CONSERVATION SOLUTIONS CORPORATION
ENERGY & WATER EFFICIENCY

1.) PHASESTOR THERMAL ENERGY STORAGE SYSTEMS

Presentation by: Dan Cook
Bio-Based Phase Change Materials (BioPCMs)
Thermal Storage Solutions
with
Existing Chillers
Bio-based PCM is used to store thermal energy within a specified temperature range -50°C to +135°C.

Pressurized heat exchangers containing process fluid are fully immersed in PCM derived from organic non food-grade fatty acids.

PCM is specifically formulated for large scale thermal storage applications.

The technology is unique, in that it remains in solid form regardless of charge state (solid to solid transition).
A retrofit to existing HVAC system requires the addition of:

- Low temperature chiller (screw and scroll only)
- Incompatible with centrifugal chillers
- > 25% glycol loop
- Primary and secondary loop
- Primary and secondary pumps
- Valves & controls
- Heat exchanger

Designed and sized to avoid peak demand energy cost, but increases energy consumption due to producing below freezing temperatures and added pumping.
Straightforward retrofit to existing chiller loop.
Addition of just:
- Minimal Material Expansion & Contraction Issues
- Storage tank
- Valves & controls

Designed and sized to avoid peak demand energy COST
AND to
Reduce energy consumption due to efficient chiller operation at higher operating temperature
PHASESTOR INSTALLATIONS

- Ft. Irwin, CA
- 18,500 sq ft Military Education Center
- 70 ton chilled water system
70 ton Chiller, kWh use over 24 hr. cycle
Average (day-time) ambient air temp :104F

Building operating for 6 hr. period during peak load using PhaseStor to reduce load on chiller
Reduction in chiller energy when charging PhaseStor at night-time (low ambient air temperature)

**Chiller Power**

- **Baseline average daytime air temp. 104°F**
- **Test case (PhaseStor) average night-time air temp 61°F**

- **Savings**
Example PhaseStor Projects

- Microsoft - WA
- Ennis Paints - NC
- 1888 Mills - GA
- Ft. Irwin - CA

Heat Energy Storage

- Smaller Footprint - BioPCM® thermal capacity is $\pm 10 \times$ greater than water
PHASESTOR APPLICATIONS

- Dedicated server backup and thermal support
- Heating & Cooling System Resilience
- Cooling & Heating System Security
- Thermal / Electric Demand Response (Chillers)
- Peak Demand Management (Chillers)
- Increase Chiller / Cooling System Capacity
- Solar Thermal Storage
- Many other temperature controlled industrial applications including exothermic heat recovery
BioPCM Thermal Energy Storage with Existing Chillers

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