



# Thermal Energy Storage for Small Commercial Buildings

## fact sheet

Thermal energy storage systems have generally been used in combination with large commercial and industrial chillers, but they are now being developed for use in smaller commercial buildings that have rooftop air conditioning. These systems can shift air conditioner compressor use off peak, yielding significant peak demand reduction and allowing buildings to take advantage of off-peak electric rates. At night (off peak), the compressor makes ice; during the day, the stored ice is used to cool ventilation air so that the compressor does not need to run very much, or at all. Refrigerant is pumped from the ice bank to a small, direct-expansion cooling coil installed in a building's existing ductwork, relying on the fan in an existing rooftop air conditioner to push air across the coil. Ice storage can save 20 to 30 percent of cooling energy by carrying some or all of the load normally met by less efficient rooftop air conditioners and by operating at night when temperatures are lower and compressor efficiencies are higher. An even greater benefit is its ability to shift cooling loads to off-peak hours, resulting in peak demand reductions of 60 percent or more.

### REPORTED BENEFITS

- Can be used in small commercial facilities that rely on rooftop cooling, rather than large central chillers
- Can be used in retrofit applications along with older, less efficient rooftop units to improve system efficiency
- Like large thermal storage systems, provides dramatic peak demand reduction

### Barriers to Market Acceptance

1. price
2. risk of failure
3. benefits not understood
4. priorities not on benefits of new technology
- ➔ 5. lack of availability

### Development Stage

1. need for the technology identified
2. technology concept developed
3. initial research findings reported
4. research on concept completed
- ➔ 5. commercial pilot completed
6. introduction to commercial market
7. immature market demand
8. mature market demand
9. market saturation

### WISCONSIN APPLICATIONS

This technology is appropriate for any small commercial building (as a new construction or retrofit application) that relies on rooftop cooling rather than large central chillers. It is appropriate for buildings that would normally rely on one to five rooftop units at five to 20 tons each.

### TYPICAL PAYBACK

Energy cost savings will depend on available rate structures. The greatest savings are possible if the rate structure includes demand charges and discounted off-peak rates. Payback for an existing building depends on whether or not the purchase of new rooftop air conditioners can be avoided, in addition to the energy and demand savings. Because small commercial ice storage systems are not yet on the market, actual payback periods have not been determined.

### MORE INFORMATION

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### MEMBERS OF THE ENERGY CENTER OF WISCONSIN

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