



Solar cold storage

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What if your air conditioning bill was \$1 million? That might seem far-fetched, but ask any operations manager at a cold storage warehouse what they spend on electricity and a million dollars is likely in the ballpark.

Cold rooms are essential to many industries from food & beverage to pharmaceuticals, as they ensure temperature-sensitive products like perishable foods and vaccines maintain their shelf life. But cold storage facilities face significant burdens due to increasing energy demands, rising operational costs, and sustainability concerns. Fortunately, solar energy is a dependable, cost-effective solution that can meet the needs of these facilities.

Cold storage facilities have significantly higher energy demands compared to other types of warehouses. According to the American Council for an Energy-Efficient Economy, electricity demand in refrigerated warehouses can reach up to 60 kilowatt-hours (kWh) per square foot annually, with refrigeration accounting for over 70% of total consumption. This dependency on electricity makes cold storage businesses especially vulnerable to price fluctuations in grid electricity.

Cold storage facilities are also susceptible to grid outages, particularly during periods of extreme weather. In regions with aging or strained grid infrastructure, these outages can lead to expensive disruptions in operations. Relying on fossil fuels for energy contributes to a larger carbon footprint, posing a challenge for businesses with sustainability goals.

Solar cold storage mitigates these issues. Solar energy is more predictable, less vulnerable to fluctuations, and helps companies reduce their carbon footprint. As businesses are increasingly looking for cost-effective practical solutions to energy cost and supply fluctuations, more are turning to solar energy.

Solar energy systems allow cold storage facilities to generate part or all their electricity needs on site with zero emissions. Solar panels convert sunlight into usable electricity, which can directly power refrigeration systems, lighting, and other critical functions within the facility.

Most cold storage facilities are ideal candidates for rooftop solar systems due to their large, flat roof spaces, which are perfect for accommodating solar panels. For businesses with lots of unused land, ground-mounted solar systems are another excellent option. Facilities with large parking lots can also benefit from solar parking canopies. These not only generate clean energy but also provide shade for vehicles and reduce the facility's heat island effect.

Solar energy systems can be enhanced by integrating with a battery energy storage system (BESS), which stores excess solar energy for use during non-sunny hours or peak demand times, maximizing cost savings. In



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distribution warehouses where fleets of electric vehicles (EVs) are used, solar energy can also power EV charging stations, further reducing reliance on grid electricity.

These systems are typically managed by an energy management system (EMS), which optimizes how and when energy is used throughout the facility, ensuring maximum efficiency and cost-effectiveness. For example, the EMS can instruct the system to store excess solar energy created during the day for use in the early evening, when utility prices tend to be higher, which reduces the facility's utility bills.

The solar cold storage design and installation process involves multiple stages: site validation, site development, engineering, procurement, and construction (EPC); and ongoing asset management. Each of these steps is crucial to ensuring the system's efficiency and longevity.

The total cost of a solar energy system for cold storage can vary depending on several factors, including the type of equipment, roof or site preparation needs, labor rates, and permitting requirements. Companies can offset these costs through financial incentives such as tax credits, rebates, and state-specific programs. Partnering with an experienced solar provider like PowerFlex can simplify the process and help companies navigate financing options while maximizing the benefits of solar for cold storage.

Cold storage facilities can significantly lower their energy bills by using solar energy to meet a large portion of their energy demands. According to the U.S. Energy Information Administration, the average commercial utility cost in 2024 was 13.10 cents per kWh. By comparison, the cost of commercial solar is 3.2 to 15.5 cents per kWh, creating a tremendous opportunity for savings across much of the United States.

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Web: <https://sumthingtasty.co.za/contact-us/>

Email: energystorage2000@gmail.com

WhatsApp: 8613816583346

