

APPLICATION OF SCHEFFLER REFLECTORS FOR PROCESS INDUSTRY

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ABSTRACT

In recent years large steam cooking systems in India have proved that Scheffler Reflectors can be a viable alternative to fossil fuels when it comes to generating low pressure steam. Now process industry has started to make use of this technology. To adapt to the needs of the industry a 16m² Reflector was developed.

Keywords: Solar Steam, Scheffler Reflector, Solar Food Processing, Process Industry

1. INTRODUCTION

Steam and hot air play a crucial role in manufacturing processes. Steam generation using light diesel oil (LSD), HSD, furnace oil or electricity is becoming costlier and more scarce all the time. The scarcity and the up scaling cost of these resources have forced everyone to look out for an alternative source of energy for the generation of steam and hot air. We Indians are fortunate to have nearly 300 good sunny days per year. The Parabolic Solar Concentrating System is a tested and proven technology which uses Solar Energy to generate steam and hot air. This process of steam generation is natural, eco friendly and long lasting (life of the system with proper maintenance is around 20 years.). The use of solar energy for generation of steam is now an economically attractive possibility since the pay back period of such a system lies between 1,5 and 2 years.

2. DEVELOPMENT STAGES

Up to recent years the reflectors were mainly used for solar steam cooking systems. The big systems like those at Brahmakumaris Ashram and Tirupati Temple have proved that it is possible to cater for higher requirements of steam. After the success of these solar cooking systems people realized that it must also be possible to provide low pressure steam for industrial applications.

To reach higher efficiency and match industrial standards we felt the need to increase the size of the reflectors, improve the receivers for better heat exchange and improve the tracking system. Planning started in the end of 2003. With guidance of Mr. Wolfgang Scheffler a team of 4 engineers worked out the details for the 16 Sq. meter reflector.

Steam cooking systems used up to that point had reflectors of 8 m², 10 m² and 12.6 m².

The basic calculations for stiffness of the materials, increasing factors and improvements to get a smaller focus had to be worked out. India's *Ministry of Non Conventional Energy Sources* funded a prototype of the reflector.

The first 16m² reflector was ready by middle of 2004 and delivered the expected output. By then some interested people from different industries had already shown their interest in installing a solar steam generation system using the above mentioned reflector.

3. APPLICATIONS

Project 1:

Steam for dry cleaning and laundry for *Gajaraj Cleaners*, in Ahmadnagar, Maharashtra, India.

Capacity : 600 kWh.

Number of reflectors 15

Total reflective area: 240m²

Receiver: 500mm diameter

usable pressure: 8 to 12 bar.

Savings per day: 75 liters of LDO

Approximate pay back period: 3years.

Pay back period with 35% govt. financial help: 2 years

System was commissioned on 4th March 2006



15 reflectors for commercial laundry



Project 2:

Steam for washing compressor components at Kirlosker Copeland Ltd., India

Number of reflectors: 4

Total reflective area : 64m²

Receiver: 500mm diameter

Usable pressure: 3 to 12 bar.

Savings per day: 160 kWh of electricity

Approximate pay back period: 2.5years.

Pay back period with 35% financial help from the government: 1.5 years.

System was commissioned at 12th March 2006



4 reflectors at Kirlosker

Planned Project:

Steam for evaporation of water from milk for preparing sweets, Ahmadnagar

Usable pressure: 3 to 10 bar

Procedure: feeding the solar steam into a jacketed vessel and turning the scrapers for uniform evaporation.

Number of reflectors: 8

Total reflective area: 128m²

4. OPERATION AND MAINTANANCE OF SOLAR STEAM GENERATION SYSTEM

The described solar system has less maintenance than a conventional boiler. It doesn't include any fast moving parts. Whereas a conventional boiler includes pump, blower, ignition rod, fuel pump etc.

But still the routine maintenance like cleaning the mirrors, adjusting the focus, checking for leakage, rectification of valves etc. has to be taken care of.

5. CONCLUSION

Process industry has a huge requirement for steam. Solar flat plate collectors can only provide a base line temperature up to 80C°. To meet higher temperatures up to 200C° Scheffler technology is most reliable, proven and has an attractive pay back period. There are continues improvements in the receivers for better output. We feel that there is huge demand from process industry for solar steam and solar hot air generating systems. Specifically in food processing industry it can be useful for applications like preparing potato wafers, Tomato Ketchup, chocolates and biscuits, confectioneries, dairies and milk based sweets etc.