NOW It Begins: Efficiency Works

Energy Efficiency Now:

Elevating Energy Performance in

Commercial and Residential Buildings

Anchorage, AK

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Andy Padian, President, PadianNYC Consulting

F.L.AndrewPadian@gmail.com

Who is this guy?

- I’m an energy and buildings geek
- I’ve spent the last 35+ years learning about why buildings go bad
- Started in policy, then energy, H+S, durability, sustainability, resilience, banking
- When I am at a building, I spend about the same amount of time with people as systems
- Owner+super+manager+occupants ÷ 4 = near truth
- Today I want to talk about some things that I’ve learned

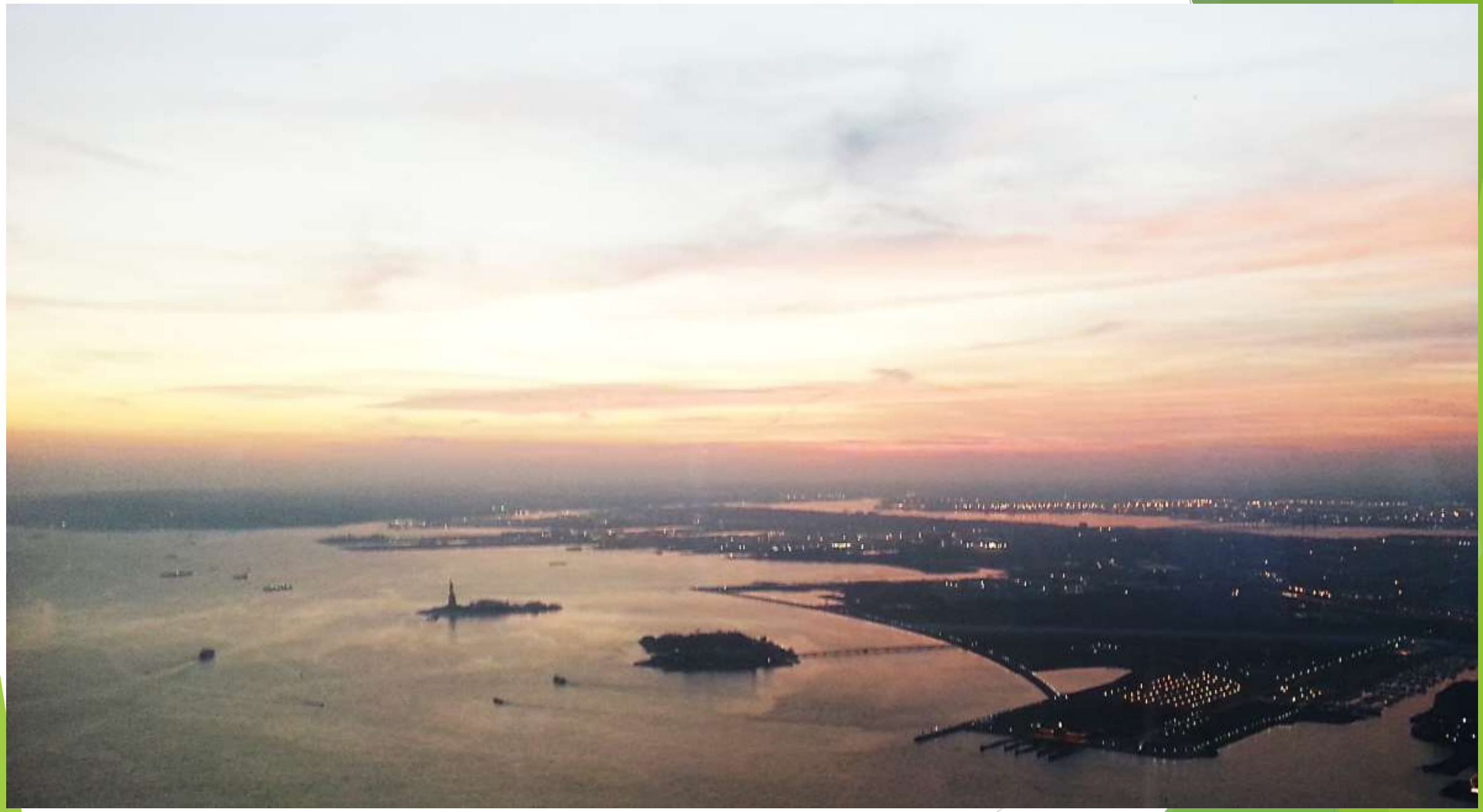
SURVEY!

- Multifamily Building owners?
- Building Managers?
- Owners of commercial property?
- Architects? Engineers?
- Bankers/Brokers?

Today's Agenda

- Buildings
- Data
- Research & Results
- Some Commentary

Welcome to New York! (Very Different from Alaska)



#1 Reason people move out of Apartments in USA?

COST.

#2 Reason people move out of Apartments in USA?

SMELL.

#3 Reason people move out of Apartments in USA?

NOISE.

#1 Reason people move out of Apartments in NYC?

PCV/ST vs. Solaire

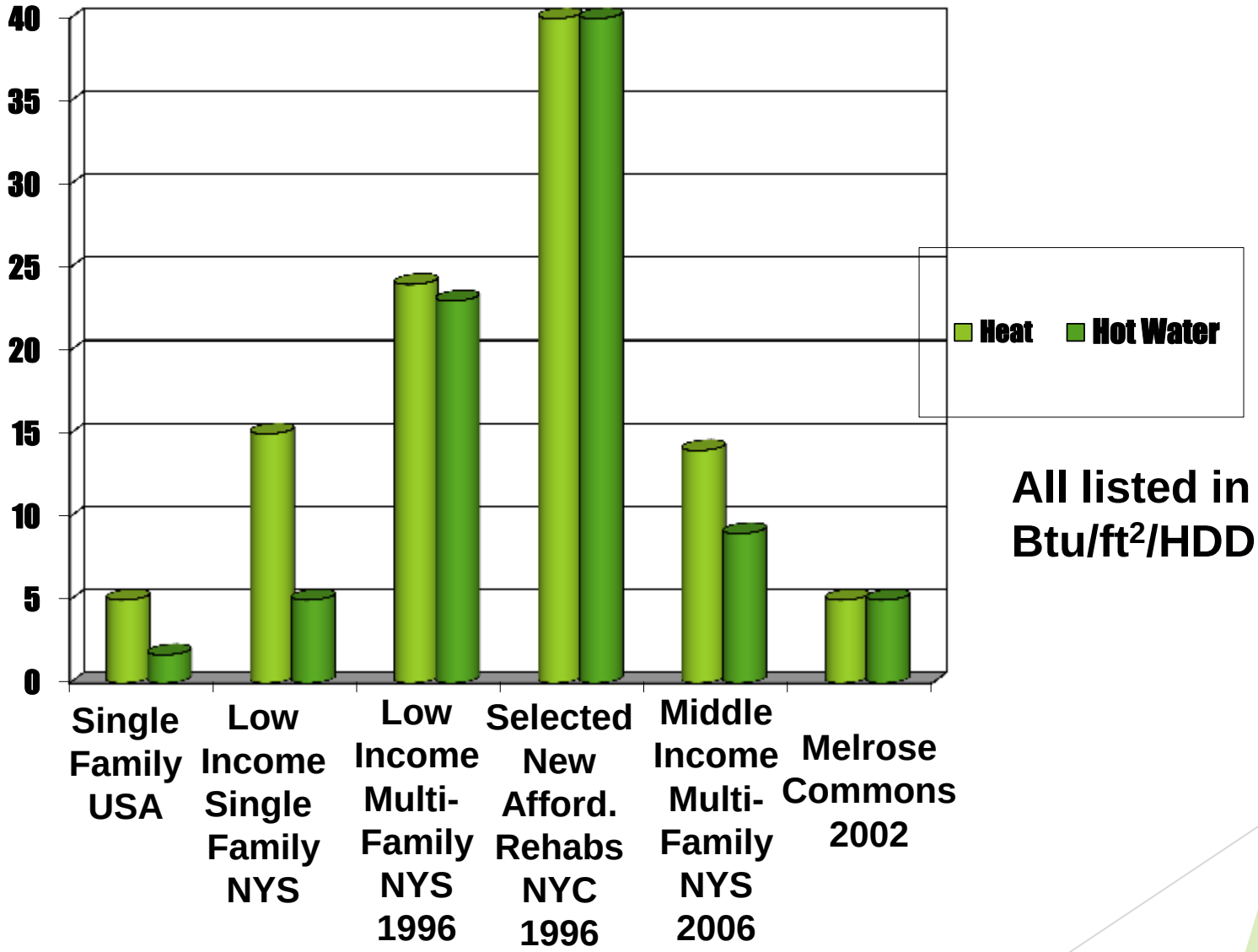
The Seven-to-One Problem in Buildings (DATA)

Boston Property Maintenance Costs

	Low	Mean	High
Water and sewer	$117	$516	$977*
Pest control	$32	$75	$156
Painting	$13	$72	$189
Landscaping	$0	$72	$187
Appliances	$0	$22	$79
Cabinets - Maintenance	$0	$34	$83
Cleaning supplies	$2	$33	$65
Lighting fixtures and bulbs	$6	$17	$38
Ovens and ranges	$0	$15	$26
Windows	$0	$5	$26
Lighting – Fixtures only	$0	$9	$18
Kitchen and bath fans	$0	$9	$2
Lighting - Bulbs only	$0	$3	$6

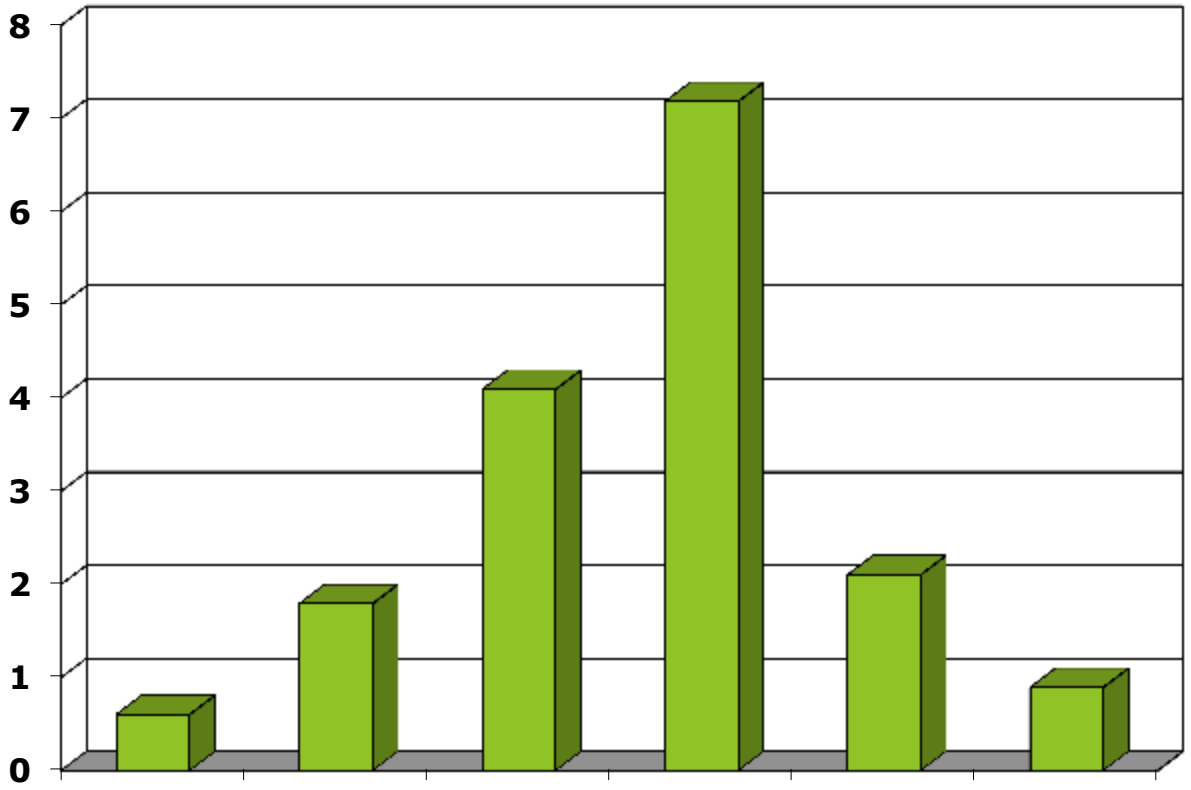
*** High costs are due to an unnoticed water usage with an outside hose.**

Range of Energy Usage in Buildings



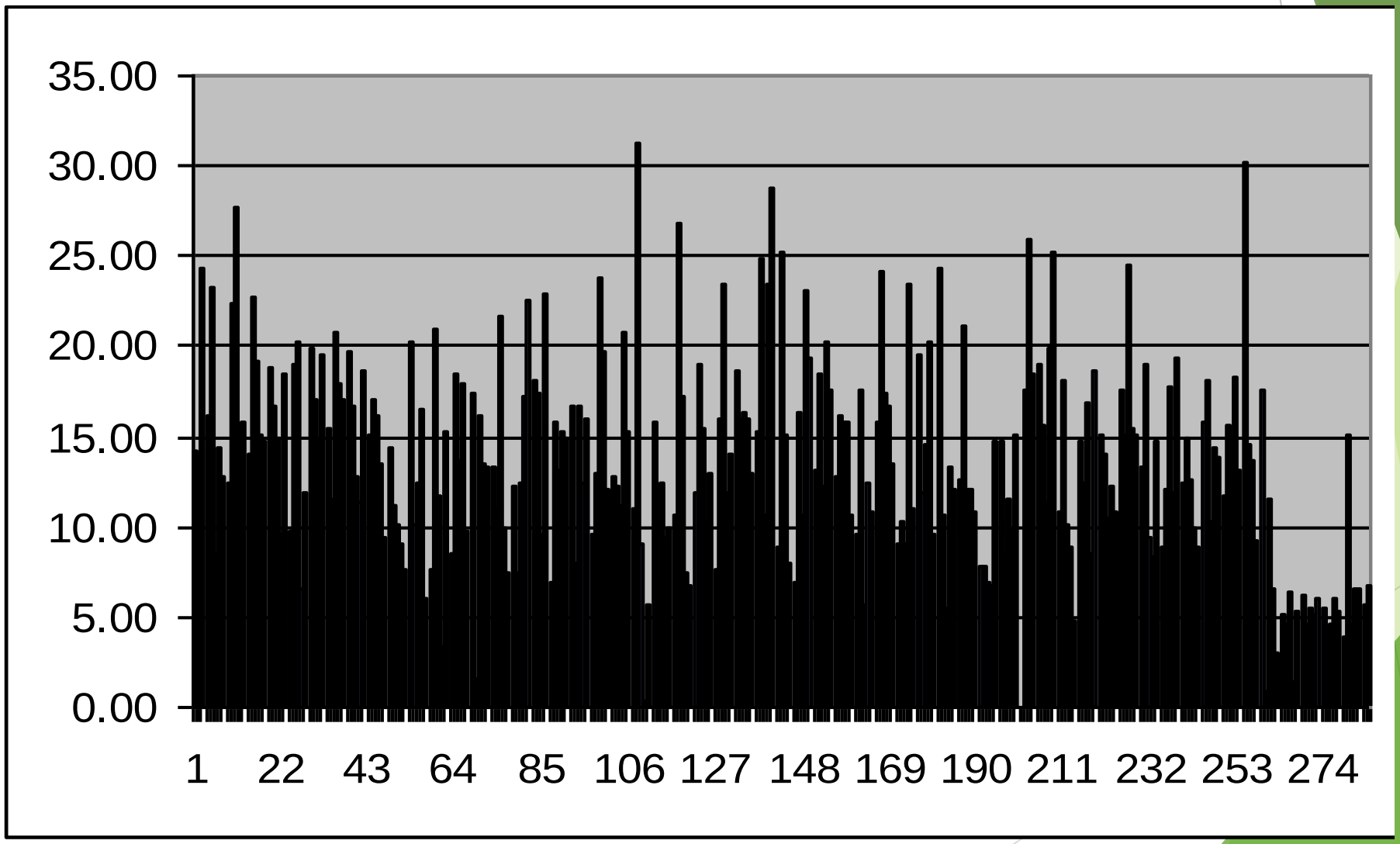
All listed in Btu/ft²/HDD

What does this mean in energy costs?

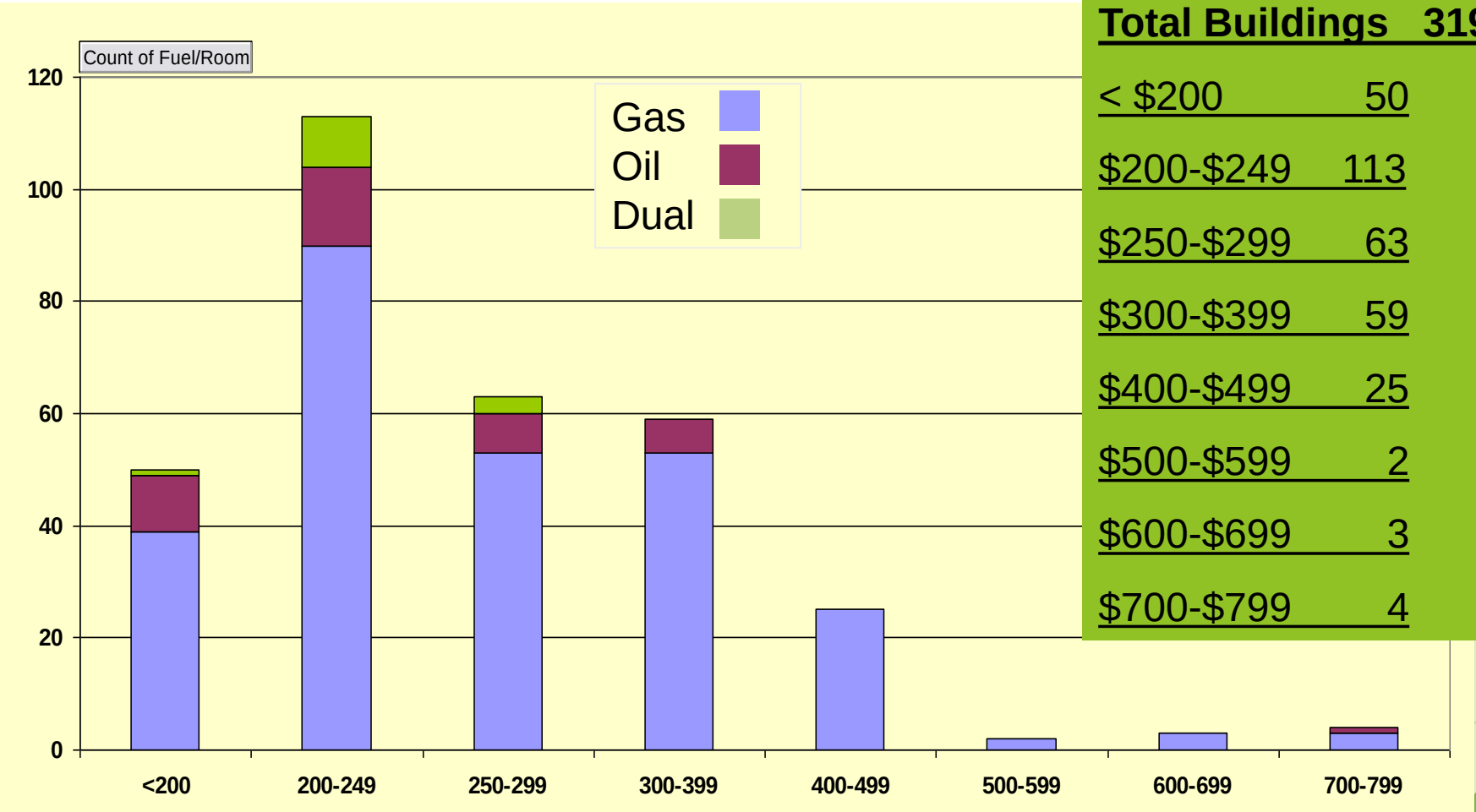


Gas Cost Assumes $1.85/therm

2001-2005


35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
1
22
43
64
85
106
127
148
169
190
211
232
253
274

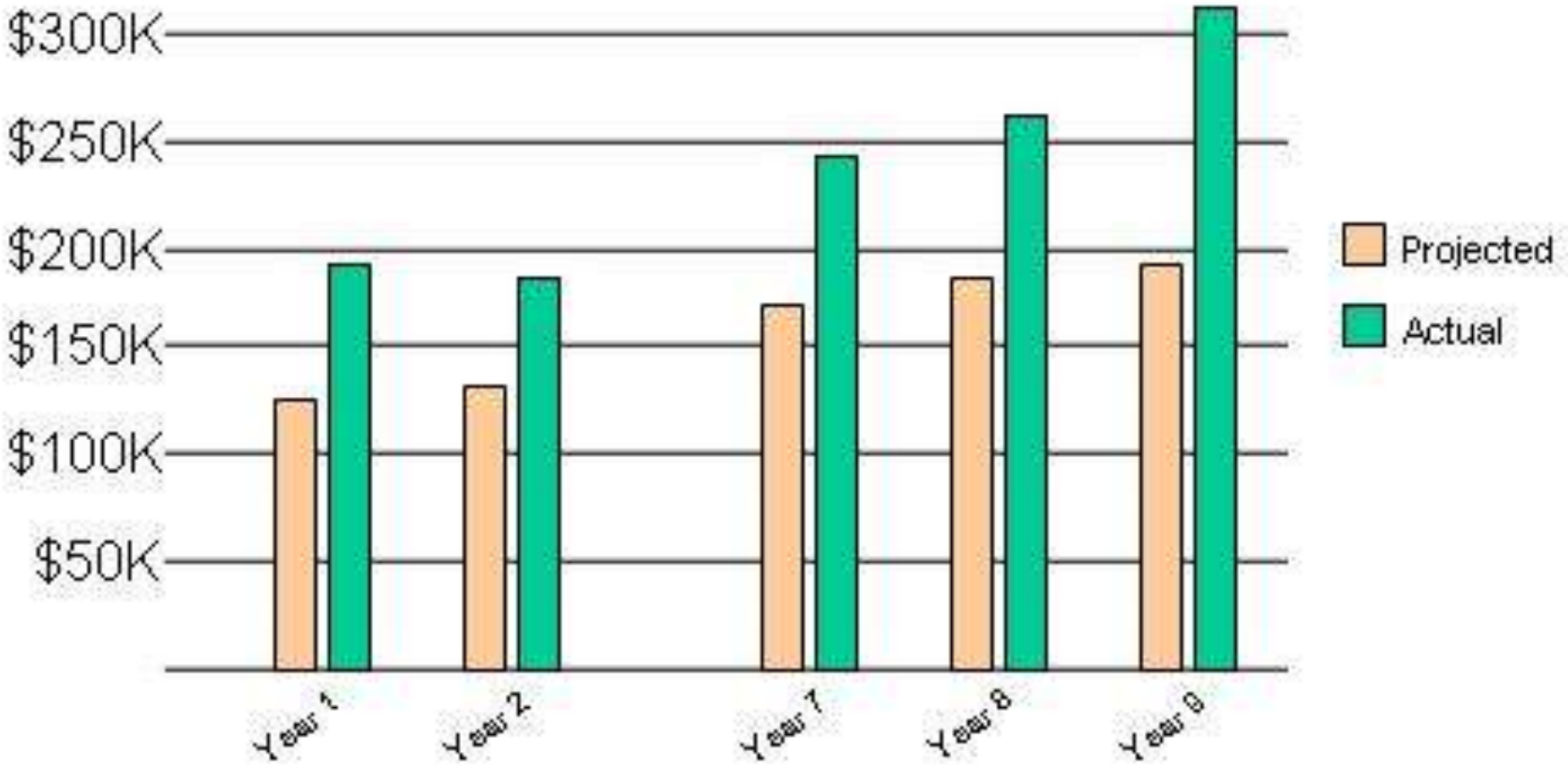
CPC Buildings- Fuel Costs per Room 2006



Total Buildings	319
< $200	50
$200-$249	113
$250-$299	63
$300-$399	59
$400-$499	25
$500-$599	2
$600-$699	3
$700-$799	4

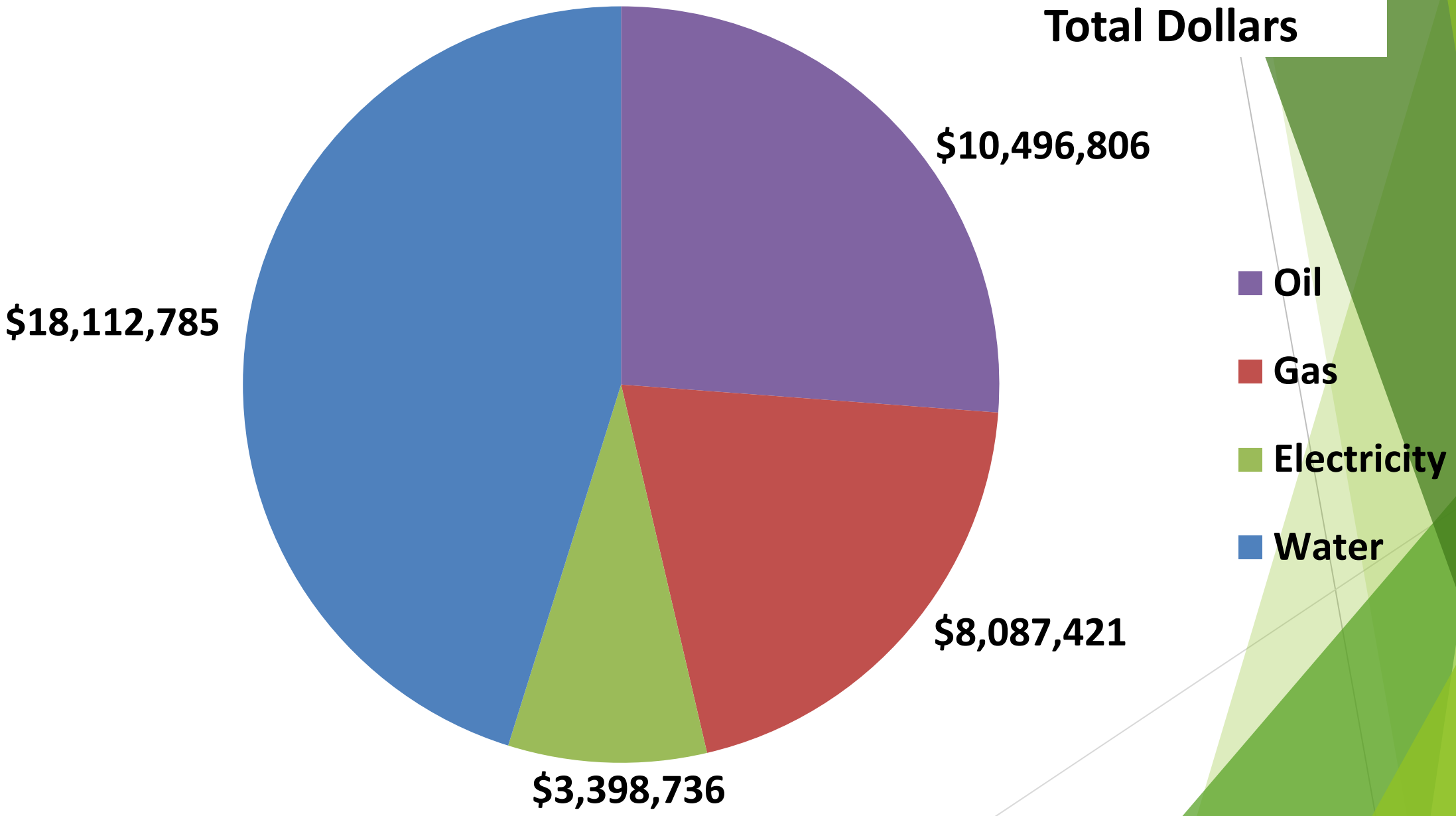
Fuel Cost/Room ($)

Actual utility costs for Urban Horizons have been consistently higher than projected in our real estate *pro formas* (1995)



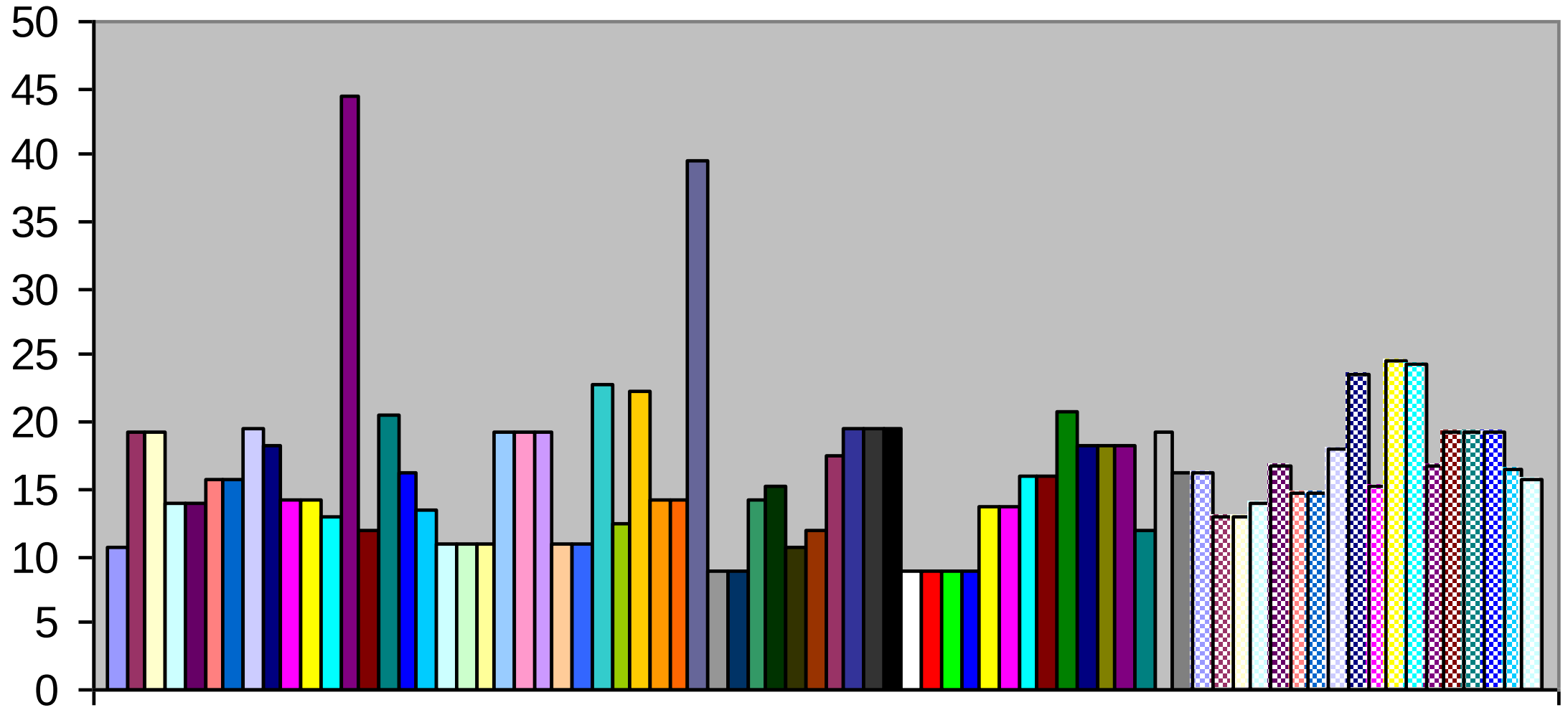
Costs were 50% higher than projected in Year 1.
Costs were 65% higher in Year 9.

CPC M&O Data 2012
Total Dollars



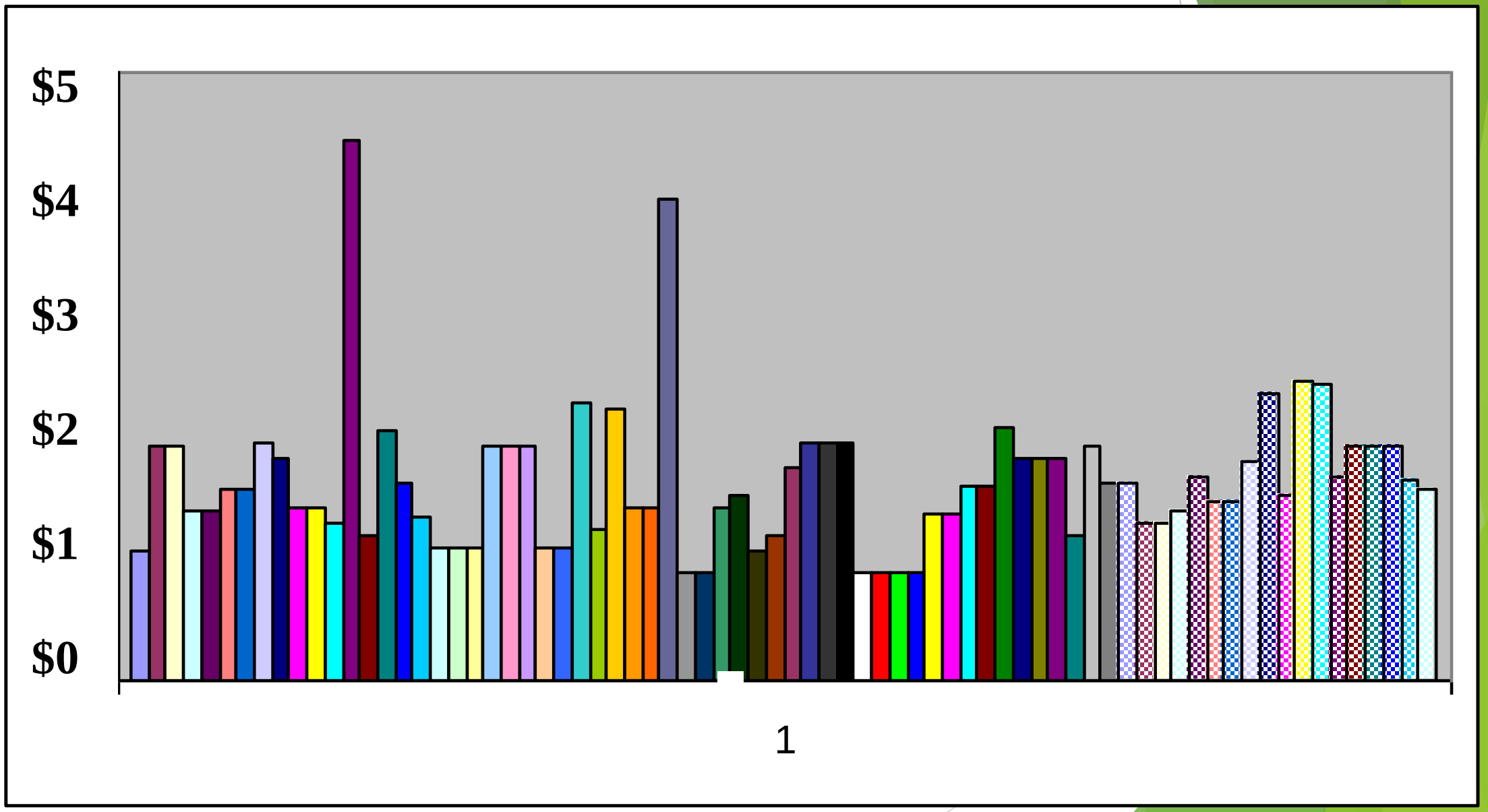
So, wanna see a real bad management company?

A Top 10 Owner of NYC Properties: Multifamily Energy Usage



All in Btu/ft2/HDD

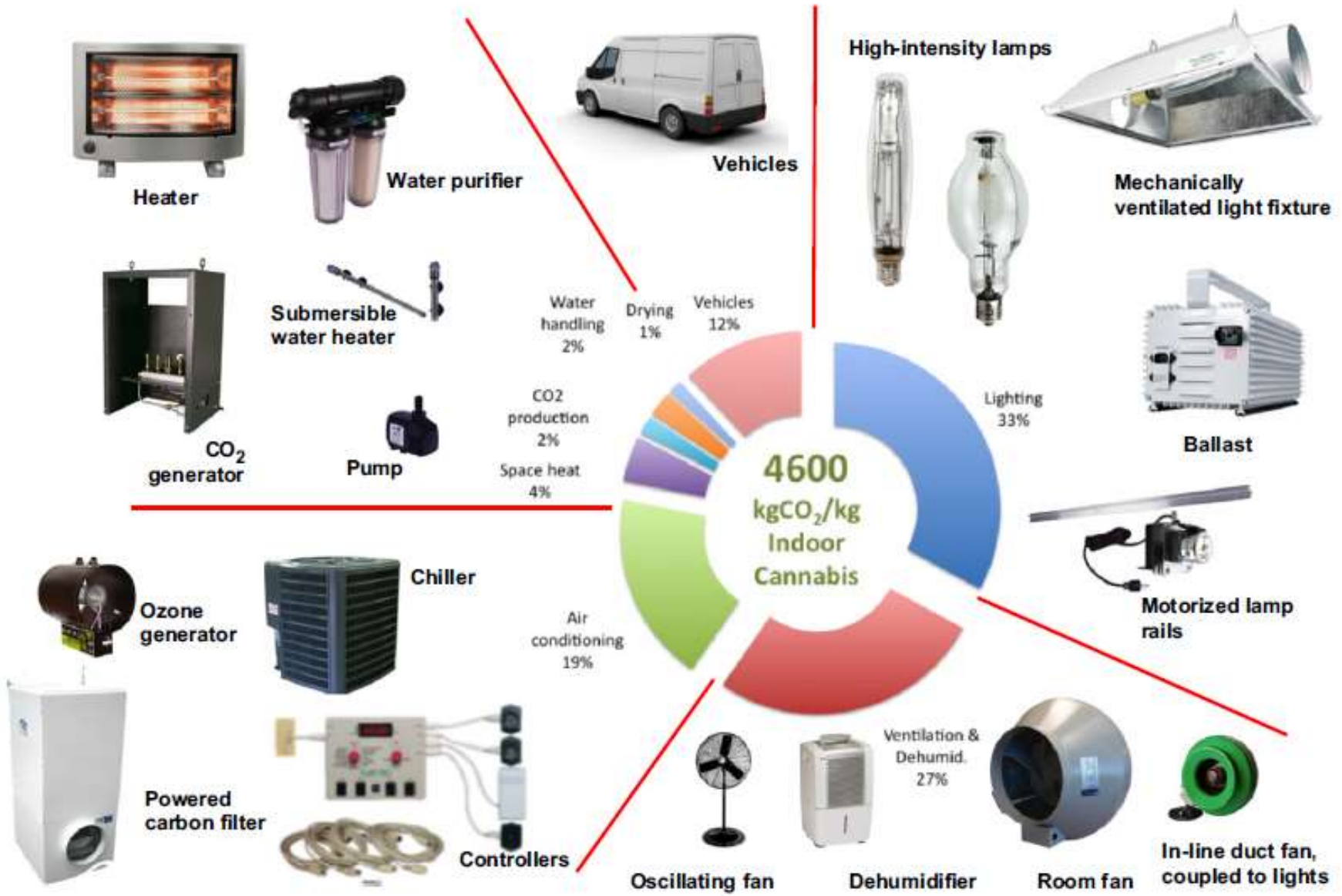
($/ft^2/Year)



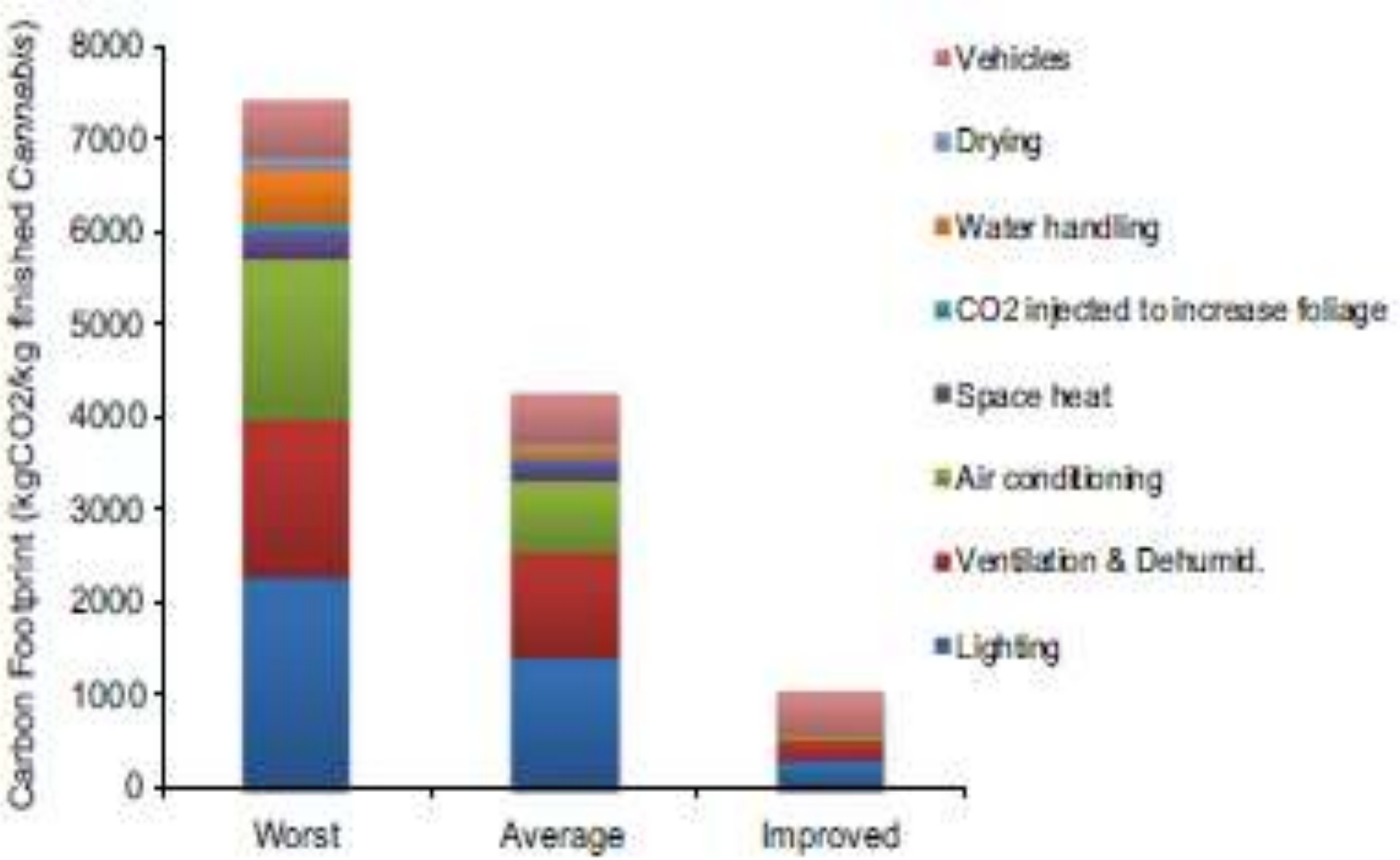
2% of California's Energy is used to manufacture this:

What is it?

Clue: It's a business that has recently been imported into other states, and it involves large buildings, massive heating and ventilation loads, high profit margins, and no tenants.


Heater
Water purifier
Vehicles
High-intensity lamps
Mechanically ventilated light fixture
Submersible water heater
Water handling 2%
Drying 1%
Vehicles 12%
CO_2 generator
Pump
CO2 production 2%
Space heat 4%
Lighting 33%
Ballast
4600 $kgCO_2/kg$ Indoor Cannabis
Motorized lamp rails
Ozone generator
Chiller
Air conditioning 19%
Powered carbon filter
Controllers
Ventilation & Dehumid. 27%
Oscillating fan
Dehumidifier
Room fan
In-line duct fan, coupled to lights

Carbon Foot Print of Marijuana Growers



But it’s not only the dopey NYC building owners, the rich Ivy League Trustafarians, or the stoners who have a Seven to one problem…….

Key Findings:

I. All Buildings

Figure 1: Overall Findings for 744 buildings (Audited and Benchmarked)

Total Square Footage	26,034,649 square feet
Annual Energy Consumption	3.26 trillion BTUs* of energy
Annual EUI Range	33,102 BTU/SF* – 1,973,345 BTU/SF*
Annual EUI Median	113,142 BTUs/SF*
Annual ECI Range**	$0.68/SF – $32.96/SF
Annual ECI Median**	$4.31/SF
Square Footage Range	1,200 SF – 361,698 SF
Square Footage Median	19,332 SF
Building Age Median (All)	30 years
Building Age Median (Schools)	32 years

*British Thermal Unit

**Benchmark data not used in cost numbers

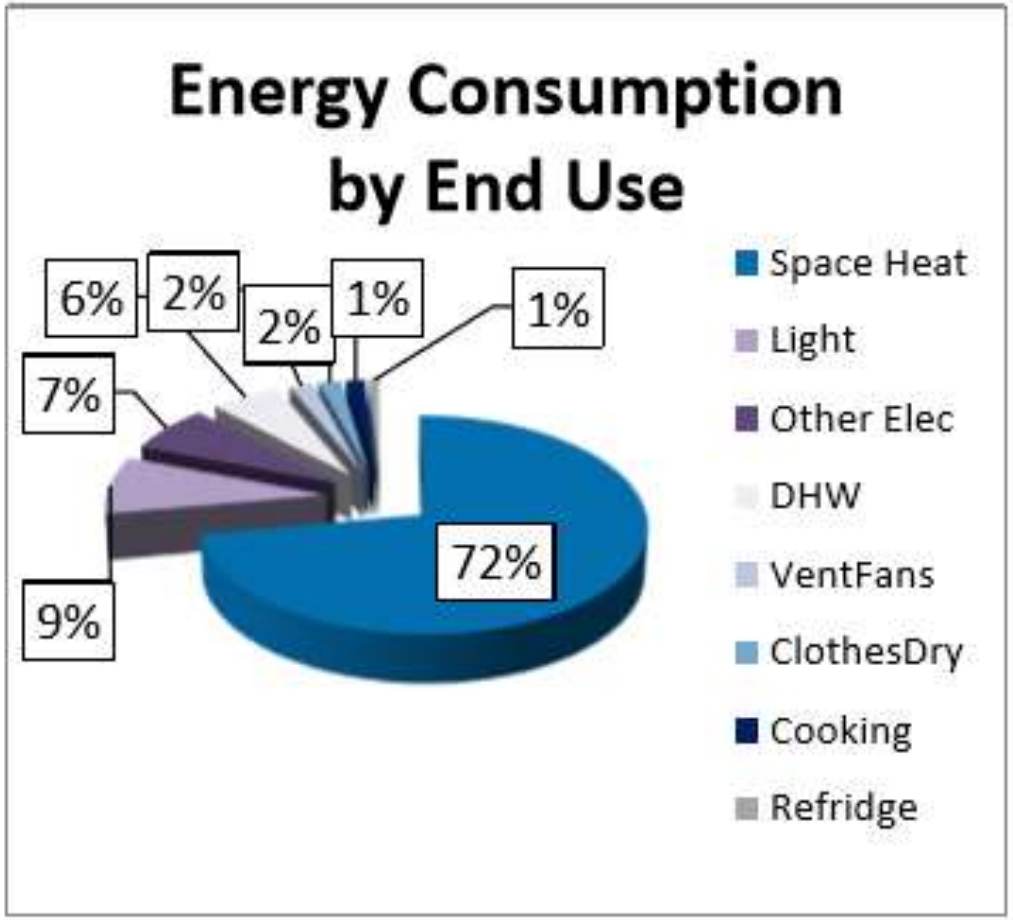
Source: Energy Efficiency of Public Buildings in Alaska: Metrics and Analysis 11/21/14

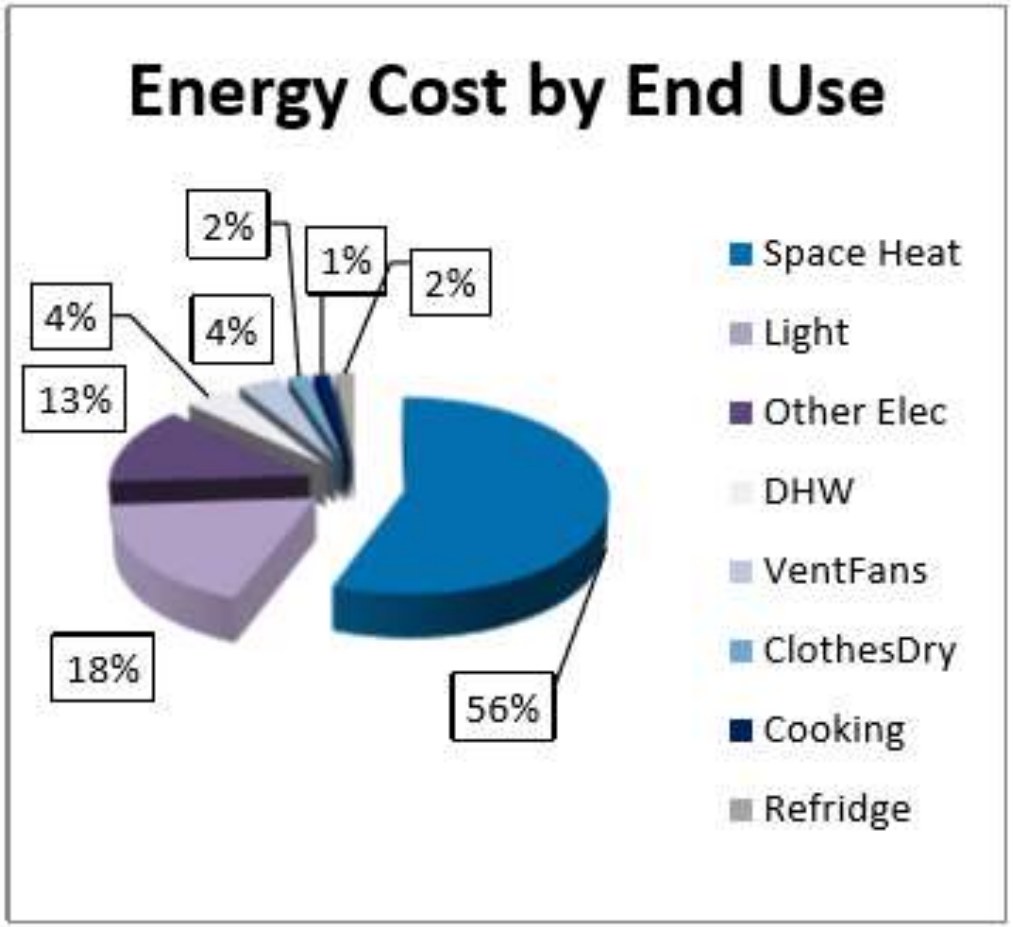
Figure 7: ECI by Usage Type[A]

USAGE TYPE	ECI[A]			
	AVG	MED	MAX	MIN
Athletics Facility	$3.22	$3.14	$5.31	$1.49
Education - K - 12	$4.29	$3.19	$12.46	$1.60
Health Care - Hospitals	$5.37	$4.13	$8.76	$3.22
Health Care - Nursing/Residential Care	$1.36	$1.36	$1.64	$1.07
Health Clinic	$6.49	$5.64	$12.14	$3.39
Maintenance/Shop	$5.19	$3.97	$19.53	$0.68
Office	$5.09	$4.71	$10.39	$1.25
Other	$2.96	$2.96	$3.51	$2.40
Pool	$7.77	$6.48	$15.71	$4.35
Public Assembly	$3.99	$2.69	$9.69	$1.79
Public Order and Safety	$4.52	$3.94	$9.72	$1.48
Terminals (Airport, Bus, Harbor, Train)	$4.85	$4.85	$4.85	$4.85
Warehousing and Wholesale	$3.33	$3.27	$5.68	$1.15
Washeteria / Water Plant	$25.18	$18.60	$108.27	$7.05

Source: Energy Efficiency of Public Buildings in Alaska: Metrics and Analysis 11/21/14

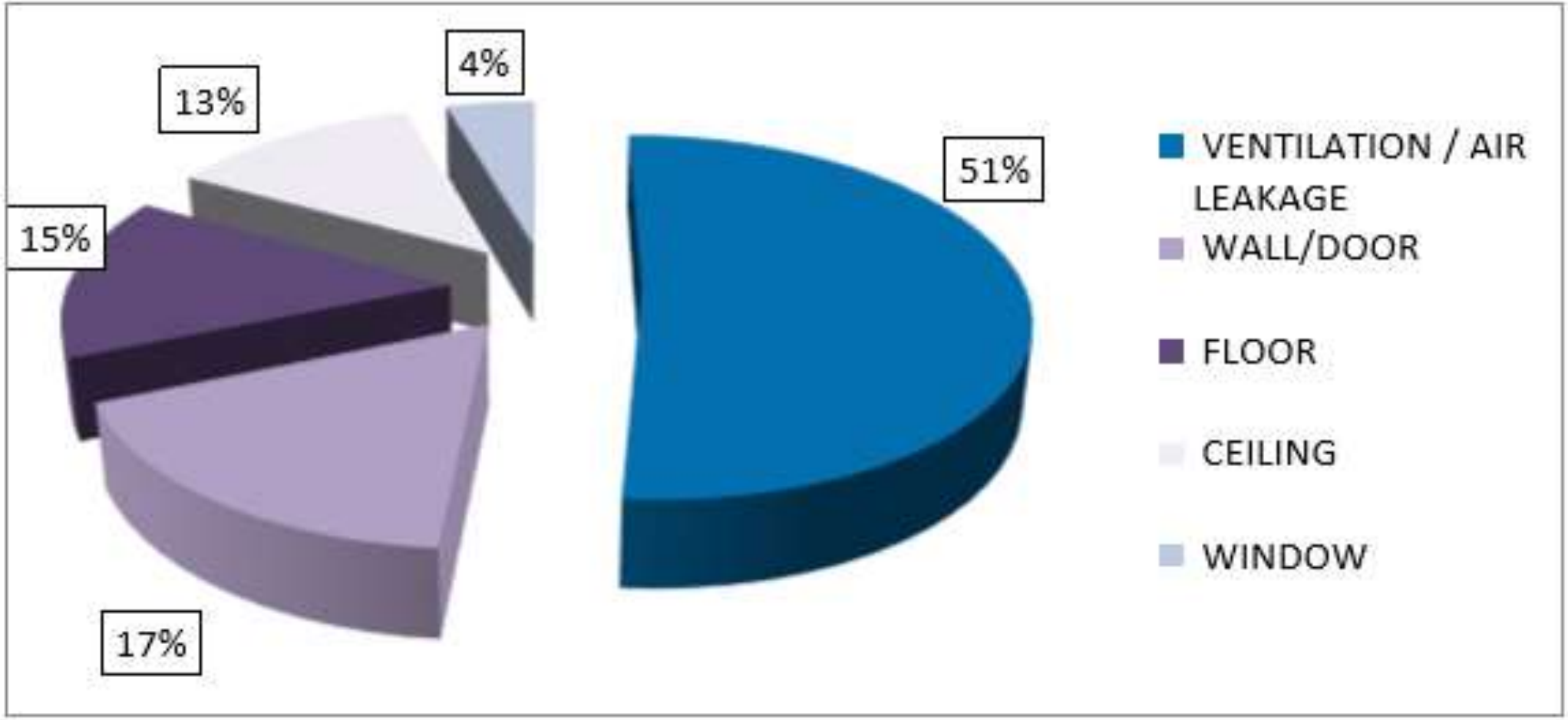
Figure 9: Energy Consumption and Cost by End Use[A]





Source: Energy Efficiency of Public Buildings in Alaska: Metrics and Analysis 11/21/14

Figure 10: Space heat loss by component for all audited buildings[A]



Source: Energy Efficiency of Public Buildings in Alaska: Metrics and Analysis 11/21/14

So why can’t energy geeks talk to bankers?

And Vice Versa?

Stupid Language on Both Ends

- BTU/ft²/HDD
- Blower door
- Interstitial
- CAZ test
- Condensing Boiler
- Infrared
- AHFA
- Phase 1 environmental
- Title search
- Comparables
- Liquidity
- Refi
- ROR
- Table Mortgage

Rule #1:

Bankers Can't do Math.

Rule #2

Bankers Don’t Want to Do Work.

Rule #3

Bankers Don’t Want to Do New Stuff.

Banking Transactions are about Risk

- Do you make enough money?
- Will the building have income?
- Expenses vs. income (we'll come back to this)
- How will income increase in the building?
- What are comparable buildings/rents?
- Who owns the title?
- Will the building last the length of the loan?
- Is there an environmental problem?

Energy Audits are about Improvement

- How much Energy/H^2O does the Building Use?
- How can we reduce usage/increase cash flow?
- How will results be attained/exceeded?
- What are comparable usage in buildings?
- Who owns the building/who makes decisions?
- Will the building last/can we increase its life?
- Is there an environmental problem?

Bankers vs. Geeks

(Understanding I have had both roles)

What soothes a banker's needs?

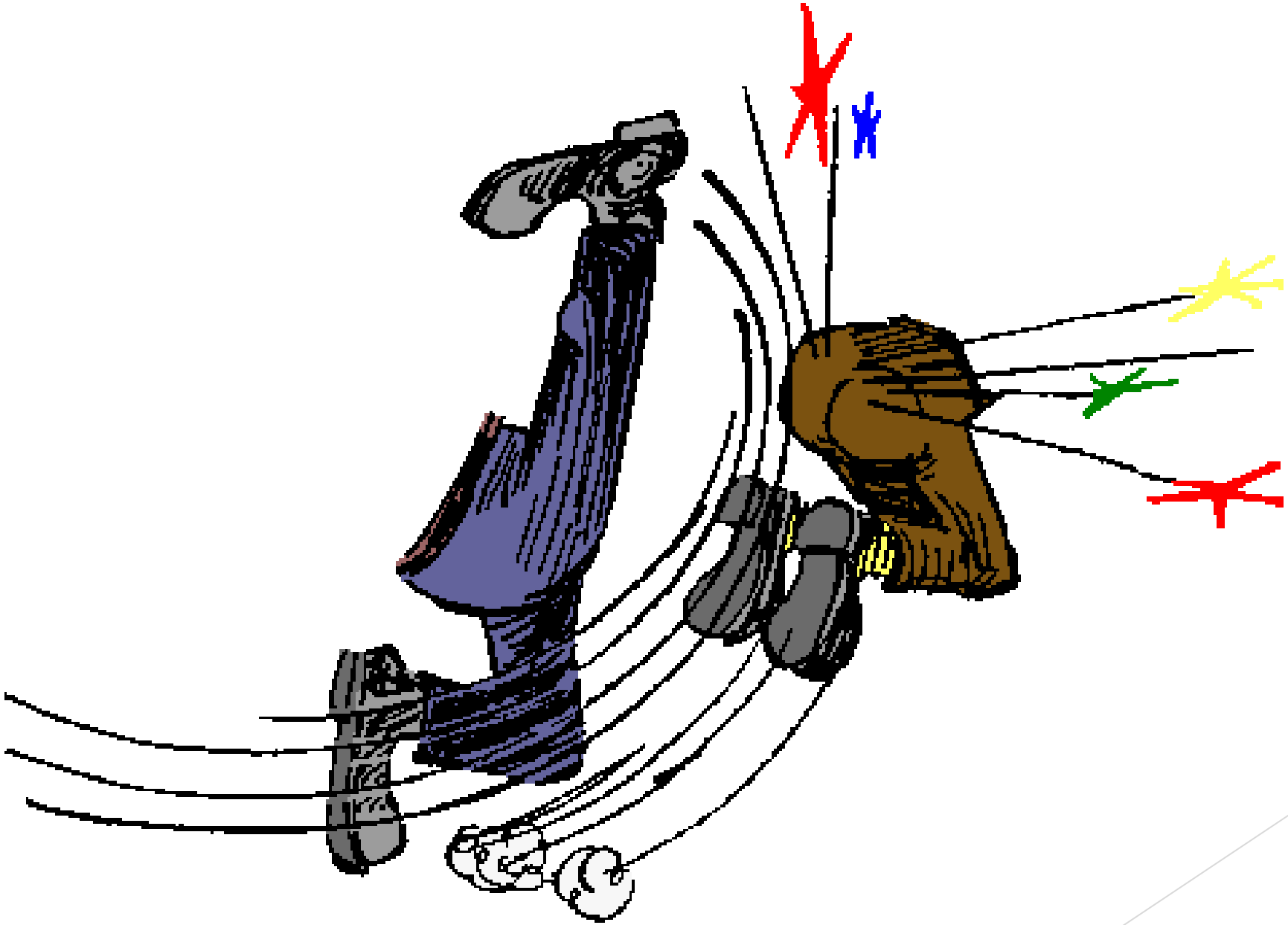
- You know the cash flow in the building
- You want to increase it via reduced costs
- You have done Comprehensive Needs Analysis
- It includes Costs and schedules
- What items have exceeded their useful life?
- The building will stay occupied/cash flowing
- Cash flow will increase
- You have a team and plan and are ready to go

How to get kicked out of a banker's office:

- "You just don't understand this"
- "Deep energy retrofit"
- LEED, Energy Star™, PassivHaus, Green, etc.
- "I'm an expert!"
- Blower door analysis in CFM 50
- "We're dense packing the walls"
- "Airsealing the building and the attic"

How to get kicked out of a banker's office: (part 2)

"We are doing a deep energy retrofit of this building, adding 4" of exterior insulation (or dense blowing the walls), moving a much smaller boiler to the roof and making it a condensing boiler, airsealing the apartments and the roof cavity, and reducing the water flow in the toilets, showers, and sinks."



Let's Break This Down……

- You're refinancing the debt on the building
- You're upgrading the firestopping throughout the building
- You're replacing the wall and roof insulation that has surpassed its useful life
- You're putting in a new boiler that will heat the building faster
- Installing high efficiency toilets and showerheads
- We have plans, specs, architect, engineer, Project Manager, and three bids

Income vs. Expenses

- Vacancy rate assumes 5%
- Expenses will go up 3% per year
- Income (rent) will go up 3% per year
- What is their biggest expense?
- What is their most controllable expense?
- Do you have data to disprove any of this?

Never.
Never.
Never.
Never.

Tell a banker you're going to save 40%.

Deutsche Bank
Corporate Social Responsibility

Passion to Perform

Recognizing the Benefits of Energy Efficiency in Multifamily Underwriting

January 2012

In conjunction with:

LIVING CITIES
INNOVATE • INVEST • LEAD

Prepared by:

Steven Winter Associates

HR&A Advisors

BRIGHT POWER

SAHF
THE BUSINESS OF MISSION

Energy and Water Savings in Multifamily Retrofits

Results from the U.S. Department of Housing and Urban Development's Green Retrofit Program and the Energy Savers Program in Illinois

Conclusion #1

1. Retrofits produced significant energy and water savings.

Conclusion #2

2. Less efficient properties achieved higher post-retrofit savings.

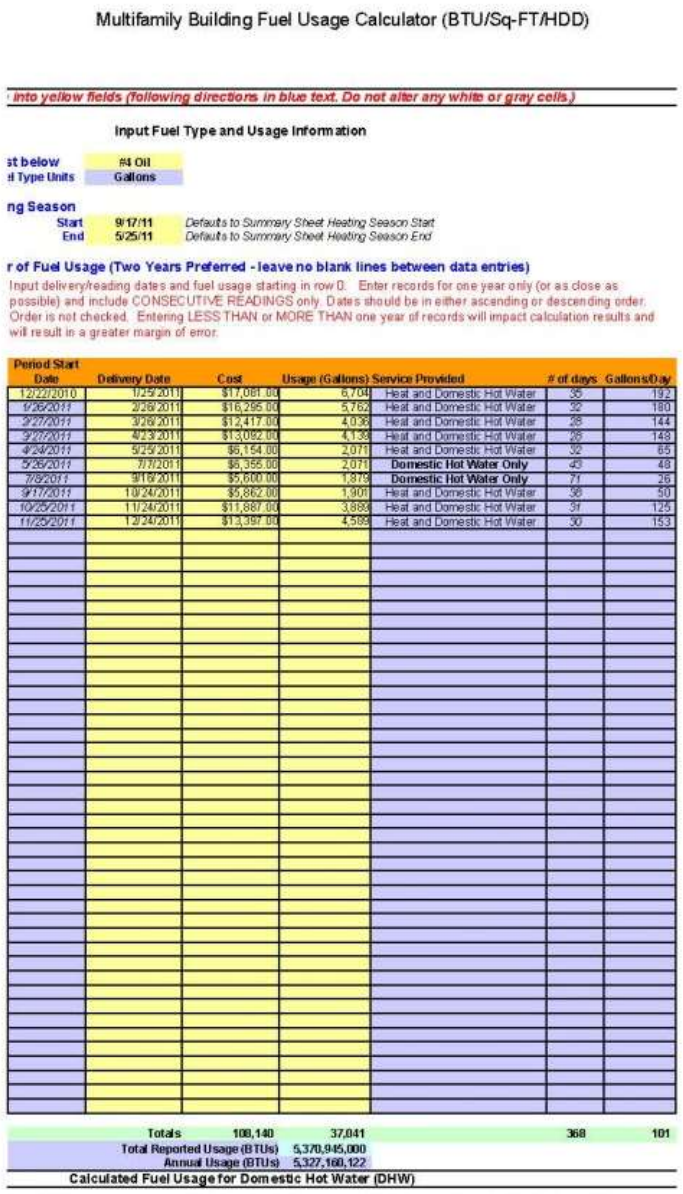
Conclusion #3

3. Both energy and water retrofits were cost-effective (water was more cost effective and more predictable, fuel second, electricity third) and both energy and water savings vary widely at the individual property level.

“Don’t EVER say Btu/ft2/HDD to me again! Give me a report card! ”

Quote from frustrated mortgage officer trying to learn math

Multifamily Building Fuel Usage Calculator (BTU/Sq-FT/HDD)



Multifamily Building Fuel Usage Calculator (BTU/Sq-FT/HDD)

into yellow fields (following directions in blue text. Do not alter any white or gray cells.)

Input Fuel Type and Usage Information

st below #4 Oil
l Type Units Gallons

ng Season
Start 9/17/11 Defaults to Summary Sheet Heating Season Start
End 5/25/11 Defaults to Summary Sheet Heating Season End

r of Fuel Usage (Two Years Preferred - leave no blank lines between data entries)
Input delivery/reading dates and fuel usage starting in row 0. Enter records for one year only (or as close as possible) and include CONSECUTIVE READINGS only. Dates should be in either ascending or descending order. Order is not checked. Entering LESS THAN or MORE THAN one year of records will impact calculation results and will result in a greater margin of error.

Period Start Date	Delivery Date	Cost	Usage (Gallons)	Service Provided	# of days	Gallons/Day
12/22/2010	1/25/2011	$17,081.00	6,704	Heat and Domestic Hot Water	35	192
1/26/2011	2/28/2011	$16,295.00	5,762	Heat and Domestic Hot Water	32	180
2/27/2011	3/26/2011	$12,417.00	4,036	Heat and Domestic Hot Water	28	144
3/27/2011	4/23/2011	$13,092.00	4,139	Heat and Domestic Hot Water	28	148
4/24/2011	5/25/2011	$6,154.00	2,071	Heat and Domestic Hot Water	32	65
5/26/2011	7/7/2011	$6,355.00	2,071	Domestic Hot Water Only	43	48
7/8/2011	9/16/2011	$5,600.00	1,879	Domestic Hot Water Only	71	26
9/17/2011	10/24/2011	$5,862.00	1,901	Heat and Domestic Hot Water	38	50
10/25/2011	11/24/2011	$11,887.00	3,889	Heat and Domestic Hot Water	31	125
11/25/2011	12/24/2011	$13,397.00	4,589	Heat and Domestic Hot Water	30	153

Totals	100,140	37,041		368	101
Total Reported Usage (BTUs)	5,370,945,000				
Annual Usage (BTUs)	5,327,160,122				

Calculated Fuel Usage for Domestic Hot Water (DHW)

into yellow fields (following directions in blue text. Do not alter any white or gray cells.)

Input Fuel Type and Usage Information

st below #4 Oil
l Type Units Gallons

ng Season
Start 9/17/11 Defaults to Summary Sheet Heating Season Start
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11/25/2011	12/24/2011	$13,397.00	4,589	Heat and Domestic Hot Water	30	153

Input Electricity Usage Information (KWH)

1. Input a Minimum of One Year of Electricity Usage (Two Years Preferred - leave no blank lines between data entries)

#	Reading Date	KWH	Cost	# of days	KWH/Unit/Day	KWH/SqFt/Day
0	12/29/2011	6,354	$625.00	30	3.11	0.00
1	11/29/2011	6,300	$622.00	30	3.09	0.00
2	10/27/2011	5,508	$729.00	33	2.45	0.00
3	9/27/2011	5,868	$669.00	30	2.88	0.00
4	8/26/2011	5,508	$652.00	32	2.53	0.00
5	7/28/2011	5,814	$593.00	29	2.95	0.00
6	6/28/2011	6,120	$590.00	30	3.00	0.00
7	5/27/2011	5,382	$538.00	32	2.47	0.00
8	4/28/2011	5,544	$572.00	29	2.81	0.00
9	3/30/2011	5,562	$519.00	29	2.82	0.00
10	3/1/2011	6,606	$595.00	29	3.35	0.00
11	1/28/2011	6,156	$569.00	32	2.83	0.00
12	12/29/2010	6,282		30	3.08	0.00
13	11/29/2010	6,102		30	2.99	0.00
14	10/27/2010	5,346		33	2.38	0.00
15	9/27/2010	6,102		30	2.99	0.00
16	8/26/2010	5,418		32	2.49	0.00
17	7/28/2010	5,544		29	2.81	0.00
18	6/28/2010	5,976		30	2.93	0.00
19	5/27/2010	5,022		32	2.31	0.00
20	4/29/2010	5,292		28	2.78	0.00
21	3/31/2010	5,598		29	2.84	0.00
22	3/2/2010	6,498		29	3.30	0.00
23	1/29/2010	6,246		32	2.87	0.00
24						
Total Reported Usage (2.00 years)		140,148	7,273	729	2.82	0.00

Input Water Usage Information

1. Select Meter Measure Gallons

2. Input a Minimum of One Year of Water Usage (Two Years Preferred - leave no blank lines between data entries

#	Reading Date	Usage (Gallons)	Cost	# of days	Gallons/Unit/Day
0	*12/31/2010*				
1	*12/31/2011*	*4,051,500*		*365*	163.24
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					

Number of Residential Units	68
Building Square Footage	58,030

CPC has analyzed your building's fuel, water, and electricity usage, and here's your CPC Benchmark Plus Report Card:

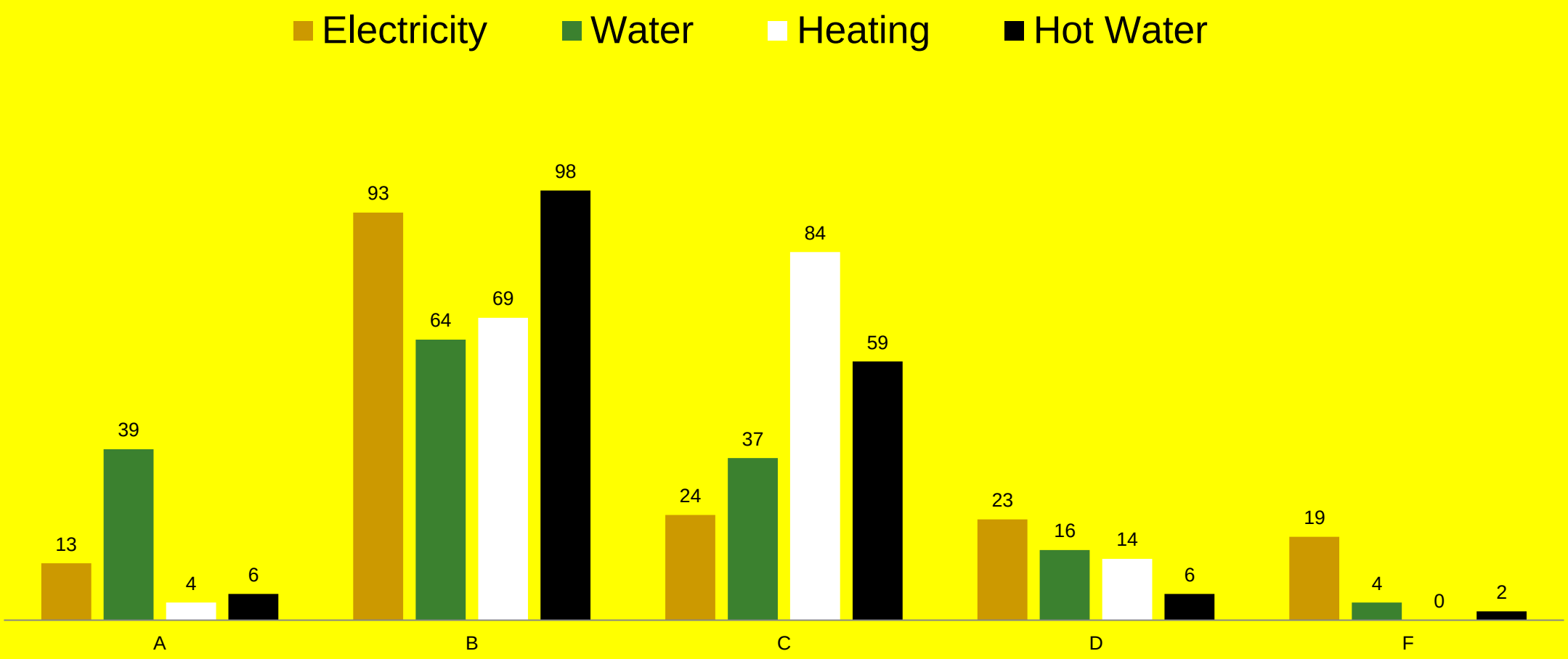
Your building's fuel usage (#4 Oil) for heating is 13.2 BTU/SqFt/HDD
and according to our scorecard, your building is a **C**

Your building's fuel usage (#4 Oil) for hot water is 73.9 BTU/Apt/Day
and according to our scorecard, your building is a **B**

Your building's common area electric usage is 1.2 KWH/SqFt/Year
and according to our scorecard, your building is a **B**

Your building's water usage is 69.8 Gallons/SqFt/Year
and according to our scorecard, your building is a **C**

CPC Report Card Grades



Rubric based off " The Green Benchmarking Cheat Sheet"

Simple Swaps, Major Savings

Don't get left underwater! New York City water costs around $.01 a gallon, plus an extra penny to heat each gallon. In order to help you cut down on costs, CPC developed a convenient worksheet to help you save on water and heating expenses in your multi-family building. Our simple solutions quickly reduce your overhead without large capital expenditures and could lead to an annual savings of over $303 per tenant.

Showerhead Switch from 2.5gpm to 1.75gpm

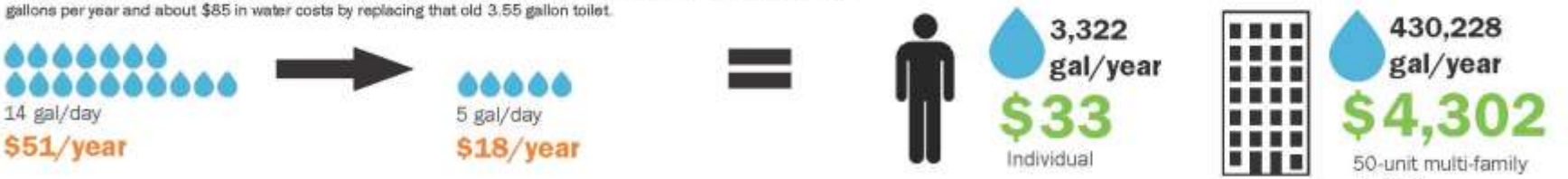
Those long hot showers are nice but a typical bathroom has a 2.5 gpm showerhead and many older models waste 5 or more gallons per minute (gpm). Upgrade existing showerheads to a 1.75 gpm showerhead and save 7.5 gallons per 10 minute shower. Per person, that's an annual savings of 2,738 gallons of water and $54 in water and related heating costs per year.

Sink Aerators Switch from 2.5gpm to .5gpm

Replace old bathroom sink aerators with 0.5 gpm high efficiency pressure compensating aerators (PCA) and save 7,300 gallons of water and $144 in water and related heating costs year/person. ADDITIONAL SAVINGS: Update your kitchen sink to a 1.5gpm aerator and save 3,650 gallons and $72 year/person.

Toilet Switch from 3.5gpf to 1.28gpf

Most old toilets use 3.5 gallons per flush (gpf) while some pre-1980 models use 5 gallons or more. Install high efficiency 1.28 gallon WaterSense certified toilets and save 2.22 gpf. For a typical household, you can save approximately 8,605 gallons per year and about $85 in water costs by replacing that old 3.55 gallon toilet.



The Community Preservation Corporation (CPC) is a not-for-profit mortgage lender that finances affordable multi-family housing throughout New York.
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PCV/ST vs. Solaire

Thank you for your time!