Parle Products Ltd. Neemrana

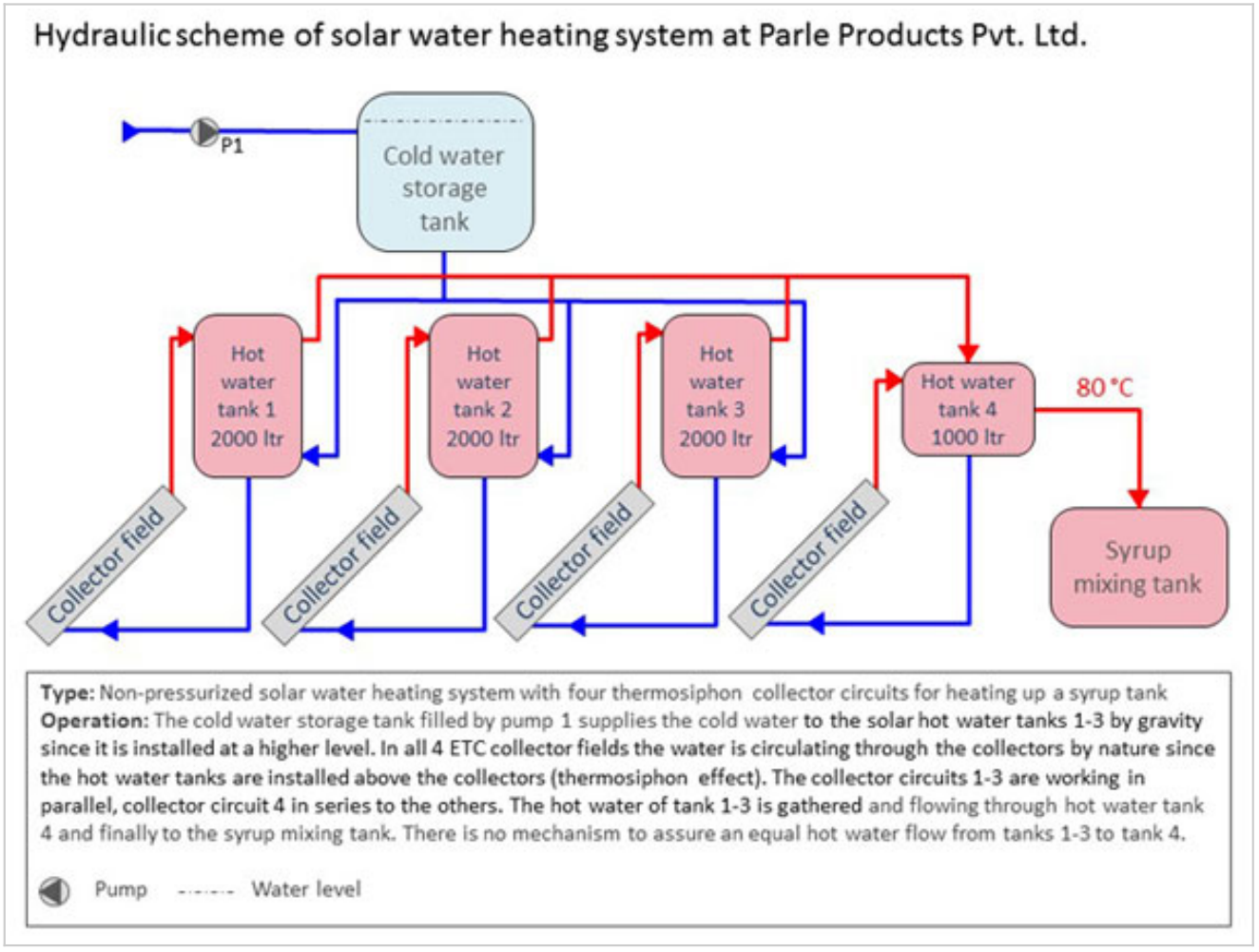
General Information

Description of the company	:	In 1929 a small company by the name of M/s. Parle Products was setup in the suburbs of Mumbai. The goal was to come up with sweets and candies which were new to Indian population during that time. A decade later, this factory was upgraded to manufacture biscuits as well. Since then, M/s. Parle's name has spread in all directions and has won international fame. The company has installed a 7000 LPD capacity SWH system for industrial process heating. Parle's plant at Neemrana has a daily biscuits production of about 150 MT. The average production is about 4000 MT/month.
Type of Industry	:	M/s Parle Biscuits is a food & confectionary company. The plant at Neemrana is manufacturing biscuits.
Location of the company and the solar plant	:	The SWH System is installed on the roof-top of the buildings at their plant addressed below: M/s. Parle Biscuits Pvt. Ltd. Plot No. SP-2-4,RIICO Industrial Area, NH-8 Alwar District, Rajasthan-301705 Key contact: Mr. NarendraSangwan, Manager-Engineering Contact:+91 9929731544
Heat demanding processes	:	For sweetening of the biscuits, sugar syrup is used. The syrup is prepared by mixing sugar with hot water. Later it is cooled to prepare the raw material by mixing it with the base flour before it is set on the biscuit production line. The syrup tank mixer requires hot water in temperature ranges of 70OC to 75OC which is supplied by the SWH System during most of the days in a year. During low heat days, the plant uses the existing thermic fluid system of 2 kW capacity, which through the heat exchanger increases the temperature from 60OC to 75OC.The heat demand is required on a continuous basis for about 15 hours a day for around 350 days of plant operation in a year. If the production demand is higher the plant is operated for more hours per day.

Conventional heat supply	:	The plant has a thermic fluid heater, which is used as auxiliary heat system. If the temperature of hot water from SWH system is lower than required, then the plant personnel will start the conventional system to meet their temperature requirements.
Conventional fuel used	:	The plant uses the high speed diesel (HSD) as a conventional fuel in the thermic fluid heater. The price of the diesel was Rs.35 per litre at the time of installation of the SWH System. The energy content of diesel oil is around 10,800 Kcal/kg.
Motivation to use solar thermal energy	:	M/s Parle Products is a known name and actively involved in ensuring highest quality standards for Environment Management Systems, Occupational Health and Food Quality. The company while utilizing Thermic Fluid System for preparation of Sugar Syrup identified the areas where major energy consumption was taking place. After thorough brainstorming and energy analysis they identified the required heat and potential for HSD savings. This triggered use of SWH System. The management had worked out the relative cost of sugar syrup preparation, vis-a-vis the existing thermic fluid system and thus implemented the SWH System.

Description of the solar thermal system

Type of solar plant	:	The SWH System is an ETC Type of 7000 LPD capacity with a system output around 60OC to 70OC exclusively used for preparation of sugar syrup.
Year of installation	:	The SWH System was commissioned in the year 2010.
Solar collector field	:	The SWH System is assembled in 14 collectors of Evacuated Tube Type collectors installed on the roof top of the plant with a gross area of 97 m2.
Water storage	:	The water storage capacity is 7000 L which is insulated with rock wool. Four different tanksi.e. 3 x 2000 Land 1 x 1000 L are installed as solar water tanks.

Hydraulics	:	 The R.O water pumped up to the collectors on the roof top, where the water is heated to the desired temperature. This cold water is pumped up to the ETC assembly the system using a pump. The SWH system works as thermo-syphon.
Operation of the system	:	The RO water at 250C is circulated through the ETC tubes using a pump. The heated water around 600C is sent solar hot water storage/ collector tanks, which is further sent for syrup preparation as required for the batch of production.

Supplier of the solar system	:	M/s Photon Solar Unit 19, Mount View Enclave, Road no 12, Banjara Hills, Hyderabad - 500 034, Andhra Pradesh, INDIA, Key contact: Mr. Shankar Devan Tel: +91 40 23331337/1338/1339
Data recorded	:	The Plant personnel are not maintaining any log book for the SWH System.

Energy balance

Heat demand	:	The hot water demand for the plant is 7000 LPD. The hot water is used in the syrup mixing tank. The plant heat requirement is about 350,000 kcal/day or 407 kWh/day.
Solar radiation-on site	:	The site receives an annual average insolation of 4.91 kWh/m2/day incident on a horizontal surface. As per NASA Surface meteorology and Solar Energy for location (Longitude: 76.7 & latitude:27.4)
Useful solar energy delivery	:	The useful solar energy delivered by the SWH System is 245,000 kcal/day or 285 kWh/day. While per m2 of collector it is 2526 Kcals or 2.94 kWh. (Assumptions for the calculation: Inlet water temp. 25OC & outlet water temperature of 60OC and the water consumption is about 7000 LPD).
Fuel saved by solar energy	:	Diesel saved by the SWH System is estimated at 26 litres per day and 9023 litres per year. (Assumptions: The calorific value of diesel is considered as 10800 Kcal/kg & density of diesel is 0.88).
Solar fraction	:	Solar fraction is about 70% (285/407)
Emissions saved	:	The CO2 emissions saved by the use of SWH System is about 24 tCO2/year. (considering 2.608 kg CO2 equivalent per litre of diesel combustion)

Economy

Investment costs	:	The total cost of the system is Rs. 9.26 lakhs. According to the actual investment cost the investment cost per m2 of collector area is about Rs. 9546.
Subsidies	:	The project proponent has availed the MNRE subsidy @ 30% on the total investment cost. i.e. Rs. 2.78 lakh.

Economics of the solar system	:	The payback period analysis is used as a yardstick to relate the project viability. The financial analysis assumes for profits and payback calculations based on seven years of operation, generally which the bank ensures as the term loan repayment period. The payback analysis is calculated with and without the MNRE subsidy. From the analysis it is seen that the pay-back period without subsidy is 2year 9 months and is improved at 1 year and 4 months with MNRE subsidy. The IRR is improved from 36.88 % to 46.80 % with MNRE subsidy

Experiences

Operation experience	:	Since the installation of the system the Solar water heating system is working properly and the project personnel has never facedany major O&M problems.
Statement of the owner	:	The system owner has expressed his satisfaction about the plant operation and has already gained benefits from the SWH System.