

PROJECT PROFILE

ON

SOLAR COOKER

Month & Year

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**PREPARED BY
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SOLAR COOKER

INTRODUCTION

A Solar Cooker is a device that uses heat energy from the sun to cook food. Two types of Solar Cookers are available viz box type and dish type. A box type Solar Cooker, suitable for a family of 4 or 5, can cook food in 2 to 3 hours. The Cooker has to be kept outside in the Sun, and can cook upto 4 items at a time. It is available with electrical backup, so it can be used even in non-shine hours. It can save upto 4 LPG cylinders a year. However food cannot be fried in the box solar cooker. There is no Government subsidy for this type of Solar Cooker. However, under arrangements made by the Government of India (MNRE), interest free loan is available for the bulk users through IREDA and some of the banks.

A dish Solar Cooker can cook food in lesser time than a box cooker. It can be used even for preparing chappaties and for frying. It can however, be used to cook only one item at a time. The Government of India (MNRE) subsidy is available upto 30% of the cost. The State Government also sanctioned an amount of Rs.2.40 lakhs for providing 40 Nos. Solar Dish Cookers at full cost to Noon Meal Centre / Hostels during the year in 2006-07. The same was allotted to the Most Backward Class and Denotified Communities Welfare Department Student Hostels.

Solar steam cooking system are also available which can be installed where boilers are used for steam generation and the food cooked for thousands of persons. Such a system installed in Tirupathy temple is working well.

PRODUCT USES AND SPECIFICATIONS

This solar cooker looks like a rectangular box fitted with handles and two hinged lid. The lower half of the box is insulated on all four sides and the bottom has four cooking pots which are coated by black matt finish paint. The outer case of all cooker is made of Aluminium or FRP (Fibre reinforced plastic) material which is light weight and tough material.

A solar cooker consists essentially of a well-insulated box with a window (glass or plastic), through which sunlight can pass. Within the box, sunlight is absorbed by the black base and walls (offset plate) or by the dark cooking pots, that is to say, the solar energy is converted into heat. Temperatures of up to 170°C can be achieved with this method.

The Indian Standard (IS 13420: 2000) defines the specifications and the performance parameters of box-type solar cookers

MAKET POTENTIAL

The market in India for energy efficiency and renewable energy (RE) is estimated at Rs.12500 crores(\$2.5 billion) and is growing at an annual rate of 15 percent. The new RE policy of the Government of India (GOI) that aimed at generating 10,000 mw by 2012, through renewable and non-conventional sources, is expected to further boost the growth rate of this sector.

India receives a good level of solar radiation, the daily incidence ranging from 4 to 7 kilowatt-hours per meter square (Kwh/m²) and can utilize this to generate power and thermal applications. Only a fraction of the aggregate potential in renewable resources and in particular solar energy is being used so far. There is a high market potential for processed raw material for solar cells, large capacity solar photovoltaic (SPV) modules, film solar cells, SPV roof tiles, inverters, and charge controllers.

The investment in RE is estimated to be about Rs.15000 crores (\$3 billion). India has not been successful in keeping pace in this sector, despite a large demand-supply gap with respect to energy requirements and ample renewable resource availability. The GOI has now implemented many programs to invest in solar energy.

INSTALLED CAPACITY

The installed capacity of the proposed unit is manufacturing of 1800 nos of solar cookers per annum on single shift basis. The capacity per day is 6 nos.

PLANT AND MACHINERY

The following items of plant and machinery are proposed to be installed.

	Items of machinery	Nos	Value-Rs
1	Hand lever shearing machine	1	30000
2	Sheet bending machine hand operated	1	30000
3	Bench drilling machine	1	10000
4	Bench grinder	1	15000
5	Hand tools and workshop equipment Jigs and fixtures		15000
	Total		100000

MANUFACTURING PROCESS

The manufacturing of solar cookers involves the following sequence of operations.

Cutting glass sheets, Fibre galss sheets

V

Insulating box

V

Assembling

Overall Dimensions	
Length (mm)	600
Width (mm)	500
Height (mm)	250
Weight (kg):cooking	19
Cooking capacity	4-5 persons
Time taken in cooking (hrs)	2.0-2.5

Box-type solar cooker consists of an insulated box, metallic cooking tray sat inside the box, double glass lid on the cooking tray, and a reflecting mirror fitted on the underside of the lid of the box. The cooking tray is insulated on the sides and bottom. The incoming solar radiation falls onto the double glass lid and passes through it to strike the blackened cooking pots and the cooking tray. The heat is absorbed by the blackened surface and gets transferred to the food inside the pots to facilitate cooking. The mirror reflector is set in such a way to reflect the solar radiation falling on it to the cooker box. Up to four black painted vessels are placed inside the box. The cooker takes 1 to 2 hours to cook items such as rice, lentils and vegetables. The cooker may also be used to prepare simple cakes, roast cashew nuts, dry grapes, etc. It is an ideal device for domestic cooking during most of the year, except for the monsoon season and cloudy days. It however cannot be used for frying or chapatti making.

RAW MATERIALS

The raw material required for the production at full capacity is given below

Glass sheets
Aluminum sheets

FRP sheets

The total cost per cooker is estimated at Rs.800 per piece.

LOCATION LAND AND BUILDING

The infrastructural facilities required for the project by way of land and building is the following.

Built up area-Sq.ft	500
Rent p.m.-Rs	5000
Advance-10 months.Rs	50000

UTILITIES

The utilities required for the project are the following;

POWER:

Three phase	KW	2.00
Power charges	Rs.lakhs p.a	0.24
Water-For process-Litres	per day	0
For human consumption		200

MANPOWER

The manpower requirement for the project is given below

Monthly	Total
wages	

Skilled	1	6000.00	6000.00
Helpers	1	4000.00	4000.00
sub total			10000.00
Add benefits		20%	2000.00
Total per month			12000.00
TOTAL PER ANNUM-Rs. lakhs			1.44

SCHEDULE OF IMPLEMENTATION

The project can be implemented within a month's period after making arrangements for the finance.

COST OF PRODUCTION AND PROFITABILTY

Assumptions

Installed capacity	1800 Solar Cookers
Capacity utilisation	Year-1 -60% Year -2 -70% Year-3 onwards- 80%
Selling price	Rs.1300 per Solar cooker
Raw materials	Rs.800 per cooker
Power	Rs.0.24 lakh per annum at 100%
Wages and salaries	Rs. 1.44 lakhs with increase 5% every year.
Repairs and Maintenance	Rs.0.30 lakh per annum
Depreciation	Written down value method -15 % on machinery
Selling general and administrative expenses	Rs.15000 per month
Interest on Term loan	12% per annum

Interest on working capital	12 % per annum
Income tax	33.22 % on profits

1. Soft loan is available from Indian Renewable Energy Development Agency Limited (IREDA), New Delhi under MNES Interest Subsidy Scheme. Loan can be extended for both domestic and commercial application for any capacity of Solar water heating system. The principal with the interest is repayable in 6 years (including one year moratorium period).

Ministry of Non Conventional Energy Sources (MNES) is providing Interest Subsidy to promote the solar water heating systems through IREDA and few Nationalized Banks so that end users/ customers can take soft loan at lesser interest rate.

Apart from the above, few states are providing additional subsidy to promote the solar water heating concept and made mandatory for certain buildings, government buildings etc. to use solar water heating systems.

The Government of India (MNRE) is providing soft loan @ 2% to domestic users, 3% to institutional users not availing accelerated depreciation and 5% to industrial / commercial users availing depreciation through IREDA and Public / Private sector banks etc. Capital subsidy equivalent to upfront interest subsidy @ RS.1100/- per sq.m of Collector area will be available to registered institutions and Rs.825/- per sq.m. of Collector area to registered Commercial establishments that do not avail soft loans.

The Tamilnadu State Government had also earlier provided subsidy to domestic and institutional users for installing the Solar Water heating systems. But now, it has been restricted to providing 100% cost for installation in Government institutions.

For technical guidance please contact

1. Secretary

Ministry Of Non-Conventional Energy Sources

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2. Principal Scientific Officer

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3. Solar Energy Centre, MNRE, B-14, CGO Complex Lodhi Road, New Delhi – 110003. Telefax : 0091-11-24360331?

Campus: Solar Energy Centre, 19th Milestone, Institutional Area, Gurgaon-Faridabad Road, Gwalpahari, Gurgaon Telefax No. : 0091-124-2579207E-mail: sec@nic.in

Opportunities for Collaboration

The Solar Energy Centre invites individual professionals working in solar energy or institutions having an interest in similar activities to build-up a mutually beneficial relationship through joint projects which could exploit each others strengths. The Centre has been working jointly on a number of projects with National Institutions such as the IITs, the NPL, the Indian Agricultural Research Institute, the Energy & Resources Institute, etc. It is also collaborating with reputed international institutions such as the National Renewable Energy Laboratories (NREL) of USA in the photovoltaic area; University of Stuttgart, Germany in the area of solar thermal testing; and with Inter-solar Centre of Moscow in the area of solar energy.

4.School Of Energy, Environment & Natural Resources, Madurai Kamraj University

FINANCIAL ASPECTS

1. COST OF PROJECT

[Rs.lakhs]

Land & Building (Advance)	1.00
Plant & Machinery	1.00
Other Misc. assets	0.10
Pre-Operative expenses	0.20
Margin for WC	0.14
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	2.44
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2. MEANS OF FINANCE

Capital	1.69
Term Loan	0.75
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	2.44
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3. COST OF PRODUCTION & PROFITABILITY STATEMENT

[Rs.lakhs]

Years	1	2	3
Installed Capacity	1800	1800	1800
Utilisation	60%	70%	80%
Production/SalesNos	1080	1260	1440
Selling Price	Rs.1,300 per Solar cooker		
Sales Value (Rs.lakhs)	14.04	16.38	18.72
Raw Materials	8.64	10.08	11.52
Power	0.14	0.17	0.19
Wages & Salaries	1.44	1.47	1.50
Repairs & Maintenance	0.30	0.33	0.36
Depreciation	0.15	0.13	0.11
Cost of Production	10.67	12.17	13.68
Selling, Admin, & General exp	1.80	1.89	1.98
Interest on Term Loan	0.09	0.08	0.06
Interest on Working Capital	0.03	0.03	0.03
Total	12.59	14.17	15.75
Profit Before Tax	1.45	2.21	2.97

Provision for tax	0.00	0.73	0.99
Profit After Tax	1.45	1.48	1.98
Add:	0.15	0.13	0.11
Depreciation			
Cash Accruals	1.60	1.60	2.09
Repayment of Term Loan	0.00	0.19	0.19

4. WORKING CAPITAL:

	Months Consumptions	Values	%	Margin Amount	Bank Finance
Raw Materials	0.50	0.36	25%	0.09	0.27
Expenses	1.00	0.05	100%	0.05	0.00
		0.41		0.14	0.27

5. PROFITABILITY RATIOS BASED ON 80% UTILISATION

<u>Profit after Tax</u>	=	<u>1.98</u>	11%
Sales		18.72	

<u>Profit before Interest and Tax</u>	=	<u>3.06</u>	113%
Total Investment		2.71	

<u>Profit after Tax</u>	=	<u>1.98</u>	117%
Promoters Capital		1.69	

6. BREAK EVEN LEVEL

Fixed Cost (FC):	
	[Rs.lakhs]
Wages & Salaries	1.50
Repairs & Maintenance	0.36
Depreciation	0.11
Admin. & General expenses	1.98
Interest on TL	0.06
	<hr/>
	4.01
	<hr/>
Profit Before Tax (P)	2.97

$$\text{BEL} = \frac{\text{FC}}{\text{FC} + \text{P}} \times 100 = \frac{4.01}{6.98} \times \frac{80}{100} \times 100$$

46% of installed capacity