

# Parabolic Solar Concentrators for Cooking and Food Processing

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## 1. Abstract

Gadhia Solar is one of the leading company in India manufacturing Solar systems based on Scheffler Solar Concentrators and the Scheffler Solar Concentrators were introduced and commercialised by the founder of Gadhia Solar Mr Deepak Gadhia along with Mr. Wolfgang Scheffler in 1994 and last 15 years have seen wide spread use of Scheffler Solar Concentrators not just for cooking but also for other applications like desalination and use in food industry both by Direct heating and with Solar generated Steam by Scheffler Concentrators and the paper will share with participants of the Solar Food Processing conference the evolution and use of same and the vision and possible roadmap.

## 2. Introduction

Wolfgang Scheffler of ULOG Group of Switzerland had been coming to India and manufacturing his parabolic Solar Concentrators which are unique due to their station focus achieved due to flexible curvature of the segment of parabola. Through Dr Dieter Seifert of Germany, the developer of SK 14 Parabolic Solar Concentrators for domestic cooking Shirin and Deepak Gadhia got to know Mr. Wolfgang Scheffler and that evolved into friendship and later into co-operation of spreading Solar technology to India. Mr. Guenther Schmitt of HTT GmbH of Germany the company in which Deepak Gadhia worked recognised the potential of Scheffler dish and suggested to Shirin and Deepak to tie-up with Wolfgang Scheffler to commercialise the same in India and thus started the process of manufacturing of the same in India and first thing that was recognised to be done was to name the dish Scheffler dish so that people understand the philanthropic intentions of the dish. A company was started to manufacture the dishes in India in commercial environment but as social enterprise with profit not being the prime motive and the profits being used to fund the activities of Eco Center ICNEER the NGO of Gadhias to promote environmental protection and rejuvenation.

## 3. Background

Scheffler dish has unique advantage over other concentrators as it has stationary focus and thus with the technology transfer and training provided by Wolfgang Scheffler the manufacturing of same was started in Valsad Gujarat.

It was found to be ideal to meet needs of community kitchens esp Tribal hostels ( called Ashramshalas) and with one dish of 7.4 sqr mtr one could cook for 40-50 persons.

With help Gemran Consulate Mumbai under its small pilot projects schemes first few dishes were installed for demonstration and later program for its promotion was started along with SPRERI with matching funding from German Consulate Mumbai and GEDA and about 50 Schools and institutions were supplied Scheffler Cookers with beneficiary participation being 25%

One technology was proven GEDA and MNRE introduced subsidy and the program has taken over and more than 250 Scheffler dishes are installed in Community Kitchens all over India

Later when Brahma Kumaris wanted Solar Steam System with help of GATE7 GTZ of Germany was developed with technology support of Ms HTT GmbH of Germany and thus the first Solar Steam Cooking was installed in 1997.

Since than Gadhia Solar has supplied and installed more than 30 Solar steam cooking system of different sizes ranging to cook from 500 to 15,000 people and for different user groups starting with temples and ashrams and enlarging the user group that includes Army, Hospitals, Industrial Canteens, Hostels etc

Till date the worlds largest Solar Cooker is at Tirupati Temple that cooks 30,000 meals per day with 106 Scheffler Concentrators of 10 sqr mtr but at present even a larger system is under installation for Shirdi Temple that will cook 40,000 meals per day with 73 Scheffler Concentrators of 16 sqr mtr

Now the Solar Steam system has found uses in Food Processing Industry and the case study presents the same

#### **4. Project**

##### **Testing of Scheffler dishes for food processing**

Few years back a young entrepreneur Mr Ghanshyam Lukhi visited Gadhia Solar to find out if Tutti Fruti he wanted to manufacture can be made using Solar energy.

A Pilot plant was set up at gadhia Solar and he came along with his products and tested manufacturing the same with Scheffler Concentrator with direct heating

The results were very encouraging but the problem was that capacity was too small and it would have meant many dishes having many vessels in its focus and thus the project was not pursued

##### **Steam System for Food Processing**

Mr Ghansyambhai was not discouraged and did not give up the idea and kept in touch and when the Solar Steam Cooking system established itself he showed interest in going for same.

An application to GEDA was submitted to get subsidy. At that time Industry were not eligible for subsidy as per MNRE policy and they were approached through GEDA and policy was modified to include Industry in the subsidy policy and GEDA chipped in with State subsidy too and thus first Solar Steam System has been installed at TAPI Foods, Surat

A System with 10 Scheffler dishes of 10 sqr mtr which generates about 350 kg/day steam at about 6 kg / cm<sup>2</sup> pressure has been installed at Tapi Foods



Its success has been path-breaking and it has several visitors and many want to follow suit.

It has not been easy as Ghanshyambhai had to modify his process and kitchen and he gave several inputs and made modifications in his factory to accommodate Solar Steam System.

The success has encouraged him to plan to grow and he has a vision and dedication and determination to take it forward.

Other Experience of use of Solar for Food Processing :

At Gadhia Solar they have successfully used the Scheffler dishes for other food processing applications like

- **Frying and making potato chips** etc and with a lady entrepreneur in Nasik several trials have been carried out and she has submitted application to bank to install the same for her Industry



- **Baking-** based on Solar bakery prototype made in Germany by Wolfgang Scheffler  
Solar bakery prototypes have been developed in India and we would soon be installing one Solar bakery for a NGO near Pune for the Women's groups for income generation

## Solar Bakery



- **Desalination:** We have with Mr Scheffler developed a Multi Effect Evaporator where with one dish of 12 sqr mtr we have been able to achieve 72 litres of distilled water
- **Concentration and in making juices:** Dr Seifert has used his SK 14 for juice

## Drinking water from Sea Water



- extraction and we would soon be trying the use of Scheffler dishes where ever larger quantity of juice extraction is needed
- **Drying:** We are now working on various other applications in food processing for drying of agricultural products
- **Jam making, Pickle making etc:** Solar energy can also be used for such applications

### 5. Conclusion

Time for using Solar energy has come and Sk 14 Concentrators, Scheffler Concentrators' with direct heating and Solar Steam generating systems have been successfully used in food processing and its time now that Industry takes it up on larger scale and it is bound to succeed because Solar energy not only saves and fuels and protects environment but also brings other advantages like value addition and employment generation at local and rural level and thus ideal for developing countries to change and help the rural population where major percent of the population resides.

There are consumers who want to buy solar manufactured products and willing to pay a bit more because it is manufactured in environmentally friendly way

- To make it happen we need more people like Wolfgang Scheffler and Dr Seiferts and others, More NGOs like Barli and Eco Center ICNEER which acts as a bridge and facilitators and Entrepreneurs like Ghansyambhai who are willing to take risk and who are passionate about it and willing to try it out and with their inputs and dedication encourage others to go Solar.