



**BIOGÁS SERTÃO+100:  
BIODIGESTERS AS AN AGROECOLOGICAL AND  
SUSTAINABILITY ALTERNATIVE ON CEARÁ'S SEMIARID  
REGION**

Sobral

2016



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## 01. INTRODUCTION

### 1.1 Global Context

Economic growth preached by the capitalist system and globalization, instilled in progress belief through dedicated production exclusively for profit, represented by the binomial productivism / consumerism fueled the rampant use of natural resources, resulting in pollution, environmental degradation, climate change, desertification, biodiversity loss as well as various social problems caused by differences in the distribution of income, resources and opportunities. In the context of climate change, gas emissions from the burning of fossil fuels (coal, oil, gas ...) and its subsequent accumulation in the atmosphere, produce the greenhouse effect and global warming.

In recent years, discussions on the environmental issue is in vogue, trying to show the impossibility and unsustainability of the current development design which is linked solely to the notion of economic growth. We aim to discuss and build new paradigms and modification alternatives of the status quodhz-.

The current development model links itself to the economic growth without taking into account the sustainability of the planet to the viability of animal, plant and human life, and without considering that development includes the blossoming of the potential of people and societies and reproduction of nature and not its depletion. Development should aim the life and the good living, with an economic, social, cultural and inclusive political process.

On this context, there is a need to create alternatives to this current development model that does not consider sustainability. There is a need to change the energy matrix, replacing the energy based on fossil and nuclear fuels with renewable energy. There is a need to change the dominant model of agricultural production for a model opposite to the imposition of the multinationals, agribusiness and dependence on chemical fertilizers and pesticides. A model that rests on agroecology, on diverse production and family farming.

Several experiences are emerging in opposition to the ruling development model. Among them, the implementation of social technologies specifically aimed to coexistence with the adversities of climate and social conditions of different regions, showing that it is possible a harmonious good living between human beings and the nature.

We introduce the *Biodigestor Sertanejo* (Backcountry Biodigester) as a social technology of renewable energy for the biogas and fertilizers production to reduce drastically environmental impacts.



## 1.2 Geographical Context

Brazilian semiarid region has an area of 969,589.4 km<sup>2</sup>, distributed in 1,133 municipalities in nine Brazilian states: Piauí, Ceará, Rio Grande do Norte, Paraíba, Pernambuco, Alagoas, Sergipe and Bahia (all in the Northeast) and Minas Gerais (Southeast Region). The predominant biome in the region is the Caatinga, rich in endemic species and the weather is dry and hot with irregular rainfall.

Despite the large territory, the semi-arid region has a strong concentration of land, resources and income in the possession of a few who hold political and economic power in the region, while most of the population lives on social exclusion, vulnerability, poverty and lack of access to rights, opportunities, resources, education, health and housing. In rural areas, the main source of income of the population is family farming and animal husbandry, and the federal government socio-assistance benefits and pensions.

Desertification and environmental degradation of the Caatinga is another problem introduced in the semiarid region caused by this production model that rampantly uses natural resources and without regard to the specifics of the region, in addition to the domestic use of firewood.

From a change of perspective, that social inequality scenario and degradation of natural resources involves the effort and investment in the development of farming families for self-reliance, knowledge of their rights and the possibility of coexistence with the semiarid region. This coexistence relies on the principles of sustainability and agroecology to ensure food and nutrition security and sovereignty, environmental preservation and the reduction of the effects of desertification, to improve income generation and the access to rights. Thus, this project initiative aims to contribute not only to the development of joint actions, along with farming families in the area of sustainability and agroecology and in the support to processes that enable coexistence with the semiarid, but also to the preservation of the Caatinga biome and to generate improvements on families' living conditions.

## 1.3 Details of the Proposal

The *Biodigestor Sertanejo* is a social technology of low cost and low maintenance presented as a tool to manage organic waste, converting manure into biogas (methane) that replaces the bottled gas for cooking and the wood stove, as well as producing bio fertilizer, thus contributing to the reduction of environmental impacts and generating an alternative source of energy.

The equipment consists in a fermentation chamber where the biomass (animal waste) undergoes anaerobic digestion by the bacteria, resulting in the production of biogas (primarily methane - CH<sub>4</sub>) and bio fertilizer organic fertilizer rich in nutrients, the final result of the fermentation of organic matter. The biogas production capacity, with the bio digester fed every two days with twenty (20) pounds of raw material, it is on an average of 13 kg of biogas per month.



The Biogas is used in food preparation and can be used for residential lighting. The bio fertilizer can be used to fertilize fruit trees, vegetables, and in planting corn, beans, manioc, and cassava at the family estate.

The supply of biogas through bio digesters will focus on the end to the use of charcoal, butane and in the Caatinga trees' deforestation for firewood collection, and provides inputs for fertilization of the soil. The use of this technology allows taking advantage of animal feces, keeping corrals clean, preventing pollution and avoiding the emission of methane gas into the atmosphere, reducing the greenhouse effect. It also contributes:

- ✓ To the reduction of the problem of the energy matrix, by lessening energy consumption;
- ✓ To minimize Caatinga degradation by reducing the use of charcoal and firewood;
- ✓ To put an end on methane release into the atmosphere produced by the fermentation properties in the feces of animals, preventing its emission into the atmosphere and contributing to the preservation of the ozone layer;
- ✓ To minimize global warming;
- ✓ To produce bio-fertilizer as organic fertilizer, replacing chemical fertilizers;
- ✓ To reduction of respiratory problems caused by soot from wood and charcoal burning;
- ✓ To the economy of family income.

Given the above, this project proposal is to implement five *Biodigestores Sertanejos* in municipalities in Ceará semi-arid region, distributed as follows: 1 unit in the municipality of Massapê, 1 unit in the municipality of Mucambo, 2 units in the city of Santana do Acaraú and 1 unit in the municipality of Forquilha. The idea is to spread the experience in several municipalities, seeking a greater impact on the perception of the technology in different locations, enabling the knowledge and the exchange of experience for a larger number of people.



## 1.4 EXECUTION

### PROJECT COORDINATION

#### MARIO FARIAS JÚNIOR

##### 1. Education

Undergraduate of Agricultural Sciences, Federal University of Paraíba - UFPB (2013)

##### 2. Professional Experience

✓ **CETRA – Center for Studies of Work and Assistance for Workers**

2015 to the present day

**Type of contract:** Territorial Coordinator

✓ **CEAT - Center for Studies and Assistance for Working Men and Women**

2013 -2015

**Type of contract:** Cisterns Project Manager

✓ **DIACONIA - Civil Society for Social Action**

**Institutional link:**

**1987 - 2013**

Type of contract: Social Promoter; PAAF (Programa de Apoio a Agricultura Familiar) Support Coordinator; P1MC (Programa 1 Milhão de Cisternas) Coordinator; P1+2 (Programa 1 Terra, 2 Águas) Coordinator; Pajeú Territorial Unit Coordinator in Pernambuco.

✓ **Civil Servant – Municipality of Santana do Acarau**

**Institutional link:**

**1982 – 1986**

Type of contract: Administrative Assistant; High School Teacher

##### 3. Other Background / Courses / Trainings

✓ Training in Systematization

✓ Course on Bidding

✓ Course on the Fundamentals and Management of Silvopastoral Systems and Goats and Sheep Nutritional Management.

✓ Training process for building boards tanks in Panama, Dominican Republic and Haiti in partnership with ASA and ACICAFOC. wareness Campaign and resource mobilization in Sweden and Norway.

##### 4. Developed and/or improved technologies

✓ Creation, along with Diaconia team, of the 16,000 liters cistern;

✓ Creation of the 52,000 liters Boardwalk Cistern in partnership with the Diaconia team;

✓ Creation of the Round Toilet along with Diaconia team;

✓ Creation of the round silo, with 1,000 kg capacity with Diaconia team;

✓ Creation of a worm farm model with Diaconia team;

✓ Creation of the Round water tank. Creation with Diaconia team;



- ✓ Creation of Biodigestor Sertanejo in partnership with the DHCP (Dom Hélder Câmara Project);
- ✓ Support to the storage expansion process of the Roof Catchment Water Tank from 12,000 to 16,000 liters, along with team Diaconia.

## 5. Seminars, Forums, Conferences and Others

- ✓ Rainwater Capture and Storage Seminar
- ✓ Seminar about Land, Work and Citizenship
- ✓ Solidarity Funds Seminar
- ✓ Every ENCONASAS (National Meeting of the Brazilian Semi-Arid Articulation);
- ✓ II ENA (National Meeting on Agroecology)
- ✓ Participation in the IV National Fair of Familiar Agriculture in Brasilia, partnership with DHCP – Building of a water tank prototype and silos;
- ✓ Water tank building and masons' training on Ilha Grande in Belem, Pará - Partnership with DHCP;
- ✓ Implementation of training processes for building the Biodigestor Sertanejo in Bahia, Rio Grande do Norte, Ceará, Paraíba and Pernambuco - Partnership with DHCP;
- ✓ Meeting of CNCD - National Committee to Combat Desertification, in which we had a seat from 2010 to 2012.
- ✓ Meeting of Focal Points for issues related to Combat Desertification.
- ✓ Participation in COP 03 in Olinda - Construction and exposition of a 16,000 liters Board Water Tank, reference to the beginning of P1MC - Program One Million Cisterns.
- ✓ Participation in COP 09 in Buenos Aires.
- ✓ Participation in COP 16 in Mexico.
- ✓ Participation in ICID - As a member of CNCD;
- ✓ Participation in the Rio + 20 - Construction of Water Tanks in the Morro do Alemão, and construction and exposure of a Boardwalk Tank prototype and the water tank of the 1st water in the Summit of The Peoples;

## 6. Bibliographic production

### Published papers in conference proceedings

BLACKBURN, D. M., BUSTAMANTE, Y., LIMA, M. S., JALFIM, F. T., VIANA, A. A., JÚNIOR, M. F. **Avaliação da Contaminação Microbiológica de Água para Consumo Doméstico na Região de Atuação da Diaconia no Semiárido Nordestino.** In: Simpósio Brasileiro de Captação de água de chuva no Semi-árido Nordeste, 2005, Teresina - PI.

JALFIM, F. T., JÚNIOR, M. F., BUSTAMANTE, Y., FERNANDES, A. C., RIBEIRO, O., NETO, L. M., NETO, J. E., PAIVA, I., BLACKBURN, D. M., LIMA, M. S., ÁVILA,



J. I. S. L. **Cisterna de Placas 'Calçada': Uma alternativa para a Captação e Armazenamento da Água de Chuva de Escoamento no Nível do Solo.** In: Simpósio Brasileiro de Captação de água de chuva no Semiárido Nordeste, 2003, Juazeiro da Bahia - BA.

JALFIM, F. T., JÚNIOR, M. F., BLACKBURN, D. M., BUSTAMANTE, Y., NETO, J. E., FERNANDES, A. C., RIBEIRO, O., NETO, L. M., PAIVA, I., LIMA, M. S. **Eficiência do Calçada Cimentado na Captação de Água de Chuva no Semiárido Brasileiro.** In: Simpósio Brasileiro de Captação de água de chuva no Semiárido Nordeste, 2003, Juazeiro da Bahia - BA.

JALFIM, F. T., JÚNIOR, M. F., ÁVILA, J. I. S. L., BUSTAMANTE, Y., FERNANDES, A. C., RIBEIRO, O., NETO, L. M., NETO, J. E., PAIVA, I. Página 3 de 3. **Ajuste na Técnica da Construção da cisterna de placas (modelo pintada) para facilitar a implementação em locais de solos rasos.** In 3º Simpósio Brasileiro de Captação de água de Chuva no Semiárido, 2001, Campina Grande.

#### **Published papers in conference proceedings (abstract)**

COSTA, H. S., FRANÇA, L., NETO, G. C., JALFIM, F. T., CAVALCANTI, A., JÚNIOR, M. F., RIBEIRO, O. **Bombeamento solar para micro-irrigação em áreas rurais do semi-árido.** In: 55º Reunião Anual da SBPC, 2003, Recife.

#### **Book**

MATTOS, L. C., JÚNIOR, M. F. **Manual do Biodigestor sertanejo.** Recife: Projeto Dom Helder Câmara, 2011. 55 p.

#### **Other bibliographic production**

BLACKBURN, D. M., BUSTAMANTE, Y., JALFIM, F. T., VIANA, A. A., JÚNIOR, M. F., LIMA, M. **Avaliação da potabilidade da água na região de Atuação da Diaconia no semiárido nordestino.** Relatório. 2005.

#### **Technical production**

BLACKBURN, D. M., BUSTAMANTE, Y., JALFIM, F. T., VIANA, A. A., JÚNIOR, M. F., LIMA, M. S. **Água de cisterna: quem bebe tem mais saúde.** 2005. (Development of educational or instructional material)

BLACKBURN, D. M., BUSTAMANTE, Y., JALFIM, F. T., VIANA, A. A., JÚNIOR, M. F., LIMA, M. S. **Avaliação de potabilidade da água na região de atuação da Diaconia no Semiárido nordestino.** 2005. (Development of educational or instructional material)

JALFIM, F. T., NETO, J. E., CAVALCANTI, A., PAIVA, I., NETO, L. M., JÚNIOR, M. F., RIBEIRO, O., BUSTAMANTE, Y. **Convivendo com o Semiárido: Construção de Cisterna de Calçada.** 2003. (Development of educational or instructional material)



## 1.5. Description of the Executor

The Center for Studies of Work and Assistance for Workers – CETRA is a civil society organization (NGO), with non-economic purposes, founded in 1981 based in a volunteer work started in 1978 in the municipality of Aratuba /CE. The worker men and women set up together by the Ecclesial Base Communities (CEBs) had, as main thought, questions related to land and agrarian reform.

Therefore, in the years that preceding its formal founding, CETRA was already developing activities on legal and social advice with the rural workers which were wronged and discriminated on the land they lived and worked for many generations. The group promoted debates about land use and possession and about the violence on rural areas. The group based also on the *Estatuto da Terra* (Brazilian Land Act).

CETRA has, as titles: The State Public Utility Title by the Law N°. 11.539 on 03/05/1989; the Federal Public Utility Title by the Law N°. 08001-006675/99-50 and the City Public Utility Title by the Law N°. 9032 on 10/11/2005. CETRA also has a Registration on the Social Assistance National Council (CNAS), by the Resolution N°. 232 on 09/09/1999 and a Beneficent Organization of Social Assistance (CEBAS) Certification by the Resolution N°. 96 on 25/08/2004. CETRA is affiliated to ABONG (Brazilian Association of NGOs), to the Brazilian National Human Rights Movement and to many federal, state and city networks and forums.

Moreover, CETRA has a seat on the State Council for the Rights of Children and Adolescents (CEDCA-CE) as a councilor; it is a member of the Semi-arid Coordination (ASA Brasil) with a seat in the Executive Coordination Office and in the National Council for Rural Development (CONDRAF); it is part of the Ceará State Solidary Socioeconomy Network na member of the Technical Assistance and Rural Extension Network (Rede ATER Nordeste e Rede Cearense de ATER).

The NGO works also as a cooperator on the National Council for Food and Nutritional Security of Ceará state (CONSEA/CE) as a member of the Thematic Chamber of Production and Supply. CETRA is also na active member of Articulation and Dialogue Process (PAD) between brazilian organizations and international cooperation. In matters of gender, CETRA cooperates with the Movement of Rural Women Workers of Brazilian Northeast (MMTR/NE)

CETRA was founded precisely to answer the growing rural workers demand for legal and social assistance, which did not have any lawyers committed to the defense of their rights. The experience, started on a voluntary basis, has grew up, expanded and required a minimal structure to meet the demands.

During the 1980s the NGO served to this segment of population with legal advice in actions related to the issue of land and it's social organization. In Itapipoca region, today a Citizenship Territory of Valleys of Curu and Aracatiaçu, CETRA had the support of Itapipoca Diocese through the Advisory Committee to the Pastoral Land - CAPT, advising 33 land conflict areas in the expropriation procedures for social interest.



The work of CETRA contributed to the development of several Settlements Development Plans (PDAs), and in trade and popular union advice up to the mid-1990s. In 1998, the organization held a consortium project with six Northeastern entities, funded by the Northeast Development Superintendence (SUDENE) for actions with farmers hit by the drought, being CETRA the project anchor entity.

### **Institutional mission**

"Contributing to the sustainable rural development, considering the economic, political, gender, environmental and cultural dimensions with family farmers based on agroecology, the solidary socio-economy and universal human rights, aiming at a fair and egalitarian society."

### **Strategic guidelines of CETRA**

Guideline 1: Agroecology and Living with the Semi-Arid	Consolidate the actions of Agroecology and coexistence with the semiarid conditions, contributing to the strengthening of family farming.
Guideline 2: Socio-environmental Actions	Promote actions of recovery, preservation and conservation of the environment, based on agroforestry systems, prioritizing the maintenance of Caatinga and ensuring its sustainable management.
Guideline 3: Solidary Socioeconomics	Contribute to the expansion of farmers access to various forms of marketing and financing, giving priority to partnership for socioeconomic initiatives that favor autonomy, income generation and agro-ecological and solidarity fairs.
Guideline 4: Strengthening Social Organizations and Networks	Encourage social organizations initiatives for family farmers, with priority given to regional agro-ecological and solidarity networks.
Guideline 5: Rural Youth	Support organizational processes of rural youth in its social, environmental, economic, cultural and political dimensions, strengthening youth participation.
Guideline 6: Women	Contribute to the strengthening of the organization of rural women workers, to the exercise of their citizenship and the construction of egalitarian gender relations.



Guideline 7: Communication	Strengthen and expand popular communication processes, emphasizing communication as a human right.

### **Brief history of the entity**

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## **02. GOALS AND METHODOLOGY**

### **2.1 General Goal**

- ✓ Construction of 100 *Biodigestores Sertanejos* distributed in the territories of Acarau Valley (most of them), Aracatiaçu and Curu Valley and Central Brushlands – Ceará.

### **2.2 Specific Goals**

- ✓ Documentary and qualitative construction related to the project implementation process consisting of two written reports being, 1 Milestone of Exploratory Research to identify the profile of households helped by the project; 1 final report consisting on the description and analysis of the process and the measurement of project implementation results.
- ✓ Development of three newsletters, one for each territory, to spread the project, printed in 1,000 copies in Portuguese and 1,000 copies in English.
- ✓ Making of a video documentary.

### **2.3 Methodology**

We will take, as the basis for this project, the concepts of sustainability and agro ecology, promoting involved families' participation and direct interaction with the execution team during the project's activities development. Considering that the concept of sustainability covers the promotion of economic, social and environmental autonomy ensuring democratic, cultural, natural and organic and participation diversity in their different ways.

Considering also, that agroecology, as a science, seeks to establish sustainable rural development strategies from ecological principles and basic technologies the use of locally available renewable resources driven to meet the needs of farming families and for the maintenance of the productive potential of the land so that the use of less



aggressive technologies to the environment would also promote social inclusion and improvement of conditions of farming families. Thus, this project is guided on the following principles:

- ✓ On the participation of beneficiary families;
- ✓ On the didactic importance and energizing experience;
- ✓ On collective knowledge construction;
- ✓ In rating the capacity of farming families;
- ✓ On the promotion of exchange of knowledge;
- ✓ From a practical exercise of constructed knowledge.

In the realization of project, the staff will make meetings with the beneficiary families for the presentation of the Biodigestor Sertanejo building proposal, its benefits and its maintenance and for the application of a questionnaire to trace the of the families' profiles.

The qualification of a mason to build the digester to ensure the quality of implementation will happen. In addition, the staff will provide qualification for the families on the management of this technology.

In the building process, the beneficiary family will have to provide labor-work as servants of masons, the feeding of the construction team, a value of R \$ 80,00 to supplement the building material (sand) and the costs of digging the hole.

Throughout the project development process, the staff will follow-up monitoring and carry out evaluation technical visits. Those visits will support the project productions (Initial milestone, newsletter, documentary and final report).

### **03. DEVELOPMENT OF PROJECT ACTIONS**

The staff will engage on following activities:

#### **1. Awareness meetings with families.**

The meetings with the families consist of the first moment of the project, aiming at raising awareness about the importance of implementing the bio digester technology. On this moment, the criteria for the selection of households to be served by the project will be presented, namely:

- ✓ Meet the main conditions to implement a biodigester: biogas necessity, availability of raw materials (animal manure);
- ✓ Interest in implementing the experience on their property;
- ✓ Willingness to receive the technicians that will give technical assistance and rural extension in their properties;
- ✓ Interest in socializing the information that observed during the development of the experience for the technicians who will accompany the experience.
- ✓ Availability to afford the counterpart of the terms of this project.

Identifying the above criteria, a family registration questionnaire will be applied.



## **2. Training of masons on the construction of the digester**

The training aims to develop local capacity to implement the technology in the communities. The training will happen in a practical way with the participation of 10 people building a unit of biodigester on the property of one of the families to be helped by the project. It will have the support of a technical project execution team.

## **3. Monitoring the construction of biodigesters and monitoring of experiences implemented**

This process is important to ensure a good development experience. Six (06) visits will be conducted in each experience - from the process of choosing the location to be implemented the experience until the final phase and initial operation. Project execution technicians will carry out the visit. At each visit, a report will be made. In those visits, we have the following objectives:

1. Locate the optimal place to build the biodigester;
2. Check excavation;
3. Verificate the construction process;
4. Feed the digester;
5. Check the level of gas production;
6. Adapt the stove and training of families.

## **4. Systematization of experiences development data**

This process consists in organizing the information collected in the technical visits and meetings with families to express the viability of experiences, lessons the difficulties and challenges, as well as the analysis of the entire process. The systematization product will be the following:

- ✓ Exploratory research initial milestone in the identification of families profile and the implementation feasibility of the proposal in each property;
- ✓ Newsletter aiming on the dissemination of the experience;
- ✓ Final report stating the development of the whole process and its analysis, lessons learned, difficulties, challenges, household assessment on the experience, results and impacts and the accountability of the project;
- ✓ Production of a video documentary.

## **5. Experiences exchange**

Promote an exchange of experience in the Production Unit of one of the families served by the *Biogás Sertão* Pilot Project.



#### **04. EXPECTED RESULTS**

- ✓ Farmers adhering to renewable energy production dynamics;
- ✓ 100 units deployed and running.
- ✓ 10 masons capable of building biodigesters.
- ✓ At least 100 families understanding better the importance of environmental conservation.
- ✓ At least 100 families trained on renewable energy production technologies.
- ✓ Improvement of methodological and monitoring approaches of experiences with renewable energy implementation.

**05. Time schedule**

Schedule of excution									
ACTIVITY/ PERIOD	May/16	June/16	July/16	August/16	September/16	October/16	November/16	December/16	AMOUNT / SPECIFICATION
Tools development	X								1 family registration questionnaire, 1 visit report model
Families awareness visits	X	X							100 visits
Application of registration questionnaire	X	X							100 registration questionnaires
Experiences exchange			X						1 Exchange
Training of masons		X							1 training session



Biodigesters building			X	X	X	X	X		100 implementations
Technician follow-up and monitoring visits			X	X	X	X	X	X	600 visits
Exploratory research report / Initial milestone	X	X	X						1 report
Newsletter						X			3 newsletters, 2.000 copies
Video documentary						X	X	X	1 Video
Final report							X	X	1 Report

### 5.1 Disbursement Schedule:

INSTALMENTS	DATE	AMOUNT
1 <sup>st</sup> Instalment	2016, April 4 <sup>th</sup> Week	RS: 110.000,00
2 <sup>nd</sup> Instalment	2016, August 1 <sup>st</sup> Week	RS: 140.000,00
3 <sup>rd</sup> Instalment	2016, November 2 <sup>nd</sup> Week	RS: 104.291,00
<b>TOTAL</b>		<b>354.291,00</b>

**06. GENERAL BUDGET**

<b>DISCRIMINATION</b>	<b>FUNDRAISER BENTO 50 AB</b>	<b>FAMILIES</b>	<b>CETRA</b>	<b>TOTAL</b>
Building material	199.315,00	9.000,00		208.315,00
Fixed costs	-		123.480,00	123.480,00
Training	6.260,00			6.260,00
Mason labour	30.000,00			30.000,00
Mason servant labour	-	60.000,00		60.000,00
Staff	107.316,00		39.600,00	146.916,00
Comunication	11.400,00			11.400,00
Feeding	-	18.000,00		18.000,00
<b>TOTALLY</b>	<b>354.291,00</b>	<b>87.0000,00</b>	<b>163.080,00</b>	<b>604.371,00</b>



## 7.1 Biodigester Budget

BUDGET TO BUILD ONE BIODIGESTER UNIT				
DISRIMINATION	UNIT	AMOUNT	UNIT PRICE	TOTAL PRICE
Cement	Bag	9	25,00	225,00
Iron bar 6,3 mm	Kg	3	8,00	24,00
Galvanized wire type 12	Kg	5	8,00	40,00
Gravel type 01	Bucket	6	3,00	18,00
3.000 L Polyethylene watertank (FORTLEV)	Unit	1	1.100,00	1.100,00
0,40 m Zinc plate	Kg	5	7,00	35,00
08 Hole brick	Unit	100	0,60	60,00
100 mm PVC Drain pipe	Meter	6	8,00	48,00
50 mm PVC Rigid pipe	Meter	3,5	6,00	21,00
40 mm Iron pipe	Meter	3,5	9,90	34,65
60 mm PVC Rigid pipe	Meter	1,5	13,00	19,50
75 mm PVC Drain pipe	Meter	1	9,00	9,00
20 mm PVC Rigid pipe	Pipe	4	10,90	43,60
20 mm PVC Rigid LR Nipple	Unit	4	0,90	3,60
75 mm PVC Drain pipe Cap	Unit	2	4,50	9,00
20 mm PVC Rigid Tee joint	Unit	1	0,70	0,70
29 cm 3/8 Screw	Unit	1	1,50	1,50
20 mm Connection sleeve	Unit	1	5,50	5,50
20 mm PVC Rigid Elbow joint	Unit	8	0,70	5,60
60X60 mm Flange	Unit	1	18,00	18,00
20 mm Flange	Unit	3	6,50	19,50
20 mm Ball valve	Unit	2	7,50	15,00
25 mm Plastic hose	Meter	3	2,50	7,50
20 mm PVC LR Sleeve	Unit	3	2,50	7,50
Inner adapter for PVC hose ( <i>rabo de tatu</i> )	Unit	3	1,00	3,00
1/2" Endless worm threaded hose clamp	Unit	4	1,00	4,00



20L Acrylic bottle (mineral water)	Unit	1	25,00	25,00
0,15 x 0,10 Wood plank	Meter	2	30,00	60,00
Wooden beam	Meter	9	10,00	90,00
Thread seal tape (Big)	Unit	1	2,50	2,50
8 cm 3/4 c Screw and Nuts	Unit	4	4,00	16,00
Glue for plastic (Small)	Unit	1	3,50	3,50
Nylon net 1,50 x 0,80	Meter	1	4,00	4,00
Epoxy 100 g	Unit	1	7,50	7,50
Silicone adhesive 50g	Unit	1	6,50	6,50
<b>TOTAL</b>				<b>1.993,15</b>
<b>MASON LABOUR</b>	<b>Unit</b>	<b>3</b>	<b>100,00</b>	<b>300,00</b>
<b>BIODIGESTER TOTAL COST</b>				<b>2.293,15</b>

## 7.2 Statement of Calculation

### Staff – N° of Technicians: 07

Item	Specification	Unit	Amount	Unit Price	Total Price	Total Cost
1	Project Coordinator (Mário Farias Junior)	Monthly	1	3.750,00	3.750,00	
2	Agricultural Technician	Monthly	3	1.500,00	4.500,00	
3	Comunicator	Monthly	1	2.000,00	2.000,00	
4	Administrative Assistant	Monthly	1	880,00	880,00	
5	Social charges (INSS Patr, FGTS, PIS)	Monthly	1	7.234,50	7.234,50	
	<b>TOTAL</b>				<b>18.364,50</b>	<b>146.916,00</b>

### Fixed Costs

Item	Specification	Unit	Amount	Unit Price	Total Price	Total Cost
1	Sobral house rent	Monthly	1	500,00	500,00	
2	Phone	Monthly	1	300,00	1.000,00	
3	Energy	Monthly	1	200,00	560,00	
4	Water	Monthly	1	20,00	20,00	
5	1 Car / 4 motorcycles rent	Monthly	1	6.200,00	6.200,00	
6	Internet	Monthly	1	75,00	75,00	
7	Fuel	Monthly	1	3.500,00	7.000,00	
8	Educational material	Monthly	1	80,00	80,00	
	<b>TOTAL</b>				<b>15.435,00</b>	<b>123.480,00</b>

**Experiences Exchange**

Item	Specification	Unit	Amount	Unit Price	Total Price	Total Cost
1	Trainees travel	Unit	15	40,00	600,00	
2	Food	Unit	18	50,00	900,00	
3	Educational material	Unit	15	10,00	150,00	
4	Travel	Freight	1	1.200,00	1.200,00	
	<b>TOTAL</b>				<b>2.850,00</b>	<b>2.850,00</b>

**Masons' Training**

Item	Specification	Unit	Amount	Unit Price	Total Price	Total Cost
1	Trainees travel	Unit	10	40,00	400,00	
2	Food	Unit	45	18,00	810,00	
3	Cookers	Day	3	60,00	180,00	
4	Gas allowance	Unit	1	20,00	20,00	
5	Educational material	Unit	10	150,00	1.500,00	
6	Trainees allowance	Unit	10	50,00	500,00	
	<b>TOTAL</b>				<b>3.410,00</b>	<b>3.410,00</b>

**Communication**

Item	Specification	Unit	Amount	Unit Price	Total Price	Total Cost
1	Newsletter	Unit	6.000	0,90	5.400,00	
2	Video documentary	Unit	1	4.500,00	4.500,00	
3	Photography	Unit	300	5,00	1.500,00	
	<b>TOTAL</b>			<b>4.505,90</b>	<b>11.400,00</b>	<b>11.400,00</b>

Fundraiser/Financiador: *Bento50 AB*

Execution:



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**Families' Counterpart**

Item	Specification	Unit	Amount	Unit Price	Total Price	Total Cost
1	Building materials - Sand	Buckets	9.000	1,00	9.000,00	
2	Food during the construction	Money (R\$)	100	180,00	18.000,00	
3	Servant Labour	Day	1.500	40,00	60.000,00	
	<b>TOTAL</b>				<b>87.000,00</b>	<b>87.000,00</b>