



ENERGY EFFICIENCY FOR THE HOSPITALITY INDUSTRY

Caribe Hilton - San Juan, Puerto Rico

5/19/10 Session 4 Track A

Energy Management

...By The Numbers

Focusing on ROI results - Not Green Washing

THINK ENERGY MANAGEMENT LLC

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THE PLAN - FOR THE NEXT 45 MINUTES



QUESTIONS – Any time (add VALUE to this session)

TOPICS – Open

INTENT – Experience exchange / education
(no products or services promoted)

LOOK FOR - 

PRESENTATION – Available via email
(leave a business card)

Hotel Energy Costs = \$7.5 B /year

- According to the US E.I.A. program the US hospitality industry spends \$7,500,000,000 for energy each year. That is ...

\$625 M / Month

\$ 20 M / Day

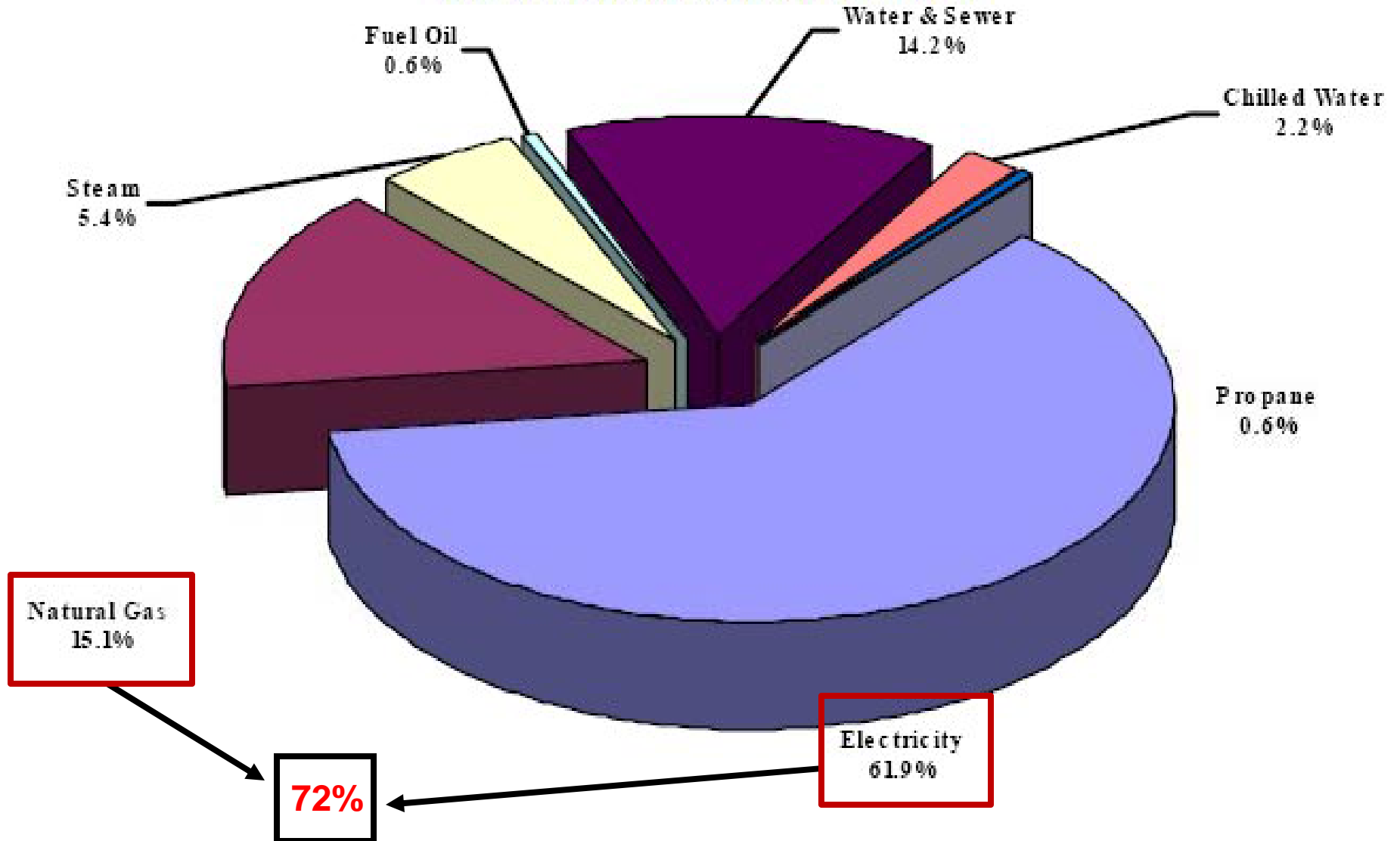
\$856 K / Hour

\$ 14 K / Minute

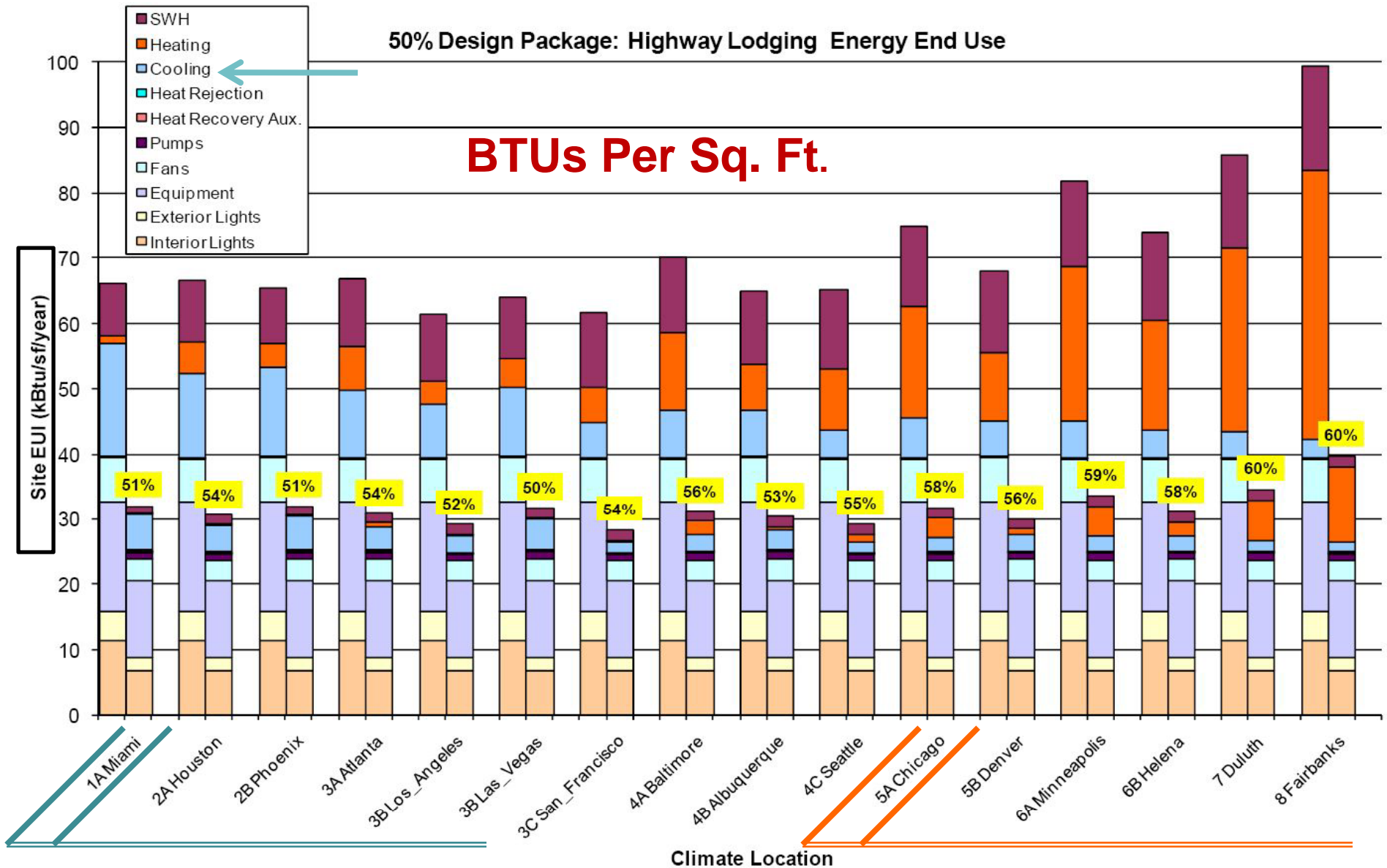
- Average energy cost = \$2+ / SF
- Average annual energy use = 120 Mbtu /SF
(vs. coml. bldg. average of = 70 Mbtu /SF) ³

Starwood Energy Spend by Fuel

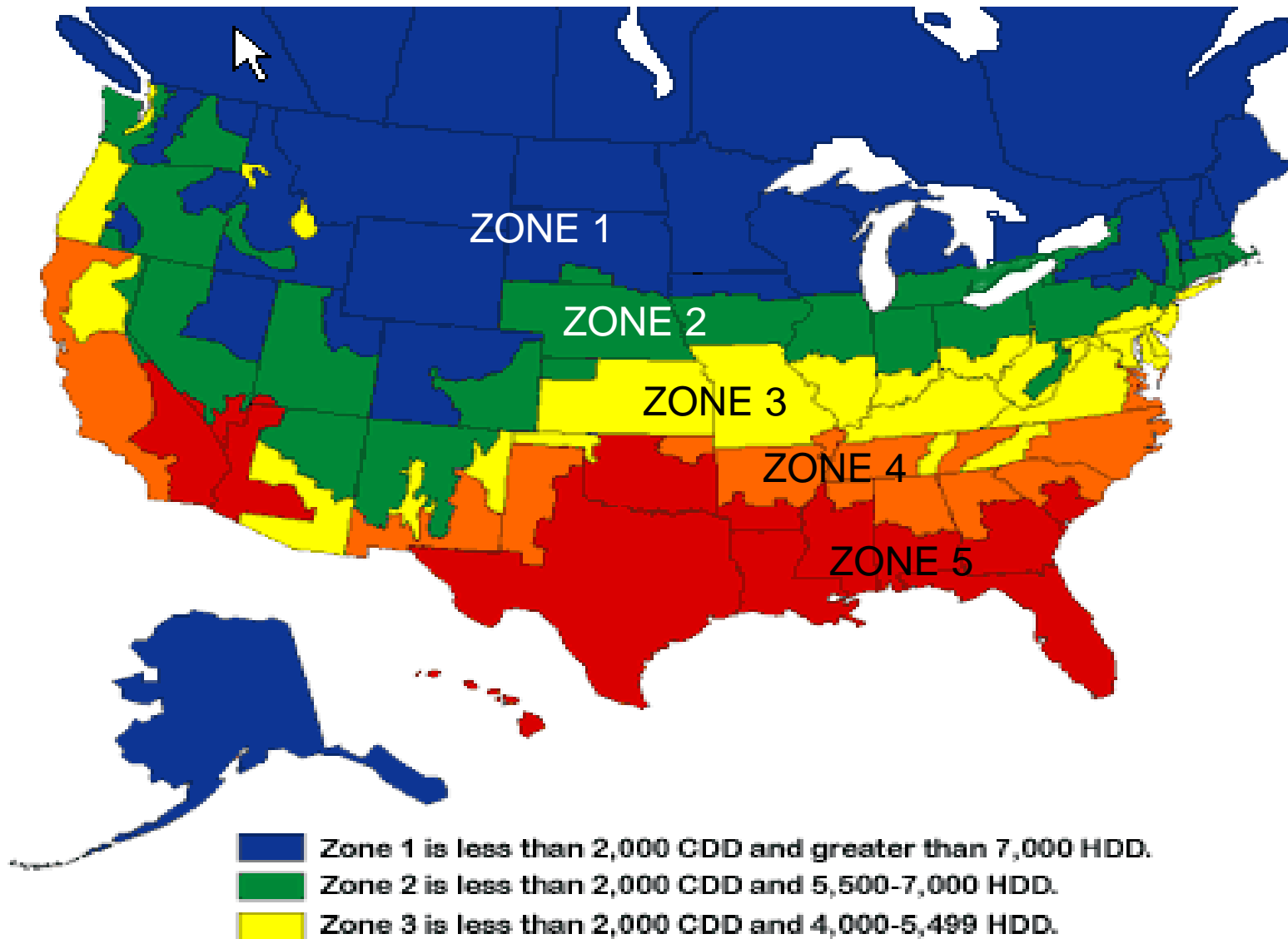
Owned Hotels in North America



' ENERGY BALANCE ' ... VARIES BY CLIMATE



ENERGY USE - ZONES

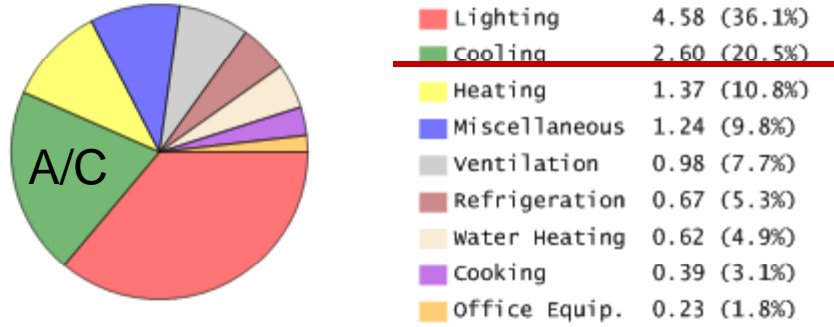


Business Segment: Lodging
 Climate Zone: Zone 1 Map
View Data

ZONE 1

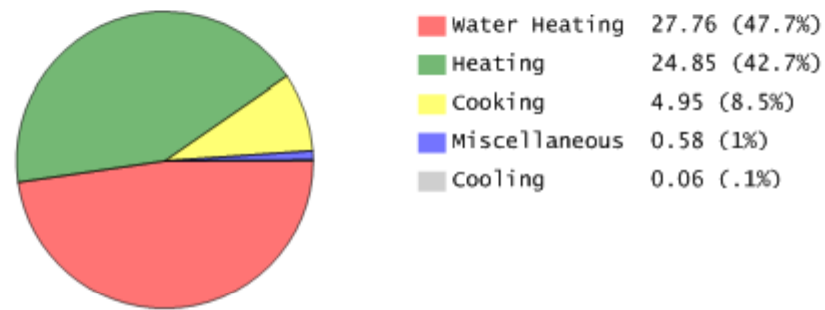
A/C = 20.5%

Electric Intensity (kWh/sqft)
Lodging



Total Electric Intensity (kWh/sqft): 12.70
 Average Electric Consumption per Establishment (kwh): 454,660.00
 Average Enclosed Floorspace per Establishment (ftsq): 35,800.00

Natural Gas Intensity (kBtu/sqft)
Lodging



Total Gas Intensity (kBtu/sqft): 58.20
 Average Gas Consumption per Establishment (kBtu): 2,083,560.00
 Average Enclosed Floorspace per Establishment (ftsq): 35,800.00

Business Segment

Lodging

Climate Zone

Map

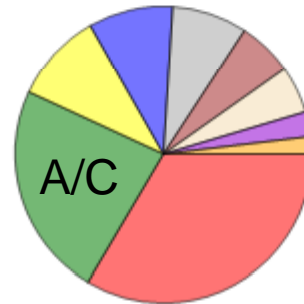
Zone 2

View Data

ZONE 2

A/C = 23.4%

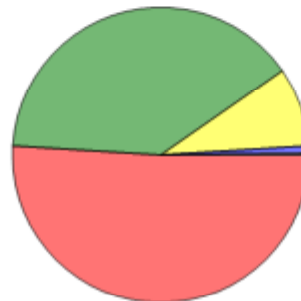
Electric Intensity (kWh/sqft) Lodging



Lighting	4.66	(33.5%)
Cooling	3.25	(23.4%)
Miscellaneous	1.38	(9.9%)
Heating	1.28	(9.2%)
Ventilation	1.14	(8.2%)
Water Heating	0.83	(6%)
Refrigeration	0.72	(5.2%)
Cooking	0.38	(2.7%)
Office Equip.	0.26	(1.9%)

Total Electric Intensity (kwh/sqft): 13.90
 Average Electric Consumption per Establishment (kwh): 497,620.00
 Average Enclosed Floorspace per Establishment (ftsq): 35,800.00

Natural Gas Intensity (kBtu/sqft) Lodging



Water Heating	27.95	(51%)
Heating	21.54	(39.3%)
Cooking	4.77	(8.7%)
Miscellaneous	0.44	(.8%)
Cooling	0.11	(.2%)

Total Gas Intensity (kBtu/sqft): 54.80
 Average Gas Consumption per Establishment (kBtu): 1,961,840.00
 Average Enclosed Floorspace per Establishment (ftsq): 35,800.00

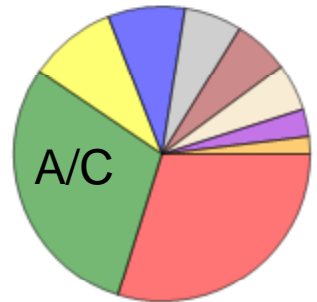
Business Segment
Lodging

Climate Zone
Zone 3

ZONE 3

A/C = 29.7%

Electric Intensity (kWh/sqft)
Lodging



Lighting	4.74	(29.8%)
<u>A/C</u>	<u>4.72</u>	<u>(29.7%)</u>
Miscellaneous	1.53	(9.6%)
Ventilation	1.34	(8.4%)
Heating	1.00	(6.3%)
Water Heating	0.97	(6.1%)
Refrigeration	0.83	(5.2%)
Cooking	0.48	(3%)
Office Equip.	0.30	(1.9%)

Total Electric Intensity (kwh/sqft): 15.90
Average Electric Consumption per Establishment (kwh): 569,220.10
Average Enclosed Floorspace per Establishment (fts): 35,800.00

Natural Gas Intensity (kBtu/sqft)
Lodging



Water Heating	27.45	(55.8%)
Heating	16.88	(34.3%)
Cooking	4.33	(8.8%)
Miscellaneous	0.44	(.9%)
Cooling	0.10	(.2%)

Total Gas Intensity (kBtu/sqft): 49.20
Average Gas Consumption per Establishment (kBtu): 1,761,360.00
Average Enclosed Floorspace per Establishment (fts): 35,800.00

Business Segment

Lodging

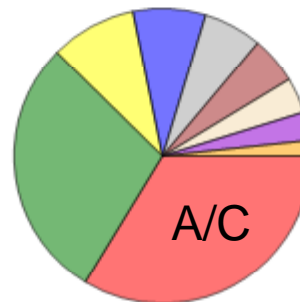
Climate Zone

Zone 4

ZONE 4

A/C = 33.7%

Electric Intensity (kWh/sqft) Lodging



Cooling	5.66	(33.7%)
Lighting	4.82	(28.7%)
Miscellaneous	1.58	(9.4%)
Ventilation	1.33	(7.9%)
Water Heating	1.08	(6.4%)
Refrigeration	0.87	(5.2%)
Heating	0.66	(3.9%)
cooking	0.52	(3.1%)
Office Equip.	0.29	(1.7%)

Total Electric Intensity (kwh/sqft): 16.80
Average Electric Consumption per Establishment (kwh): 601,440.10
Average Enclosed Floorspace per Establishment (ftsq): 35,800.00

Natural Gas Intensity (kBtu/sqft) Lodging



Water Heating	27.11	(61.9%)
Heating	10.60	(24.2%)
Cooking	5.48	(12.5%)
Miscellaneous	0.48	(1.1%)
Cooling	0.13	(0.3%)

Total Gas Intensity (kBtu/sqft): 43.80
Average Gas Consumption per Establishment (kBtu): 1,568,040.00
Average Enclosed Floorspace per Establishment (ftsq): 35,800.00

Business Segment

Lodging

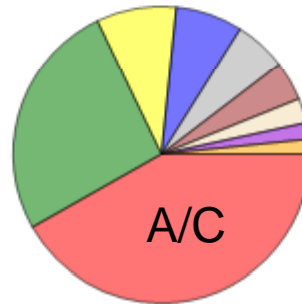
Climate Zone

Zone 5

ZONE 5

A/C = 41.7%

Electric Intensity (kWh/sqft) Lodging



Cooling	7.73	(41.8%)
Lighting	4.83	(26.1%)
Miscellaneous	1.61	(8.7%)
Ventilation	1.35	(7.3%)
Water Heating	1.05	(5.7%)
Refrigeration	0.80	(4.3%)
Cooking	0.50	(2.7%)
Heating	0.33	(1.8%)
Office Equip.	0.30	(1.6%)

Total Electric Intensity (kwh/sqft): 18.50
 Average Electric Consumption per Establishment (kwh): 662,300.00
 Average Enclosed Floorspace per Establishment (ftsqt): 35,800.00

Natural Gas Intensity (kBtu/sqft) Lodging



Water Heating	27.20	(68%)
Cooking	7.84	(19.6%)
Heating	4.36	(10.9%)
Miscellaneous	0.48	(1.2%)
Cooling	0.12	(.3%)

Total Gas Intensity (kBtu/sqft): 40.00
 Average Gas Consumption per Establishment (kBtu): 1,432,000.00
 Average Enclosed Floorspace per Establishment (ftsqt): 35,800.00

Table 3.1. Highway Lodging Prototype Space Type

Space Type	Floor Area Percentage
Guest rooms	63%
Corridor	13%
Lobby/lounge	4%
Stairs	4%
Storage	3%
Office/reception	3%
Meeting room	2%
Laundry room	2%
Elevator	2%
Employee lounge	1%
Restrooms	1%
Exercise room	1%
Mechanical room	1%
Total floor area	100%

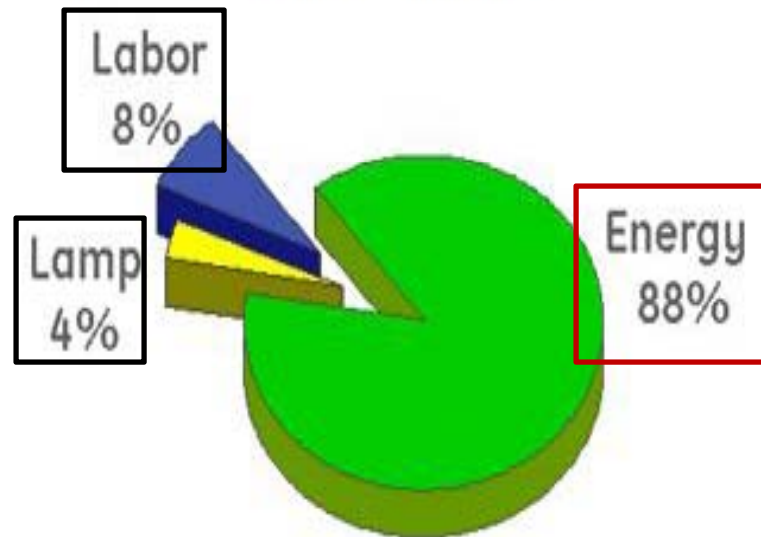
76%

LIGHTING

Cost of Light - Hospitality

The greatest potential for cost saving is electric reduction.

Where should I spend my money?



These percentages are approximates, and actual costs will vary based upon local electricity and labor rates, nature of the facility, type of lighting installed, etc.

Hospitality Energy Savings

A 200 guest room lodging property can reduce its annual lighting related electricity expenses by as much as 45% through better application solutions.

Maintenance & procurement expenses related to lighting will be reduced ten-fold through incorporating better lighting practices into any Lodging Operation.



LIGHTING – Guest Room

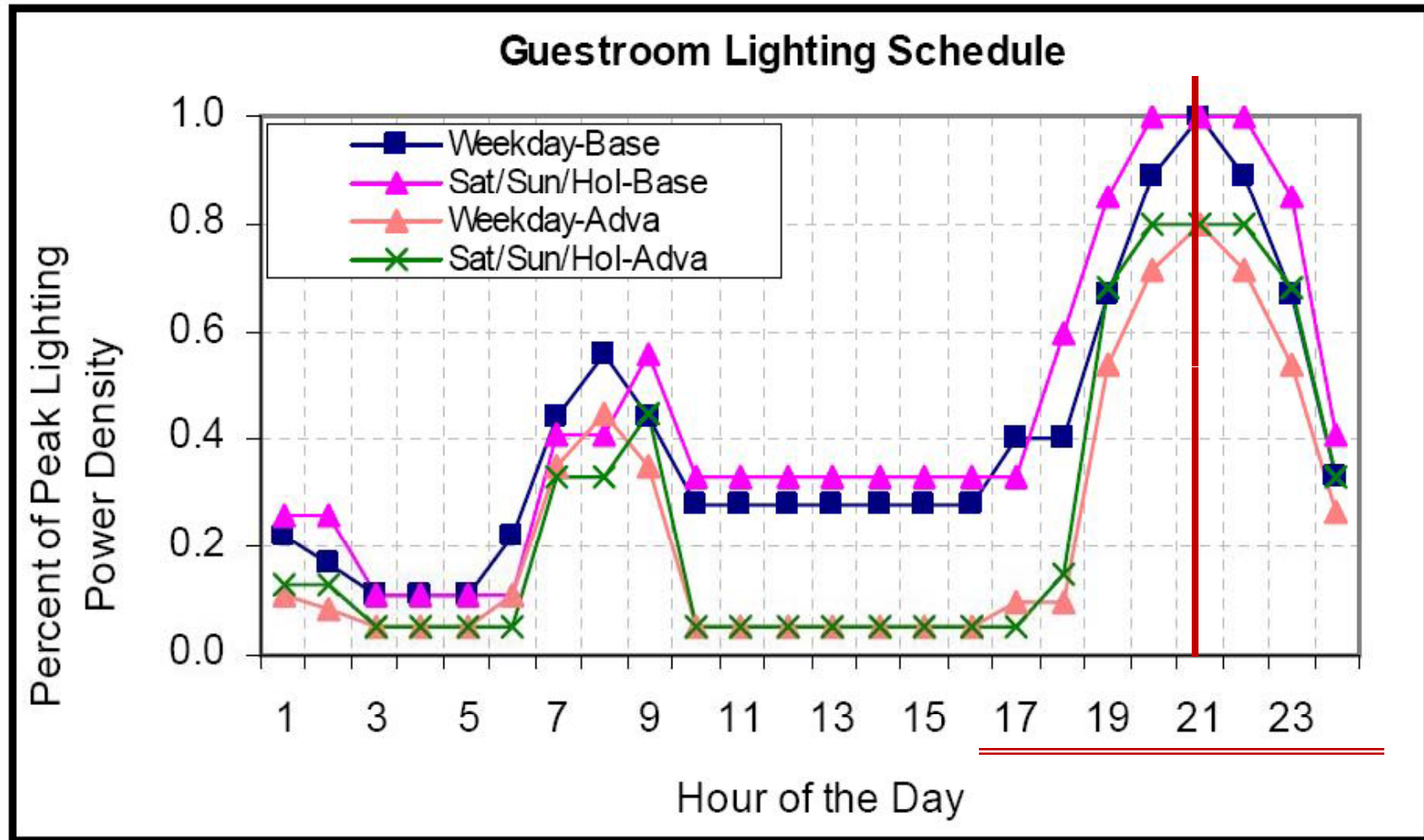


Figure 5.1. Guest Room Interior Lighting Schedule

LOWER 'OFF PEAK' RATE ... if you have correct meter, rate/contract

ELECTRICITY RATES

— UNDERSTANDING AND
USING THE RATES TO YOUR ADVANTAGE



TIME OF DAY POWER RATES

Rates Effective April 1, 2010

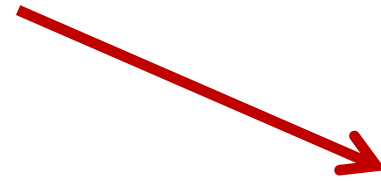
CA

General Service (OGS-1-TOU)

Time Period	Definition	Price per kWh
Summer On Peak	July 1 – September 30, from 1:01 p.m. to 6:00 p.m. weekdays.	\$0.40304 per kWh
Summer Mid Peak	July 1 – September 30, from 10:01 a.m. to 1:00 p.m. and 6:01 p.m. to 9 p.m. weekdays.	\$0.24448 per kWh
<u>Summer Off Peak</u>	All other hours, from July 1 – September 30.	\$0.06816 per kWh
Winter On Peak	October 1 – June 30, from 5:01 p.m. to 9 p.m. daily.	\$0.11611 per kWh
<u>Winter Off Peak</u>	All other hours, from October 1 – June 30.	\$0.06816 per kWh

ELECTRICITY RATES

– UNDERSTANDING AND
USING THE RATES TO YOUR ADVANTAGE



BILLING MEASUREMENT	MEANING	COST	\$ IMPACT
KWH	Consumption	\$ / KWH	_____%
KW	Peak Demand (load)	\$ / KW	_____%
KW / KVA	Power factor %	\$ / KW	_____%

ENERGY USE - LAUNDRY

Table 4.7. Baseline Laundry Equipment Gas Consumption

Washer Type	No. of Rooms	Laundry Load lb/room (kg/room)	<u>Water Use per Pound of Laundry</u>			<u>Gas Use</u>		
			Total Water gallon/lb (L/kg)	Hot Water gallon/lb (L/kg)	% Retained Water (g's)	Annual Water Removed lb (kg)	Annual Gas Use therms (MW)	Gas Use therms/cycle (kWh/cycle)
Standard	77	9 (4.08)	3 (25.03)	1.2 (10.01)	87.5%	221,327 (100,393)	3,995 (117)	0.68 (19.93)

FUEL COST (\$) - NATURAL GAS

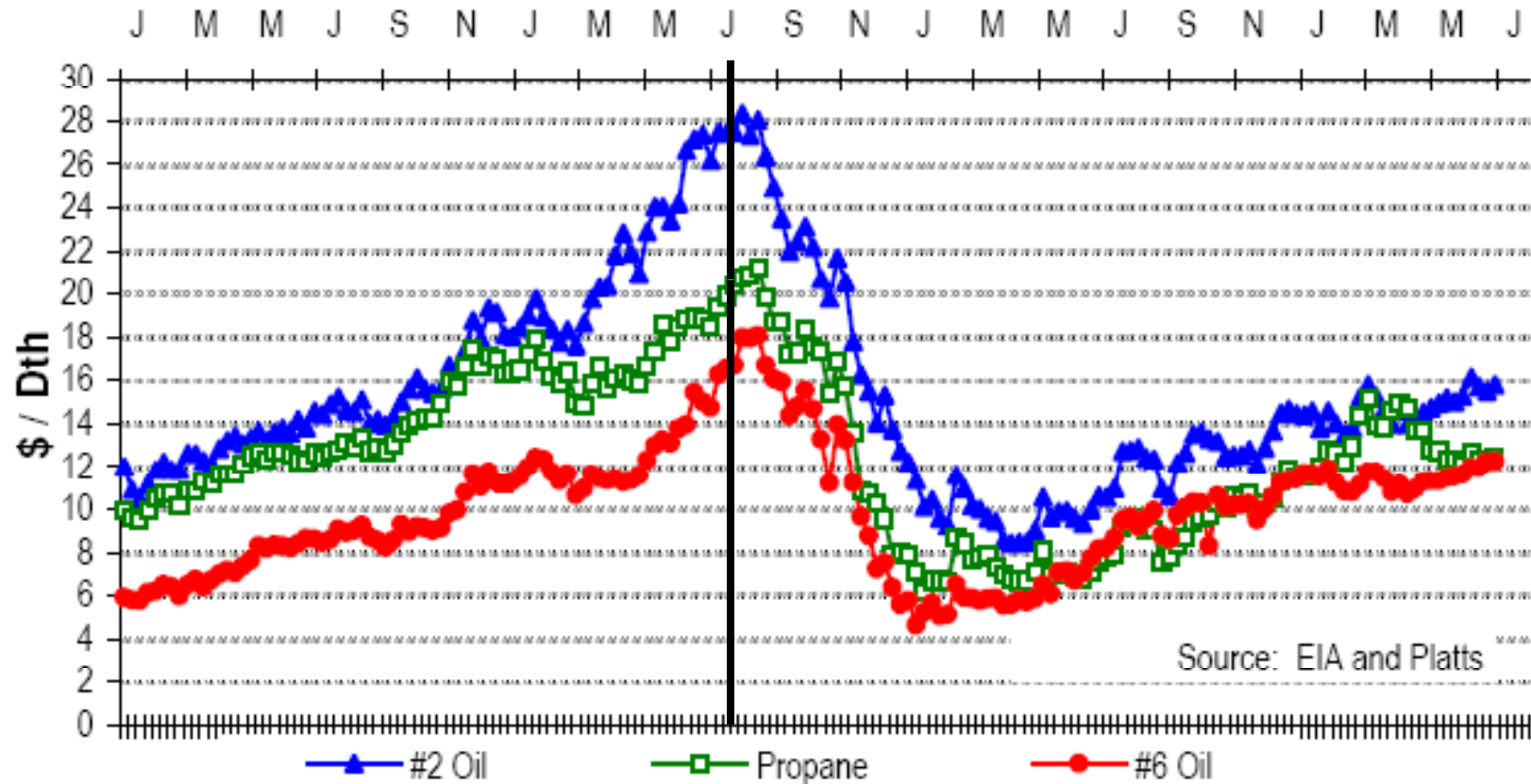
NYMEX Natural Gas 12-Month Strip, April 29, 2010



NG Prices will not stay this low (in the long term)

FUEL COSTS (\$) - OIL

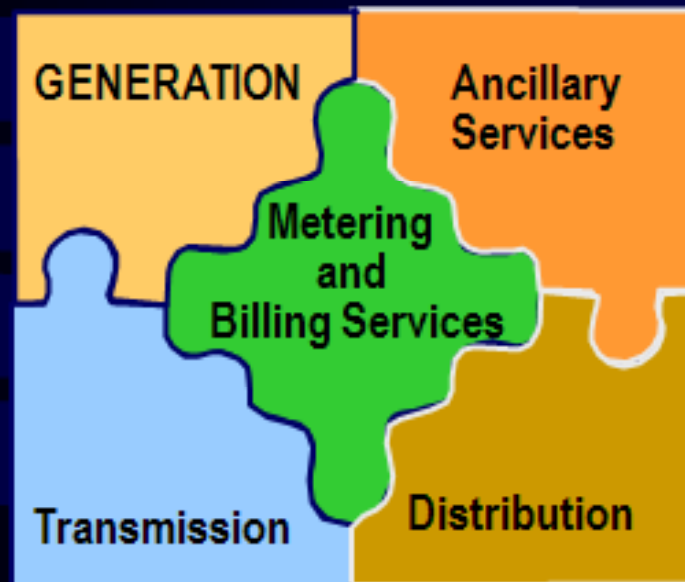
Weekly Liquid Fuel Prices through April 27, 2010



Graph Range: January 2007 through Present

The Good Old Days: REGULATED UTILITIES

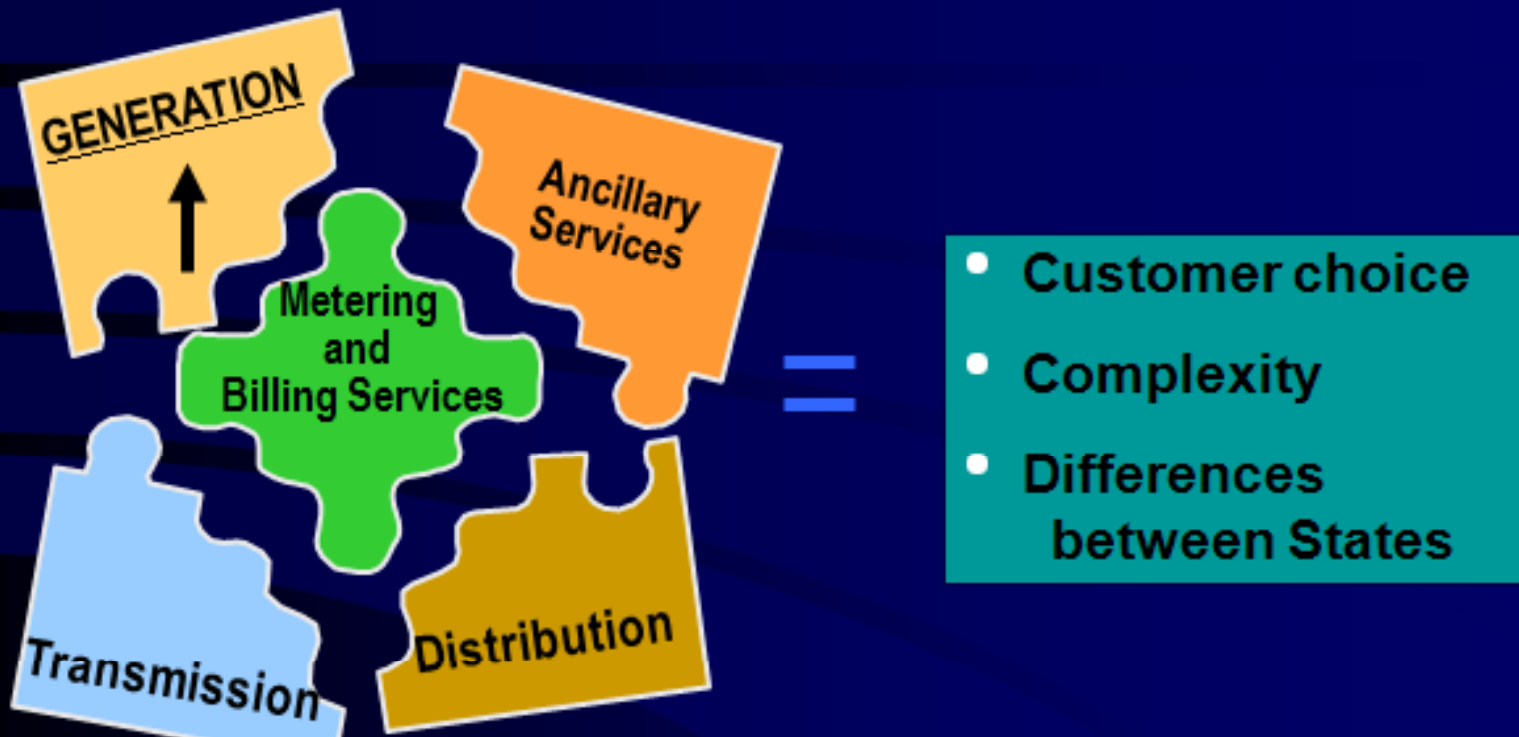
BEFORE: Electricity as a Bundled Product (before deregulation)



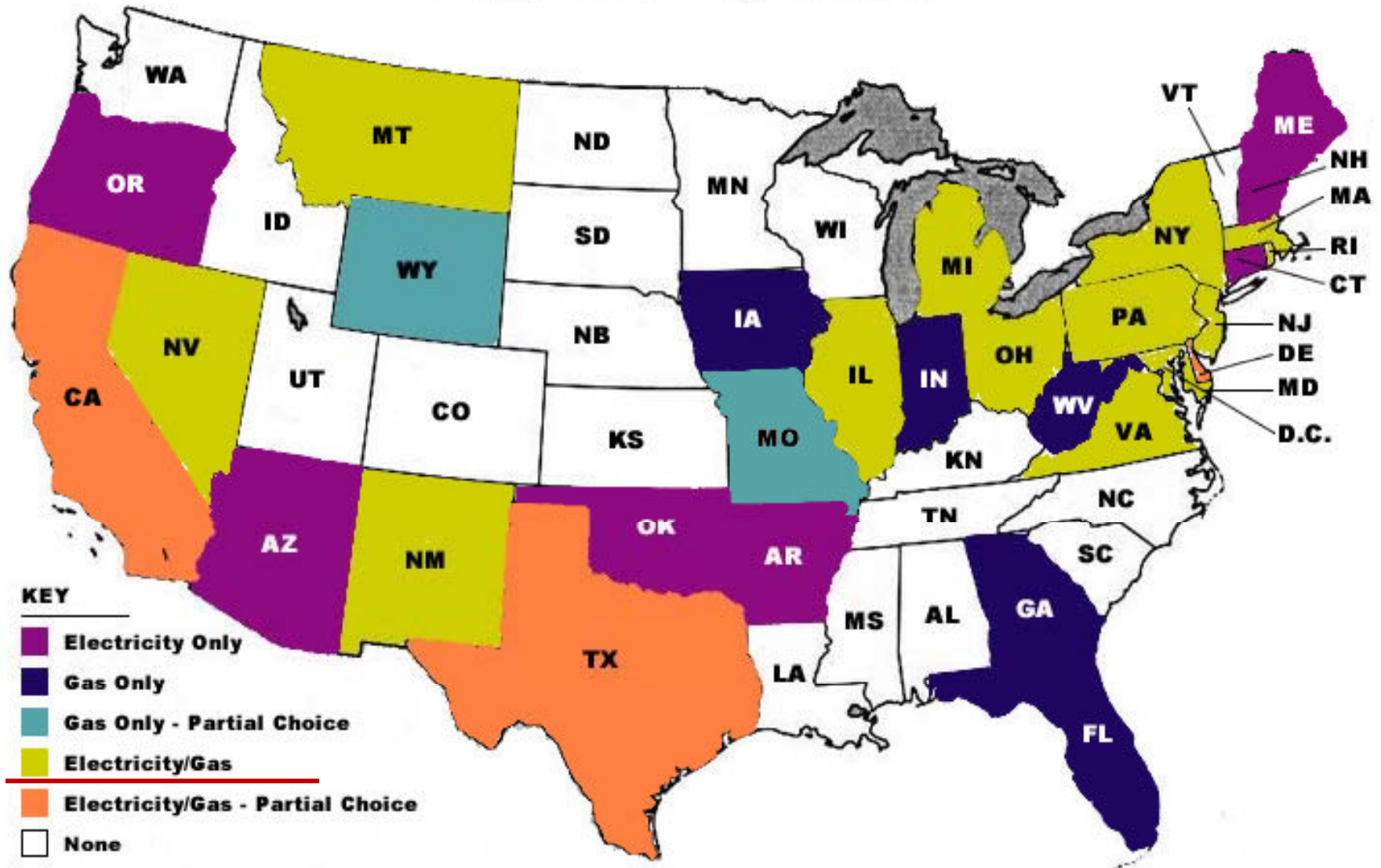
- Single vendor
- Tightly integrated product
- Similar in all states
- Minimal buying decisions

TODAY 50% of the US DE – REGULATED UTILITIES

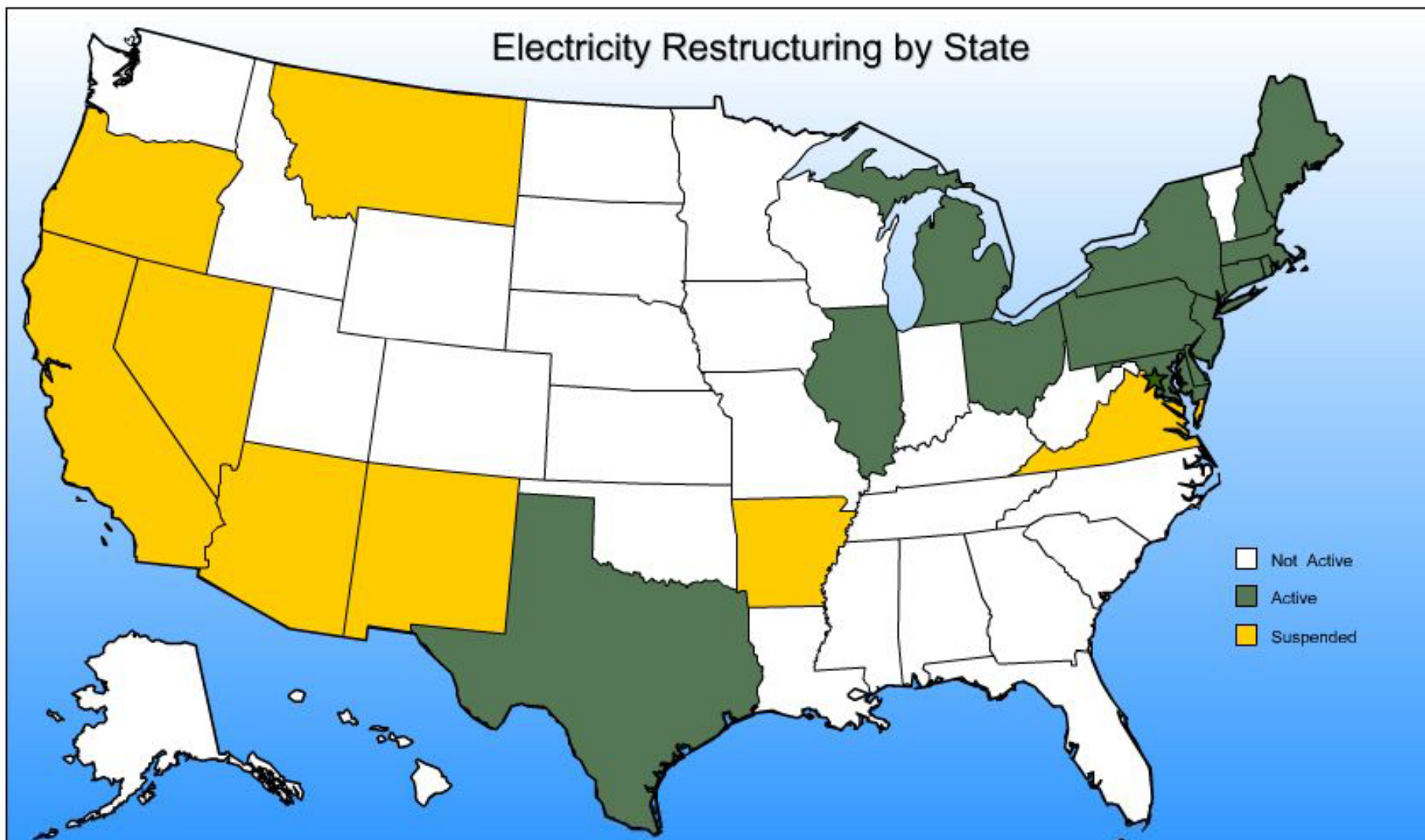
NOW: Electricity as an Unbundled Product
(after deregulation)



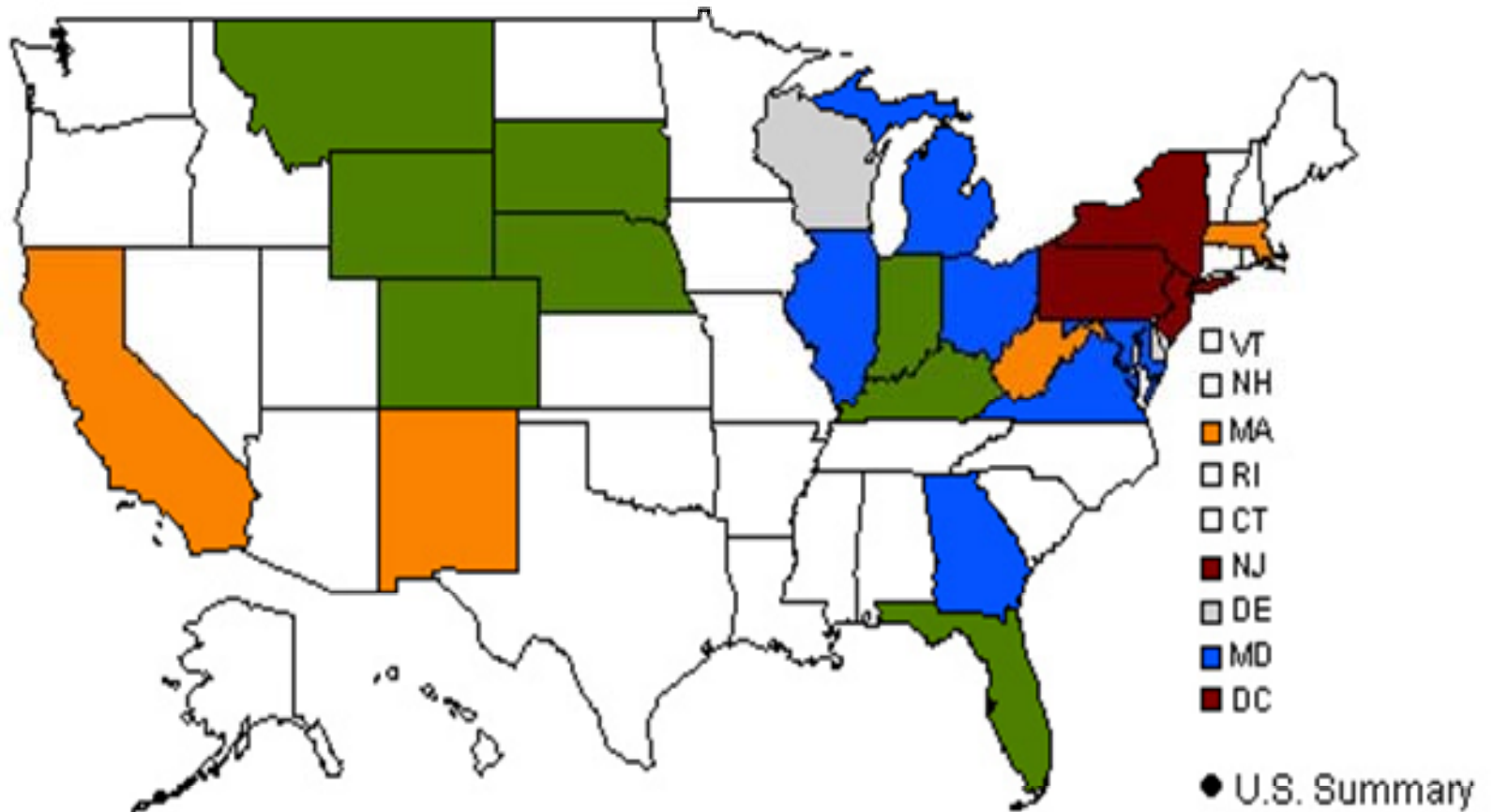
ELECTRICITY and NATURAL GAS Deregulation by States



ELECTRICITY - DEREGULATED



NATURAL GAS - DEREGULATED



- Statewide unbundling - 100% eligibility: Active
- Statewide unbundling - 100% eligibility: Inactive/Limited programs
- Statewide unbundling - implementation phase: > 50 percent eligibility
- Pilot programs/partial unbundling
- No unbundling
- Pilot Program Discontinued

ENERGY MANAGEMENT



Supply –Side

- Regulated tariffs
- De-regulated *energy commodities*
- Energy commodities - price and Ts & Cs
- Seek expert assistance
- Budgeting advice

Demand-Side

- Getting the GM & *DOE* to support the process near term and long term
- Incentives for *DOE* for beating YOY energy consumption?
- *Better control of employees* & contractors (human behavior)*
- Better control of equipment
- Energy efficiency improvements
- Energy Conservation Measures (ECMs)
- Letting *DOEs* get quotes alone (vs. with expert assistance)

* *Policies, procedures, posters in more than one language?*

DATA : 'YOU CANNOT CONTROL WHAT YOU DO NOT MEASURE'



Energy Management – at the portfolio level

- Annual 'utility spend' portfolio wide
 - Annual utility spend by property
 - Monthly summary of utility cost and consumption by property
(c/o utility exports to Excel, screen captures, fax ... or via snail mail)
 - Average cost unit energy unit (converted to *common standard billing units*
KWH, Therms, 1000 gallons of water plus other fuels like district energy)
- **Tracking energy cost (\$) and energy consumption (#)**
 - **Internal database** - via accounting system(s)
 - **Actual utility bill database (with details) vs. accounting system dollars**
 - **External database** (bill payment, administration and reporting)
 - Third party system - enrollment (and re-direction of utility bills)
 - \$8 to \$12 / month per utility account (meter)
 - Back-filling the history from utility bills or utility printouts
(for YOY and YTD report)
 - *Process requires time, follow through and patience ... to get it right*
 - *WARNING: 'Talking to 'IT' people'*

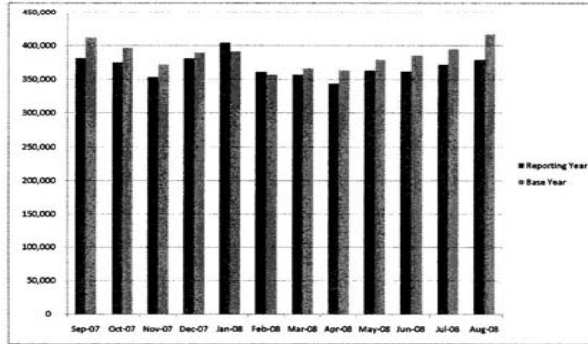


MONTHLY ENERGY - DASH BOARD

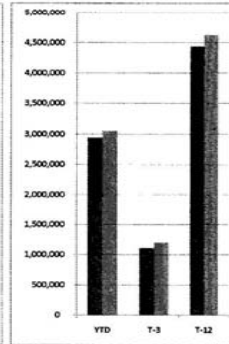
August 2008

Electricity:													(Trend)			Comments
Reporting Yr (2008)	Sep-07	Oct-07	Nov-07	Dec-07	Jan-08	Feb-08	Mar-08	Apr-08	May-08	Jun-08	Jul-08	Aug-08	YTD	T-3	T-12	Reporting Yr (2008)
kWh	381,606	374,698	359,392	381,223	404,326	360,947	356,912	343,461	362,970	361,639	371,852	379,077	2,941,184	1,112,568	4,432,103	kWh
\$	\$ 22,564	\$ 21,544	\$ 19,127	\$ 21,472	\$ 25,348	\$ 23,463	\$ 25,264	\$ 23,900	\$ 24,536	\$ 23,674	\$ 25,030	\$ 26,047	\$ 197,262	\$ 74,751	\$ 281,969	\$
Base Yr (2007)	Sep-06	Oct-06	Nov-06	Dec-06	Jan-07	Feb-07	Mar-07	Apr-07	May-07	Jun-07	Jul-07	Aug-07	YTD	T-3	T-12	Base Yr (2007)
kWh	412,072	396,517	371,837	388,975	391,626	356,990	365,972	362,927	378,829	385,338	394,970	416,562	3,053,214	1,196,870	4,622,615	kWh
\$	\$ 20,937	\$ 18,925	\$ 18,109	\$ 18,547	\$ 18,683	\$ 19,344	\$ 19,152	\$ 19,890	\$ 20,584	\$ 21,345	\$ 25,547	\$ 33,846	\$ 178,391	\$ 80,738	\$ 254,909	\$
% Variance													% Variance			
kWh	-7.39%	-5.50%	-4.96%	-1.99%	3.24%	1.11%	-2.48%	-5.36%	-4.19%	-6.15%	-5.85%	-9.00%	-3.67%	-7.04%	-4.12%	kWh
\$	7.77%	13.84%	5.62%	15.77%	35.67%	21.29%	31.91%	20.16%	19.20%	10.91%	-2.02%	-23.04%	10.58%	-7.42%	10.62%	\$

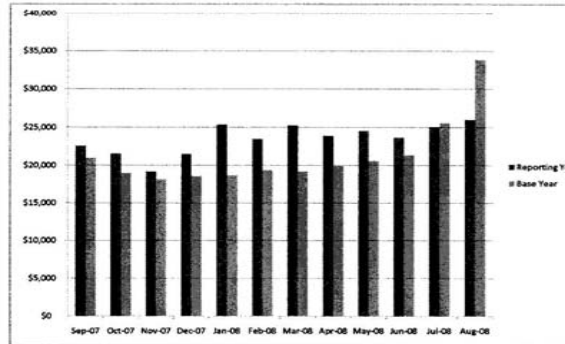
Electricity: in kWh



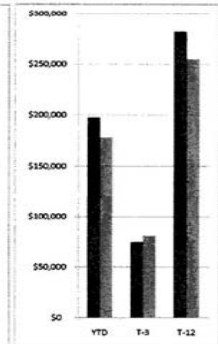
Electricity: in kWh (Trend)



Electricity: in \$

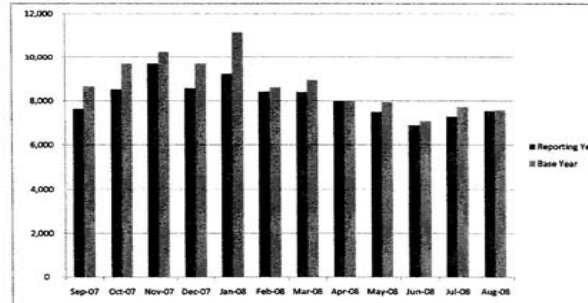


Electricity: in \$ (Trend)

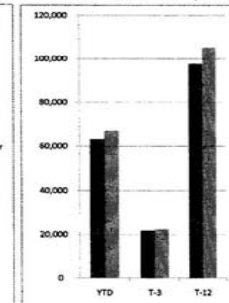


Natural Gas:													(Trend)			Comments
Reporting Yr (2008)	Sep-07	Oct-07	Nov-07	Dec-07	Jan-08	Feb-08	Mar-08	Apr-08	May-08	Jun-08	Jul-08	Aug-08	YTD	T-3	T-12	Reporting Yr (2008)
Therm	7,634	8,514	9,694	8,569	9,232	8,417	8,393	7,981	7,483	6,898	7,284	7,527	63,215	21,709	97,626	Therm
\$	\$ 6,075	\$ 7,225	\$ 9,029	\$ 8,098	\$ 8,689	\$ 8,447	\$ 9,168	\$ 10,647	\$ 10,509	\$ 9,883	\$ 11,151	\$ 7,724	\$ 76,218	\$ 28,758	\$ 106,645	\$
Base Yr (2007)	Sep-06	Oct-06	Nov-06	Dec-06	Jan-07	Feb-07	Mar-07	Apr-07	May-07	Jun-07	Jul-07	Aug-07	YTD	T-3	T-12	Base Yr (2007)
Therm	8,662	9,696	10,271	9,704	11,146	8,610	8,951	7,994	7,936	7,087	7,725	7,574	67,023	22,386	105,356	Therm
\$	\$ 9,749	\$ 10,877	\$ 11,427	\$ 10,801	\$ 9,903	\$ 7,850	\$ 8,883	\$ 8,238	\$ 8,159	\$ 7,340	\$ 7,644	\$ 6,615	\$ 64,632	\$ 21,599	\$ 107,486	\$
% Variance													% Variance			
Therm	-11.87%	-12.19%	-5.62%	-11.70%	-17.17%	-2.24%	-6.23%	-0.16%	-5.71%	-2.67%	-5.71%	-0.62%	-5.68%	-3.02%	-7.34%	Therm
\$	-37.69%	-33.58%	-20.99%	-25.03%	-12.26%	7.61%	3.21%	29.24%	28.80%	34.65%	45.88%	16.76%	17.93%	33.15%	-0.78%	\$

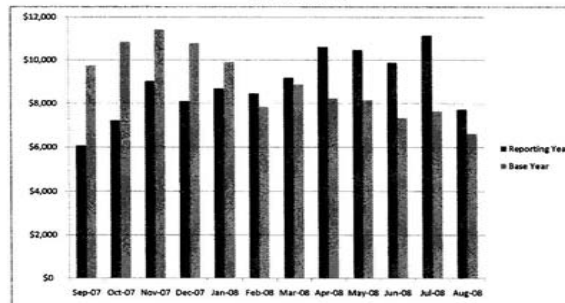
Natural Gas: in Therm



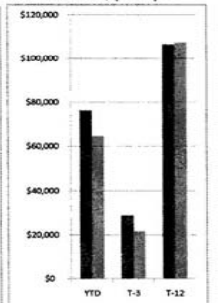
Natural Gas: in Therm (Trend)



Natural Gas: in \$



Natural Gas: in \$ (Trend)



SAMPLE PORTFOLIO : SORTED by MMBTU / SF (in yellow)

NAME	RMS	SQ FT	ENERGY COST	MMBTU	\$/ ROOM	COST SQ FT	MMBTU SQ FT	COST PAR	MMBTU PAR
1	1200	949,542	\$ 2,420,239	149,278	\$ 2,030	\$ 2.55	0.16	\$ 2,030	\$ 125
2	384	353,000	\$ 916,445	54,158	\$ 2,387	\$ 2.60	0.15	\$ 2,387	\$ 141
3	274	179,999	\$ 685,297	25,727	\$ 2,501	\$ 3.81	0.14	\$ 2,501	\$ 94
4	509	313,000	\$ 484,155	43,609	\$ 951	\$ 1.55	0.14	\$ 951	\$ 86
5	182	180,000	\$ 494,586	24,389	\$ 2,718	\$ 2.75	0.14	\$ 2,718	\$ 134
6	504	551,329	\$ 1,457,947	73,993	\$ 2,893	\$ 2.64	0.13	\$ 2,893	\$ 147
7	409	339,000	\$ 625,006	41,809	\$ 1,528	\$ 1.84	0.12	\$ 1,528	\$ 102
8	316	206,356	\$ 403,475	25,340	\$ 1,277	\$ 1.96	0.12	\$ 1,277	\$ 80
9	486	321,200	\$ 754,462	36,120	\$ 1,552	\$ 2.35	0.11	\$ 1,552	\$ 74
10	521	800,000	\$ 891,202	79,502	\$ 1,711	\$ 1.11	0.10	\$ 1,711	\$ 153
11	1010	664,712	\$ 1,175,925	64,292	\$ 1,164	\$ 1.77	0.10	\$ 1,164	\$ 64
12	492	547,000	\$ 880,214	45,168	\$ 1,789	\$ 1.61	0.08	\$ 1,789	\$ 92
13	487	375,000	\$ 887,371	29,957	\$ 1,822	\$ 2.37	0.08	\$ 1,822	\$ 62

ENERGY MANAGEMENT

Doing nothing ... is not an answer



- **What the CEO and CFO want to know (the problem)**
- **What can be done (the solutions)**
 - ***Understanding the EM opportunities***
 - **Trends:** Increasing electricity and natural gas costs for energy commodity and delivery fees *in regulated and de-regulated markets*
 - **Investments** = ROI, NPV and asset appreciation
 - ***Getting capital (selling the project)***
 - ***Tracking and reporting the results***

Energy Management

From AUDIT to ACTION



Demand-Side EM – First Step = Energy Audit

- **Level 1 Energy Audits**
 - low cost / no cost ECMs and O&M savings
 - people issues
 - ECMs with ROI
 - **Level 2 Energy Audits**
 - specific ECMs, ROI and NPV
 - specifications and bids
 - **Level 3 Energy Audits**
 - investment grade
-
- Use only utility cost savings (hard numbers), real O&M savings (exclude other soft benefits)
 - Owner's role vs. the chain's DOE or Energy Manager

EM Strategies and Goals

What is your firm's investment horizon?

- REIT
- Private equity

- Only properties that are *long term holds*?
- Short payback periods only? (skimming the cream only)
- Longer term perspective?
- ROI and NPV only?
- Asset appreciation !

.....

FUND ONLY THE TOP 3 TO 5 ECMs ?

→ The best ECMs can pay for the less attractive ECMs

ENERGY MANAGEMENT AS AN INVESTMENT

Simple Payback Period	Return on Investment
1 Year	100% ROI
2 Years	50% ROI
3 Years	33% ROI
4 Years	25% ROI
5 Years	20% ROI
6 Years	17% ROI

Demand - Side *(energy) Facts of Life*

“You are already paying for the energy management project ... whether it is done or not”

.....

“Self funded energy management projects are paid for with funds normally given away to the utility companies”

DEMAND SIDE EM : PROVEN ECMs



CONTROL WHAT YOU ALREADY OWN !

- | | |
|------------------------------|--|
| - Common area HVAC | Scheduling |
| - Guest Room HVAC | EMS |
| - Lighting | F&B staff control |
| - Kitchen | Cooking, defrost, WIF/WIC ... SOPs |
| - Kitchen Exhaust / MUA | VFD control |
| - Central plant | Chillers, boilers, cooling towers, pumps |
| - EMS for common area | DDC BAS/EMS with schedules |
| - EMS for guest rooms | Occupancy based control |
| - VFDs | Reduce speed 20% = save 50% |
| - Water conservation | HETs, HEIs, Low flow shower heads |
| - <i>Retro Commissioning</i> | <i>Large HVAC with DDC controls</i> |

-
- **DSM rebates** from utility or state energy office
 - **EPACT** of 2005 tax incentives via section 179D (lighting vs. other improvements)
 - **DR** = Demand Response in some markets



ECMs

RETROFIT - Lighting (CFL, Super T8, LED, Induction , controls)

AVOID 'leading edge' technology without a proven track record for energy saving results (look for EnergyStar label - on some equipment)

CONSIDER lifecycle cost of high efficiency equipment for new construction and major renovations
(i.e. Std. replacement chiller vs. chiller with VFD)

PLANS & Specification vs. Design / Build
vs. Vendors ... *quoting what they like.*

BEST IN CLASS national vendors
(w/ national acct prices and project management teams)

INDEPENDENT ROI NUMBERS (not just vendor numbers) Independent advice: such as a Certified Energy Manager (CEM) or registered professional engineer (PE)

ROI FOR COMMON ECMs

Based on Average USA Energy Cost

ENERGY CONSERVATION MEASURES (ECMS)	PAYBACK PERIOD (YEARS)
Energy Management System - new	1 to 4
High Efficiency Motors & VFDs	1 to 3
Lighting Fixtures & Ballasts - retrofit	1 to 5
Steam Trap - replacement / repairs	1 to 5
Energy Management System - replacement	1 to 6
Manufacturing Process - heat recovery	2 to 5
Boiler - replacement	7 to 12
Chiller - replacement	8 to 12
Rooftop Unit HVAC - replacement	9 to 15
Building Insulation	10 to 15
Roof Insulation	20 to 30
Windows - replacement	20 to 50

QUESTION: Are the TV ads about replacement windows correct?

DSM : Demand Side Management **REBATES**

from local Utility Companies or your State Energy Office

<http://www.dsireusa.org/>

DSIRE
Database of State Incentives for Renewables & Efficiency

U.S. DEPARTMENT OF ENERGY Energy Efficiency & Renewable Energy
North Carolina Solar Center
IREC

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DSIRE SOLAR
DSIRE SOLAR
Database of State Incentives for Renewables & Efficiency

DSIRE is a comprehensive source of information on state, local, utility and federal incentives and policies that promote renewable energy and energy efficiency. Established in 1995 and funded by the U.S. Department of Energy, DSIRE is an ongoing project of the N.C. Solar Center and the Interstate Renewable Energy Council.

Choose one or both databases:
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T U.S. Territories

U.S. DEPT OF ENERGY – FREE TOOLS

http://apps1.eere.energy.gov/buildings/tools_directory/doe_sponsored.cfm

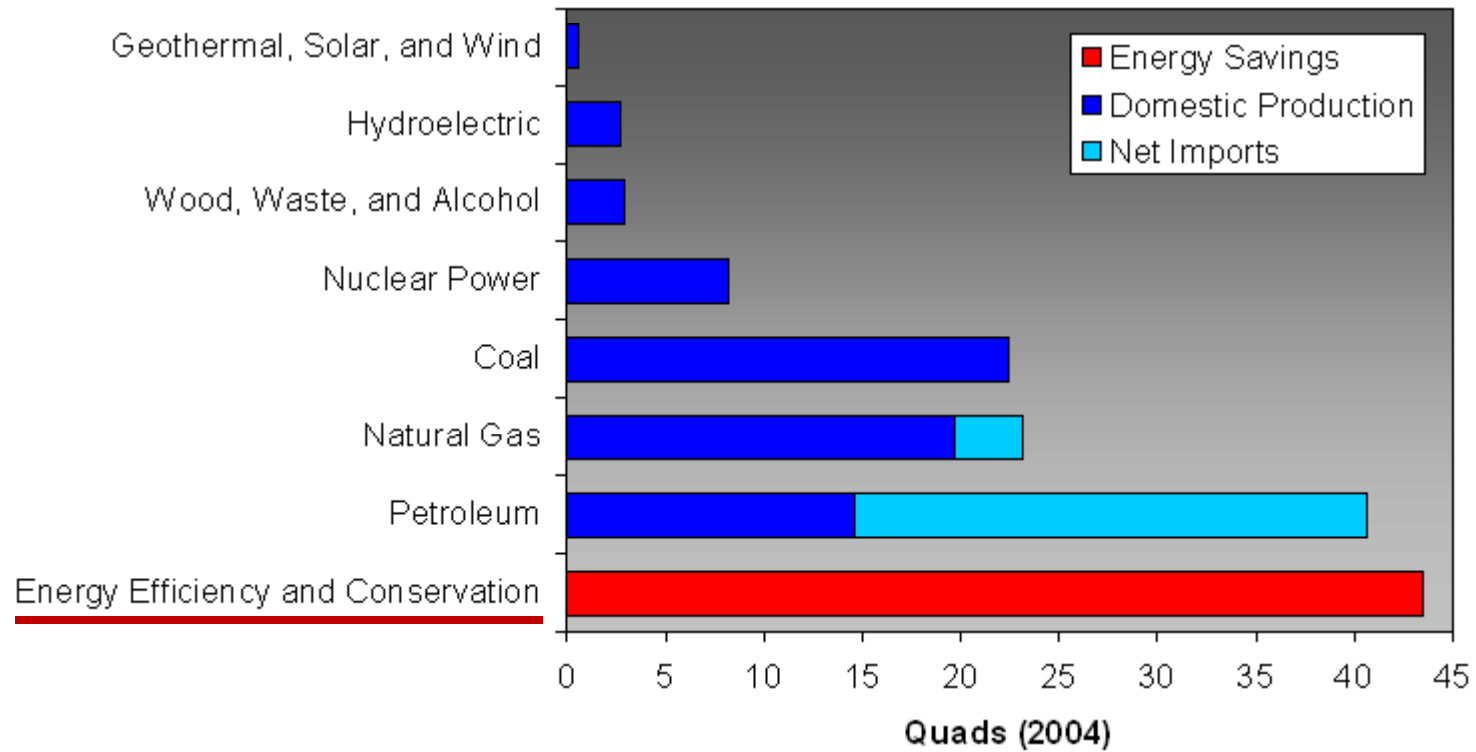
Nearly 300 free energy software programs available for down load

The screenshot shows the website for the U.S. Department of Energy's Building Technologies Program. The header includes the U.S. Department of Energy logo and the text "Energy Efficiency & Renewable Energy". Below this is a green bar with "Building Technologies Program" and a navigation menu with links for "About the Program", "Program Areas", "Information Resources", "Financial Opportunities", "Technologies", "Deployment", and "Home". The main heading is "Building Energy Software Tools Directory". A left sidebar contains a "Building Energy Software Tools Directory Home" link and several categories: "About the Directory" (with sub-links for "New Tools", "DOE Sponsored Tools", "Submit a Tool", and "Disclaimer"), "Tools by Subject", "Tools Listed Alphabetically", "Tools by Platform", "Tools by Country", and "Related Links". The main content area lists several tools:

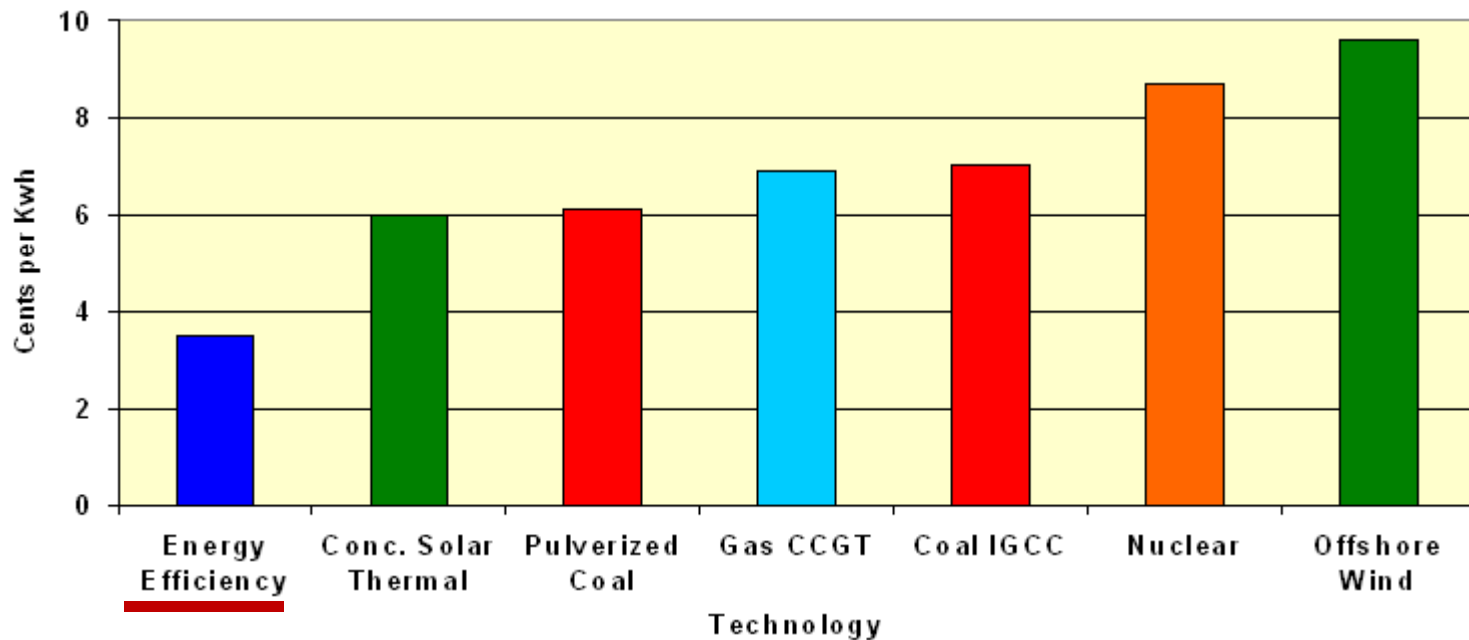
- DOE Sponsored Tools**: The Department of Energy sponsors continued development of a variety of building energy software tools. See the following for more information about software tools now under development:
- Whole-Building Energy Performance Simulation EnergyPlus**: A new-generation building energy simulation program from the creators of BLAST and DOE-2.
- DOE-2**: An hourly, whole-building energy analysis program which calculates energy performance and life-cycle cost of operation. The current version is DOE-2.1E.
- Building Design Advisor**: Provides building decision-makers with the energy-related information they need beginning in the initial, schematic phases of building design through the detailed specification of building components and systems.
- Energy-10**: A program for small commercial and residential buildings that integrates daylighting, passive solar heating, and low-energy cooling strategies with energy-efficient envelope design, and mechanical equipment. This allows for detailed simulation and performance analysis.
- SPARK**: Models complex building envelopes and mechanical systems that are beyond the scope of EnergyPlus and DOE-2. Good for modeling short time-step dynamics. Runs 10-20 times faster than similar programs.
- Validation and Testing BESTEST**: Through the National Renewable Energy Laboratory, the Department of Energy has been working with the International Energy Agency Solar Cooling and Heating Programme Implementing Agreement (IEA SHC) and the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) for more than the last 10 years to develop standard methods of test for building energy analysis computer software.
- Standards Compliance REScheck (formerly MECcheck)**: The MECcheck product group makes it fast and easy for designers and builders to determine whether new homes and additions meet the requirements of the Model Energy Codes (MEC) and International Energy Conservation Codes (IECC).
- COMcheck-EZ**: COMcheck-EZ offers an easy-to-understand process for demonstrating compliance with ASHRAE 90.1-1989 and IECC commercial energy code requirements for envelope, lighting, and mechanical systems.

ENERGY EFFICIENCY

– BEST SOURCE OF ‘NEW’ ENERGY



COST OF ENERGY EFFICIENCY vs. MAKING MORE ENERGY



Source: Neal Elliott, PhD., ACEEE 2006, EPRI 2006



BOTTOM LINE RESULTS



- Benchmarking
(consumption/ SF, Consumption/ Rm., BTUs/SF)
- Measurement & Verification (M & V)
- Follow-up reporting to Senior Management and investors
- PR benefits
(EnergyStar Partner, Green programs
... avoid '*green-washing*')

EM Process

- | | |
|-------------------|--------------------------|
| - Portfolio level | Data ! |
| - Supply Side | No capital |
| - Demand Side | Active Energy Management |

ENERGY MANAGEMENT – SUCCESS !

APPROACH

FOCUS ON

Traditional = Demand-Side

De Regulation = Supply-Side

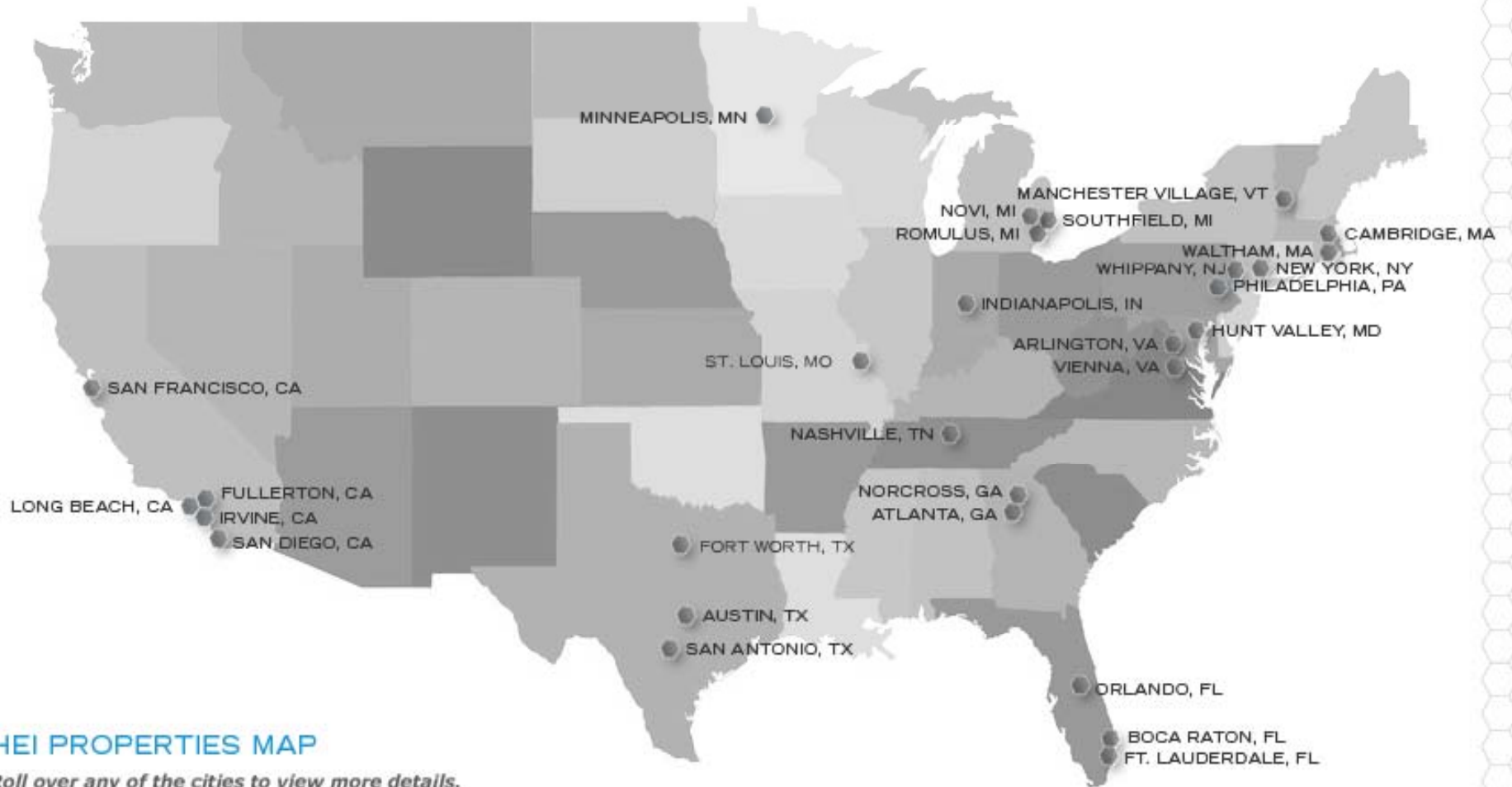
Winning = Supply-Side and Demand-Side

EXAMPLE: A TEM CLIENT

• BRANDS • STATES • MAP



Properties: Map



Corporate Energy Management Project of the Year

2009 World Energy Engineering Congress



HEI HOTELS & RESORTS

ENERGYSTAR 2010 - PARTNER OF THE YEAR AWARD



HEI HOTELS & RESORTS

Reduced Utility Costs by 24 % !

DIRECTIVE : REDUCE ENERGY COSTS BY 20% THIS YEAR !

Don't Say it Can't Be done !



CAP and TRADE TAX (HR 2454) !

- \$ 80 B / yr.? In new taxes *
- \$3,000 per family / yr.

* ENERGY TAX INCREASES:

- + \$0.025 / KWH
- + \$1.50 / MCF
- + \$0.28 / Gallon of gasoline

STATUS

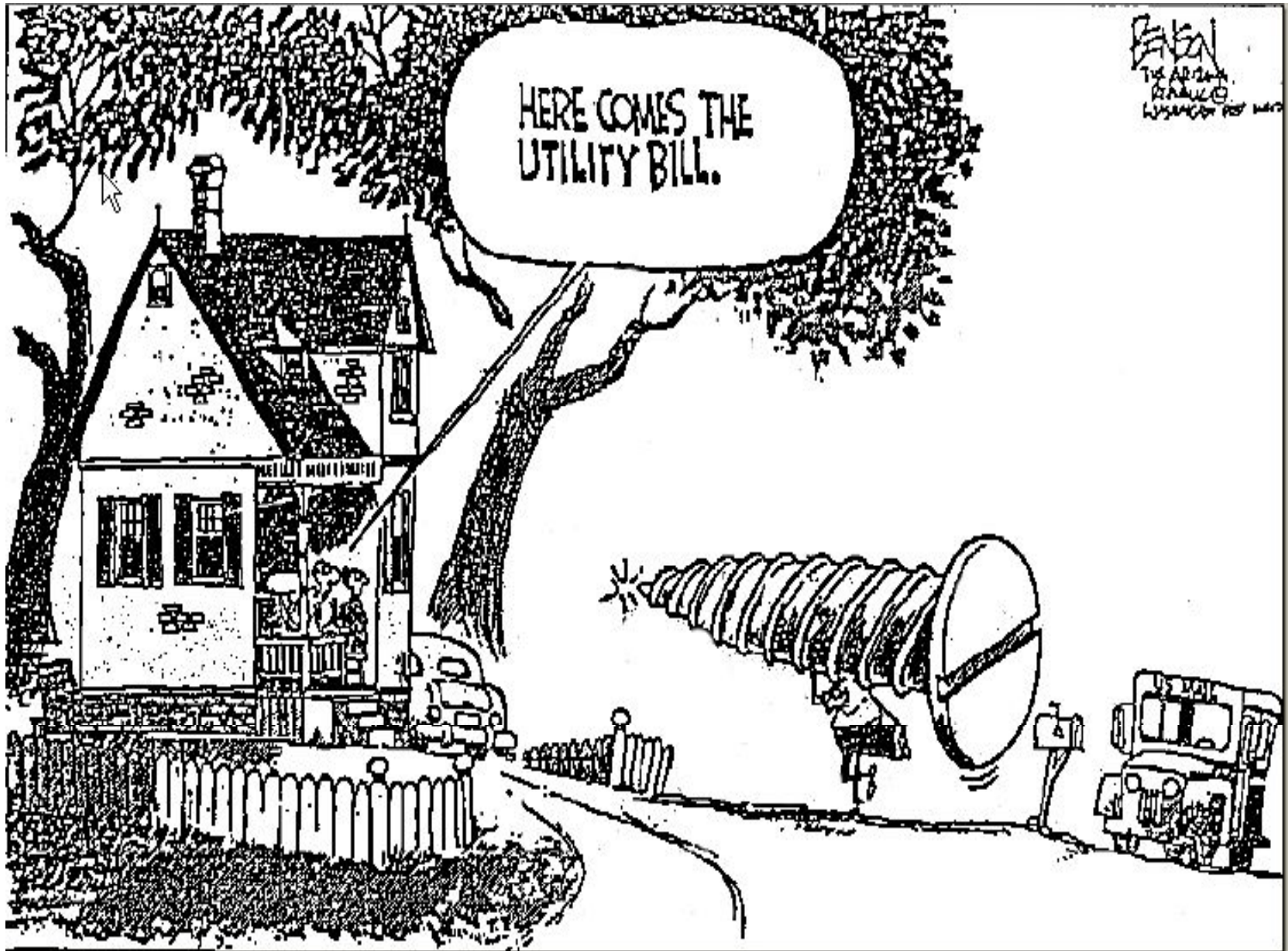
PASSED **US HOUSE** (**July 2009**)
PROPOSED **US SENATE** (**May 2010**)

http://www.rules.house.gov/111/LegText/111_hr2454.pdf

IRS Estimate = +\$100B to \$200B / yr.

DBA CAP & TAX





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RESOURCES (URLs)

- www.think-energy.net
- http://www.energystar.gov/index.cfm?c=hospitality.bus_hospitality
- http://www.energystar.gov/index.cfm?c=business.bus_commit
- <http://www.treeo.ufl.edu/greenlodging/>
- http://www.energystar.gov/ia/partners/downloads/Success_Story_ThinkEnergy_HEI.pdf
- http://www.gelighting.com/na/business_lighting/lighting_applications/hospitality/index.htm