



Solar-Powered Cooling System with Thermal Storage

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Intellectual Property

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Background

Solar power is one of the fastest growing sectors of renewable energy and is finding application in nearly every industry. One of the more recent applications is in solar powered air conditioning. Air conditioning accounts for a large percentage of electricity consumption in the business and residential sectors, as well military operations abroad. Solar powered air conditioning has the potential to reduce dependence on oil and coal power plants at home, and protect troops abroad since there will not need to be as many fuel convoys. Current residential PV systems are either grid-connected, which require expensive inverters, or require electric batteries for storage. Both of these cause potential problems, primarily for the local utility (grid compatibility issues) and additionally for the homeowner (toxic, expensive batteries that must be replaced regularly).

Invention Description

Researchers at Arizona State University have developed a photovoltaic driven solar air conditioning system, with thermal storage, that provides a means to efficiently utilize solar energy at the residential and business scale. PV power drives a compressor in a vapor-compression air conditioner, which in turn delivers cooling to the building, or recharges an ice thermal storage tank. Inexpensive, off-peak grid power is used to run the air conditioner at night or during the early morning. The novel aspects of this system are that it enables solar PV electricity to be stored in the form of ice, for local use. Electric batteries, inverters, and maximum powerpoint trackers are not required, thus reducing the system cost and complexity.

Potential Applications

- Residential home air conditioning units
- Business air conditioning units
- Portable air conditioning systems
- Military operating bases

Benefits and Advantages

- **Simplicity** - Eliminates necessity to be grid tied
- **Less Maintenance** - Eliminates expensive forms of energy storage
- **Less Expensive** - By eliminating inverter and batteries drastically reduce initial costs
- **Energy Efficient** - Decrease energy costs
- **Portable** - Air conditioning possible in remote off grid locations