4. COMMERCIAL APPLICATION

The approach to dissemination of solar cookers world-wide has traditionally been non-commercial and no commercial application has taken place. The definition of commercialisation is taken to mean "the manufacture and sale of solar cookers is a profit driven process in that the income derived (which may or may not include subsidies) is sufficient to make it a worthwhile activity for the entrepreneur". Several national as well as international overviews (Wentzel, 1997, Synopsis, 1997 and Schoennemann, 2000) found no significant level of commercialisation. Synopsis (1997) classified the international cooker production status into

- Prototype
- Pre-series
- Series

The report neglected to define the numbers involved in pre-series and series production, but it was clear that no large-scale production is taking place. Synopsis (1997) also did not include dissemination figures since these are difficult to verify and there is a "notorious difference between numbers of cookers disseminated and cookers actually in use". However, the issue of dissemination figures vs. actual stoves in use requires some comment. When a pure commercial approach[1] to the dissemination of solar cookers is adopted, the focus on actual stoves in use falls away and what becomes important is the number of cookers sold. After all, no manufacturer of any consumer product is interested in the use rate of the product, or put differently, the manufacturer of a commercial oven is not in the slightest way concerned with the purchaser's rate of use of the oven, his success is not measured against the use rate of the product but against the number of units sold. The only instance where the use rate of solar cookers will be important, is if it forms part of a CO^2 abatement type of project, where the frequency of use is a clear critical project indicator.

India as well as Nepal and China have been involved in fairly large-scale dissemination projects but cookers were either highly subsidized (Shresta, 2000) or provided free of charge. The International Conference on Solar Cooking 2000, held in South Africa (Kimberley 27 – 29 November 2000), marked a clear departure from the poverty alleviation approach to solar cooker dissemination. Delegates accepted and acknowledged that a commercial approach is required from the production to the dissemination aspects, if solar cookers will succeed as a renewable energy technology. The GTZ/DME Solar Cooker Project will attempt to establish the necessary framework conditions for large-scale commercialisation of solar cookers.

[1] With a purely commercial approach it is meant that solar cookers are produced and sold in a commercial way, i.e. that cooker prices are not subsidized and that end-users bear the full cost of the product.

5. COMMERCIALIZATION ASPECT OF THE TECHNOLOGY

The commercialisation process of solar cookers presents different commercialisation opportunities:

1. Production of a product with commercial value – the production of the cookers by a manufacturer (product)
2. Distribution of solar cookers – physically transporting and distributing cookers to retail outlets (service) as well as related issues such as packaging
3. Retailers selling solar cookers to end-users or customers (service)
4. Marketing and advertising solar cookers as product and as concept (service)
5. Maintenance and repair to maintain the product (service)
6. Training to end-users, retailers and service providers (service)

As is evident, various possibilities for commercialisation exist. However, the GTZ/DME solar cooker field test only investigated the commercial production of solar cookers (1) and selling of solar cookers through retail outlets (3). The other possibilities are acknowledged and will be addressed in some minor detail.

5.1 Production of solar cookers

Model Selection and Adaptation

- First selection step criterion is the adaptation potential of the stove to the local situation. Important tools: cooking profiles (listing of local conditions see **Table 1: End user cooking profiles**) and comparative cooker tests.

- Next step is the process of actual adaptation of the selected design to the local situation, to the user requirements, to the local production possibilities and to the local distribution conditions.

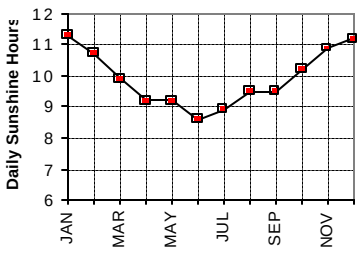
- Technology transfer is not a one-way process, but needs the qualified and intensive interaction of the different partners.

In practice, solar cookers can be produced locally in two ways:

- Either materials, tools and a production manager are brought in ("container production");

- Cookers are produced in local production facilities: the design has to be intimately understood by the local production manager in order to be able to adapt the product carefully to local conditions. Also, the entrepreneurial decision must be taken over by the local producer. This implies that the producer makes the cooker his or her product.

Table 1: End user cooking profiles

Cooking Profiles Families (State : January 1997)	
Location	ONSEEPKANS (Northern Cape), on the Oranje River and the border with Namibia, 8 km long with 3 settlements (Melkbosrand, Viljoensdraai, Sending), 50 km from Pofadder. Surrounding: green belt on the Oranje with agricultural plots, otherwise semi-desert.
Typical Housing	river reed houses with corrugated iron, partly fenced in, occasionaly vegetable gardens
Income	average income/month: 650.-R; most of the families are in the income bracket of 250.- to 500.-R/month (2)
Household Members per Family	1 to 14 (2)
Dishes	porridge, soft porridge, rice, vegtables, meat, entrails with other innards and head, pulses, fish, bread, "rusks", spaghetti, soup, macaroni, potatoes, tea, eggs, milk (1)
Cooking Techniques	boiling, frying, baking, simmering, steaming (1 and 2)
Preparation Techniques	cutting up, soaking (e.g. pulses), stirring (e.g. porridge dishes need to be stirred vigorously), rice is added to cold water (1)
Start of Cooking	morning: between 6 and 10 o'clock; noon: between 10 and 13 o'clock; evening: between 16 and 20 o'clock (2)
End of Cooking	morning: between 7 and 11 o'clock; noon: between 11and 14 o'clock; evening: between 18 and 21 o'clock (2)
Meal Times	morning: between 7 and 11 o'clock; noon: between 12 and 14 o'clock; evening: between 19 and 21 o'clock (2)
Existing Cooking Equipment	mainly wood stoves or three-stone fires, some gas cookers, hardly any kerosene cookers; some families have more than one cooking facility, e.g. wood and gas cooker (2)
Cooking Area	mainly in the house or covered areas (even open fires), rarely outside (1)
Number of Cooking Pots	often 2 pots with ca. 5-8 l capacity (1)
Fuel (bought/collected)	mainly wood (mostly collected along the river, some bought); little kerosene ("paraffin") and gas (1 and 2)
Fuel Costs	1 l kerosene = 1.-R; 9 kg gas bottle = 38.- R; 1 bundel of wood (ca. 15 kg) = 7.-Rd (2)
Weather Conditions	October until March very sunny; April/May partially cloudy and windy; June/July partly sunny, partly light rains; August very sunny and windy, very little rain; September sunny, sometimes cloudy and windy (2)
Suitable Place for Solar Cooker	area close to kitchen, fear of theft of food or damage to the cooker (1)
Interest of Families to Acquire Solar Cooker (e.g. on credit)	yes (1)
Annual Daily Average Insolation	6100 Wh/m²/day (4)
Insolation Location Onseepkans 10-Year Average (3) 	
	Remarks:
	* Some data (e.g. who decides about new acquisitions; is somebody prepared to track cookers regularly) are difficult to obtain on a regional basis and should be determined individually with questionnaires.
	Sources:
	(1) On-site inquiries (2) Questionnaire survey (3) Weather office South Africa, Pofadder station (4) W D Cowan (ed), "RAPS Design Manual", EDRC, University of Cape Town, 1992

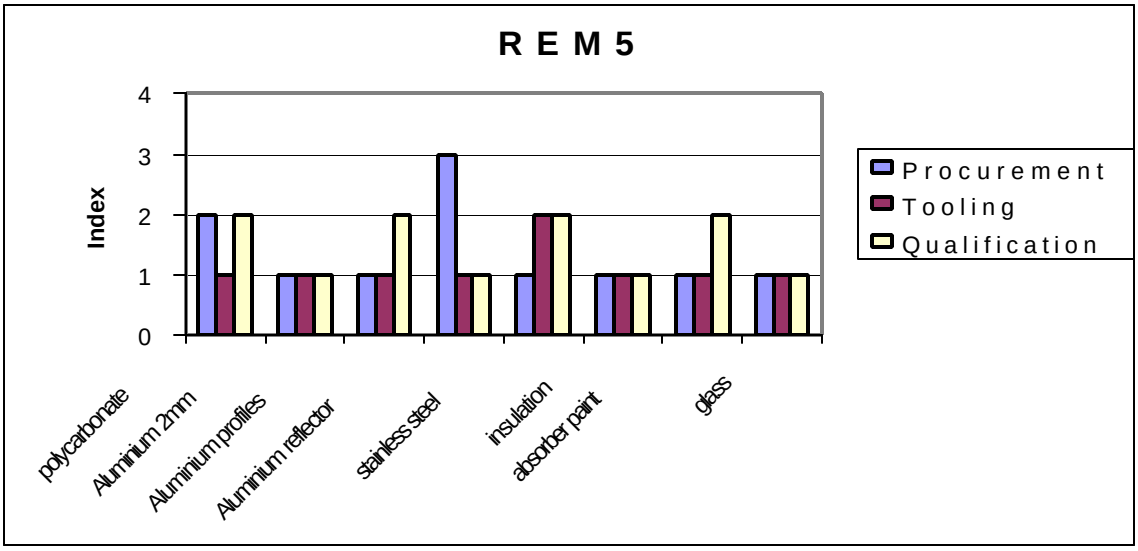
Production Profiles

The experience shows that manufacturers, for small start-up batches, prefer cookers consisting of the fewest possible different component materials which fit into their "horizon" in procurement, tooling and worker qualification: easiest is best.

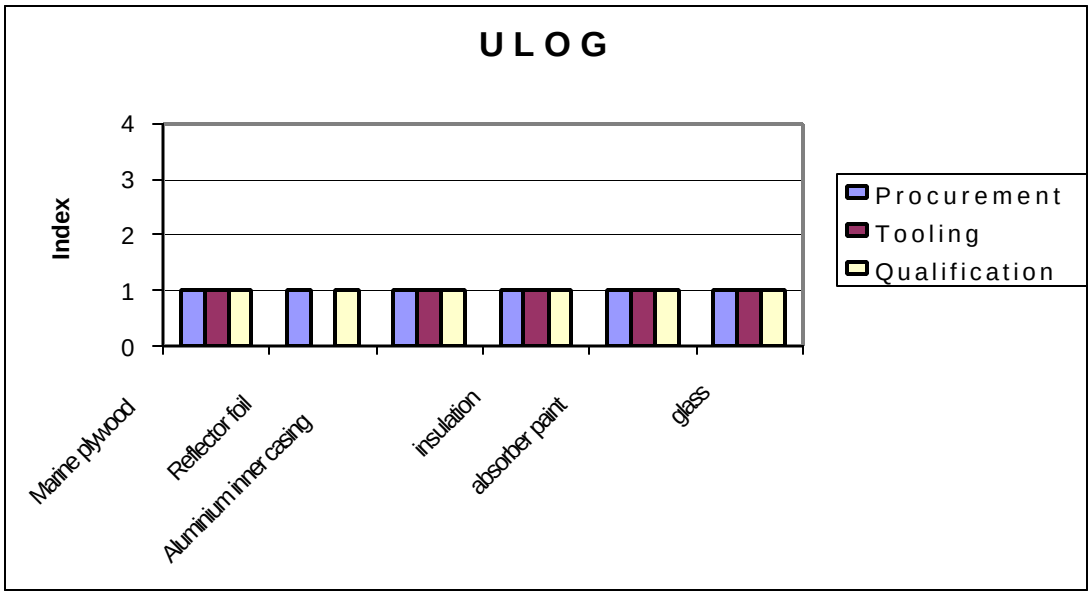
To understand this and anticipate problems, "production profiles" have been established, to compare the production requirements of a given cooker model, for each component, with the existing conditions and potential of a given manufacturer

Production profiles for 3 test cookers:

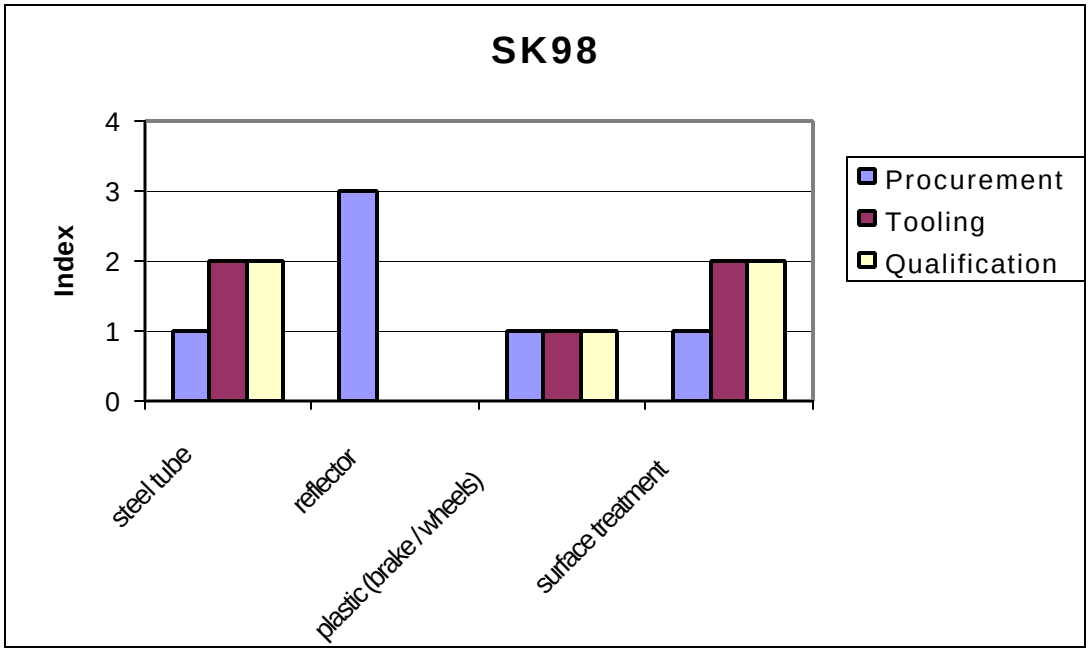
Box cooker (REM 5)



Indirect Cooker(ULOG)



Parabolic reflector (SK 98)



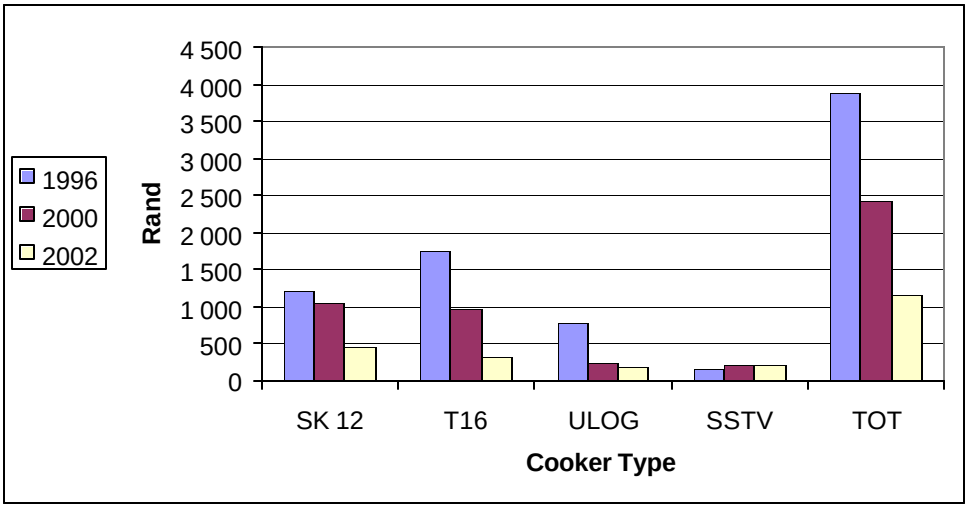
- Indirect Cooker (ULOG) in the middle is best adapted for small-scale production: few component materials, easy local procurement and no exotic qualifications.

- Parabolic Reflector (SK98), at the bottom, has even fewer component materials, but needs some import and qualification (this model has been redesigned, also concerning assembly and handling, see photo).

- Box Cooker (REM5), at the top, has the highest production requirements of the three models: many components, particularly imports, complicated and unforgiving assembly procedures. This model was redesigned as well, with the result shown below.

Production prices, and the resulting decrease of production prices over time, is illustrated in Figure 1.

Figure 1: Towards a Mass-Production Price



5.2 Distribution of solar cookers

A channel of distribution is a pathway to the market, extending from the manufacturer to its ultimate consumer or user (Jain, 1997). Various pathways to markets therefore exist. A channel of distribution can be described as a sequence of value adding activities that assist the flow of goods from conception to sale. In this view, channel members perform as part of this value adding chain (Hardy and Magrath, 1988).

PROBLEMS FACING SOLAR COOKER DISTRIBUTION

Experience with the dissemination and distribution of solar cookers is severely lacking since few solar cooker projects distributed cookers on a large scale and even fewer distributed cookers along commercial lines. In an overview of solar cooker projects in southern and eastern Africa (Schoneman, 1999) found no example of a large-scale commercial distribution effort of solar cookers. Distribution of cookers mostly took place through NGO's, churches or individuals. Solar cooker projects are often integrated into other development projects or maintained as a small demonstration project.

During 1997, PDG investigated and evaluated the distribution channels utilised by the Sunstove Organisation during a DME supported project. In essence, three dissemination channels were investigated; the individual, the NGO and the commercial channels. It is important to note that although it is referred to as the NGO method, in essence, individuals were responsible for the dissemination of *Sunstoves.* Very little resources, back-up and know-how of the NGO where accessed (or, in most cases available) by the individual disseminating the *Sunstoves.* Due to these experiences, the Sunstove Organisation largely abandoned the notion of disseminating *Sunstoves* through NGO's and instead concentrated on dissemination through individuals utilising the demonstration method.

Problems in terms of dissemination of *Sunstoves* for the two dissemination methods studied, can be summarised as follows:

Table 2: Problems related to tested dissemination methods

NGO	Commercial
Lack of transport (especially between NGO to end-user)	Stoves arrive battered - quality issues
Dangerous area prevented easy access	Stoves sent on to retail branches without matching lids
Lack of time to devote to dissemination activities	
Regarded as a private concern/activity by NGO	
Difficult to collect money due to distances	

The most cost-effective distribution channel was the commercial one where the retail outlet collected the solar cookers using their own transport. However, not all retail outlets have this possibility and other routes had to be investigated. Due to the small numbers of products being moved, no distribution company could be interested in handling the solar cookers. In the end, the most effective and affordable method was to mail the solar cookers through the Post Office. Alternatively, if customers were in a hurry to receive their cookers, the cookers could also be couriered.

Specific problems related to the distribution of solar cookers during the South African Solar Cooker Field Test can be identified as follows:

- Low number of retailers selling solar cookers
- Low volumes of cookers to be distributed
- Large project area and dispersed retailers
- Different methods of distribution employed by retailers
- Un-organised retailers – want cookers immediately
- No system of return distribution in place
- High expense of distributing solar cookers
- Damage during distribution
- Packaging

Distribution remains a problem in the commercialisation of solar cookers. In some countries, distribution systems are cheaper and more accessible, but in South Africa, the distribution of small quantities of products over large distances is expensive, time consuming and ineffective. Distribution also requires attention to packaging of solar cookers, since rough handling can cause damage. Packaging material is expensive and adds to the cost of the cooker.

5.3 Marketing

For renewable energy products to be accepted and marketed successfully, it should add value to prospected users and be significantly different from current products on the market. Renewable energy products should be a supplement to existing products and not replacing the current. For example: a solar cooker should be marketed as a supplementary product to solve the cooking needs of the people. It should definitely not be marketed as the only solution for cooking but should be included in cooking options available to prospective users.

Before any product can be commercialised it should be developed as shown in the product development steps as depicted in Figure 1 (Adapted from Kotler (1997))

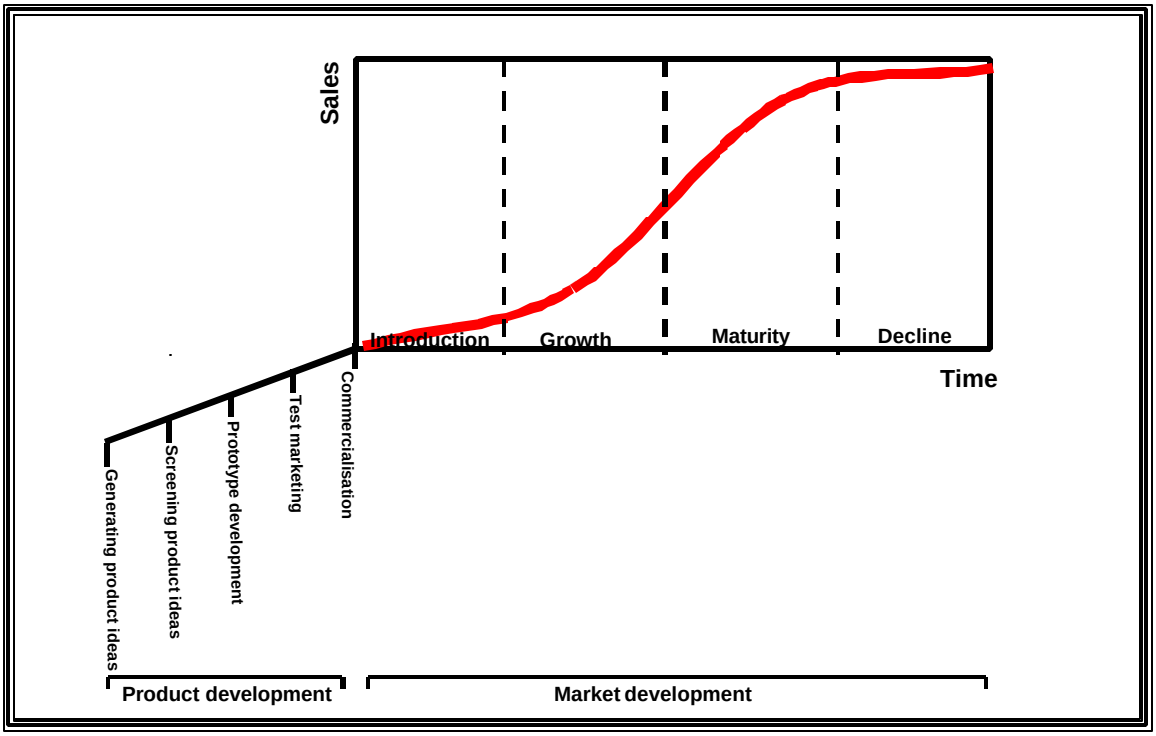


Figure 2: Product development, Market development and the Product Life Cycle

Commercialisation is the last stage in product development and the first stage in market development. It is interesting to note that the solar cooker project in the Republic of South Africa is now in the last phase of product development and on the brink of the first phase of market development.

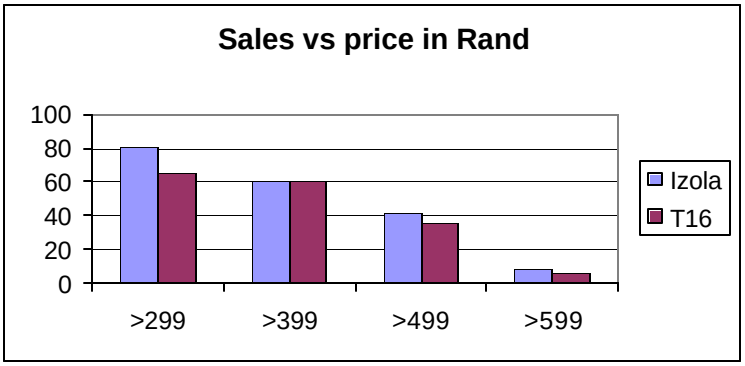
The efforts to the marketing of an innovation should be focused on all four marketing mix instruments ($4P^{'s}$) – product, price, place and promotion. For the marketing of solar cookers, emphasis should be placed on the most creative marketing mix instrument of promotion. An intensive advertising and promotional campaign should be aimed at:

- Creating awareness,
- Communicating the advantages to prospective buyers;
- Creating credibility and trust with prospective buyers and other role players such as intermediaries; and
- Breaking through cultural barriers.

During an intensive promotional and awareness campaign the target market should be given the opportunity to see, feel and experience the product in order to create belief, credibility and trust in the innovation. By actively involving the people the product through its capabilities can start to break through cultural barriers. It is therefore very important to break through cultural barriers as it can take one generation to change the current habits of people.

The marketing strategy with the biggest impact was to lower the price of solar cookers through special offers. The dependence of sales on price is given in Figure 3. Since the project sold stoves at different prices, these data can be used as an indicator of customer price sensitivity.

Figure 3



Exchange rate: $1 = R8