



# Financial Benefits of Energy Savings

April 17, 2013  
Dr. Sharon L. Levin, MBA, CPA

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## Experience:

13 years in energy industry  
25 years in higher education

ENERGY STAR Portfolio Manager Trainer

Curriculum Developer: ENERGY STAR, BOMA Energy Efficiency Program (BEEP), BOMA Sustainability Operations Series (SOS)

# Agenda

- ▶ Direct financial benefits of energy efficiency
- ▶ Federal and state financial incentives
- ▶ Federal Energy Policy Act
- ▶ Hedging against volatile fuel prices
- ▶ Free DOE and EPA energy calculators
- ▶ Emissions trading
- ▶ Case Studies

# Direct Benefits of Energy Efficiency

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Increased NOI

Increased Asset Value

# Increase Net Operating Income (NOI)

Reducing energy consumption reduces energy costs, which increases NOI

Assumptions: Office building size = 100,000 sf;  
energy costs = \$2.50/sf



Example: assume client reduces energy consumption 10% based on MSCA contractor recommendations

Results:  $\$2.50/\text{sf} \times 10\% = 25\text{¢}/\text{sf}$  cost savings  $\times 100,000$  sf

**Bottom line: \$25,000 energy savings  
& increase to NOI**

# Capitalization Rate (Cap Rate)



Are cap rates  
in your real  
estate tool  
belt?

- Definition: ratio between Net Operating Income & Market Value
- Used to estimate market value

Equations:

Cap rate = Net Operating Income / Market value

Therefore,

Market value = Net Operating Income / Cap rate

# Increased Building Value

## Income Approach to Valuing Assets

Increasing NOI increases property value

NOI increased \$25,000

Capitalization rate = 6%\*

Market value = Net Operating Income / Cap rate

$$\$25,000 / .06 = \$416,667$$



**Bottom line: Market Value of Property**

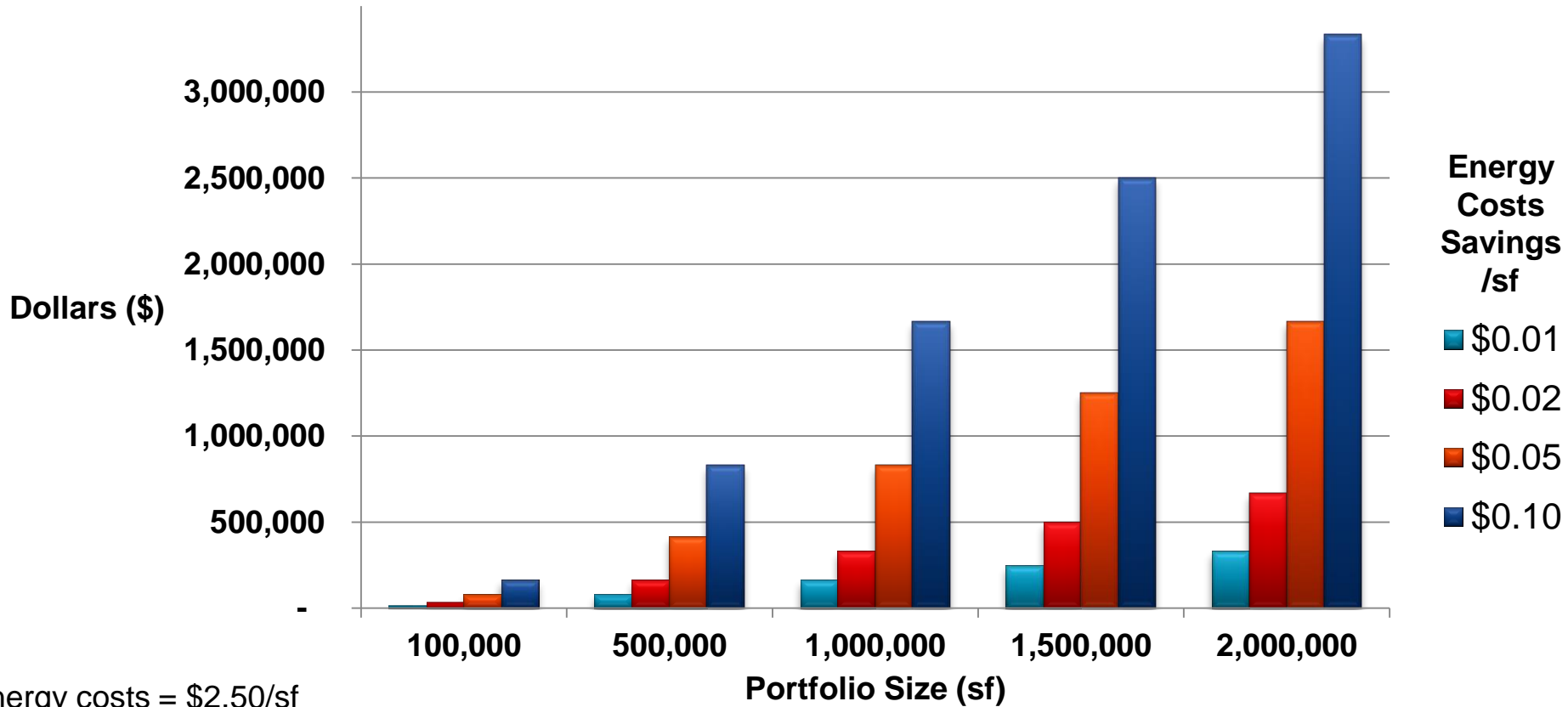


**\$416,667 (Estimated)**

\* Estimated national average for high quality real estate

# Pennies to Millions

## Asset Value Increase



Energy costs = \$2.50/sf  
Capitalization rate = 6%



# Benefit to MSCA Contractors



Clients are in a better position to obtain funding to pay for YOUR recommendations

Assumptions: You recommend purchasing \$100,000 of energy efficient equipment

Client borrows \$100,000, Interest rate = 5%, Term = 15 years

Client's payment = \$790/month or \$9,480/year

\$9,480/year payment is offset by \$25,000/year energy cost savings

**Bottom line: \$15,520 POSITIVE net cash flow  
BEFORE depreciation & financial incentives**

# Depreciation of HVAC

Traditional (MACRS)	Cost Segregation
$\$100,000 / 39 \text{ years} = \$2,564/\text{year}$	$\$100,000 / 7 \text{ years} = \$14,285/\text{year}$
40% tax rate $\approx$ \$1,025 tax savings	40% tax rate $\approx$ \$5,714 tax savings

$$\$15,520 + \$1,025 \text{ tax savings} = \$16,545$$

**Bottom line: \$16,545 POSITIVE annual cash flows  
BEFORE financial incentives**

*Reminder: loan payment ends after 15 years,  
thereby increasing annual cash flow \$9,480/year.*

\* Cost segregation (component) depreciation may be possible

# Federal & State Financial Incentives

# Federal & State Financial Incentives

[DSIREUSA.org](http://DSIREUSA.org)

Database of State Incentives for Renewables & Efficiency

Also includes Federal Financial Incentives, including Tax deductions & credits

The screenshot shows the DSIRE website interface. At the top, there is a red header with the DSIRE logo and the U.S. Department of Energy logo. Below the header is a navigation bar with links for Home, Glossary, Links, FAQs, Contact, and About. The main content area features a search bar, a 'View Federal Incentives' button with a US flag icon, and a map of the United States. A red callout bubble points to the 'View Federal Incentives' button with the text 'Federal Incentives'. Another red callout bubble points to the map with the text 'Click State'. The website also includes a 'Resources' sidebar with links for RPS Data, Summary Maps, Summary Tables, Library, What's New?, and Search. A 'DSIRE News' sign-up button is visible in the top right corner.

# State Financial Incentives

Inform customers of these financial incentives as a means to offset YOUR fees

Maryland	California
	Sales Tax Incentive
	State Loan Programs
	Local Rebate Program
	State Rebate Program
	Property Tax Incentive
	Performance-based Incentive
	Utility Rebate Program (many)
	Property Assessed Clean Energy (PACE) Financing
Corporate Tax Credit Personal Tax Credit	Leasing Program Green Building Incentive State Grant Program Utility Grant Program Utility Loan Program



# Polling Question

Which financial incentives has your company recommended as a means to offset HVAC costs?

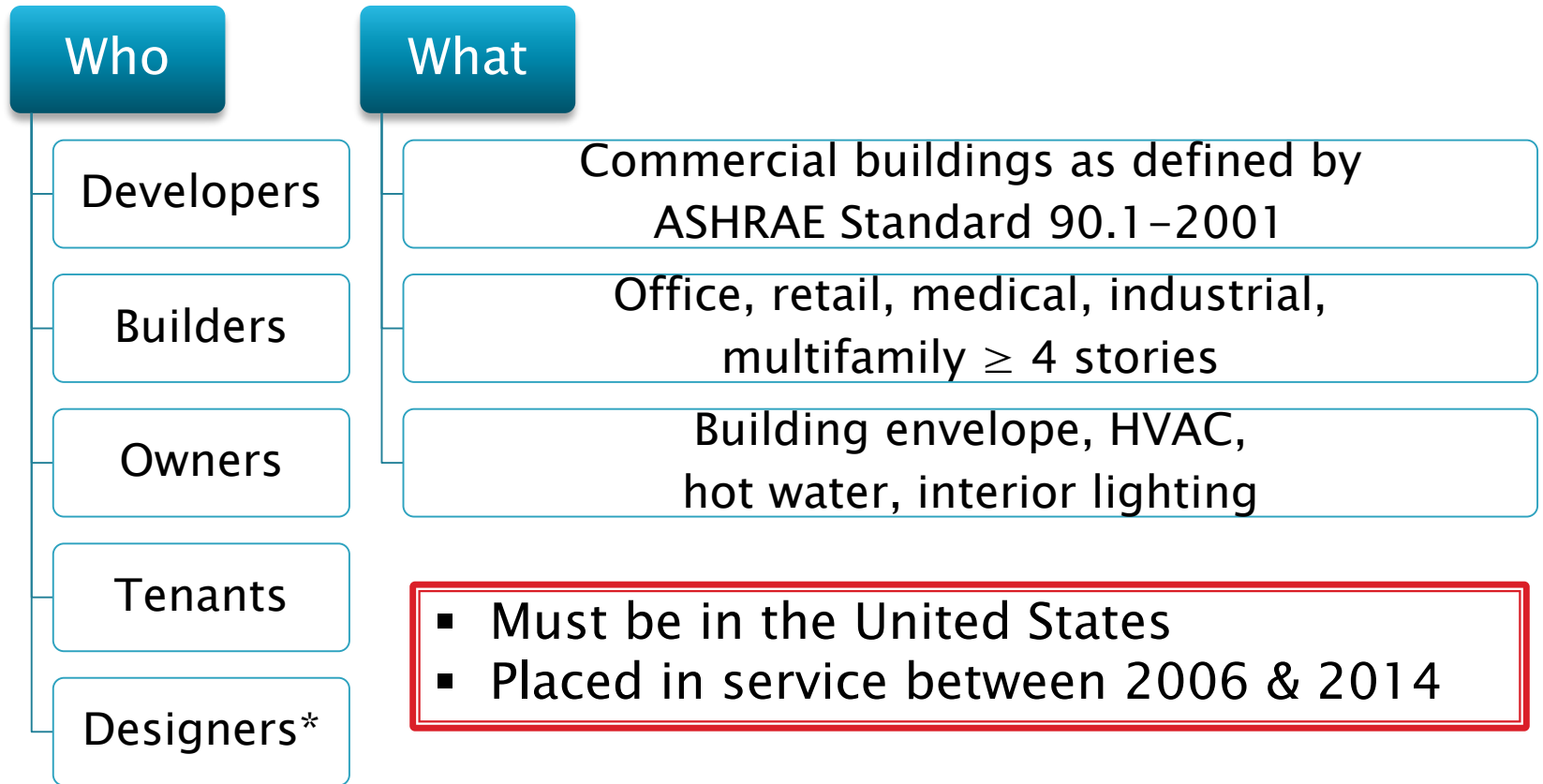
- a) Utility rebate, loan, & grant programs
- b) Federal & state tax incentives
- c) State rebate, loan, & grant programs
- d) Performance-based incentives



# Federal Energy Policy Act EPAAct of 2005



# Commercial Tax Deductions



\* Architects & engineers may be eligible for deduction if building is owned by government



# Federal Energy Policy Act (EPAct)

- IRS Code Section § 179D
- Placed in service after 12/31/05 & before 12/31/14
- Reduce total annual energy & power costs

EPAct 179D Energy Tax Deduction

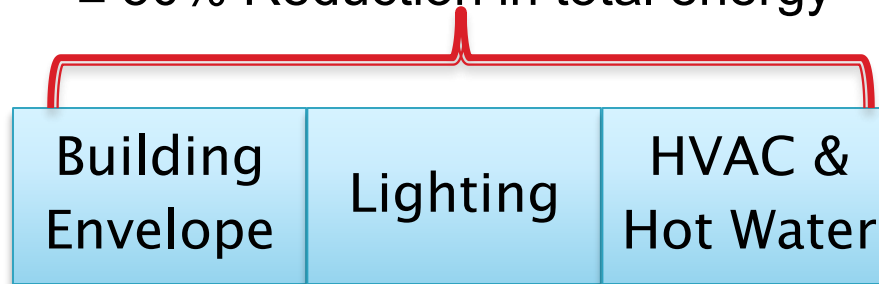


Applicable completion dates	Indoor lighting	HVAC & Hot water	Building envelope
1/1/06 to 12/31/08	16-2/3%	16-2/3%	16-2/3%
1/1/06 to 12/31/13	20%	20%	10%
4/23/12 to 12/31/13	25%	15%	10%

Note: % reduction is in comparison to a reference building that meets the minimum requirements of ASHRAE 90.1-2001

# Immediate Tax Savings: Combined Tax Rate of 40%

A one time deduction of \$1.80/sf for all 3 or 60¢/sf for any 1 system  
≥ 50% Reduction in total energy



Total Building sf	Investment Amount in Dollars			Maximum Deduction \$1.80/sf	Immediate Tax Savings
	Lighting \$.30 - \$.60/sf	HVAC \$.60/sf	Building Envelope \$.60/sf		
100,000	\$30,000 to \$60,000	\$60,000	\$60,000	\$180,000	\$72,000
500,000	\$150,000 to \$300,000	\$300,000	\$300,000	\$900,000	\$360,000

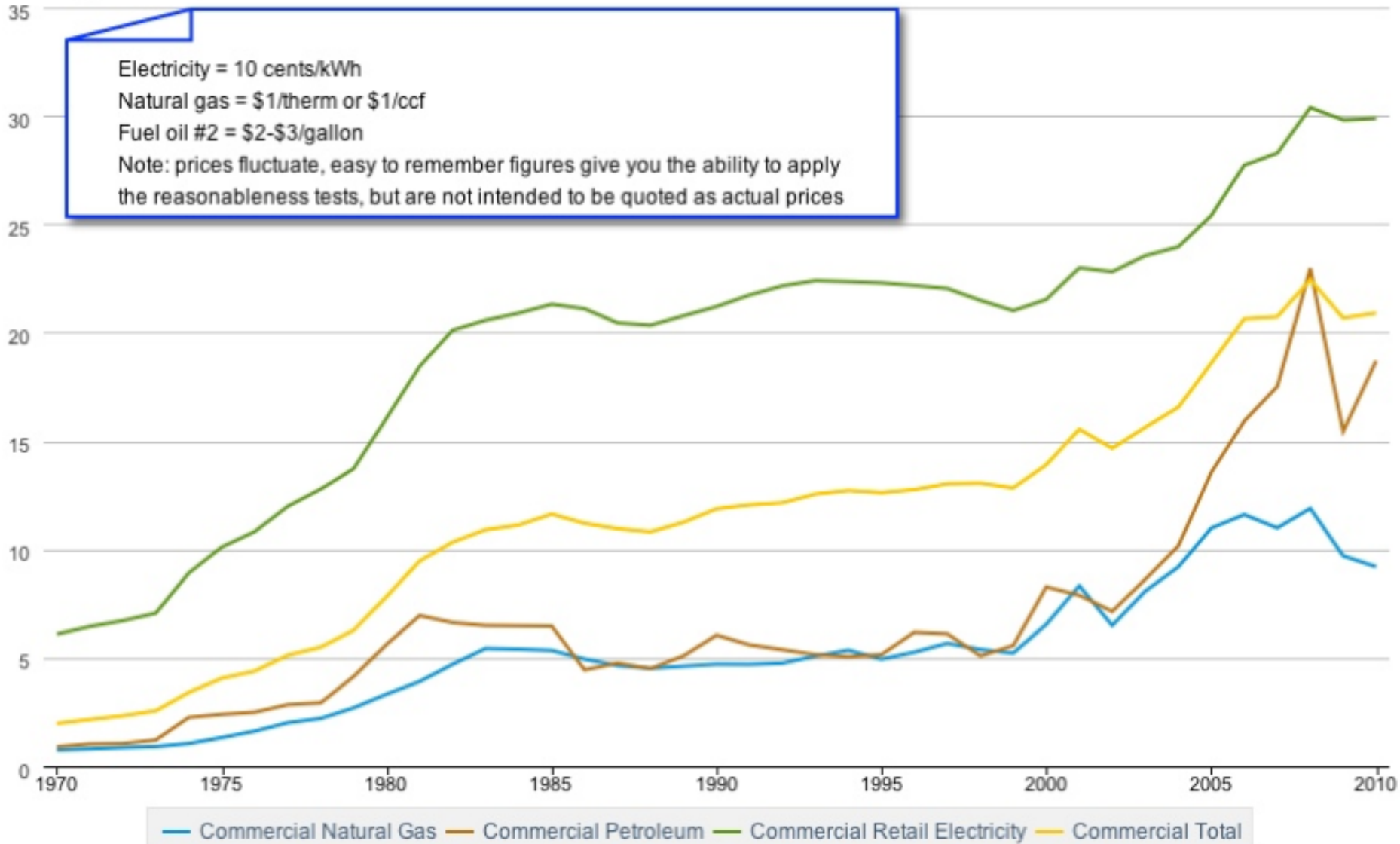
# Hedging Against Volatile Energy Prices



Table 3.4 Consumer Price Estimates for Energy by End-Use Sector, 1970-2010



Dollars per Million Btu



# Hedging

Definition: making an investment to reduce the risk of adverse price movements

Educate your customers to hedge against volatile energy prices by:

- Upgrading their EMS
- Better preventive maintenance program
- Purchasing more VFD's & VAV's
- Investing in higher efficiency HVAC equipment
- Installing dual fuel systems (if appropriate)
- Investing in renewal energy equipment
  - Become a renewal energy system expert



# Free DOE & EPA Energy Calculators & Energy Simulation Software

**Return On  
Investment**



## Free Energy Calculators & Energy Modeling Software

Excel-based Calculators	Purpose	Link
DOE: Central air conditioning	Excel based. Estimates life cycle costs.	<a href="#">CACCalculator</a>
DOE & EPA: Air Source Heat Pumps	Excel based. Estimates life cycle costs.	<a href="#">ASHeatPumpsCalc</a>
DOE & EPA: Gas Furnaces	Excel based. Estimates life cycle costs.	<a href="#">GFCalc</a>
EPA: Building Upgrade Value Calculator for Office Buildings	Excel based. Estimates the financial impact of proposed investments in energy efficiency in office properties.	<a href="#">BUVCalc</a>
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DOE: Commercial Heat pumps (5.4 >=< 20 tons)	Web based. Estimates a product's lifetime energy cost savings at various efficiency levels.	<a href="#">CommHPCalc</a>
DOE: Commercial Boilers	Web based. Includes water or steam fluid type, oil or gas energy type, capacity, and thermal efficiency.	<a href="#">CommBoilersCalc</a>
DOE-Pacific Northwest National Laboratory: Rooftop Air Conditioners	Web based. Compares high-efficiency rooftop air conditioners to standard equipment in terms of life cycle cost. May be used for multi-family, hospital, hotel, office, restaurant, retail, school, & warehouse.	<a href="#">RooftopACCalc</a>
DOE: Water heaters (electric & gas)	Web based. Estimates a product's lifetime energy cost savings at various efficiency levels.	<a href="#">WHeaterCalc</a>
	Supports motor and motor systems planning by	

Free vetted  
 Calculators  
 & Software  
 to assist in  
 your  
 analyses

See  
 Handout

# Emissions Trading



# Obama's Carbon Tax (Cap & Trade)

- ▶ Market-based approach to reducing GHG emissions
  - Government sets a limit (Cap) on amount of GHG's a company may emit
    - Sells / allocates Emissions Permits
- ▶ On Jan. 1, 2013 California implemented a Cap & Trade system
  - Legally committed to reduce GHG\* emissions to 1990 levels by 2020
- ▶ European Union's Cap & Trade system sells emission permits on NYSE Euronext



\*GHG = Greenhouse gas

# Financial Impact of Cap & Trade

- ▶ Educate your clients
- ▶ Your services reduce need to buy Emissions Permits
- ▶ Clients' opportunity to
  - ▶ Improve corporate image
  - ▶ Earn income from selling Emissions Permits/Credits
- ▶ Motivate your clients to cut energy use as an alternative investment strategy





# Polling Question

What percentage of your customers have successfully “defended” cost segregation depreciation on HVAC equipment?

- a) 0-25%
- b) 26-50%
- c) 51-75%
- d) 76-100%



# Case Studies

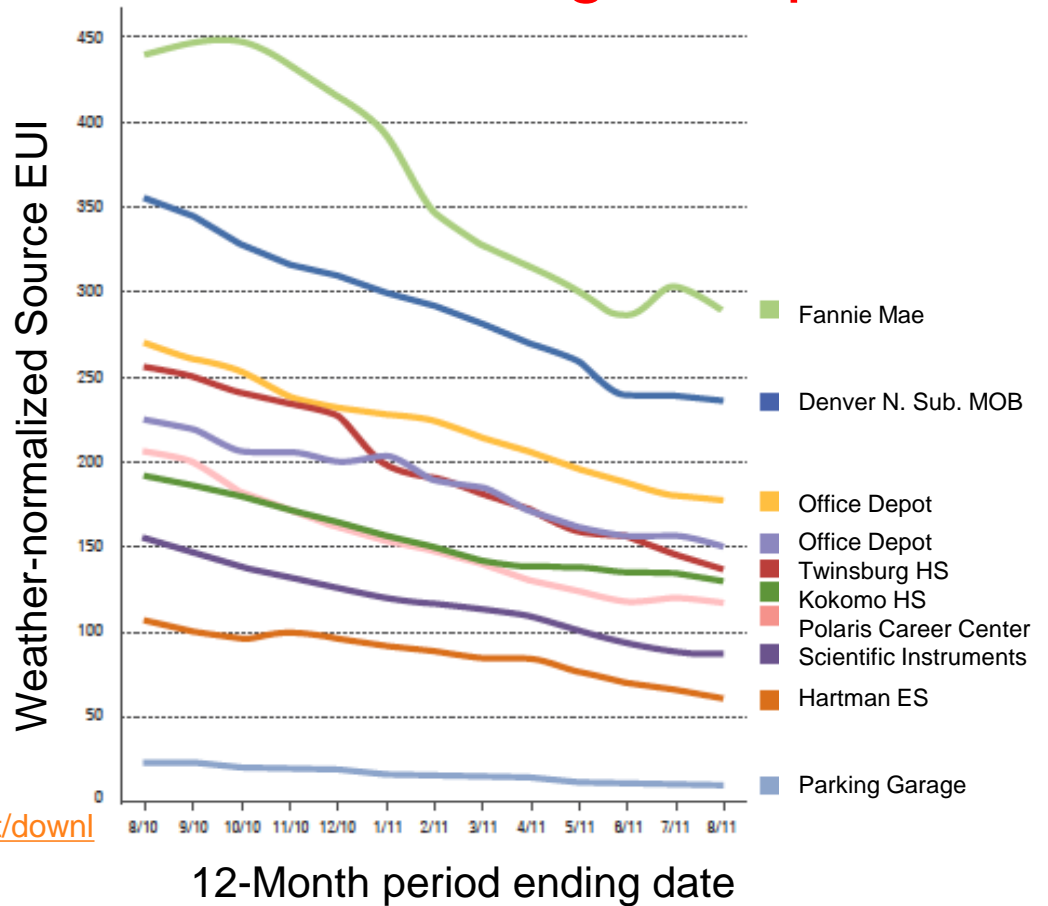
## 2011 ENERGY STAR National Building Competition

**“Biggest Loser” competition**

- 245 buildings competed

**Savings:**

- 240 million kBtu's
- \$5.2 million



Source: [http://www.energystar.gov/ia/business/buildingcontest/downloads/2011\\_NBC\\_Report.pdf?2ec6-9ab1](http://www.energystar.gov/ia/business/buildingcontest/downloads/2011_NBC_Report.pdf?2ec6-9ab1)



# BATTLE OF THE BUILDINGS

EPA's NATIONAL BUILDING COMPETITION



Organization	Reduced Energy by	Energy Cost Savings	GHG's Prevented (Mt)
Univ. of Central FL—Garage C, FL	63.2%	\$34,907	258
Twinsburg HS & Sports Complex, OH	46.3%	\$505,323	2,412
Polaris Career Center, OH	43.4%	\$220,902	1,071
Hartman Elementary, TX	43.2%	\$26,271	167
Scientific Instruments, FL	42.2%	\$3,129	36
Fannie Mae, DC	34.6%	\$49,544	262
Office Depot, TX	34.1%	\$14,989	101
N. Suburban Medical Office Building, CO	33.7%	\$106,710	607
Office Depot, NC	33.1%	\$11,678	80
Kokomo High School, IN	32.3%	\$442,338	1,816
<b>Totals</b>		<b><u>\$1,415,791</u></b>	<b><u>6,810</u></b>

Source:

[http://www.energystar.gov/ia/business/buildingcontest/downloads/2011\\_NBC\\_Report.pdf?2ec6-9ab1](http://www.energystar.gov/ia/business/buildingcontest/downloads/2011_NBC_Report.pdf?2ec6-9ab1)

# 2040 Main Street



309,000 sf

Irvine, CA, Built 2003

## Energy Efficiency Project:

Total cost = \$160,000

Utility rebate = \$80,100

Net cost = \$79,900

Payback = 1.13 years

**Bottom line: annual energy savings =  
\$89,514**

Energy Efficiency Projects	Cost	Annual Savings
Installed VFD on 750 ton Trane chiller	\$73K	\$27K
Installed: 4 VFD's: cooling tower fans (2), chilled water pump, & condenser water pump	\$31K	\$16K
Upgraded EMS	\$56K	\$47K

# 770 City Drive South

Orange, CA, built 1987



## Energy Efficiency Project

Replaced two 120 ton Carrier open drive reciprocating compressors (5H120's) with new Turbocor compressors

Cost \$86,000

Utility rebate \$32,000

Net cost = \$54,000

Payback = 2.5 years

**Bottom line: annual energy savings =  
\$31,000**



# Dreyfuss & Blackford Architects



- Sacramento, CA, built 1965
  - Annual Gas Savings: 35%
  - Annual Electricity Savings: 32%

## Steps taken to achieve higher efficiency:

- Installed improved air flow system
- Replaced compressor & cooling coils w/high-efficiency (SEER)-rated equipment
- High flow filters were installed

**Bottom line: Combined energy savings = 67%**

# Lawrence Memorial Hospital



Lawrence, KS, Built 1921

## Renovation & Expansion Project

Replaced chiller, motors, & air handlers  
Added 95,000 sf w/ NO increase in energy

Invested \$20,000

Annual Energy Savings = \$40,000

Payback = 6 months

## Advice from facility engineer

*"You've got to try your best to **make an effective argument for energy efficiency every time you see the opportunity.** These investments continue to pay you back over time. By making a succinct presentation in terms that resonated with the CEO, we have built trust and a strong relationship over time. He knows that when I present an idea, it has been vetted, tested, and is well-positioned to generate the savings I estimate."*

**Bottom line: annual energy savings = \$40,000**

# New York–Presbyterian Hospital



New York, NY, Chartered 1998

## Energy Efficiency Project

- Conducted cost-benefit analysis
- Partnered w/ reputable ESCO who shared expertise
- Discussed how energy upgrades contribute to patient comfort and employee retention
- Leveraged outside funding through state grants and regional energy programs

*“Facility managers can make an effective pitch to senior leadership through a few key steps, but the most important of all is to switch from “tech talk” to “money talk.” **Speaking in the language that senior leaders understand will go a long way in being heard.**”*

**Bottom line: Learn a new language: CEO / CFO**

# Thomas Mott Homestead Bed & Breakfast



- Alburg, Vermont, Built 1838
  - 4,200 sf
  - Annual cash savings: \$10,000
  - Annual energy savings: 140,000 kWh
  - Payback period: 6 years

## Steps taken to achieve higher efficiency:

- Insulated between exterior and interior walls
- Replaced electric baseboard heating with continuous flow hot water system with a state-of-the-art boiler
- Planted trees to provide shade and reduce heating costs in the winter
- Converted cooking facilities from electric to gas
- Retrofitted highly efficient compact fluorescent lamps
- Replaced 39 double sliding glass doors

Source:

[http://www.energystar.gov/index.cfm?c=sb\\_successories\\_thomasmott](http://www.energystar.gov/index.cfm?c=sb_successories_thomasmott)

# Certificate of Participation



# Final Evaluation Polling Questions

## 1) How would you rate this training?

- a) Excellent
- b) Very Good
- c) Average
- d) Below Average
- e) Poor

## 2) How would you rate the trainer, Sherri Levin?

- a) Excellent
- b) Very Good
- c) Average
- d) Below Average
- e) Poor

## 3) Did you learn at least one new idea to promote the financial benefits of energy efficiency?

- a) Yes
- b) No
- c) I am not sure

## 4) Would you recommend this Webinar to other MSCA members?

- a) Yes
- b) No
- c) I am not sure

## 5) What other energy efficiency Webinar topics would you like MSCA to offer its members?

# Question & Answer (Q&A)



Thank you for participating  
in the MSCA training  
*Financial Benefits of Energy Savings*

Barbara Dolim  
Executive Director, MSCA  
BDolim@MCAA.org

Sherri L. Levin  
Managing member, ManageEnergy.com, LLC  
SLevin@ManageEnergy.com





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Software Downloads	Purpose	Link
DOE: Building Life-Cycle Cost	Provides computational support for the analysis of capital investments in buildings.	<a href="#">BldgLLCCalc</a>
DOE: Motor-driven systems	Supports motor and motor systems planning by identifying the most efficient action for a given repair or motor purchase decision.	<a href="#">MotorsCalc</a>
DOE: Energy Plus (energy modeling)	Energy simulation program that models energy & water use in whole buildings. Used by engineers, architects, and researchers.	<a href="#">EModelingCalc</a>

