American Water Works Association

The Authoritative Resource on Safe Water℠

Energy & Water Savings Potential in Commercial Food Service

FISHER NICKEL inc.

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Food Service Technology Center

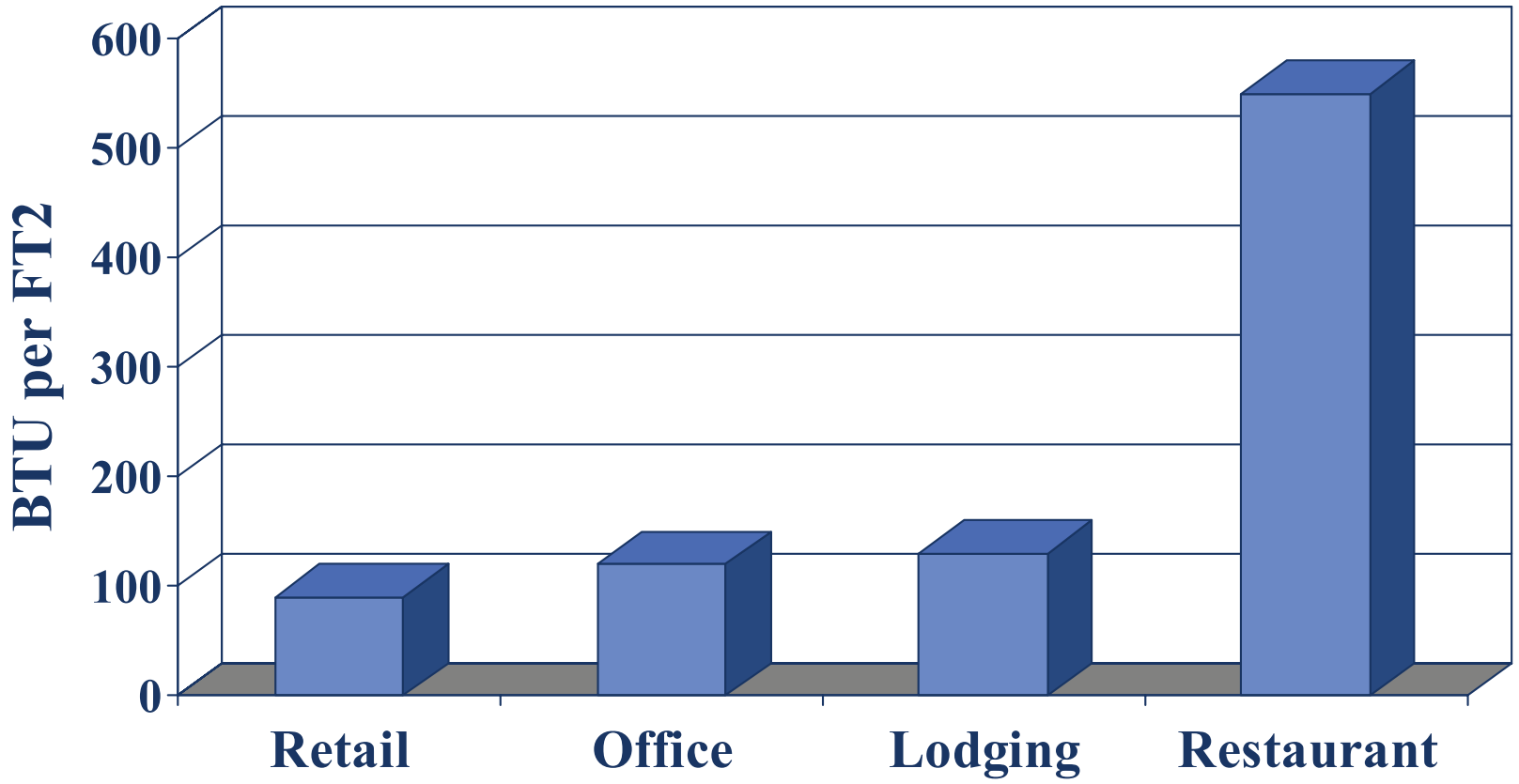
The Food Service Technology Center (FSTC) program is funded by California utility customers and administered by the Pacific Gas and Electric Company under the auspices of the California Public Utilities Commission.

Promoting:

Energy Efficiency in Commercial Food Service

PG&E Pacific Gas and Electric Company®

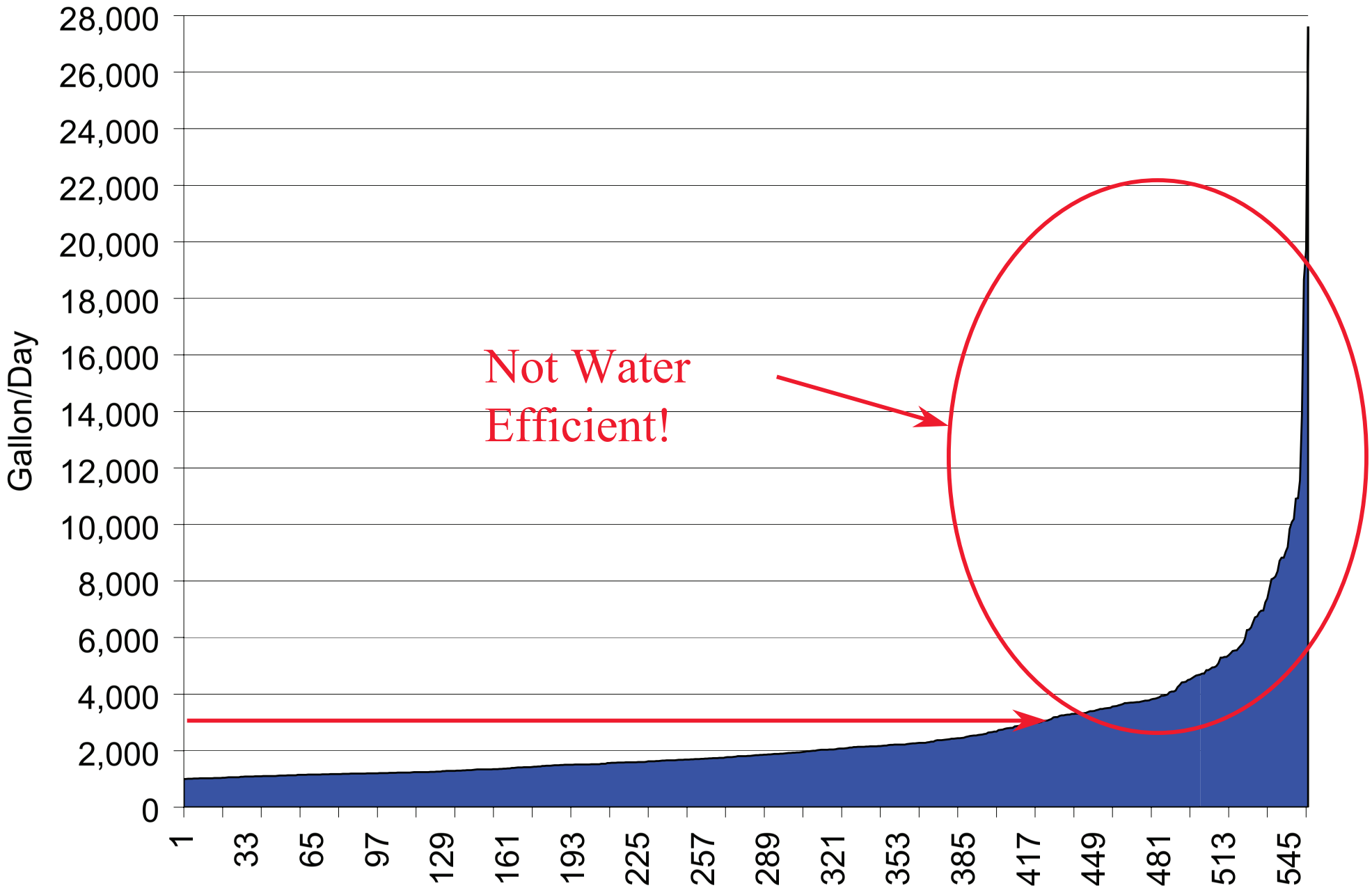
Foodservice is energy intensive ...



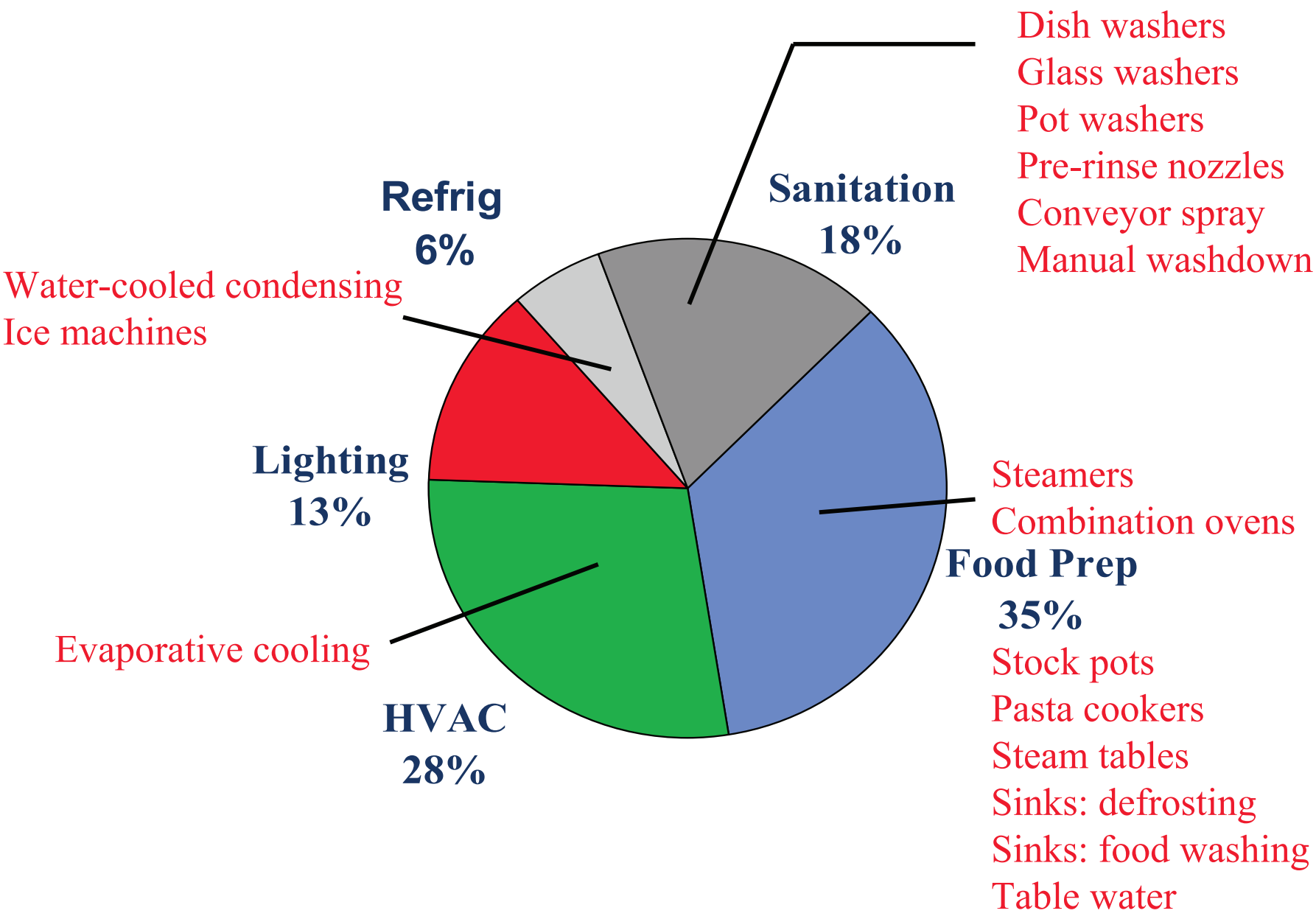
…and Water Intensive!

300 – 3000 gallons per day

Some Restaurants Use More Water Than Others!



…and where does it go?



Conservation Perspective:

- 1,000,000 food service facilities in U.S.
- $10 billion energy bill
- 300 billion gallons of water per year
- Untapped conservation potential

=

An appliance utility bill can easily match your gas bill!

If you had to gas each appliance in your restaurant every morning, your perspective would quickly change…

Monitoring the Dishroom

Cost Projection

	Conveyor Dishwasher	Booster Heater
Average daily electrical Consumption (kWh)	115	66
Peak demand (kW) (15 minute interval)	12.98	16.2
Average electric demand (kW)	8.03	4.58
Daily electric costs*	$17.28	$9.84
Annual electric costs* (360 days)	$6,221	$3,542

Add $2000 for Water/Sewer!

Add $3000 for Gas!

Add $3000 for Detergent!

*$0.15 kWh

$18,000 Operating Cost!

All Driven by Water Consumption!

But the commercial kitchen is a complicated and challenging environment!

And while kitchen operators are highly skilled at controlling labor and food costs…

…utility costs remain essentially "out of control"

Enter the…
PG&E Food Service Technology Center!

- Appliance Testing Laboratory
  - create standard test methods

Use data to create customer specific utility use & cost model

ASTM Test Methods for 32 appliance types!

…to help customers spec the right appliance for their kitchen!

?

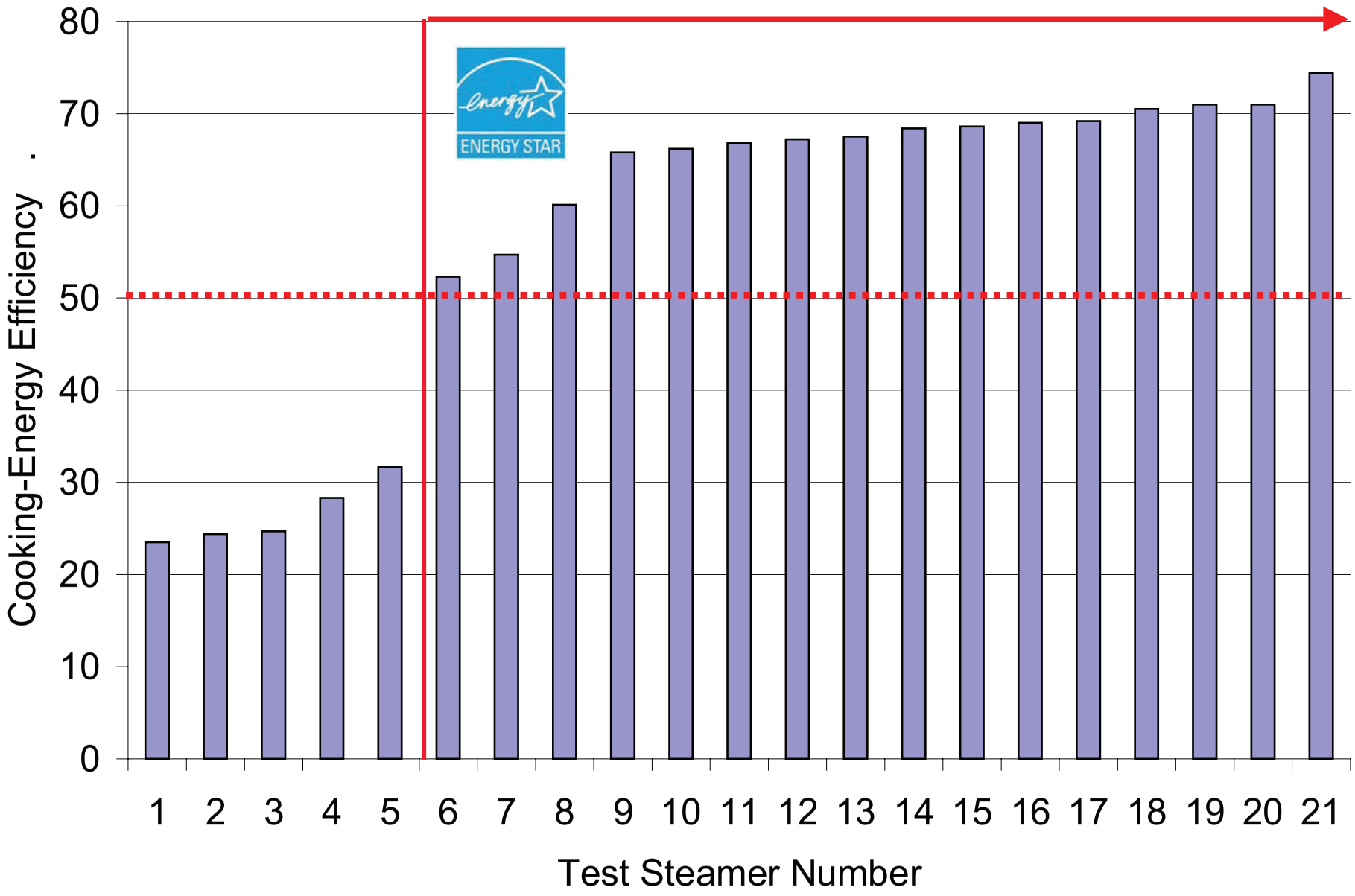
?

?

Appliances are not created equal!

Energy Star Steamer Saves Big on Water and Energy

Electric Steamer Efficiency



Steam Generator (8 kW Electric)

Full-Load Frozen Green Peas:

8.4 kW **27 gal/h**

Full-Load Red Potatoes:

8.4 kW **27 gal/h**

Boilerless (9 kW Electric)

Full-Load Frozen Green Peas:

5.8 kW **< 2.0 gal/h**

Full-Load Red Potatoes:

4.2 kW **< 2.0 gal/h**

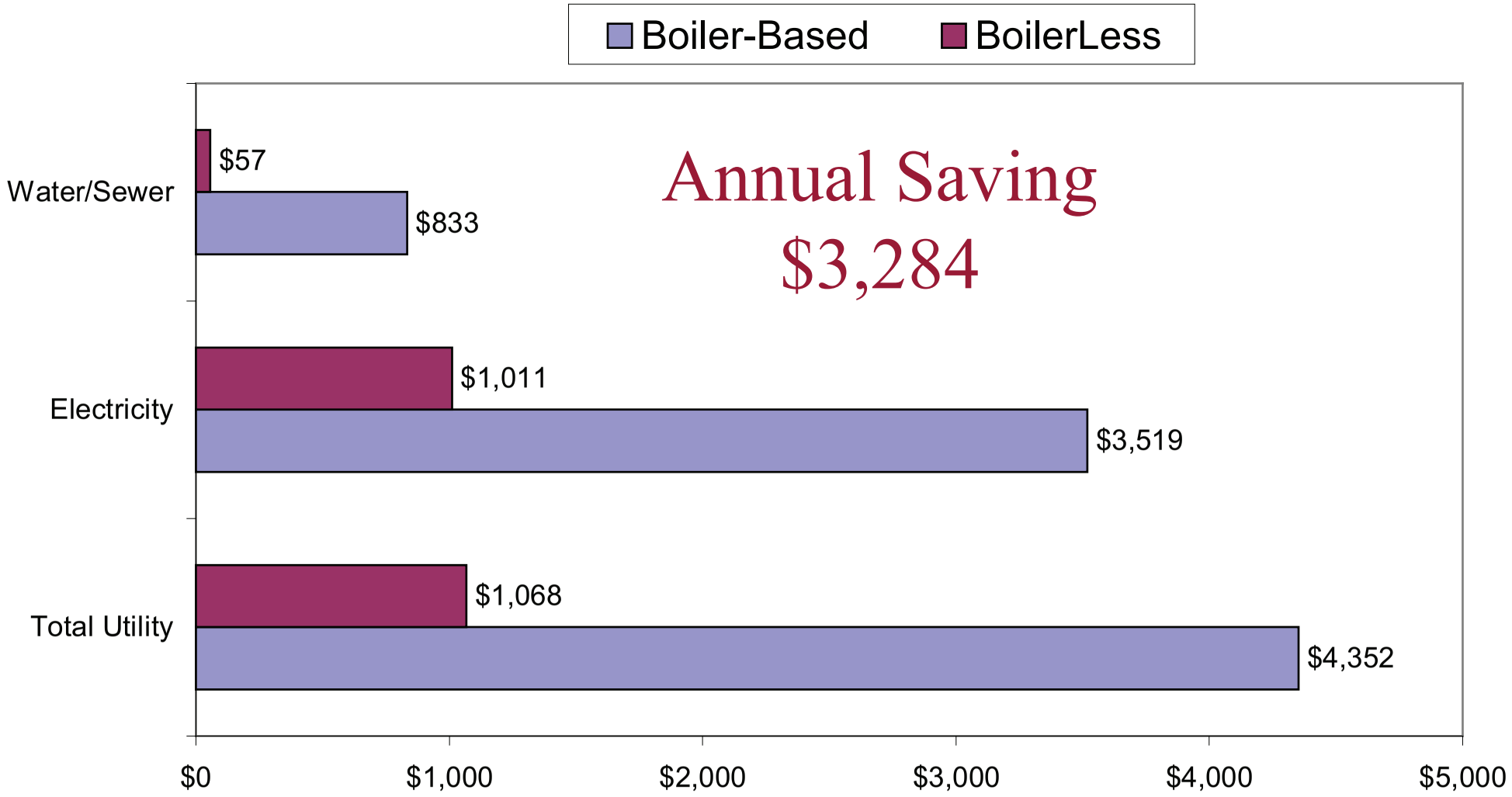
Steamer Field Study

Metropolitan Water District
East Bay Municipal Utility District
Pacific Gas & Electric
Southern California Edison

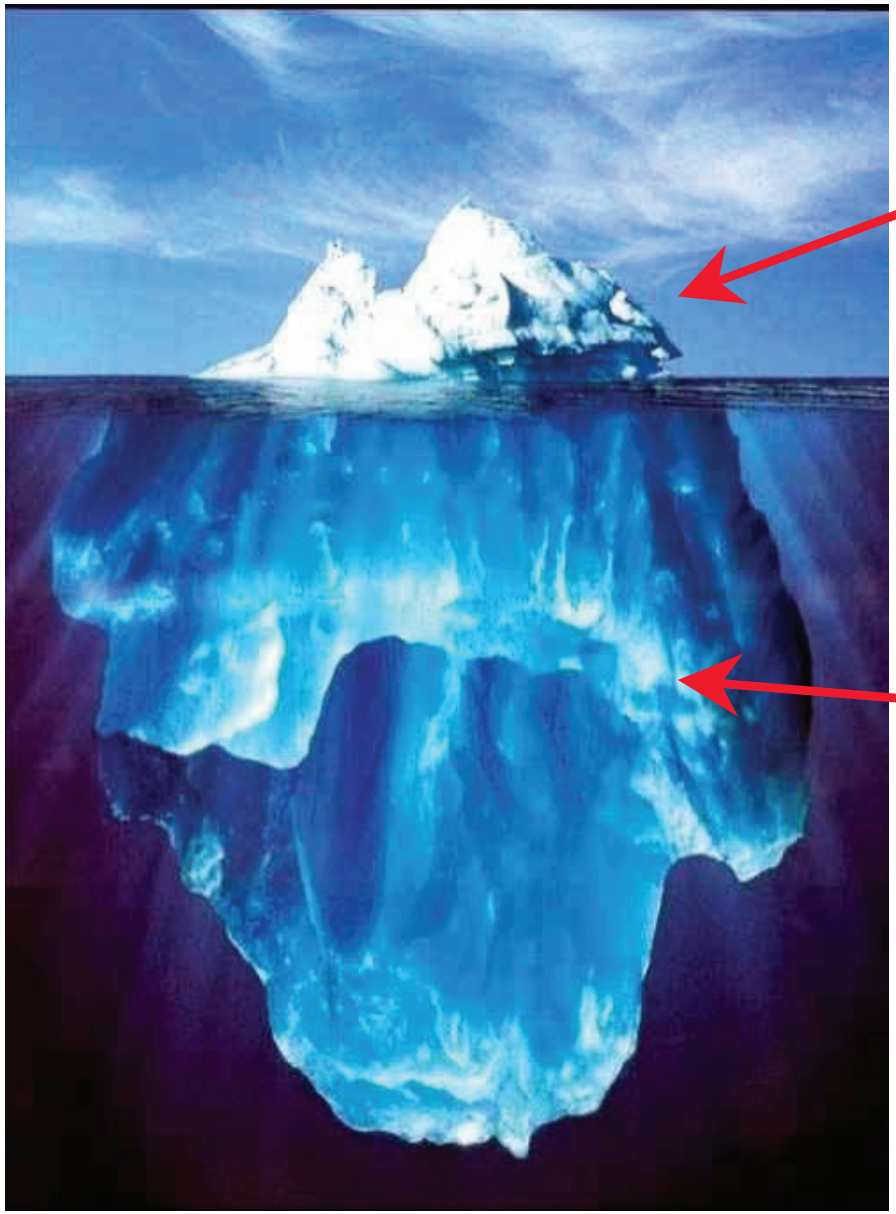
Download Final Report: www.fishnick.com


Study reported average water use of
40 gal/hr for boiler-based steamers

Steamer Retrofit Case Study



Life Cycle Cost – The Big Picture



Acquisition Costs

Sustaining Costs

can be

2 to 20 times greater

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Life-cycle and Energy Cost Calculators

High-efficiency equipment will continue to save energy dollars years after the initial purchase. These calculators allow you to compare the total cost of operating different appliances over their useful service lives.

Calculators for additonal appliance categories continue to be developed, so check back often!

fishnick.com

Search Site:

Go!

Ovens
Electric Convection Oven Life-Cycle Energy Cost Calculator
Gas Convection Oven Life-Cycle Energy Cost Calculator
Gas Rack Oven Life-Cycle Energy Cost Calculator

Steamers
Electric Steam Cooker Life-Cycle Energy Cost Calculator
Gas Steam Cooker Life-Cycle Energy Cost Calculator

Underfired Char-Broilers
Gas Underfired Char-Broiler Life-Cycle Energy Cost Calculator

Refrigeration
Reach-In Refrigerator/Freezer Life-Cycle Energy Cost Calculator

Holding Cabinets
Hot-Food Holding Cabinet Life-Cycle Energy Cost Calculator

Electric Steam Cooker Life-Cycle Cost Calculator

[About this calculator]

ASTM Data

User Data

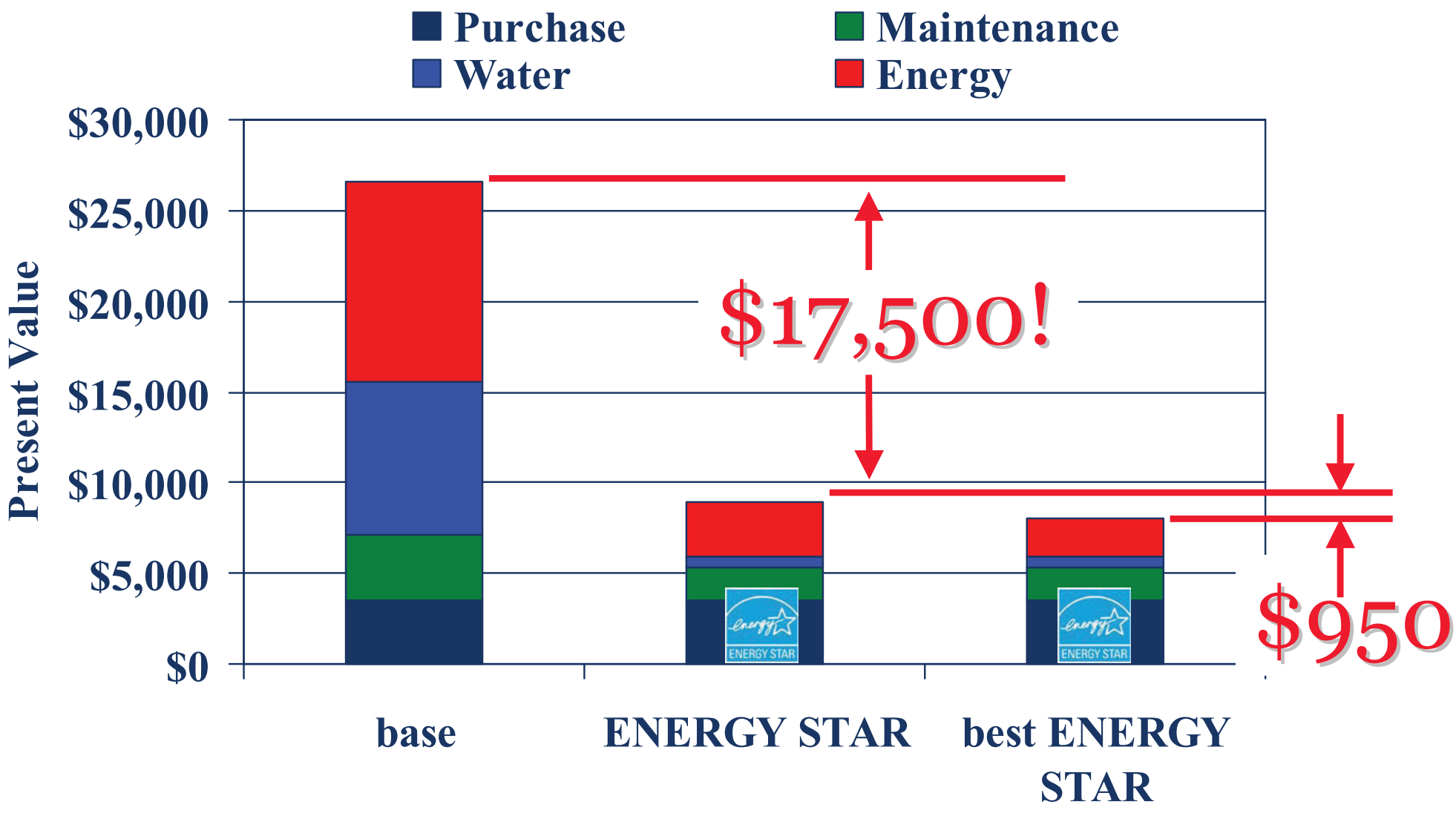
User Inputs			
Steamer Performance *(Based on ASTM Standard Test Method F 1484-04)*			
Number of Pans	3	pans	[Default] [Help]
Preheat Energy	1.50	kWh	[Default] [Help]
Idle Energy Rate	0.20	kW	[Default] [Help]
Heavy-Load Potato Energy Efficiency	70.0	%	[Default] [Help]
Potato Production Capacity	60.0	lbs/h	[Default] [Help]
Average Water Consumption Rate	3.0	gal/h	[Default] [Help]
Steamer Usage			
Operating Hours per Day	12.0	h/day	[Default] [Help]
Operating Days per Year	365	d/year	[Default] [Help]
Number of Preheats per Day	1	p/day	[Default] [Help]
Pounds of Food Cooked per Day	100.0	lbs/day	[Default] [Help]
Utility Cost and Lifespan			
Electric Cost per kWh	0.100	$/kWh	[Default] [Help]
Electric Demand Charge per kW	0.00	$/kW	[Default] [Help]
Water/Sewer Cost per CCF (100 cubic feet)	5.00	$/CCF	[Default] [Help]
Lifespan of Steamer in Years	8.0	years	[Default] [Help]
Discount Rate	3.10	%/year	[Default] [Help]
	Calculate		[Default All]

Insert estimated maintenance costs

Add purchase price

Results			
	Base Efficiency Steamer [About]	User Input Steamer [About]	ENERGY STAR® Steamer [About]
Annual Energy Consumption (kWh)	15287	2890	4219
Probable Contribution to Demand (kW) [Help]	3.5	0.7	1.0
Annual Water Consumption (gal)	175200	13140	13140
Annual Energy Cost	$1529	$289	$422
Annual Water Cost	$1171	$88	$88
Lifetime Energy Cost (Discounted)	$11019	$2083	$3041
Lifetime Water Cost (Discounted)	$8439	$634	$634
Input Additional Costs (Optional)			
Maintenance Costs per Year [Help]	$500	$250	$250
Initial Cost of Steamer	$3500	$3500	$3500
Results: Total Cost			
Lifetime Energy Cost (Discounted)	$11019	$2083	$3041
Lifetime Water Cost (Discounted)	$8439	$634	$634
Lifetime Maintenance Cost (Discounted)	$3603	$1801	$1801
Initial Cost of Steamer	$3500	$3500	$3500
Total Cost	$26561	$8018	$8976

8-Year Life-Cycle Cost
Three-pan Steamer Example



ASTM Standard Test Methods are Tools to:

- Quantify productivity and energy efficiency
- Model energy consumption & cost
- Compare gas & electric equipment
- Differentiate equipment based on performance
- Stimulate research & development
- Validate performance claims
- Secure equipment specifications

Ice Machines

Water & Energy Saving Candidates?

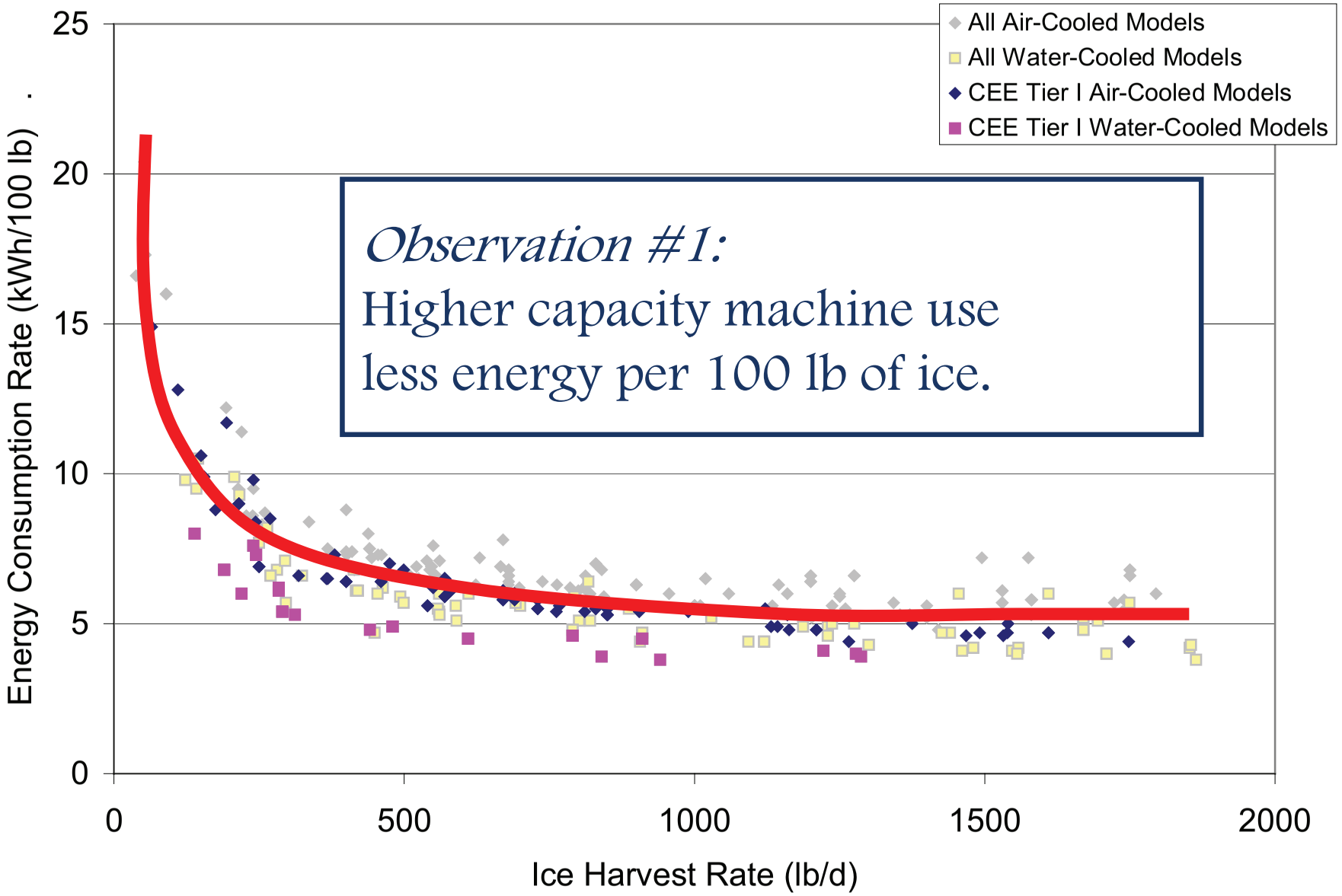
Ice machines are found in a wide variety of commercial applications: from bars, delis, and restaurants, to hotels, hospitals, and other institutional kitchens. Typically harvest ice from 200 lb/24 hr to 1600 lb/24 hr

ARI Ice Machine Database

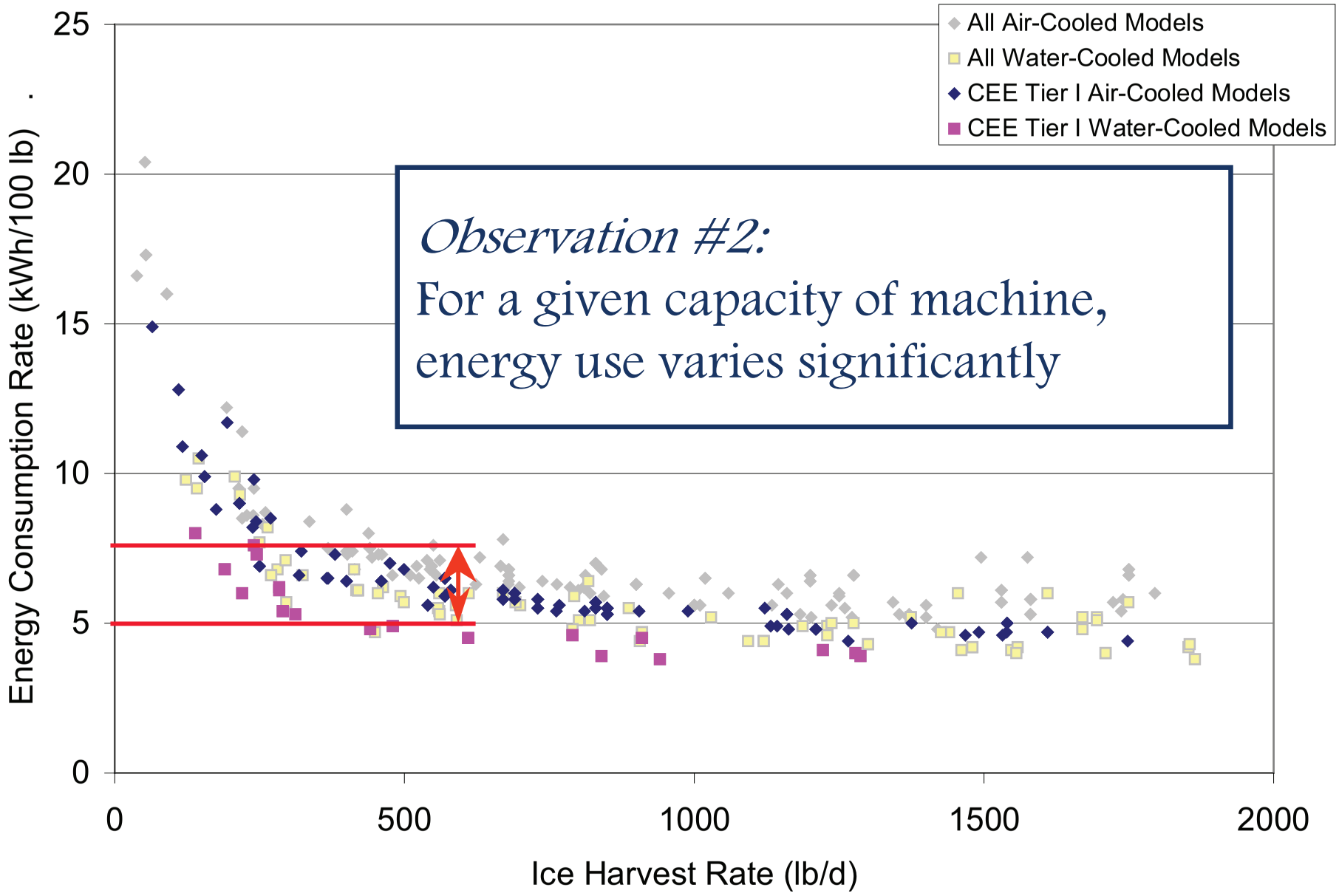
- Air-Conditioning & Refrigeration Institute (ARI)*
- Ice harvest (lb/24 hr)
- Water usage (gal/100 lb ice)
- Energy consumption rate (kWh/100 lb ice)
- Condenser water usage (gal/100 lb ice)

*(www.ari.org/directories/acim/)

ARI Database



ARI Database



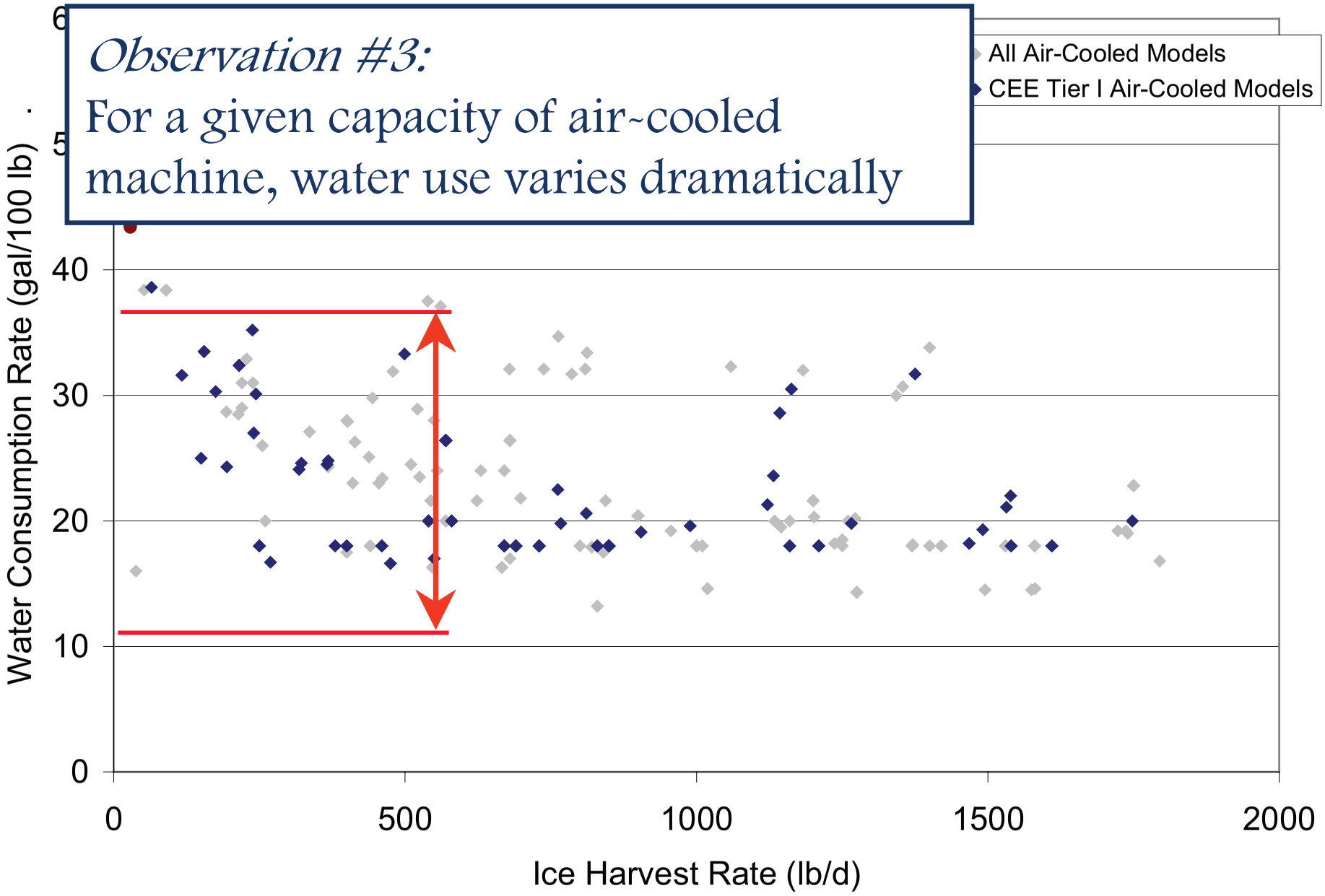
Observation #2:

For a given capacity of machine, energy use varies significantly

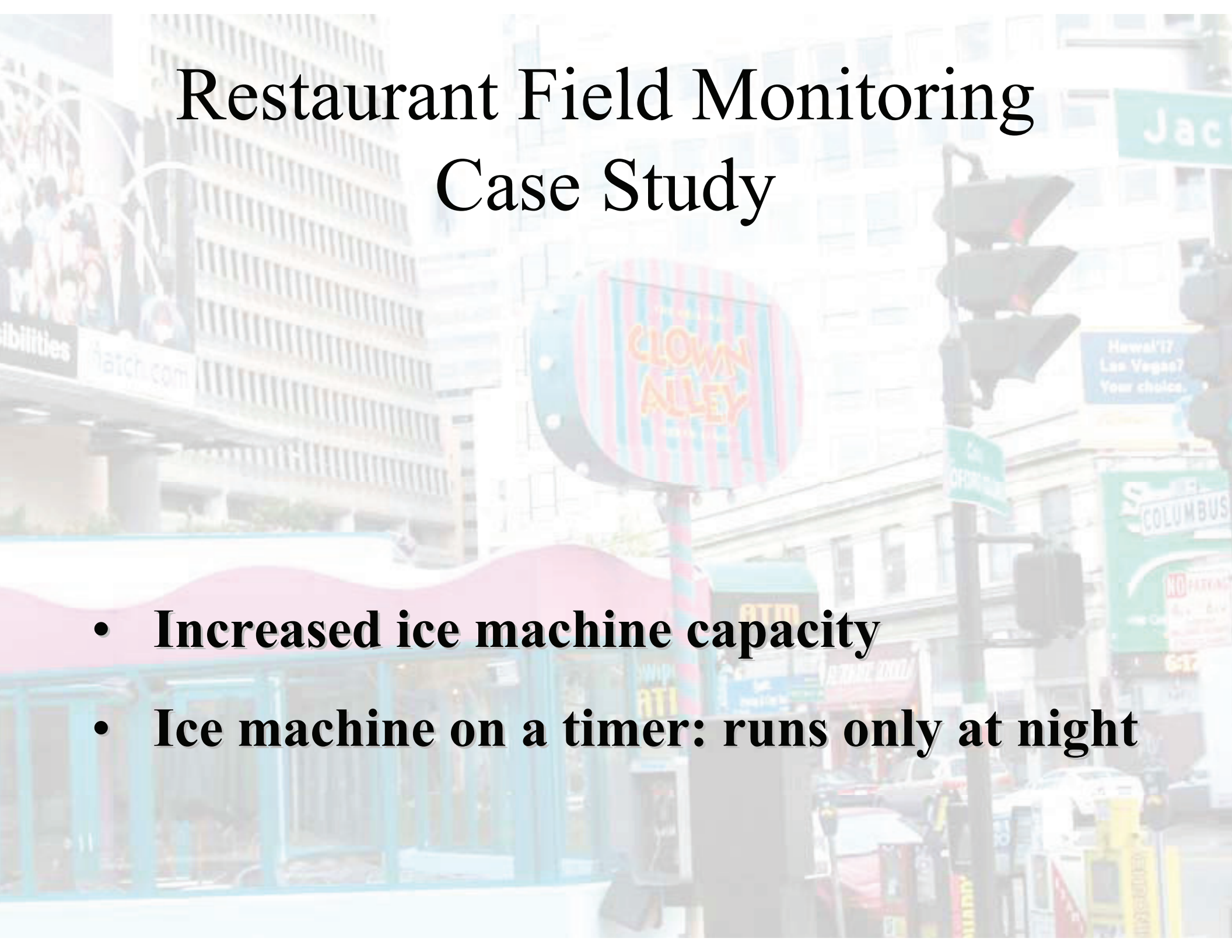
ARI Database

Observation #3:

For a given capacity of air-cooled machine, water use varies dramatically



Restaurant Field Monitoring Case Study



- **Increased ice machine capacity**
- **Ice machine on a timer: runs only at night**

From:

- 194 lb/day
- 12.2 kWh/100 lb
- 28.7gal/100 lb
- 18.6 kWh/day
- $650/year

To:

- 570 lb/day
- 6.5 kWh/100 lb
- 26.4 gal/100 lb
- 7.25 kWh/day
- $ 250/year

@ $0.10/kWh

From:

To:

Save $400 a year

- quieter kitchen
- cooler kitchen
- more ice available
- reduce demand by 1kw

…and the lowest hanging fruit!

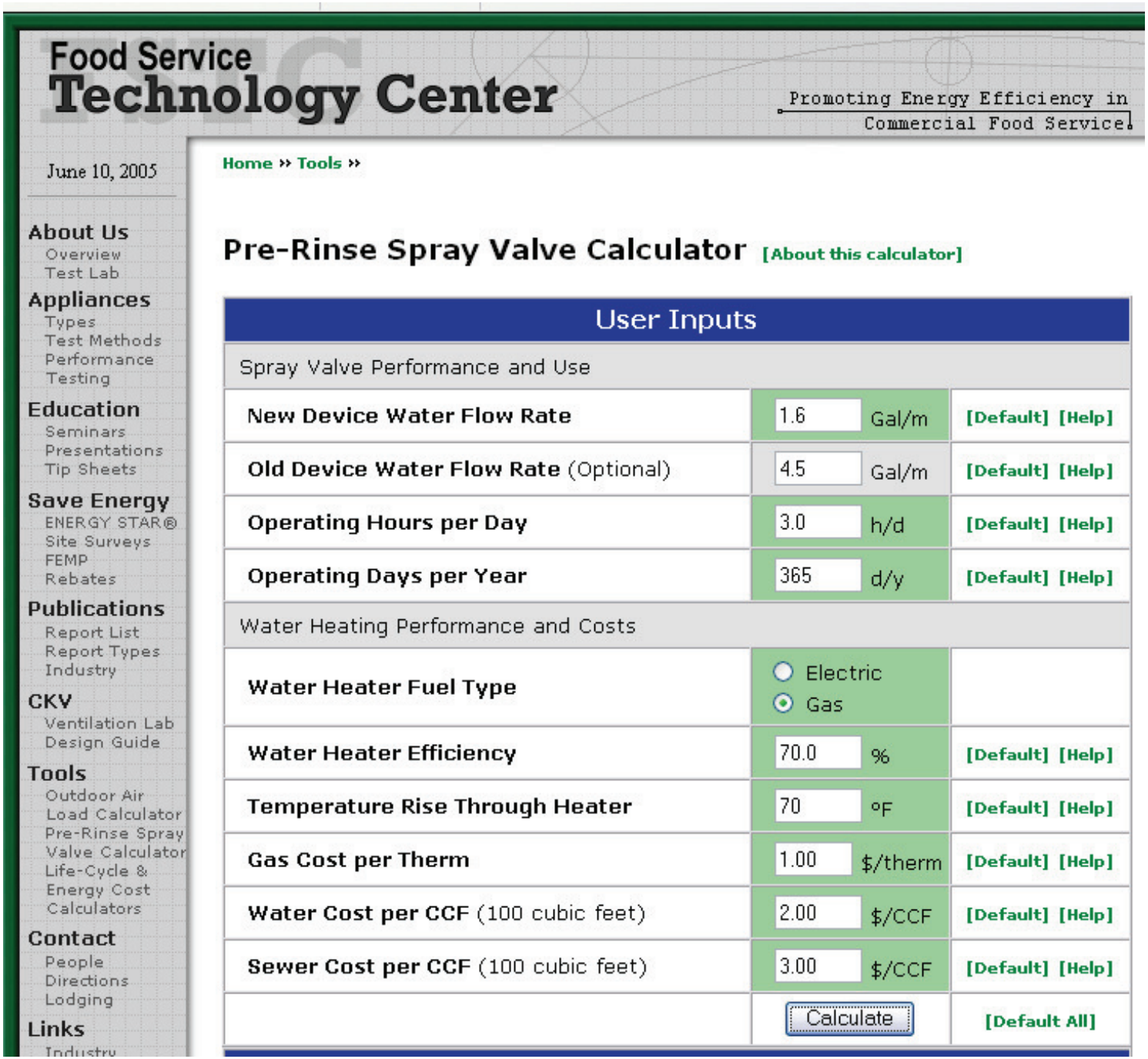
….are Not Created Equal!

1.6 gpm | 1.6 gpm | 2.6 gpm | 4.5 gpm

$1400/yr → $4000/yr

@ 3 hr per day usage

Run Your Own Numbers



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June 10, 2005

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Pre-Rinse Spray Valve Calculator
Life-Cycle & Energy Cost Calculators
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Links
Industry

Pre-Rinse Spray Valve Calculator [About this calculator]

User Inputs			
Spray Valve Performance and Use			
New Device Water Flow Rate	1.6	Gal/m	[Default] [Help]
Old Device Water Flow Rate (Optional)	4.5	Gal/m	[Default] [Help]
Operating Hours per Day	3.0	h/d	[Default] [Help]
Operating Days per Year	365	d/y	[Default] [Help]
Water Heating Performance and Costs			
Water Heater Fuel Type	○ Electric ◉ Gas		
Water Heater Efficiency	70.0	%	[Default] [Help]
Temperature Rise Through Heater	70	°F	[Default] [Help]
Gas Cost per Therm	1.00	$/therm	[Default] [Help]
Water Cost per CCF (100 cubic feet)	2.00	$/CCF	[Default] [Help]
Sewer Cost per CCF (100 cubic feet)	3.00	$/CCF	[Default] [Help]
	Calculate		[Default All]

1.6 gpm vs. 4.5 gpm

Results		
	New Device Results [About]	Old Device Results [About]
Annual Water Consumption (Gallons)	105120	295650
Annual Water Consumption (Units)	140.5	395.3
Annual Water Cost	$ 281.00	$ 790.60
Annual Sewer Cost	$ 421.50	$ 1185.90
Combined Annual Water and Sewer Cost	$ 702.50	$ 1976.50
Annual Water Heating Cost	$ 875.65	$ 2462.76
Overall Annual Cost	$ 1578.15	$ 4439.26

Who Wouldn’t Like a New Sprayer?

Water

Energy

Natural Synergy!