

# HIGH URUGUAI RIVER: TURNING A PROBLEM INTO A SOLUTION

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## 1 INTRODUCTION

High Uruguai region is characterized strongly by the agricultural industries and hogs production, generating wealth but with environment preservation concern. The southern region of Brazil concentrates about 16 millions of hogs which is a key factor for the region's growth. As that sector grows the negative effects cause deep environmental problems such as the underground superficial waters as wells as the Green House Gas emissions.

According to Overcash *et al* (1963) the hog raise sector is responsible by high organic content residuals with a contribution per capita up to 340g DBO<sup>5</sup>/animal.day while a human being contributes with an average of 54g DBO<sup>5</sup>/inhabitant.day.

That sector is also responsible for gases that contribute to the GHG. The Methane gas - CH<sub>4</sub> generated during the anaerobic digestion process of the hog residuals presents a GHG potential 21 times the CO<sub>2</sub> (IPCC, 2007).

High Uruguai River Project Citizenship, Energy and Environment is a Pilot Project of National concern that aims at turning a 29 city region between Santa Catarina and Rio Grande do Sul states, in the southern region of Brazil, into a sustainable model region of energy production and consumption. In this sense, this paper aims to report the actions and results achieved by the Project, specifically the installation of digesters.

### 1.1 History High Uruguai River Project

The Project has its roots during the Energy and Development Seminar sponsored by the MAB – Movement of People around the Dams, Chapeco Prefecture and University Community Region Chapeco where a deep debate held in 2003 was able to discuss the relationship between regional development and ways of energy production and consumption in the Uruguai River area.

On May 5, 2004, High Uruguai River Project had its start up in Chapeco city in the State of Santa Catarina. Around 600 leaders from the nearby cities in that region. At that moment the Commitment Terms for the Project Implementation. On May 2005, a cooperation agreement between the companies Eletrobras and Eletrosul was signed in order to implement the required actions.

High Uruguai River Project is coordinated by Eletrobras and Eletrosul, MAB, Chapeco Region Community University – UNOCHAPECO, the Research and Planning Institute from Rio de Janeiro Federal University and local prefectures.

High Uruguai River Project Citizenship, Energy and Environment is committed in contributing with the environmental sustainability and proposes the conversion of a problem: environmental degradation caused by hog breeding – into a solution ie: energy and biofertilizer production.

## 2 METHODOLOGY

In the Project 35 biodigester have already been assembled in rural properties which have been selected through a participative process that involved the whole community by applying social and technical criteria. Those properties are located in 25 cities, being 19 in the State of Santa Catarina, and 6 in the Sate of Rio Grande do Sul.

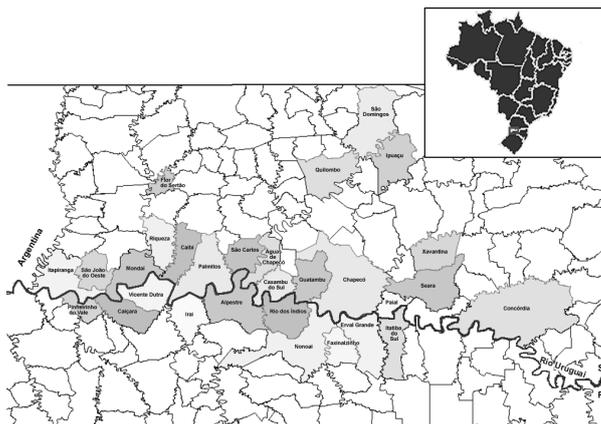


FIGURE 1 Area covered by the Project Alto Uruguay in Santa Catarina and Rio Grande do Sul

The Biodigester used is the Canadina Model, built with a geomembrane including a digestion chamber and a biogas chamber. In that reactor occurs the anaerobic digestion process having as its product the biogas with a content of about 75 % of Methane gas (CH<sub>4</sub>).

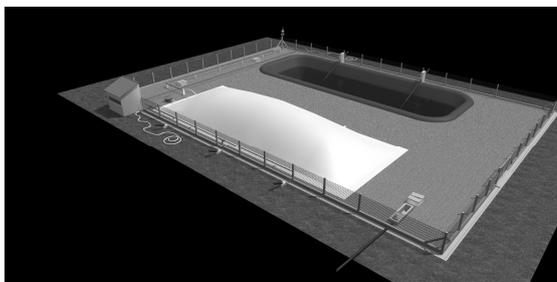


FIGURE 2 Model of the digester installed on 35 farms

### 3 RESULTS AND DISCUSSION

These biodigesters will contribute to residual organic load reduction in the hog facilities and consequently lowering the water and soil pollution caused by waste without proper treatment. Moreover they will contribute to the GHG emission reduction due to hog breeding. The biodigesters will use the energy resources from biogas which may be applied for the production of thermal and electrical energy.

As seen, a biodigester may contribute - from the use of a renewable power source – to aggregate values to agricultural products contributing as well as to rural producers economic sustainability in a decentralized and democratic way for energy production.

The productive unities have a hog breeding of 4,486 heads which can produce about 160,370 cubic meters of methane gas. The use of biogas as fuel in a generator may generate an energy amount up to 260,601 KWh/year and reduce 1,043 t CO<sub>2</sub>/e per year.

The covered region of the High Uruguai River Project is characterized by small properties with family labor force. So such a sector is responsible by the good performance of the local economy.

That sector is also responsible by significant environmental impacts, due to the massive hog breeding in small areas, that threat that model which has presented evidences of environmental and economic sustainability of that activity.

The development of confined hog breeding in those small areas have surpassed the support capacity, properties have generated more residual than the soil capacity to absorb the effluence and convert the organic matter into nutrients in rural activities. That surplus has contributed to the contamination of the soil and water, so that's the significance of promoting the reduction of organic load from hogs' excrements.

The properties that have been benefited by the 35 rural biodigesters aggregate a hog breeding of 17,096 units, divided in baby nurseries ( 3,000 units ), terminations ( 12,061), complete cycle ( 300 units) and the adult

productive unit – UPL (1,735). With the assemble of the biodigesters and the burning of biogas (CO<sub>2</sub>) there will be an emission reduction of CO<sub>2</sub> of about 3,940 t/year, the annual biogas production may achieve to 605,952 m<sup>3</sup>/year, the use ou burning of the biogas may increment the producer in an expressive way (Bley Junior, 2009).

This fuel gas, besides the use as a renewable energy source it contributes to the GHG reduction – since it contributes to GHG 2 times more than CO<sub>2</sub>. The High Uruguai River Project goes beyond the GHG reduction since it proposes the biogas use as a thermal energy source for facilities heating of birds and hogs during the winter as well as for water heating for bathing, cloth and dish washing and other home tasks.

The Project also contemplates the biogas use for productive activities such as milk cooling, water heating for cleaning the milk facilities, milk cooking, jelly production, cheese, bread, and other products.

The excrements remain in the biodigester for about 35 days for a fermentation process. At the end of that period the biofertilizer is produced for use on the plantation reducing the costs with chemical fertilizers. The biodigesters also contribute to the rural sanitation as a excrement treatment unity reducing the contamination of the water and rivers.

The High Uruguai River Project achieves other renewable energy sources, for besides the biodigesters solar panels will be assembled for water heating at hospitals and schools.

The Project contributes to Energy Conservation promoting training courses for teachers and community agents and for members of the Municipal Energy Planning Committee. Which help the city staff on reducing energy costs increasing the efficiency on the population demand.

It also promotes the dissemination of the technologies and the socialization of the subject through the social communication vehicles such as radios, newspapers and television, promoting the insertion of the matters in all the region involved by the Project issuing hints of how to save energy as well as all the actions already taken place.

#### **4 CONCLUSIONS**

So the use of clean and renewable energy becomes more and more necessary for the human survival in the planet, and it's up to the society to due changes on the consumption habits and to the governors, the actions to preserve the natural resources and the emission reduction of polluting gases in the atmosphere. The High Uruguai River Project comes to contribute, in a concrete and affirmative significant way, in the production of clean energy and in the sustainable development.

#### **REFERENCES**

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