

## **Solar Cookers**

Solar cooker use solar thermal energy for cooking of rice, pulses, vegetables, meat, fish and preparation of snacks, soups, cakes etc. either directly or by producing steam.

### **Merits**

- No fuel requirement and no recurring charges
- Maintains quality of food cooked
- Retains the nutrition value of food
- No soot formation
- No health problem because there is no smoke

### **Types of Solar cookers:**

1. Box Type
2. Dish Type
3. Scheffler Model
4. Solar Steam Model

### **(iii) Community ( Scheffler ) Solar Cooker**



The unique feature of this cooker is that it is possible to cook food indoor using solar energy within the kitchen itself and can cater to 40 to 50 persons.

### **Configuration**

The cooker is of paraboloid type having primary and secondary reflectors. The parabolic frame of the primary reflector is made of metallic square tubes. The reflector is made of aluminium facet (plates / rods) in which reflecting mirrors of glass / acrylic / polyester film are fixed to reflect the solar rays towards secondary reflector placed inside the kitchen. Secondary reflector sheet / mirror is so curved in shape that it reflects the incoming rays towards the bottom of the vessel. The stand on which the reflector frame is fixed is made of iron structure suitably painted. The movement of the rotating support on which the frame is fixed is done with the help of automatic tracking device. There is a pendulum clock work device with provision for seasonal adjustment.

### **Working Principle**

The 8 sq.m large reflector standing outside the kitchen reflects solar rays into the kitchen through an opening in its north wall, while the secondary reflector further concentrates the rays to the bottom of the pot / frying pan which is painted black, to absorb heat faster and better.

In view of high temperature (400° C) at focal point, the cooking rate is significantly faster than that in other types of solar cookers. It is possible to cook two meals a day in places where solar insolation is good during most part of the year. It can cook almost all traditional dishes including chappathis, poories, dosas etc. and can eliminate use of conventional fuel like gas, electricity etc.

### **Potential for use:**

- Cooking in residential schools, institutions, ashrams
- Cooking in hotels, hostels, hospitals etc.
- Cooking for industrial canteens

### **Economics (Tentative)**

- Costs about Rs 50 000.
- Subsidy @ 2100 per sq.m is available
- Use of this can save about 35 to 40 LPG cylinders per annum (Rs.12 000 per year). The payback period is 4.5 years with subsidy.
- The metallic structures will last for 15 years and the reflecting mirror for 5 years. O & M expenditure is about 2 to 3 % per annum.

### **Limitations**

- The kitchen wall should be north facing
- A single storey building is preferred to avoid shadows.
- It must be ensured that there is no other buildings / structure / trees to cast shadow on the reflector frame.
- 6 to 8 m distance should be available from the kitchen's north wall for installing the cooker.

**Manufacturers:** [View the list of manufacturers](#)

### **(iv) Steam Cooking ( Parabolic concentrators )**

#### **Configuration**

Solar steam cooking system can cook food for several thousand persons at a time. The system uses automatic tracking solar dish concentrators which convert water into high pressure steam and consists of shell type receiver made of mild steel, 35 cm in diameter, connected to two concentrators on either side, which focus sunlight on both sides of the receiver. Several such receivers are connected to a 12" dia header pipe which is half-filled with demineralized water.

The receivers and the header. Each receiver is integrated with two pipes of 1 ½" and ½" diameter from inside, which pipes are insulated to avoid any heat losses help in thermo-siphonic flow of water from receivers to header and back. When the water gets heated in the receiver, it starts moving up in the header through one pipe and the cold water from the header starts coming into the receiver. The cycle goes on and a high pressure steam is generated in the header pipe after some time.

### **Working of the System**

Before the system is put into operation in the morning, all the header pipes are half-filled with water using a high pressure reciprocating pump. All the concentrators are then arranged manually in the direction of the sun with the help of a central tracking arrangement. Once this is done, all the concentrators then track the sun automatically with the help of a small DC motor run by PV panel. A timer relay is used for adjustment of tracking time relay.

The steam pressure starts building up in the header pipes immediately and is sufficient to deliver the steam to the kitchen in an hour or so. This steam can be drawn any time in the day even at the time of power failure as the feed water pump is not required to feed water and push the steam. An oil-fired boiler can be connected to the system to ensure that required steam is always available in the kitchen if the sun shine on a particular day is not adequate.

### **Potential for Use**

- Cooking in ashrams, temples, gurdwaras, army canteens etc.

### **MNRE Assistance**

Subsidy @ Rs. 5400 per sq.m for singlr axis tracking system and Rs.6000 per sq.m for double axis tracking system.

### **Limitations**

The system will be successful only in places where exclusive staff are available for operation and maintenance. These places could be religious ashrams, temples, gurdwaras, army canteens etc.

It has to be hooked up with conventional steam generating system to make it reliable under all climatic conditions.

### **Economics (Tentative)**

- Cost of cooking system for 1000 people is about Rs.80 lakhs. (Special workshop facilities are required at site for installing the system besides back up boiler and cooking utensils.)
- MNRE provides capital subsidy upto 30 % of the cost.
- Saving in fuel cost (furnace oil) would be about Rs.20 lakhs / year. The payback period varies from 7 to 8 years depending upon size of the system.

### **MNRE LINKS**

[Manufacturers of Box Type & Dish Type Solar Cooker \(As on 17.05.2013\)](#)

[Manufacturers of Disk cookers & Direct indoor cooking systems \(As on 17.05.2013\)](#)

[Manufacturers / Suppliers / Institutions involved in Installation of Solar Air heating System \(As on 04.02.2013\)](#)

[Manufacturers of Solar Steam generating systems \(As on 25.10.2012\)](#)

**LIST OF MANUFACTURERS OF SOLAR COOKERS**  
(as per MNRE List)

S. No	Name & Address of Manufacturer	Telephone / Fax
<b>A. BOX SOLAR COOKER</b>		
1	M/s Bharat Engineering Co. WZ – 1, Phool Bagh, Rampura, Delhi – 110 035	Tel : 011 – 5102573 Fax : 011 – 5119155
2	M/s J.N Enterprises F-12, Navin Shahdara, Delhi	Tel : 011 – 2278870
3	M/s Energy & Environment System A-1 / 1, Vijay Enclave, Dabri Palam Road New Delhi – 110045	Tel : 011 – 5032019 Fax : 011 – 5036000
4	M/s. Vishvakarma Solar Energy Co. G.T. Road, Phillour, Distt. Jalandhar, Punjab	Tel : 01826 – 22523 – 22217
5	M/s Suntron Energy 11, Industrial Area, Kangra, H.P	Tel : 01892 – 64034
6	M/s INKAS India E / 14, Zinnia Block, Ashiana Gardens, Sonari Jamshadpur – 831 001	Tel : 0657 – 421334 / 223708 Fax : 0657 – 421334
7	M/s Fair Fabricators 142, Tilak Nagar, Indore – 452 001	Tel : 0731 – 491488 / 721472 Fax : 0731 – 490368
8	M/s Sun-N-Shade 14 / 1, G.N.T. Market, Dhar Road, Indore – 452 001	Tel : 0731 – 480930 0731 – 480931

9	M/s Classic Solar Devices C/o Shri N.C. Gupta, Near Shambu Talkies Nai Basti, katni – 483 501	Tel : 07622 – 52525 – 54848 ®
10	M/s Cosmo Products Ashoka Complex, Pachpedhi Naka Dhamatari Road, Raipur – 492 001	Tel : 0771 – 422323 Fax : 0771 – 422323
11	M/s Sharda Inventions 94 / 1, MIDC, Satpur, Nashik – 422 007	Tel : 0254 – 352444 Fax : 0254 – 353853
12	M/s Ghagare Engg. (P) Ltd 105 / 30, “ Matru Krupa”, 2 <sup>nd</sup> Lane, Behind Gogate Petrol Pump, Off. Karve Road, Pune – 411 004	Tel : 0212 – 5448880 – 543311 Fax : 0212 – 5433123
13	M/s FRP Point G-3, Sarojini Nagar, Industrial Area, Lucknow – 226 008	Tel : 0522 – 440004-8 Extn. 2607 Fax : 0522 – 440299
14	M/s Universal Engineers Enterprises Garg Bhavan, Prince Road, Gandhi Nagar, Moradabad	Tel : 0591 – 493619 Fax : 0591 – 499768
15	M/s Ideal Solar Energy Centre 568, kha / 504, Rajini Complex, Geeta Palli, Alambagh, Lucknow	Tel : 0522 – 460946 Fax : 0522 – 457390
16	M/s Rohtas Electronics 15/268-B, Civil lines, Kanpur – 208 001	Tel : 0512 – 305564 Fax : 0512 – 305390
17	M/s J.K Constructions Shop No. 3, Talwar Market, Near Transfarmer, Shivpuri Road, Jhansi	Tel : 0517 – 480519
18	M/s Solar Equipment Mfg. Co., C-3, Sector – 6, Noida – 201 302	Tel : 8557126
19	M/s Yantra Vidyalaya Post Box No. 4, Suruchi Vasahat, Bardoli – 394 601, Surat	Tel : 02622 – 20258 – 20095

	Dt.	Fax : 02622 – 23434
20	M/s Gita Furniture A / 105, B.G. Towers (Ground Floor), Delhi Darwaja, Sashibaug Road, Ahemedabad – 380004	Tel : 079 – 5631604 – 5626686 Fax : 079 – 5626471
21	M/s Piniball Mfg. Co, 147, G.I.D.C. Estate, Makarpura, Vadodara – 390010	Tel : 0265 – 642747 – 333629 Fax : 0265 – 336 287
22	M/s Rural Engineering School Rojmal, Tal : Gadhada ( SN ), Bhavnagar Dt. – 364 750	Telefax : 02847 – 53104
23	M/s Surya International “ SURYA”, 159, Kenya Nagar, New Sama Road Vadodara – 390 008	Tel : 0265 – 781427 – 781428 Fax : 0265 – 781221
24	M/s Solar Energy Service 21-B, Jalaram Nagar, B/h, Mother School Near ISKON Temple, Gotri Road, Vadodara – 390 015	Tel : 0265 – 337674
25	Khadi Gramodhyog Prayog Samiti Gandhi Ashram, Ahmedapad – 27	Tel : 079 – 7559382
26	M/s Usha Engineering Works Trunk Road, Madanur – 635 804, Vellore Dt.	Tel : 04174 – 73613
27	M/s Geetanjali Solar Enterprises P / 14, Kasba Industrial Estate, Phase –I, E.M. Bye Pass, Kolkatta – 700078	Tel : 033 – 4420773 – 4424027 Fax : 033 – 4420773 Email : <a href="mailto:gse@cal.vsnl.net.in">gse@cal.vsnl.net.in</a>



28	M/s Surya Enterprises 6/80/4, Bijoygarh, Kolkatta – 700 032	
29	M/s Partha Associates 305, Jessore Road, Kolkatta – 700 048	Tel : 033 – 5215476
<b>B. CONCENTRATING SOLAR COOKERS</b>		
1	M/s Gadhia Solar Energy Systems (P) Ltd Plot No. 86, OLD GIDC, Gundlav, Valsad – 396 035, Gujarat - <b><i>For all types of concentrating type solar cookers including Scheffler &amp; solar steam cooking systems</i></b>	Telefax : 02632 – 36703 Email : <a href="mailto:deepak_gadhia@yahoo.com">deepak_gadhia@yahoo.com</a> <a href="mailto:gadhiasolar@vsnl.com">gadhiasolar@vsnl.com</a>
2	M/s Solar Alternatves St. Mary's Church Compound, Phulwari Sharif, Patna – 801 505 - <b><i>For Scheffler &amp; Dish solar cookers</i></b>	Tel : 0612 – 254487 Fax : 0612 – 227903 Email : <a href="mailto:solarpatna@yahoo.com">solarpatna@yahoo.com</a> <a href="mailto:siphulco@dte.vsnl.net.in">siphulco@dte.vsnl.net.in</a>
3	Sustainable Development Agency (SDA) Regional Office ( North ), C / 114, Panchavati Apartments, Vikas Puri, New Delhi – 110 018 - <b><i>For Dish solar cooker only</i></b>	Tel : 5593449 Fax : 5617894
	Sustainable Development Agency (SDA) Parathodu, P.O. Kanjirapally, Kottayam District, Kerala-686 512	Telefax:0482-890646 email: <a href="mailto:soakply@sancharnet.in">soakply@sancharnet.in</a>

4	M/s Eco Solar Systems ( India ) Ltd 2035 / 2 Sadashiv peth, Tilak Road, Pune – 411 030 - <b><i>For Dish solar cooker only</i></b>	Tel : 020 – 4336999 / 4330442 Fax : 020 – 4336412 Email : ccosolar@ecosolar.com
5	M/s. Veeraja Industries 117/A/2, Pune Sinhgad Road Parvati Pune 411 030 - <b><i>For Dish solar cooker only</i></b>	
6	M/s Multi Crafts India 6-1-101/3, Padmarao Nagar, Secunderabad – 500025 - <b><i>For Dish solar cooker only</i></b>	Tel : 040 – 7505107 / 6212641 Fax : 040 – 7504321
7	M/s Tata BP Solar India Ltd Plot No. 78, Electronics City, Hosur Road, Bangalore – 561 229 - <b><i>For Dish solar cooker only</i></b>	Tel : 080 – 8521016 ( 4 lines ) Fax : 080 – 8520116 / 972 Email : tatabp@solar.ind.bp.com

**Incentives by Government of India (MNRE) under Solar thermal programme**

<b>SINo</b>	<b>Beneficiary</b>	<b>company</b>	<b>Project type</b>	<b>Unit_Description</b>	<b>No of persons</b>	<b>year_sanction</b>	<b>Sanctioned_Dt</b>	<b>status</b>	<b>Cost_Lakhs</b>	<b>CFA_Lakhs</b>
1	Adichunchungiri Mutt Belluru,Karnataka	Unissun Tech	steam-cook	Persons	1500	2006-07	29-08-2006	Commissioned	41.5	20
2	Adichunchungiri Residential School,Mandya,Karnataka	Unissun Tech	steam-cook	Persons	2500	2006-07	29-08-2006	Commissioned	35	17.5
3	Adichungiri Mutt,Kumbalagodu ,Karnataka	Unissun Tech	steam-cook	Persons	3000	2006-07	29-08-2006	Commissioned	27.05	12.5
4	Bosch Adugodi Plant Canteen	Unissun Tech	steam-cook	Persons	1500	2007-08	20-10-2010	Commissioned	32	10.8
5	Brigade Group Hotel Sheraton	Unissun Tech	steam-cook	Persons	130	2011-12	30-11-2011	Commissioned	11.6	3.06
6	IIM Bangalore	Unissun Tech	steam-cook	Persons	200	2011-12	30-11-2011	Commissioned	15	3.9
7	Jagadguru Shankaracharya Mahasamstranam Dakshinamnaya Sringeri	Gadhia Solar Enegy Sysytem Gujarath	steam-cook	Persons	5000	2004-05	23-02-2004	Commissioned	50.37	25
8	JSS Mahavidhyapeetha, Mysore. (Boys Hostel, Girls Hostel and Dasoha	Unissun Tech	steam-cook	Persons	3500	2011-12		Commissioned	31.86	8.48

	Bhavan Suttur)									
9	Karnataka Veershaiva Vidyaabhivruddi Samsthe, Bangalore	Unissun Tech	steam-cook	Persons	200	2011-12	30-11-2011	Commissi oned	18.12	4.83
10	Ramakrishna Math Boys Hostel	Unissun Tech	steam-cook	Persons	135	2011-12		Commissi oned	11.56	3.17
11	Rishi Samskri Vidya Kendra	Gadhia Solar Enegy Sysytem Gujarath	steam-cook	Persons	200	2007-08		Commissi oned	14	5.5
12	Sainik School Bijapur	Unissun Tech	steam-cook	Persons	500	2007-08	09-08-2010	Commissi oned	12.5	5
13	Siddaganga Mutt ,Tumkur	Unissun Tech	steam-cook	Persons	5000	2009-10	22-02-2010	Not Commissi oned	181	44
14	Siddganga Institute of Technology, Tumkur	Unissun Tech	steam-cook	Persons	130	2011-12	30-11-2011	Commissi oned	11.6	3.1
15	Tontada Siddalingeswara Kainkarya Dasoha Seva Sangh, Yedeyur	Unissun Tech	steam-cook	Persons	5000	2010-11	22-02-2011	Commissi oned	20.15	9.27

16	Ved Vigyan Maha Peeth, Panchagiri Educational Campus, kanakapura road, Bangalore	Gadhia Solar Energy System Gujarat	steam-cook	Persons	8000	2010-11	10-11-2010	Commissioned	62.4	13.86
17	Royal Garden ITC Hotels	Thermax Pune	Laundry			2009-10	16-11-2010	Commissioned	11	3.36
						<b>Grand Total:</b>			<b>575.71</b>	<b>189.97</b>

