CLEAN DEVELOPMENT MECHANISM
SMALL-SCALE PROGRAMME OF ACTIVITIES DESIGN DOCUMENT
(CDM-SSC-PoA-DD) Version 01

CONTENTS

NOTE:

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

(ii) At the time of requesting registration this form must be accompanied by a CDM-SSC-CPA-DD form that has been specified for the proposed PoA, as well as by one completed CDM-SSC-CPA-DD (using a real case).

SECTION A. General description of small-scale programme of activities (PoA)

A.1 Title of the small-scale programme of activities (PoA):

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

Version 02
Date: 01 October 2008

A.2. Description of the small-scale programme of activities (PoA):

Established in Brazil in 1944, Sadia is one of the Brazilian market leaders in frozen and chilled meat products and margarines. The Company has gained a reputation for excellence in the agro industrial sector and in the production and innovation of pork, beef, chicken and turkey products, as well as pasta, margarine and desserts. The brand Sadia has been the most valued in the food sector since 2001, according to a survey done by British consulting firm Interbrand. Sadia has consolidated itself as one of the largest food companies in Latin America and is among Brazil's largest exporters.

The Company maintains 13 industrial plants, two units for animal production and distribution centres spread across seven Brazilian states. It has over 50 thousand employees and partners with approximately 10.000 integrated fowl and pork farms by means of its Animal Production Management system.

Sadia has two types of swine farming systems: Market Farms and Breeding Farms. To farmers who work with Market Farms, Sadia offers a system of partnership. This system supplies farmers with the required quality food, medication, technical support, veterinary support and transportation. The farmers have the responsibility of offering physical infrastructure and feeding the animals. In the Market Farm system, the swine reach the farm with an average weight of 22Kg after spending 60 days in the Breeding System. After the fattening process is concluded (within a period of approximately 120 days), the swine are delivered to Sadia with an average weight of 130Kg.

In the Breeding Farm system, reproduction occurs within farmers' facilities; after 60 days, the hogs weigh approximately 22Kg and are directed to the Market Farm system. Medication and food are supplied by the farmer and Sadia S/A provides the farmer with veterinary assistance, technical support and transportation.

This system provided a huge advance in dissemination of new technologies, production growth and specialization, in addition to promoting social and economic development in rural communities. At the same time, however, geographic concentration of production and the increasing volume of waste to be managed were causing relevant environmental impacts. This led Sadia to create, in 2003, a voluntary sustainability program in swine farms, in order to generate benefits to farmers' animal waste management systems (AWMS), developing Clean Development Mechanism (CDM) projects and reducing GHG emissions.

This voluntary program began at three of Sadia's own swine farms (Faxinal dos Guedes, Toledo Luz Marina and Toledo São Sebastião), functioning as prototypes to be extended to its outsourced producers.

This process led Sadia to establish the Instituto Sadia de Sustentabilidade, a non-profit organization, in December 2004. The Instituto Sadia de Sustentabilidade mission is to contribute to local development in communities in which it operates. For this purpose, our first responsibility was to be in charge of the voluntary sustainability program to outsourced farmers called 3S Program (Sadia Sustainable Swine Production Program).

Thus, this project enables the 3S Program to fulfil its wider purpose of promoting sustainable development among swine producers. Swine production in Brazil is not totally sustainable due to its less severe environmental legislation and poor working and living conditions of producers. The goals for this PoA are to ensure that all farmers that want to take part in the 3S Program will be able to do so at any time for the duration of the PoA.

This PoA project involves five states of Brazil with Market Farms and Breeding Farms generating a large amount of GHG emissions. The states of the project are: Rio Grande do Sul (RS), Santa Catarina (SC), Paraná (PR), Minas Gerais (MG) and Mato Grosso (MT). The project consists of installing a biodigester system to capture methane gas and an enclosed flare system to combust the biogas. The resources obtained from carbon credit trading will be used to improve social and environmental conditions in the farms, assuring sustainability of both the farmers and the program. The resources generated by the 3S Program will return to the farmers according to each property's potential for reducing emissions and after deducting equipment and operational costs of 3S Program.

The estimated amount of installed biodigester and enclosed flare systems in the PoA of the Instituto Sadia de Sustentabilidade is of 1103 in 1074 farmers. The estimated amount of CO2 generation is of 591,418 tCO2/year. Besides these farms there is an existing potential of inclusion of farmers in the PoA.

For all farms included in the 3S Program, the installed equipment follows identical standards. Their equipment has the same technology with a non-heated biodigester system and an enclosed flare system. The biodigester is an anaerobic digester, which captures the methane gas produced by fermentation of organic material from swine production, and the enclosed flare system for combustion of the biogas.

The expected result for this project is a significant reduction of GHG emissions compared to the emissions that would occur in the absence of this project. The second expected result is to promote sustainable swine production for farmers, generating environmental and social benefits.

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 Certificate Emission Reduction (CER) originated 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. Coordinating/managing entity and participants of SSC-POA:

Information relating to the parties involved in the project activity is described in Annex 1. The parties involved are:

Table 1 – Table of the parties involved in the PoA for the Instituto Sadia de Sustentabilidade.

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

United Kingdom	• European Carbon Fund (ECF)	No

A.4. Technical description of the small-scale programme of activities:

A.4.1. Location of the programme of activities:

A.4.1.1. Host Party(ies):

The host party for the project is Brazil.

A.4.1.2. Physical/ Geographical boundary:

The geographical boundary for the project five states of Brazil which are: Rio Grande do Sul (RS), Santa Catarina (SC), Paraná (PR), Minas Gerais (MG) and Mato Grosso (MT). Figure 1 characterizes the regions of the CPAs in Brazil.

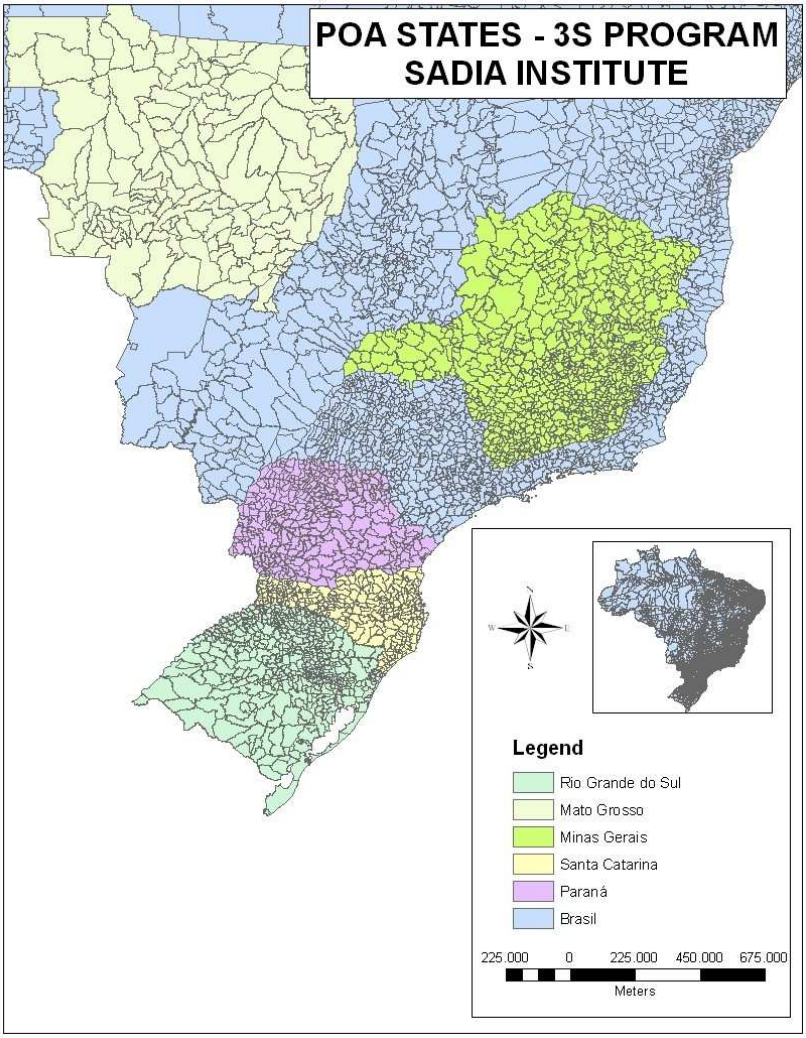


Figure 1 – Geographical boundary for the Instituto Sadia de Sustentabilidade PoA

A.4.2. Description of a typical small-scale CDM programme activity (CPA):

A.4.2.1. Technology or measures to be employed by the SSC-CPA:

The project activity described in this document uses the AMS III.D-Version 13 methodology, "Methane recovery in agricultural and agro industrial activities". A tool to determine emissions for the project activity is also used and the methodology is "Tool to determine project emissions from flaring gases containing methane".

The proposed project activity for all CPAs in this PoA on AWMS in swine production has the same initial concept. The process is to capture and combust biogas produced by fermentation of organic material in the biodigesters. The project activity consists of substituting the business as usual of open-air lagoons for the installed biodigester system and enclosed flare system.

The applicable technology used on the farms that take part in the 3S Program is the non-heated anaerobic biodigester, which works as a reactor, receiving daily loads of swine waste organic material. The system installed has a proper retention time to reduce its volatile solids, maintaining the methanogenic bacterial population in a steady state for degradation.

Anaerobic digestion can be simplified as the following (Chernicharo, 1997):

Phase I – Hydrolysis – In this stage, bacteria release extra cellular enzymes that promote the compound's hydrolysis, generating small soluble molecules such as organic volatile acids. The products of this stage are the substrate for bacteria in the next step.

Phase II – Acidogenesis – The decomposed matter from the previous step is converted into organic acids. Other substances are formed: salts, carbon dioxide, water and ammonia.

Phase III – Methanogenesis – Methanogenic bacteria use hydrogen and carbon dioxide and transform it into methane, producing the biogas.

The biodigester system is comprised by a synthetic geomembrane cover, made polyvinyl chloride (PVC) and is fixed on the perimeter by an anchorage system. The PVC is a product used for several applications and is resistant to ultra-violet radiations, ozone, and chemical compounds. The effluent processed in the biodigester is directed to the open-air lagoon system and the biogas is produced by fermentation in the biodigester. Thus the production of the biogas is captured and directed to the enclosed flare system to be combusted. Procedures for sludge elimination were analysed and determined by the manufacturer specifications.

The enclosed flare system is responsible for combusting the produced biogas and is entirely automated. The enclosed flare was designed to guarantee methane elimination. The biogas residence time inside the flare follows manufacturer specifications. The average temperature considered for carbon crediting in the operation of the enclosed flare must be within a minimum of 500° Celsius and a maximum of 800° Celsius. The temperature is set as outlined by the manufacturer for security. The internal insulation of the enclosed flare is glass wool in the top of the flare it is covered by a protection to guarantee no rain leakage or animal intrusion. The enclosed flare system presents a protection system by a cut-off flame valve. Parameters of the flare system such as oxygen opening, diameter, and height were determined by manufacturer specifications to ensure controlled biogas combustion committed to eliminating all the

methane present in the current system. The distance of the enclosed flare from the biodigester system was determined by the Brazilian Gas specification, which is between 15-20 meters.

The project foresees an outlet for biogas exploitation. Biogas can be used for electricity production (e.g. barn lighting or barn-heating systems) and the remainder can be flared. After validation of the biogas equipment by Sadia's engineers using the UNFCCC standards, the farmers will be able to use the biogas. However, if biogas is utilised, no CERs will be claimed for potentially displacing fossil fuels or grid electricity.

The treated wastewater of the open-air lagoon is used for irrigation of surrounding crops. Mineralized sludge from the biodigester is removed and disposed in the open-air lagoon as needed. Biofertilizer irrigation will be used in surrounding fields as needed, outside of project boundaries, where methane and nitrous oxide emissions can be considered negligible since there are no anaerobic conditions in these applications.

A.4.2.2. Eligibility criteria for inclusion of a SSC-CPA in the PoA:

This CDM SSC project activity is applicable to manure management of 3S Program swine farms and presents the following characteristics.

- Swine farms with livestock populations managed under confined conditions;
- Swine farms where manure is not discharged into natural water resources (e.g. rivers or estuaries);
- The depth of the lagoons used for manure management in the baseline scenario is at least 1m;
- The annual average temperature on 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 mineralized sludge is handled aerobically, and the final application is made in the open-air lagoon in the proper conditions;
- Technical measures are used (e.g. flared, combusted) to ensure that all biogas produced by the digester is used or flared.

A.4.3. Description of how the anthropogenic emissions of GHG by sources are reduced by a SSC-CPA below those that would have occurred in the absence of the registered PoA (assessment and demonstration of additionality):

Currently the business as usual procedures for swine manure waste management systems are non-permeable open-air anaerobic lagoons, where all emitted GHG goes directly to the atmosphere. These practices of AWMS by treating swine waste in non-permeable open-air anaerobic lagoons are in accordance with local legislation of all the Brazilian states to which this PoA applies.

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.

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. Therefore the project activity is a voluntary action and is implemented by the coordinating entity.

A.4.4. Operational, management and monitoring plan for the programme of activities (PoA):

A.4.4.1. Operational and management plan:

Operation of the biodigester and flaring system with probable energetic use is performed by different actors of the 3S Program. The operation of the biodigester is carried out by the farmer; training of the operation system of the biodigester is given by Sadia technicians. Operation of the enclosed flare and flarin for fuel are done automatically by the Programmable Logical Controller (PLC) and Sadia's technicians are responsible for data collection in the farms. The maintenance of the equipments is accomplished by an outsourced company.

The farmer is co-responsible for operation of the biodigester system and monitoring its tears and leaks is also responsible for the maintenance of the equipment installed to fuel biogas. The coordinating entity, Instituto Sadia de Sustentabilidade, is responsible for liaising with the outsourced companies in charge of maintaining the biodigester and enclosed flare system of the project activity. The Instituto Sadia de Sustentabilidade developed a monitoring plan and procedures for identifying the farms and these are used by Sadia's technicians on all farms of the project. Sadia's technicians are in charge of monitoring the project activity, while the Instituto Sadia de Sustentabilidade engineers and technicians are in charge of managing the project activity.

Procedures for identifying each farm as well as each CPA are determined by Sadia's CLIFOR number. Each farm will be identified by a number designated as CLIFOR and by the name of the farmer. In addition to the name and the CLIFOR number, all of the farms will have a geographic location reference (latitude and longitude) stored in an ArcGIS system. Each CPA is identified with this information to ensure single counting in the PoA. It is noteworthy that all the equipment of the biodigester and enclosed flare system has different serial numbers for each farm. The serial numbers were determined by the manufacturer and are linked with Sadia's CLIFOR number, geographic location and the farmer's name.

A data system was developed by a software company to ensure that the information about each farm can not be altered, manipulated or double-counted. This system works with a device called PLC (Programmable Logical Controller) that is installed for each enclosed flare system or for a system to fuel the biogas. It is responsible for the data sources (pressure, temperature, flow, farmer, maintenance and other variables) of the project and where the information is processed. This program operates the system automatically and provides all needed data for each farm.

The architecture of the PLC system and data acquisition of the project activity by the SCA System is represented in Figure 2. below. It is divided into: biodigester system, PLC controller and flare system. The PLC is the device used to manage, collect and store the information.

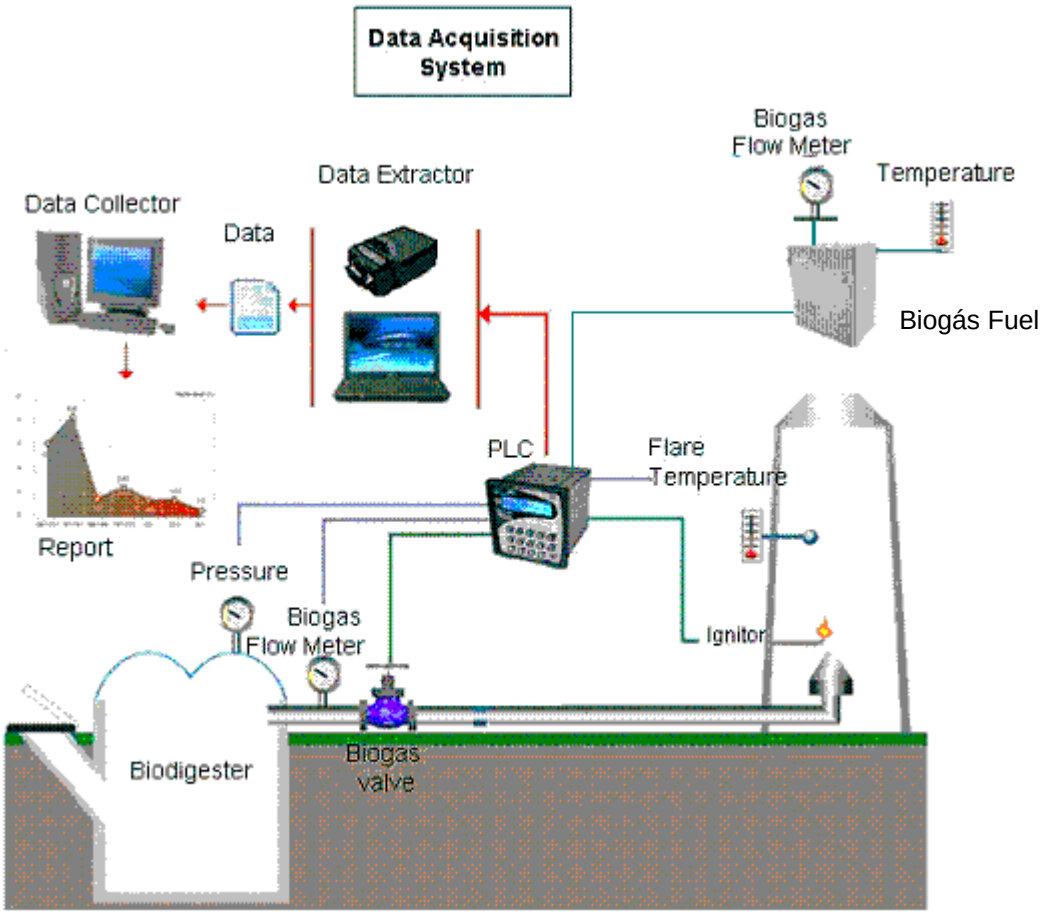


Figure 2 – Architecture of the data acquisition system (SCA) for the project activity in 3S Program farms.

Acquisition and control of the information are completed by a system called SCA System, responsible for control of the combustion system. Collection and supervision of the information are completed by the SCS System, responsible for the data information. The elements of the SCS system involved are the SCS-Collector and the SCS-Viewer. Each farm of the project activity presents a SCA Data Control and Data Acquisition System. Figure 3. represents each element involved in the collection and supervision process.

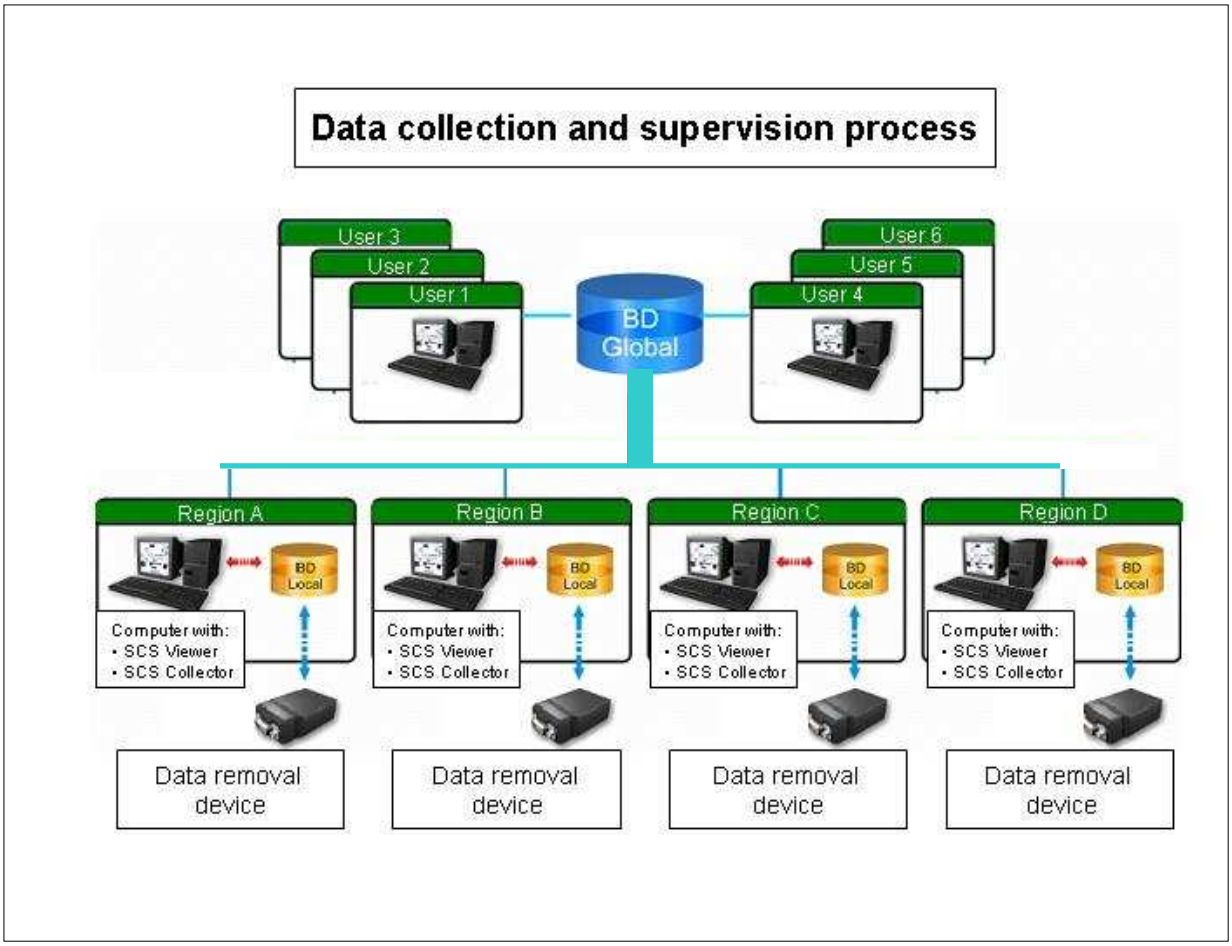


Figure 3 – Representation of PLC data collection and supervision process.

The data is stored in each SCA of each farm of the 3S Program. Data collection starts when the data removal device is connected to the local controller. The data is extracted from the controller, stored and read by the SCS-Collector.

The SCS-Collector is capable of extracting the data to be collected through the USB device and is initially stored in the local database. After the data is sent to the intranet, information from the local base can be stored in the global database. The global database can be viewed by the SCS-Viewer, which is controlled by an outsourced company. The SCS-Collector and SCS-Viewer are the tools used to manage the 3S Program database. Users only consult the data generated in the farm.

Functioning of the PLC program system is demonstrated in Figure 4. Each farm of the project activity has the SCA installed and also the SCS-Collector system available. Through the SCS-Collector, the data of each SCA present in the device is read and transferred to a local database system and thus to Sadia's intranet. The collected information is sent to the outsourced company responsible for managing the information of the 3S Program. The software program ensures absolute protection of the data collected in the farm by the automatic report that is generated by the software system, so there is no possibility of data manipulation. A backup system covering periods of at least 3 months was developed for the data generated in farmers' properties.

The figure below represents the stages of the data collection process and supervision processes.

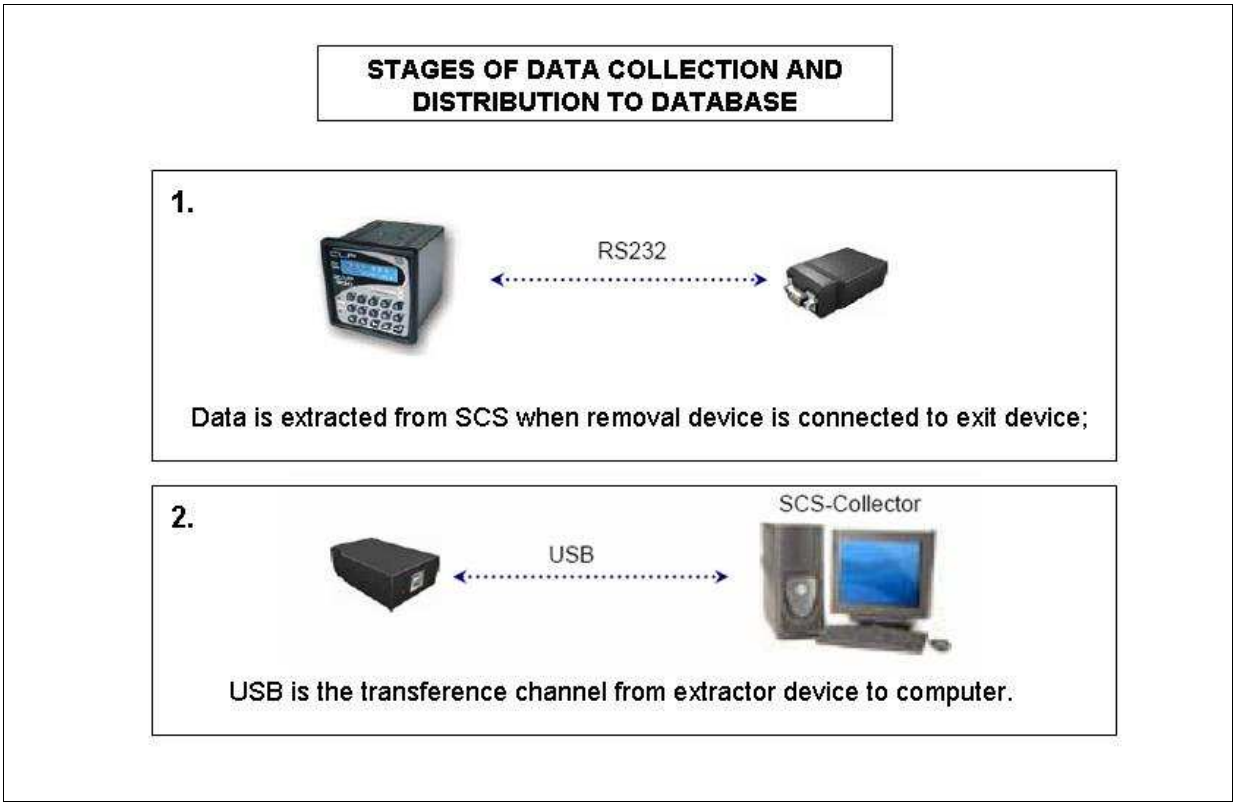


Figure 4 - Stages 1 and 2 of data collection and distribution process for Instituto Sadia de Sustentabilidade 3S Program's farms.

First, the data is extracted by a device from the SCA System (Control and Acquisition System), then it is extracted from the SCS-Collector through the USB mode. The data of the SCA is emitted to the local database and then to the global database when the connection is made.

Figure 5. represents the process evolution, with stages 3 and 4.

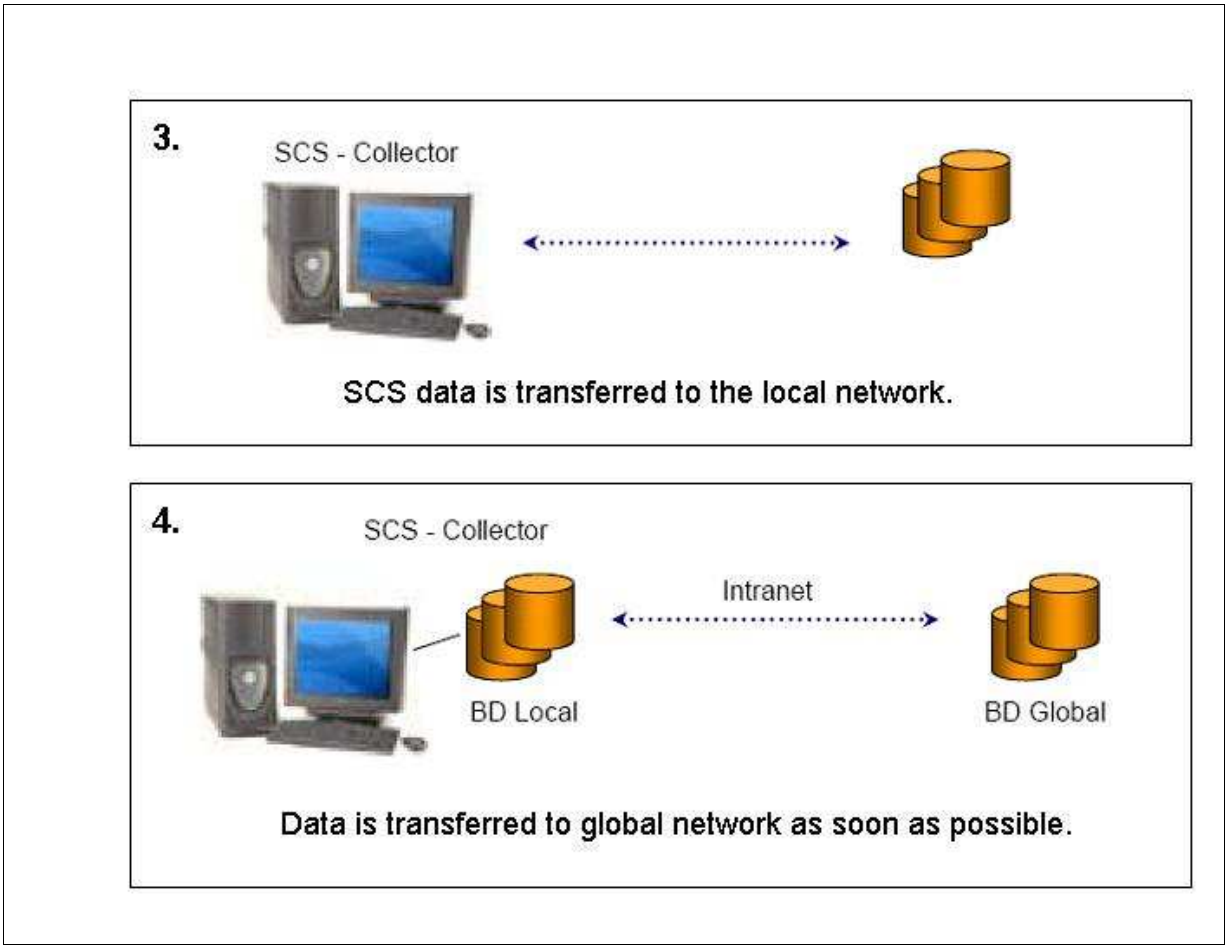


Figure 5 – Continuation of data collection and transference process for Instituto Sadia de Sustentabilidade 3S Program's farms.

SCS-Viewer allows access to the data extracted from the local and global databases. This tool generates reports, alarms and other data.

A.4.4.2. Monitoring plan:

Procedures to monitor the amount of methane to be used as fuel or to be combusted are described in section E.7.2. The simplified modalities and procedures for the SSC CDM project activity is used to monitor the data. The methodology used is AMS – IIID. Version-13. The amounts of methane used as fuel or combusted are monitored by continuous flow meters and gas analysers. The flow meters, sampling devices and gas analyzers shall be subjected to regular maintenance, testing and calibration to ensure accuracy according to manufacturer specifications.

The specific parameters to be measured by this PoA, extending to all CPAs, are described below. More details of the monitoring plan can be observed in section E.7.2. demonstrates essential parameters to ensure the project's trustworthiness. All data obtained in this project will be stored electronically.

The sampling random method to be applied in verification by the DOE's is estimated as 25% in each round for each verification. These samplings estimate that every 4 rounds or every 4 verifications the amount to be verified is 100% of the farms.

The estimated 25% to verify the properties was determined by the method of random sampling for discrete data according to the Bayesian's statistics for equal or more than 1100 CPA's with an error level of 5% and confidence level of 95% for Simple Random Sampling (for population under 10.000 elements).

$$n = \frac{N \times p \times (1-p)}{(N-1) \times D + p \times (1-p)}$$

where:

n: size of the sample
N: Size of the population (total number of CPA's): 1.100 properties or more
D: $E^2/4$, where E is a acceptable precision: 0.05. The confidence level is established in 95% determining a value of 4 ($(z_{\alpha/2})^2 = ((1.96)^2)$) in the denominator of the variable D.
p: Interest Proportion. The specification of the p value is possible to determine by the research in pilot samples. If there is no information about the p the value used is p = 0.5 so that the size of the sample will reach the maximum value.

In this case replacing the values N = 1100 CPA's E = 0.05 we find n = 294 CPA's.

In percentual terms there is 294/1.100 properties = 26.7% that is in consistence with the 25% defined to verify the CPA's.

This method was applied because of the trustworthiness of the management system developed by the Instituto Sadia de Sustentabilidade and by the Sadia Company. According to the procedures of operation, maintenance, monitoring and archive of data base we guarantee that the systems implemented in the properties function with the same logic supporting the amount of 25% for verification.

A.4.5. Public funding of the programme of activities (PoA):

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

SECTION B. Duration of the programme of activities (PoA)

B.1. Starting date of the programme of activities (PoA):

The voluntary program began at three of Sadia's own swine farms (Faxinal dos Guedes, Toledo Luz Marina and Toledo São Sebastião), functioning as prototypes to be extended to its outsourced producers.

This process led Sadia to establish the Instituto Sadia de Sustentabilidade, a non-profit organization, in December 2004. The first responsibility of the Institute was to be in charge of the voluntary sustainable program to outsourced farmers called 3S Program (Sadia Sustainable Swine Production Program). Thus, this project enables the 3S Program to fulfil its wider purpose of promoting sustainable development among swine producers.

The initial proposal for the 3S Program was to use the approved methodology AMS 0006, however in 2006 the methodology was put on hold and the project was rearranged. In 2007 the PoA methodology was approved by the UNFCCC Executive Board in the 32 meeting and the Instituto Sadia de Sustentabilidade decided to use the approved PoA methodology.

B.2. Length of the programme of activities (PoA):

The length of the PoA is 28 years. The starting date begins in the date of the registration of the PoA.

SECTION C. Environmental Analysis

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

1. Environmental Analysis is done at PoA level
2. **Environmental Analysis is done at SSC-CPA level** **X**

An environmental analysis is not required by the government's environmental agency for this type of project activity for GHG emissions.

There are no negative impacts resulting from this proposed project activity. The project brings only benefits to the farmers, such as:

- reduction in GHG emissions;
- reduction in foul odours ensuing from methane emissions to the atmosphere;
- reduction of insects and other vector diseases;
- increase of local biosafety;
- reduction of disease dissemination.

The combination of these factors improves the environmental and health quality of the farmers and their neighbours, resulting in a more sustainable environment.

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

The project activity is carried out in small and medium swine producing facilities. The environmental impacts of swine production activity are considered potential and limited to a small area of the farms. The farms of the Host Country are at least 50Km from the limits of the other country limits involved in

this PoA. The direct environmental impact is considered negligible outside Brazilian territory. The environmental benefits are limited to the local farms in the Host Country.

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

Brazilian environmental legislation does not require an Environmental Impact Assessment for this type of facility and activity. The environmental agency in charge of environment requires farmers to do the following:

- Carry out swine waste management projects to store wastewater for at least 120 days;
- Have a person registered in the National Engineers' Council in charge of waste management project;
- Prove that the farm executes proper wastewater management;
- Apply biofertilizer in the minimal agricultural area as set forth in Brazilian environmental legislation;
- Maintain minimal distance from water bodies to swine production facilities and to wastewater storage system, to limit environmental risks of accidental contamination;
- Preserve riparian forests by maintaining a permanent preservation area (legal reserve) of the forest in farms, proportional to the property's total area.

Studies for these conditions are required for the approval of any AWMS in the country. After this authorization, an operation license is issued. In the operation license, the elements are: maximum number of animals to be allotted in farms, permission to use of biodigester technology and the enclosed flare technology and validity of the license.

The 3S Program meets these legal demands and goes beyond them. There is continuous monitoring by Sadia on the legal situation of all farms in such a way that Sadia only allows the implementation of the 3S Program technology if the environmental legal conditions are met.

The amounts of animals to be allotted are indicated in the operation license. Periodic inspection is performed in all farms to verify compliance with the environmental license elements.

SECTION D. Stakeholders' comments

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

1. **Local stakeholder consultation is done at PoA level** **X**
2. Local stakeholder consultation is done at SSC-CPA level

Invitation to stakeholders followed the procedures of "Resolution nr. 1 of September 11th, 2003 (approved by Administrative Rule nr. 863 of November, 27th, 2003.and published in the Federative Republic of Brazil's *Diário Oficial* (Official Gazette) of December, 2nd, 2003.)". Invitations and attendance lists are available upon request.

Public consultations were held in the five regions of the Host Country before the project's implementation. The main agenda of these consultations has been to explain the 3S Program, its process,

implications and benefits for sustainable development of the swine production chain. In the invitation letters, stakeholders were informed that the consultations would provide an opportunity to clarify any doubts related to the project. Public consultations involved several entities:

- city halls and municipal aldermen assemblies;
- environmental government agency (state and municipal);
- Public Prosecutor's Office (*Ministério Público*)
- NGOs;
- swine producers' unions and community associations;
- research institutes and universities;
- civil society and local communities;
- farmers.

A presentation of the 3S Program was also held in October 2007 at the Agriculture Research Government Company EMBRAPA – Santa Catarina State.

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

The stakeholders were invited by registered invitation letter, and announcements were made in local newspapers so that all stakeholders could take part, including civil society at large.

In the state of Paraná (PR), the public consultation was held on September 27th of 2005, with invitations sent to all stakeholders involved. There were 118 participants including the Environmental Secretary of the city of Toledo (Mr. Gilmar Jeferson Paludo), the Deputy Mayor of the city of Enéas Marques (Mr. Sérgio Miguel Tumma) and the Agricultural Secretary of Entre Rios do Oeste (Mr. Claudio Marcelo Lerner).

In the state of Rio Grande do Sul (RS), the public consultation was held on November 22nd of 2005, with invitations sent to all stakeholders involved. There were 130 participants including the mayor of the city of Três Passos (Mr. Carlos Alberto Canova), the Deputy Mayor of the city of Três Passos (Ms. Rejane Luiza Rick) and the Agricultural and Environmental Secretary of the city of Tenente Portela (Mr. Claudenir Sherer).

In the state of Minas Gerais (MG), the public consultation was held on November 22nd of 2005, with invitations sent to all the stakeholders involved. There were 166 participants including the Agricultural State Institute (Mr. Anderson Carsoso Costa), the Public Prosecutor's Office – *Ministério Público* (Ms. Daniela Gouveia Martins) and the Brazilian Bar Association – *Ordem dos Advogados do Brasil/OAB* (Mr. Elizeu de Oliveira and Mr. Luiz Artur Corrêa).

In the state of Santa Catarina (SC), the public consultation was held on November 23rd of 2005, with invitations sent to all stakeholders involved. There were 49 participants including the Mayor of the city of Irani (Mr. Fabio Antônio Fávero), the President of the State of Santa Catarina Swine Producers (Mr. Wolmir de Souza) and the Regional Development Secretary of the State of Santa Catarina (Mr. Luiz Carlos Bergamo).

In the state of Mato Grosso (MT), the public consultation was realized on May 23rd of 2006, with invitations sent to all stakeholders involved. There were 160 participants including the Secretary of Economic Development of the city of Lucas do Rio Verde (Mr. Edu Laudi Pascoski), the Public

Defender of the city of Varzea Grande (Mr. Flávio Marcos Asvolinsque Peixoto) and the Industry, Trade, Energy and Mines Secretary of the state of Mato Grosso (Mr. Alexandre Furlan).

Comments were compiled from the evaluation questionnaire distributed during presentations.

D.3. Summary of the comments received:

The comments received during presentations referred to clarification of the project itself and its operational structure, and there were no comments regarding objections to the proposed project activity.

Evaluations from stakeholders and entities involved which took part in the public consultations held in the different States of Brazil were all positive opinions.

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

All clarifications requested by local attending stakeholders were addressed during the debate after the presentations.

SECTION E. Application of a baseline and monitoring methodology

E.1. Title and reference of the approved SSC baseline and monitoring methodology applied to a SSC-CPA included in the PoA:

The project activity of the PoA uses the approved small scale AMS III.D. – Version 13 methodology and sectoral scope number 15. The III.D methodology is for methane recovery in agricultural and agro industrial activities. A methodological tool to determine project emission from flaring gases containing methane was used.

E.2. Justification of the choice of the methodology and why it is applicable to a SSC-CPA:

The simplified methodology is the most appropriate for the Instituto Sadia de Sustentabilidade SSC-CPA's because the project activity sites are considered agro industrial and calculation of the GHG emissions can be estimated using directions of the IPCC.

The baseline methodology AMS III.D – Version 13 used in this project activity is applicable because without this technology the methane gas produced by the AWMS would go 100% into the atmosphere.

The proposed project activity is to capture the methane gas with the biodigester equipment and combust the methane gas formed by the enclosed flare system. This activity changes the actual AWMS that is the business as usual for the farmers. The technology generates better conditions for all farmers of the Instituto Sadia de Sustentabilidade 3S Program. Based on tentative calculations, the emission reduction does not exceed 60 kt CO2eq. /year as the methodology requires for each CPA.

E.3. Description of the sources and gases included in the SSC-CPA boundary

The boundary limits for all farms of the 3S Program, which are arranged in different CPAs and included in this PoA, have the same characteristics. The proposed limit for this project considers the total GHG

emissions produced in the AWMS and includes even the GHG emission that is captured and combusted by using the biodigester and flare systems technology. This limit is described below in Figure 6

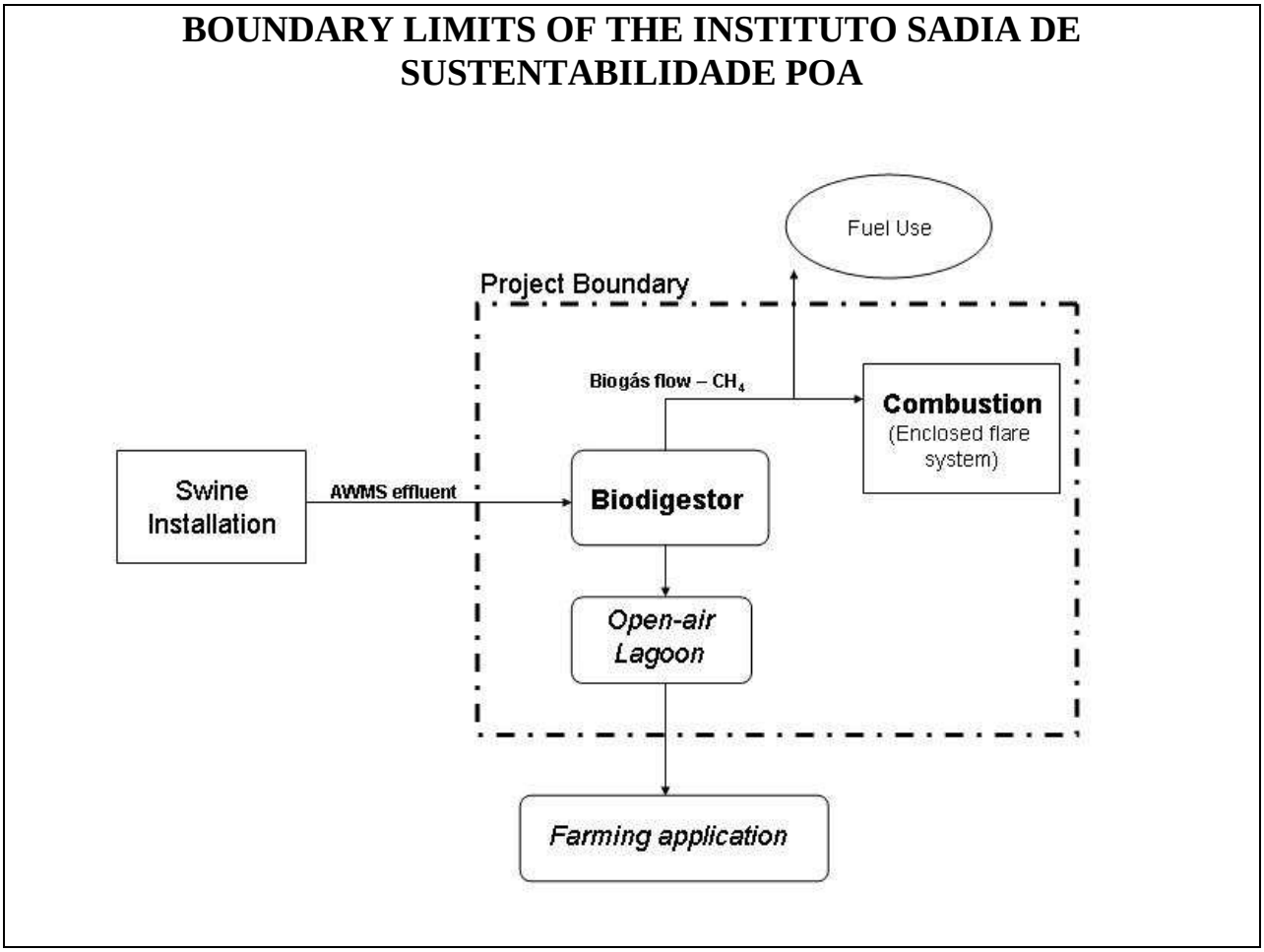
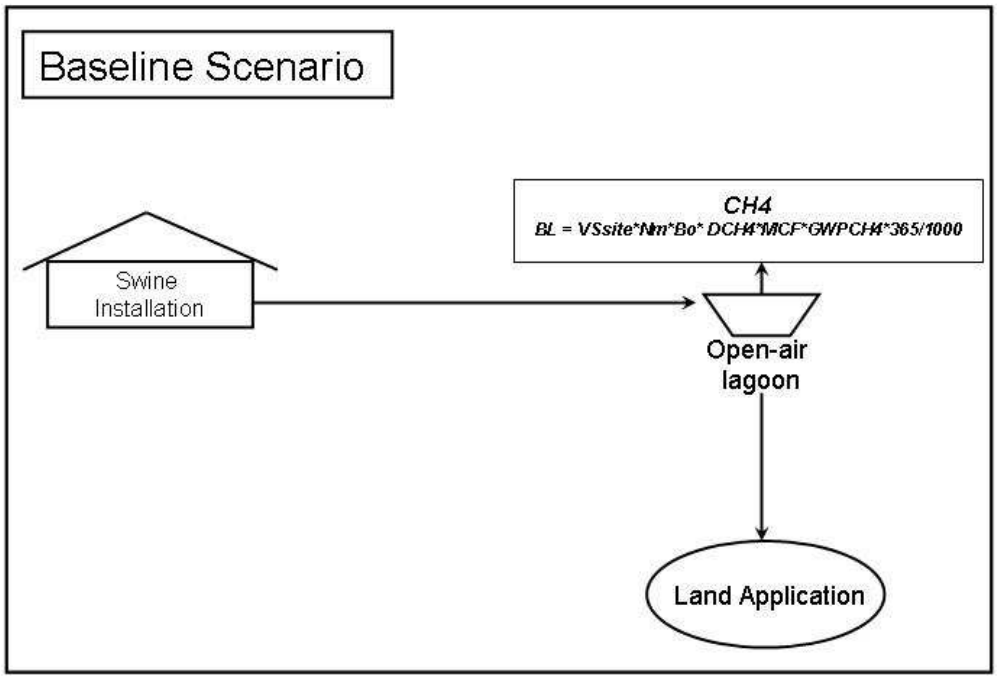


Figure 6 - Layout of the boundary limits for the Instituto Sadia de Sustentabilidade PoA.

E.4. Description of how the baseline scenario is identified and description of the identified baseline scenario:

The baseline scenario illustrated in Figure 7. for this project activity is defined as the volume of methane gas that would be emitted in the atmosphere during the crediting period in the absence of the project activity. In this case an open-air lagoon is considered the baseline scenario. The estimated equations for the baseline scenario are determined below.



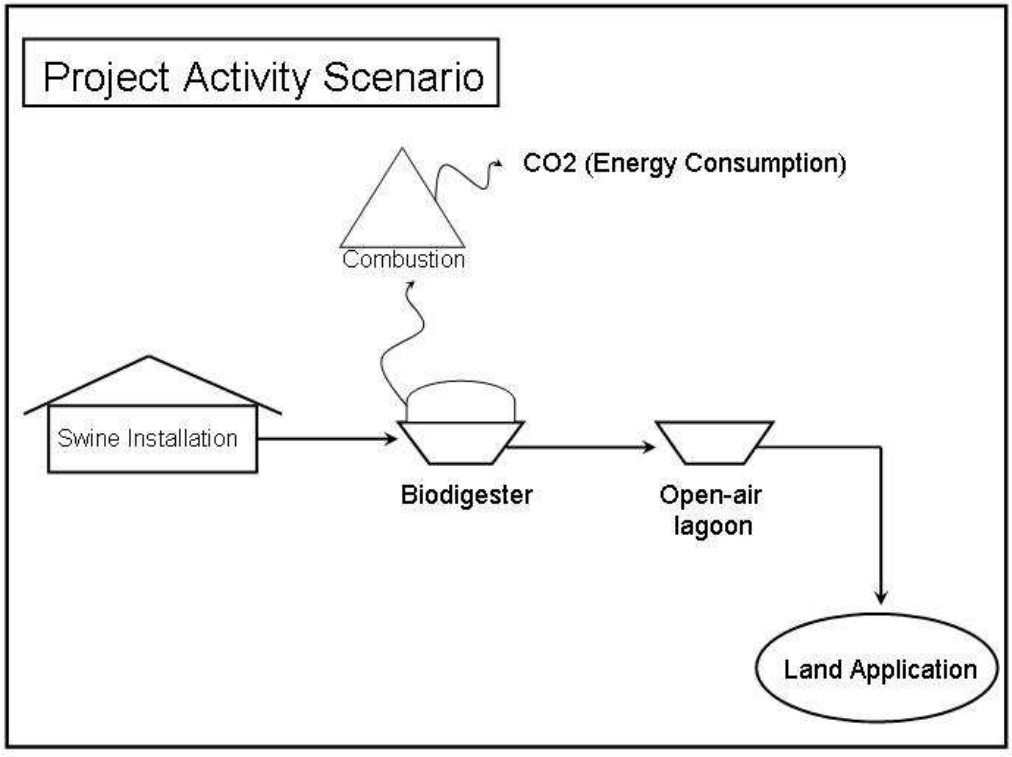


Figure 7 - Illustration of the baseline scenario and the project activity scenario.

The baseline scenario treatment system is characterized by low investment costs, low levels of management participation, poor environmental safeguards and high rates of GHG emission, especially methane. In the proposed project activity, the scenario identified for the farms is demonstrated in the illustration above in Figure 7.

Calculation of Emission Reductions
The table below summarizes emissions for the baseline and project scenarios:

Table 2 – Emissions 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

Maximum animal population in each farm/CPA is determined by the Environmental License issued by the local government environmental agency. The animal population is described in the CPA form. The PoA form describes the procedures to calculate emissions.

2. Baseline Emission

In order to demonstrate emissions for each treatment stage in the project and baseline scenarios, default values were used to represent the volatile solids content in raw and treated manure. The default values were taken from chapter 10, volume 4 of the IPCC 2006 Guidelines.

The justification for using IPCC default values corresponding to Western Europe for Bo and VS is:

- The genetic composition of swine in Europe is similar to that of swine produced in Brazil.
- Sadia's farms use formulated feed rations (FFR) which are optimized for the various stages of animal growth, category, weight gain, productivity and genetics;
- The use of FFR can be checked (through Sadia's on-site records in each farm);
- The project's specified animal weight is more similar to developed country IPCC default values then to Latin American default values.

The emissions from the open-air lagoon 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:
18º RS -State (MCF 77%)
18º SC-State (MCF 77%)
19º PR-State (MCF 77%)
20º SP-State (MCF 78%)
21 º MG-State (MCF 78%)
22º Go-State (MCF 78%)
26º 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.

E.5. Description of how the anthropogenic emissions of GHG by sources are reduced below those that would have occurred in the absence of the SSC-CPA being included as registered PoA (assessment and demonstration of additionality of SSC-CPA): >>

E.5.1. Assessment and demonstration of additionality for a typical SSC-CPA:

Barrier Analysis

The main objective of this analysis is to demonstrate that the proposed project activity is not business as usual for typical AWMS. The analysis demonstrates the additionality determined by the AMS – III.D.

Version-13 methodology. Different analyses were completed: Investment Analysis, Technological Analysis and Legal Analysis.

a. Investment Barrier

An economic comparison was made between the baseline scenario and the proposed project activity scenario. The high investment cost for the proposed project activity, compared to the open-air lagoon technology, discourages Sadia's farmers to adopt the project activity technology. With this comparison we can prove that, from an economic standpoint, the proposed project activity is additional. This investment comparison is demonstrated in the CPA for each farm.

- Current Practices: The open-air lagoon treatment method is considered standard practice in Brazil. The business as usual scenario is financially attractive and requires no management to achieve the parameters set forth in legislation. All land is appropriate to have open-air non-permeable ponds.

b. Technological Barrier

The biodigester system and the enclosed flare system were installed to manage animal waste with a retention time of 40 days in the biodigester and at least 80 days in the open-air lagoon. This time of 40 days in the biodigester permits extraction of the methane by fermentation, enabling combustion of the biogas in the enclosed flare system. The conditions of installation, operation, maintenance and monitoring plan for this technology are considered more detailed than the business as usual practice and require more precision. The monitoring plan is described in section E.7. of this PoA.

The technologies of the biodigester, of the enclosed flare system and of the programmable logical controller were developed by different outsourced companies. The combination of these technologies, however, was performed by Sadia's engineers, to meet the methodology proposed by the United Nations Framework Convention of the Climate Change – UNFCCC and to contribute to technological innovation and dissemination, which are in high demand in the country. In addition, the new technology developed is contributing to the environment's sustainability.

The risk involved with this technology is greater than in business as usual, because of the long-term effects (high maintenance costs, for instance) to the equipment and because of the long-term period of operation. The high cost of the developed technology hinders farmers in purchasing equipment. These high costs come from the diversity of equipment installed in order to create the entire system and some of the devices are imported, incurring even more costs.

The combination of the biodigester, PLC and enclosed flare system technologies makes the difference in the project activity, leading to the technology additionality point of view.

c. Legal Barrier

National, state or municipal legislation in Brazil regarding AWMS requires water treatment by open-air in non-permeable lagoons with a retention time of 120 days. The project activity goes beyond these legal provisions. The proposed project activity treats the wastewater for this management system by introducing the wastewater to the biodigester with a retention time of 40 days. The biogas is formed and captured in the biodigester. The residual water is directed to an open-air non-permeable lagoon where it

is retained for 80 more days. The next step for this residual water is to be applied in surrounding fields as a biofertilizer. Current legislation does not contemplate GHG emissions and the project activity does not issue GHG to the atmosphere. Therefore the project is additional from the legal point of view.

E.5.2. Key criteria and data for assessing additionality of a SSC-CPA:

The project estimates that the farms included in this PoA have the same technology, are under the same legislation criteria and completed the same type of investment. Some items are defined below on how to ensure the criteria for the CPAs:

- We guarantee that the same technology will be implemented in all farms. To take part in the Instituto Sadia de Sustentabilidade 3S Program, farmers need to sign a contract. In this contract the technology is already determined.
- The baseline scenario is the same for all farms, so the investment in equipment will differ only according to the size of each farm.
- 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. All CPA's will be verified in the section C.2 by the demonstrated table. To operate the system an environmental licence is submitted by the state where the 3S Program acts determining whether the activity can be accomplished and is in conformance with the Brazilian Environmental Legislation. The table demonstrates the number of the environmental licence, permitting to evidence the criteria to access additionality in the terms of legislation.
- By developing an economic comparison between the baseline scenario and the proposed project activity, including or not the electric generation or the heat generation, it can be demonstrated that by implementing the project activity by an economic point of view it is not feasible to implement the system without the generation of the CER's. The economic comparison is demonstrated in all CPA's in the section B.3 in the table Economic Comparison demonstrating the investment barrier.
- 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[1]. 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.

E.6. Estimation of Emission reductions of a CPA:

E.6.1. Explanation of methodological choices, provided in the approved baseline and monitoring methodology applied, selected for a typical SSC-CPA:

Baseline emissions are calculated by the equations determined by the SSC-AMS III.D. – Version 13 methodology with the use of IPCC Guidelines for National Greenhouse Gas Inventories (most recent version: 2006).

Estimates for the project's emissions for CPAs are described in item E.6.2., in accordance with the SSC AMS III.D. – Version 13 methodology. The equations used for calculating emissions by the flare system

[1] IRGANG, R.; FAVERO, J.A. *Melhoramento Genético de Suínos no CNPSA.* Revista EMBRAPA. p.105-112.

and the fuel system are determined by the Methodological Tool – Annex 16 "Tool to determine project emissions from flaring gases containing methane".

E.6.2. Equations, including fixed parametric values, to be used for calculation of emission reductions of a SSC-CPA:

1. Project Activity Emissions

Total calculated project emissions are determined by the project's emissions in a year y. The project's emissions related to the PoA is the electricity for the operation of the facility. 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 2007 calculation determined in tCO2e./MWh.

2. 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 power consumption is presumed insignificant in CO2 equivalent emissions and therefore not considered in leakage calculations (IPCC, 2006).

3. Emission Reduction of Project Activity

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

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

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

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

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

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

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

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

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

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

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

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 (Kg/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}: Volumetric fraction of methane.

D_{CH4}: CH4 density at normal conditions temperature, 20o C and 1 atm pressure (Kg/m^3).

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.

E.6.3. Data and parameters that are to be reported in CDM-SSC-CPA-DD form:

Data / Parameter:	**Nm**
Data unit:	Number of heads
Description:	Average livestock population.
Source of data used:	Sadia
Value applied:	
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:	
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 is different for breeding swine and market swine.

Data / Parameter:	**MCF**
Data unit:	Fraction
Description:	Methane conversion factor
Source of data used:	IPCC 2006 Guidelines.
Value applied:	18°/RS - State MCF 77% / 18º SC-State MCF 77% / 19º PR-State MCF 77%/ 20º SP-State MCF 78%/ 21 º MG-State MCF 78%/ 22º Go-State MCF 78%/ 26º 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's National Meteorological Institute (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:	**w CH4**
Data unit:	% CH4
Description:	Fraction of methane of the biogas.
Source of data used:	Instituto Sadia de Sustentabilidade
Value applied:	
Justification of the choice of data or description of measurement methods and procedures actually applied :	The sampling will be accomplished in 100% of the CPA's with periodical measurements at a 95% confidence level. After this period a statistical analyses will be completed to determine the frequency of analyses for the next accreditation period. The equipment used to determine these analyses is a methane analyser. Archive electronically during 2 years.
Any comment:	The concentration of methane present in the biogas is measured in site in a 95% confidence level.

Data / Parameter:	**BG_{fuel}**
Data unit:	M^3
Description:	Biogas flow
Source of data used:	Instituto Sadia de Sustentabilidade
Value applied:	$30m^3/h$
Justification of the choice of data or description of measurement methods and procedures actually applied :	Archive electronically during 2 years.
Any comment:	It is measured continuously and reported cumulatively.

Data / Parameter:	**η_m**
Data unit:	%
Description:	Flare efficiency
Source of data used:	Field data.
Value applied:	0% or 50% or 90%
Justification of the choice of data or description of measurement methods and procedures actually applied :	Archive electronically during 2 years. The parameter is used to determine the project emission from the enclosed flare system and is monitored as per specifications of the "Tool to determine project emissions from flaring gases containing methane.
Any comment:	

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 20°C and 1 atm 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:	Quantity of allotment of swine activity in a determined year.
Value applied:	
Justification of the choice of data or description of measurement methods and procedures actually applied :	Archive electronically during 2 years.
Any comment:	

E.7. Application of the monitoring methodology and description of the monitoring plan:

E.7.1. Data and parameters to be monitored by each SSC-CPA:	
Data / Parameter:	**BG_{fuel}**
Data unit:	m3/h
Description:	Volumetric flow rate in a hour h.
Source of data to be used:	Sadia, through a flow meter.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	It operates by monitoring the cooling effect of a fluid stream as it passes over a heated transducer (RTD). The fluid flow over two RTD elements, one of which senses the actual fluid temperature and provides a reference, whilst the other is heated to ensure a constant differential temperature above the fluid temperature. The applied power needed to maintain this differential is proportional to the mass flow of the fluid.
Description of measurement methods and procedures to be applied:	Measured continuously by the flow meter, the values are directed to the PLC where it remains in the database.
QA/QC procedures to be applied:	Flow meters will be periodically calibrated according to manufacturer specifications.
Any comment:	Archive electronically during 2 years.

Data / Parameter:	**BG_{flare}**
Data unit:	m3/h
Description:	Volumetric flow rate in a hour h.
Source of data to be used:	Sadia, through a flow meter.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	It operates by monitoring the cooling effect of a fluid stream as it passes over a heated transducer (RTD). The fluid flow over two RTD elements, one of which senses the actual fluid temperature and provides a reference, whilst the other is heated to ensure a constant differential temperature above the fluid temperature. The applied power needed to maintain this differential is proportional to the mass flow of the fluid.
Description of measurement methods and procedures to be applied:	Measured continuously by the flow meter, the values are directed to the PLC where it remains in the database.
QA/QC procedures to be applied:	Flow meters will be periodically calibrated according to manufacturer specifications.
Any comment:	Archive electronically during 2 years.

Data / Parameter:	**w CH4**
Data unit:	%
Description:	Methane content rate in the biogas.
Source of data to be used:	Sadia, through a methane analyzer
Value of data applied for the purpose of calculating expected emission reductions in section B.5	
Description of measurement methods and procedures to be applied:	The sampling will be accomplished in 100% of the CPA's with periodical measurements at a 95% confidence level. After this period a statistical analyses will be completed to determine the frequency of analyses for the next accreditation period. The equipment used to determine these analyses is a methane electronic potable analyser.
QA/QC procedures to be applied:	Analyzers will be calibrated according to manufacturer specifications.
Any comment:	The methane content will be measured by the analyzer. Archive electronically during 2 years.

Data / Parameter:	**Tflare**
Data unit:	°C
Description:	Temperature of the flare.
Source of data to be used:	Instituto Sadia de Sustentabilidade
Value of data applied for the purpose of calculating expected emission reductions in section B.5	≥ 500ºC
Description of measurement methods and procedures to be applied:	The temperature meter measures the temperature of the exhaust gas in the flare. To ensure 90% of combustion of the biogas in the enclosed flare system, the temperature needs to be between 500°C and 700°C. The control of the temperature is determined by the temperature meter and the values are directed to the database of the PLC.
QA/QC procedures to be applied:	Temperature meters will be calibrated as manufacturer specifications, or replaced when necessary.
Any comment:	Archive electronically during 2 years.

Data / Parameter:	Tfuel
Data unit:	°C
Description:	Temperature of the combustion for alternative use.
Source of data to be used:	Instituto Sadia de Sustentabilidade
Value of data applied for the purpose of calculating expected emission reductions in section B.5	≥ 500ºC
Description of measurement methods and procedures to be applied:	The temperature meter measures the temperature of the exhaust gas for alternative use.
QA/QC procedures to be applied:	Temperature meters will be calibrated as manufacturer specifications, or replaced when necessary.
Any comment:	Archive electronically during 2 years.

Data / Parameter:	η_{flare}
Data unit:	%
Description:	Flare efficiency
Source of data to be used:	Sadia, AMS III.D. Version13 methodology and Tool for flaring gases containing methane.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	90% because the T of the flare is >500°C.
Description of measurement methods and procedures to be applied:	The tool determines the efficiency of the flare.
QA/QC procedures to be applied:	Manufacturer specifications.
Any comment:	Archive electronically during 2 years.

Data / Parameter:	Biogas density
Data unit:	Kg/m³
Description:	Historical monthly average temperature was determined to calculate the biogas density.
Source of data to be used:	INMET (Brazilian Meteorological Institute) and AMS III.D. methodology.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	
Description of measurement methods and procedures to be applied:	Density of the biogas at environment temperature. The temperature is collected by the monthly average in the historical year. The historical temperature is taken by INMET (Brazilian Meteorological Institute).
QA/QC procedures to be applied:	The value is applied in the equations to calculate the emission reductions.
Any comment:	Archive electronically during 2 years.

Data / Parameter:	Electricity
Data unit:	KWh
Description:	Electricity consumed by the monitoring system.
Source of data to be used:	The Brasilian DNA.
Value applied	Determined in CPA's (KWh)
Description of measurement methods and procedures to be applied:	The nominal power sourced to the monitoring system times the equipment operating time in a daily basis.
QA/QC procedures to be applied:	NA
Any comment:	Archive electronically during 2 years.

Data / Parameter:	Waste of biodigester
Data unit:	Kg
Description:	Waste that stays in the biodigester system.
Source of data to be used:	AMS III.D. Version 13 methodology.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	
Description of measurement methods and procedures to be applied:	Manufacturer specifications. Archived electronically for 2 years.
QA/QC procedures to be applied:	Manufacturer specifications.
Any comment:	Archive electronically during 2 years.

E.7.2. Description of the monitoring plan for a SSC-CPA:

The emission reduction compared with the yearly methane generation potential will be limited by the minimum value of the comparison.

The purpose of the monitoring plan is to describe the criteria for maintaining the equipment and to report on the failure of any equipment in the system, in addition to maintaining the project's sustainability. Also, criteria are defined for data collection for determining GHG emissions reductions. This monitoring plan is applicable to the project activity related to mitigating GHG emissions.

Monitoring of the system (waste discharge, biodigester, alternative use and enclosed flare) is performed by Sadia's technicians who visit the farm regularly. When it is necessary to repair or replace any equipment, pipeline, leakage, tear or anything incorrect in the combined system, the technician in charge of monitoring the farm will supply the PLC with data. This information will be registered in the database. The database will be used to identify what kind of improvement is needed and in which farms. This data will be managed by the outsourced company.

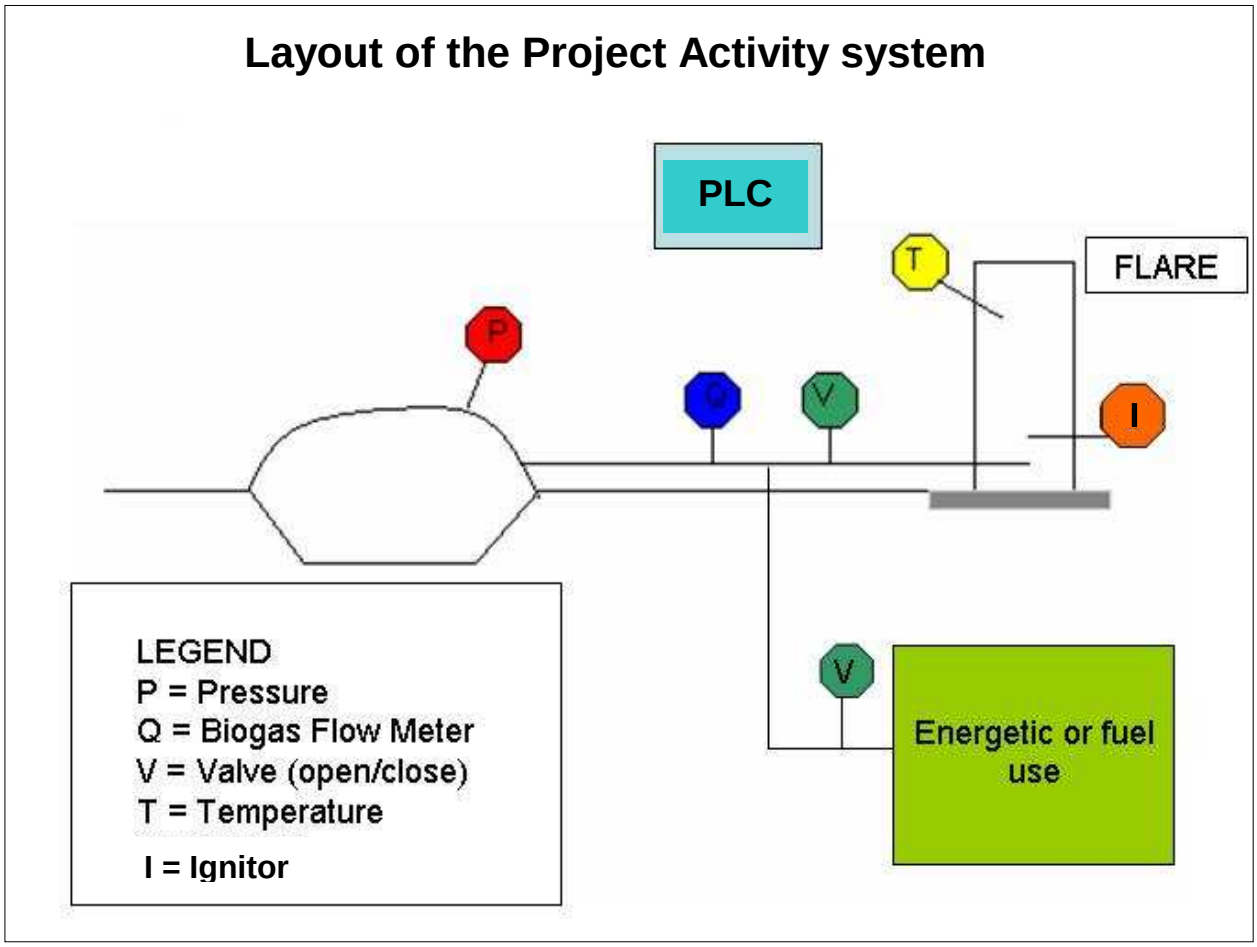


Figure 8 – Layout of the project activity system.

Maintenance, operation and monitoring of the project activity

AWMS is composed by three main monitoring systems:

- Waste Discharge;
- Biodigester System; and
- Combustion system.

Waste discharge

Training on the waste discharge system is provided by the Instituto Sadia de Sustentabilidade team according to manufacturer specifications for best efficiency on operating the biodigester system and is in accordance with local legislation of the States of Brazil. The training is comprised of a description of the waste disposal system, normal operation of the system and maintenance.

Waste discharge is done on alternate days and there should not be an interval longer than one day without any discharge. This effluent is directed to the biodigester, where it will ferment. After the retention time in the biodigester, it is directed to the storage open-air lagoon. Inspections are performed monthly on the system by the technician. Inspections are carried out on the gutter pipe, pipelines and on the entrances and exits of the biodigester to search for any leaks or tears. If any are found, they will be promptly repaired by the maintenance team, usually within hours.

Biodigester System

Training on the biodigester is performed by the Sadia team according to manufacturer specifications for operating the system. The training includes normal operation of the system and maintenance. Inspections are performed by Sadia's technicians, who evaluate the cover material, tears, loose points, pipelines, entrances and exits, perimeter, pressure, leakage, temperature, and emergency box. All data is archived in the PLC upon being measured or collected. The information stored in the PLC is inviolable, ensuring 100% data trustworthiness.

The waste inside the biodigester system is removed as determined by the manufacturer specifications. The disposal of the waste is done aerobically in the agriculture not emitting methane to the atmosphere.

Combustion System

Training on combustion system is provided by the Instituto Sadia de Sustentabilidade team to 100% of Sadia's technicians. The training includes system components, normal operation, emergency operation, maintenance and warranty validity of the equipments.

The emergency routine for the enclosed flare system is:

- Emergency procedures are automated;
- When pressure reaches a determined value, the ignitor is lighted, followed seconds later by the biogas valve starting to open. The ignitor equipment keeps working for two minutes.
- If the system detects any failure, all system components close down. If pressure in the biodigester is still within the limits for combustion, the PLC orders a system restart. If failure is detected again, the system will stop and restart; this sequence is repeated five times. If pressure remains too high after the fifth attempt to combust the biogas, the valve will open. The biogas goes to the atmosphere with no combustion, and no measurement data will be recorded. The information informed by the PLC and read in the Instituto Sadia de Sustentabilidade office is system failure.

Maintenance is performed by an outsourced company when needed, as per manufacturer specifications. The data for maintenance is recorded in the PLC by the Instituto Sadia de Sustentabilidade technicians.

High pressure emergency procedures are independent from the electronic control system, providing no risk of the biodigester rupturing.

E.8 Date of completion of the application of the baseline study and monitoring methodology and the name of the responsible person(s)/entity(ies)

May 10th of 2008.
Alexandre Mater
3S Program Operational Coordinator
Environmental Management of Sadia

Annex 1

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Annex 2

Public funding was used in this PoA and related CPA's. The entity involved with the funds 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.