



## **Growing Inclusive Markets**

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CASE STUDY

Latin America & the Caribbean • Brazil

### **Sadia Program for Sustainable Swine Production (3S Program): Bringing Sustainability to the Supply Chain**

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Sector • Food

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## Summary

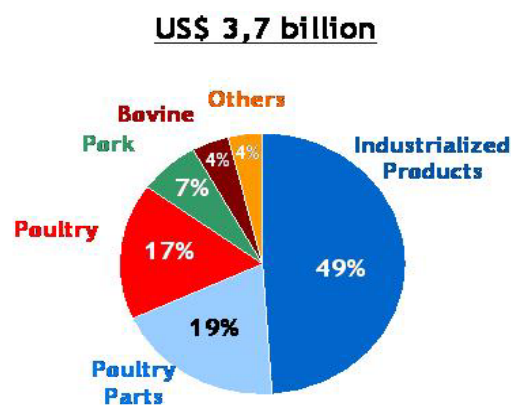
Sadia's Program for Sustainable Swine Production (3S program) was designed to assist more than 3,500 swine producers in reducing greenhouse gas emissions from their farm operations. Developed and managed by the Sadia Sustainability Institute, the 3S Program seeks to institute sustainability into the company's supply chain. The emission reductions qualify for the Kyoto Protocol's Clean Development Mechanism (CDM) programme, under which Sadia Institute sells the carbon credits. The emission reduction technology provides supplementary revenue and improved working conditions for Sadia's swine producers (the farmers), while reducing the environmental impact associated with swine production.



## Company Overview

Established in Brazil in 1944, Sadia is one of the world's leading producers of chilled and frozen foods. In Brazil, the company leads all market segments of its 680 products, including meat, pasta, margarine and desserts (see Table 1 for details). It is also the country's main exporter of meat-based products. The company has more than 40,000 employees and 12 industrial plants in Brazil that together produce over 1.3 million tons of protein-based products derived from chicken, turkey, pork and beef. Its 2006 revenue totaled US\$3.7 billion. Figure 1 illustrates revenue broken down by product category.

Figure 1: Invoiced Revenue (2006) by Product Category

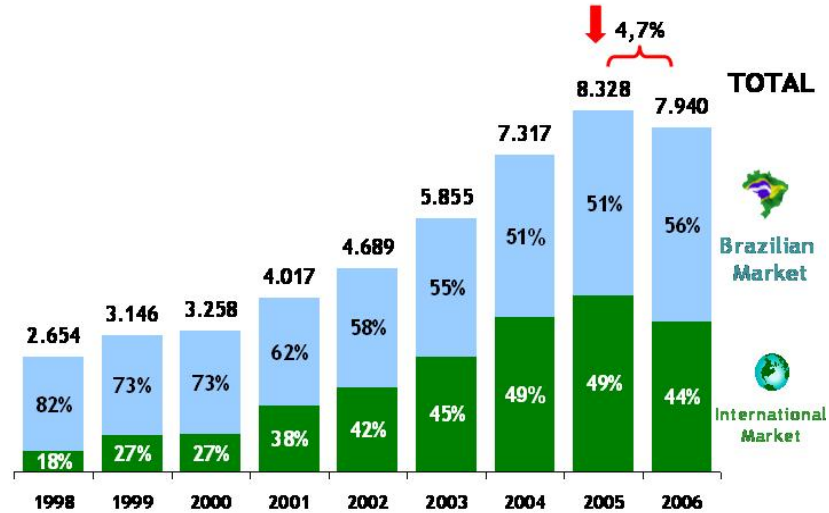


Source: Sadia



Figure 2: Sadia Operational Gross Revenue (1998 – 2006), in Millions R\$

### Operational Gross Revenue



Source: Sadia

Table 1: Product Segment Ranking in Brazilian Market

	Ranking	Market Share	Source	Period
Frozen goods	1 <sup>a</sup>	43,2%	NIELSEN	ON06
Chilled goods	1 <sup>a</sup>	30,2%	NIELSEN	ND06
Margarine	1 <sup>a</sup>	38,1%	NIELSEN	ON06
Chicken	1 <sup>a</sup>	14,2%	ABEF	2005
Turkey	1 <sup>a</sup>	65,6%	UBA	2005
Pork	1 <sup>a</sup>	12,2%	ABIPECS	2005

ON06- october/november 2006      ND06- november/december 2006

Source: Sadia

Sadia - meaning “healthy” in Portuguese - was considered the most valuable brand in Brazil’s food sector for the fourth consecutive time in a research study lead by the British consultant firm Interbrand in 2005. Its products can be found at over 300,000 points of sale throughout Brazil. Sadia also exports to approximately 200 foreign clients in almost 100 countries (some of the brands are shown in Figure 3), mainly in Europe and the Middle East but also to

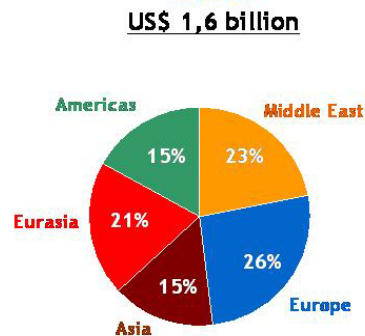


Russia, Japan, Southeastern Asia and the Americas. International sales distribution is shown in Figure 4.

Figure 3: Selected Sadia Brands Worldwide



Figure 4: Regional Sales Distribution (2006)



Source: Sadia

## CORPORATE SUSTAINABILITY

Since Sadia's founder, Attilio Fontana, started the business, the company has always considered education, transparency, and employees' and consumers' well-being, health and safety as important values. Recognizing the increasing influence of social and environmental issues, Sadia created a Strategic Committee for Sustainability, in 2004, comprised of some of the company's highest ranked executives. The Sadia Institute for Sustainability, which will be introduced later in this case, was also created in 2004 to manage its social investment.

Currently, Sadia has a Committee for Sustainability at its Board that has the participation of the Chairman.

Sadia is also part of the Sustainable Food Laboratory (Food Lab), a project designed to rethink food supply chain systems in Latin America, North America and Europe. Companies, governments and civil organizations work together to develop food products that are not only healthier but also more sustainable from the beginning of the supply chain (producer) through the end (consumer). The company is leading a Brazilian initiative from Food Lab, called Brazilian Business Coalition, to engage stakeholders of the Food Chain in Brazil.



## Drivers for the 3S Program

In early 2004, Sadia recognized a need to look at the environmental and social implications of its business more strategically. The main drivers for the 3S Program, explained in detail later, were related to the social and environmental impact of swine production.

To meet the demand for its products, Sadia partners with around 10,000 poultry and swine producers in Brazil, referred to by the company as *integrados* (integrated). Of Sadia's integrados, 3,500 are swine producers. Those with more than 1,000 animals are considered large producers by Sadia, those with between 600 and 1,000 animals are medium-sized producers and the remaining, with less than 600, are small producers. About 90 percent of Sadia's integrados are small and medium, and 10 percent are large producers.

Of course there are environmental and social impacts from all swine production, but the small and medium swine producers faced particular social and environmental challenges that had the potential to become liabilities for Sadia. This was a troubling scenario for a company striving for sustainability in all its activities, including the supply chain.

### **ENVIRONMENTAL CHALLENGES: WASTE DISPOSAL**

A significant number of swine facilities in Sadia's chain did not even have an environmental permit. Brazilian legislation dictates the use of a somewhat inefficient mechanism of waste disposal, and very few producers used it. Environmental licenses were also expensive and not all farmers were aware of their importance or how to obtain them.

It was not unusual, for example, for small producers to dispose of untreated waste (excrement) directly into soil and water sources. Such practices compromised the ecosystem by polluting the earth and the water, not to mention the bad smell. Analyses showed that a facility with 300 breeding pigs generated the equivalent pollution charge of a town of 75,000 people.<sup>1</sup> In addition, the waste also emitted greenhouse gases.

### **SOCIAL CHALLENGES: URBANIZATION**

Another challenge faced by Sadia was the limited revenue potential from swine production to provide for the medium and small producer and their families. Such producers were typically dependant on big companies, like Sadia, to purchase their product. However, the small producer had little negotiating power in such a relationship.

The situation for small and medium producers also triggered younger generations to leave the countryside in search of better opportunities in bigger cities (although not necessarily finding any). In fact, big cities in Brazil face high unemployment rates. With very few exceptions, this exodus contributed to the increasing urban poverty statistics. Therefore, it was essential to

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<sup>1</sup> Fonte: Bley, Cícero – “A Suinocultura e o Meio Ambiente”.

Available at [www.suino.com.br/meioambiente/noticia.asp?pf\\_id=11350&dept\\_id=8](http://www.suino.com.br/meioambiente/noticia.asp?pf_id=11350&dept_id=8)



diversify production, by growing different crops and breeding different animals, in order to guarantee additional revenue and improve the quality of life for present and future generations.

It was also very important to turn the working environment into a healthier and more pleasant one. When waste from swine production is not well managed, it compromises the producers' self-image and self-esteem and also dissuades the participation of younger generations in the family business. Furthermore, nearby communities were affected by water and soil pollution, as well as the unpleasant odor.

For Sadia, the risk of supporting non-sustainable conditions in its supply chain, together with the risk of losing producers to other livelihoods, was exacerbated by the risk of losing producers to competitors. The unpleasant conditions for swine production also make producers want to change from one company to another from time to time. Sadia could not afford to increase the already high turnover of suppliers from around ten percent per annum.

## **Development of the 3S Program**

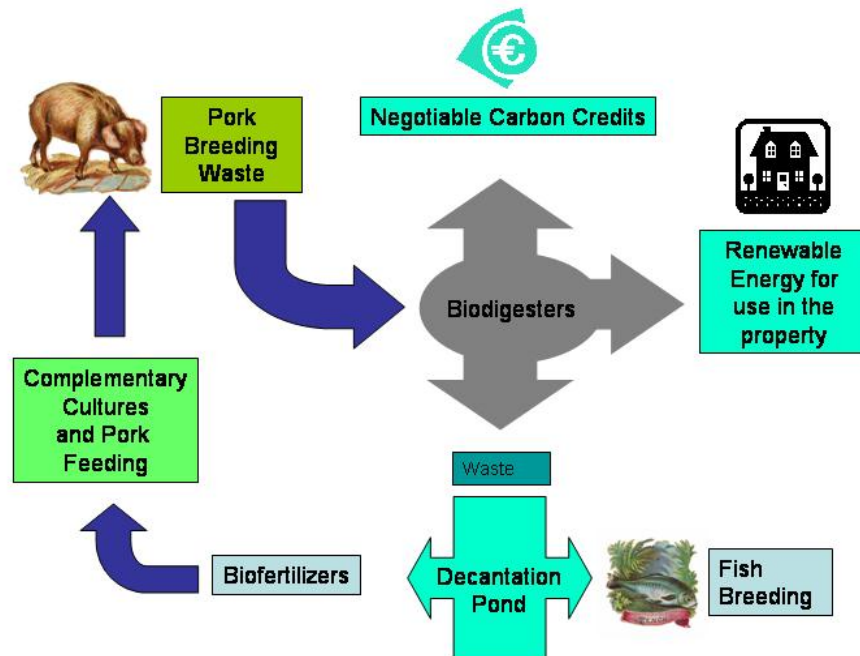
In the beginning of 2004, Sadia decided to face the challenge of how to reduce the environmental impact of swine production, at no additional cost, while also increasing producers' revenues. At first, it seemed unlikely, but the study of available technologies, along with opportunities in the carbon credit market, showed promise considering the first methodology from UNFCCC AM0006. What would eventually become Sadia's Program for Sustainable Swine Production (3S program) involved putting swine waste into biodigesters for multiple benefits.

With biodigesters, swine waste is fermented by bacteria in closed reservoirs, avoiding methane emission. In the process, the methane gas is converted into CO<sub>2</sub>, which is 21 times less intensive in terms of greenhouse gas effects. Such sequestration of greenhouse gases generates carbon credits under the Kyoto Protocol Clean Development Mechanism (CDM) that can be traded with other companies in need of carbon offsets. See Appendix A for an overview of the CDM. The sale of carbon credits could be enough, according to Sadia's studies and considering the old methodology AM0006 from UNFCCC, to cover the cost of the biodigesters.

In addition, the producer's revenues would increase. Gases captured from the biodigester operation can also be used as energy, thus reducing operating costs for producers. Also, the byproduct from the fermentation process can be used as crop fertilizer or as food for fish breeding. Figure 5 illustrates the process.



Figure 5: Cycle of Swine Waste Treated in Biodigesters



Source: Authors

## Overview of the 3S Program

By the end of 2004, Sadia had decided to facilitate the CDM process. The company created a non-profit entity called the Sadia Sustainability Institute, Instituto Sadia de Sustentabilidade, to manage the 3S Program and negotiate the carbon credits. Since inception in 2004, besides managing and guaranteeing financial resources for the 3S Program, the Institute took on the responsibility for the 3S Program and Sadia's social investment in the communities where the company has industrial plants and commercial units.

In the first three quarters of 2005, the Institute developed studies to analyze the 3S program and identified the producers that could be potential participants. They asked all of Sadia's integrados to complete a survey about their facility and production in order to find the ones that best fit the Program.

The Institute also started negotiations to make it financially feasible. In December 2005, the Institute, relying on Sadia's reputation, obtained a credit line of R\$ 60 million with BNDES (Banco Nacional de Desenvolvimento, the Brazilian Development Bank), for implementation of the 3S Program. This amount would allow the Institute to include 60 percent of Sadia's integrados in the Program. It hoped to engage 100 percent through profits from the 3S Program, turning the Program into a self-financed initiative by mid-2007. However, by early



2007, it seemed that regulatory challenges might postpone this target. If the revenue generated by the carbon credits is not adequate, the Sadia Institute will look for alternatives to include all integrados in the Program.

The role of the Sadia Institute was to provide the swine producers with information through the company's technicians to procure the biodigesters, identify the infrastructure needed at each facility, hire the companies responsible for building the decantation pond, and overall administration for the Program.

### **Phase 1: Enrolment of producers**

To generate interest in the 3S Program, in the last quarter of 2005, the Institute held meetings with swine producers to present Sadia's proposal and provide as much information about it as possible. The company's technicians were trained to introduce the 3S Program to the swine producers in these group information sessions and share with them a copy of the contract. Some integrados decided to join immediately following these meetings, and they formalized their participation by signing a contract.

Sadia expected that about 50 percent of the producers would want to participate in the 3S Program. By early 2007, 96 percent had signed a contract indicating willingness to participate in the program. The other four percent were large integrados that are already prepared or were preparing to individually operate in the carbon credit market. Even though 96 percent of integrados wanted to participate in the 3S Program, it was implemented in only 30 percent of facilities.

At the beginning, Sadia thought it would be easiest to work with the integrados in groups according to geographical regions. The initial meetings would be with these groups, which would also have a common Project Design Document (see Appendix A). This model would simplify and reduce the costs of the process of approval by the Brazilian Government and the United Nations. However, timing, stage of development and environmental legislation compliance were varied widely among producers, and this made it impossible to work with regional groups. Instead, Sadia decided to work individually with those producers ready to join the Program.

### **Phase 2: installation of biodigesters**

After signing on, the implementation process began. Sadia Institute determined how many biodigesters would be necessary, estimated the available carbon sequestration amount and calculated the time it would take the producer to reimburse Sadia Institute for the investment. Biodigesters were installed and commissioned by the Institute, and each producer was given instructions on how to operate it. By the end of the second phase, the environmental impact of swine production was already reduced, and the swine producer could have fertilizer for their crops and food to begin fish breeding.



### **Phase 3: installation of the equipment to burn and measure methane and CO2**

In the third phase equipment to burn the gases and measure the amount of gas emitted was installed and commissioned (like the biodigesters). With this in place, the producer could certify and negotiate carbon credits.

### **Phase 4: energy generation**

Equipment to generate electricity from the combustion of the gases was installed by some integrados. The electricity is used on the producers' property, reducing their energy costs. Consideration of individual financial viability for the equipments acquisition would have to be a second phase of the Program, after the carbon credits generated from the methane sequestration.

Sadia Institute owns all the equipment installed in the farmers' facilities for the purpose of the 3S Program. In approximately five years, when the producers finish paying the Institute for it, the biodigesters and all related equipment will change hands and be owned by the integrados.

### **FINANCIAL MODEL**

The Institute negotiates carbon credits with the Operational Entity under the CDM. The Institute takes a percentage of the revenue from the offsets to cover operational expenses, and the remainder is allocated to the producer. Before seeing any income from the credits, the producer pays for the biodigester; the payment is estimated to take five years of installments. Sadia sees the main financial benefit for producers from producing energy and fertilizer.

In May 2006, Sadia and the Sadia Institute sold the first carbon credits generated by the 3S Program. 290,000 tons were sold by Sadia's own farms and will be delivered in 2007, at €11/ton for 50,000 tons and the rest of the tons were based on the European Allowance Market Index. The European Carbon Fund also bought approximately 2.5 million tons of carbon from the Institute to be sequestered by the integrados. The price is yet to be defined, because the carbon market is extremely volatile and the prices vary almost daily, at a price to be determined under the European Allowance Market Index.

## **Challenges and Innovations in Implementation of 3S Program**

The biodigesters idea helped Sadia staff develop the 3S Program, and the company was committed to finding a way to make it work. But implementation was not without challenges.

### **TECHNOLOGICAL CHALLENGES: BIODIGESTER AND INSTRUMENTATION**

The first challenge was to identify suppliers for biodigesters and instrumentation to measure the gas emissions. Both of these components were required to prove carbon sequestration. The available solutions were expensive and thus unaffordable for small and medium swine producers.



The main difficulty in the process of introducing the 3S Program was the necessity of developing a supplier to produce biodigesters at a reasonable price to make it accessible to small and medium sized producers. When Sadia started considering the 3S Program in 2004, there was only one company in Brazil capable of producing biodigesters: Sansuy. But this company had an exclusivity agreement with a Canadian company and could not supply Sadia Institute.

Sadia Institute could not find an alternative company. It found only an engineer willing to work on the project. He had knowledge, but no experience in producing biodigesters. The company decided to invest in such professional and hoped that he could develop a prototype. One year went by and he did not meet Sadia Institute's expectations.

In the meantime, Sansuy had a hard time renegotiating with the Canadian company and decided to terminate the contract. Sansuy then became available and, at about the same time, another biodigester producer was identified: Avesuy. In 2006, Sadia decided to partner with both companies.

The second technological challenge was to find a gauge to measure the gas emissions. Such equipment is necessary to measure the quantity of methane sequestered and amount of CO<sub>2</sub> produced. There was no efficient technology available for that purpose, all tested devices quickly corroded (methane is highly corrosive) and stopped functioning. Therefore, constant maintenance is required, raising costs and making the measurement unreliable.

High performance gauges remained elusive. Sadia decided to partner with Universidade do Espírito Santo (Espírito Santo University) to develop new equipment. This University had extensive experience in gas measurement by working with Petrobras in the process of petroleum extraction and it used a technology that does not show signs of corrosion. Sadia has been testing this technology with satisfactory results, so far. But to guarantee the results, the company will need to fund further research.

### **CULTURAL CHALLENGES: AWARENESS RAISING WITH FARMERS**

The Sadia Institute, with its 3S Program, was able to overcome the technological challenges, but the problems were far from over. It was also necessary to convince and mobilize the producers to change their methods of swine production, methods they were used to and had been practicing for generations.

The company provided information on biodigesters, the carbon sequestration process, energy production and fertilizers production. It was important to Sadia for the farmers to make an informed decision about whether to join the 3S Program. The company decided from the beginning that participation would be voluntary, and Sadia's technicians would be in charge of communicating about the Program and its benefits to the producers.



Sadia's group of technicians were already known and respected by the integrados. The technicians were responsible for following up with each integrado to check on the swine production. They visited the farmer's facilities, verified several efficiency and quality indexes and generally fostered a good relationship between the producer and the company. The technicians' credibility and respect among the producers turned them into important assets in the process of spreading information and generating interest in the biodigesters. They were the first line of communication for presenting the 3S Program to the integrados.

Another important measure Sadia took in order to enroll the swine producers in the 3S program was to install biodigesters and develop the carbon sequestration, certification and trade process in the company's own facilities. The success of the example helped convince the producers and provided an opportunity to learn and improve the process.

### **FINANCIAL CHALLENGES**

The financial challenge was to guarantee the necessary capital to install the infrastructure required for the Program. The program was expected to become self-sustaining in the medium-term, but at first, the carbon credit trade resources would be insufficient to cover the up-front costs.

Ratification of the Kyoto Protocol in February 2005 tripled the carbon credit's value, improving the financial outlook for the program. The carbon credit trade would eventually cover the investment, but it would take time before the Program could have access to these funds. Under the CDM process, the deal for the carbon credit sale is closed before the carbon is actually sequestered, but it is only paid after the sequestration is certified. So the credits negotiated in 2006 will only be paid in 2008. But Sadia Institute and Sadia's integrados needed the money earlier, or it would be impossible to achieve the volume of carbon credits the Program could negotiate. Sadia's reputation was very important here in helping it get credit lines to make the Program work.

### **INSTITUTIONAL CHALLENGES**

Sadia's Institute also had to consolidate a large number of carbon sequestering facilities (biodigesters) to achieve a volume of carbon credits meaningful to market interests.

The first step to qualify a Brazilian carbon sequestration project is to present it to the Interministerial Climate Change Commission, in Brazil. If the project complies with every requirement, the Commission will give it an approval letter, authorizing it to send a Project Design Development (PDD) to the United Nations. At this stage, the UN Executive Board for Climate Change then allows the company responsible for the project to negotiate carbon credits from carbon sequestration in the international market.

By signing the approval letter, the Brazilian Government takes responsibility for checking the information given by the Project's managers. The UN has no responsibility for finding out if the information given is correct or not. The UN Executive Board has its own rules about



PDD's contents and the way to calculate carbon sequestration, among other things. This rule's definition was very recent; it actually changed after the 3S Program was under development.

The process was very complex for small and medium producers; it demanded technical and institutional capabilities they do not usually have. Furthermore, it was very difficult to find someone able to develop a PDD; so, Sadia trained people (and continues to train people) in a learn-by-doing kind of process.

It was also important to pay constant attention to the carbon credit market, as it is still being structured. The purchasers are beginning to mobilize and to organize themselves and a lot of changes are anticipated before it is consolidated.

All these challenges show that small producers alone (90 percent of Sadia's integrados are small and medium) could have never addressed the environmental impact of its swine facilities in a way that generated income through carbon credit sales and also generated energy to reduce the production cost. They would have needed an external agent to structure a consistent program and help implement it.

## **Expected Benefits and Development Outcomes from the 3S Program**

Sadia Institute's first big project, the 3S Program, is an example of a sustainability practice that considers social, environmental and economic aspects. With the Program, at least three million litres of swine excrement will be processed daily, a volume equal to five percent of the total swine waste volume produced in Brazil.

3S Program's benefits for the integrados include reduced operating costs, the possibility to use an alternative energy source and potentially new sources of income. Operating costs are reduced from free energy sources, and free fertilizer. The producer can use the pond for pisciculture as a potential new endeavor. Furthermore, the fertilizer is organic and better for the environment. By reducing costs and creating the possibility for diversifying income sources, Sadia hopes to encourage the small producers to stay in the business, and to reduce the exodus to the cities.

The 3S Program also brings health benefits to integrados and the communities near their facilities. The open swine waste attracted insects and rodents that could be disease vectors. The new process also improved the quality of life for the integrados and the surrounding communities by reducing the noxious odors. It increased self-esteem, because the swine producing families were no longer living with the rats and mosquitoes, or the bad smells and filth usually related to this occupation.



The communities living in or near an area with intense swine production will also benefit from the 3S Program, because it will help improve the quality of water, reduce soil pollution and control bad smells.

The 3S Program is also expected to help spread environmental education among swine producers, educating them of important issues related to conservation and the better use of natural resources.

It will also develop a group of trained people ready to work with the implementation of CDM projects. Global research centers and environmental organizations may benefit from the experience. Some local universities have already shown interest in following the project's evolution and contributing ideas for improvement.

For Sadia, the Program represents an opportunity to develop a better partnership with the swine producers, raising the suppliers' loyalty.

## Next Steps and Current Challenges

The main challenge Sadia Institute and its 3S Program faced in early 2007 was a regulatory one. In September 2006, the CDM Executive Board proposed new rules for applying for a CDM project, which were accepted in December, making it even more difficult for small and medium producers to participate. These new rules declare that all CDM projects' equipments must have some of the same characteristics, no matter the size or kind of production. The cost of buying the equipment designated by the CDM Executive Board may hurt the Program. Sadia Institute was trying to win the battle for 3S survival on two fronts. First they were searching for new equipment suppliers, specifically those that have *all-in-one* biodigesters (biodigester, flare and gauge). They think it will be more efficient and less expensive. The Institute was also trying to convince the CDM Executive Board that the changes are discriminatory to small producers, and may prevent them from joining CDM projects. Sadia Institute hopes to convince the Executive Board that differences in scale should be respected and that the type of equipment required for carbon sequestration by a small swine producer does not have to be the same required, for example, for a big city's garbage processing facility.

Developed and planned in the first half of 2004, the 3S Program was rolled out in the last quarter of 2005. No results have been measured, so far. The evaluation tools were being developed as the Program was implemented. The 3S is a management programme developed for Sadia supply chain of swine producers, but the experience will probably be extended to other producers that do business with the company.

A big challenge appeared since the end of 2006, with the new methodology ACM0010 from UNFCCC. This methodology brought more technical specifications for control of the



equipments system and rules for monitoring and efficiency of the sequestration of the methane. It means more cost that could make it impracticable to implement the 3S Program as a whole.

Sadia expected 3S Program costs to be covered by 2010, based on the price per ton of carbon between eight to twelve euros, but the timeline was being reviewed after the changes were made by the CDM Executive Board. As mentioned previously, the swine producers will pay for the equipment, administrative and operational costs as monitoring, PDDs, accountability etc, so that carbon credits are not expected to be a major source of revenue; however, production diversification and cost savings should improve their income.

Encouraging and qualifying properties and producers for pisciculture is 3S Program's next step. Sadia is developing a "Sustainable Site Platform" in which it will give the integrados alternatives for new farming possibilities. The Program will include education on environmental, financial and management issues, creating entrepreneurs better prepared for the market.



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## Appendix A: Overview of the Clean Development Mechanism

To qualify for Certified Emission Reductions (CERs) under the Kyoto Protocol, the 3S Program had to qualify under the Clean Development Mechanism. According to Article 12 of the Kyoto Protocol, *“the purpose of the Clean Development Mechanism shall be to assist parties not included in Annex I [developing countries] in achieving sustainable development and in contributing to the ultimate objective of the Convention, and to assist parties included in Annex I [industrialized countries] in achieving compliance with their quantified emission limitation and reduction commitments under article 3.”*<sup>2</sup>

In other words, under the CDM, industrialized countries work with developing countries to implement projects that reduce greenhouse gas emissions. For developing countries, it is an opportunity to encourage sustainable development via environmentally friendly technology, financed by the trading of carbon credits in international markets. For industrialized countries the CDM creates enhanced opportunities to meet their emissions targets under the Kyoto Protocol.

The first step to implement a CDM project is to register it with the CDM Executive Board by presenting a Project Design Document (PDD) to prove that the project meets CDM’s requirements. The PDD provides a general description of the project, the proposed baseline methodology, estimates the lifetime of the project and the crediting period, demonstrates how the project generates emission reductions that are additional to what would have otherwise occurred, presents an analysis of the environmental impacts, discusses the stakeholder consultation process and outlines a monitoring and verification plan. Once approved, the PDD is submitted to a designated Operational Entity (OE) for the project validation.

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<sup>2</sup> Source: United Nations Framework Convention on Climate Change  
[http://cdm.unfccc.int/Reference/Guidclarif/glossary\\_of\\_CDM\\_terms.pdf](http://cdm.unfccc.int/Reference/Guidclarif/glossary_of_CDM_terms.pdf)



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The information presented in this case study has been reviewed and signed-off by the company to ensure its accuracy. The views expressed in the case study are the ones of the author and do not necessarily reflect those of the UN, UNDP or their Member States.

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