



Redding's Ice Bear Program



**Introducing the Ice Bear
from Ice Energy**

The Engineer's Motto:

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If it isn't Broken...

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If it isn't Broken...

Take it apart and FIX IT!

Benefits of Distributed Energy Storage



Improves System Operations

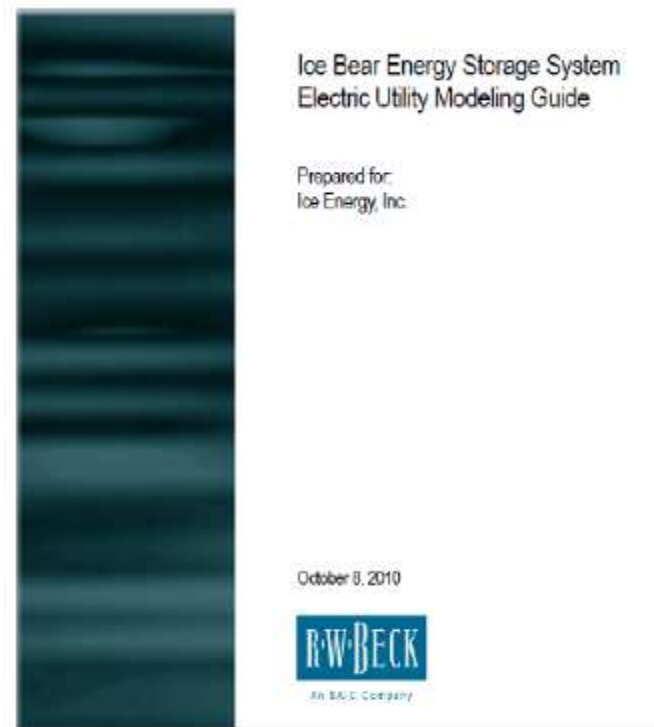
- ☐ Improved system efficiency
- ☐ Improved system power factor & voltage support
- ☐ Improved daily electric system load profile

Avoided Costs

- ☐ Avoided or delayed peakers/generators
- ☐ Avoided or delayed T&D system expenses
- ☐ Avoided electric system losses

Enhances System Capacity

- ☐ Increased system power transfer capability
- ☐ Enhanced integration of renewable resources
- ☐ Eliminates fault-induced delayed voltage recovery (AC stalling)



www.ice-energy.com/energy-storage-modeling-guide/



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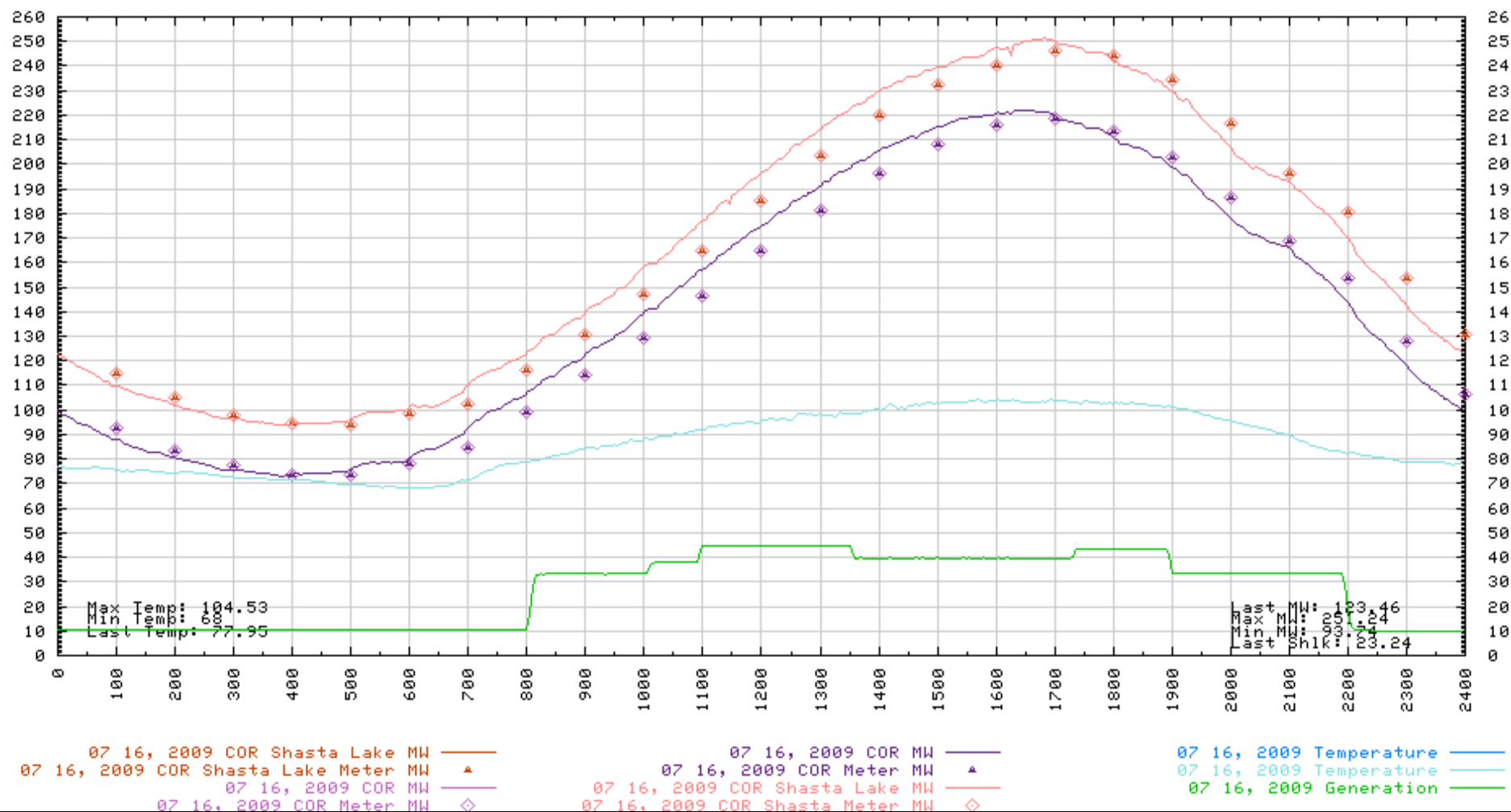
“As our dependence on electricity grows, demand is quickly outpacing supply. Over the next decade, demand in the U.S. alone is expected to increase by 18% or more; new generation infrastructure will grow by less than 8%.

The traditional approach to meeting demand has been to build more power plants and add transmission capacity. But today’s utilities – already facing rising energy costs, peak demand growth, overstressed and aging infrastructure, stringent environmental standards, and mandated integration of solar and wind powered generation – are hard pressed to overcome the environmental, regulatory, permitting, and financing barriers that building new generation requires.” - Ice Energy

** Excerpt from Ice Energy brochure**

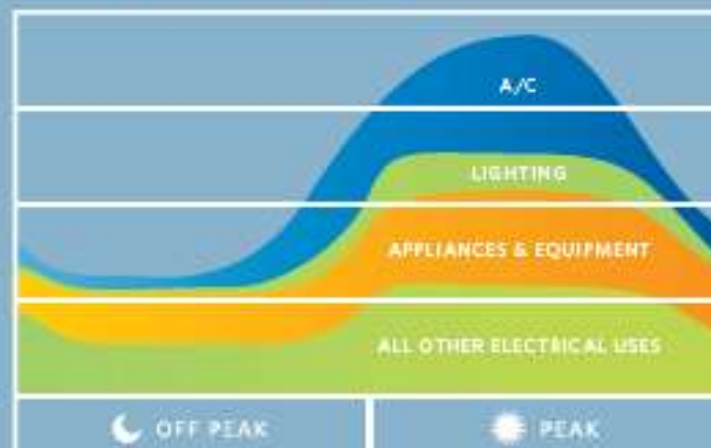
REU System Peak Graph – June 16, 2009

System Load and Temperature for 2009-07-16 (Thu) and 2009-07-16 (Thu)



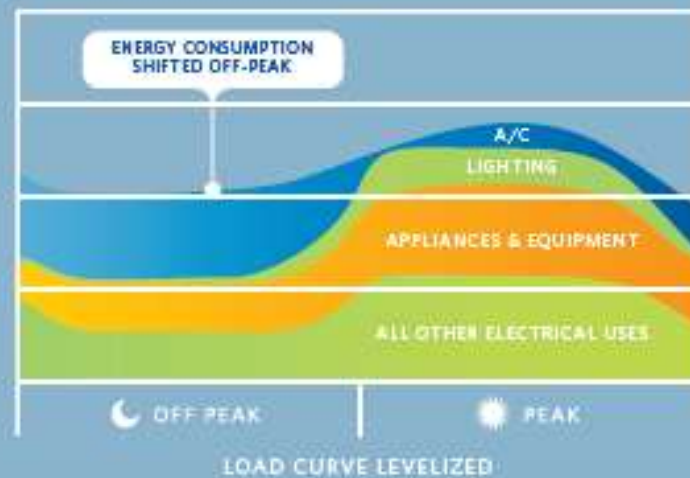
WITHOUT ICE STORAGE

TYPICAL 24 HOUR LOAD PROFILE



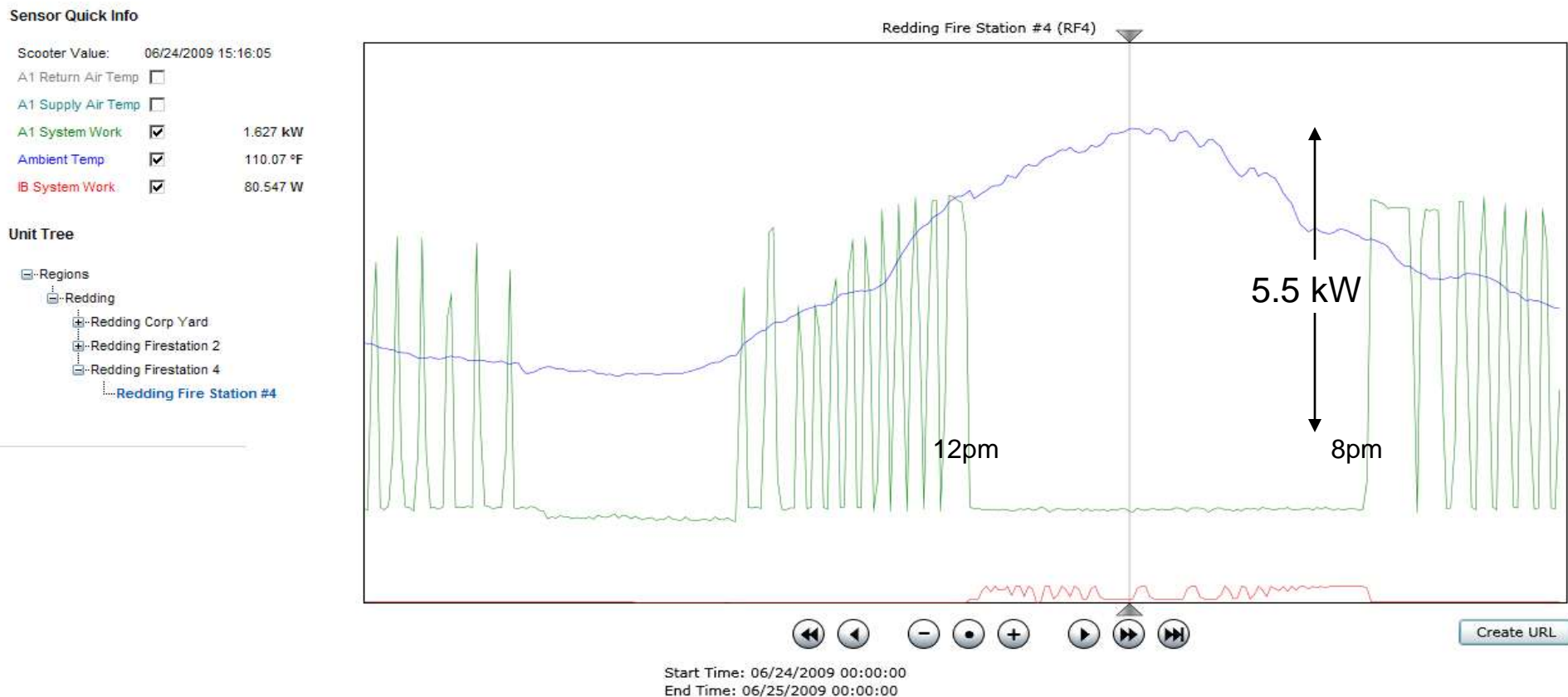
WITH ICE STORAGE

TYPICAL 24 HOUR LOAD PROFILE



RFD-STATION 4 Ice Bear operation

Chart pulled from Ice Energy Cool Data Dashboard...all Redding Ice Bear installations remotely monitored in real-time



Ice Bears – Scalable/Controllable/ Cost Effective



Distributed resources



Real-time control



Aggregated units
managed as a
single resource



Product Sheet



Product Specifications

Ice Energy's Ice Bear distributed energy storage system enables a powerful change in how – and, more importantly, when – energy is consumed for air conditioning, without sacrificing consumer comfort.

Using thermally efficient, off-peak power to produce and store energy for use by air conditioners the next day, the Ice Bear uses a fraction of the peak energy required by conventional systems. It requires no modification to existing ductwork or structure, and integrates seamlessly with standard rooftop and split-system air conditioners.

The Ice Bear unit creates and stores cooling energy at night by freezing water in an insulated storage tank. It cools during the day by circulating chilled refrigerant from that tank to the conventional air conditioning system, eliminating the need to run the energy-intensive compressor during peak daytime hours.

During off-peak hours, the conventional HVAC system operates as usual. Together, this unique hybrid system surpasses the overall efficiency and performance of conventional equipment alone.

Key Benefits

For Utilities

- Cost-effective Alternative to New Peaking Generation
- Permanently Shifts Peak Demand
- Uses Cleaner, More Efficient Off-Peak Power
- Improves System Efficiency & Grid Reliability
- Relieves Congestion on Peak
- Enables Reliable Integration of Renewables
- Reduces Greenhouse Gas Emissions
- Easy, Rapid Deployment at a Multi-Megawatt Scale

For Commercial Energy Consumers

- Reduces the Building's Carbon Footprint by 10% or More
- Reduces Building Energy Consumption on Peak
- Delivers Superior Cooling Comfort for Customers and Employees
- Improves Building Energy Performance
- No Cost Under Utility-Sponsored Programs
- Utility Pays for Equipment, Installation and Maintenance



Key Features

High Reliability

- 25-year design life
- Cooling mode uses two long-life pumps
- Extends compressor life by eliminating stop-start operation during hottest hours of the day

Widely Compatible

- For commercial rooftop and split systems from 4 to 20 Tons, and ductless units from 3 to 5 Tons
- Each Ice Bear unit can be applied to a 3-5 Ton system, or a single 5-ton stage of a 7.5-20-Ton system
- 30 Ton-hours of cooling at a load of up to 5 Tons
- Easy Installation
- Can be installed on the roof or ground by an Ice Energy certified local HVAC contractor
- CoolData® Controller programmed for utility savings
- Low Maintenance
- Simple 1 hour annual maintenance procedure

Technical Specifications

Cooling Capability

- Maximum Cooling Load 5 Tons
- Total Storage Module Capacity 30 Ton-hours

Daytime Peak Power Reduction

- On-Peak Demand Reduction Up to 7kW
- On-Peak Electric Demand 300 watts
- On-Peak Energy Efficiency ffi200 EER
- Energy Shifted to Off-Peak 35 kWh

Nighttime Ice Make

- Copeland Scroll Compressor 4.3 Ton
- Ice Make Time (full make) @ 55° F 10 hours
- Ice Make Time (full make) @ 75° F 11.5 hours

Line Set Restrictions

- Length (Ice Bear to airside coil) 150 feet
- Height (Ice Bear to coil above/max) 35 feet
- Height (Ice Bear to coil below/max) 20 feet

Ice Storage Section

- Tank Capacity (tap water) 480 gallons
- Thermal Storage Capacity (latent) 360,000 BTU

Refrigerant Management System (RMS) & Compressor

- Refrigerant R-410A

CoolData® SmartGrid Controller

- Built-In Web Server & Data Logging
- NI LabVIEW On-Board Application Lay.. 
- Historian 
- 1-Wire Dallas Sensor Network 



Physical Properties

- Size 100^{7/16}" W x 60^{3/8}" D x 48^{1/8}" H
- Weight (dry) 1,400 lb. (approx.)
- Weight (filled) 5,400 lb. (approx.)
- Load Distribution (filled) 152 lbs. per sq.ft

Electrical Requirements (by model #)

- #IB30A-521: 208/230 VAC, 1 Φ ,50A min. service
- #IB30A-523: 208/230 VAC, 3 Φ ,30A min. service
- #IB30A-543: 460 VAC, 3 Φ ,20A min. service

Warranty

Ice Energy products are warranted to be free from defects in workmanship and materials under normal use and service per the terms below. See full warranty for details.

- Tank & Ice Heat Exchanger5 years
- Compressor5 years
- Condensing Unit Heat Exchanger5 years
- Other Components1 year



REU's *Ice Bear* Projects to Date

- (60) Ice Bear units
 - Total load shift - 400 kW
 - Average installed cost < \$125/kW-yr
 - 20 year asset
- Recent installation at Redding's NMR Architecture office - testimonial
 - **Dear Mr. Hauser** – *"You may absolutely discuss the positive experience we've had with this technology switch (as well as the great job you did coordinating everything with the contractors). Also, you may wish to let the Council know that we are encouraging our clients in Redding to follow our lead by incorporating the same mechanical system in the facilities we are designing for them. Everyone quickly sees the benefit to the community, and are excited to be part of the 'energy solution' for Redding. It is really a 'no-brainer' to us, as there is no negative side to this system."*

- Les Melburg -

Principal Architect - NMR

**NMR
Architecture
Installation-
Ice Bear 50**





**Redding Fire Station #2 Installation
Ice Bear 50**

Ice Energy - Ice Bear 30



Ice storage tank

Integrated condensing
unit/charging unit

Ice Bear 30 – Roof Mounted Installation at National Movie Chain in Redding



Ice Bear 30 – Installation

Carl's Jr. Redding



Ice Bear 30 – Installation Frozen Gourmet, Redding



Ice Bear 50 – Installations

Mercy Medical Center (CHW), Redding



Ice Bear 30 – Installation

Shasta Builders' Exchange, Redding



Ice Bear 30 – Installations

Social Security Building, Redding



Ice Bear 30 – Installations

Panda Express, Redding



Utility Considerations/Recommendations Regarding Cost/Benefit Analysis



- Utilities need to widely recognize cost-effectiveness methodology (inc. recognizing variances among storage technologies/applications)
- Utilities have to fully recognize the challenges we face with optimally and cheaply integrating renewables
- To both decrease Ice Bear deployment costs and increase benefits, Utility ownership of the asset (Ice Bears) must be appreciated
- Utilities need to recognize that storage products often provide much more than just “traditional” storage services; the value of the other services – such as EE, direct load control, etc. – needs to be factored in
- Ice storage benefits need to be aggregated up as it touches many divisions of your Utility – including generation, resources, transmission, distribution and DSM



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Thank You!