

Smart Customers, Smart Grid- A New Value Proposition

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Presented: May 24, 2007
BuilConn-Chicago, Illinois

- Information + Technology + Smart Customers=

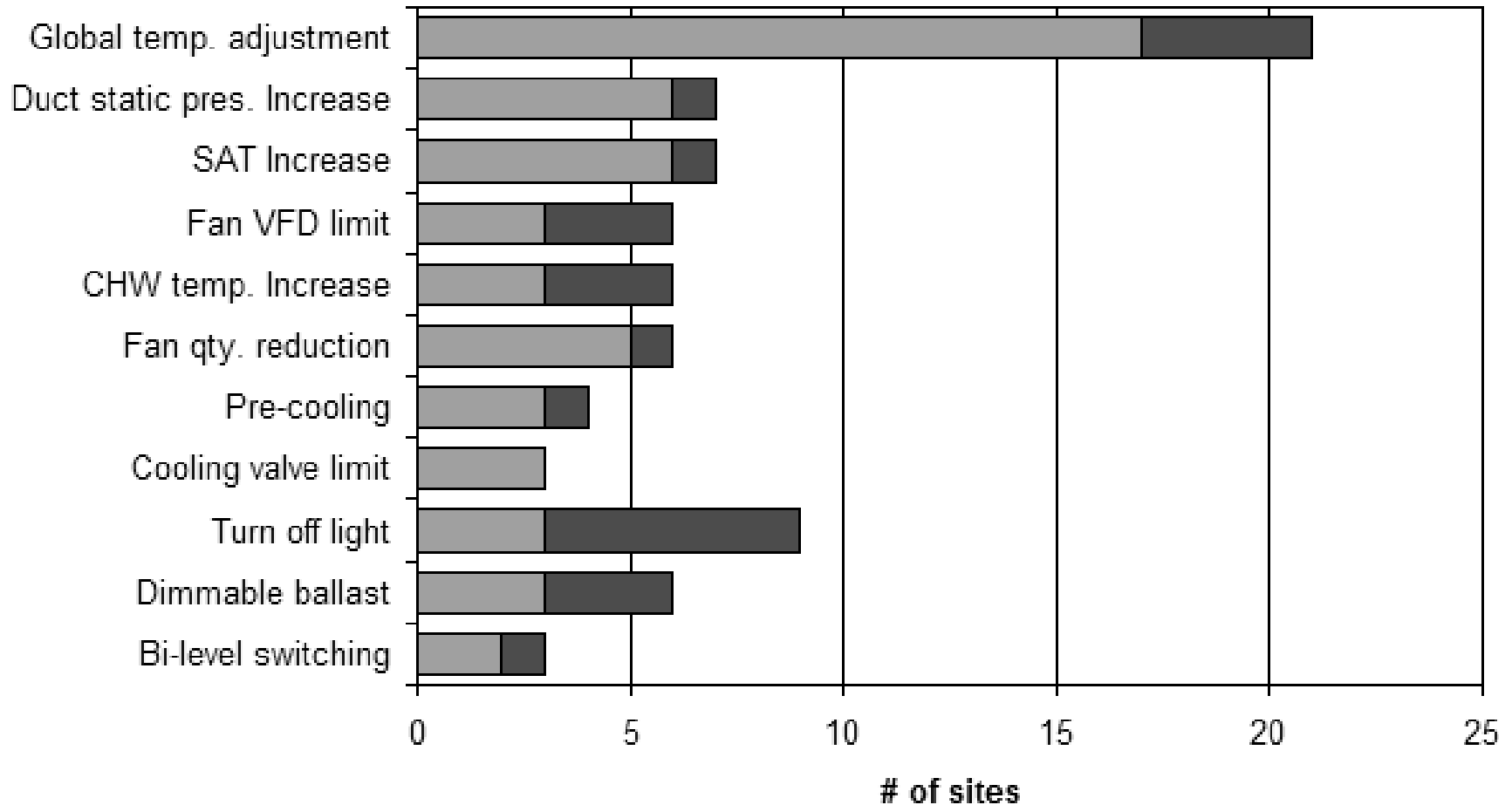
Economic Efficiency

- Real-Time and Day Ahead Price Signals Which Accurately Reflect Grid and Market Conditions
- Real-Time Consumption Information at Meter and Sub-Meter Level
- Extensive Knowledge of Facility

Combining the Three Allows for Creation and Implementation of Smart Strategies

- Decisions Will be Driven by Information
- One size does not fit all
 - Elasticities differ
- Steel Plant Factors in Cost of Production
- Chain Store Knows Budget and Essentials
- Building Operator Knows Characteristics, Occupancy Schedules

- Questions to be Answered:
 1. What Need Do Building Serve?
 2. Owner-Occupied?
 3. Characteristics
 - Thermal Mass?
 4. What Systems Exist?

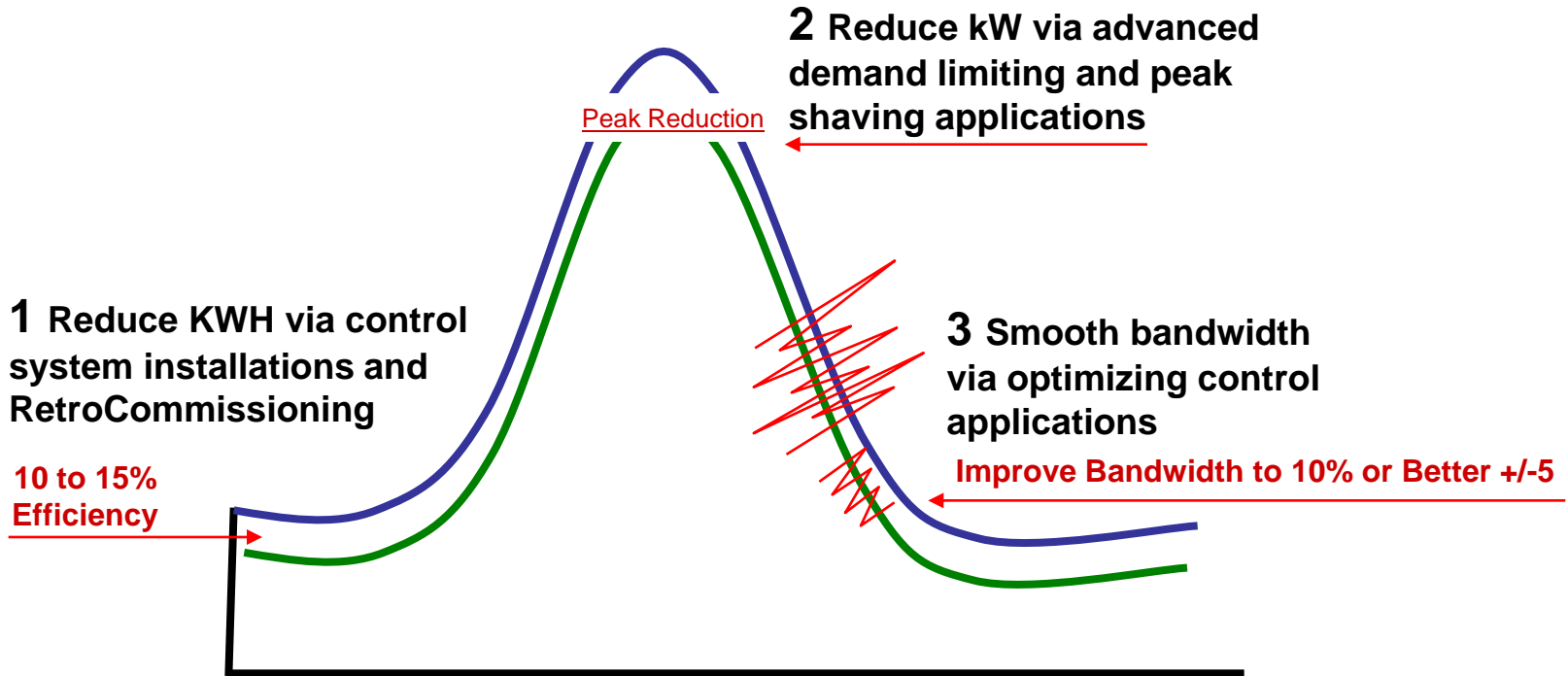


LBNL "Automated DemandResponse in Large Facilities" 10/06

■ Fully-Automated ■ Manual or Semi-Automated

CETS Energy Chain Mission

Affect Load Shape in 3 Ways:



Energy Supply

External Energy Sources



Commodity Supply

Electricity

Gas

Oil

Energy Use

Energy Control



Building Automation

Load Shaping

Demand Limiting

Energy Consumption

Demand Response

Control Sequences

EMS / BAS / HVAC

RetroCommissioning &
Building Optimization

Energy Use Strategies

Energy Assets

Energy Consuming Devices



HVAC Equipment

Fans / Pumps / Motors

Central Plant Systems

Boilers / Chillers

Lighting

Air Handlers

Local Generation

Energy Generation

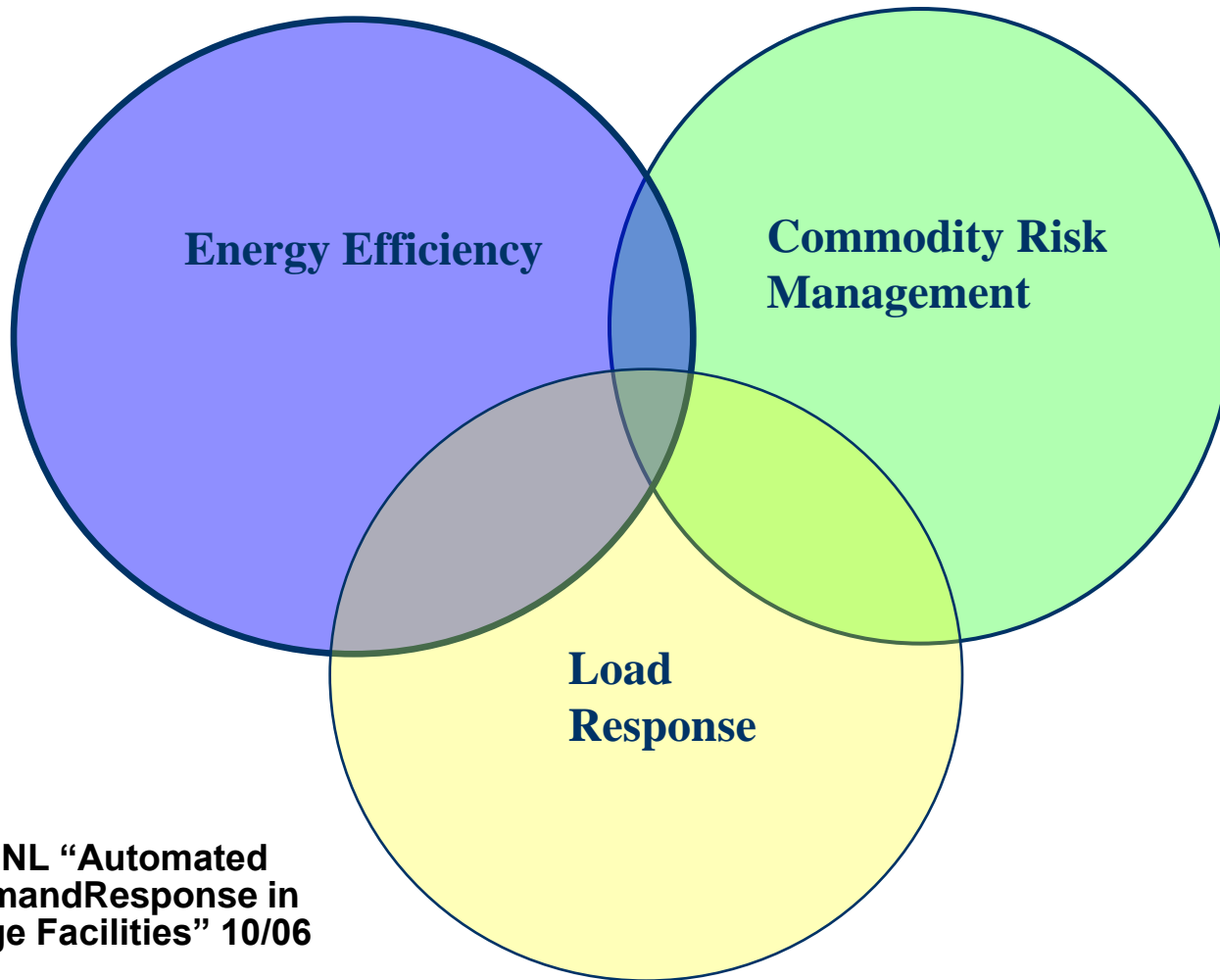


Generation Assets

CoGen Units

Fuel Cells

GenSets



**LBNL "Automated
DemandResponse in
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- Ability to respond to curtailment signals in minutes
- Ability to utilize new and emerging energy technologies for smooth load shaping and demand responsiveness
- Commercial customer operations not negatively impacted by extreme reduction applications
- Consideration of load shifting strategies so that load shaping is simply not load shifting

1. Energy Market Benefits:

- PJM August 2006 Event – \$6mm in payments to Customers. Results: \$230mm saved on peak day wholesale costs. Over \$650mm saved in total heat wave benefits. PJM News Release 8/17/06
- ISO NE: 5% Reduction during peak hours saves \$580mm per year. Controlling Electricity Costs, 6/06
- EPRI Estimate 2.5% Load Reduction could cut wholesale prices 25%. FERC Assessment of Demand Response and Advanced Metering. 8/06
- FERC – “Moderate amount of Demand Response can save \$7.5bn annually by 2010.” USDOE Report to Congress 2003

2. Societal Benefits:

- 10 – 20% reduction in kWh = significant reduction in CO2