

Can solar energy integrate with agricultural greenhouses?

Over the last few years, solar energy has demonstrated great potential for integration with agricultural greenhouses. The present study reviews the progress of solar greenhouses by investigating their integration with solar energy technologies including photovoltaic (PV), photovoltaic-thermal (PVT), and solar thermal collectors.

How much energy does a greenhouse use?

The greenhouse was integrated with a central solar heating system with seasonal storage. The results from the simulation indicated that the system could fulfill about 39% of the annual total energy demand of the greenhouse equal to 885,000 MJ/year.

Can a concentrator be integrated with a greenhouse?

Integrating concentrators with greenhouses requires sun-tracking systems which increases the total costs of the system. Fresnel lenses are the most suitable concentrators for integration with greenhouses since they can transmit most of the incident light into the greenhouse.

Can TES units be used in solar greenhouses?

Despite the benefits of using TES units in solar greenhouses, some future research prospects in terms of technical improvements and economic assessments are still required to bring this technology to the commercial scale in solar greenhouses. The thermal behavior of solar greenhouses can be described by mathematical-based models.

Can concentrating solar collectors be integrated with a greenhouse?

Fig. 23. Experimental setup of concentrating solar collectors integrated with a greenhouse: a) Spot Fresnel lens collector system, b) Linear Fresnel lens collector system (Imtiaz Hussain et al., 2015). Table 3 summarizes the main findings of the research works carried out on GHIPVT systems.

Are solar greenhouses the future of Agriculture?

With further technical and economic improvements, as well as the institution of encouraging policies and attracting mechanisms, it can be expected that modern solar greenhouses have a brilliant global opportunity to facilitate sustainable development in the agriculture sector in near future.



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