A.T.E. Solar Thermal Concentrator for Air-Conditioning using VAM

Solar Concentrator Technology

Solar energy is one of the main renewable energy resources that can reduce India's carbon intensity, as well as meet the rising energy demand and simultaneously save fossil fuel resources and money. Solar concentrators are mainly used to concentrate solar energy for medium- and high-temperature thermal applications or power generation. Dish concentrator technology is best suited for direct steam generation in land-constrained process applications.

A.T.E.

A.T.E. is a seven decades-old, diversified engineering group with an excellent reputation for value-based operations and customer service. Established as a small trading company in 1939, A.T.E. is well-known in all areas of textile engineering, print and packaging, effluent water treatment and flow technology, and machine-to-machine solutions. 9 regional offices in India, and one in Bangladesh, support the sales, service and manufacturing operations.

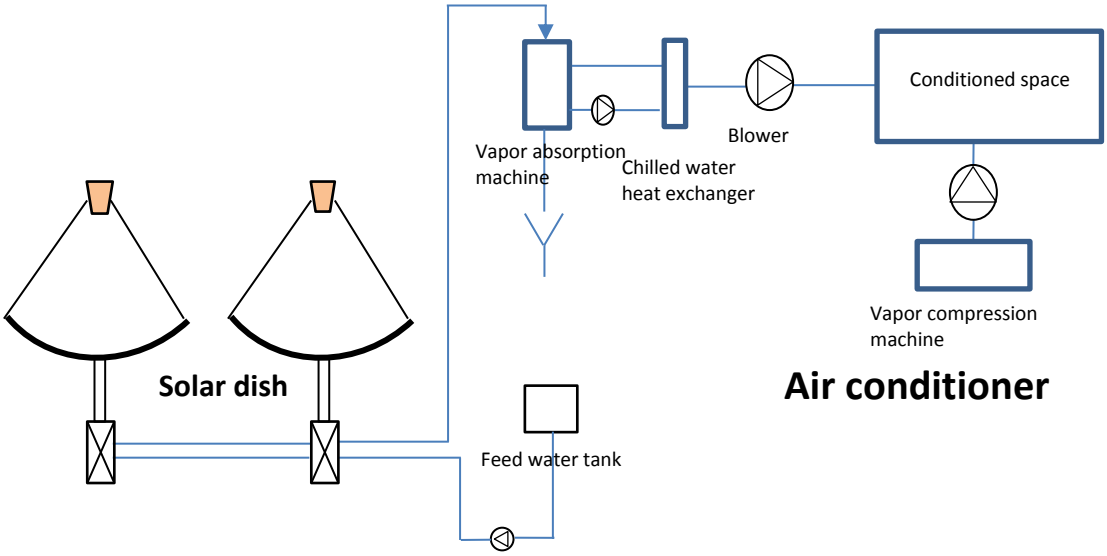
A.T.E.'s paraboloid concentrator dishes reflect and concentrate solar energy on a receiver at the focal point to generate steam directly. Three years into development, the in-house pilot at A.T.E.'s solar test facility at Pirangut, near Pune, has already clocked more than 2000 hours of operation and 17000 hours of installation. The performance of the A.T.E. solar dish concentrator has been certified by MNRE's Regional Test Facility at University of Pune. A.T.E. is ready to commercially launch this product.

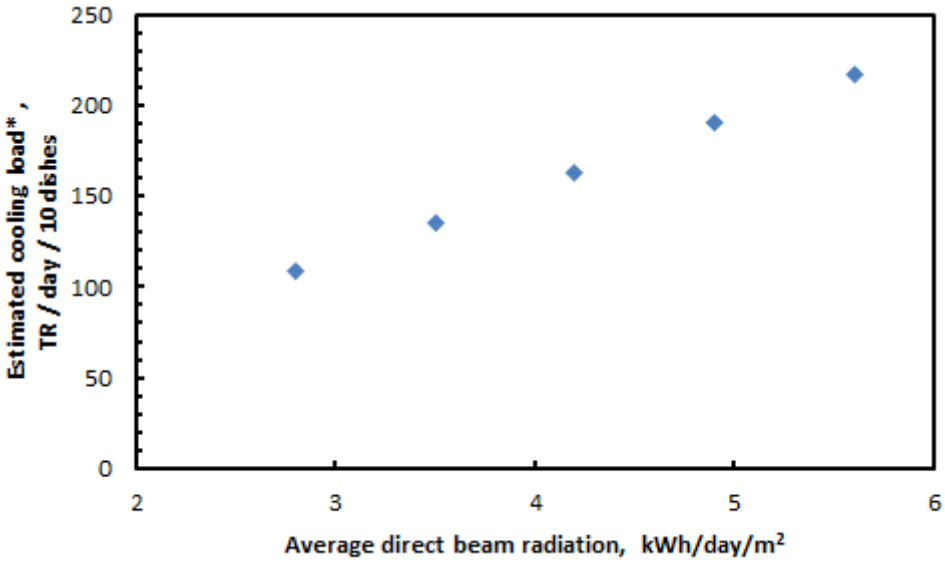
Salient Features of the Technology

- Point focus concentrator results in smallest footprint plus flexibility in siting
- Direct steam generation avoids extra secondary heat exchange process
- Two-axis system drives the dish to accurately track the Sun position and utilizes available solar energy to the maximum
- Automated control system with several in-built safety measures ensures easy and safe operation
- Proprietary modular construction makes installation simple
- Robust structural design to withstand extreme winds
- Simple system to clean the reflector surface
- Proprietary technology with 3 patent applications filed
- 100% indigenous content in components
- Continuous monitoring: proprietary remote monitoring available on request
- Solar-grade mirrors: imported mirrors available on request

Application to Air Conditioning

Air conditioners require chilled water in the range of 7–12°C. Chilled water can be generated from solar based steam using Vapor Absorption Machine (VAM). In A.T.E.'s proposed system, the conditioned space is primarily cooled by using a Vapor Compression Machine operating on electricity, while the cooling is augmented by cooling generated by the VAM-based on steam from solar concentrator. The solar based cooling can be carried out from 8 am to 4 pm on sunny days. Based on the size of conditioned space and space available for solar installation, an appropriate VAM capacity can be selected and typically, substitution of 30–70 % electrical units is possible from solar steam-based cooling system.





* The cooling load calculated for 10 dish steam supply systems due to present limitation on commercially available VAM capacity

India solar map

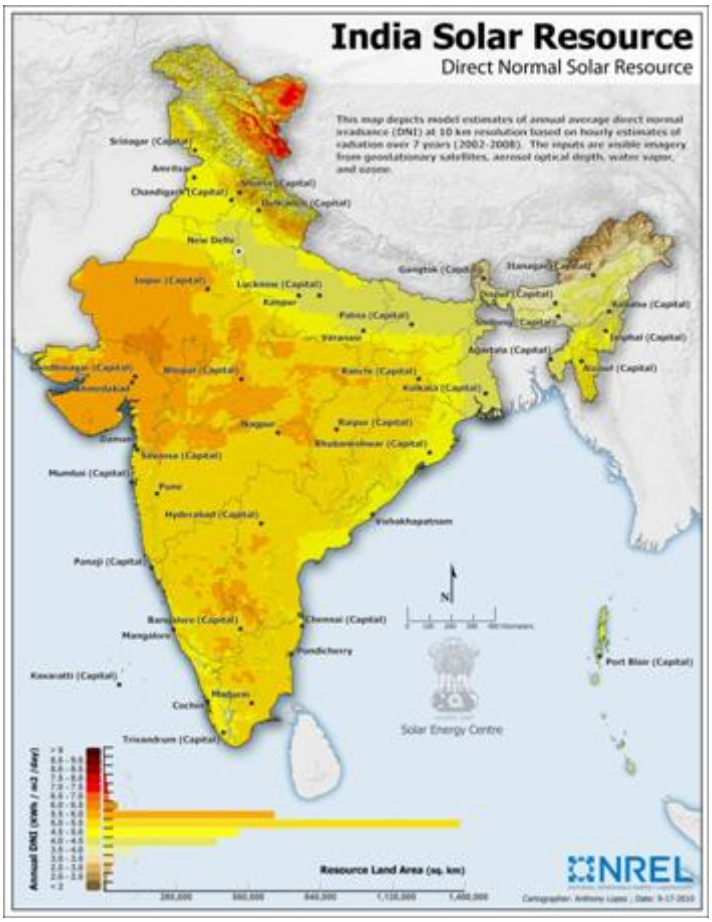


Photo dishes

Product specifications

Parameter	Value
Aperture area	25 m^2
Concentration ratio (ratio of size of image to dish aperture)	250-300
Rate of steam generation	100 kg/day
Operating temperature range	100-180 ºC
Rated thermal power	11 kW
Annual steam generation	24000-30000 kg/h
Environmental impact	20-25 ton CO_2 / year