

# Dairy reduces its heating costs using solar thermal technology

## Background

A co-operative dairy operates a milk processing facility of 100,000 litres per day (lpd) capacity at Bellary, Karnataka, South India. The facility operates two furnace oil-fired boilers of 1 TPH and 2 TPH capacities and requires 15,000 lpd of hot water at 95°C for the following process heat applications: boiler feed water, clean-in-place (CIP), crate washer, and pasteurization.

## Problem

As part of their continuous improvement drive, the management of the dairy wished to save on process heating costs. They invited A.T.E. to develop and install a customized solar thermal solution for their needs.

## Solution

After an audit and extensive discussions with the dairy on the process requirements, A.T.E. proposed a solution to provide hot water at 95°C as feed water to the boiler, to the crate-washing and CIP sections, and to the pasteurization process. The roof-mounted solar thermal solution was designed with high-efficiency compound parabolic concentrators (CPC). The system was sized to deliver on average 15,000 LPD of hot water at 95°C for 9 months of the year (283 MWh<sub>th</sub> annually)

## System Description

The system comprises a primary circuit with the array of CPC modules, a secondary circuit with storage tanks to store the heat and a process integration circuit. The heat transfer liquid (water treated by reverse osmosis) circulating in the closed-loop primary circuit is heated in the CPC modules, and then

exchanges its heat with softened water in the secondary circuit. This hot water in the secondary circuit is stored in stainless steel tanks. When the temperature of the water in the tanks exceeds a threshold value, process pumps transfer the hot water to the applications. The entire system is designed for reliable and automated operation including start-up and shut-down. In addition, a remote monitoring solution permits instantaneous, daily, and monthly performance to be viewed at a glance.

## Results

Over a period of 25 days in early-winter of 2017, this solar thermal installation produced 30 MWh<sub>th</sub>, thus saving the dairy 3.86 tonnes of furnace oil and avoids about 1 tonne of CO<sub>2</sub> emissions. Annually, this solar thermal installation will save the dairy Rs. 0.94 million, and reduce its CO<sub>2</sub> emissions by more than 9 tonnes.

