

# Sunstove Market Research in Zimbabwe

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A report prepared for

ProBEC

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## 1. Introduction

There exists a need to increase the use of renewable and alternative energy technologies from an environmental perspective as well as a socio-economic one. The relentless pursuit for cheap carbon-based energy has not only severely depleted existing resources, but has brought great harm to our natural environment through climate change and global warming.

Given the many pressing concerns facing the developing world, in particular rural sub-Saharan Africa, attending to environmental issues is often considered a luxury, as people battle daily to survive. Environmental degradation takes second place in order of priority as people focus on meeting their basic yet vital energy needs for cooking, heating and sometimes lighting. These energy needs are met primarily by burning of biomass, and the utilisation of traditional energy sources, but increasingly basic energy in the form of fuel gels, paraffin and gas is being used.

Zimbabwe is no different, and in some cases worse off than its neighbouring countries in Southern Africa. Issues regarding energy security that have plagued rural lives for years are now visible in urban areas too, where a lack of infrastructure, more specifically the lack of access to existing infrastructure, has forced urban dwellers to utilise both traditional and alternative energy sources for basic household use. This has impacted severely on the biomass resources of the country and has resulted in the intensified competition for such resources.

In addition government has begun to formally sell biomass in the form of fuelwood from allocated woodlots. This has the potential to severely impact the access to energy for rural dwellers that do not possess the buying power that urban dwellers do. Furthermore the deteriorating political-economic climate in Zimbabwe has exacerbated this problem and has created a situation whereby purchasing of goods and paying for services is in itself a difficult task.

## 2. Background

### 2.1 Fuelwood use in the current Zimbabwean political-economic climate

According to Mujokoro (2007), the urban demand for fuelwood is accelerating the degradation of the country's woody vegetation so much so, that the Forestry Company of Zimbabwe has indicated that the country loses as much as 400 000 hectares of forest and woody vegetation a year<sup>1</sup>. Furthermore, this has had a

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<sup>1</sup> [www.allAfrica.com](http://www.allAfrica.com), Mujokoro, J, *Energy Crisis Threatens Environment*, 18 September 2007



negative effect on rural livelihoods. Mujokoro argues that the increased demand for fuelwood has led to economic decline and stagnation in rural areas. This is particularly experienced by those who use fuelwood to cure tobacco and tea, especially those who work in the various rural cottage industries that support this activity in Zimbabwe.

In Zimbabwe, the use of such energy sources for the rural population has been restricted, which has in turn had the effect of amplifying calls for renewable and alternative energy. This will not only ease the burden on the environment but will providing alternatives for those who cannot access the existing infrastructure and are forced to use fossil fuels.

According to a UNEP country study on Zimbabwe (Fenhann et al., 2002; 34)<sup>2</sup>, fuelwood accounted for 50% of the entire energy consumption of the country. Significantly, it was found to be the major source of energy for cooking, heating and lighting for over 80% of the rural population.

Unfortunately there has been no study that has updated these findings, but it is largely assumed that these figures would have increased dramatically given population growth and a growing energy crisis in Zimbabwe. Thus the need for renewable and alternative energy technologies in Zimbabwe seems essential, as it will certainly help curb the large-scale environmental degradation taking place and has the potential to improve the livelihoods of both rural and urban dwellers.

## 2.2. Background to the Sunstove

Solar Cookers harness solar energy by using principles of reflection, concentration, glazing, absorption and the greenhouse effect to produce heat<sup>3</sup>. There are various types of cookers that are now available on the market, but the market research exercise concentrated entirely on the Sunstove. The reason for this is that the Sunstove is a commercially available product and relatively affordable in comparison with other solar cookers available.

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<sup>2</sup> Fenhann, J V & Painuly, J P, *Implementation of Renewable Energy Technologies – Opportunities and Barriers : Summary of Country Studies*, UNEP Collaborating Centre on Energy and Environment, RisØ National Laboratory, Denmark, 2002

<sup>3</sup>“Assessment of the Commercialization of selected Sustainable Energy Technologies, Products and Services: Solar Cookers”, Palmer Development Consulting, July 2001.



**Figure 1: The old (left) and new design on the Sunstove**

### 2.2.1 Description and Materials

This solar cooker falls under the generic type of solar ovens and was originally developed from a box cooker. It is made up of a few materials, importantly most of the materials used are recycled or waste material discarded from industrial usages. It consists of:

- A plastic outer casing, made from recycled material.
- Aluminium reflector linings, made up of scrap aluminium printing plates.
- A poly-carbonated lid. This lid replaced an acrylic lid that was used in previous models, particularly because of its durability and its ability to maintain its shape.
- The stove is insulated with fibreglass.

The Sunstove solar cooker costs about ZAR 195.00, the previous model cost ZAR 135. This is because the replacement of the cheaper acrylic lid with the poly-carbonate lid raised the cost – a necessary sacrifice for increased efficiency in handling and utilisation of the product.

### 2.2.2 Functionality

The low-cost case or housing of the Sunstove is blow-moulded from 75% reground plastic bottles and 25% of virgin material. It can also be injected, vacuum or rotary moulded<sup>4</sup>. The sloped, internal walls and the black bottom of the Sunstove are comprised of a single piece of scrap aluminium. (An off-set, lithograph, printing plate is purchased locally.) The reflector sides, whether soiled, dull or painted black, will reflect, radiate and conduct the sun's energy to the black cooking pots<sup>5</sup>. The side walls are insulated with fibreglass blanket and the bottom with high density fibreglass to support the pots of food. Cotton, wood, mineral wool, jute, hemp, etc. can be used but the aluminium bottom may require support to maintain the insulation thickness. The large aperture lid of the Sunstove partially

<sup>4</sup> [www.sungravity.com/molded.html](http://www.sungravity.com/molded.html)

<sup>5</sup> [www.sungravity.com/molded.html](http://www.sungravity.com/molded.html)



compensates for the elimination of external reflectors. The temperature of the food will exceed the cooking temperature of approximately 80°C. Furthermore the water used in cooking acts as a heat sink and limits the food temperature to 100°C. Therefore the temperature of the pot cover can exceed 148°C<sup>6</sup>.

Because of its shape the stove can be easily stacked one upon the other, making handling and transportation of the stoves easy and cheap, and for this reason the lid is provided separately. To ensure optimum cooking conditions black enamel pots are supplied with the Sunstove, these cost ZAR 20.00 to ZAR 30.00.

However the company providing these enamel pots are stopping production, and it is critical to deal with this gap to ensure the enhanced functionality of the product – either by finding a replacement enamel pot supplier or a replacement product itself. Ceramic has been highlighted as a decent replacement. A solution must be found so as not to jeopardise future developments.

In addition, a cooking/recipe book demonstrating the most efficient ways to cook tasty meals with the Sunstove is supplied at no extra cost.

### 2.2.3 Reflections on the commercial dissemination of the Sunstove

Traditionally the dissemination of solar cookers globally was non-commercial<sup>7</sup>. However, projects like the South African Solar Cooker Field Test (SCFT) have assessed not only the importance of commercial dissemination of solar cookers but also its viability. The Sunstove Organisation, the company that produces the Sunstove, has been active in the market selling solar cookers for almost twenty years, and although production is on a relatively small scale, it is one of, if not the only, self-sustaining solar cooker programme in the country. The Sunstove design has been sold to companies and non-profit organisations in India and Mexico, however not much is known about the success of the Sunstove in those countries.

### 2.2.4 Social and commercial acceptance of Solar Cookers

Since the initial assessments of the commercialisation of solar cookers, it has been difficult to place them in mainstream renewable energy markets. One of the major issues surrounding this was that it was hard to obtain social acceptance. This was primarily because solar cookers were targeted as renewable energy technologies for the rural poor and in general those that did not have access to and/or could not afford electricity. Whilst it might not be in the scope of this report to accurately account for why this was the case, it can be said that solar cookers were perceived by those that it was aimed for (low-income rural and peri-urban households depending on biomass energy as their primary energy source) as a step backward

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<sup>6</sup> See footnote 5

<sup>7</sup> “Assessment of the successful Commercialization of Sustainable Energy technologies, Products and Services: Solar Cookers”, Palmer Development Consulting, July 2001.





since most household aspire to use conventional electricity. Solar cookers were perceived as slow and inconvenient and most people found it easier to carry on using paraffin or biomass.

### **3. Aim**

The aim of the Sunstove Market Research was to assess potential opportunities for the introduction of the Sunstove as an alternative renewable energy technology in Zimbabwe. Given the state of the existing energy infrastructures currently in the country, and that people were forced to increase their use of fuelwood and other alternative or traditional fuel sources, it was envisaged by the Sunstove Organisation that the introduction of its product in Zimbabwe will serve two purposes.

Firstly, it will attempt to ease the strain placed on natural resources by the increased consumption of fuelwood in both urban and rural areas by providing an alternative, renewable cooking technology that will supplement the existing cooking technologies and methods. Secondly, it forms a central component in a planned marketing campaign that ProBEC is providing to support the Sunstove Organisation, improve its image and increase the exposure of the Sunstove.

### **4. Methodology**

A simple questionnaire survey was the main method of assessment. The venue where these questionnaires were administered was the Harare Agricultural Show. The exercise took place on the first three days of the show itself. ProBEC has historically had a stand in the show and it was felt that the product should be on display at this demonstration stand, along with other products that ProBEC actively promotes, including the *rocket* woodfuel stove, charcoal clay stoves and another solar cooker product, a parabolic reflector cooker. The Harare Agricultural Show is an important event in Zimbabwe and attracts a wide range of people from both rural and urban areas.

The sample group was selected randomly and included both individuals that were interested in the Sunstove and those that showed no interest initially. These individuals were approached by a ProBEC member conducting the assessment and given information on the product and asked if they would like to participate in the investigation. Upon agreeing, the individual was asked questions ranging from the perceived functionality of the Sunstove to the perceived financial costs. It was agreed that 50 returns would be an acceptable return for an accurate assessment.



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## 5. Objectives

The main objective of the market investigation was to increase exposure of the Sunstove. Based on the perceptions of the product and bearing in mind the current Zimbabwean political economic situation, it is hoped that this report would inform a decision on determining the feasibility of integrating the product into the Zimbabwean market. The Sunstove Organisation would benefit from such integration as it will allow for the expansion of the existing production capacity to cater to the Zimbabwean market, and in turn benefit the producers. For Zimbabwe it will mean access to an alternative cooking technology that can reduce the strain on demand for fuelwood and in the long term provide financial and energy savings.

## 6. Results

It was initially envisaged that 50 samples be taken to ascertain a fair assessment of the perceptions toward the product and toward energy savings in general. However, due the lack of popularity of the event this year, only 35 samples were obtained. This was due mainly to the fact that many people from outlying and rural areas could not secure transportation to and from the event itself. This was a trend that was exhibited for the three days that the survey took place at the Harare Agricultural Show.

There were in total 35 survey questionnaires that were completed. The results are based primarily on these questionnaires.



**Table 1: The perceptions of the Sunstove and other cooking technologies according to geographical distribution**

<b>Criteria</b>	<b>Total from Samples</b>	<b>Rural</b>	<b>Urban</b>	<b>Peri-Urban</b>
No. who are interested in the Sunstove	28	3	24	0
No. who liked the Sunstove specifically	9	1	8	0
No. interested in Parabolic Solar Cooker mainly	8	1	7	0
No. interested in rocket stoves	24	4	20	0
No. not interested in the Sunstove	7	2	5	0
No. that would buy the Sunstove on credit	6	1	5*	0
No. that would buy rocket stoves that were on display on credit	29	4	25*	0
No. that would buy the parabolic solar cooker on credit	7	1	6*	0
No. interested in an energy efficient stove	35	6	29	0
No. of samples	35	6	29	0



\* Overlapping of preferences<sup>8</sup>

These criteria were chosen because they illustrate different perceptions on the Sunstove in relation to the two other popular cooking technologies on display.

Since the economic situation in Zimbabwe has drastically restricted the ability of people to purchase products that they might do under normal circumstances, the criteria regarding the availability of a **credit facility** was also included. It is this criterion that reflects most accurately and honestly, the perceptions toward the Sunstove product.

Given the option of credit facilities, it was found that the rocket stove was the most preferred technology, and it emerged that credit was the most critical consideration when deciding to buy such a product. Only 7 people were totally uninterested in buying it, while the other 28 that said they would buy a Sunstove were usually deterred by perceived inefficiencies in functionality, and a view that the technology would simply not work. Thus they felt that the Sunstove is a cooking technology that is not a necessity, and because they already use wood in both urban and rural areas, the rocket stove ultimately seemed more viable because it reduced the amount of wood used.

It is also important to note that the criteria were compared between urban, rural and peri-urban dwellers. Even though it is a vague indicator of socio-economic standing and class, it is nonetheless essential in understanding the perceptions toward the Sunstove over a wide range of income groups. There were no people present that represented the peri-urban group so this group will be omitted from future discussions.

There was a significant noted difference between the perceptions of rural and urban dwellers toward the Sunstove. However it should be noted here that accurate comparisons and correlations cannot be clearly construed given that only 6 of the 35 samples were in fact from rural areas. Thus one can only draw assumptions based on the trends exhibited from rural areas in relation to those from urban areas.

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<sup>8</sup> This overlapping occurred because some samples indicated that they would like to purchase more than one type of stove. Only once was both the parabolic solar cooker and the Sunstove chosen. The other two times the rocket stove and Sunstove were chosen.



**Figure 2: Willingness to purchase appliances if credit were available**

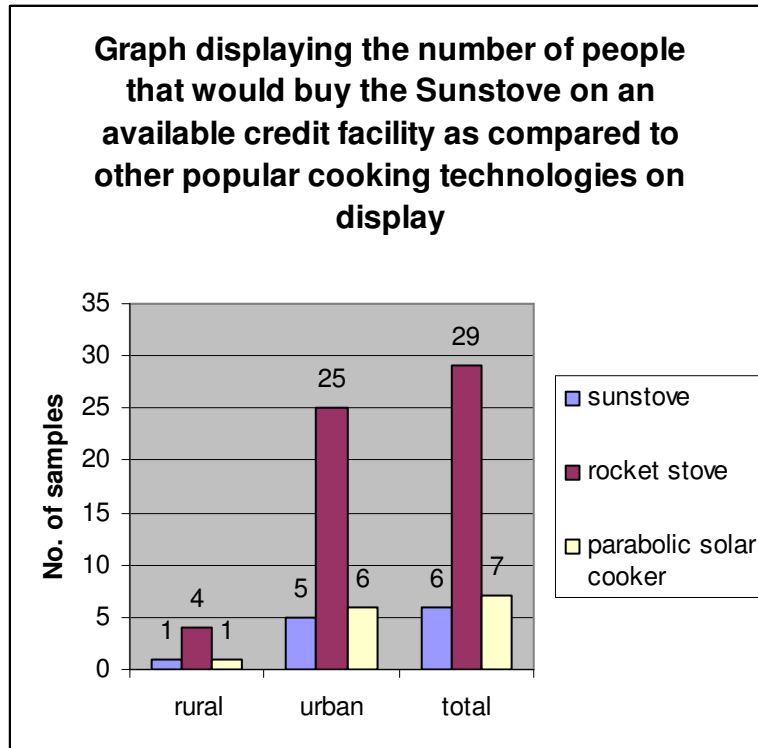


Figure 2 displays the number of people that would purchase the Sunstove if a credit facility were available for the purchase of the product.

It also compares the Sunstove with other cooking technologies that were on display at the ProBEC stand at the Harare Agricultural Show.

The importance of this criterion must be stressed because it reflects consumer perceptions in the face of the current deteriorating Zimbabwean situation, especially with respect to the commodity freeze in place and hyperinflation. Hyperinflation has made the purchase of goods extremely difficult as the prices for said goods continually increase. For example the price of a rocket stove in the previous year’s show was 10 000 Zimbabwean dollars. In the space of a year, it increased by a 1000%. This has made budgeting of income extremely difficult in both rural and urban areas.

The inclusion of credit as a criterion in buying such cooking technologies allows people to purchase the products with smaller, more achievable instalments. It can be seen from the graph that the most popular stove in this regard was the rocket stove, where 29 people in total indicated that they would purchase it. Second was a



preference for the parabolic solar cooker and lastly for the Sunstove, which registered only 6 potential buyers in total.

It is interesting to note that although 28 people in total stated interest in purchasing the Sunstove, once they were given a hypothetical situation in which purchasing the Sunstove was made easier, most opted for the rocket stove. However, it should also be noted that not a single person was familiar with the Sunstove even if they heard about solar cookers before. After a brief explanation on functionality and general information on the product, they were generally impressed that it did not require energy but its slow-cooking functionality was generally frowned upon. Thus the rocket stove was more popular. It used a technology that a lot of the people could relate to and it saved wood which was the main draw card. The parabolic solar cooker was more popular because it was aesthetically unique compared to other stoves and cookers. It was also favoured over the Sunstove with regard to functionality because its cooking time was less, even though it was cumbersome to set up.

Comparing the perceptions of the rural and urban dwellers toward the Sunstove, it was interesting to note that 2 out of the 6 rural respondents indicated that they were not at all interested in the Sunstove – this amounts to 33% of the group. Urban dwellers were more upbeat and only 5 of the 24 said that they were not interested in the Sunstove (20% of the target group).

Despite the fact that the number of rural respondents was substantially smaller, it nonetheless provides a general idea of perceptions toward the Sunstove. A highly probable reason for this is that only one of the rural respondents had heard of solar cookers before. Most had seen how the cookers work by way of the demonstrations at the ProBEC stand. The general perceptions based on these demonstrations were that of awe that no fuel or energy source was used, just solar energy. However it is also interesting to note that the remaining 4 respondents all favoured the rocket stove rather than the parabolic solar cooker, making it clear that rural dwellers still favour wood-fired stoves due to the perceived higher efficiency as compared to the Sunstove, which takes longer to cook and does not readily boil water – a question continually asked of the product.

Once again it is maintained that perceptions toward the Sunstove and buying the Sunstove have been severely affected by the political economic climate of Zimbabwe and the growing energy crisis.

One could have assumed that the growing energy crisis should have made the Sunstove more popular, but although it was not in competition with other fuel saving technologies on show, it was nonetheless affected by the presence of two other popular stoves (the rocket and the parabolic solar cooker) that were better suited to the Zimbabwean situation as they were at opposite ends of the range provided.



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The rocket stove was more amenable because it was a technology that has been used before and importantly it was efficient in that it used less wood and cooking time was substantively less. The parabolic solar cooker was only just more popular because it was aesthetically unique and represents a sense of modernity that many people in both rural and urban areas aspire to.

## **7. Conclusion**

In terms of the aim and the outcome of this market research it can be safely concluded that there is little room in Zimbabwe to accommodate the introduction of the Sunstove. This is because the current Zimbabwean economic situation does not allow for it. This pertains directly to hyperinflation and the existing commodity freeze. It has made it almost impossible for consumers to purchase any goods other than essential ones that meet basic needs such as foodstuff.

However, the market research had successfully achieved its objectives. The increased exposure of the Sunstove is demonstrated in Table 1 under the first criterion depicting the number that indicated that they would buy the Sunstove. It should still be maintained that this criterion was not included in comparisons with other technologies and was not taken into consideration in determining the feasibility of selling the Sunstove in Zimbabwe. This is because, whilst it does illustrate that people are aware of the product, it does not necessarily mean that the selling of the Sunstove will be viable.



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