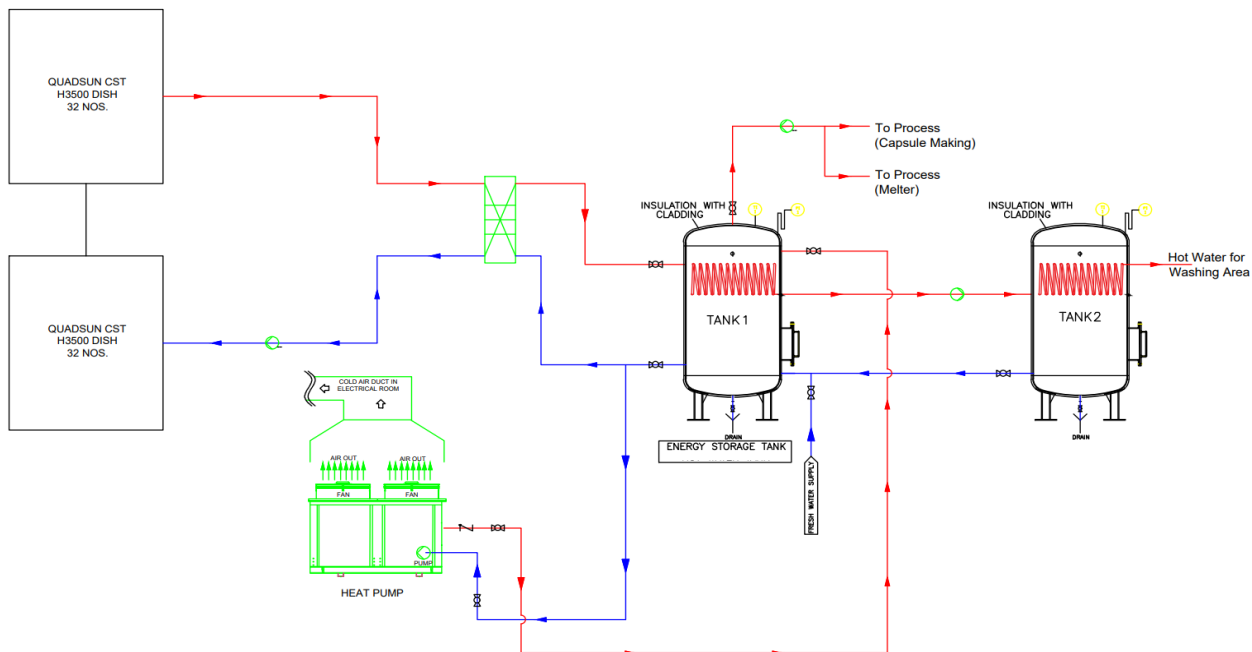


Concentrating Solar Thermal System using process heat application at Natural Capsule Ltd, Puducherry

Location: Pichaiveerampet, Puducherry	Type of Technology: Paraboloid dish
Type of Industry: Pharmaceutical	Technical and Financial Support: MNRE-GEF-UNIDO project
Configuration: 64 No's Paraboloid dishes with collector area 281.6 m ²	Supplier: QuadSun Solar Pvt. Ltd, a MNRE approved CST manufacturer
Application: Process Heating	Year of Installation: March 2021
Beneficiary Details: Natural Capsules Limited is a Public Limited Company established in the year 1993 in Bangalore and the year 2003 at Pondicherry. The company is a well-equipped modern manufacturing plant to manufacture hard Gelatin capsule shells, hard cellulose capsule shells, and pharmaceutical dosage forms in Capsule. NCL has become the first in Puducherry to adapt Concentrating solar thermal (CST) system which is used for process heat application. The CST system supported under the MNRE-GEF-UNIDO project on <i>promoting business models for increasing penetration and scaling up of solar energy in India</i> and the purpose to reduce the dependence of fossil fuels using in the existing boiler.	 Picture of the installation Beneficiary Contact Natural Capsule Pvt., Ltd., Contact Person: Mr. Sunil L. Mundra, Managing Director Natural Capsule Limited R.S.84, Perambai Road, Pitchavaiveeranpet, Pondicherry- 605010
System Details: A highly efficient single Paraboloid dish solar concentrator with a dual-axis tracking mechanism generates 3.8kW of thermal energy at a standard test condition. The technology uses a curved mirror which reflects the radiation over a receiver to generate high-temperature heat energy in the range of 110-120°C at 1.5 Bar pressure.	
Timings & System Application Details: The operating hours of the installed CST system are 8-9 Hours from direct CST and 12 - 14 hours of pressurized hot water supply during good sunny days. The system is also provided with a heat pump for backup. The application is to supply hot water at a constant temperature of 61°C for capsules manufacturing and washing processes. CST system designed to deliver average thermal energy of 8 Lakh kCal/day for pre-heating boiler feed water for the process of capsules treatment.	

Schematic diagram of CST with heat pump:



Flow Diagram

Thermal Output: 80,00,00 kCal/day	Operating Temperature & Pressure: 110°C at 1.5 bar pressure
Type of Fuel Saved: Diesel	Quantity of Fuel Saved: 180-200 Liter/day
Percentage of heat provided by the CST system: Using Paraboloid Dish based CST system contributed 70-80% of heat and through heat pump using Solar Photovoltaic (SPV powered) provides 20-30%.	
Status of Equipment& Key Issues of Non-Operation: System Operational, Performance well.	
Existing arrangement: Diesel fired boiler	O & M Issues & Beneficiary Perception: Operation and maintenance by Suppliers with functioning well.
Project Cost: INR 289 Lakh [Project Cost of CST is INR 138 Lakh & Solar Roof top PV (200 KWp) is INR 121 lakh].	Financial supports: INR 187.50 Lakh • INR 103.50 Lakh for CST (including bridge loan of INR 16.80 lakhs against MNRE subsidy) • INR 84 lakhs for Solar Rooftop PV
Loan component: INR 187.50 Lakh (Loan support for CST under the MNRE-GEF-UNIDO project)	Overall System Performance: Satisfactory
Payback with FA: 5.49 Years	Payback without FA: 6.72 Years
Date of Visit: CST plant inaugurated on 16 March 2021 by Secretary, Department of Science, Technology & Environment, Government of Puducherry in presence of Renewable Energy Agency Puducherry (REAP) and UNIDO India office.	
Other comments by beneficiary/ project developer: Beneficiary is satisfied with performance of the system	

