California Energy Commission
Docket No. 08-DR-01 June 19, 2008
Energy Efficiency Committee Workshop

Presentation related to CEC authority to adopt standards to shift peak demand via end use storage systems which store energy during off-peak periods for use during peak periods (PRC 25403.5).

Permanent Load Shifting
The first technology for widespread customer load management

ICE ENERGY
CLEAN ENERGY DOESN'T
GET ANY COOLER THAN THIS.

Permanent Load Shifting

➢ **CPUC Final Decision 06-11-049** (Commissioner Chong)

- ▪ Defines Permanent Load Shifting (PLS)
- ▪ Finds use of DR funds for PLS to reduce peak load is reasonable
- ▪ Q1-08, First IOU PLS Contracts for Ice Bear Storage
  - • Trane, Honeywell, and Cypress execute contracts with PG&E and SCE
  - • 140,000 megawatt hours of load shifting over 20-year life

Ice Bear unit - Ice Storage Air Conditioning

➢ **CEC Optional Compliance Method for 2008 Title 24**

➢ **Residential and Non-Residential Buildings Energy Efficiency**

- Residential ~ 50% reduction in building cooling energy in hot dry climates

- Non-Residential ~ 20% reduction in building cooling energy

➢ **95% reduction in building cooling energy during peak period (Noon – 6 PM)**
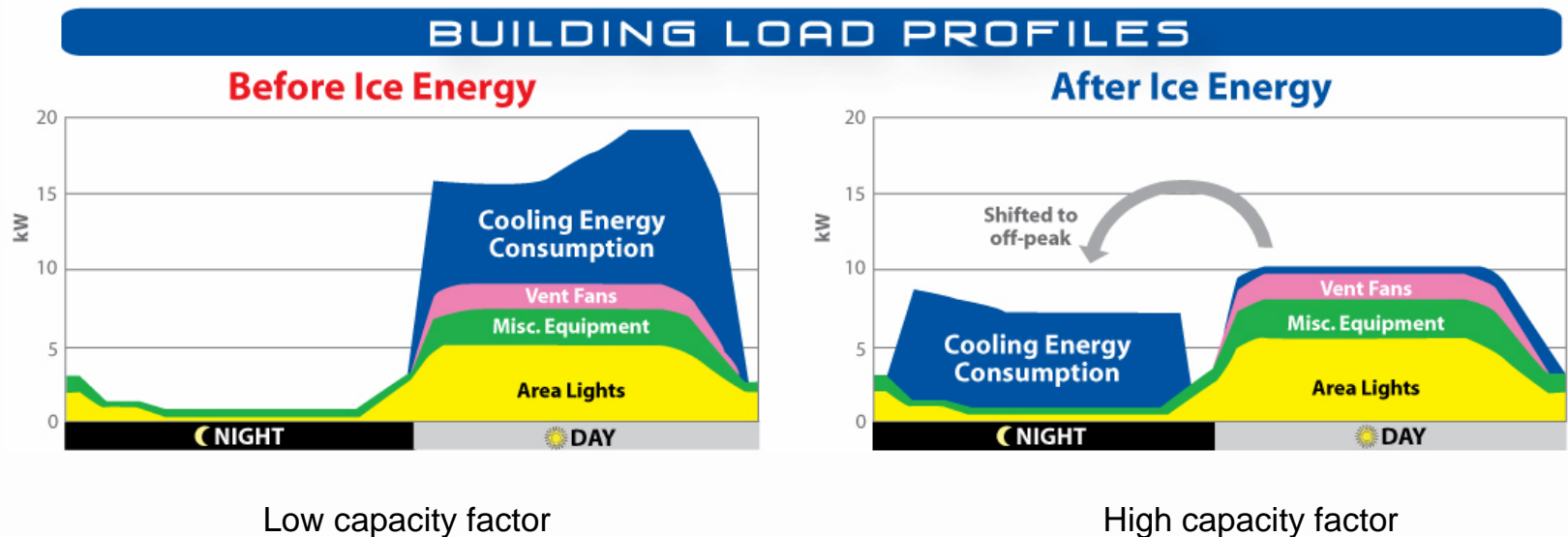
Climate Zone	Standard cooling energy (TDV KBtu/sqft-yr)	ISAC cooling energy (TDV Kbtu/sqft-yr)	Reduction in cooling energy
10	23.23	11.36	51%
11	22.09	10.68	52%
12	14.33	6.9	52%
13	31.93	15.77	51%
14	32.07	15.63	51%
15	74.25	37.89	49%

Source CEC Staff Report: CEC-400-2006-006-SF

ICE ENERGY

Most Buildings Have a Poor Load Factor ~ 53%

Manage customer load by efficiently shifting A/C energy to the off-peak

BUILDING LOAD PROFILES

Before Ice Energy

Low capacity factor

After Ice Energy

High capacity factor

➢ *Enabling Technology for TOU rate switching*

- *Consume low cost, off-peak energy*
- *Reduce expensive on-peak demand and on-peak energy*
- *Zero loss storage measured at building meter*

Victorville, CA Police Station - Meter Data

Electric Utility Meter Load Profile (inclusive of all loads)

Before — Peak Day — 12 PM — 9 PM

After — 9 hour A/C load shift — 12 PM — 9 PM
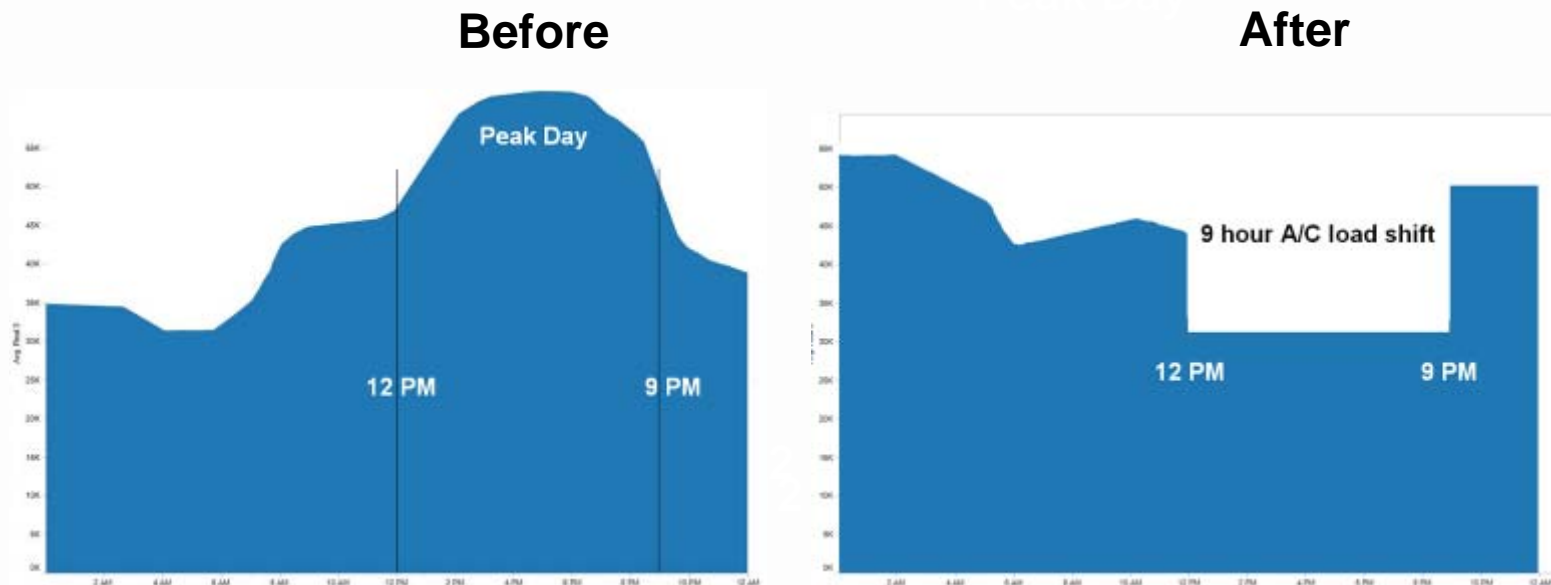
- ➢ 45 kW peak day demand reduction
- ➢300 kWh load shifting per day (on peak to off peak)
- ➢ 105% high desert round trip storage efficiency (saves site energy)
- ➢ 6 hour minimum of storage per day summer (9 hours on shoulder months)

ICE ENERGY

CoolData® SmartGrid Controller
Schedule/Dispatch/Measurement & Verification

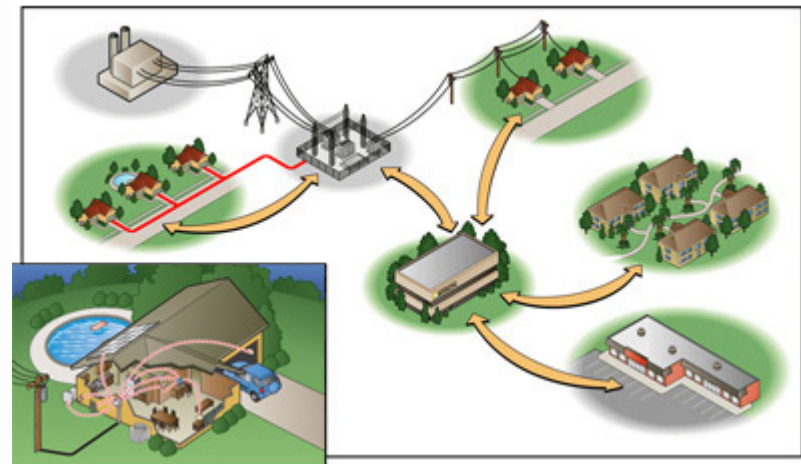Si Manufacturing Interval Meter Data, Average of 5 Consecutive Weekdays

Actual meter data before 5, IB 50 units

Actual meter data after

Utility on-peak period
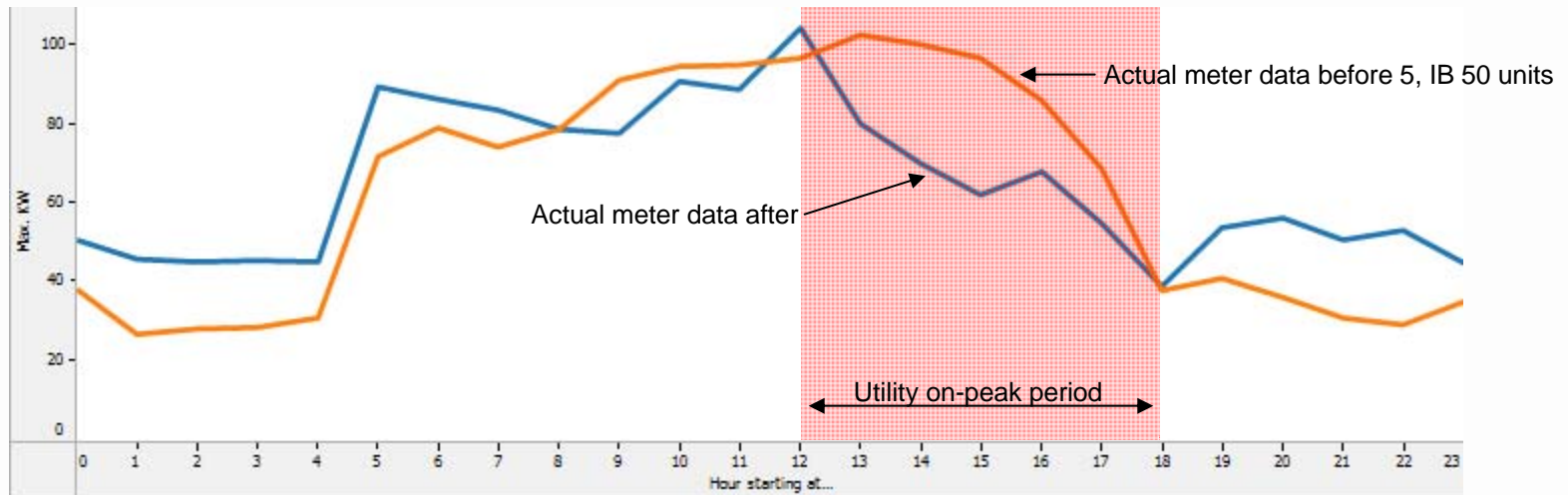
Central control
Remote data storage
Highly scalable

❖ **Demand Response**
❖ **Equipment Health**
❖ **Plug-in Hybrid charging**

Ice Energy's CoolData

CoolData® SmartGrid Controller

- ➤ "SmartGrid" ready
- ➤ Network communications
- ➤ Local scheduling and remote dispatch
- ➤ Direct load control for demand response of other building assets
- ➤ Real-time status, sub-metering, and data monitoring of customer equipment
- ➤ Performance analysis and automated diagnostics
- ➤ Configuration management
- ➤ Physical & Cyber security

- •1-Wire Dallas Sensor Network
- •NI LabVIEW Application Layer
- •Web Server
- •OSIsoft, PI Enterprise Layer

Most advanced HVAC controller on the market

Ice Bear® 50 Hybrid Air Conditioner

From this…

Ice Bear® 30 Hybrid Air Conditioner

To this!!!!

Advanced Technology for Lower Cost and Serviceability

➢ **Lower cost**
  ▪ **Integration of ice storage module, dedicated ice-make condensing unit, and new CoolData® smart grid controller & web server**
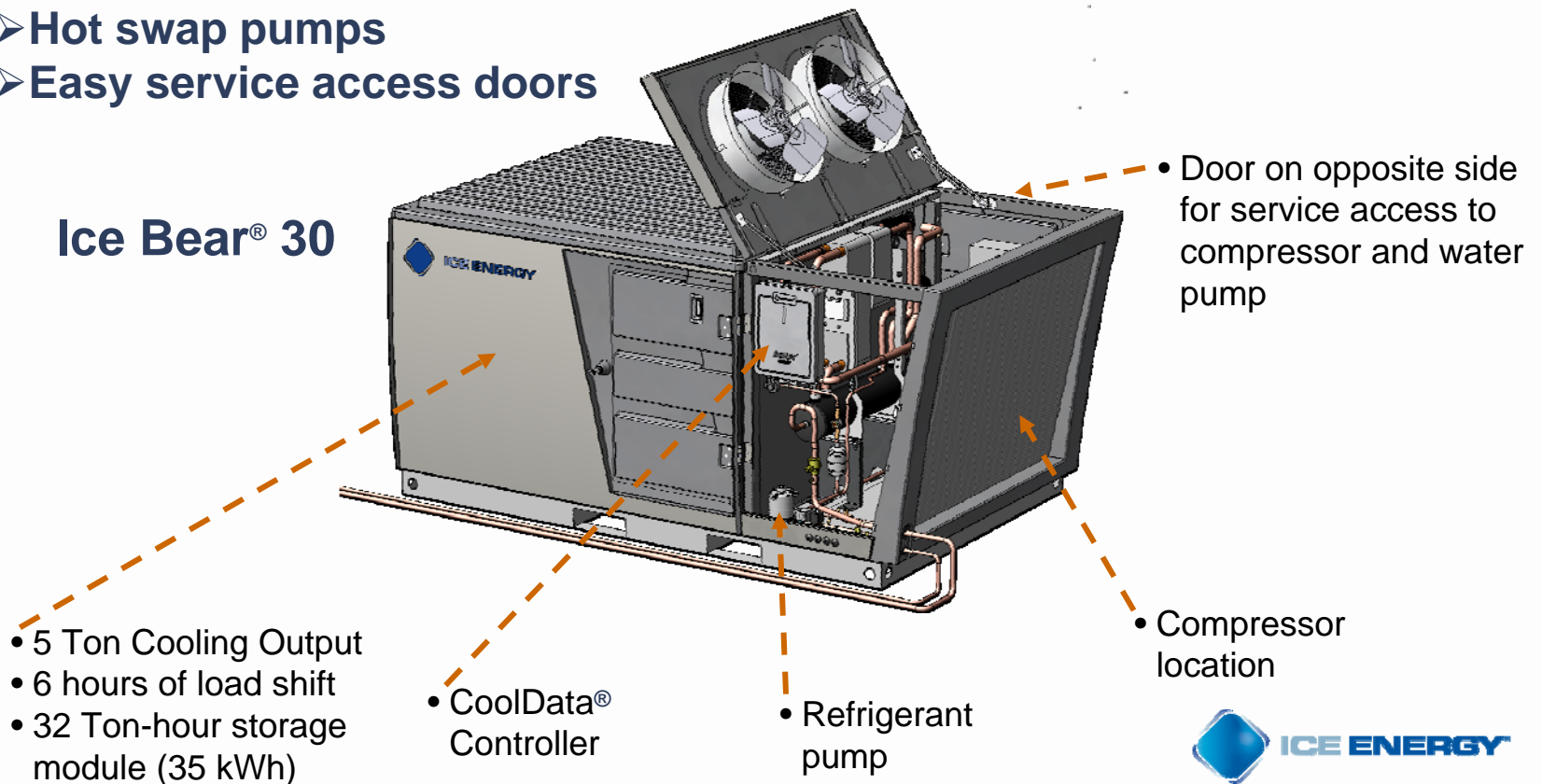 ▪ **16 units on one truck**

➢ **Longer 20-year asset life**

➢ **Greater reliability**
  ▪ **Isolated ice-make compressor, always factory quality**

➢ **Hot swap pumps**

➢ **Easy service access doors**

Ice Bear® 30

• Door on opposite side for service access to compressor and water pump

• 5 Ton Cooling Output
• 6 hours of load shift
• 32 Ton-hour storage module (35 kWh)

• CoolData® Controller

• Refrigerant pump

• Compressor location
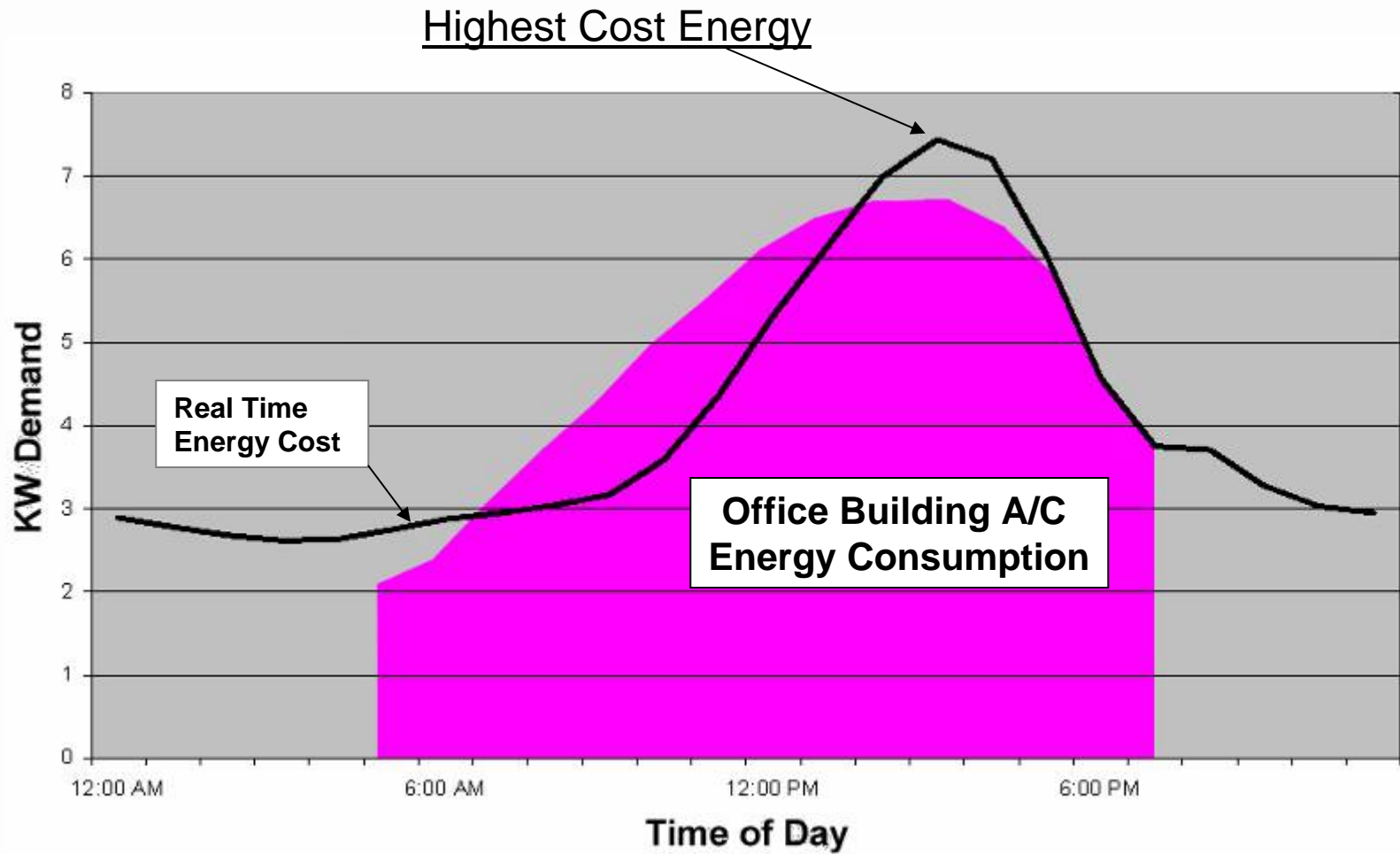
ICE ENERGY

Thank-You

www.ice-energy.com

Gregory Tropsa
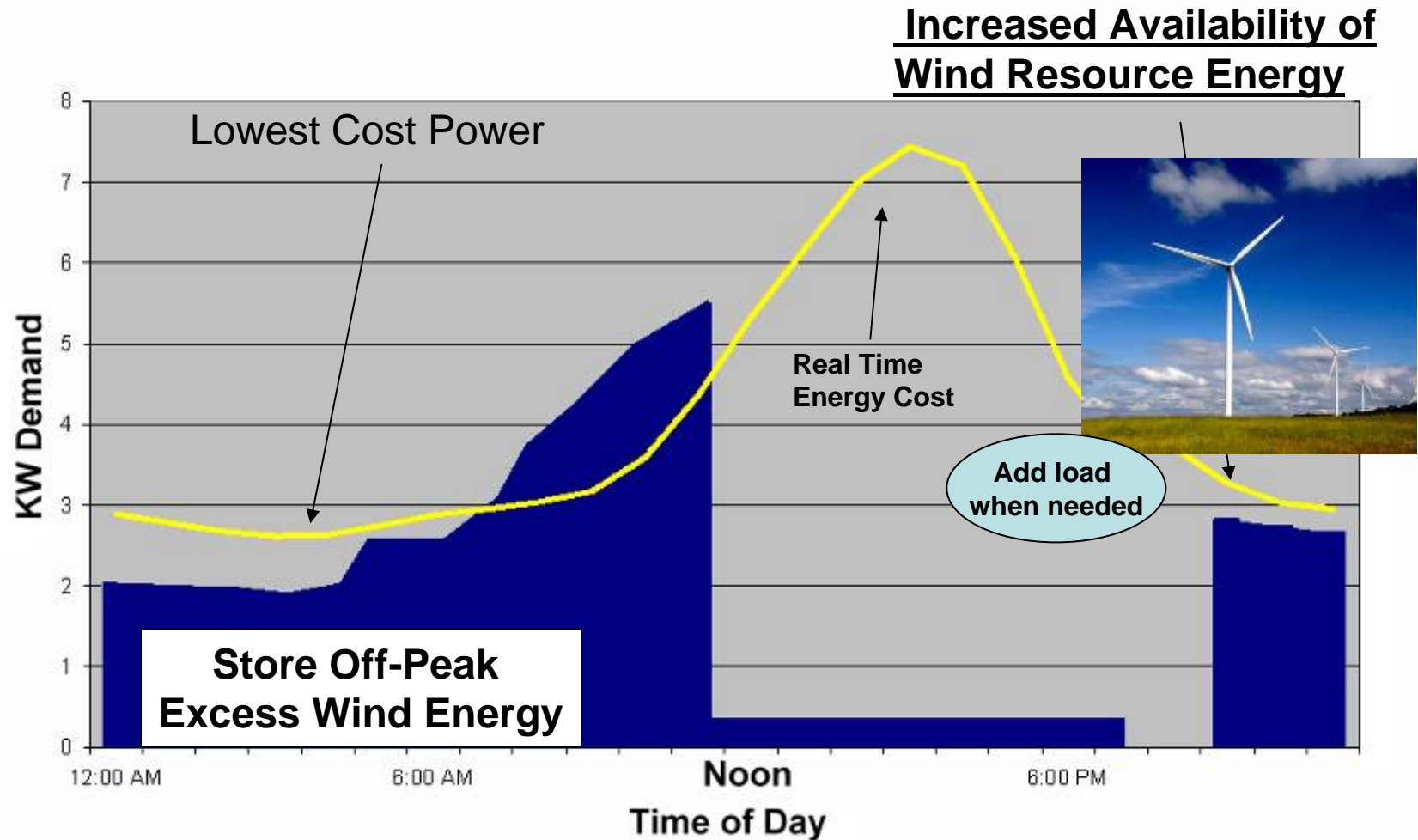**President, Ice Energy, Inc.**
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Building Air Conditioning Energy Profile Drives System Peak

Create a market for off-peak wind *and* reduce the need to run on-peak generators

Bi-Directional Utility Controlled Regulation Energy Resource

Increased Availability of Wind Resource Energy

Lowest Cost Power

Real Time Energy Cost

Add load when needed

Store Off-Peak Excess Wind Energy

KW Demand

12:00 AM   6:00 AM   Noon   6:00 PM

Time of Day

ICE ENERGY

Ice-on-coil Heat Exchanger