



Energy Efficiency Workshops For Commercial Customers

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Takeaways...

- 🌟 Energy is a business issue
- 🌟 Energy improvements are an investment
- 🌟 Save energy because you can
- 🌟 Enjoy the next hour- this really isn't work!



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Necessary Definitions

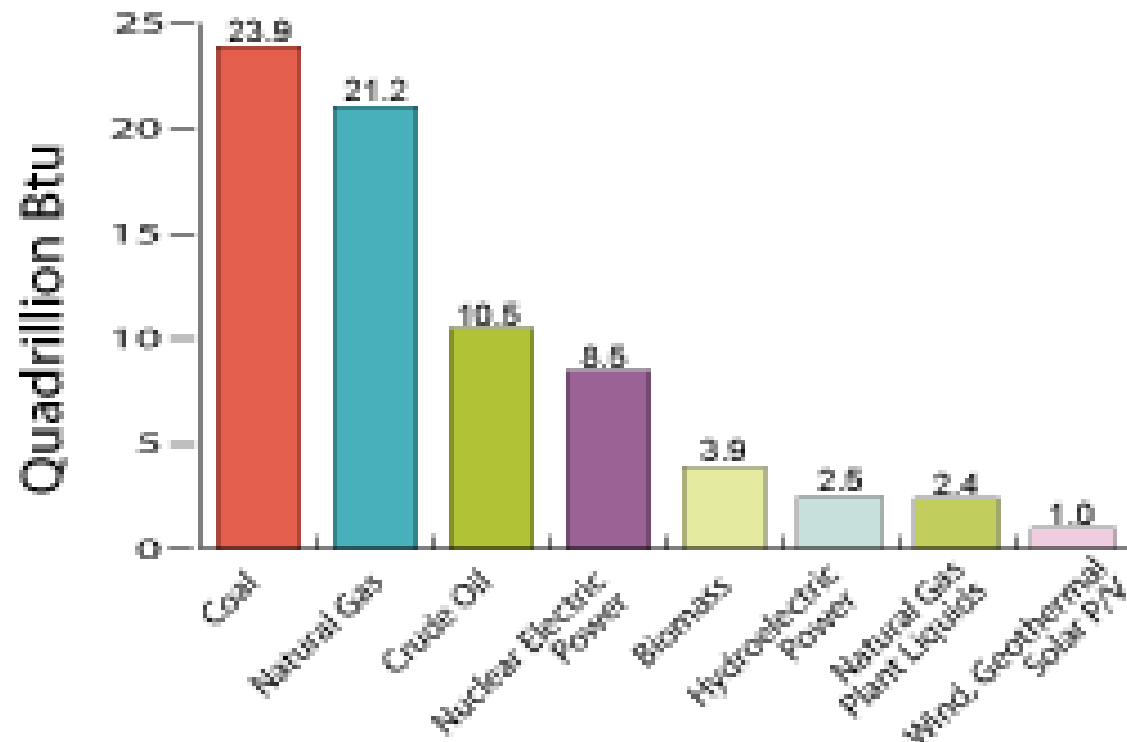
Conservation – Waste as little as possible

Efficiency – $\text{Power output} / \text{Power input}$

Sustainable -- The responsible planning and management of resources.

U.S. Energy Portfolio

U.S. Primary Energy Production by Major Source (2008)



Source: Energy Information Administration, *Annual Energy Review 2008*, Table 1.2. (June 2009)

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Energy Discussion

ELECTRIC



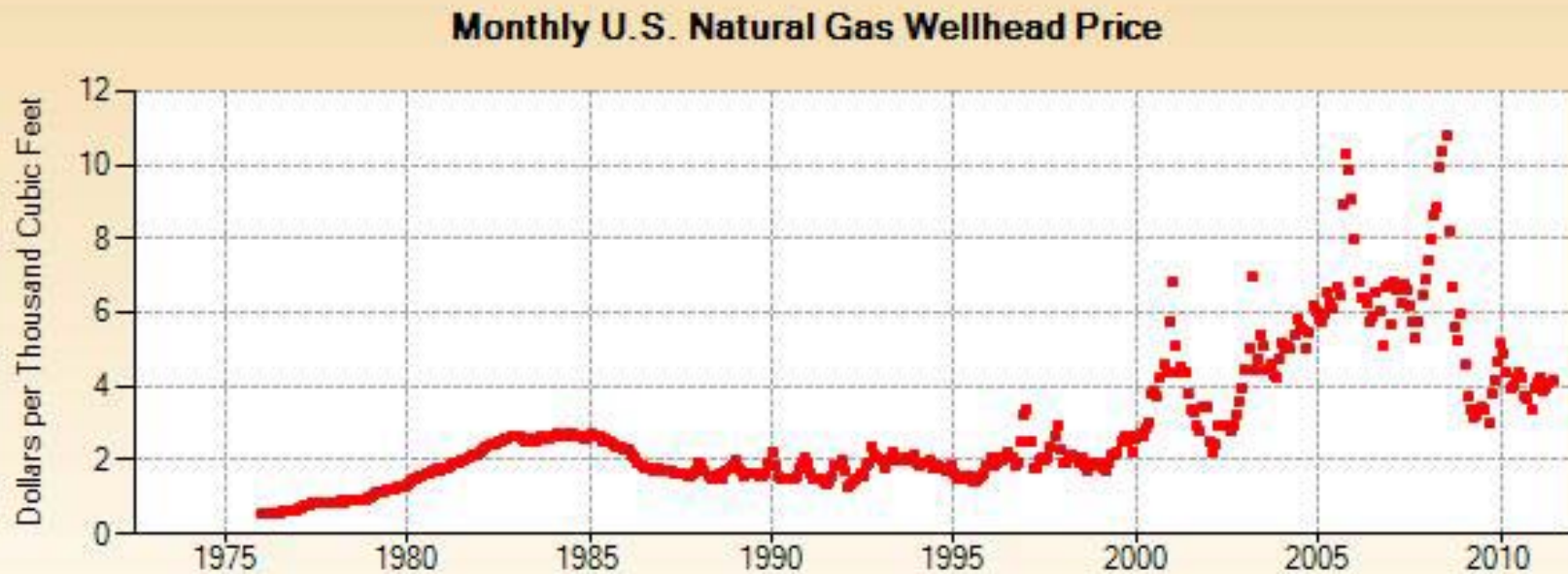
Global demand forecasted to grow 55%
over the next twenty five years...

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Energy Discussion

Natural Gas



Source: U.S. Energy Information Administration

It's a wild ride!

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Energy Management

Quiz

- ❖ True or False, Energy is the single largest operating expense for the majority of commercial businesses?
 - True – not counting wages.
- ❖ Department of Energy studies show that what percentage of commercial energy can be saved if properly managed? 5%, 15%, 25%, 50%
 - 15%
- ❖ What is the most energy efficient light bulb?
 - The one you don't turn on!

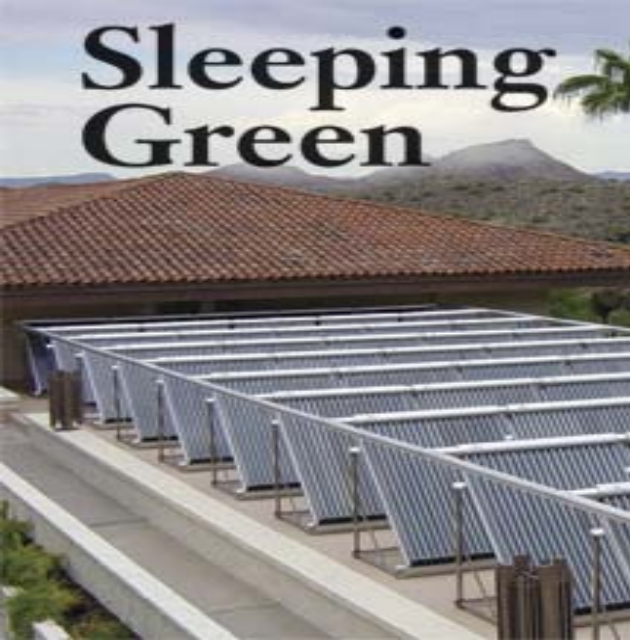
Goals Of Energy Management

1. Believe energy costs are controllable
2. Provide knowledge of opportunities
3. Provide courage to make change
4. Instill motivation to “make it happen”

Did You Know

- ! Lodging is 2nd largest U.S employer
- ! And the 4th largest energy consumer
- ! 87% of travelers prefer to stay **Green**
- ! **Green** travelers will pay more to stay 8.5%
- ! Save energy **go green!**

Sleeping Green



Green Lodging: Typical reference to those hospitality areas that promote energy efficiency and waste reduction

Voluntary Programs: Green Seal, International Eco-tourism Assoc., Energy Star Lodging, Stay Green etc



State promoters: Florida, Vermont, Michigan, , California, Arizona



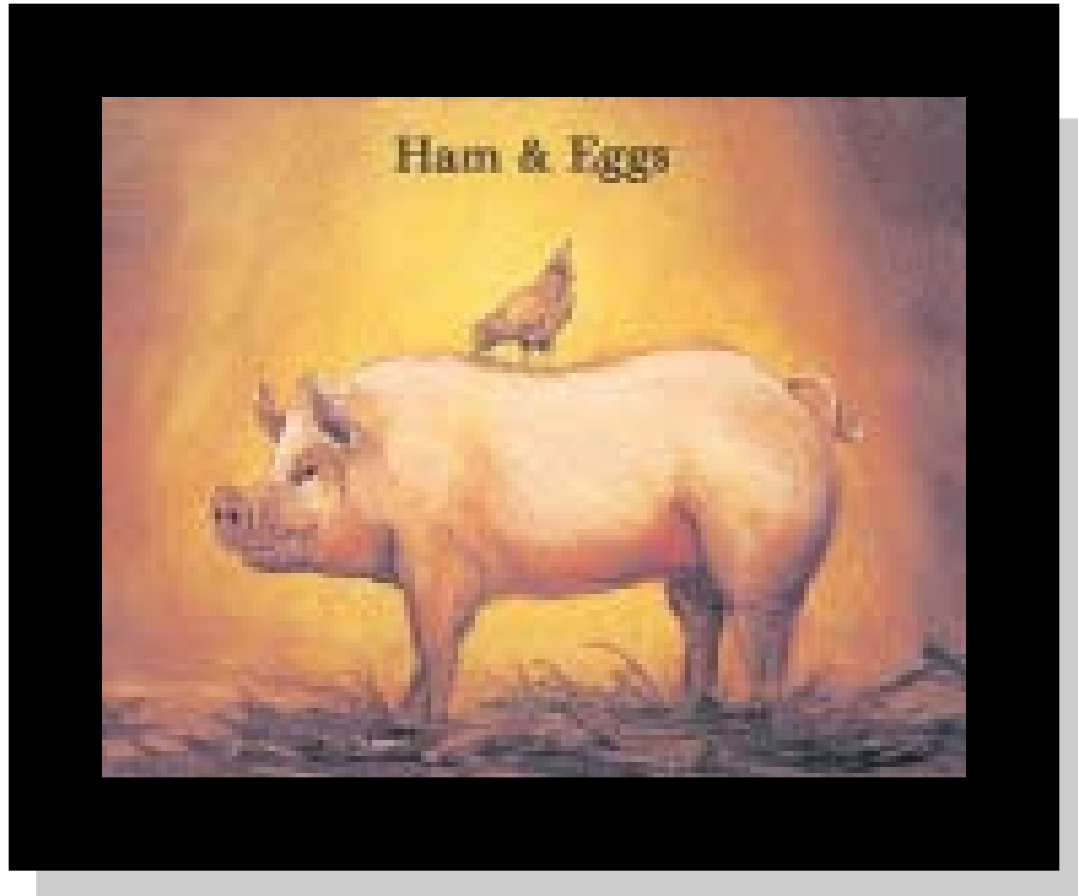
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Energy Management Model



Step 1: Make a Commitment



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Step 2: Assess Performance

- ✦ Assessing performance is simply stated as “benchmarking your energy consumption”
- ✦ Many ways to accomplish
 - Simple spreadsheet
 - Energy Star Portfolio Manager

Meter Number	Read Dates		Billing Days	Meter Readings			Multiplier	Usage	Units	Power Factor
	Present	Previous		Code	Present	Previous				
ELECTRIC: E000069890	09-12-11	08-11-11	32	MR	023363	022675	240	165120	kWh	0.8700
ELECTRIC: E000069890	09-12-11	08-11-11	32	MR	000140		240	336.00	kW	
ELECTRIC: PF00069890	09-12-11	08-11-11	32	MR	008700		10	87.00	kVa	

All payments are due upon receipt. Payments received after 2:00 p.m. will be processed the next business day. A 5% penalty will be assessed on current amounts not paid by the "Past Due On" date. **Any unpaid previous balance on your bill may cause immediate disconnection of service.**

PREVIOUS BALANCE \$20,469.66
PAYMENT 09/09/2011 -20,469.66
BALANCE FORWARD 0.00

Billing Summary	
Previous Balance as of : 08-17-11	\$20,469.66
Payments & Adjustments:	-20,469.66
Balance Forward as of : 09-19-11	0.00
Current Charges as of : 09-19-11	21,785.96
Total Amount Due	\$21,785.96

	RATE	USAGE	CHARGES
CUSTOMER CHARGE			20.82
ENERGY CHARGE	0.110600	165120	18,262.27
BILLING DEMAND	6.900000	336.00	2,318.40
POWER ADJUSTMENT	-0.004950	165120	-817.34
GROSS RECEIPTS TAX			506.47
LOCAL OPTION TAX			75.00
STATE ENERGY TAX			202.91
SALES TAX			1,217.44

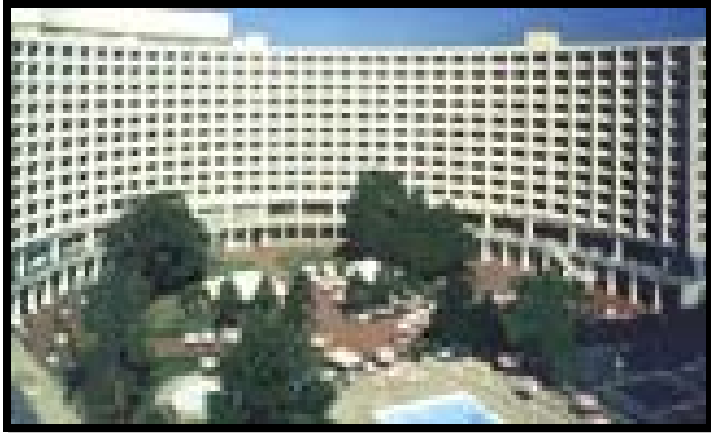
CURRENT CHARGES 21,785.96
TOTAL AMOUNT DUE \$21,785.96

CONSUMPTION HISTORY			
Read Date	Days	Electric Use (kWh)	Avg. (kWh) Usage per Day
09-12-11	32	165120	5160.00
08-11-11	30	154080	5136.00
07-12-11	29	148320	5114.48
06-13-11	32	151680	4740.00
05-12-11	30	139440	4648.00
04-12-11	32	140400	4387.50
03-11-11	30	128880	4296.00
02-09-11	30	121200	4040.00
01-10-11	31	122880	3963.87
12-10-10	29	134160	4626.21
11-11-10	29	146640	5056.55
10-13-10	30	161520	5384.00
09-13-10	32	183360	5730.00



Energy Ranking For Buildings

- 🌟 Energy Star Portfolio Manager
 - www.energystar.gov
- 🌟 National program for ranking commercial buildings 1-100



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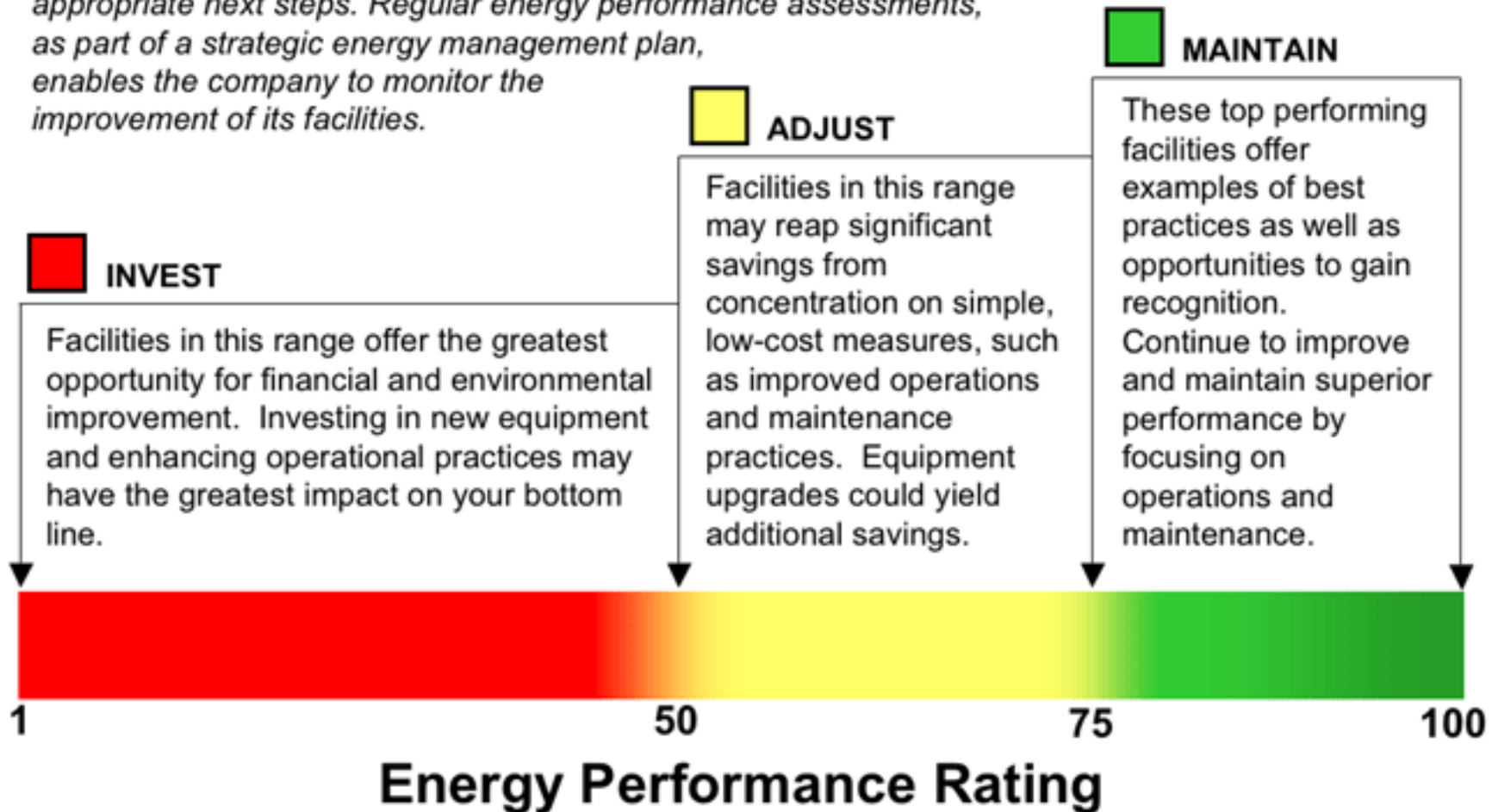
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Energy Star Ranks the Following Building Types

- Government
- Higher Education
- K-12
- Health Care
- Hospitality
- Waste Water Treatment Plants
- Real Estate
- Retail
- Small Business
- Congregations
- Warehouses
- Industrial

What Does the Ranking Tell Us

Establish an energy performance baseline for all facilities in the company's portfolio, then set performance goals and create an action plan. The guide below can help determine the appropriate next steps. Regular energy performance assessments, as part of a strategic energy management plan, enables the company to monitor the improvement of its facilities.

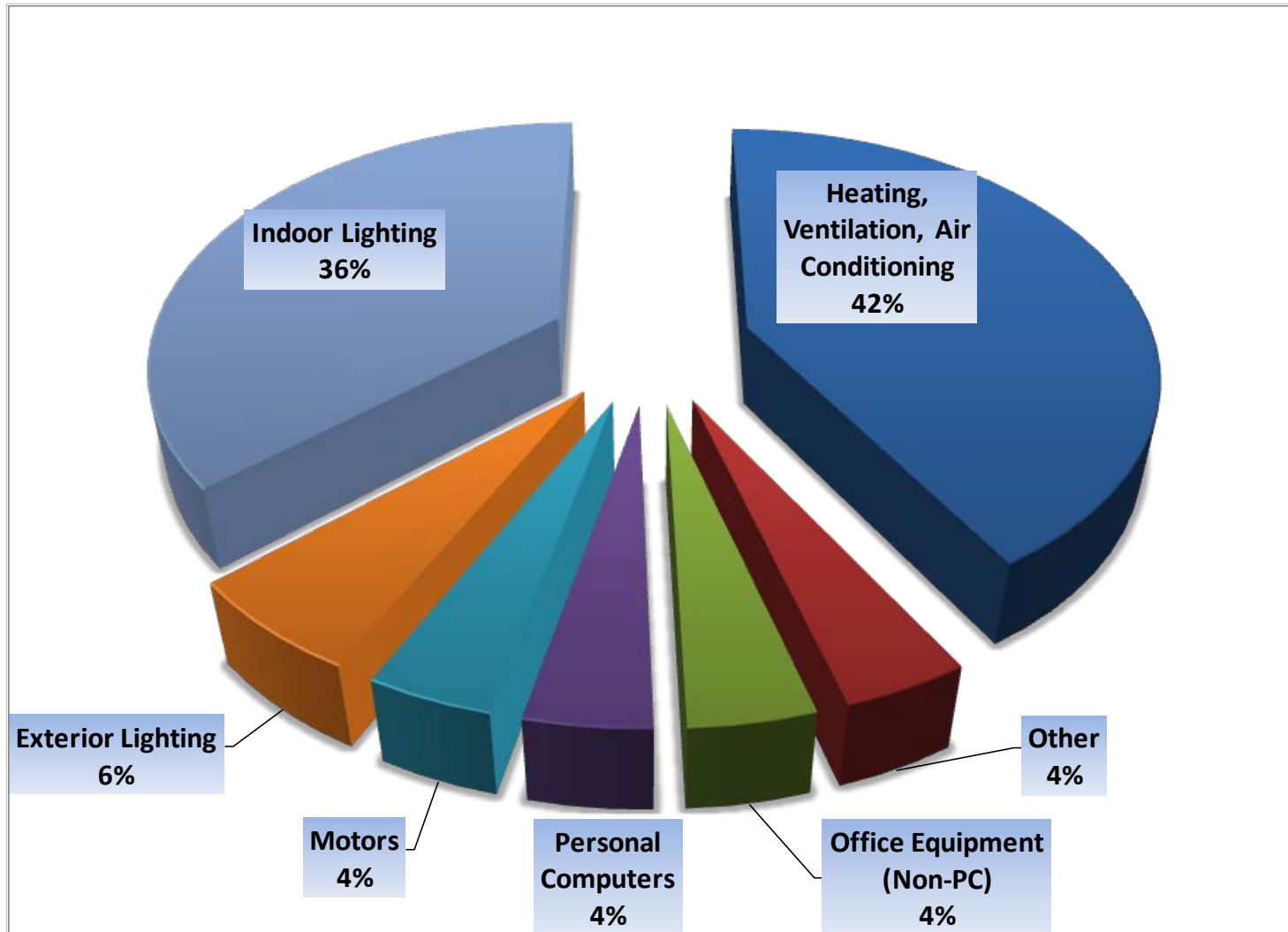


Energy Performance Rating

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Typical Energy Consumption for Commercial Office Space



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Step 3: Set An Energy Saving Goal

Perspective on why goal setting is important:

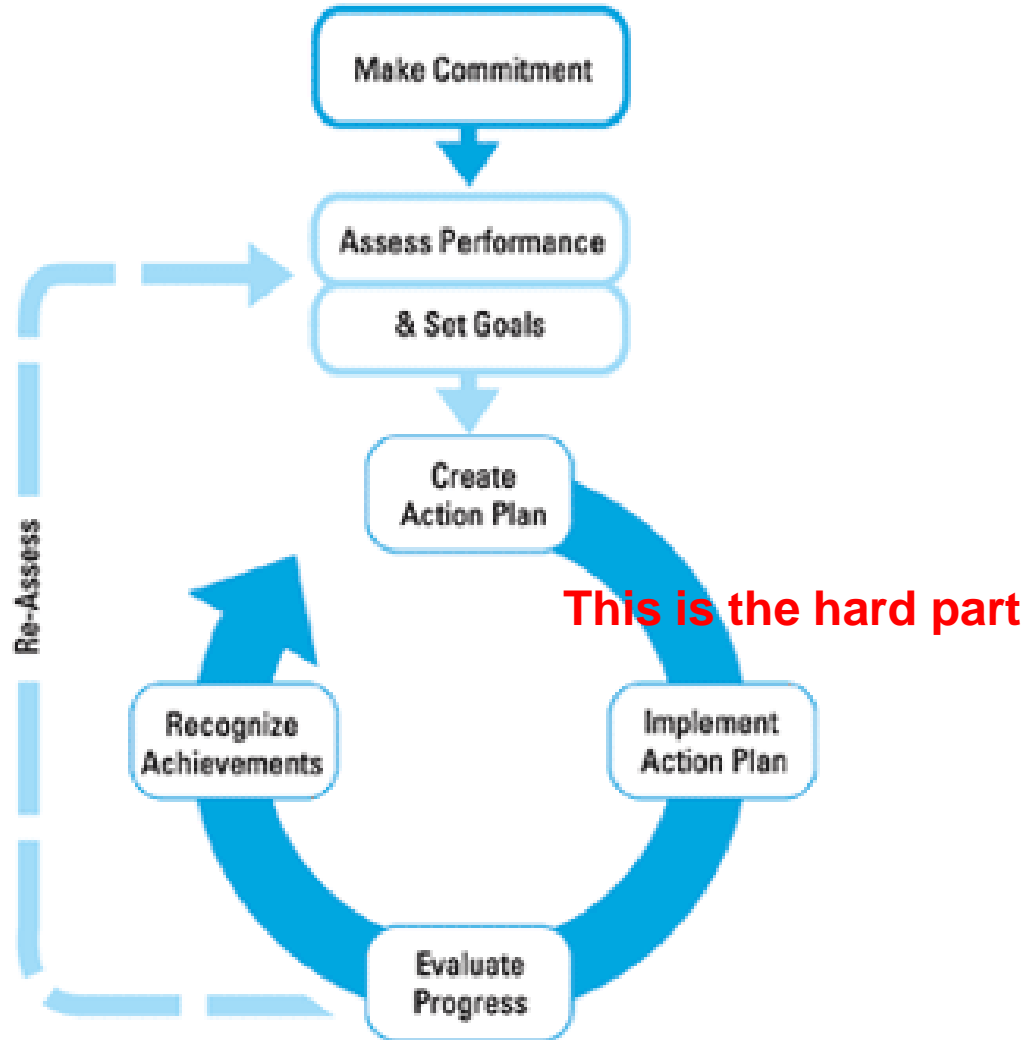
1. Principle of Deadline: Set short term goals
2. Pick things that are measureable and important to your business.
3. Routinely evaluate goals

Step #4 Creating An Action Plan

Keys to success:

- Involve employees, utility & vendors
- Ask for ideas
- Consider everything
- Manage the opportunities list

Step #5: Implement Action Plan



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The Energy Box Principle

Goal: Squeeze the box properly.

1. Fix what is broken, clean what is dirty
2. Tune up and maintain existing equipment
3. Optimize operation, tune equipment & controls
4. Install new energy efficient technologies
5. Consider renewable options

Step # 7: Recognize Achievement

- 🌟 Communicate your success
- 🌟 Document the impact
- 🌟 Invest savings towards next project



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How to Achieve Energy Savings

- ✦ Savings are number related so being sharp in math is vital to success
- ✦ [C:\Users\dlaube\Desktop\Energy Saving calculations, old school style.wmv](#)

Behavior Based Savings

Simple no cost, low risk

- Thermostat settings
- Lighting reminders
- Sleep modes for equipment
- Use of shades/blinds
- Cleaning habits/ space scheduling
- Outdoor lighting needs vs wants

Operations and Maintenance Savings

1. Fix what is broke
2. Clean what is dirty
3. Plan for replacement
4. Don't cut corners



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Equipment Savings:

- 🌟 Highest cost with highest risk
- 🌟 Everything from motors to light bulbs
- 🌟 Let your vendors know you are interested in energy efficiency
- 🌟 Energy efficient equipment comes at a higher cost, consider it an investment

Idea Generation

- 🌟 Ask for feedback
- 🌟 Grab a clip board and go for a walk
- 🌟 Invite a colleague over
- 🌟 Make it a rewards challenge
- 🌟 Don't forget to manage the list of opportunities

ENERGY MANAGEMENT PLAN TEMPLATE



Best Practices List	Project Manager	Project Recommended	Project Completed	In House (I) - Bid (B)	Estimated Annual Savings	Estimated Measure Total Cost	Estimated Years Simple Payback	Estimated Measure Life	Operational Budget	5 Year Plan	Utility Incentive	Estimated Incentive Amount
1												
2												
3												
4												
5												
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10												
11												
12												
13												
14												

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Equipment & Technologies Discussion

- ✦ Electronics and Appliances
- ✦ Motors & Variable Frequency Drives
- ✦ Heating, Cooling, & Ventilating Equipment
- ✦ Lighting & Controls
- ✦ Refrigeration

Energy Efficient Electronics and Appliances

40%



\$110/yr



25% or \$150/yr



30% savings



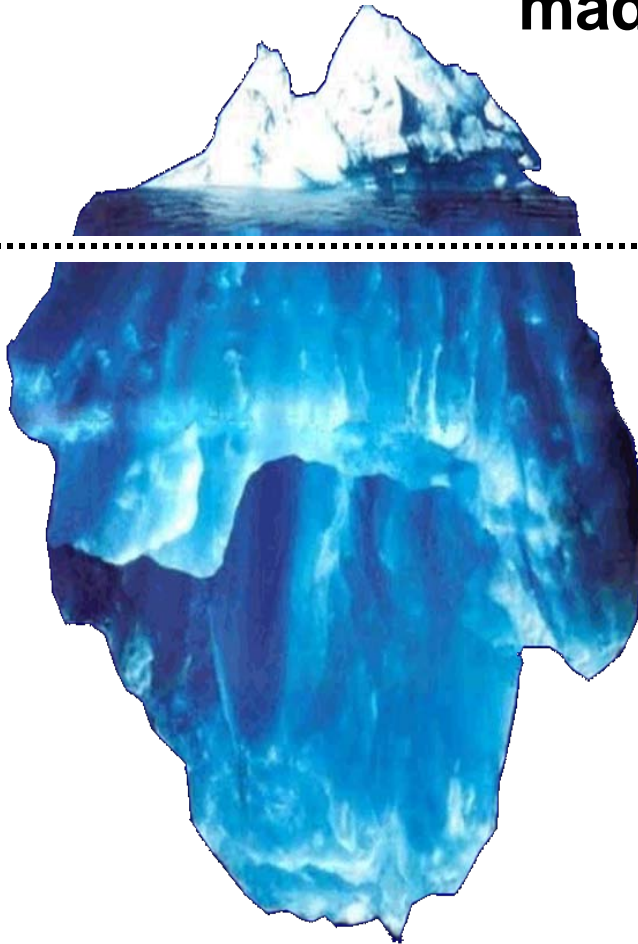
20% or \$150/yr

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MOTORS:

Motor decisions are typically made on price and availability



TRUE COST INCLUDES

Operational expense
Maintenance expense
Reliability issues
Life cycle cost
Proper sizing

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Power of Motors



25HP



EPACT 91.7%
\$800 Purchase
\$4,100 energy cost

**NEMA
Premium** 93.6%
\$875 Purchase
\$4,015 energy cost

Pay \$75 more to get save \$85 in first year

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Variable Frequency Drives

- ❖ Savings aren't magic they're physics
- ❖ Easy to spot
 - Look for throttled valves or partially closed dampers
 - Changes in power are proportional to speed cubed!
 - 40 hp motor will now consumes 5 hp of electricity
- ❖ Many opportunities in the commercial and industrial sector
- ❖ Priced right and easy to program with little maintenance



Air Conditioning Performance Ratings



- ❖ EER: Energy Efficiency Ratio
- ❖ SEER: Seasonal Energy Efficiency Ratio
$$\frac{\text{useful energy output}}{\text{energy input}}$$
- ❖ kW/Ton: Used primarily for chillers
- ❖ COP: Coefficient of Performance: Based on rate of heat removal or rate of useful heat delivered
- ❖ ARI Directory and Energy Star good resources

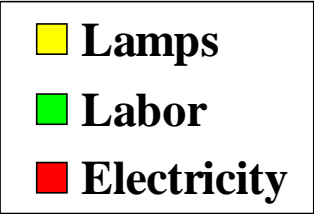
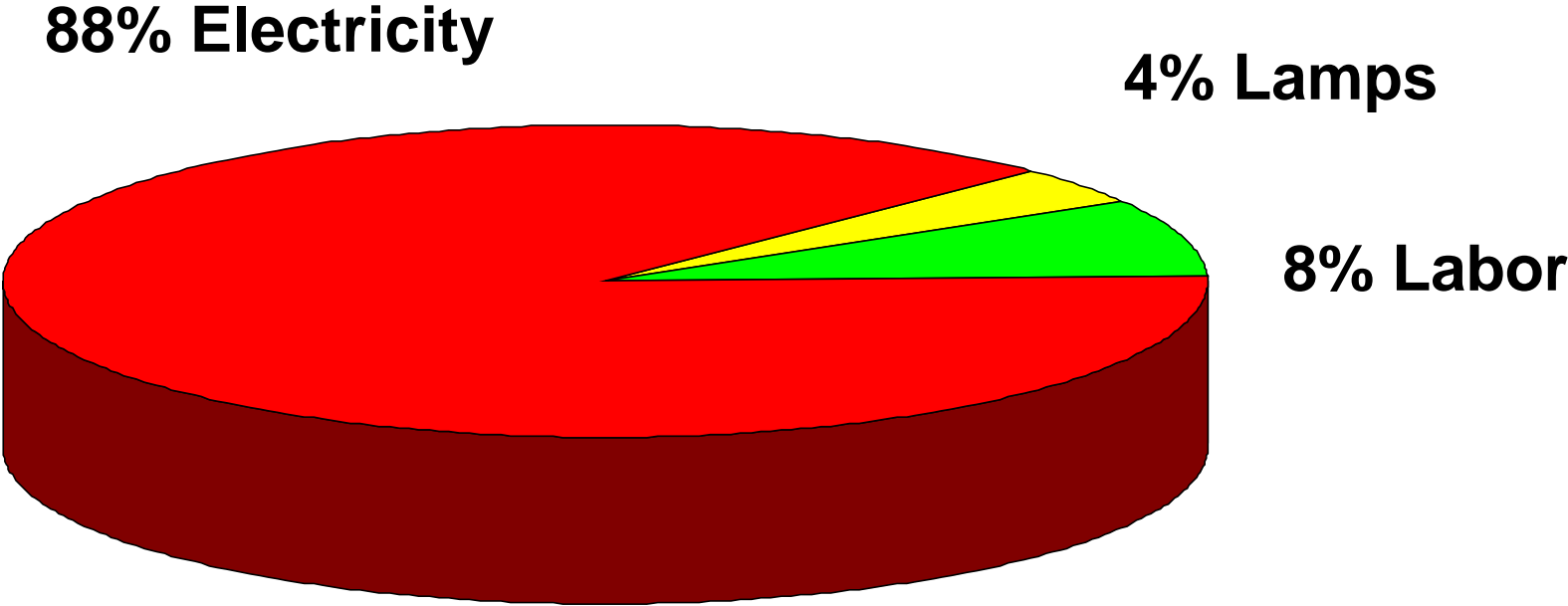
Cooling Equipment Efficiency Options

- ❖ Equipment cost is a fraction of operational costs
- ❖ Routine maintenance
- ❖ Temperature set points
- ❖ Chilled water reset
- ❖ Energy Star rated equipment
- ❖ Bearing-less chiller technology

Lighting

- Technology rapidly expanding
- Very visible opportunity
- Big Business Impact
 - Energy savings
 - Maintenance
 - Appearance
 - Productivity

Cost of Lighting a Space

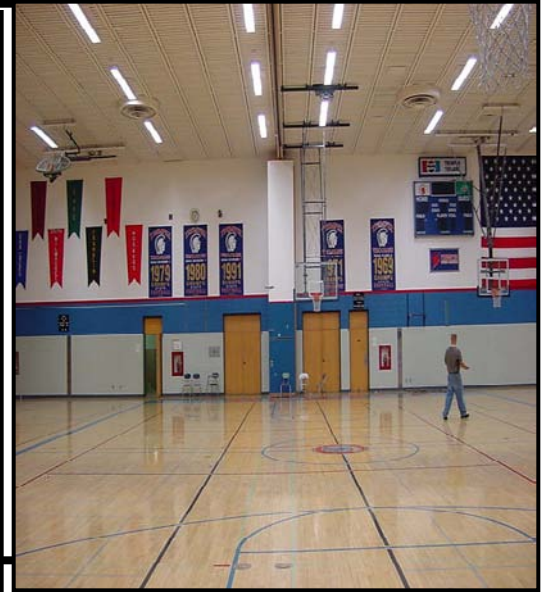


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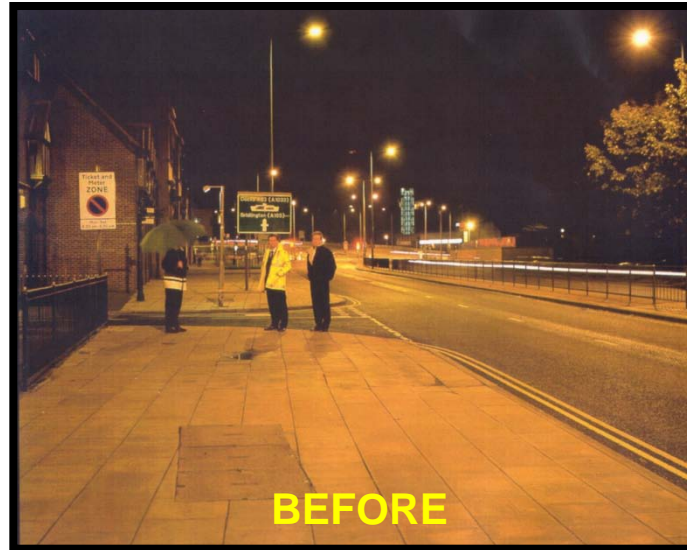


Impacts From Lighting

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BEFORE



AFTER

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Color Correlated Temperature Visual



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Color Rendering: Appearance of colored objects when viewed under a light source



CRI = 90



CRI = 70



CRI = 50

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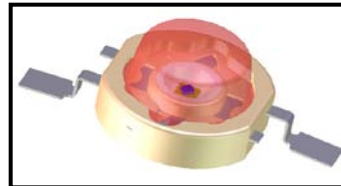
Recommended Light Levels

• Auditorium (assembly)	10
• Classrooms/Lecture Rooms	
• Regular desk work, study halls	30
• Marker boards	5
• Corridors, Lobbies and Stairways	10
• Food Service Facilities	50
• Gymnasiums/Athletic Centers	
• General	30
• Competition and events	100



Lighting Technology Specifics

- ❖ Compact Fluorescents
- ❖ Screw in vs pin based
- ❖ Linear Fluorescents T5/T8
- ❖ Low Watt T8
- ❖ High Performance T8
- ❖ High Bay Linear Fluorescent
- ❖ Pulse Start Metal Halide
- ❖ LED



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Lighting Examples

Upgrade rooms and halls

- ❖ Incandescent to CFL
- ❖ Project cost \$1000
- ❖ Annual savings \$12,646



Parking structure upgrade

- ❖ HPS to Induction
- ❖ Project cost \$62,570
- ❖ Annual savings \$16,950



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Compressed Air



- Industry's 4th utility
- This air isn't free..
- A hidden cost of doing business
- Inefficient to produce
- Reliability is critical
- Often used as wrong applications

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Refrigeration

(10% of total US electric load)

Options:

- Equipment controls
- Heat recovery options
- Vending machine controls
- Anti-sweat heater controls
- Interior display case lighting

Data Centers



☀️ “Typical” data center:

- Frequently largest load in commercial
- Energy density as high as **300** W/sq. ft.
- Runs 24 x 7 x 365 and needs cooling

☀️ Typical PC/monitor uses 600-1000 kWh annually

Conclusion

Summary

- ✦ The opportunities are there, question remains what will you do to make a difference?

Questions?

Don't forget the evaluation
Thanks for your attention!



Providing the residents and businesses of the Lower Keys with outstanding service, environmental leadership, responsiveness and accessibility, as only a local utility can.

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