

Potential of PCM as a thermal energy source for uninterrupted on-farm agricultural food processing

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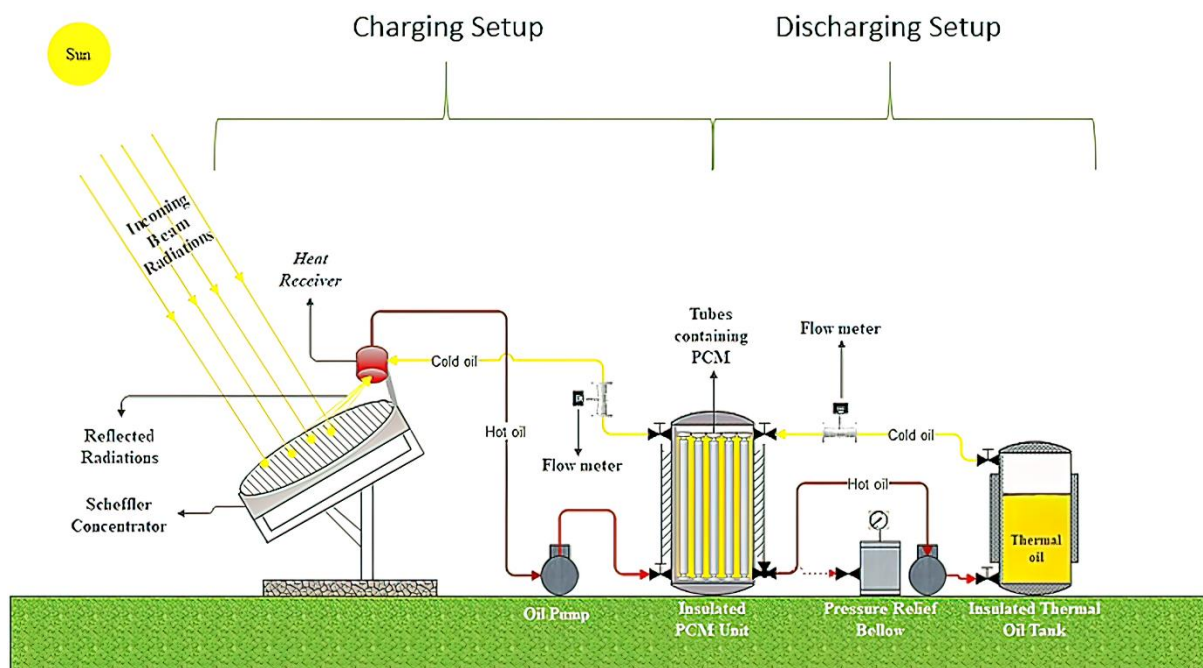
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Zeeshan Munir

Project description:

The current study is focused on finding the possibility to integrate a latent heat thermal energy storage system in various suitable solar thermal processes in agriculture. The setup consists of a laying Scheffler reflector, a heat receiver, a PCM storage tank, a heat exchanger, and a thermal oil reservoir. The laying type Scheffler reflector generates high radiation flux at the bottom of the receiver causing a rise in the temperature of thermal oil inside the receiver. Heated thermal oil is then introduced to the PCM storage tank to exchange thermal energy with PCM after which it is reintroduced to the receiver to repeat the cycle. The heat exchanger acts as a thermal load by absorbing thermal energy from the PCM.



Extensive experimentation during the summer season of 2020-21 shows that the system can store and release 1 kWh and 0.99 kWh of thermal energy with an overall thermal efficiency of 9%. Further investigations are underway to identify the impact of various operating parameters under controlled heating on the performance of the PCM tank as well as on the melting dynamics of the Phase change material.