

# SOLAR COOKERS SYSTEMS IN SOCIAL INTEREST HOUSES BUILT BY THE STATE IN CHUBUT, ARGENTINA

Arq. Edgardo Mele  
Instituto Provincial de la Vivienda

Don Bosco 293. 9103.  
Rawson, Chubut, Argentina.  
edmele@hotmail.com

Arq. Liliana De Benito  
Instituto Provincial de la Vivienda

Don Bosco 293. 9103.  
Rawson, Chubut, Argentina.  
lilianadebenito@yahoo.com.ar

Arq. Beatriz Garzón  
FAU-SeCyT, Universidad  
Nacional de Tucumán-CONICET.  
Av. Roca 1900. 4000.  
S. M. De Tucumán, Tucumán, Argentina.  
bgarzon@cgcet.org.ar

## ABSTRACT

**Objectives:** To encourage the spread use of solar cookers in a management and production model of houses built by the State for the improvement of the rural dwellers' quality of life and the protection of the environment in three districts in Chubut, a province in the south of Argentina.

**Methodology:** The Participative Action Research (Investigación Acción Participativa, IAP) has been used, in order to be aware of this place's reality and to transform it. The aim of this transformation is to value participation and popular knowledge as tools for a wholesome change.

**Results:** We have sought to reinforce the commitment and the capacity of the community to use the power resources available in an independent, rational and reflexive way.

**Conclusions:** The proposal is supported by a strong involvement in the qualifications of the users for the spread and adoption of alternative technology systems that respond to the environmental, socio-economic and functional needs and/or requirements of the families and communities in question, in order to favour a sustained settling process and re-evaluation of its natural and cultural context.

**Key Words:** Solar cooker systems, social interest houses, management and production by the State

## 1. INTRODUCTION

In rural areas of scanty resources, many families spend a great percentage of their income in cooking fuel. In this

respect, it should be noted that one kilogram of wood is needed to boil one litre of water. But they also spend time collecting it.

Many of these families suffered from breathing and visual problems due to the extreme conditions in which they cook. The amount of smoke equals the smoke of 2 or 3 packets of cigarettes a day.

It is estimated that between 400 and 700 million people, mainly women, suffered from breathing problems caused by smoke.

Also, billions of human beings suffered from diseases like diarrhoea due to the lack of drinking water.

Another consequence is malnutrition which is caused, in most cases, by lack of food, but also by the inadequate cooking processes because of the shortage and high cost of the fuel.

Another reason is the use of only one saucepan which means that different meals cannot be prepared at once.

On the other hand, there is a shortage of fuel in many towns, and so, people are turning to the burning of dried cattle excrement or leftovers from the different harvests.

This takes away important fertilizers from the soil.

Moreover, in some high Andean regions where there is very scarce vegetation, people burn bushes' roots as they have more energetic value.

This results in the erosion and destruction of the soil, the pollution of our water resources and the loss of soil fertility.

In this way, the desert is dangerously taking over more territory.

## 2. BACKGROUND

“A Management and Production Model for family houses by the State for the improvement of the quality of life of scattered and isolated rural communities in Chubut, Argentina” is presented in this project.

In this project, we also state an architectural prototype which is adjusted to the needs and tough conditions of the place, together with the incorporation of the appropriate technology for the use of solar energy for the cooking and baking of food (Mele, De Benito, Garzón, Piva. 2006).

This project has been developed to promote the search for original everyday phenomena and common applications of thermo-physical laws and principles.

This is carried out so as to generate solutions to the different problems in each house, in different places.

Furthermore, we believe it is highly important to value the daily use of alternative power sources, such as solar power, in order to decrease the negative environmental impact produced by burning different fuels (Garzón, Fernández Abregú, 2005).

We have sought to reinforce the commitment and the capacity of the community to use the power resources available in an independent, rational and reflexive way.

## 3. PROPOSAL

### a) Objectives

- **General Objective:**

- To encourage the spread use of solar cookers in a management and production model of houses built by the State for the improvement of the rural dwellers' quality of life and the protection of the environment in three districts in Chubut, a province in the south of Argentina.

- **Specific Objectives:**

- To favour the possibility and need of using alternative power sources in complementary facilities for cooking and baking in social interest houses,

- To transfer efficient, low cost simple solar cookers with support from the State,

- To train people for the use and maintenance of the solar cookers.

### b) Geographic area considered

The area considered for this project correspond to three districts in the plateau of Chubut (Fig. 1):

- Rinconada,
- Ñorquinco Sur
- Fofó Cahuel (Fig. 2).

It is situated in 42° 18' South latitude and 70°34' West, at 589 meters above sea level.



**Fig. 1 Chubut: Geographic situation in Argentina.**



**Fig. 2 The three districts considered in Chubut.**

This is part of a larger geographic area known as Patagonic Plateau which is going through a dramatic enlargement of its desert area. This is caused, in part, by the pressure of the antropic activity of the place.

The weather of this part of Argentina is desert, dry during the summer and cold with snow and freezing periods in winter.

There are strong winds, sandstorms and dust suspended in the air that rotate from north-northwest to southwest.

Also, temperatures are high during the day and low at night. This big thermal differences takes place in summer as well as in winter.

The vegetation, which is a consequence of the climatic characteristics, is xerophilous, not very high and with presence of dry pastures which are used to feed goats and sheep.

This is the economic source of the inhabitants of the Patagonia (Fig. 3).



**Fig. 3 The plateau of Chubut.**

**c) People involved**

The project seeks to take its results to aboriginal families who are land owners in the area already mentioned.

They would have to be in a Habitat and Productive Conditions Improvement Program for scattered rural dwellers and small communities in Chubut, Argentina, which began 1 October 2004.

Two institutions from two provinces in Argentina (Instituto Nacional de la Vivienda de Chubut and the Universidad Nacional de Tucumán) will develop a joint action through pre-existent agreement.



**Fig. 4 Intersectorial coordination.**

This project was needed because research about healthy rural conditions have not been carried out in Chubut .

In this respect, this work should have an interdisciplinary and intersectorial perspective (Fig. 4 y Fig. 5).

The project began, in a joint and official way, with the agreement between the Infrastructure Planning and Public Services Secretary, the Province Institute of Housing and Urban Development, the Cushamen Council, the Executor Provincial Unit and the Ministry of Family and Social Development and the Ministry of Production.



**Fig. 5 The participants.**

**d ) Methodology**

The Participative Action Research (Investigación Acción Participativa, IAP) has been used, in order to be aware of this place's reality and to transform it. The aim of this transformation is to value participation and popular knowledge as tools for a wholesome change.

**e) Technological factors used**

The Cushamen Council received, years ago, donated solar systems for the spread use of solar cookers for cooking and baking (Fig. 6 and Fig. 7).

They are:

1. Prototype 1



**Fig. 6 Parabolic solar cooker**

2. Prototype 2.



**Fig. 7 Cooker with reflective lid**

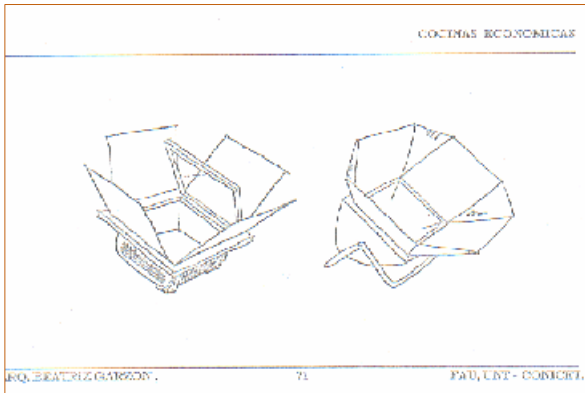
**d) Activities developed**

The stages performed are:

1. Spread use and training (Fig. 8, 9, 10):



**Fig. 8 Promotion of the systems.**



**Fig. 9** Didactic publication (Garzón. 1996).



**Fig. 10** Workshop about solar cookers systems.

2. Prototype use demonstration (Fig. 11, 12, 13, 14):



**Fig. 11** Explication about the characteristics.



**Fig. 12** Solar cooking .



**Fig. 13** Meat solar baking.



**Fig. 14** Solar baking by the rural people.

Management planning and organization (Fig15,16)



**Fig. 15** Communitarian meeting for actions development



**Fig. 16** Compromise agreement.

3. Incorporation of the system in the architectural prototype.



**Fig. 17** Cooking and baking by the users of the first bioclimatic house built by the state in the south of Argentina (Mele, De Benito, Garzón, Piva. 2006).

#### **g) Aims of the project**

1. To take advantage of the solar power available
2. to get the users to watch and understand the principles of heat changes in a solar cooker/oven
3. To improve sanitary and work conditions
4. To spread these systems for their later adoption

- Garzón, B., Fernández Abregú, L. Unidad Integrada Cocina-Horno Eficiente: Manual para su Construcción y Recomendaciones para usarla. Formulario 74402 ISBN 987-43-9069-7. Tucumán, Argentina. 2005.

#### **4. CONCLUSION**

The proposal is supported by a strong involvement in the qualifications of the users for the spread and adoption of alternative technology systems that respond to the environmental, socio-economic and functional needs and/or requirements of the families and communities in question, in order to favour a sustained settling process and re-evaluation of its natural and cultural context.

We can also say that both solar cooker systems allow the use of two saucapans, and in this way different meals can be prepared simultaneously.

And, the food is well cooked helping the digestion and/or the absorption of nutrients.

Also, water can be pasteurised at 65°C reducing diarrhoeic diseases. And finally, these cookers do not produce smoke, so breathing and visual problems are expected to decrease, too.

Another aspect to take into account is the fact that the burning of dried excrement and harvests left over will also be reduced.

So, these important fertilizers will enrich the soil of the region and we can expect a reduction of the deforestation process and soil erosion.

Solar cookers will allow their users to avoid the use of wood, kerosene, coal and gas; and they can be used as useful tools to develop the economy of rural families.

#### **5. BIBLIOGRAPHY**

- Mele, E.; De Benito, L.; Garzón, B; Piva, R. Arquitectura Bioclimática: Experiencia Intersectorial en la Producción de Viviendas de Interés Social en Chubut, Argentina ConstuTierra 2006. Bogotá, Colombia. 2006.
- Garzón, B. Cocinas Solares. CONICET. 1996.