



How Managers Should Focus on Improving Building Operational Efficiency



Body Shop:
Building
Strategies

In The Driver's Seat: Management Focus Tuesday, August 8, 4:00 - 5:30, Session A

Map the road with your real estate manager from the way things are to the way things could be. Learn how to build a business case for the supporting resource requirements.

Presenters:

- Mark Nelson, Commonwealth of Massachusetts, Division of Capital Assessment Management;
- Mike Gordon, CEO ConsumerPowerline
- Chelle Izzi, Director of Asset Services ConsumerPowerline



How Managers Should Focus on Improving Building Operational Efficiency



Behind the
Wheel:
Management
Focus

Session Agenda and Take-aways

- **From Efficiency to Optimization:** Learn why optimization is more valuable and sustainable than an efficiency only approach (Chelle Izzi)
- **From Facility Management to Asset Management:** Learn how to make the business case to finance and implement your energy programs (Mike Gordon)
- **Case Study:** Learn how to overcome the bumps in the road - Commonwealth of Massachusetts (Mark Nelson)



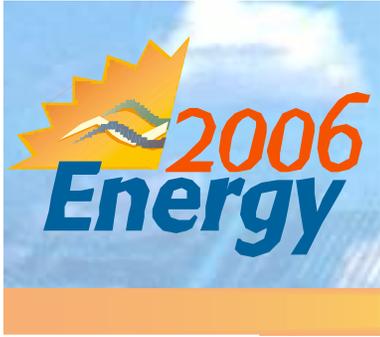
CONSUMER POWERLINE

- ConsumerPowerline (CPLN) is a full service strategic energy asset management firm and the largest provider of demand response solutions in the United States.
 - We help our clients build strategic energy programs
 - We help energy managers optimize their time, assets & cash flows
 - We represent consumers as advocates for better market design
- CPLN's portfolio includes more than 750 MW's under management, including 110,000 residential units and 75 million square feet of commercial real estate.
- We currently operate in the nation's largest energy markets including New York, California and New England, and are expanding into the PJM region in 2006.

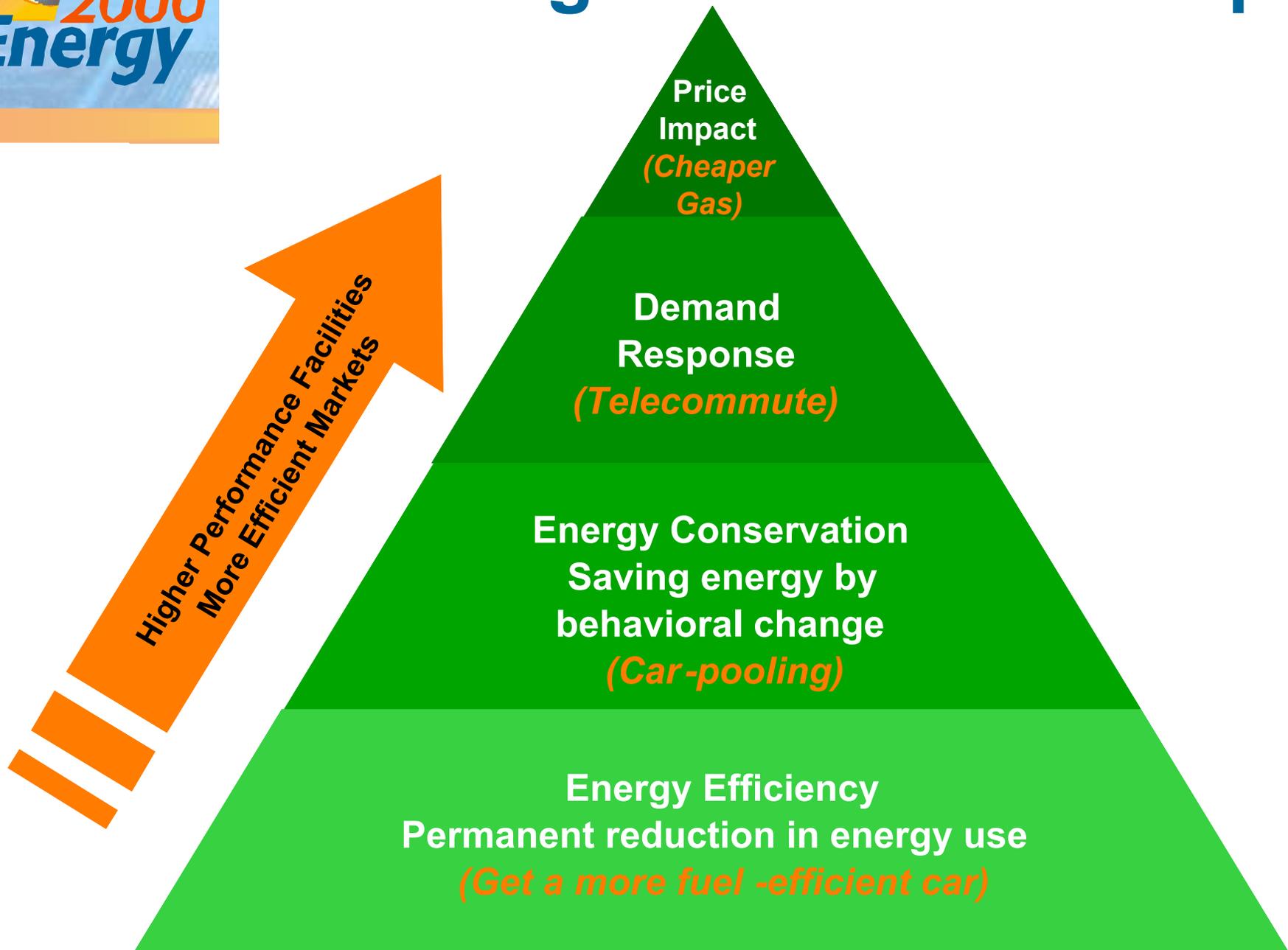


**Behind the
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From Efficiency to Optimization



The Big Picture Road Map





The View from Facilities

The Way things are today

ENERGY MARKETS,
FINANCING &
INCENTIVES

ENGINEERING

STAKEHOLDERS

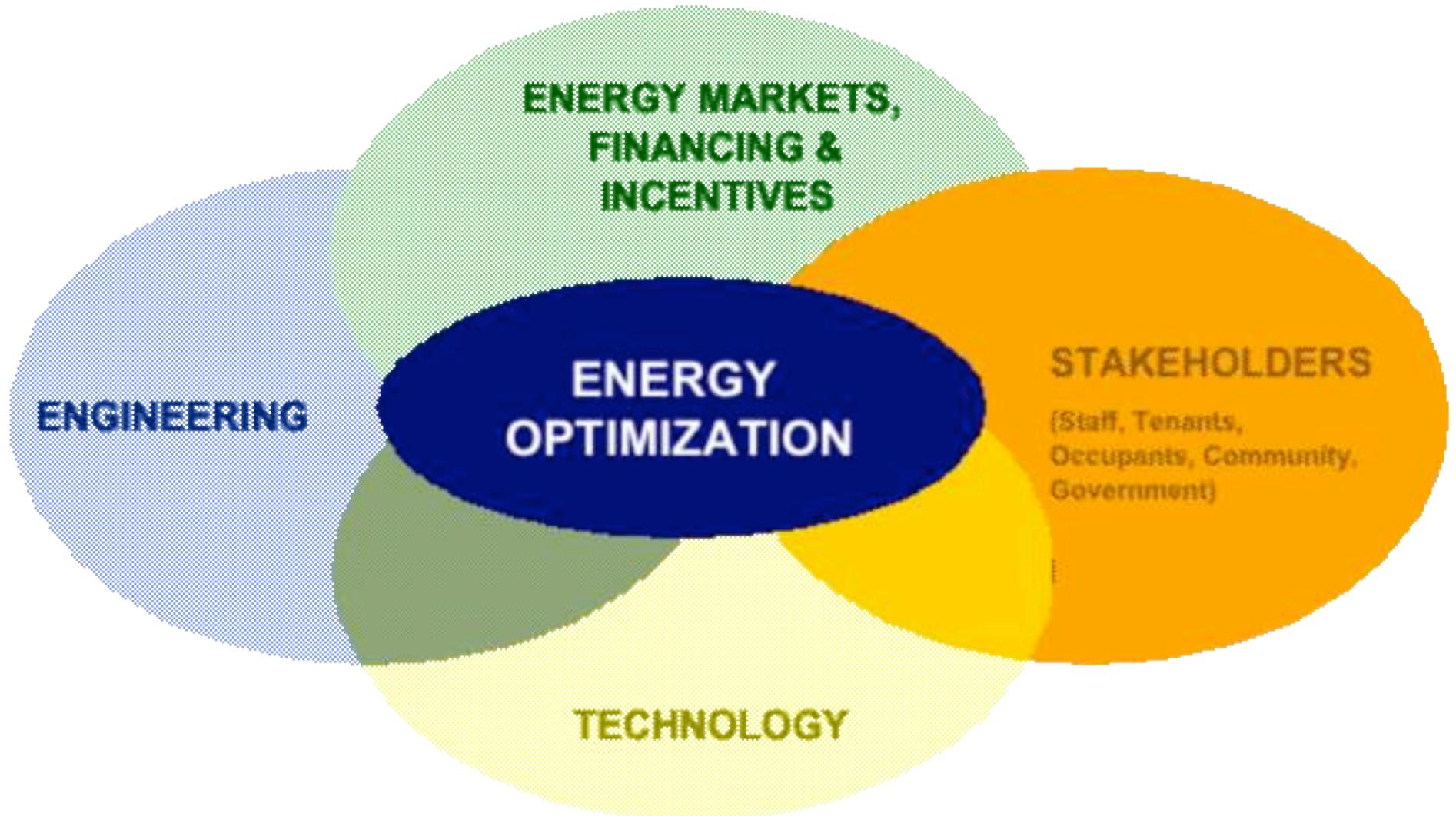
(Staff, Tenants, Occupants,
Community, Government)

TECHNOLOGY



The Road Map at the facility level

From Efficiency to Optimization





Energy Optimization Strategies

“What you use; When you use it”



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1. **Timing**: manage the timing of your energy use to maximize off-peak demand / minimize peak demand
2. **Balance**: manage your Load Shape and minimize / hedge Coincident Demand
3. **Optionality**: use the most cost-effective asset at any given time
4. **Market Revenues**: Get paid for what you are already doing (emergency generators) and what you could do (demand response)

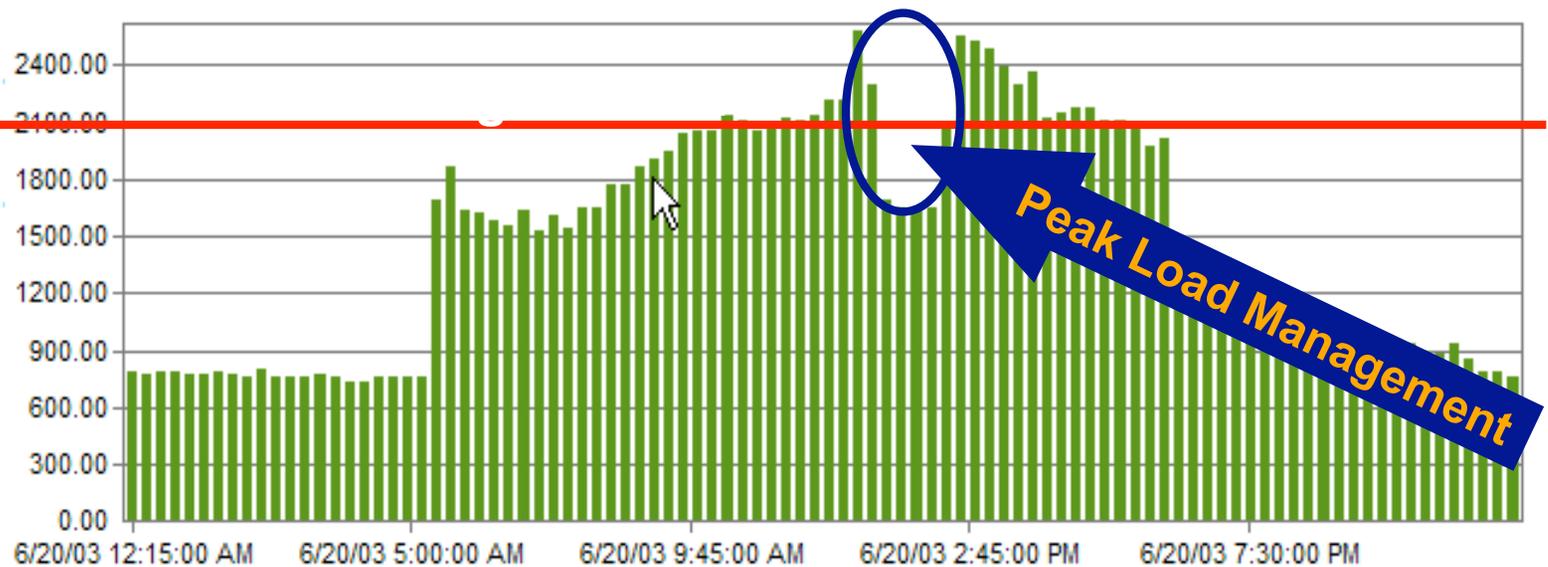


Example: Demand management leads to commodity savings



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- Peak load is a major component of your electric costs (*up to 22%*)
- If you reduce your load when the system peaks, you can start taking control of this cost
- The electrical grid typically peaks during hot summer afternoons
- Demand response measures can also reduce on-going peak load





Demand Management – Building Blocks for Optimization

Reduce / Temporarily Disable

- A/C Units (duty-cycling)
- Lighting (dimming, partial lighting)
- Chilled Water Temperature Reset
- Disable Heat / Vent Unit
- Exhaust & Return Air Fans
- Cooling Tower Fans
- Feed, Condenser, Chilled Water Pumps
- Reheat systems
- Elevators / Escalators
- Gyms / Pools / Laundry equipment

Modify Settings / Protocols

- Fuel Switching (i.e. electric to steam)
- Pre-Cool Building
- Pre-Programmed Controls
- Chiller Load Optimization
- Reset Static Pressure (Air Handlers)
- Reset Space Temperature Set-points
- Global Reset VFDs (fan, pump, AHUs)
- Demand Control Ventilation
- Utilizing Thermal Energy Storage



Energy Optimization

- Elements of Successful Programs



Behind the
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1. Information for Decision Making

- Real-time consumption data
- Forecasting & budgeting tools

2. Integrated approach

- Staff: Facilities + Finance + Purchasing + Environment
- Stakeholder Support: occupants, tenants, policymakers

3. Dynamic Decision Making

- Staff capacity to respond to real-time signals
- Management capacity to approve projects/strategies in response to changing market opportunities

4. Aligned Incentives

- Facility and staff recognition for success
- Revenues and savings reinvested into continuous improvements



Optimization: Non-Financial Selling Points



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- + **Community Leadership** – improves grid reliability
- + **Sustainability** – optimization is a ‘renewable resource’
- + **Good Governance** - best use of tax dollars
- + **Self-Financing** (sometimes) – market revenues and/or third-party financing available



**Behind the
Wheel:
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From Facility Management to Asset Management

Contracts

Information

Insight

Innovation

Infrastructure

***Operating
Strategies***



Optimization begins with: Market Opportunity Reviews (MOR)

Contracts	Infrastructure	Operating Strategies
Get on the right rates	Retro-Commissioning	Emergency Preparedness
Block rates	Building Management Systems	Demand Response
Bill Auditing	Load Controls	Peak Load Management
Regulatory Advice	Fuel Optionality	Fuel-switching
Direct Purchasing	Cogeneration	Behavioral Changes



Information, Insight & Innovation <i>(software, engineering, analytics)</i>		
Forecasting & Budgeting	Investment Grade Audits	Interval Metering
Market Prices	Incentive Program Opportunities	Weather data



From Facility Management to Asset Management



Behind the
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Get more than one use out of your assets

- + Operational Protocols
- + Demand Response
- + Emergency Preparedness
- + Peak Load Management

✓ *Faster Simple-Paybacks*

✓ *Improved ROIs*

✓ *Reduced Financing / Capital Costs*



From Facility Management to Asset Management



Behind the
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Include all savings into investment analysis:

- + Operating/maintenance savings
(labor, parts, down-time)
- + Electricity savings *(kWh)*
- + Improved commodity contract terms
(Demand charges and \$/kWh)
- + Risk mitigation from optionality
(avoided cost)

✓ **Savings of 10-20% + better reliability**

From Facility Management to Asset Management



Behind the
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Include all revenues into investment analysis:

+ Demand Response (DR)
\$18 - 80 / kW / year

+ Emissions credits
\$.05 - \$.20 / kWh / year

+ Vendor's tax credits
Vendor's receive up to \$1.80 / sq ft

✓ *Untapped revenues can make those old, unfunded projects become viable*



Example: Potential Value of Strategic Energy Asset Management



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Sample Building Profile

- 500,000 sq ft office building
- 5 kW / sq ft peak demand, or 2.5MW
- Annual electricity bill of \$1.5 million
- 10% demand management capability thru BMS; 250kW
- Demand Charges reduced by 10% from demand management
- Lighting upgrade saving 100kW of base load



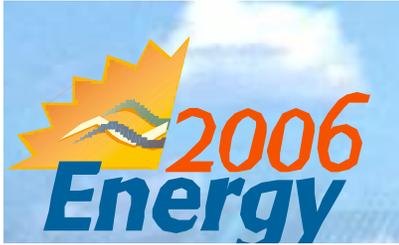
Example: Potential Value of Strategic Energy Asset Management



Behind the
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- + Demand Response
 $250\text{kW} * \$40 / \text{year} = \$40,000$
- + Commodity Contract
250kW Demand reduction = 10% reduction of
20% of bill, or 2% Electricity Savings = \$30,000
- + Emissions credits
 $100\text{kW} * 8,760 * \$0.10 = \$87,600$
- + Vendor's tax credits
 $100,000 \text{ sq ft} * \$0.60 \text{ (lighting only)} = \$60,000$

✓ \$217,600 Total Potential Asset Value



Case Study: 525,000sq. ft. NYC Office Building; \$500,000 in 3 years

Measures

- Peak Demand Reduction dollars earned from initial manual measures
- ATS's connecting HVAC loads to generator, loading generator to capacity
- Equipment Upgrades: Premium Efficiency Motors, VFD's, BMS hardware and software
- BMS programmed to execute peak demand reduction/ curtailment measures
- Peak demand reduction dollars significantly increased from expanded and automated measures
- Building obtained better terms for electricity contract supply due to increased efficiency and control

Effects

Market nW Trading REVENUES

nWs grew from 250 to 900kw in 2 yrs

Summer 2002	\$ 7,854
Winter 2002/3	\$ 14,700
Summer 2003	\$ 23,562
Winter 2003/04	\$ 13,314
Summer 2004	\$ 40,859
Winter 2004/05	\$ 14,926
Summer 2005	\$ 28,646
	\$143,861

Capital Investment INCENTIVES

Energy Study	\$ 60,000
Equipment	\$ 169,000

Energy Cost SAVINGS

Demand Reduction	\$ 80,640
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Electricity Purchase RESTRUCTURING

\$ 79,000

Total Value Revenue, Incentives & Savings
\$534,501



CASE STUDY



Behind the
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Commonwealth of Massachusetts Division of Capital Asset Management (DCAM)

**Demand Response –
A Building Block for Optimization &
Asset Management**



Behind the
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Mission: Provide public-building design, construction, maintenance and real estate services to the Commonwealth.

Organization:

- Reports to the Governor through the Secretary of Administration and Finance.
- Owns/maintains few facilities.
- Monitors and advises all facilities through Office of Facility Maintenance.
- Works collaboratively with State procurement and environmental offices to get best solutions to facility issues





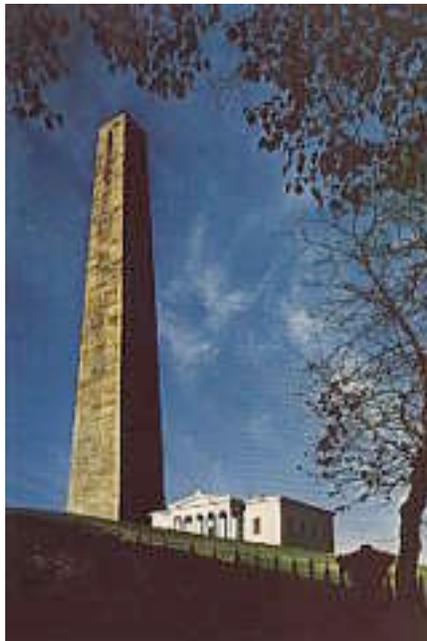
Behind the
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- **Over 5,500 buildings of various size**
- **Over 73 million sf of space**
- **Includes:**
 - Prisons
 - Hospitals
 - Colleges
 - Court Houses
 - Office buildings
 - Power plants
 - Rinks, pools, stables
 - and so on....





Components of MA Energy Management Effort



- **Environmental Stewardship**
- **Emergency Preparedness**
- **Commodity Contracts**
- **Performance Based Contracts for Efficiency Projects**
- **Demand Response**



Why We Implemented Demand Response

- **Social responsibility - grid reliability**
- **Green – curtailment is a “renewable resource”**
- **Improved emergency preparedness**
- **Another source of O&M funding**

...and, due to Hurricane Katrina, there was a crisis at hand.





Aligning Incentives: *DCAM's Innovative Expendable Trust Fund*



Behind the
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- **Why an Expendable Trust?**
- **Securing Approvals for the Trust**
- **How does it work?**
 - Vendor check to DCAM
 - Separation of earned revenues by agency
 - Letter to agency followed by fund dispersal
 - No strings attached





Winter 2006 Participating Sites

Department of Corrections

- Old Colony Correction Center, Bridgewater
- Boston Pre-release Center, Roslindale
- MCI Center, Norfolk
- Pondville Correctional Center, Norfolk
- MASAC, Bridgewater
- Bay state Correction Center, Norfolk
- Bridgewater State Hospital, Bridgewater
- Tewkesbury State Hospital, Tewkesbury
- Lemuel Shattuck Hospital, Jamaica Plain
- MCI Plymouth, Plymouth
- Cedar Junction, Walpole
- Massachusetts, Shirley
- Souza Baranowski , Shirley

University, Dept of Public Health, and Dept Youth Services

- Massachusetts State Police Academy, Braintree
- University of Massachusetts, Amherst
- Worcester State Hospital, Worcester
- The Massachusetts Treatment Center, Bridgewater
- Essex County Sheriff's Department, Middleton
- Department of Youth Services, Allen Hall, Westborough



Winter 2006 Demand Response Revenues

Month	ISO – NE Price per kW	kW Bid	Performance Achieved	Revenues Earned
Jan <i>(1/2 of month)</i>	\$12	5,717	Avg 2.9 MW	\$17,472
Feb	\$10	5,717	Avg 5.5 MW	\$42,210
Mar	\$8	5,717	Not tested	\$45,736
Total:				\$105,418



How DR 'fuels' further Energy Management



**Behind the
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- **Secured Infrastructure upgrades**
 - Identified and addressed small infrastructure issues that prevented timely generator activation
- **Improved staff awareness and capabilities**
 - Upgraded staff emergency preparedness; addressed 2nd shift vulnerabilities
 - Upgraded internal emergency communications protocols
- **Provides Metering & Monitoring to manage load**
 - Secured telecom installations to allow remote monitoring
 - Provides real-time load information
- **Aligned Incentives / Financing for energy projects**
 - Facilities receive funds based on their actual performance
 - Facilities decide how to spend the funds on energy projects
- **Generates PR / Recognition and momentum for Energy management**



DCAM's Winter 06 Effort

- A nationally recognized success



***DCAM introduces Demand Response
at 22 sites on January 16, 2006***

**March 13, 2006 - DCAM is recognized by the
Peak Load Management Alliance**

**Outstanding Achievement by an End User
for 'time to market'**

**June, 2006 - DCAM is recognized by the
Pioneer Institute for Public Policy Research**

Finalist Better Government Competition



**Behind the
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Conclusions / Re-Cap



Behind the
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- **Optimization**
 - Think beyond efficiency; think optimization
 - Demand Response can help you “earn and learn” and finance / enable peak load management

- **Asset Management**
 - Get more than one use out of your assets
 - Factor in all savings, cash flows and procurement improvements into project paybacks

- **DCAM Case Study**
 - Consider setting up a dispensable trust fund
 - Work to secure public recognition to increase support for the program



Contact Information



**Behind the
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