation for the choice of default factors and values – where applicable – is justified.					
B.4.1. Are the calculations documented according to the approved methodology and in a complete and transparent manner?	**/1/**	DR	The project emissions were calculated considering the emission from the system as 10% of baseline emissions and the flare efficiency of 90% according to AMS-III.D and (c) emissions from electricity for the operation of the installed facilities. However, there are no emissions from electricity consumption of the project activity.		OK
B.4.2. Have conservative assumptions been used when calculating the project emissions?	**/1/**	DR	See B.4.1.		OK
B.4.3. Are uncertainties in the project emission estimates properly addressed?	**/1/**	DR	See B.4.1.		OK
B.5. Calculation of GHG Emission Reductions – Baseline emissions *It is assessed whether the baseline emissions are stated according to the methodology and whether the argumentation for the choice of default factors and values – where applicable – is justified.*					
B.5.1. Are the calculations documented according to the approved methodology and in a complete and transparent manner?	**/1/** **/2/** **/23/**	DR	Emission reduction calculations are transparently documented in the spreadsheet, in line with AMS-III.D version 15. Baseline emissions consider the IPCC 2006 Tier 2 approach and applicable default values		OK

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			as defaults values of Tables 10A-7 10A-8. The Baseline emissions consider the factor $MS\%_{Bl,j}$ as 100% of the manure will be handled per category T, system S and climate region k and on project emissions consider the MS% i,y as 90% of the manure be handled in system "i". The MCF for open lagoon and ambient temperature has been chosen according to INPE (National Institute of Space Research) for Mato Grosso do Sul State annual average temperature. However, the reference for the specific ambient temperature in the PDD is not coherent. Mato Grosso do Sul State is not located in the southwest region of Brazil. Project participant is requested to clarify it.	~~CL 4~~	
B.5.2. Have conservative assumptions been used when calculating the baseline emissions?	**/1/ /2/ /23/**	DR	See B.5.1.	~~CL 4~~	OK
B.5.3. Are uncertainties in the baseline emission estimates properly addressed?	**/1/ /2/ /23/**	DR	See B.5.1.	~~CL 4~~	OK
B.6. Calculation of GHG Emission Reductions – Leakage *It is assessed whether leakage emissions are stated according to the methodology and whether the argumentation for the choice of default factors and values – where applicable – is justified.*					

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B.6.1. Are the leakage calculations documented according to the approved methodology and in a complete and transparent manner?	**/1/**	DR	No leakage is applicable under the methodology.		OK
B.6.2. Have conservative assumptions been used when calculating the leakage emissions?	**/1/**	DR	See B.6.1.		OK
B.6.3. Are uncertainties in the leakage emission estimates properly addressed?	**/1/**	DR	See B.6.1.		OK
B.7. Emission Reductions *The emission reductions shall be real, measurable and give long-term benefits related to the mitigation of climate change.*					
B.7.1. Are the emission reductions real, measurable and give long-term benefits related to the mitigation of climate change.	**/1/**	DR	The project is expected to reduce CO_2 emissions to the extent of 399 098 tCO_2e during the 7-years crediting period.		OK
B.8. Monitoring Methodology *It is assessed whether the project applies an appropriate monitoring methodology.*					
B.8.1. Is the monitoring plan documented according to the approved methodology and in a complete and transparent manner?	**/1/**	DR	The project applies the approved monitoring methodology AMS-III.D (version 15) "*Methane recovery in animal manure management systems*". Also, monitoring requirements specified in the methodological "Tool to determine project emissions from flaring gases containing methane". The "Tool to determine project emissions from flaring gases containing methane" should be	~~**CL 5**~~	OK

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			mentioned in section B.1 of the PDD. According to AMS-III.D version 15, the monitoring consists of direct measurement of the amount of methane flared or fueled, and concerning leakage, no sources of emission were identified.		
B.8.2. 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 project activity, whichever occurs later?	**/1/**	DR	All data will be kept until five years after the end of the crediting period.		OK
B.9. Monitoring of Project Emissions *It is established whether the monitoring plan provides for reliable and complete project emission data over time.*					
B.9.1. 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 project boundary during the crediting period?	**/1/** **/6/**	DR I	The parameters used for the *ex-post* emission reduction calculations that are available and listed in PDD include: • Combustion temperature of the flare (T_f), according to Monitoring Operational Procedure POP-01, which will be measured through the continuous temperature registration in the programmable logic controller (PLC); • Inspection on the site considering relevant regulation and the infrastructure of the site according to Operational Procedure POP-02; • Swine population ($N_{LT,y}$) according to	~~**CL 6**~~	OK

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			Monitoring Operational Procedure POP-03; • Average swine weight (W_{site}) according to Operational Procedure POP-16; • Biogas flared or used as a fuel in the year y ($BG_{burnt,y}$) according to Monitoring Operational Procedure POP-04.The project specifies the biogas produced will be measured by cumulative flow meter and reported monthly by the regional technician; • Fraction of methane in the biogas ($W_{CH4,y}$) be measured through Biogas/Geotech at frequency established according statistical analyses in order to assure 95% confidence level according Monitoring operational procedure POP-05; • Temperature of the biogas at ambient conditions (T_{biogas}) be measured through Biogas/Geotech according Monitoring operational procedure POP-06; • Pressure of the biogas at operation conditions (P_{biogas}) be measured through Biogas/Geotech according Monitoring operational procedure POP-06, where the capture system of biogas from swine manure will operate without blower, and the biogas will be the		

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			measured at atmospheric pressure (1013 mb). As verified during the site visit, the pressure of biogas will be monitored according Monitoring operational procedure POP-13 and not Monitoring operational procedure POP-06. Project participant is requested to clarify. • Density of the methane combusted at operation conditions ($D_{CH4,y}$) according Monitoring operational procedure POP-07; • Sludge soil application (Q_{DM}) according Monitoring operational procedure POP-09; • Selection of the correct default Flare Efficiency (FE or $\eta_{flare,h}$) according to the combustion temperature of the flare (T_f) and Monitoring Operational Procedure POP-08 applying the programmable logic controller (PLC) which at flare operation above 500ºC will select a 90% flare efficiency and otherwise 50% flare efficiency; • Comparison of the calculated emission reductions with the actual measured data ($ER_{y,ex-post}$) according to the operational procedure POP-17; • Formulated Feed Rations (FFR) according operational procedure POP-		

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
			14; • Genetic source from annex I Party according operational procedure POP-15; • Fraction of manure handled in project emissions in system "i", year "y" monitored through the annex attached at the operational procedure POP-02. • Number of animals produced annually of type "LT" in year "y" and Number of days animal is alive in the farm, in year "y", according operational procedure POP-03; The monitoring approaches are considered appropriate and effective and comply with AMS-III.D (version 15).		
B.9.2. Are the choices of project GHG indicators reasonable and conservative?	**/1/ /6/**	DR I	See B.9.1	~~**CL 6**~~	OK
B.9.3. Is the measurement method clearly stated for each GHG value to be monitored and deemed appropriate?	**/1/ /6/**	DR I	See B.9.1	~~**CL 6**~~	OK
B.9.4. Is the measurement equipment described and deemed appropriate?	**/1/ /6/**	DR I	See B.9.1	~~**CL 6**~~	OK
B.9.5. Is the measurement accuracy addressed and deemed appropriate? Are procedures in place on how to deal with erroneous measurements?	**/1/ /6/**	DR I	See B.9.1	~~**CL 6**~~	OK

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CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
B.9.6. Is the measurement *interval* identified and deemed appropriate?	**/1/ /6/**	DR I	See B.9.1	~~**CL 6**~~	OK
B.9.7. Is the *registration, monitoring, measurement* and *reporting* procedure defined?	**/1/ /6/**	DR I	See B.9.1	~~**CL 6**~~	OK
B.9.8. Are procedures identified for *maintenance* of monitoring equipment and installations? Are the calibration intervals being observed?	**/1/ /6/**	DR I	See B.9.1	~~**CL 6**~~	OK
B.9.9. 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/ /6/**	DR I	See B.9.1	~~**CL 6**~~	OK
B.10. Monitoring of Baseline Emissions *It is established whether the monitoring plan provides for reliable and complete baseline emission data over time.*					
B.10.1. Does the monitoring plan provide for the collection and archiving of all relevant data necessary for determining baseline emissions during the crediting period?	**/1/ /12/**	DR I	According to AMS-III.D version 15, the baseline emissions are calculated considering the estimated swine population hosted by each farm, and respective default values of MCF, VS and B_0 according to the 2006 IPCC Guidelines. The parameters used for the emission reduction calculations that are available *ex ante* and listed in PDD include: • Default of daily volatile solid excreted for livestock category T as IPCC 2006		OK

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			(Vs); • Methane conversion factor for management system S, climate region K ($MCF_{S,K}$) considering the temperature for southwest region. The reference for the specific ambient temperature in the PDD is not coherent. Mato Grosso do Sul State is not located in the southwest region of Brazil. Project participant is requested to clarify it; • Maximum methane production (B_0) according Western Genetic as IPCC 2006 and considering the Agroceres and Topigs genetic sources used by swine producers; • Default average animal weight of a defined population at the project site ($W_{default}$) considering market swine as 50kg and breeding swine 198 kg, according IPCC 2006 and Western Europe genetic;	~~CL 4~~	
B.10.2. Are the choices of baseline GHG indicators reasonable and conservative?	**/1/ /12/**	DR I	See B.10.1	~~CL 4~~	OK
B.10.3. Is the measurement method clearly stated for each baseline indicator to be monitored and also deemed appropriate?	**/1/ /12/**	DR I	See B.10.1	~~CL 4~~	OK

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B.10.4. Is the measurement *equipment* described and deemed appropriate?	**/1/**	DR	The measurement equipments used for the monitoring purposes is identified and the applicable procedures established. See A.3.3		OK
B.10.5. Is the measurement *accuracy* addressed and deemed appropriate? Are procedures in place on how to deal with erroneous measurements?	**/1/**	DR	The measurement accuracy is addressed for the various parameters. Procedures to deal with erroneous measurements were established. See A.3.3.		OK
B.10.6. Is the measurement *interval* for baseline data identified and deemed appropriate?	**/1/** **/12/**	DR I	See B.10.1.	~~**CL 4**~~	OK
B.10.7. Is the registration, *monitoring*, *measurement* and *reporting* procedure defined?	**/1/**	DR	Procedures for the registration, monitoring, measurement and reporting of the parameters in the monitoring plan were identified. See A.3.3.		OK
B.10.8. Are procedures identified for *maintenance* of monitoring equipment and installations? Are the calibration intervals being observed?	**/1/**	DR	Procedures for maintenance of the monitoring equipments and installations and the calibration frequency were identified. See A.3.3.		OK
B.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	Procedures for day-to-day record handling, collection and archiving were identified. See A.3.3.		OK
B.11. Monitoring of Leakage *It is assessed whether the monitoring plan provides for reliable and complete leakage data over time.*					

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CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
B.11.1. Does the monitoring plan provide for the collection and archiving of all relevant data necessary for determining leakage?	**/1/**	DR	Concerning leakage, no sources of emission were identified according to AMS-III.D version 15		OK
B.11.2. Are the choices of project leakage indicators reasonable and conservative?	**/1/**	DR	See B.11.1.		OK
B.11.3. Is the measurement method clearly stated for each leakage value to be monitored and deemed appropriate?	**/1/**	DR	See B.11.1.		OK
B.12. Monitoring of Sustainable Development Indicators/ Environmental Impacts *It is assessed whether choices of indicators are reasonable and complete to monitor sustainable performance over time.*					
B.12.1. Is the monitoring of sustainable development indicators/ environmental impacts warranted by legislation in the host country?	**/1/**	DR	The simplified monitoring methodology AMS-III.D version 15 and the Brazilian DNA do not require the monitoring of social and environmental indicators.		OK
B.12.2. Does the monitoring plan provide for the collection and archiving of relevant data concerning environmental, social and economic impacts?	**/1/**	DR	See B.12.1		OK
B.12.3. Are the sustainable development indicators in line with stated national priorities in the Host Country?	**/1/**	DR	See B.12.1		OK

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B.13. Project Management Planning *It is checked that project implementation is properly prepared for and that critical arrangements are addressed.*					
B.13.1. Is the authority and responsibility of overall project management clearly described?	**/1/**	DR	Yes.		OK
B.13.2. Are procedures identified for training of monitoring personnel?	**/1/**	DR	Procedures for identification of training for the monitoring personnel are addressed in the PDD. See A.3.3.		OK
B.13.3. Are procedures identified for emergency preparedness for cases where emergencies can cause unintended emissions?	**/1/**	DR	Emergencies procedure has been identified with respect the leak of biogas on biodigester under the POP 12 GENERAL MAINTENANCE.		OK
B.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 were established. See A.3.3.		OK
B.13.5. Are procedures identified for corrective actions in order to provide for more accurate future monitoring and reporting?	**/1/**	DR	See A.3.3.		OK
C. Duration of the Project/ Crediting Period *It is assessed whether the temporary boundaries of the project are clearly defined.*					
C.1.1. Are the project's starting date and operational	**/1/**	DR	The project starting date was on 18 January		OK

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lifetime clearly defined and evidenced?			2010 with an expected lifetime of 21 years. The project proponent is requested to provide documentary evidence of the starting date of the project as the earliest of implementation, construction and real action in line with the guidelines of EB 41. In addition, project participant is requested to describe in section C.1.1 of the PDD the evidence available to support this date. Moreover, the project starting date mentioned in section C.1.1 does not match with the date mentioned in section B.2 of the PDD.	~~CL 2~~	
C.1.2. Is the start of the crediting period clearly defined and reasonable?	**/1/**	DR	A 7-years renewable crediting period is selected (with the potential of being renewed twice), starting on 1 January 2011 or the date of registration project activity.		OK
D. Environmental Impacts *Documentation on the analysis of the environmental impacts will be assessed, and if deemed significant, an EIA should be provided to the validator.*					
D.1.1. Does host country legislation require an analysis of the environmental impacts of the project activity?	**/1/** **/9/**	DR I	As stated in the PDD, the project activities will reduce negative environment impacts, like the population of flies, possible spread of disease and odor.		OK
D.1.2. Does the project comply with environmental legislation in the host country?	**/1/** **/9/**	DR I	See D.1.1.		OK
D.1.3. Will the project create any adverse environmental effects?	**/1/**	DR	See D.1.1.		OK

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CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
	/9/	I			
D.1.4. Have environmental impacts been identified and addressed in the PDD?	**/1/ /9/**	DR I	See D.1.1.		OK
E. Stakeholder Comments *The validator should ensure that stakeholder comments have been invited with appropriate media and that due account has been taken of any comments received.*					
E.1.1. Have relevant stakeholders been consulted?	**/1/ /25/**	DR I	Local stakeholders, such as the City Hall, Chamber of Councilors, the environmental state and local agencies, State and Federal Ministry Public, Legislative Assembly, ONG's and local community associations were invited to comment on the project, in accordance with the requirements of Resolution 7 of the Brazilian DNA. The invitation letters and the mail receipts were received from the project proponent. In addition all clarification meetings and commentaries were verified. Project participant is requested to explain why the stakeholders' meeting was held at São Gabriel do Oeste municipality if this municipality is not included in the PDD.	~~**CL 7**~~	OK
E.1.2. Have appropriate media been used to invite comments by local stakeholders?	**/1/ /25/**	DR I	See E.1.1	~~**CL 7**~~	OK
E.1.3. If a stakeholder consultation process is required by regulations/laws in the host country, has the	**/1/ /25/**	DR I	See E.1.1	~~**CL 7**~~	OK

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

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
stakeholder consultation process been carried out in accordance with such regulations/laws?					
E.1.4. Is a summary of the stakeholder comments received provided?	**/1/ /25/**	DR I	See E.1.1	~~**CL 7**~~	OK
E.1.5. Has due account been taken of any stakeholder comments received?	**/1/ /25/**	DR I	See E.1.1	~~**CL 7**~~	OK

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

Table 2b: Additional requirements checklist for VVM version 1 (EB 44)

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
A.6. Letter of approval					
A.1.1 Is the LoA received directly from the DNA or through the project participant.	**/1/**	DR	Prior to the submission of the final validation report to the CDM Executive Board, DNV will have to receive the written approval of voluntary participation from the DNA of Brazil, including the confirmation by the DNA of Brazil that the project assists it in achieving sustainable development.	--	--
A.7. Project design					
A.2.1 Does the PDD describe the CDM project activity with all relevant elements in a transparent and accurate way?	**/1/**		Yes, please see Table 2 A.3.1		OK
A.2.2 Has the CDM project activity at the start of the validation been constructed or does the CDM project activity use existing facilities or equipment?	**/1/**		No. The starting date of the project activity indicated in the PDD is expected to be 18 January 2009 the date of signing the Construction contract. Please see Table 2 C.1.1		OK
A.2.3 Is the project a large scale project, a small scale project with average annual emission reductions above 15 000 tonnes or a bundled small scale project? Has on-site visit been carried out?	**/1/**		Although the project participant has other small scale projects with the same methodology, all farms included in these projects are at a distance of more than 1 km from the sites included in this project. The project includes farms in Mato Grosso do Sul State, at the municipalities of Brasilândia, Bataguassu and Glória de Dourados. PDD "BRASCARBON Methane Recovery Project BCA-BRA-10" also has some farms in the municipality of Brasilândia: Fazenda Córrego		OK

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
			Azul – Paredão 2, Fazenda Córrego Azul – Progresso, Fazenda Córrego Azul – Laguna, Fazenda Córrego Azul – São José, Fazenda Córrego Azul – Acácia 1 e2, Fazenda Córrego Azul – Pontal, Fazenda Córrego Azul – União, Fazenda Córrego Azul – Conquista, Sítio Santa Luzia, Fazenda Jatiuca, Sítio Primavera, Fazenda São José, Sítio Estrela de Fogo II and Sítio Herança. The distance from the farms in Brasilândia of PDD "BRASCARBON Methane Recovery Project BCA-BRA-10" and the ones of PDD "BRASCARBON Methane Recovery Project BCA-BRA-09" were checked and they are all greater than 1 km. PDD "BRASCARBON Methane Recovery Project BCA-BRA-10" also has a farm in the municipality of Glória de Dourados: Sítio Lote 26 Qda. 39. The distance from the farm in Glória de Dourados of PDD "BRASCARBON Methane Recovery Project BCA-BRA-10" and the ones of PDD "BRASCARBON Methane Recovery Project BCA-BRA-09" were checked and they are all greater than 1 km. PDD "BRASCARBON Methane Recovery Project BCA-BRA-14" also has a farm in the municipality of Glória de Dourados: Sítio Lote 47, 49, 51. The distance from the farm in Glória de Dourados of PDD		

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
			"BRASCARBON Methane Recovery Project BCA-BRA-14" and the ones of PDD "BRASCARBON Methane Recovery Project BCA-BRA-09" were checked and they are all greater than 1 km. Hence, the project is not a de-bundled component of a larger project activity.		
A.2.4 Does the project activity involved alteration of existing installations? If so, have the differences between pre-project and post-project activity been clearly described in the PDD?	**/1/**		No, the entire project will use new equipment. Please see Table 2 A.3.1.		OK
A.8. Project emissions not addressed by the methodology					
A.3.1 Does the methodology describe all project emission source for the project activity that contributes all 1% of the emission reductions? Sources that the methodology considers not to take into account are not relevant (e.g. cement and iron consumption for building hydropower plants).	**/1/**		Yes. Please see Table 2 B.4 and B.5.		OK
A.9. Documentation of baseline emissions					
A.4.1 Documentation of the baseline determination: a. All assumptions and data used by the project participants are listed in the PDD and related document to be submitted for registration. The data are properly referenced. b. All documentation is relevant as well as correctly quoted and interpreted. c. Assumptions and data can be deemed reasonable d. Relevant national and/or sectoral policies and circumstances are considered and listed in the PDD.	**/1/**		Yes. Please see Table 2- B.1.1, B.2.1, B.2.2 and B.5.		OK

CHECKLIST QUESTION	Ref.	MoV*	COMMENTS	Draft Concl.	Final Concl.
e. The methodology has been correctly applied to identify what would occurred in the absence of the proposed CDM project activity					
A.10. Documentation of the calculations					
A.5.1 Algorithms and/or formulae used to determine emission reductions • All assumptions and data used by the project participants are listed in the PDD and related document submitted for registration. The data are properly referenced • All documentation is correctly quoted and interpreted. • All values used can be deemed reasonable in the context of the project activity • The methodology has been correctly applied to calculate the emission reductions and this can be replicated by the data provided in the PDD and supporting files to be submitted for registration.	**/1/**		Yes, Please See Table 2 B.4 and B.5.		OK
A.11. Implementation of the monitoring plan					
A.6.1 How were the plans for implementation of the monitoring plan, data management, QA/QC procedures assessed? To what extent can the emission reductions achieved by the project by monitored ex-post and verified later by a DOE?	**/1/**		Yes, please see Table 2 B.8, B.9 and B.10.		OK
A.12. CDM consideration prior to starting date					
A.7.1 The prior consideration of CDM for the project activity complies with EB41 annex 46	**/1/**		Yes, Pease see Table 2 B.3.4.		OK

Table 3 Resolution of Corrective Action and Clarification Requests

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
CAR 1 The starting date of the project activity was 1 May 2009, the date of signing the construction agreement. The validation started on 5 September 2009 when the PDD was published for global stakeholder consultation. As the project starting date is after 2 August 2008, in accordance with EB 48 Annex 61, the project participants must inform the Brazilian DNA and the UNFCCC secretariat in writing of the commencement of the project activity and their intention to seek CDM status. Since DNV was not able to find the notification in the UNFCCC website, project participant is requested to provide the confirmation from the UNFCCC secretariat that such a notification had been provided.	B.3.4	The project activity didn't start yet. Brascarbon will consider the starting date of the project on 18 January 2010. This date was considered and updated in the PDD. The validation started before construction or project start. Any construction started at the moment and the estimation of the project starting date is 18/01/2010, waiting previous validation report from DOE before starting project expenses.	Ok. DNV checked the revised PDD and confirmed that the starting date of the project activity is expected to be 18 January 2010, the date of signing the construction agreement. The validation started on 5 September 2009 when the PDD was published for global stakeholder consultation. Thus, in accordance with EB 48 Annex 61 for new project activities, since the PDD has been published for global stakeholder consultation before the project activity start date, it is not necessary to notify the host Party DNA and the UNFCCC secretariat. Therefore, this CAR is closed.
CAR 2 As stated in the PDD, the chosen discount rate of 12.75% considered for 21 years represents the SELIC rate on 4 March 2009. However, DNV was able to check that this value does not match with the value mentioned in the Central Bank of Brazil web site. In addition, the value applied is not valid at the time of taking the investment decision by the project participants (i.e. project start date 1 May	B.3.1 B.3.2 B.3.3	New SELIC rate of 10.77% included in the PDD, having has reference the period between January and August of 2009. jan/09 13.43 fev/09 12.75 mar/09 11.78	Since the start date of the project activity changed to 18 January 2010, then, the discount rate should represent the average SELIC rate when the PDD was submitted for global stakeholders consultation, i.e. an average for the period January 2009 to August 2009. This approach is considered conservative as the project activity was not yet implemented.

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
2009).		abr/09 10.84 mai/09 10.25 jun/09 9.26 jul/09 9.1 ago/09 8.75 Source: Portal Brazil (Banco Central)	Therefore, this CAR is closed.
CAR 3 As verified by DNV, the financial analysis spreadsheet provided by project participant does not match with the NPV calculations summarised in the PDD. Project participant is requested to correct the PDD and excel spreadsheet.	B.3.1 B.3.2 B.3.3	The tables of PDD and the excel spreadsheet were corrected.	Ok. DNV checked the revised financial analysis spreadsheet and confirmed that NPV value is correctly calculated. Therefore, this CAR is closed.
CL 1 Project participant is requested to provide in section A.4.1.4 of the PDD the GPS coordinates of the farm Sitio São João – Córrego da Anta.	A.1.1	GPS of the Sítio São João is S 21º45´56" W 52º17´33". The value was imputed in PDD.	Ok. DNV checked the revised PDD and confirms that GPS coordinates of the farm Sitio São João – Córrego da Anta was include in section A.4.1.4. Therefore, this CL is closed.
CL 2 The project proponent is requested to provide documentary evidence of the starting date of the project as the earliest of implementation, construction and real action in line with the guidelines of EB 41. In addition, project	C.1.1	Starting date in section C.1.1 and section B2, both are 18/01/2010 and updated in the PDD.	Ok. DNV checked the revised PDD and confirmed that the starting date of the project activity is expected to be 18 January 2010, the date of signing the construction agreement. Therefore, this CL is closed.

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
participant is requested to describe in section C.1.1 of the PDD the evidence available to support this date. Moreover, the project starting date mentioned in section C.1.1 does not match with the date mentioned in section B.2 of the PDD.			
CL 3 The applicability of the methodology should be clearly described and justified in the PDD. In addition, as per AMS-III.D, project participant is requested to demonstrate that the storage time of the manure after removal from the animals barns should not exceed 24 hours before being fed into the anaerobic digester. Moreover, project participant is requested to provide documented evidences in order to justify the applicability criteria.	B.1.2	This description of this information was imputed in section B.2. Evidence is according to the confined feed animal operations practices.	Ok. DNV checked the revised PDD and verified that all applicability criteria and respectively justification were included in section B.2. Therefore, this CL is closed.
CL 4 The reference for the specific ambient temperature in the PDD is not coherent. Mato Grosso do Sul State is not located in the southwest region of Brazil. Project participant is requested to clarify it	B.5.1 B.5.2 B.5.3 B.10.1 B.10.2 B.10.3 B.10.6	The region informed now in document is Central Region where the temperature range is 23 to 25 celsius degrees during the year, according to CPTEC/INPE/EMBRAPA and INMET http://bancodedados.cptec.inpe.br http://www.inmet.gov.br/html/clima.php	Ok. DNV was able to check the revised PDD and confirms that information about ambient temperature is correctly specified. Therefore, this CL is closed.
CL 5 The "Tool to determine project emissions from flaring gases containing methane" should be mentioned in section B.1 of the	B.8.1	This tool was included in section B.1.	Ok. DNV checked the revised PDD and observed that the Tool to determine project emissions from flaring gases containing methane was included in

Draft report clarifications and corrective action requests by validation team	Ref. to checklist question in table 2	Summary of project owner response	Validation team conclusion
PDD.			section B.1. Therefore, this CL is closed.
CL 6 As verified during the site visit, the pressure of biogas will be monitored according Monitoring operational procedure POP-13 and not Monitoring operational procedure POP-06. Project participant is requested to clarify.	B.9.1 B.9.2 B.9.3 B.9.4 B.9.5 B.9.6 B.9.7 B.9.8 B.9.9	The correct monitoring operational procedure to be use is the POP-13. This information was corrected in the section B.9.	Ok. The correct POP was included in the monitoring plan of the revised PDD. Therefore, this CL is closed.
CL 7 Project participant is requested to explain why the stakeholders' meeting was held at São Gabriel do Oeste municipality if this municipality is not included in the PDD.	E.1.1 E.1.2 E.1.3 E.1.4 E.1.5	All stakeholders were invited to comment the project activity according to the sent invitation cards. Protocols of the invitation cards were sent to the validator. The presentation of the project activity was done at São Gabriel do Oeste for the PDD 5. The comments at the section E was excluded from the PDD.	Ok. DNV checked the revised PDD and observed that information about local stakeholders consultation meetings were removed from the PDD. DNV was able to confirm that local stakeholders were invited to comment on the project only by letters. Therefore, this CL is closed.

APPENDIX B

CERTIFICATES OF COMPETENCE

CERTIFICATE OF COMPETENCE

Luis Filipe Tavares

Qualification in accordance with DNV's Qualification Scheme CDM/JI (ICP-9-8-i1-CDMJI-i1

GHG Auditor:		Yes				
Technical Area		***CDM Validator***	***CDM Verifier***	***Sector Expert***	***Methodology Expert***	***Technical Reviewer***
Landfill gas		Jan 2009	Jan 2009			
Renewables	*Hydro power*	Jan 2009	Jan 2009			
	Wind power					
	Other renewable					
Biomass						
Grid connection of isolated system						
Cement						
Waste-heat / waste-gas recovery		Jan 2009				
Efficiency of thermal power plants						
Coal mine methane						
Fuel switch						
Manure management		Jan 2009	Jan 2009	Jan 2009		
Waste / wastewater treatment		Jan 2009	Jan 2009	Jan 2009		
Energy efficiency						
N_2O						
HFCs						
Flare reduction						
PFCs						
Charcoal						
CO_2 recovery						
Transport						
Non-renewable biomass						
Biofuel						
Pipeline leakage reduction						
SF_6						

Høvik, 9 January 2009

Michael Lehmann

Michael Lehmann
Technical Director, Climate Change Services

CERTIFICATE OF COMPETENCE

Andrea Leiroz

Qualification in accordance with DNV's Qualification Scheme CDM/JI (ICP-8-1-CDMJI-i1)

GHG Auditor:		Yes				
Technical Area		***CDM Validator***	***CDM Verifier***	***Sector Expert***	***Methodology Expert***	***Technical Reviewer***
Landfill gas			Sept 2009			
Renewables	*Hydro power*	Jan 2009	Jan 2009		July 2009	July 2009
	Wind power		Sept 2009			
	Other renewable		Sept 2009			
Biomass		Jan 2009	Jan 2009			
Grid connection of isolated system			Sept 2009			
Cement						
Waste-heat / waste-gas recovery						
Efficiency of thermal power plants						
Coal mine methane						
Fuel switch						
Manure management		Jan 2009	Jan 2009			
Waste / wastewater treatment			Sept 2009			
Energy efficiency						
N_2O						
HFCs						
Flare reduction						
PFCs						
Charcoal			Sept 2009			
CO_2 recovery						
Transport						
Non-renewable biomass			Sept 2009			
Biofuel						
Pipeline leakage reduction						
SF_6						

Høvik, 1 September 2009

Michael Lehmann

Michael Lehmann
Technical Director, Climate Change Services

CERTIFICATE OF COMPETENCE

Ramesh Ramachandran

Qualification in accordance with DNV's Qualification Scheme CDM/JI (ICP-8-1-CDMJI-i1)

GHG Auditor:		Yes				
Technical Area		***CDM Validator***	***CDM Verifier***	***Sector Expert***	***Methodology Expert***	***Technical Reviewer***
Landfill gas		Jan 2009	Jan 2009	Jan 2009		
Renewables	*Hydro power*	Jan 2009	Jan 2009		Jan 2009	Jan 2009
	Wind power	Jan 2009	Jan 2009			
	Other renewable	Jan 2009	Jan 2009			
Biomass		Jan 2009	Jan 2009			
Grid connection of isolated system		Jan 2009	Jan 2009			
Cement		Jan 2009	Jan 2009			
Waste-heat / waste-gas recovery		Jan 2009	Jan 2009			
Efficiency of thermal power plants		Jan 2009	Jan 2009			
Coal mine methane		Jan 2009	Jan 2009			
Fuel switch		Jan 2009	Jan 2009			
Manure management		Jan 2009	Jan 2009			
Waste / wastewater treatment		Jan 2009	Jan 2009	Jan 2009		
Energy efficiency		Jan 2009	Jan 2009			
N_2O		Jan 2009	Jan 2009			
HFCs		Jan 2009	Jan 2009			
Flare reduction		Jan 2009	Jan 2009			
PFCs		Jan 2009	Jan 2009			
Charcoal		Jan 2009	Jan 2009			
CO_2 recovery		Jan 2009	Jan 2009			
Transport		Jan 2009	Jan 2009			
Non-renewable biomass		Jan 2009	Jan 2009			
Biofuel		Jan 2009	Jan 2009			
Pipeline leakage reduction		Jan 2009	Jan 2009			
SF_6		Jan 2009	Jan 2009			

Høvik, 9 January 2009

Michael Lehmann

Michael Lehmann
Technical Director, Climate Change Services

CERTIFICATE OF COMPETENCE

Michael Lehmann

Qualification in accordance with DNV's Qualification Scheme CDM/JI (ICP-8-1-CDMJI-i1)

GHG Auditor:		**Yes**				
Technical Area		***CDM Validator***	***CDM Verifier***	***Sector Expert***	***Methodology Expert***	***Technical Reviewer***
Landfill gas		Jan 2009	Jan 2009		Jan 2009	Jan 2009
Renewables	*Hydro power*	Jan 2009	Jan 2009	Jan 2009	Jan 2009	
	Wind power	Jan 2009	Jan 2009			
	Other renewable	Jan 2009	Jan 2009			
Biomass		Jan 2009	Jan 2009		Jan 2009	
Grid connection of isolated system		Jan 2009	Jan 2009	Jan 2009	Jan 2009	Jan 2009
Cement		Jan 2009	Jan 2009		Jan 2009	
Waste-heat / waste-gas recovery		Jan 2009	Jan 2009		Jan 2009	
Efficiency of thermal power plants		Jan 2009	Jan 2009		Jan 2009	
Coal mine methane		Jan 2009	Jan 2009		Jan 2009	Jan 2009
Fuel switch		Jan 2009	Jan 2009		Jan 2009	
Manure management		Jan 2009	Jan 2009		Jan 2009	Jan 2009
Waste / wastewater treatment		Jan 2009	Jan 2009		Jan 2009	Jan 2009
Energy efficiency		Jan 2009	Jan 2009		Jan 2009	
N_2O		Jan 2009	Jan 2009		Jan 2009	
HFCs		Jan 2009	Jan 2009		Jan 2009	
Flare reduction		Jan 2009	Jan 2009		Jan 2009	Jan 2009
PFCs		Jan 2009	Jan 2009		Jan 2009	
Charcoal		Jan 2009	Jan 2009		Jan 2009	Jan 2009
CO_2 recovery		Jan 2009	Jan 2009		Jan 2009	
Transport		Jan 2009	Jan 2009		Jan 2009	Jan 2009
Non-renewable biomass		Jan 2009	Jan 2009		Jan 2009	Jan 2009
Biofuel		Jan 2009	Jan 2009		Jan 2009	Jan 2009
Pipeline leakage reduction		Jan 2009	Jan 2009		Jan 2009	
SF_6		Jan 2009	Jan 2009		Jan 2009	Jan 2009

Høvik, 15 December 2009

Stein B. Jensen
Managing Director, Climate Change Services