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

CONTENTS

Annexes

NOTE:

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

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

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

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

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

A.1. Title of the small-scale CPA:

BRA PR - (ANTONIO JACKOSKI - 2116197S01) 3SP – Under the PoA "Methane Capture and combustion from AWMS of the 3S Program farms of the Instituto Sadia de Sustentabilidade".

Version 01
Date: 10 June 2010

A.2. Description of the small-scale CPA:

The purpose of the CPA of the Instituto Sadia de Sustentabilidade is to promote sustainable integrated development of the swine management system by improvements in the production chain. The program provides to each farmer the necessary resource to implement a proper waste management control system, eliminating problems such as pollution of air and water, diseases, foul odour, and agricultural exodus.

The proposed project activity for this project is to direct swine excrements to the biodigester system. In the system, biogas is formed by fermentation of organic material contained inside the biodigester. The biogas produced is then directed to the enclosed flare system where it is combusted. This sophisticated system avoids the emission to the atmosphere of gases that contribute to the Greenhouse Gas effect common in the business as usual procedures of the current swine manure systems. Furthermore, the system allows preparation of a biofertilizer and the biogas can be used as a source of energy. The project activity is accomplished in each farm of the PoA. The farms are identified as single CPA's.

The farm (ANTONIO JACKOSKI)/ CLIFOR – (2116197S01) is projected to receive (250) swine. The type of farming system found in this property is the (Breeding) Swine system. This CPA is part of the PoA of the Instituto Sadia de Sustentabilidade. As the SSC methodology determines this CPA does not exceed 60,000 tCO2eq.

a. Local Environmental Benefits

The proposed CDM project, by installing biodigesters and enclosed flare systems in the farms taking part in the 3S Program, aims to reduce not only GHG emissions but also other negative environmental impacts of swine production. The proposed project activity diminishes the load of organic material in wastewater, thus decreasing diseases, foul odours, disease vectors, bacteria, among others, and leading to better environmental conditions and local quality of life.

b. Social-Economic Benefits

The program brings several contributions to improve social and economic conditions for swine farms, establishing an alternative strategy to the currently predominant model in Brazil. The CDM project of the Instituto Sadia de Sustentabilidade intends to provide a practical model by improving economic sustainability of the farms.

The program helps to guarantee rural labour by fixing population and decreasing rural exodus. This is possible because the program increases swine production, assures production and sales, decreases energy and heating costs and creates instruments to diversify economic activities in farms.

c. Income-Generating Capacity Benefits

One of the most important benefits of the Program is that the Instituto Sadia de Sustentabilidade obtains funds with banks for farmers to purchase equipment, thus enabling small and medium rural producers to take part in the program. Small and medium producers are in fact the largest portion of the Sadia integration system.

In addition, the Institute is in charge of negotiating the CER certificates originating from the properties. The Institute distributes the resources generated from carbon credit trading among the properties in proportion to their respective credit-generation potential; these resources are used to amortise the debts and operational costs related to the program and are applied to social and environmental improvements to enhance the farms' swine management systems, aiming at turning them into sustainable farming models.

d. Technological Benefits

The 3S Program aims to share technology, knowledge and expertise with swine farmers, as part of the Instituto Sadia de Sustentabilidade mission of promoting sustainable development. In addition, the program also provides technological support, thus ensuring safe conditions for farmers to adopt and operate biodigesters and other related equipment.

e. Integration of actors involved in the project

The project promotes regional integration through technology dissemination, environmental improvements, and income distribution in the states which the 3S Program operates. The program also includes articulation with other productive sectors of society. As a final result for the program we expect to have improved the sustainability of the farms taking part in the 3S Program with an increase of quantity and quality of production, in addition to workers fixed in the rural area.

A.3. Entity/individual responsible for the small-scale CPA:

The parties involved are:

Table 1– CPA implementers as participants of the PoA under which the CPA is submitted.

Party involved	Private or public entity	Does the party involved want to be considered as a project participant (Yes/No)
Brazil	• Instituto Sadia de	No

	Sustentabilidade (ISS)	

A.4. Technical description of the small-scale CPA:

A.4.1. Identification of the small-scale CPA:

A.4.1.1. Host Party:

The host party for this CPA is Brazil.

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

The table to identify the CPA (ANTONIO JACKOSKI - 2116197S01) is described below.

Table 2 – Geographical reference of the farm involved in this CPA.

Farm	Clifor	State	City	Geographic reference		Market/ Breeding Swine	N° of biodigesters
				Latitude	Longitude		
ANTONIO JACKOSKI	2116197S01	Paraná	DOIS VIZINHOS	-25.728	-53.051	250	1

A.4.2. Duration of the small-scale CPA:

A.4.2.1. Starting date of the small-scale CPA:

The starting date of the (ANTONIO JACKOSKI - 2116197S01) CPA is the date of the purchase of the flare, i.e. 30/06/2010.

The 3S Program was developed and implemented to reach all the outsourced farmers partners of the Sadia Company in the year of 2004. The program's objective was to introduce in the properties a system to reduce the GHG gases emissions and to improve the farms with environmental, economic and social sustainability. Although by the demonstration of the economic comparison in the additionality it can be analysed that without the emissions of the CER's the implementation of the project activity would not be feasible.

Therefore the 3S Program needs the contribution of the CER's to improve the sustainability of the farm of (ANTONIO JACKOSKI - 2116197S01).

Table 3 – Timeline of the stages of the project activity.

Project Stages	Date	Evidence
Implementation of Sadia Biogas Combustion System (SQBS)	30/06/2010	NA
Starting date of CPA	30/06/2010	
CPA Validation Submission	16/10/2008	Validation report # 2008-0447

A.4.2.2. Expected operational lifetime of the small-scale CPA:

The expected operational lifetime of this CPA is minimum of 21 years and is according to the length determined for the PoA.

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

Renewable Crediting period

A.4.3.1. Starting date of the crediting period:

The starting date of the first crediting period is 20 August 2010.

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

The length of the crediting period for this CPA is 7 years, and can be renewed for two periods of seven years.

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

The estimated amount of emission reduction was calculated for the CPA of (ANTONIO JACKOSKI - 2116197S01) from the equations described in the Instituto Sadia de Sustentabilidade - PoA. The table below demonstrates the total emission reduction estimated for the first crediting period for this proposed CPA.

Table 4 – Estimated amount of reduction for the first crediting period the present CPA .

Year	Estimation of project activity emissions (tonnes of CO_2 e)	Estimation of baseline emissions (tonnes of CO_2 e)	Estimation of leakage (tonnes of CO_2 e)	Estimation of overall emission reduction (tonnes of CO_2 e)
2009	0.15	205	0	204
2010	0.15	205	0	204
2011	0.15	205	0	204
2012	0.15	205	0	204
2013	0.15	205	0	204
2014	0.15	205	0	204
2015	0.15	205	0	204

Total years (ton. of CO2eq)	1	1,432	0	1,431

A.4.5. Public funding of the CPA:

Public funding was provided for the CPA's. The National Bank of Economic and Social Development (BNDES) is the responsible for the funds loaned to the Instituto Sadia de Sustentabilidade.

A.4.6. Information to confirm that the proposed small-scale CPA is not a de-bundled component

The SSC-CPA of the farm (ANTONIO JACKOSKI - 2116197S01) is not a de-bundled component of a large-scale activity because the implementer of the project activity is unique for each CPA inserted in the PoA for the Instituto Sadia de Sustentabilidade 3S Program. The implementer of the project activity for this CPA is the owner of the farm.

A.4.7. Confirmation that small-scale CPA is neither registered as an individual CDM project activity or is part of another Registered PoA:

The CPA (ANTONIO JACKOSKI - 2116197S01) is the only project of the Instituto Sadia de Sustentabilidade and can be identified as a unique project by the geographic location established by GPS equipment and applied to the ArcGIS system.

SECTION B. Eligibility of small-scale CPA and Estimation of emissions reductions

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

Methane Capture and Combustion from Animal Waste Management System (AWMS) of the 3S Program farms of the Instituto Sadia de Sustentabilidade.

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

This CPA project activity is applicable to manure management of swine farms of the Instituto Sadia de Sustentabilidade 3S Program and presents the following characteristics.

- Swine farm with livestock populations managed under confined conditions;
- Swine farm where manure is not discharged into natural water resources (e.g. rivers or estuaries) and the barns are connected directly with biodigester;
- The depth of the lagoons used for manure management in the baseline scenario is at least 1m;
- The annual average temperature in the site is higher than 5°C;

- The AWMS/process in the project case ensures that no leakage of manure waste into ground water takes place, all the lagoons have a non-permeable layer at the lagoon bottom;
- The sludge is handled aerobically, and the final application is made in proper conditions. The procedures for application are described in the monitoring plan of the PoA of the Instituto Sadia de Sustentabilidade farms. It is in accordance with Brazilian legislation;
- Technical measures are used (e.g. flared, combusted) to ensure that all biogas produced by the digester is used or flared.
- The same technology of biodigester and enclosed flare system are applied in all the CPA's.
- Legislation is in conformance with the Brazilian Legislation and there is no additional legislation involved.
- Investment costs are similar in all CPA's.
- The Sadia Company maintains a pattern of swine production in all states of Brazil. The technology of production and the genetics of the Sadia Company are similar to the pattern found in the Western Europe. Therefore the values Bo e VS applied in the CPA's are the same for all states of Brazil and for all CPA's involved in the PoA of the Instituto Sadia de Sustentabilidade.

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

- *Business as Usual*

Currently the business as usual procedures for swine manure waste management systems in the host country that is Brazil are non-permeable open-air anaerobic lagoons, where all emitted GHG goes directly to the atmosphere.

The swine producers do not have to implement the new system with the new technology, which consists in the implementation of biodigester and enclosed flare system. Therefore the program is considered a voluntary action and the project activity is being implemented by the Instituto Sadia de Sustentabilidade voluntarily.

- *Implemented Technology*

The proposed project activity improves current practices. Substituting these business as usual procedures for the new technology results in methane recovery and mitigating GHG emissions, by controlling the decomposition process of open-air lagoons and by capturing and combusting the produced biogas. The treatment of the manure of the swine activity is accomplished by the decomposition of the manure inside the biodigester which produces the biogas that is combusted in the enclosed flare system reducing the emissions of GHG's and generates the CER's contributing to the sustainable development.

- *Legal*

There are no national, state or local requirements providing for GHG emissions of agro industrial operations (swine production) in Brazil. The state legislation on swine waste in Brazilian states determines that animal waste must have 120 days of retention in a non-permeable open-air lagoon, for reduction of the organic load. This way, farmers are not required to implement the new technology with the biodigester system and with the enclosed flare system to his farm.

These practices of AWMS by treating swine waste in non-permeable open-air anaerobic lagoons are in accordance with local legislation of the State of (Paraná - Resolução CEMA (Conselho Estadual do Meio Ambiente) 065/08) to which this CPA applies.

- *Investment*

An economic comparison was made between the baseline scenario and the proposed project activity scenario. The comparison can be observed in Table 5. below. The comparison was accomplished between the baseline scenario and by the project activity with or without the use of the biogas. The values used for the comparison of the CPA are determined below.

1. Average market value for a property of (250) animals;
2. SELIC interest rate of Brazil;
3. NPV for 10 years;
4. Electrical Energy Cost from national grid for free consumers;
5. Thermal Energy Cost of the LPG for the project areas.

The use of the biogas will be determined by the farmers intention regarding to the economic comparison developed for the CPA. The type of utilization of the biogas whether it will be for electricity generation or for heat generation in the Breeding swine farms will also be determined by the farmer. The coordinating entity only provides the study of the comparison.

Table 5 –Investment analysis of CPA
Economic Comparison (U$)

Baseline Scenario – Open-air lagoon	Year 1	Year 2	Year n	Year n+1
Equipment Cost (U$)	2,500.00			
Maintenance Cost (U$)	500.00	500.00	500.00	500.00
Total (US)	3,000.00			
NPV (i=14% Year SELIC – 10 years) US$ -4,801.04				

Project Activity – Biodigester and enclosed flare	Year 1	Year 2	Year n	Year n+1
Equipment Cost (cover, PVC, meter, flare) (U$)	23,559.46			
Maintenance Cost (U$)	1,250.00	1,250.00	1,250.00	1,250.00
Total (U$)	24,809.46			
NPV (i=14% Year SELIC – 10 years) US$ -29,355.80				

Project Activity – Biodigester + Enclosed Fare + Electrical generator	Year 1	Year 2	Year n	Year n+1
Equipment Cost (cover, PVC, meter, flare) (U$)	23,559.46			
Electrical Generator (25 kW)	18,950.00			
Maintenance Cost (U$)	6,000.00	6,000.00	6,000.00	6,000.00
Total (U$)	54,109.46			
Electrical Energy Consumption: 120 kWh/day				

Electrical Energy Cost: 0.065 US$/kWh				
Energy Savings	621.00			
NPV (i=14% Year SELIC – 10 years) US$ -73,133.46				

Project Activity – Biodigester + Enclosed Fare + Heat Exchanger	**Year 1**	**Year 2**	**Year n**	**Year n+1**
Equipment Cost (cover, PVC, meter, flare) (U$)	23,559.46			
Heat Exchanger	17,000.00			
Maintenance Cost (U$)	4 500.00	4 500.00	4 500.00	4 500.00
Total (U$)	45,059.46			
Thermal Energy Used: 110,000 kCal/day				
Thermal Energy Cost: 0.000139 US$/kCal				
Energy Savings	1,098.00			
NPV (i=14% Year SELIC – 10 years) US$ -62,844.88				

According to the results of the economic comparison, treatment by using the biodigester and enclosed flare system is much more expensive than the business as usual practice with the open-air lagoon. The high costs of the investment for the proposed project activity compared to the open-air lagoon technology discourages the farmers of Sadia S/A to adopt this technology. With this comparison we can prove that, from an economic standpoint, the proposed project activity is additional.

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

This section is linked with the PoA of the Instituto Sadia de Sustentabilidade as demonstrated in the section B.1 and B.2 of the CPA of (ANTONIO JACKOSKI - 2116197S01).

The gases for the present **CPA** are described in Figures 1.and 2. The gas contained in the baseline scenario is Methane (CH4); the source of this gas is the open-air lagoon. In the project activity scenario the gas emitted is Carbon Dioxide (CO2) from the electricity consumption in the system.

This **CPA** is located in (Paraná) state, one of the five states listed in the PoA.

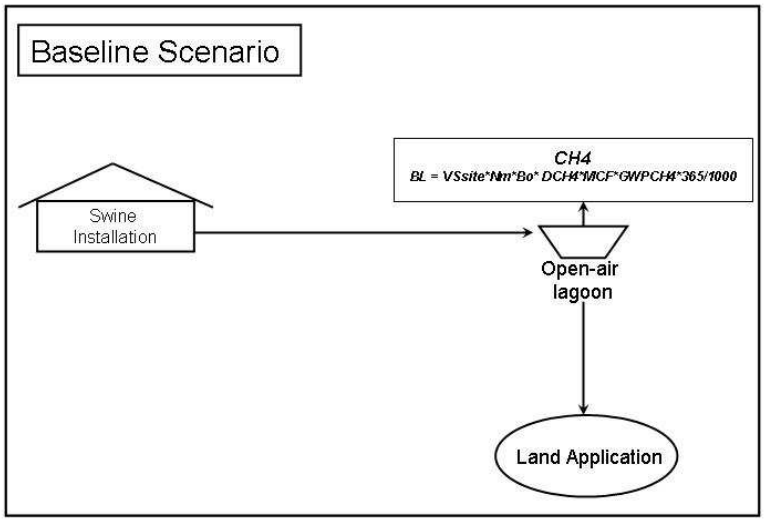

Figure 1 - Gases and sources for baseline scenario of CPA .

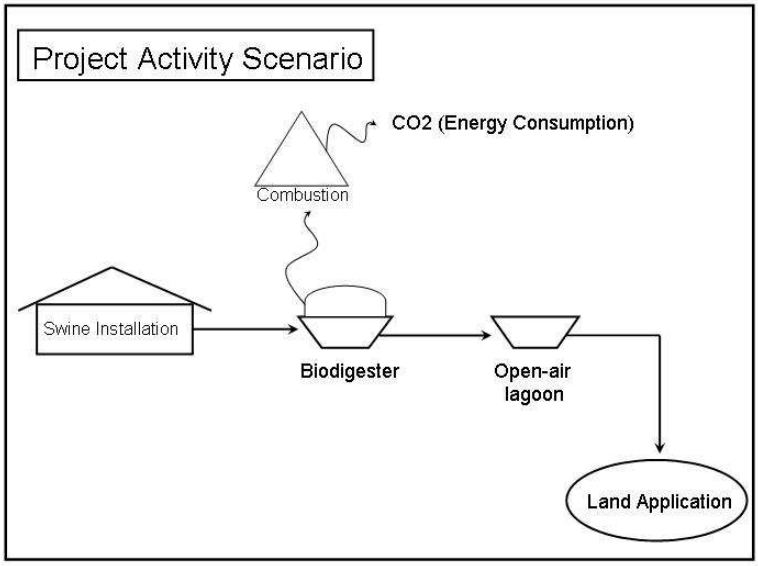

Figure 2 - Gases and sources for project activity scenario of CPA.

B.5. Emission reductions:

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

Data / Parameter:	**Nm**
Data unit:	Number of heads
Description:	Average livestock population used in both baseline and project emissions.
Source of data used:	Sadia
Value applied:	250
Justification of the choice of data or description of measurement methods and procedures actually applied :	Archive electronically during 2 years.
Any comment:	The number of livestock in each farm is determined by the allocation of the animals in the farm for a determined period.

Data / Parameter:	**W site**
Data unit:	Kg
Description:	Average weight of livestock
Source of data used:	Sadia
Value applied:	82 for market and 198 for breeding
Justification of the choice of data or description of measurement methods and procedures actually applied :	Archive electronically during 2 years. The average weight is determined by Sadia's technicians according to a procedure determined by the Sadia Industry.
Any comment:	The average weight of the livestock population market swine.

Data / Parameter:	**MCF**
Data unit:	Fraction
Description:	Methane conversion factor
Source of data used:	IPCC 2006 Guidelines.
Value applied:	18°C RS – State MCF 77% / 18ºC SC-State MCF 77% / 19ºC PR-State MCF 77% / 20ºC SP-State MCF 78% / 21ºC MG-State MCF 78% / 22ºC Go-State MCF 78% / 26ºC MT-State MCF 79%.
Justification of the choice of data or description of measurement methods and procedures actually applied :	Archive electronically during 2 years.
Any comment:	The factor MCF is taken from IPCC 2006 Guidelines according to the annual average temperature in Brazil (INMET) for the manure management system considered in this PoA. (Volume 4, chapter 10, table 10.17)

Data / Parameter:	**Bo**
Data unit:	m^3CH_4/kg VS
Description:	Methane production
Source of data used:	IPCC 2006 Guidelines
Value applied:	0.45
Justification of the choice of data or description of measurement methods and procedures actually applied :	According the Western European genetic used by the Sadia' swine farms. Archive electronically during 2 years.
Any comment:	The IPCC value used is for Western Europe.

Data / Parameter:	**VS site**
Data unit:	Kg/animal/day
Description:	Volatile solid excretion per animal per day.
Source of data used:	Sadia estimation based on the IPCC 2006 Guidelines.
Value applied:	0,30 for market swine and 0,46 for breed swine.
Justification of the choice of data or description of measurement methods and procedures actually applied :	According the Western European genetic used by the Sadia' swine farms. Archive electronically during 2 years.
Any comment:	VS site is determined by an equation that uses VS default values of the IPCC Guidelines. In the equations there is a VSsite value for breeding swine and a VSsite value for market swine.

Data / Parameter:	**D CH4**
Data unit:	Kg/m3
Description:	Density of the methane
Source of data used:	IPCC 2006 Guidelines
Value applied:	0.67 (at Normal conditions of temperature and pressure)
Justification of the choice of data or description of measurement methods and procedures actually applied :	Archive electronically during 2 years.
Any comment:	

Data / Parameter:	**GWP CH4**
Data unit:	
Description:	Global Warming Potential for methane
Source of data used:	IPCC 2006 Guidelines
Value applied:	21
Justification of the choice of data or description of measurement methods and procedures actually applied :	Archive electronically during 2 years.
Any comment:	

Data / Parameter:	**Dy**
Data unit:	Number of days.
Description:	Number of days of the allocation of swine in the farms.
Source of data used:	Maximum number according to the environmental licence.
Value applied:	350 for market Swine and 365 for Breeding Swine
Justification of the choice of data or description of measurement methods and procedures actually applied :	Archive electronically during 2 years.
Any comment:	

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

Calculation of Emission Reductions

The table below summarizes the emissions for the baseline and project scenarios that are calculated in the CPA's:

Table 6 – Emission Summary

Baseline – Anaerobic Lagoon	**Project – Anaerobic Digester**
CH4 emissions from anaerobic storage lagoon	CO2 emission of the electricity consumption in the system.

1. Animal population

There are two different types of swine production. This difference is determined by the different types of swine production system used for Sadia's farms.

The amounts of animals in the farm are informed in the PLC and the maximum number of animals allowed in the farm facility is determined by Brazilian environmental legislation.
The table below indicates the values for the CPA.

Table 7 – Number of animals determined by type of production.

Parameter	Value	Unit	Comment/Source
Nm breed	250	Breed Swine	Number of animals during a period x. Information obtained from Sadia S/A.
Nm market	0	Market Swine	Number of animals for during a period x. Information obtained from Sadia S/A.

2. Baseline Emissions

In order to demonstrate emissions of the baseline scenario, default values were used to represent the volatile solids content in raw and treated manure. The default values were taken from the IPCC 2006 Guidelines.

IPCC default values are based on an average weight of 82 Kg for market swine and 198 Kg for breeding swine. In order to obtain a representative figure, the IPCC default values for Volatile Solids are corrected.

The emissions from the baseline in swine production are calculated by:

$$BE = VS_{site} * N_m * B_o * D_{CH4} * MCF * GWP_{CH4} * Dy/1000$$

Where:

BE: Baseline emission of CH4 emissions in manure management system, in tons of CO2 equivalents.

VSsite: Adjusted volatile solid excretion per day on dry-matter basis for defined livestock population at project site, in kg-dm/animal.

Nm: Livestock of defined population.

B0: Maximum CH4 production capacity from manure per animal for defined livestock population (m3 CH4/kg-d).

DCH4ex ante: CH4 density (0,67kg/m3 at room temperature, 20o C and 1 atm pressure).

MCF: Methane conversion factor (MCF). The Brazil's National Meteorological Institute (INMET) considers as an annual average temperature for the follow:

18°C RS - State MCF 77%
18ºC SC-State (MCF 77%)
19ºC PR-State (MCF 77%)
20ºC SP-State (MCF 78%)
21ºC MG-State (MCF 78%)
22ºC Go-State (MCF 78%)
26ºC MT-State (MCF 79%)

GWP CH_4: Approved Global Warming Potential (GWP) of CH4.

Dy: Number of days in the year.

IPCC default values are based on an average weight of 82 kg of the market swine and 198Kg of the breeding swine. In order to obtain a representative figure, the IPCC default value for Volatile Solids is corrected as follows:

$$VS_{site} = (W\ site / W\ default) \times VS\ default$$

Where:

VSsite: Adjusted volatile solid excretion per day on dry-matter basis for defined livestock population at project site, in kg-dm/animal.

Wsite: Average site animal weight for defined population, in kg.

Wdefault: Default average animal weight for defined population, in kg.

VSdefault: Default value (IPCC) for the volatile solid excretion per day on a dry-matter basis for defined livestock population, in kg-dm/animal.

3. Project Emission

The consumption of the electricity will be analysed in all equipments installed in the CPA to determine the total consumption of the system.

The factor used to calculate the parameter is the ef-grid that is based in the generation of national electricity calculated by the Brazilian DNA.

$$El = \sum electricity * ef\text{-}grid$$

Where:

El: Total energy consumption of the project activity in tCO2e./year

$\sum electricity$*:* sum of the voltage of the operating equipments in MWh.

Ef-grid: energy grid factor from Brazil's DNA 2008 calculation determined in tCO2e./MWh.

The total electricity consumption in the system per hour is of 0.000056 MWh, estimated from the installed equipment. The total year consumption can be accomplished by multiplying the 0.000056 MWh per hour by 24 hours a day and by 365 days per year. Then the total electricity consumption is multiplied by the grid factor determined by the DNA of Brazil for the year of 2008 that is 0.3119 t CO_2e, resulting in (0,15) tons CO2e./year.

4. Estimated leakage

Emissions generated outside project boundaries that prove to be significant and reasonably attributable to changes in manure management are not expected. The digester emissions are presumed insignificant in CO2 equivalents and therefore not considered in leakage calculations (IPCC, 2006).

5. Emission Reduction of the Project Activity

The emission reduction considered in this project activity uses the following equations:

$$ER_{Estimated} = BE - PE_{El}$$

$$ER_{Calculated} = MD_{total} - PE_y$$

$$MD_{total} = MD_{flare} + MD_{fuel}$$

$$MD_{flare} = BG_{flare} * w_{CH4} * D_{CH4} * FE * GWP_{CH4}$$

$$MD_{fuel} = BG_{fuel} * w_{CH4} * D_{CH4} * FE * GWP_{CH4}$$

$$PE_y = PE_{flare} + PE_{fuel} + PE_{El}$$

$$PE_{flare} = \sum_{h=1}^{8760} TM_{RG,h} * (1 - \eta_{flare,\,h}) * \frac{GWP_{CH4}}{1000}$$

$$PE_{fuel} = \sum_{h=1}^{8760} TM_{RG,h} * (1 - \eta_{fuel,\,h}) * \frac{GWP_{CH4}}{1000}$$

$$TM_{RG,h} = FV_{RG} * fv_{CH4,\,RG} * D_{CH4}$$

$$P_{El} = \sum electricity * ef\text{-}grid$$

Where:

$ER_{Estimated}$: Estimated project emission reduction in year y, in tons of CO2 equivalent.

BE: Baseline emissions in year y, in tons of CO2 equivalent.

$PE_{El:}$ Emission of CO2 related by the consumption of electricity in the facility, in tons CO2e./year

$ER_{Calculated}$: Calculated project emission reduction, in tons of CO2 equivalent.

MD_{total} : methane captured and destroyed by project activity, in tons of CO2 equivalent, which will be measured using the conditions of the flaring process.

MD_{flare} : methane captured and destroyed by enclosed flare, in tons of CO_2 equivalent

MD_{fuel} : methane captured and destroyed by fuel system, in tons of CO_2 equivalent

BG_{flare}: biogas flared (m^3) that is equivalent to FV_{RG} (m^3).

BG_{fuel}: biogas fuelled (m^3) that is equivalent to FV_{RG} (m^3).

w_{CH4} : methane content in biogas (mass fraction).

D_{CH4} : density of methane at the temperature and pressure of the biogas at (tonnes/m^3).

FE : flare efficiency (fraction)

GWP_{CH4} : Methane global warming potential (21)

PE_y : Total project emissions, in tons of CO2 equivalent.

$PE_{flare,}$: CH4 emissions related to enclosed flare system, in tons of CO2 equivalent.

PE_{fuel}: CH4 emissions related to fuel system, in tons of CO2 equivalent.

$PE_{El:}$ Emission of CO2 related by the consumption of electricity in the facility, in tons CO2e./year

$\eta_{fuel,\,h}$: Flare efficiency in hour h.

$\eta_{flare,\,h}$: Flare efficiency in hour h.

$TM_{RG,h}$: Mass flow rate of methane in residual gas in hour h, in Kg/h.

FV_{RG}: Volumetric flow rate (m^3)., that is equivalent to the variable of BG (m^3).

$fv_{CH4,\,RG}$: Volumetric fraction of methane .

D_{CH4}: CH4 density at normal conditions temperature, 20o C and 1 atm pressure (Kg/m³).

P_{El}: Total emission of the energy consumption of the project activity in tCO2e./year

$\sum electricity$: sum of the voltage of the operating equipments in MWh.

Ef-grid: energy grid factor from Brazil's DNA 2007 calculation determined in tCO2e./MWh.

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

Table 8 – Estimation of the emissions of the project.

Year	Estimation of project activity emissions (tonnes of CO_2 e)	Estimation of baseline emissions (tonnes of CO_2 e)	Estimation of leakage (tonnes of CO_2 e)	Estimation of overall emission reduction (tonnes of CO_2 e)
2009	0.15	205	0	204
2010	0.15	205	0	204
2011	0.15	205	0	204
2012	0.15	205	0	204
2013	0.15	205	0	204
2014	0.15	205	0	204
2015	0.15	205	0	204
Total years (ton. of CO2eq)	1	1,432	0	1,431

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

B.6.1. Description of the monitoring plan:

The monitoring plan is described in the Instituto Sadia de Sustentabilidade PoA in section E.7.

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

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

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

Table 9 – Demonstration of the analyses of the legal documentation.

Name	Clifor	State	N° of Environmental Licence	Nº of Protocol in the Environmental State Entity	Emission Date	Validation Date
ANTONIO JACKOSKI	2116197S01	PR	12636	9279892-5	21/12/2006	21/12/2010

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

>> The state does not require any environmental impact study for the role of swine production.

SECTION D. Stakeholders' comments

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

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

The stakeholder's comments were determined at PoA level in section D.

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

>>
NA

D.3. Summary of the comments received:

>>
NA

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

>>
NA

Annex 1

CONTACT INFORMATION ON ENTITY/INDIVIDUAL RESPONSIBLE FOR THE SMALL-SCALE CPA

Organization:	Instituto Sadia de Sustentabilidade
Street/P.O.Box:	R. Fortunato Ferraz,
Building:	365
City:	São Paulo
State/Region:	São Paulo
Postfix/ZIP:	05093 - 900
Country:	Brazil
Telephone:	+55 (11) 2113-1535
FAX:	+55 (11) 2113-3575
E-Mail:	ralf.piper@sadia.com.br
URL:	www.sadia.com
Represented by:	Ralf Piper
Title:	Director
Salutation:	Sr.
Last Name:	Piper
Middle Name:	
First Name:	Ralf
Department:	Diretoria de Recursos Humanos, Tecnologia e Qualidade
Mobile:	
Direct FAX:	+55 11 2113 3399
Direct tel:	+55 11 2113 3160
Personal E-Mail:	

Annex 2

Public funding was used in this PoA and in the related CPA's. The entity involved with the fund is the National Bank of Economic and Social Development (BNDES).

Annex 3

Described in section E.

Annex 4

Procedures to monitor the amount of methane to be used as fuel or to be combusted are described in section E.7.2.