

Hotel Energy Efficiency

MichaelsEnergy

A Webinar on Energy Efficiency
Opportunities in Minnesota's
Hospitality Sector
January 12, 2016

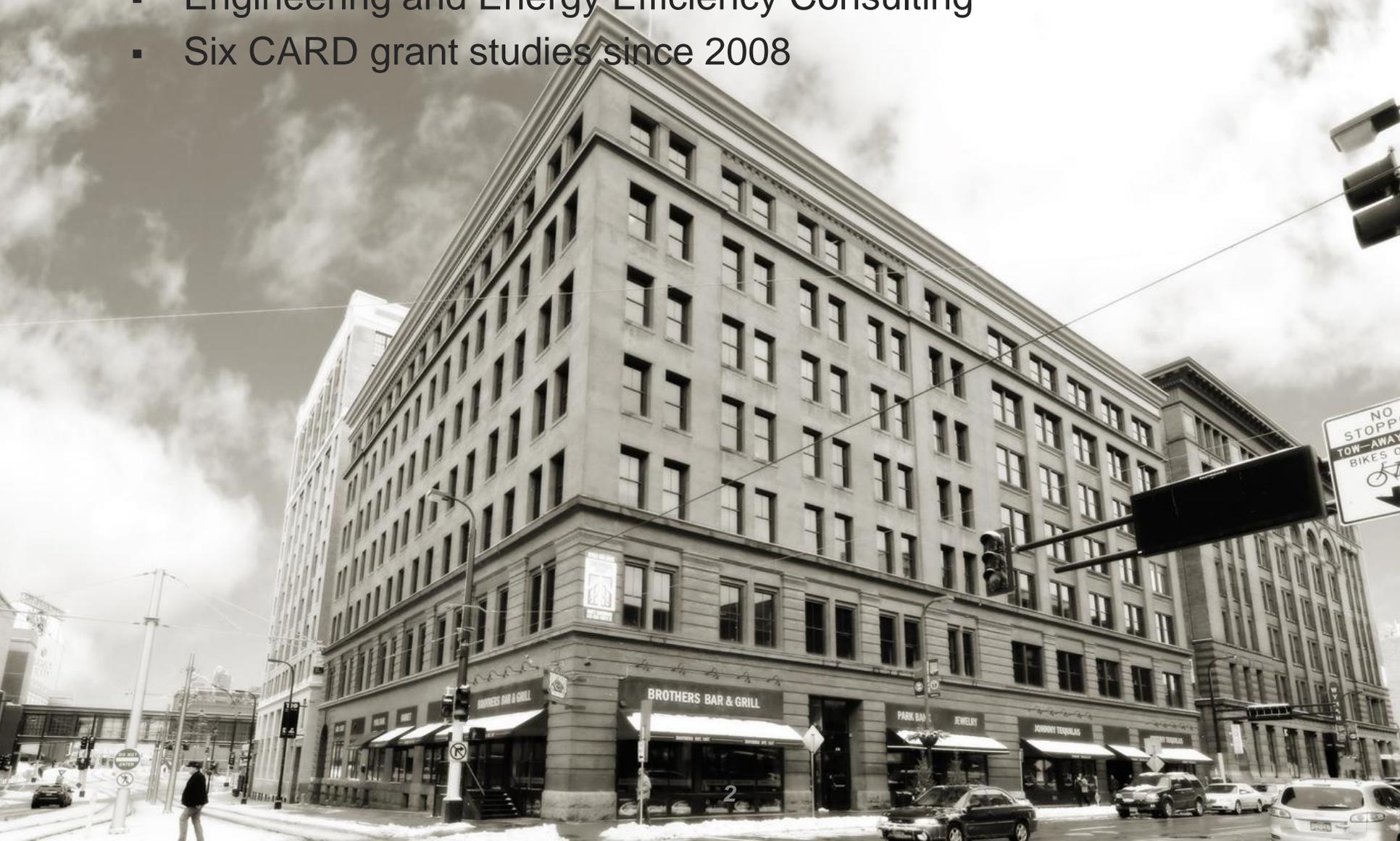


Research funded by the Minnesota Department
of Commerce, Division of Energy Resources



Michaels Energy

- Headquarters in La Crosse WI
- Engineering and Energy Efficiency Consulting
- Six CARD grant studies since 2008



CARD Grants: Help Utilities Achieve 1.5% Annual Savings Goals



Agenda

- Background on the Study
- Initial Findings
 - ◆ Guest Comfort and Energy Efficiency
 - ◆ End Use Analysis
 - ◆ Non-Energy Savings
- Specific Measures
- Recommendations
- Discussion



STUDY BACKGROUND



Why Mid-Scale Hotels?

- Energy Intensive Small Businesses
- Unique issues



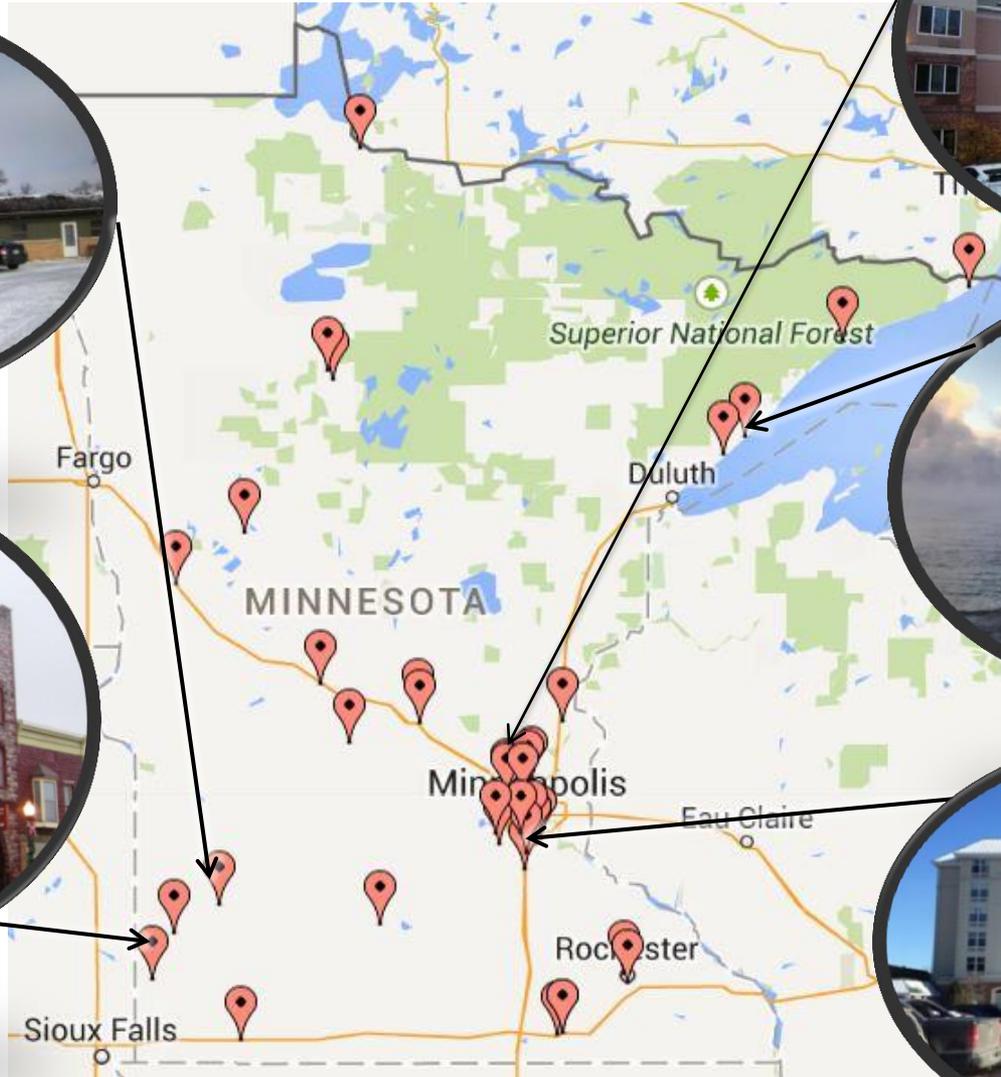
Assumptions on Measures



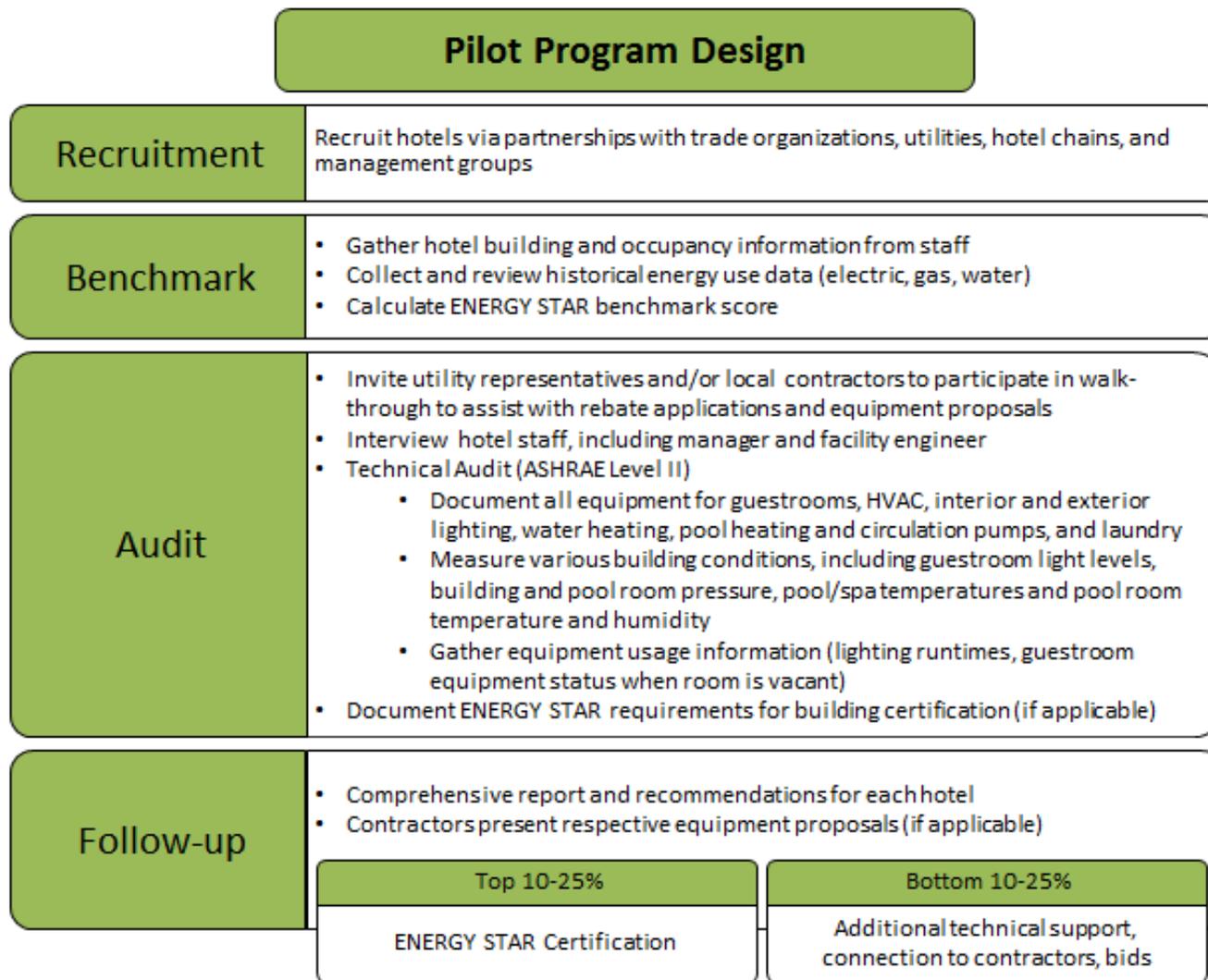
* Photo credit for Ozone Laundry Systems, www.ozonelaundrysystems.com



Hotels in Minnesota



Pilot Design



INITIAL FINDINGS



GUEST COMFORT



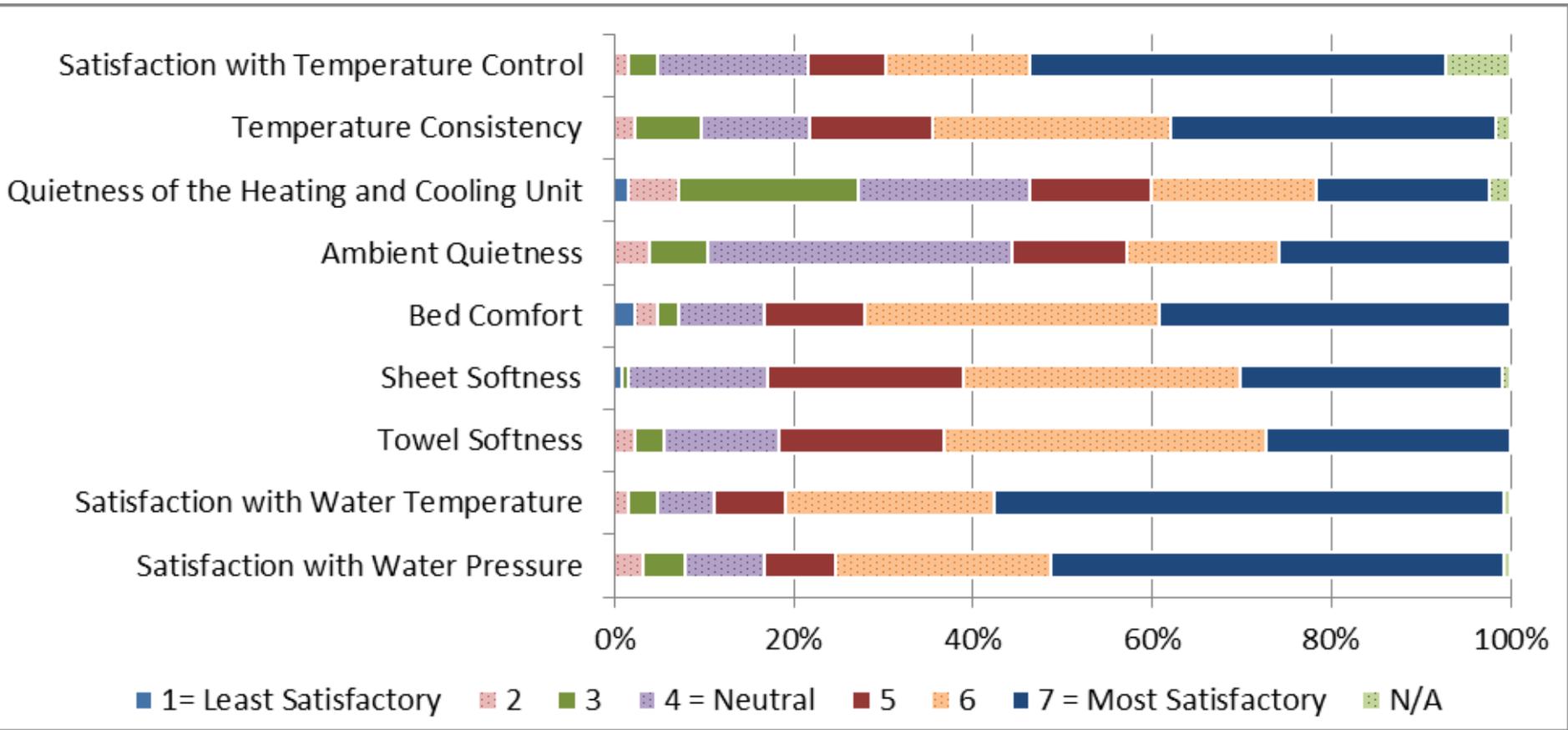
Guest Comfort Survey



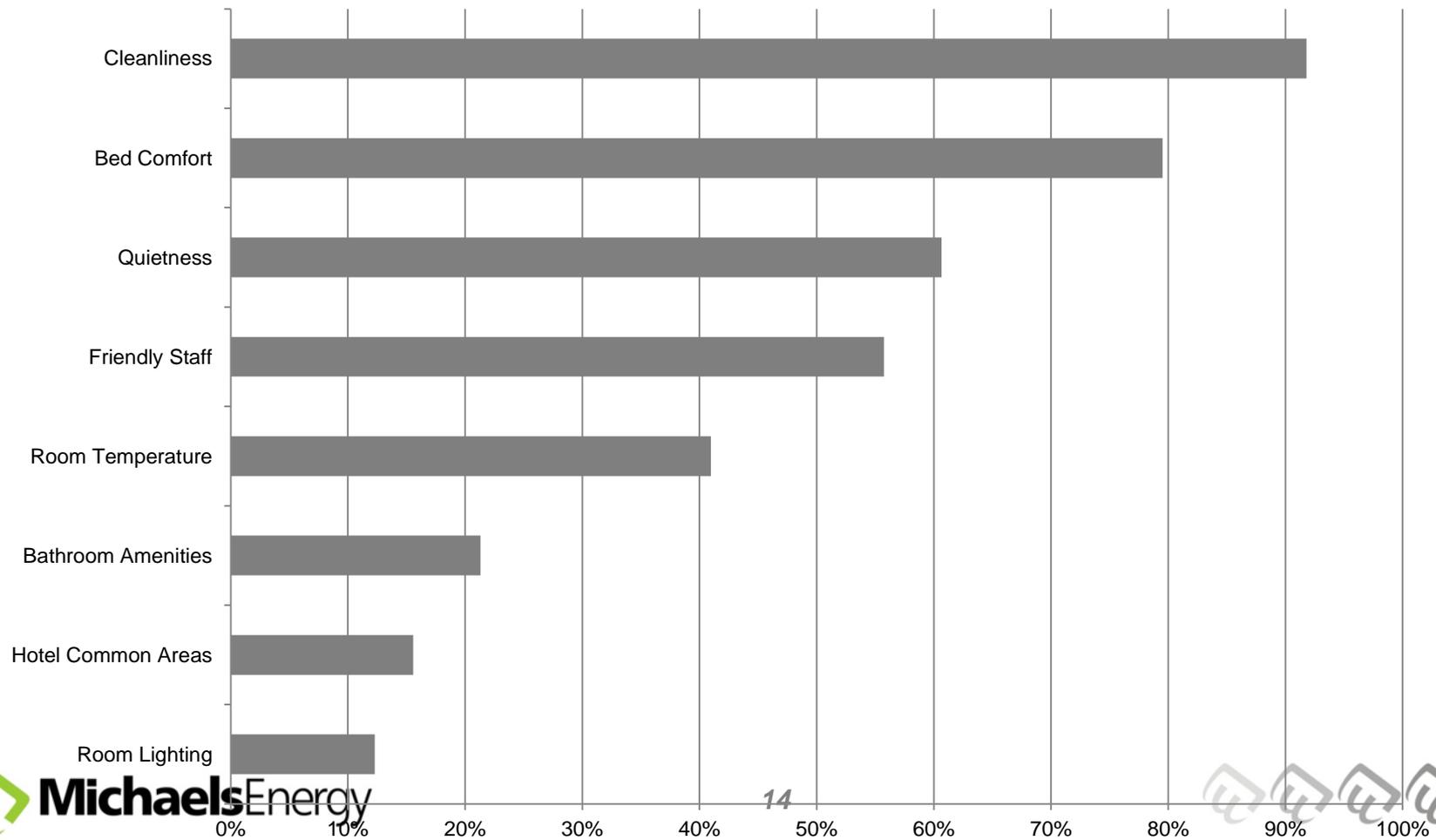
Highlights from Guest Comfort Survey



Guest Comfort



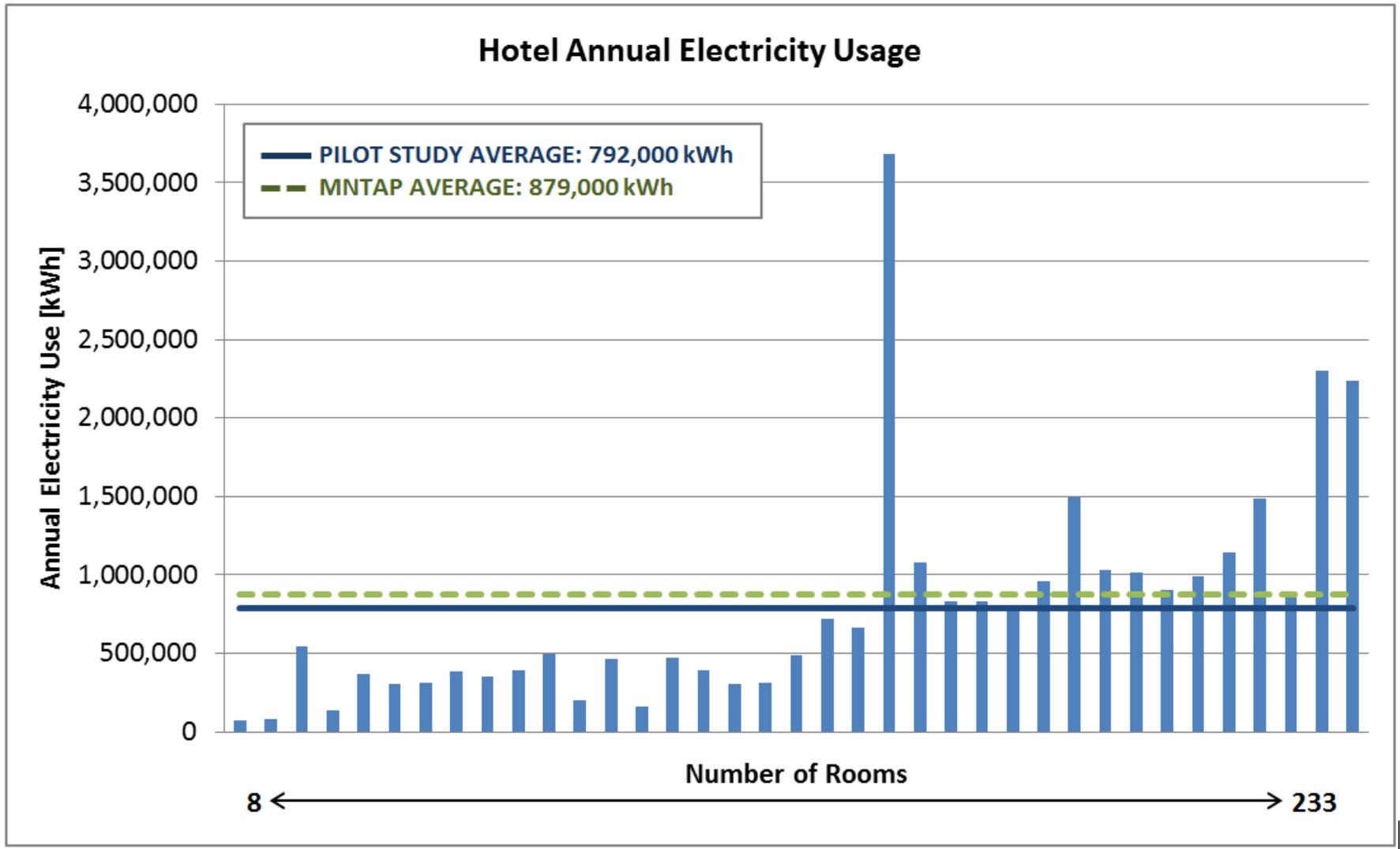
What matters most to Guests



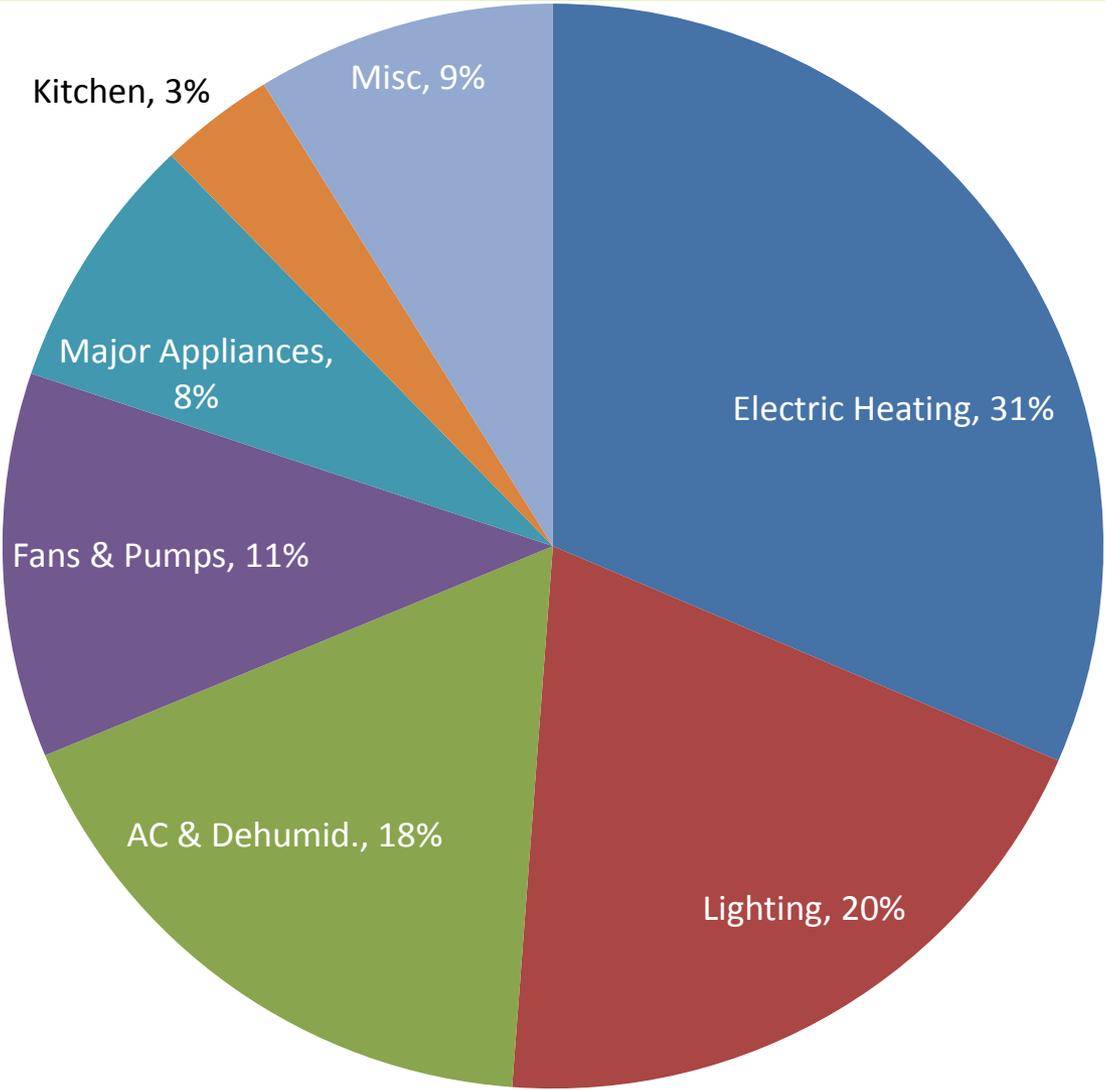
ENERGY USE



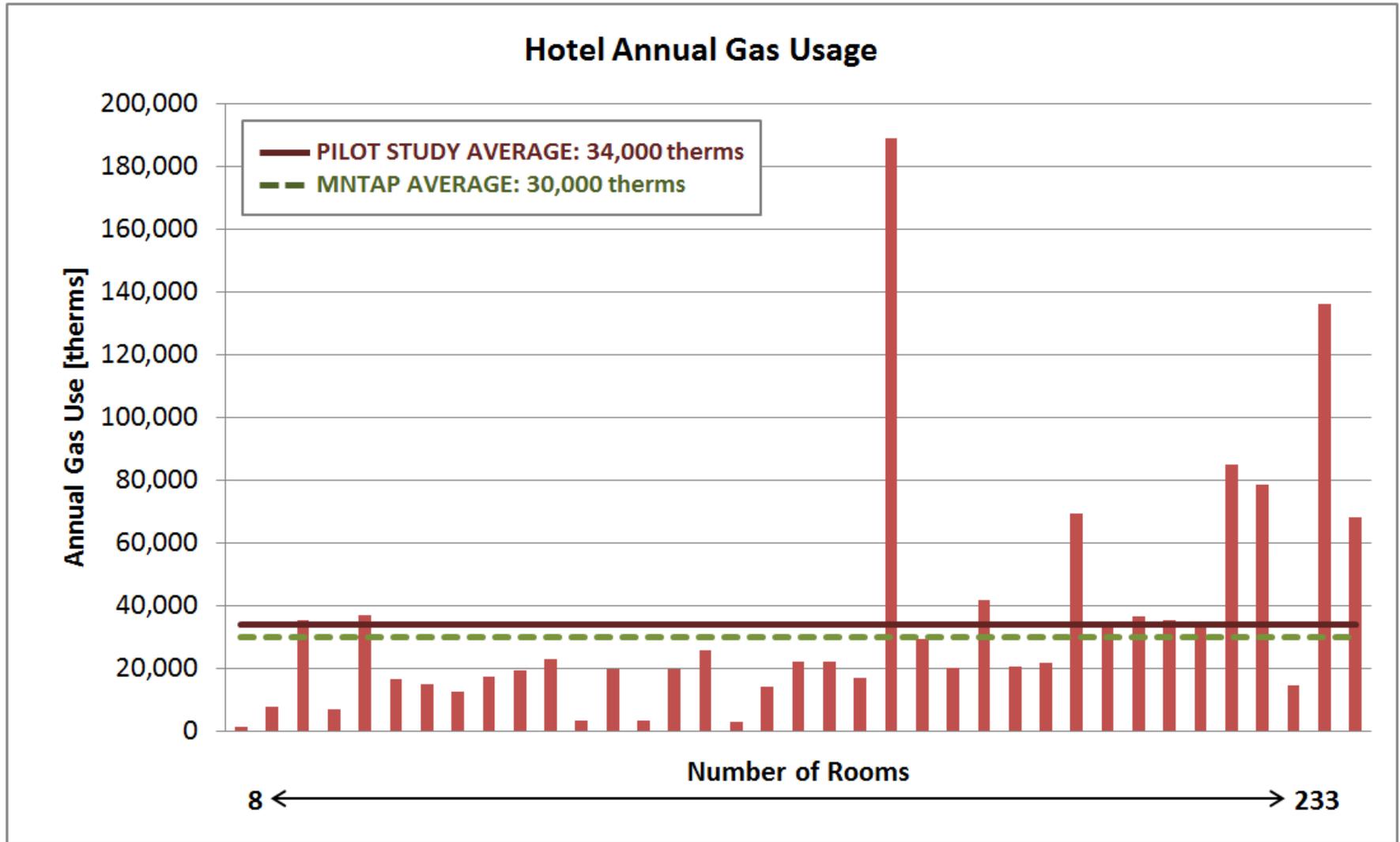
Annual Electric Use



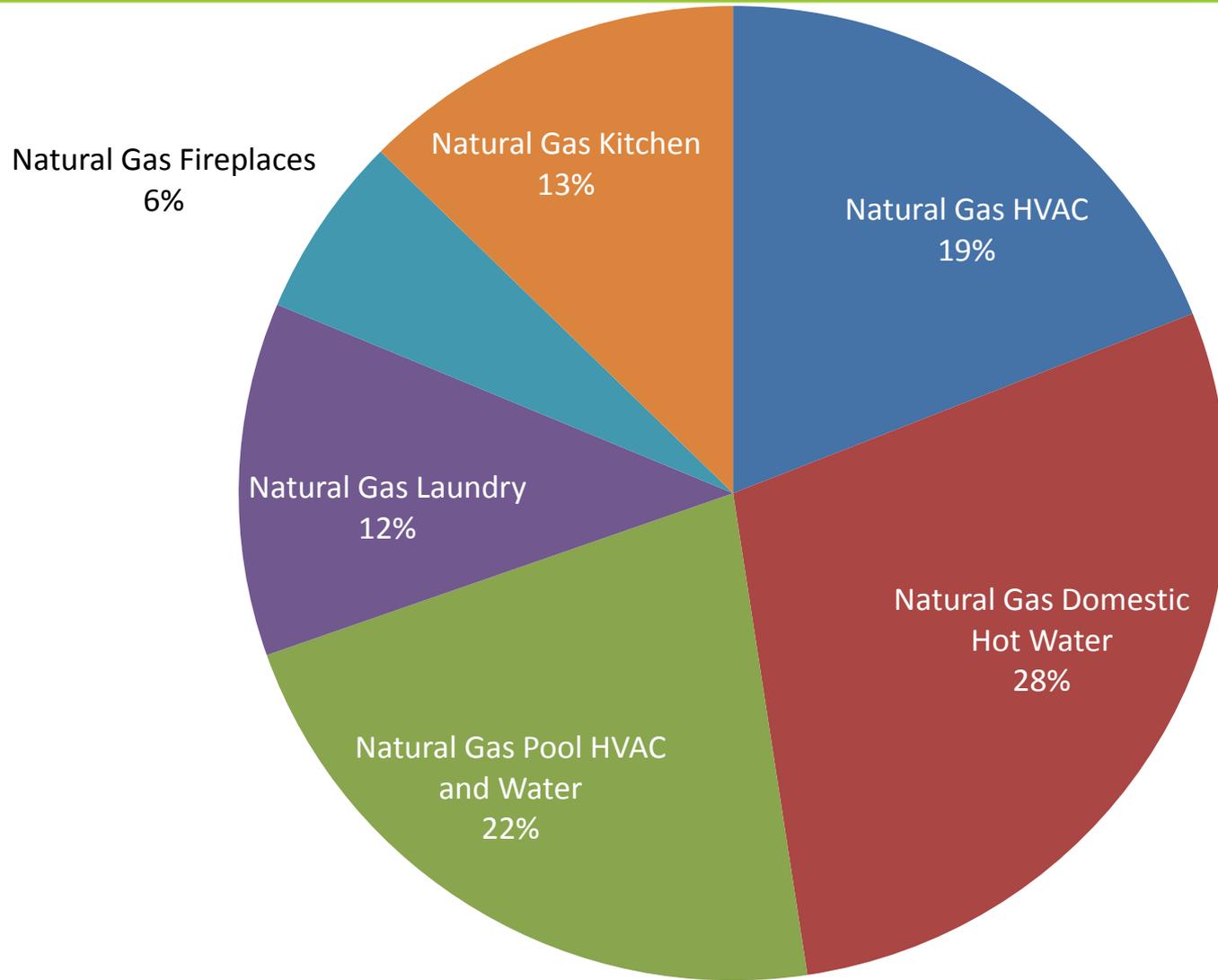
Electric End Use



Annual Gas Use



Gas End Use



NON-ENERGY SAVINGS



Maintenance Savings!

Energy Saving Measure	% of Hotels Identified	Average Measure Cost (\$)	Average Annual Energy Savings (\$)	Average Maintenance Savings (\$)	Average Utility Rebate (\$)	Payback W/ Utility Rebate & Maint. Savings (Years)	Payback W/ Utility Rebate & Maint. Savings (Years)
Replace Exterior Lighting with LED	92%	\$14,000	\$1,700	\$740	\$2,200	4.8	6.9
Retrofit T8 and T12 Fixtures with LED Tubular Lamps	92%	\$6,600	\$1,100	\$330	\$1,500	3.9	4.6
Replace Pool Area Lighting with LED	74%	\$3,500	\$940	\$340	\$470	2.3	3.2
Replace Common Area Lighting with LED	76%	\$3,900	\$1,500	\$1,500	\$1,400	0.9	1.7



Water Savings

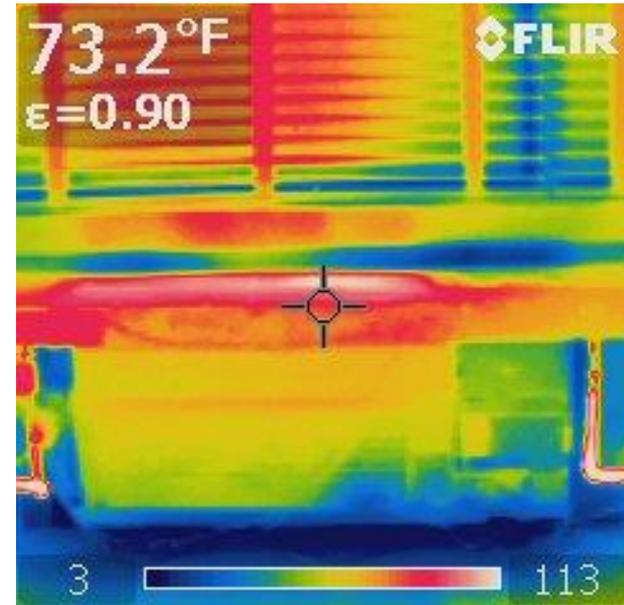
Energy Saving Measure	% of Hotels Identified	Average Measure Cost (\$)	Average Annual Energy Savings (\$)	Average Water Savings (\$)	Average Utility Rebate (\$)	Payback WITH Water Savings (Years)	Payback W/O Water Savings (Years)
Install Efficient Showerheads in Guestrooms	84%	\$5,700	\$640	\$690	\$380*	4.6	8.3
Install Efficient Faucet Aerators in Guestrooms	92%	\$600	\$120	\$190	\$70	2.4	4.4
Implement Low Temperature Laundry System	82%	\$1,000*	\$1,000	\$1,100	\$0	0.5	1.0



*Photo credits CenterPoint Energy



Blower Door Testing



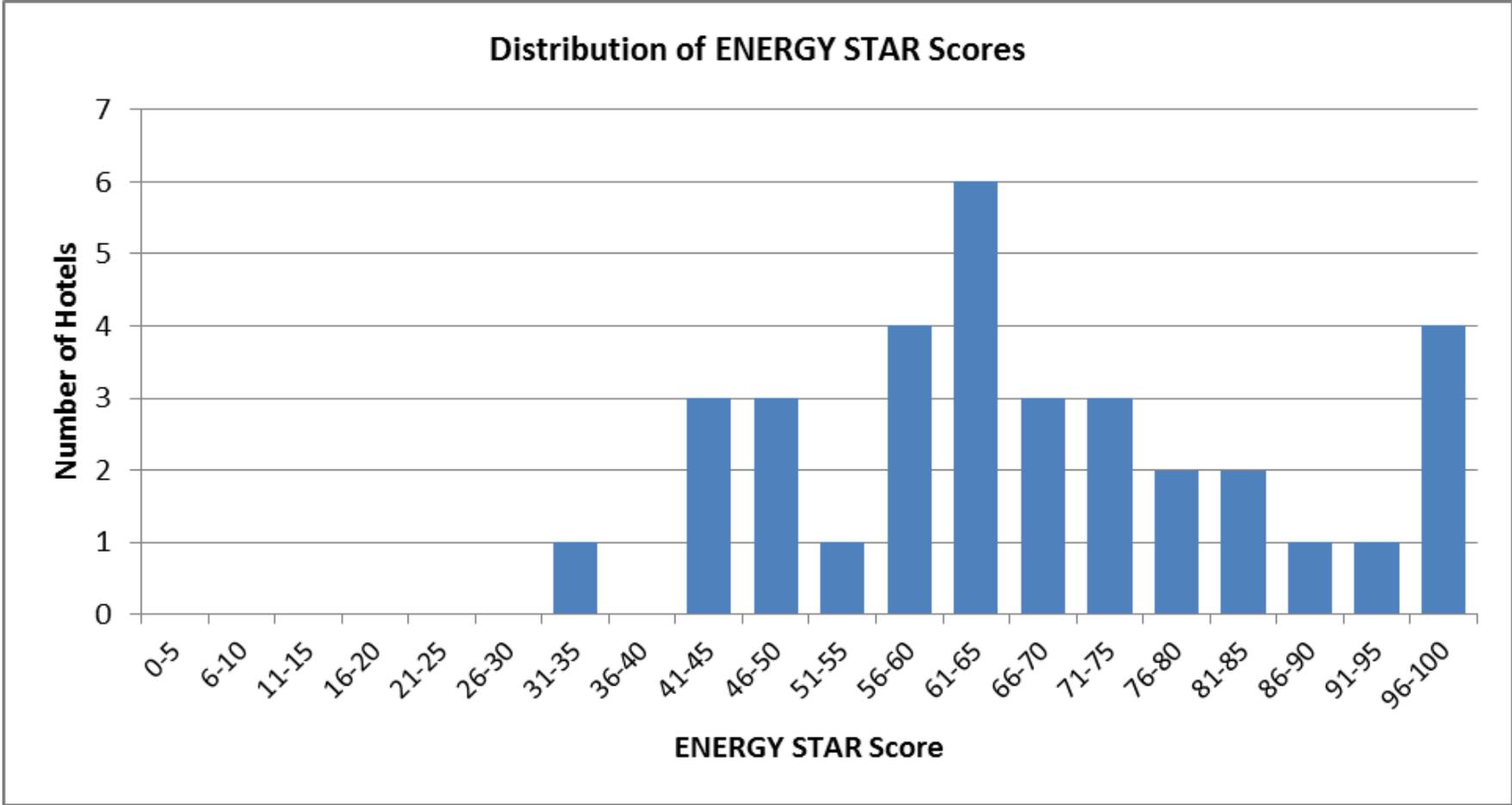
Bare wall



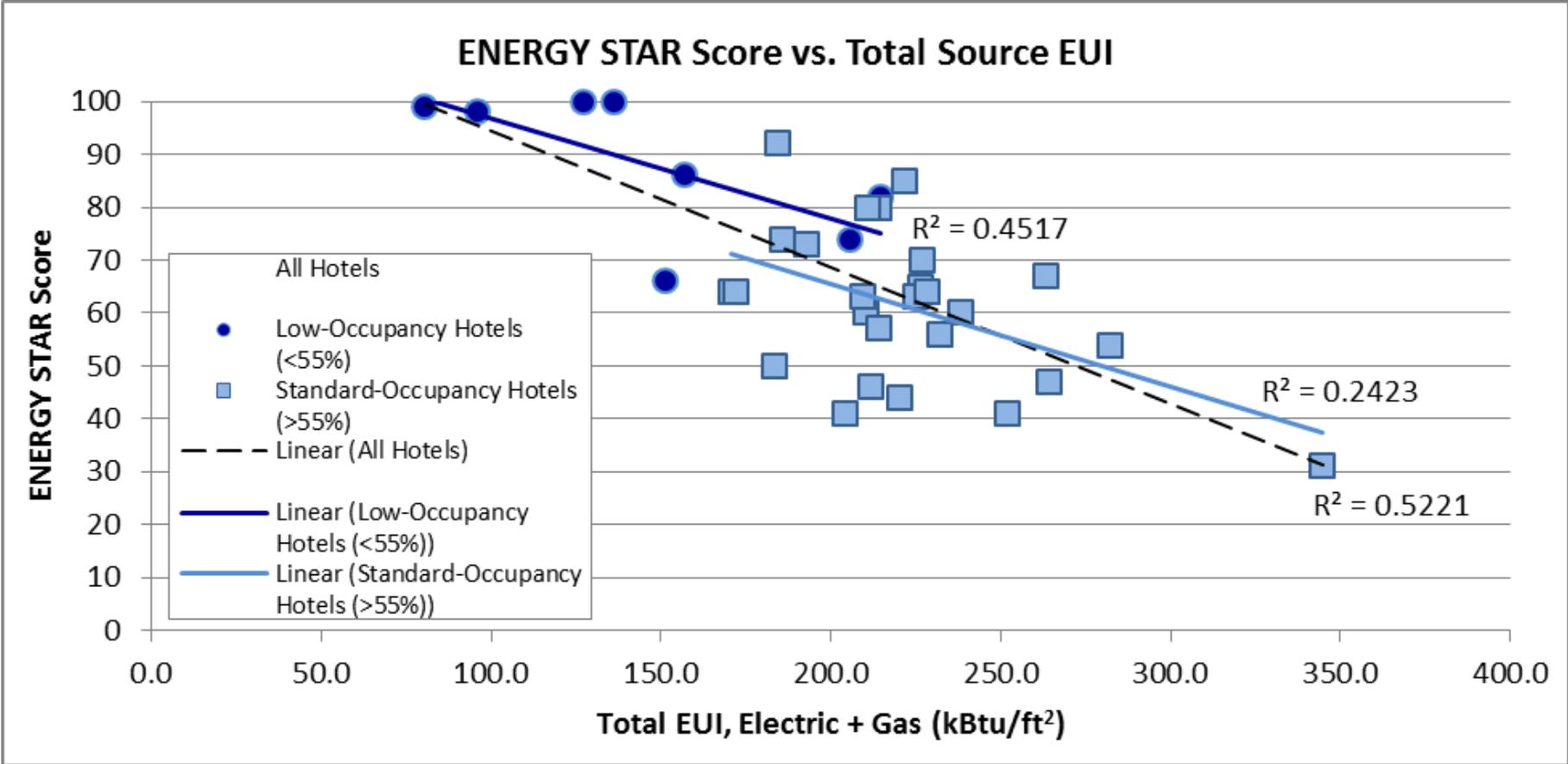
ENERGY STAR



ENERGY STAR



ENERGY STAR



ENERGY EFFICIENCY MEASURES

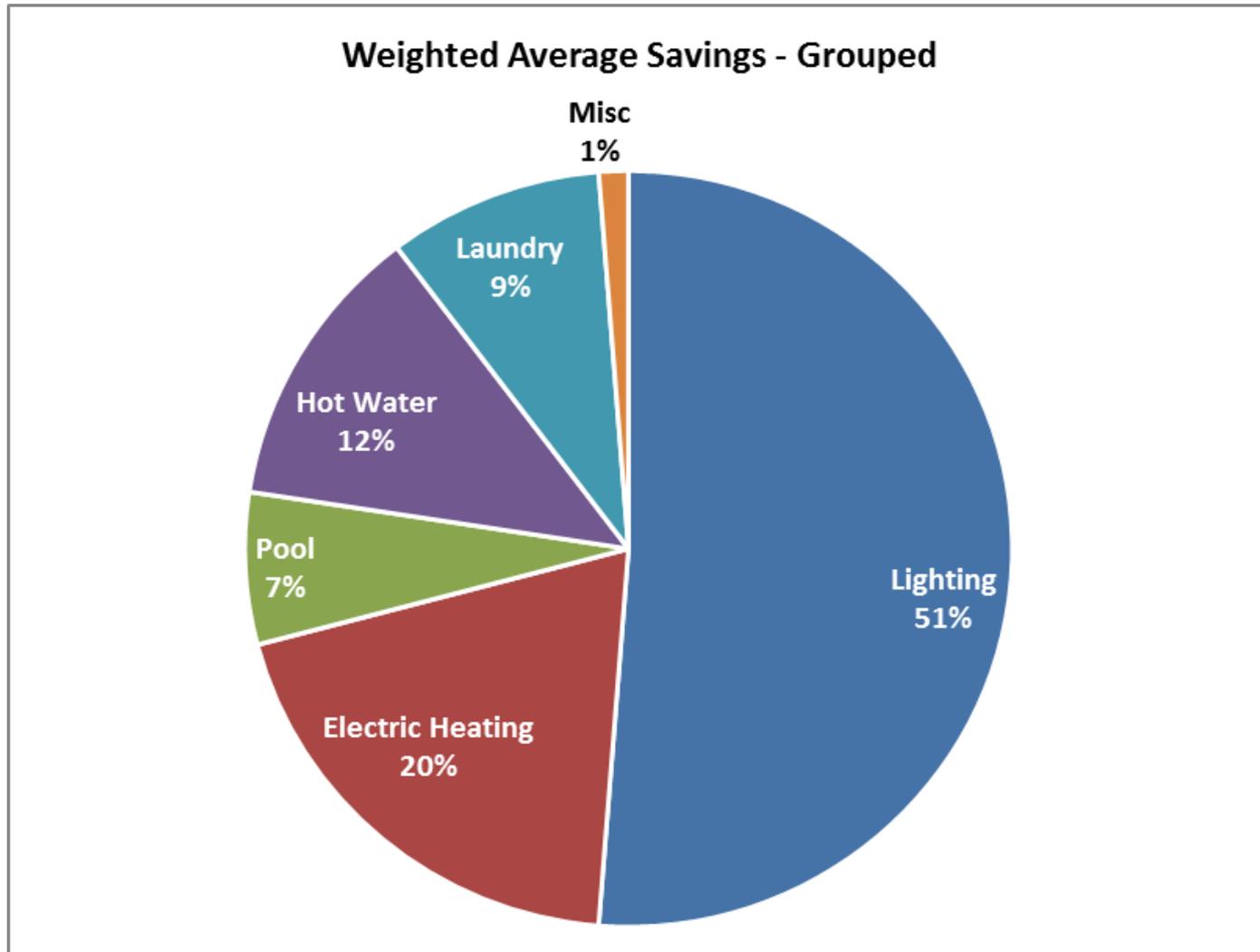


Recommended Measures

Energy Saving Measure	% of Hotels in need of Measure	Average Measure Cost (\$)	Average Electrical Savings (kWh)	Average Monthly Demand Savings (kW)	Average Gas Savings (therms)	Average Annual Energy Savings (\$)	Average Non-Energy Savings (\$)	Average Utility Rebate (\$)	Average Payback (Years)
Replace Exterior Lights with LED Fixtures	92%	\$14,000	27,000	-	-	\$1,700	\$740	\$2,200	4.8
Retrofit T8 and T12 Fixtures with LED Tubular Lamps	92%	\$6,600	12,000	2.3	-	\$1,100	\$330	\$1,500	3.9
Replace Pool Area Lighting with LED Lamps	74%	\$3,500	11,000	1.7	-	\$940	\$340	\$470	2.3
Replace Common Area Lights with LED Lamps	76%	\$3,900	17,000	2.5	-	\$1,500	\$1,500	\$1,400	0.9
Install Occupancy Sensors on Lighting in Public Spaces	74%	\$730	3,400	0.1	-	\$260	\$-	\$130	3.0
Replace PTACs with Heat Pump Units	42%	\$6,000*	54,000	3.5	-	\$4,200	\$-	\$4,800	0.3
Install Liquid Pool Cover	79%	\$920	2,100	0.1	690	\$740	\$30	\$-	1.6
Install Efficient Showerheads in Guestrooms	84%	\$5,700	-	-	710	\$640	\$690	\$380	4.6
Install Efficient Faucet Aerators in Guestrooms	92%	\$600	-	-	140	\$120	\$190	\$70	2.4
Replace Standard Water Heaters with High Efficiency Units	66%	\$5,800*	-	-	840	\$690	\$-	\$1,000	7.0
Implement Low Temperature Laundry System	82%	\$1,000*	-	-	1,100	\$1,000	\$1,100	\$-	0.5
Install Occupancy Controller for Vending Machines	66%	\$590	2,600	-	-	\$170	\$-	\$120	2.9
TOTALS		\$49,340	129,100	10.2	3480	\$13,060	\$4,920	\$12,070	2.1



Savings Opportunities



Not Ready for Prime Time?

Guest Room Energy Management Systems



Ozone Laundry



LOW TEMP LAUNDRY



How do Low Temperature Detergents Work?

- Savings from:
 - Enzymes break down the dirt and stains at lower temperatures
 - Polymers and surfactants keep the dirt and grease suspended in the water so less rinse cycles are needed

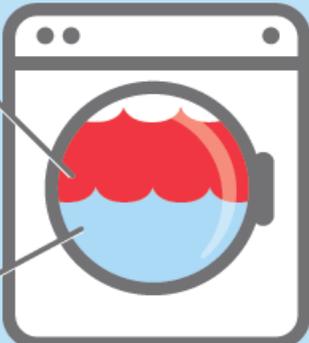
- Results:
 - Reducing hot water usage
 - Reducing number of cycles



EcoLab's Aquanomic Laundry Program

Traditional Laundry Program

Typical 100-lb. Machine



111 Gallons of Hot Water

103 Gallons of Cold Water

214 Gallons of Water

0.97 Therms of Energy

Aquanomic Laundry Program

Typical 100-lb. Machine



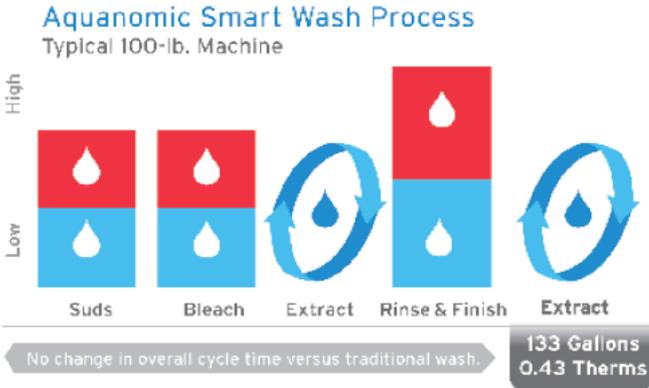
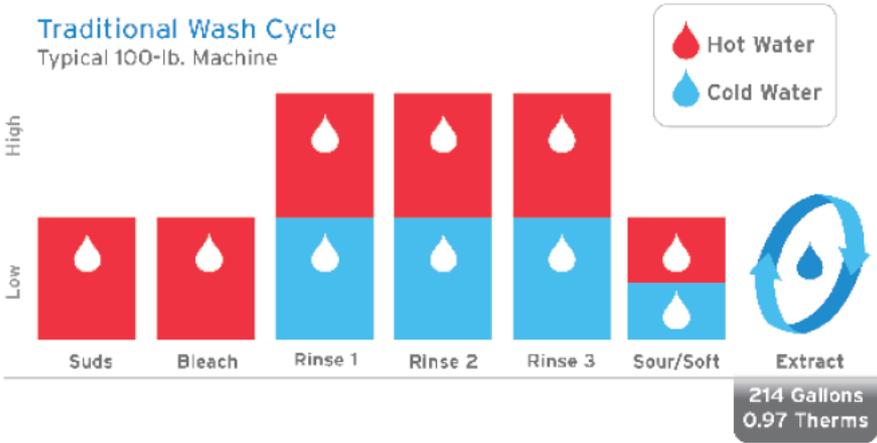
51 Gallons of Hot Water

83 Gallons of Cold Water

133 Gallons of Water

0.43 Therms of Energy

AQUANOMIC



1. EcoLab Aquanomic™ Laundry Program Third-Party Engineering Review Report, Karges-Faulconbridge, Inc., June 2011.
2. Based on 160-room property, 75% occupancy rate, 16 pounds of linen per room, national average utility rates.

Source: EcoLab



Hotel Laundry



LIQUID POOL COVER



HVAC Issues with Hotel Pools



Indoor Environment

- Air Temp 82 F, Water Temp 80 F, RH 60% Max
- Room at Negative Pressure



Lots of Open Hours with No Use



Pool Covers – Nobody uses them...



Integrity of Structure Important



Liquid Pool Cover



VS



The Hazard Potential or...the “yuck” factor

What is this stuff ?

Ethyl Alcohol – or corn based alcohol	95.24%	TLV = 1000 ppm
Isopropyl Alcohol – “rubbing alcohol”	4.76%	TLV = 200 ppm
Amount = 1 oz. per 400 SF of Surface		
Active Ingredient is Biodegradable – need to add to pool daily		

How about that Chlorine ?

Chlorine needed all the time for disinfecting

TLV = 0.5 ppm



Measurement and Verification of Savings

	Hotel 1	Hotel 2
HVAC System Type	DX with Water Heat Recovery	Outdoor Air Dilution with DX Cooling
Reduced Evaporation	40%	19%
kW Savings, at \$9.43/kW	\$300	\$100
kWh Savings at \$0.07/kWh	\$900	\$200
Therm Savings at \$0.79/Therm	-	\$400
Total Energy Savings, \$	\$1,200	\$700
One Time Equipment Cost	\$500	\$500
Annual Chemical	\$180	\$320
Payback First Year, months	7	14
Payback After First Year, months	2	5
% Effectiveness	73%	64%



Rebating Consumables?

Liquid Pool Covers



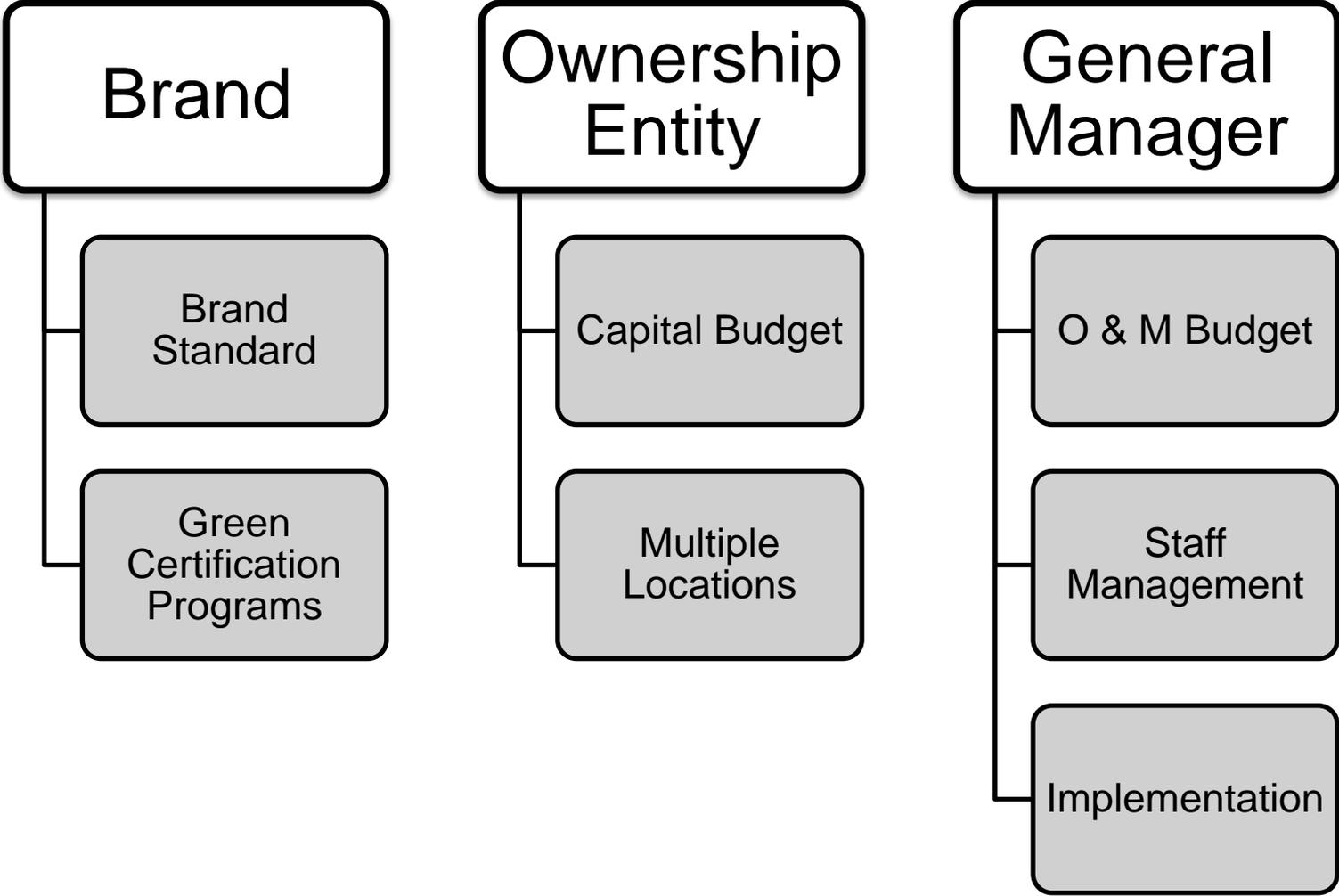
Low Temperature
Laundry Detergents



RECOMMENDATIONS



Brand Standards and Hotel Leadership



Case Study of GM Leadership



Potential for Savings

Savings Potential		Electrical Savings (kWh)	Monthly Demand Savings (kW)	Gas Savings (therms)	Annual Energy Savings (\$)	Non-Energy Savings (\$)
Weighted Single-Property Savings		85,600	6.9	2,700	\$9,000	\$4,100
MN Savings Potential	10% Impact 125 Hotels	10,700,000	860	340,000	\$1,100,000	\$510,000
	25% Impact 310 Hotels	26,800,000	2,200	840,000	\$2,800,000	\$1,300,000
	50% Impact 625 Hotels	53,500,000	4,300	1,700,000	\$5,600,000	\$2,600,000



Summary and Recommendations

- Utility Energy Audits
- Involve contractors
- Drive rebate awareness and use
- Engage GM in leadership
- Tap into brand standard requirements
- Minimize guest comfort concerns
- Pros and Cons to ENERGY STAR



Questions?

Hotel Energy Efficiency Final Report

Contact us!

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