

Can solar energy be used as a building energy system?

In solar planning for building energy systems, either solar photovoltaic (PV) or solar thermal collectors (STC) can be considered. One primary issue associated with solar energy is the need of energy storage to cope with its unstable nature and seasonal cycles that mismatch the demand cycle.

How will solar photovoltaic energy impact sustainable building design?

Solar photovoltaic (PV) energy is anticipated to impact the global sustainable energy system's development significantly. The trend toward sustainable building design shows evident expansion, particularly on multi-objective optimization.

Does solar energy use a power grid as a storage system?

Although the instantaneous thermal collector efficiency can be greater than this value, the annual average is much smaller because the mismatches between loads and solar energy reduces the portion of collected energy to be unutilized. The PV system does not have such losses if it can use the power grid as the storage.

Can solar energy help in renewable planning in the studied climate?

The results can help in renewable planning in the studied climate. Solar energy application in buildings is expected to play a major part in the global effort of carbon reduction considering that the global building sector accounted for 36% of energy consumption and 37% of CO<sub>2</sub> emissions in 2020 (IEA 2021).

What is the energy saving potential of buildings?

The building sector accounts for the largest share of global primary energy consumption (32% in 2010) and produces nearly one-quarter of all greenhouse gas emissions<sup>1</sup>. These emissions may double or triple by mid-century due to further urbanization<sup>1,2</sup>. Likewise, the energy saving potential of buildings has been estimated at 50-90% (ref. 1).

Why is solar energy important?

It has achieved the purpose of saving energy, reducing carbon dioxide emissions and protecting the environment. The energy crisis and environmental pollution are becoming more and more serious, and solar energy is getting attention because it is clean, non-polluting and widely distributed<sup>1, 2, 3</sup>.



# Energy-saving building solar power generation model

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