

A breath of fresh air: Protos the plant oil stove



Author

Samuel N. Shiroff

Protos project leader,
BSH Bosch and
Siemens Hausgeräte GmbH,
Carl-Wery-Strasse 34,
81739 Munich, Germany

Email: protos@bshg.com

Figure 1: Kami cooks on a first generation protos instead of her wood fire (Photo: BSH)

Figure 2: The second generation protos stove (Photo: BSH)

With a project that originally began in 1998 with the work of Dr. Ing. Elmar Stumpf at the University of Hohenheim in Germany, the initial steps were taken in the development of the world's first fully functional plant oil cooking stove. In 2003, the stove gained the attention of BSH Bosch und Siemens Hausgeräte GmbH who then developed it into a product for the 'bottom of the pyramid'. BSH were able to improve the performance, life-span and most importantly reduce the costs so that they could offer protos at a price that people could afford. First launched three years ago, the stove has now undergone a major redesign which the manufacturers claim will offer a step change in cost reduction, efficiency improvements and user friendliness. This article offers an overview of the BSH protos stove.



Kami is making their evening meal. The usual routine starts earlier in the day with the collecting of fire wood. The fire is then slowly set to cook the staple rice. This is inevitably accompanied by a smoky kitchen, and Kami's slight cough is proof that this is not the first time. This evening however, the air is clear as Kami is using her brand new protos plant oil stove with coconut oil as the fuel.

Everybody cooks, but not everyone cooks in the same way. While those in wealthier countries generally use electricity or gas stoves, more than 2.5 billion people around

the world still use the older, less efficient and unhealthy fuel sources such as wood, charcoal, kerosene and other biomass. The World Health Organisation (WHO) estimates that 1.6 million people, mostly women and children, die each year as a result of their exposure to indoor air pollution.

The challenges and the vision

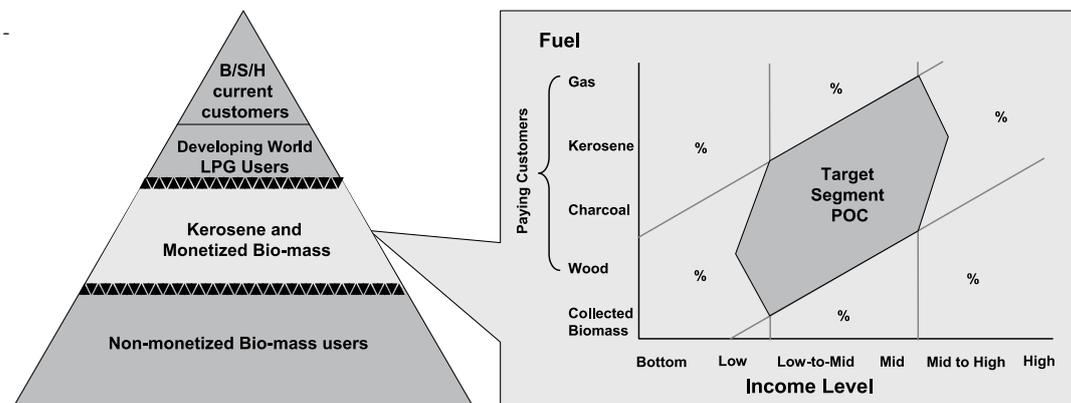
The BSH Home Appliances Group thought it could use its considerable expertise, experience and engineering prowess to tackle this problem. With a project that originally began in 1998 at the University

of Hohenheim in Germany, the initial steps were taken in the development of the world's first fully functional plant oil cooking stove.

"My original work began at the University of Hohenheim", explains Dr. Ing. Elmar Stumpf, "I was a Ph.D. student and enamoured with the idea of creating a new technology. When it eventually caught the attention of a large multi-national I thought – now here is the chance I have been waiting for to make an impact."

"In 2003, when BSH learned about this new technology we decided it presented a very interesting challenge for

Figure 3: Cooking fuel pyramid - Who and where are the users?



us”, explains the Senior Vice President of sales for emerging markets Dr. h.c. Dirk Hoffmann, “concurrently, we believed that if we could develop a product for the ‘bottom of the pyramid’ it would provide BSH some unique insights into a market that we do not currently serve with our conventional products.”

Dr. Stumpf was brought on board to make the next developments in the technology. “We had achieved some real advances in Hohenheim, but the product was not ready for a mass market. With the resources and the teamwork at BSH we were able to improve the performance, life-span and most importantly reduce the costs so that we could offer protos at a price that people could afford.

Plant oils often have different levels of viscosity and BSH was determined to make a cooker that would not only burn all types of oil, but would also do so without requiring them to be refined. “People in rural settings may have the ability to press their own oil, but they don’t have the infrastructure to refine it,” explains Dr. Stumpf, “our challenge was to make a cooker that would burn oil that had been filtered in a simple manner and required no refining. This isn’t oil you buy in the store. It is a very simple and low cost fuel.”

By the time BSH publicly launched Protos in April of 2006 the stove had already gone through many different technical and design changes. However, a last change was in store. Although the protos team had already reduced the cost of production by over 50% and had dramatically increased the efficiency of the stove, a series of experiments came together to allow for a technological leap that created a new protos generation. The new cooker has a revised design and brings with it a 40% cost reduction, 30% efficiency increase and a dramatic improvement in user friendliness with easier cleaning and quieter operation. “The only downside,” explains Samuel Shiroff, protos project leader, “is that it caused a disruption in our production schedule and plans for large-scale market introduction. Although waiting for a new generation meant a 12-month delay, we decided that the purchase cost and especially the

reduced operating cost were such strong arguments for poorer customers that it would be inappropriate to sell them the first generation when the second was so much better.”

The fuel, the customers and the carbon

Protos presented some brand new challenge to BSH. Dr. Hoffmann explains, “although we have always made adjustments in design, size and other changes needed for different market specifications of electricity or gas, we never before put much thought into the source of the fuel. With plant oil this is different.” BSH makes a clear policy of stating that it will not introduce protos in markets where it cannot be assured of the sustainability of plant oil: in terms of both environmental and social factors. Hoffmann continues, “A second huge challenge is serving a different kind of customer. BSH primarily sells high-end goods to customers for whom price is not the sole concern. We realized that protos’ customers might not be able to pay even the cost of production, but like all customers, they want a user-friendly, well designed and durable product. We always knew that achieving this and economic sustainability – that is not losing money on every product – was going to require some innovative business models.”

As is true with any product, identifying the correct market segment to target is essential (see Fig. 3). Poor households have a lot in common but they are by no means a homogenous group. A plant oil stove requires a liquid fuel. In addition, research conducted by BSH indicated that in most circumstances only families that were already using a monetized fuel (i.e. paying for it) would be willing to switch to protos. Moreover, although the cost of the stove itself must be reasonable, the most important cost criteria would be on a cost per meal basis. Using plant oil as a fuel source in protos needed to be at a lower cost than the current alternatives. Concurrently, plant oil had the large advantage over liquefied petroleum gas (LPG) in so far as that plant oil can be purchased in small quantities whereas LPG often presented cash flow problems for poor families.

Once the correct market had been identified, tackling the challenge of the purchase cost of the stove required a different perspective. BSH has focused on truly understanding how protos provides a variety of service. Shiroff clarifies, “protos is a stove, but people don’t really want a stove, they want warm food – that is the service a stove provides. In addition we recognized that protos provides some additional services; in terms of health, by reducing indoor air pollution; as well as environmental, by running on a locally produced, carbon-neutral fuel.” BSH established that although users appreciate the health and environmental advantages, they are not in an economic position to pay for such “premium services”.

However, there are organizations and markets that specifically direct funding towards the health and environment sectors. “We recognized that there are foundations, charitable organizations, companies and even government organizations that saw a real benefit to filling the necessary cost gap so that the end-user is able to afford the stove. In terms of environmental service, when we are able to replace fossil fuels like kerosene, or wood and charcoal which is not being harvested sustainably, we can generate carbon credits – which are also enough to cover the cost gap as well,” clarifies Shiroff. Thus, BSH has implemented two business models. The first, traditional model simply sells the cooker for a price which covers production cost and overhead. The second involves a price for the end-user below the cost of production, with the cost gap filled via purchasers of “additional services” provided by protos such as health, environmental or local economic benefits.

Within the context of carbon credits, BSH has submitted a methodology to the UNFCCC which is responsible for the Clean Development Mechanism of the Kyoto Protocol. Although still in the approval process, the methodology already makes it possible to receive voluntary carbon credits which, as part of a project with a positive social benefit for the poor, can provide adequate revenue to dramatically lower the cost of the stove and expand the number of people who can afford it.



Figure 4: “We are very excited about protos,” says Surya shortly after completing the training, “the plantation will provide us with the fuel which is lower than kerosene and I no longer have to drive 40 minutes to get it. The stove cooks fast and it definitely does not have the bad smell of kerosene. I think our food will taste better too.” (Photo: BSH)

one really has experience. Once there is a critical mass of users, only basic training is needed. Similarly, we want to make sure that enough people really are comfortable with our product so that as new users purchase their cookers, following some basic instruction, they can just ask a neighbour if something is unclear.”

BSH is in the process of making protos as widely available as possible. As part of a technology transfer, BSH has established a local production partner in Indonesia where protos will be produced. Initial plans are to manufacture 50,000 units in 2009 and then to expand as demand increase. BSH remains open to additional production partners; however at first all orders will be filled out of this first production facility. Market demand will dictate whether additional production partnerships are established elsewhere in the world. Additional information is available at the protos website, available via the @HEDON link below.

Profile of the author

Samuel Neal Shiroff is the project leader for the market introduction of Protos, the plant oil cooking stove, at BSH Bosch and Siemens Home Appliances Group - located in Munich, Germany. Sam is responsible for developing and implementing the business models necessary to reach the market segment for which Protos was designed - individuals who are purchasing wood, charcoal or kerosene for their cooking fuel source. Sam is also active in conceptualizing and developing carbon-savings, energy efficiency related programs for conventional appliances.

Bringing Protos to the market

BSH recognizes that the users of protos have different needs and are in different locations than its traditional customers. As a result, the company has decided to work with partners who have a deeper knowledge of these customers. “To bring protos to the market involves some complexity. It is necessary to establish both a cooker and a plant oil supply chain,” explains Shiroff. “In the first stages of development and field-tests we worked with the GTZ and the DEG to take advantage of their considerable experience in development. Now, in the market introduction we are continuing to deal with different cultures in often remote places; we know that we need local assistance if we want to be successful. Therefore we have decided only to work with project partners who have the capacity and local knowledge to create the necessary infrastructure and manage a protos introduction sustainably.”

A plant oil cooker does not function without plant oil and therefore that is the first necessary question to clarify.

The first large scale projects are slated to take place on either plant oil plantations or in villages specifically identified to be part of an energy-self-sufficient program of the Indonesian government. Plant oil plantations often have thousands of workers. Sometimes they live more than an hour away from the nearest shopping stores and the plantation company is responsible for supplying them with the products essential for daily living. The ability to purchase fuel that is grown locally – rather than imported via long-distances – provides cost advantages for the both workers and the plantations.

BSH has established clear guidelines for bringing the cooker to a new market. Not only must the supply chains be in place, but the first users must also be trained. Shiroff elaborates, “Using protos is easy, but it is not exactly the same as other cookers. Perhaps it is best comparable to when automobiles are first introduced. For the initial users, intense training is needed since it is not yet common knowledge how to operate a car and no

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