BOSTON GREEN TOURISM

CONSERVATION SOLUTIONS CORPORATION

ENERGY & WATER EFFICIENCY

1.) PHASESTOR THERMAL ENERGY STORAGE SYSTEMS

Presentation by: Dan Cook

PhaseStor™

LATENT ENERGY STORAGE SYSTEM

Bio-Based Phase Change Materials (BioPCMs)

Thermal Storage Solutions

with

Existing Chillers

PHASESTOR TECHNOLOGY

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.

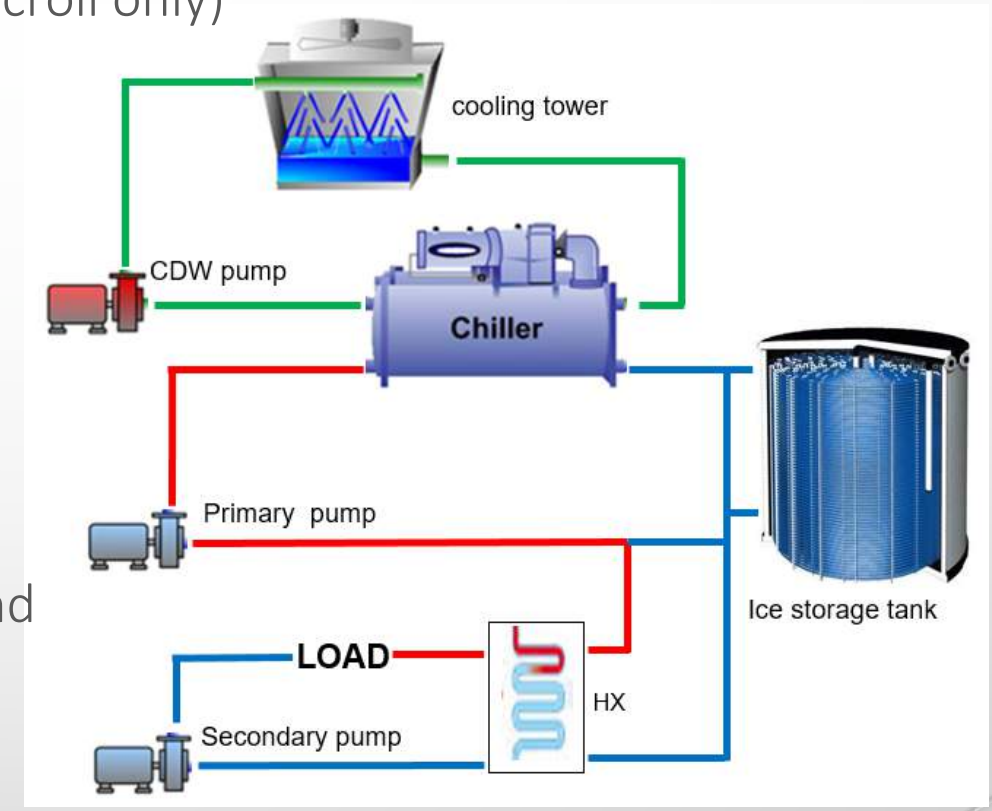
The technology is unique, in that it remains in solid form regardless of charge state (solid to solid transition).

840,000 BTU (70 ton-hr) PhaseStor Tank

ICE STORAGE DESCRIPTION

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

PHASESTOR SOLUTION

Straightforward retrofit to existing chiller loop.

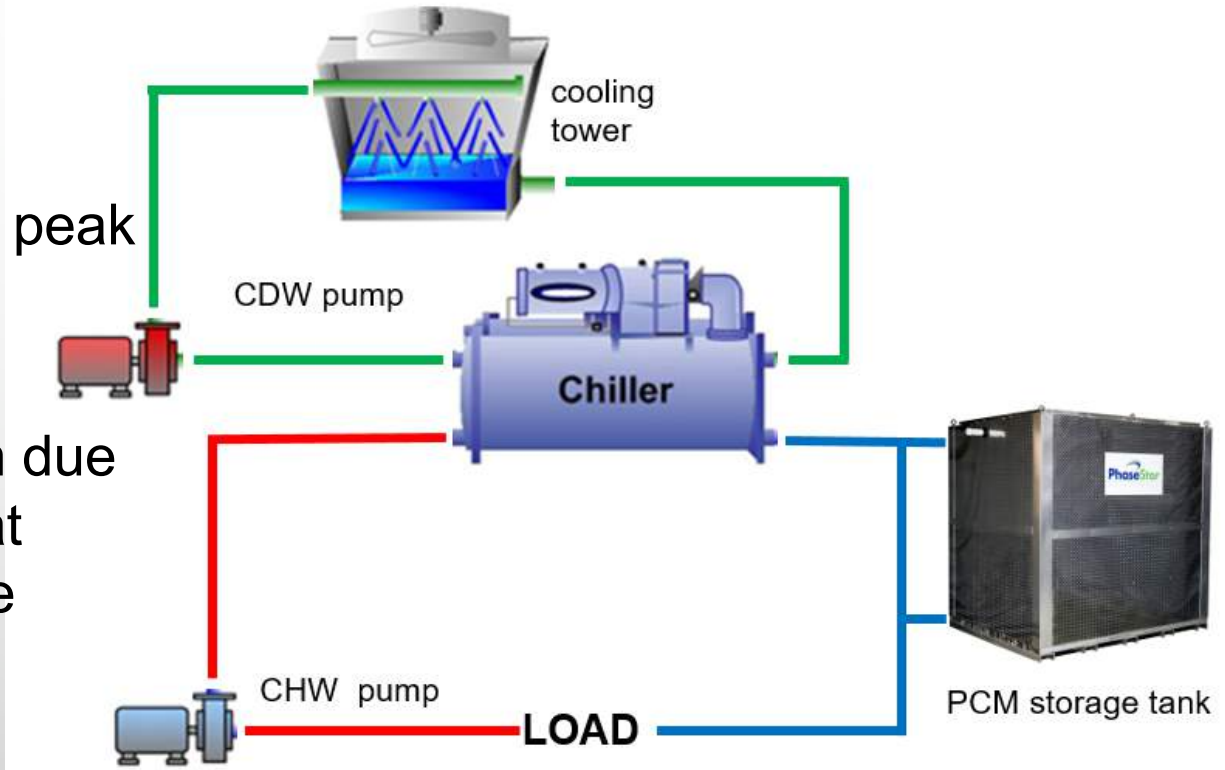
Addition of just:

- 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

Building 1020 Education Center

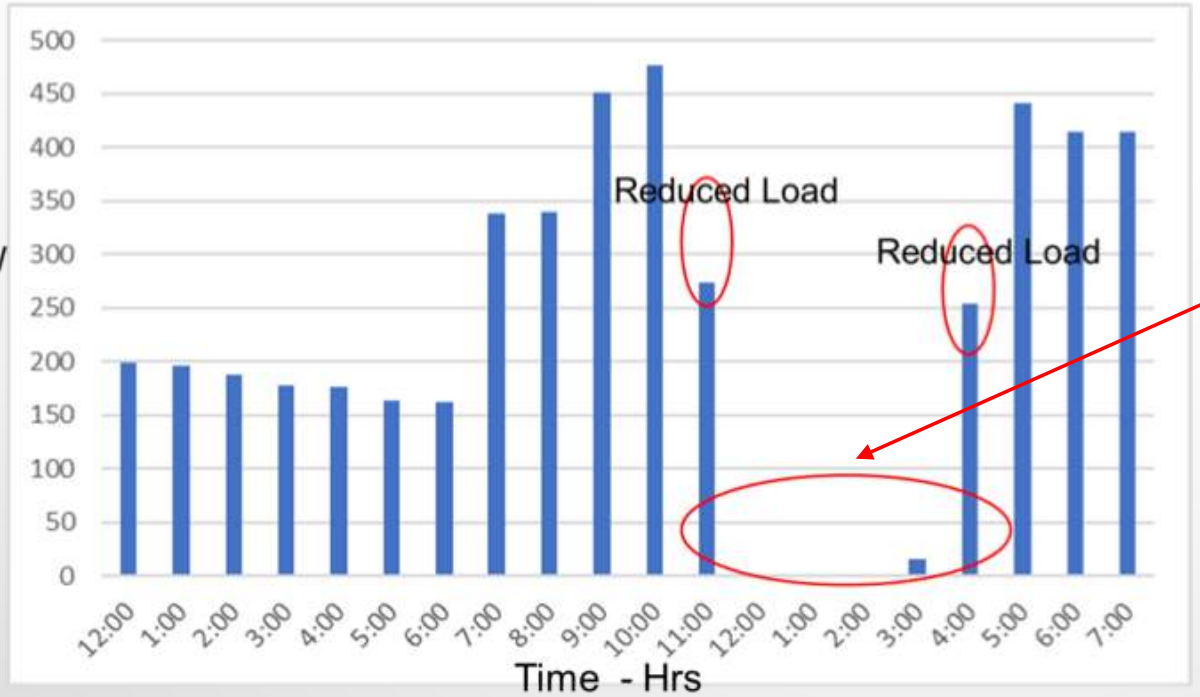
PhaseStor Install, rear service yard, B1020

PhaseStor

PHASESTOR RESULTS

70 ton Chiller, kWh use over 24 hr. cycle
Average (day-time) ambient air temp :104F

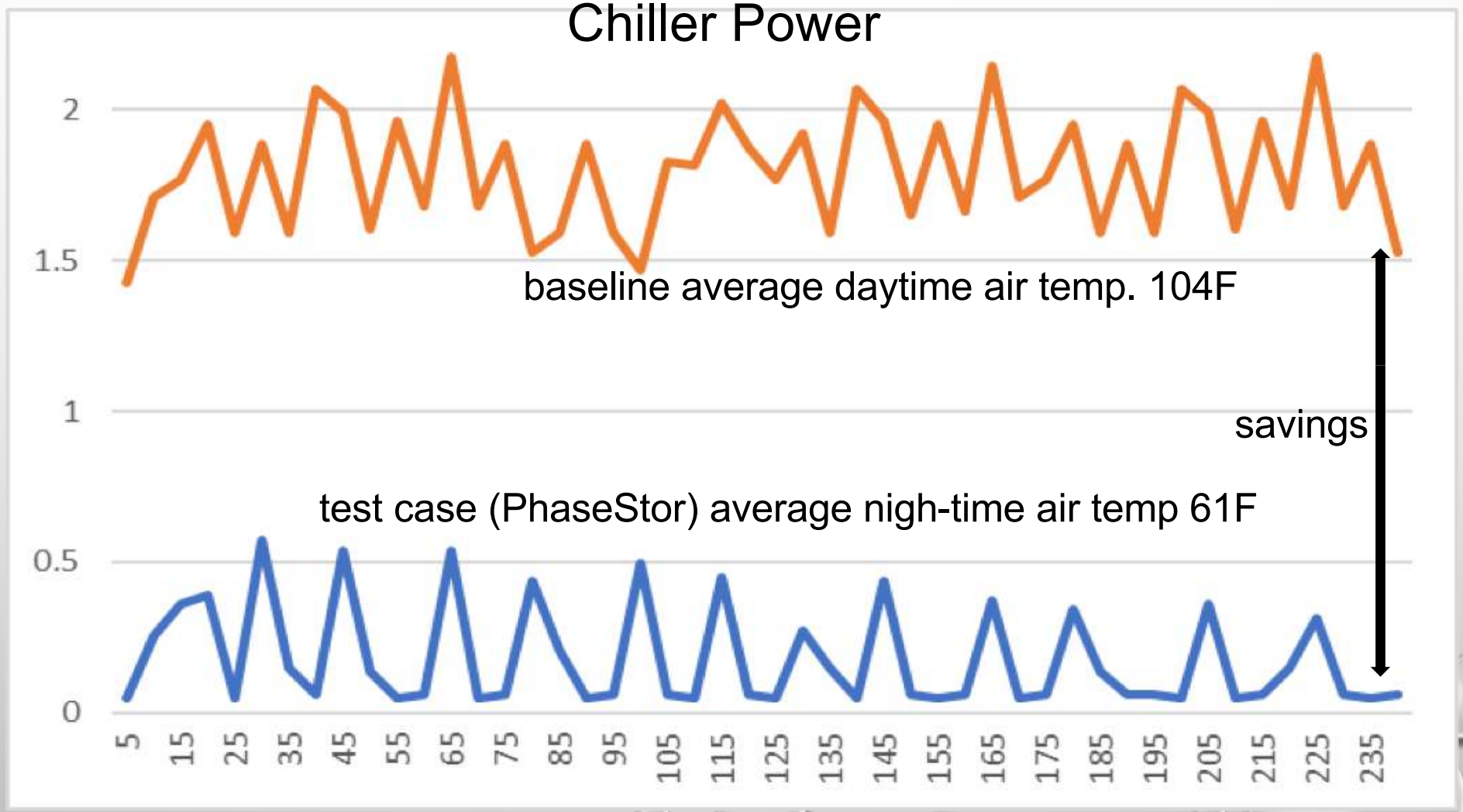
PhaseStor
LATENT ENERGY STORAGE SYSTEM



Building operating for 6 hr. period during peak load using PhaseStor to reduce load on chiller

PHASESTOR INSTALLATIONS

Reduction in chiller energy when charging PhaseStor at night-time (low ambient air temperature)



INSTALLATION REFERENCES

Example PhaseStor Projects

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

Heat Energy Storage

- Smaller Footprint - BioPCM® thermal capacity is ±10 x 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

PhaseStor™

LATENT ENERGY STORAGE SYSTEM

BioPCM Thermal Energy Storage with Existing Chillers

Conservation Solutions Corporation

Energy & Water Efficiency

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