INTELLIGENT **Thermal Energy Storage**

EFFICIENCY • FLEXIBILITY • SUSTAINABILITY

Now there is a safe, cost-effective way to add significant sustainability to cold storage facilities which have the highest energy demand per cubic foot of any industrial category on the grid. Behind-themeter Thermal Energy Storage (TES) better protects food while adding both EFFICIENCY and FLEXIBILITY to commercial and industrial freezers with a levelized cost of energy of less than two cents per kWh.

LCOE < 2¢ per kWh

Efficiency for Sustainability

Intelligent TES systems increase the efficiency of commercial and industrial freezers an average of 26%. Added thermal mass in the form of Phase Change Materials amplifies convection and leverages latent heat absorption. See more efficiency benefits on the next panel.

Flexibility for Demand Management

TES systems with intelligent controls provide the flexibility to allow cold storage operators, energy service companies, and power providers to more cost-effectively manage the demand of large commercial and industrial freezers. TES has been shown to shed 300-500 kW for 13 hours, six days per week in a single facility.

Scan to watch our overview video.







THERMAL ENERGY STORAGE

INTELLIGENCE + 0100000 11^{°°} 11^{°°°°} 0

Improve Profit: TES-as-a-Service

Cut Energy Costs Up to 50%

Efficiency: Average kWh reduction

Flexibility: Shed load up to 13 hours

No upfront capital cost

to avoid peak pricing

Fixed monthly expense

of 26%

- Guaranteed energy savings
- Cash-flow positive from day one

NO UPFRONT CAPITAL & GUARANTEED SAVINGS

Thermal Energy Storage-as-a-Service

TESaaS delivers guaranteed energy savings with no upfront capital and no operational risk.

- Cash-flow positive from day one
- Zero CAPEX
- Risk free savings
- Fixed monthly expense paid out of savings
- Monitoring and maintenance included
- Off balance sheet service agreement

TESaaS maximizes your savings while protecting food quality. Don't continue to overpay and put your food at risk.





Sustainability & Resiliency

Lower refrigeration energy costs 20% to 35% or more



vikingcold.com



- More stable temperatures
- Minimize micro-thawing and crystallization
- Reporting for chain-of-cold verification

Protect Temperature Stability

Absorbs 50% to 85% of heat infiltration

3X Longer thermal back-up resiliency

Algorithms prioritize temperature

Maximize Refrigeration

Shift more run time to night

of the room in the air flow

Consolidates more heat at the top

TES transfers heat 8x faster than food

Same BTUs removed with fewer kWh

Run compressors at maximum efficiency

requirements

Efficiencies

Extend Equipment Life

- - Reduce refrigeration mechanical run time
 - ▶ 24/7 Monitoring & notification of equipment status
 - Reduce existing maintenance costs

Thermal Energy Storage Cells



- Individually sealed HDPE bottles
- Filled with environmentally-friendly Phase Change Material (PCM)
- PCM formulas range from
 -20° F to 32° F (-28° C to 0° C)

Intelligent Controls, Monitoring, and Notifications



- Sub-system easily integrates with existing controls
- Prioritize temperatures and food quality while reducing kWh consumption
- Unique capability to shed load for extended periods while increasing energy efficiency
- Real-time monitoring of temperatures, equipment status, and energy use
- Notifications via email, text, telephone
- Identify equipment or operational issues before they become costly problems

HOW DOES TES WORK?

- Heat infiltration moves upward through natural convection where our TES modules attract, absorb, and consolidate it.
- 2. The modules release stored cold energy that continuously falls down over the food.
- 3. TES maintains stable temperatures without active refrigeration for up to 13 hours.



Latent Heat Absorption



PCM absorbs 300x more heat than frozen food and maintains a consistent temperature while in its latent stage for up to 13 hours per day.

INSTALLATION EXAMPLES



On Top of Pallet Racking



Under the Top Pallet Position



Ceiling Mount in a Walk-In Freezer

"Viking Cold's TES systems have delivered an immediate reduction in refrigeration equipment run time, significant load reduction during peak pricing periods, and stable temperatures throughout the entire freezer."

> JASON DREISBACH Dreisbach Enterprises

INTELLIGENT Thermal Energy Storage

"Having real-time monitoring has been invaluable and has helped us recognize and address numerous equipment issues before they became costly problems."

> **ROBERT A. CIMINO** Plaza Provision Company