

The Market of Heating Water with Solar Energy for Popular Domestic Home Consumption in Sergipe

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Abstract

This paper pretends to motivate the debate of the market of heating water using solar energy in popular homes, in the northeast region of Brazil, built or financed by the State Government. In the study was taken into consideration the hydraulic infrastructure of the houses, number of inhabitants, timetable of the usage of hot water to shower, the mechanisms used to heat water, situations in which the population wants hot water to shower, the capacity of payment of the population for the acquisition of the heating system. The study, accomplished in the state of Sergipe in 2002 also, projected the different ways approved by the population to market and commercialize systems of heating water using solar energy. The relevance of the study is to identify the characteristics of the demand of hot water, making possible an understanding of the different ways in which the population living in popular homes uses and wishes to use hot water to shower. This study collected information for the adoption of public policies and commercial strategy for the implantation of water heated by solar energy to be used in popular homes in the northeast region of Brazil.

Key words: To Heat, Marketing, Popular Homes, Shower, Solar,

1. Introduction

In the northeast region of Brazil, where the radiation of the sun is strong during the whole year the population doesn't use the solar energy to heat water to shower.

This text pretends to motivate the debate of the market of heating water using solar energy in popular homes, in the northeast region of Brazil, built or financed by the State Government.

The information submitted is the results of a research financed by FAP-SE (*Fundação de Ampara a Pesquisa do Estado de Sergipe*), through the “Study of Viability the Applied Solar Local Production of Heaters Water in Popular Homes”, it was made in popular homes, during the second semester of 2002, in state of Sergipe. The research tried to identify the demand of hot water to shower. Before the research it was almost self understood that due to climate conditions of the specific area with sun and hot weather year around, there was no need or desire the use of hot water to shower.

But the truth is that there are factories of electric hot showers and that this product is openly offered in the local market in the area.

Taking these facts into consideration a survey was made interviewing the residents of 174 homes, chosen at random, in a development of the State of Sergipe, among people with the same income and living conditions.

The relevancy of the survey is to identify the characteristics of the demand of hot water among these inhabitants, trying to make a critical appraisal of how they are using or wishing to use hot water to shower. This study collected information for the adoption of public policies and commercial strategy for the implantation of water heated by solar energy to be used in popular homes in the northeast region of Brazil.

This paper presents the method of collection data, the characteristic of the researched universe and sample, the main results of the research and important aspects of system of heating water with solar energy for popular homes.

2. Method

During 1968 and 2002, 56055 popular homes were built in the State of Sergipe by *Companhia Estadual de Habitacao Popular Obras Publicas de Sergipe (CEHOP)*. The homes surveyed were chosen in the *Complexo Habitacional Governador João Alves Filho*, in the development *Conjunto Siri I*, second stage, in the *Municipality of Nossa Senhora do Socorro*. Trying to be fair in the selection of the homes chosen for the survey five blocks were drawn by luck among the twenty blocks of the total development.

The blocks drawn had different number of houses. The surveyors interviewed the residents of all the houses in the block, not taken into consideration the vacant homes or the businesses sites.

The units are considered popular since they were built and financed by the Government of Sergipe.

The information for the draw was taken from the archives of *Partido Urbanistico do Complexo Habitacional Governador João Alves Filho*, filed at the *(CHEOP) Companhia Estadual de Habitacao e Obras Publicas de Sergipe*.

To collect the information in the blocks, 8 people were hired and trained from a neighbor community through a local computer school. The training lasted six hours two days before the survey started.

It was estimated in reference to information established in the Urban Plan that the questionnaire was to be applied to 150 homes. This number was estimated taking into consideration the fact that the development had been completed for over 16 years, which brings some alterations in the original characteristics of the homes and the lots, some were used for commerce sites instead of living quarters, some destroyed or converted into religious temples. Also, some lots had been sub-divided and originated more homes.

The characteristic of choosing the sample homes at random was the fact of all the blocks had the same opportunity of being chosen, and on the block all the homes had to be visited.

According to the Urban Plan, the second stage of the *Siri I* development had initially 690 homes of two different types: SE.36I.3.44 (house of 3 bedrooms 44 m²); SE.36.I.1.29 (house of 1 bedroom 29m²); SE.36.I.2.37 (house of 2 bedrooms 37m²), all build in 150m² lots.

One hundred seventy nine homes were surveyed; each questionnaire had thirty questions. Five questionnaire were eliminated due to filling errors, a hundred and seventy four were tabulated following the Lotos Approache system.

The survey identified the following facts: hydraulic infrastructure of the homes, number of inhabitants, time schedules of the hot water used to shower, mechanisms used to heat the water, situations in which the inhabitants wishes the use of hot water, financial facilities of the inhabitants for the payments to use hot water, it was not established the consumption of hot water per house. The research, also, took into consideration the opinion of the public on how to establish the marketing and advertising of the use of solar energy for heating water.

3. Results

The results indicated that only 16,09% of the population do not use hot water to shower, that 28,74% of the homes have electric hot showers installed but only 16,89% use it regularly and 11,85% are unplugged or broken. In the houses where the survey was performed 52,30% of the people heat the water to shower on the stove, the best reason for taking a hot shower are the considered cold days. (Table A1).

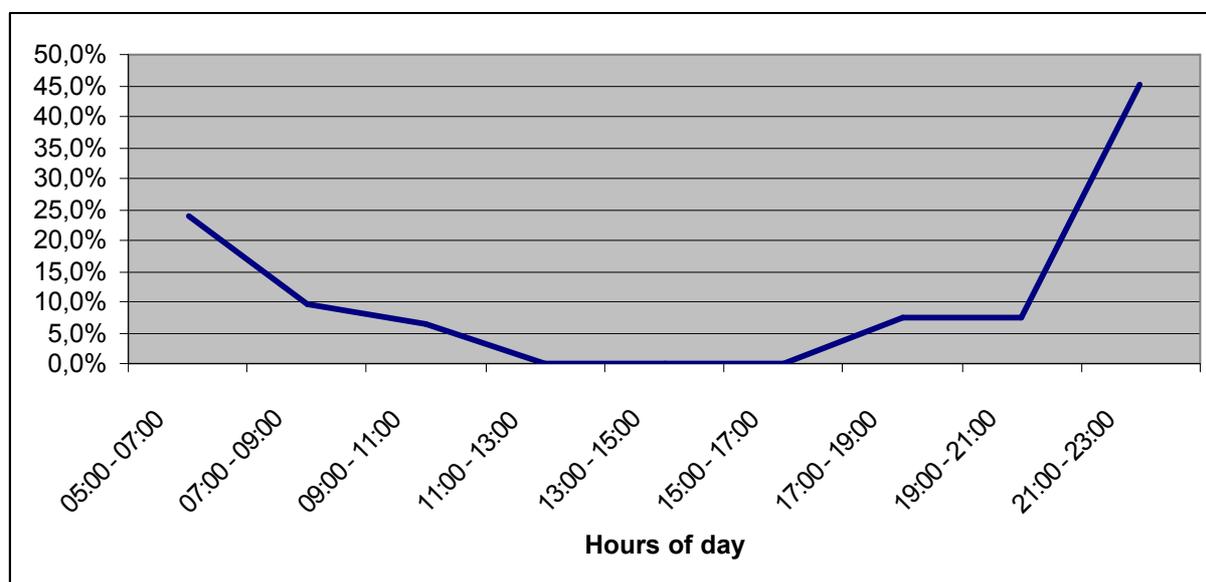
77,59% of the interviewees declared the wish to have hot water for regular shower, as long as it will not increase the energy cost. 46,55% declared to be able to pay up to US\$ 4,00 per month to finance the solar system, 23,00% declared that they would like to have the heating water system financed together with the home.

Table A1. Water usage to take hot showers and heating mode

Heating Procedures Usage Situations		Gas Stove (GLP)	Gas Heater (GLP)	Coal	Don't Use	TOTAL	%
Always	9	9	1	0	0	19	10,92%
Cool Days	17	35	0	1	0	53	30,46%
Sickness	12	13	0	2	0	27	15,52%
Old People	0	4	0	0	0	4	2,30%
Children	4	2	0	0	0	6	3,45%
Other	8	28	0	1	0	37	21,26%
Never	0	0	0	0	28	28	16,09%
TOTAL	50	91	1	4	28	174	100%
	% 28,74%	52,30%	0,57%	2,30%	16,09	100%	

The average number of inhabitants per home is 5, being that only about 3 had the habit of using hot water to shower. 23,80% of hot shower are taken between 05:00 and 07:00 hours and 45,10% between 21:00 and 23:00 hours (Graphic 1A).

Graphic A1. Distribution hot showers per hour



In spite of not having the appropriated hydraulic installations to have the heating solar energy system installed, 86,00% have water tanks with a capacity superior to 500 liters installed on top of the house, making easier the future installation of the water solar energy heating system.

When asked about the possibility of them acquiring *Kits* to install their own solar heating system, only 20,11% declared being interested on doing it, 35,06% declared to have thought about it, 38,73% would like to see it working or to have contact with another user.

When asked about the marketing system to be used for advertisement of the system only 20,11% suggested TV and 51,15% mouth to mouth.

4. System of Heating Water with Solar Energy for Popular Homes

The system of heating water using solar energy is already technical known but they have not been commercialized, as much as the traditional electric shower, for being considered of high acquisition cost. Research institutions like *Labsolar* in *Santa Catarina*, *Sunpower Engenharia* in *Sao Paulo* and *Instituto de Tecnologia e Pesquisade Universaida da Tiradentes (ITP/UNIT)* in *Aracaju*, have worked in projects to reduce the installation costs of this system. At the time the research made in Sergipe, the cost, as an average, was for a five inhabitants home was US\$800 without taking into consideration the installation. This cost is completely out of the budget for the people living at *Conjunto Siri I*.

The proposal of an ASBC – low cost solar heater, of *Sunpower Engenharia* – using alternate materials, was successfully tested by *ITP/UNIT* in 2002, producing 120 liters of hot water using 1,54 m² of PVC plates at an average temperature of 48 degrees centigrade every day at 6 am at a cost of approximately US\$ 35 per unit. This ASBC cost is compatible within the reality of the population surveyed, but the production of solar heated water to take care of the popular homes requires the knowledge of the daily water demand of the families in order to make it work without the necessity of additional energy.

The equipments to heat water by solar energy can be considered as a simple mechanical system of easy fabrication, there is no need of any special material but they are not manufactured locally in Sergipe, they are manufactured in other states and sometimes do not have the required specifications for the local for the local climate conditions with strong hot sun which facilitate the usage of smaller and cheaper systems. The heat and strong sun contrary to what was thought is not a barrier to the utilization of using hot water to shower as it was found in the survey 77,9% of interviewees would like to have hot water available but only 10,8% declared to use it. This difference between the usage and the desire to have hot water is connected to the cost of heating water with electricity or gas. Another proof of this significant cost is the custom of 52,30% of the houses surveyed in specific situation use the stove to heat the water to take a shower.

5. Conclusion

Using the data obtained from the survey it was concluded that the popular homes built or financed by the State Government could become a market for the system of water heated solar as long as the following items are taken into consideration: the capacity of payment of the population, the specific characteristics to measure the different systems in relation to the strong sun of the region, the cost should be incorporated to total of the financed home, and a program on how to use solar energy. These requirements will be different for each particular area.

In order to measure the size of the demand for hot water in a region it is necessary for the population to study their specific behavior and needs when hot water is offered to them without the extra energy cost involved.

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