



ARUN®100 with Thermal Storage at RAMKRISHNA MISSION, CHENNAI

Project Description

Ram Krishna Mission Student's Home, Mylapore, Chennai wanted to adopt solar cooking system for its hostel. However the cooking timings and Sun availability was not matching. Breakfast is cooked at 4.00 a.m. and lunch cooking starts at 7.00 a.m. while dinner is cooked after 5.00 p.m. Hence system with heat storage was designed and installed. System consists of an ARUN®100 solar steam generating system. The system was commissioned on 26th October 2013.

Project USP

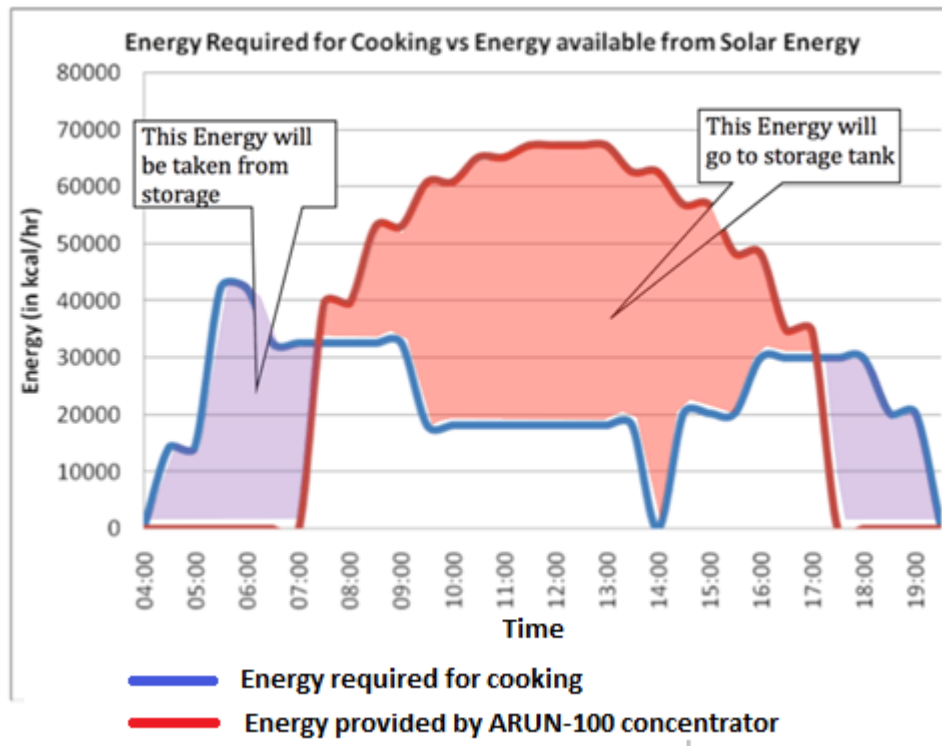
- Pressurised water Storage has been provided for cooking breakfast at 4 a.m. and lunch at 7.00 a.m.
- System is installed on roof top of existing building
- Cooks about 2500 meals per day

Project Summary

Date of Completion	26 th October 2013
Steam Delivery	Pressure 7 bar / 170°C
No of meals cooked on solar	About 2500 meals on a sunny day
Average Fuel Savings	30 to 40 kg of LPG per day on a clear sunny day

Need for Thermal Energy Storage in Cooking

A typical energy requirement in community cooking setting is shown in the graph below in blue line. The red curve shows the energy generation with solar system.



It is seen from the above graph that there is a mismatch in timings between the cooking energy demand and solar energy supply. The red shaded area (solar energy delivered in excess of requirement) is stored in a thermal storage tank. It is used at times when solar energy is not available for the cooking requirement (blue shaded area).

ARUN@100 Technology Details

Aperture Area	104 sq.m.
Footprint Area	3m x 3m = 9 sq.m.
Temperature Rating	Peak delivery of 350°C
Thermal Output Rating	Peak delivery of 3,50,000 kcal/day
Tracking System	Fully automatic two-axes tracking system
Estimated Life of System	20 years +

Operating Philosophy

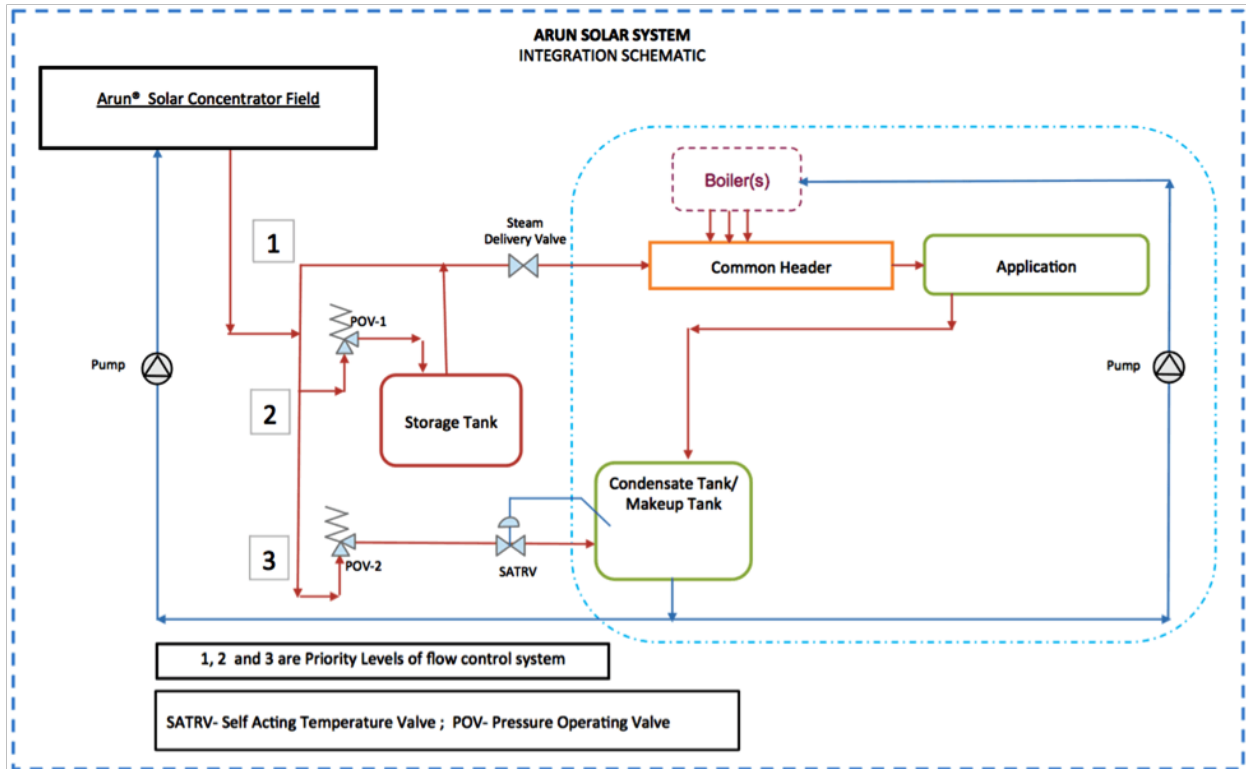


The basic aim of the control system in this integration scheme is to deliver steam to the existing boiler header and excess steam to be delivered to thermal storage for non-solar hours operation.

The ARUN dish automatically tracks the sun from morning to evening. The receiver coil at the focus of the dish transfers the heat of the sun to the heat transfer medium (water). “The Steam generation system with Storage” consists of ARUN®100 dish, thermal storage, pumps, valves, etc. Once the system starts generating steam and required pressure is achieved, the steam is delivered to the common header of existing boiler system. If there is reduction in steam usage by the process (due to holiday, break, etc), the upstream pressure increases causing a valve to open, thereby delivering steam to the storage tank. This process continues whenever the sun is available. When the sun is not available, steam is first generated by flashing pressurised hot water from the storage tank. Thereafter the existing boiler system is turned on.



Integration Schematic



Contact:

Prof. Dr. Ajay Chandak | PRINCE, India | renewable.india@gmail.com | www.princeindia.org
 Abhishek Bhatewara | Clique Solar | Cell: 0091-909 618 0000 | adb@cliquesolar.com