This presentation premiered at WaterSmart Innovations

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INNOVATIONS

The Water Conservation Opportunities Because of the Rapid Rise in Water and Sewer Rates

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What Will be Covered

- A brief survey of the cost of water and wastewater to the customer
- A look at the opportunities
- How to put the cost of water into terms that People can really understand

Cost of Water

Circle of Blue
May 7, 2014

http://www.circleofblue.org/waternews/2014/world/price-water-2014-6-percent-30-major-u-s-cities-33-percent-rise-since-2010/

Price of Water 2014: Up 6 Percent in 30 Major U.S. Cities; 33 Percent Rise Since 2010

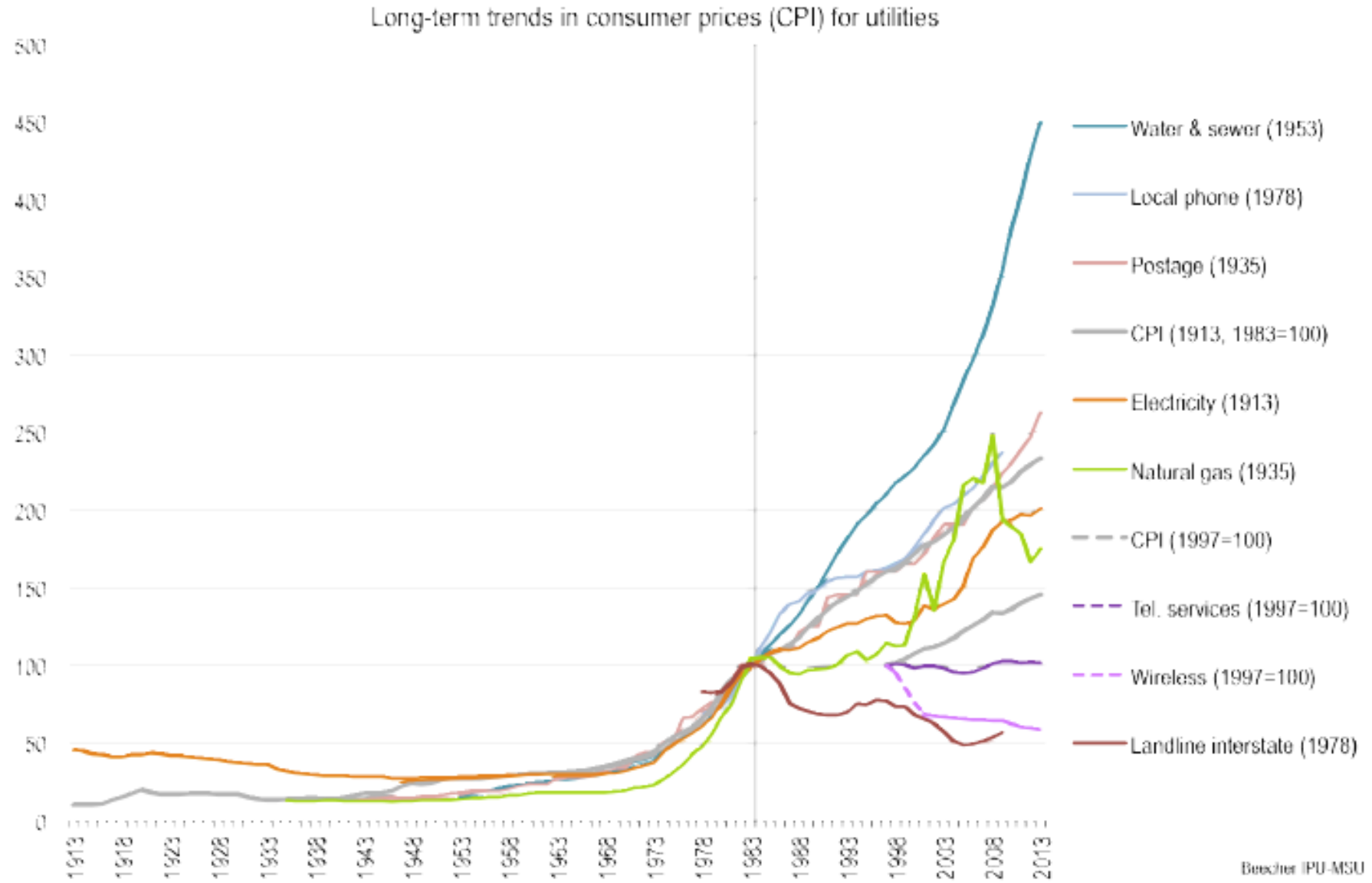
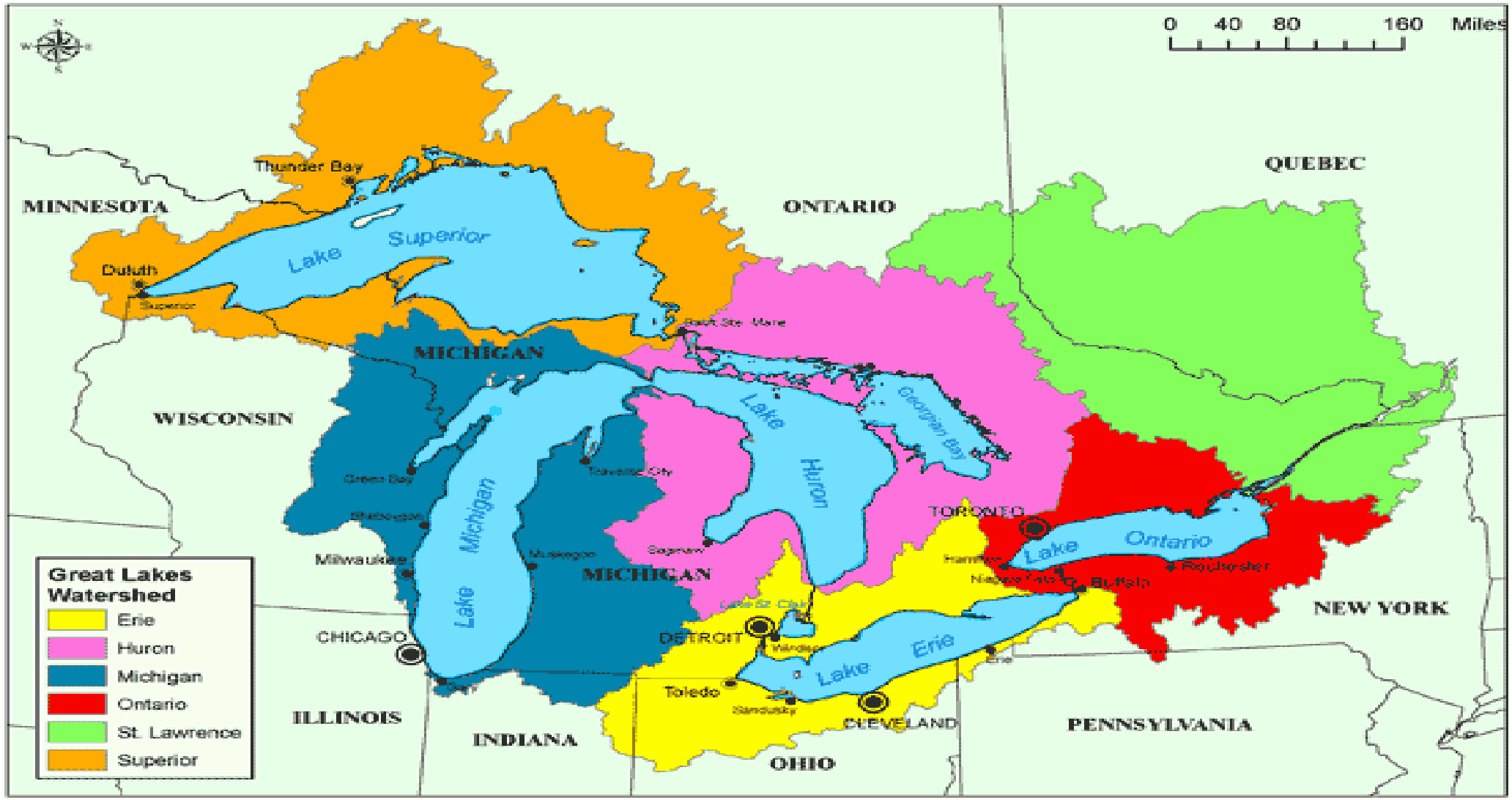


Exhibit 1. Long-term trends in the Consumer Price Index (CPI) for utilities (1913-2013). The index is set to 100 for 1982-1984 except for telephone and wireless services, where the index is set to 100 for 1997. Year (*) indicates start of series.

Even in Chicago, the Mayor Wants to
Double Water Rates!



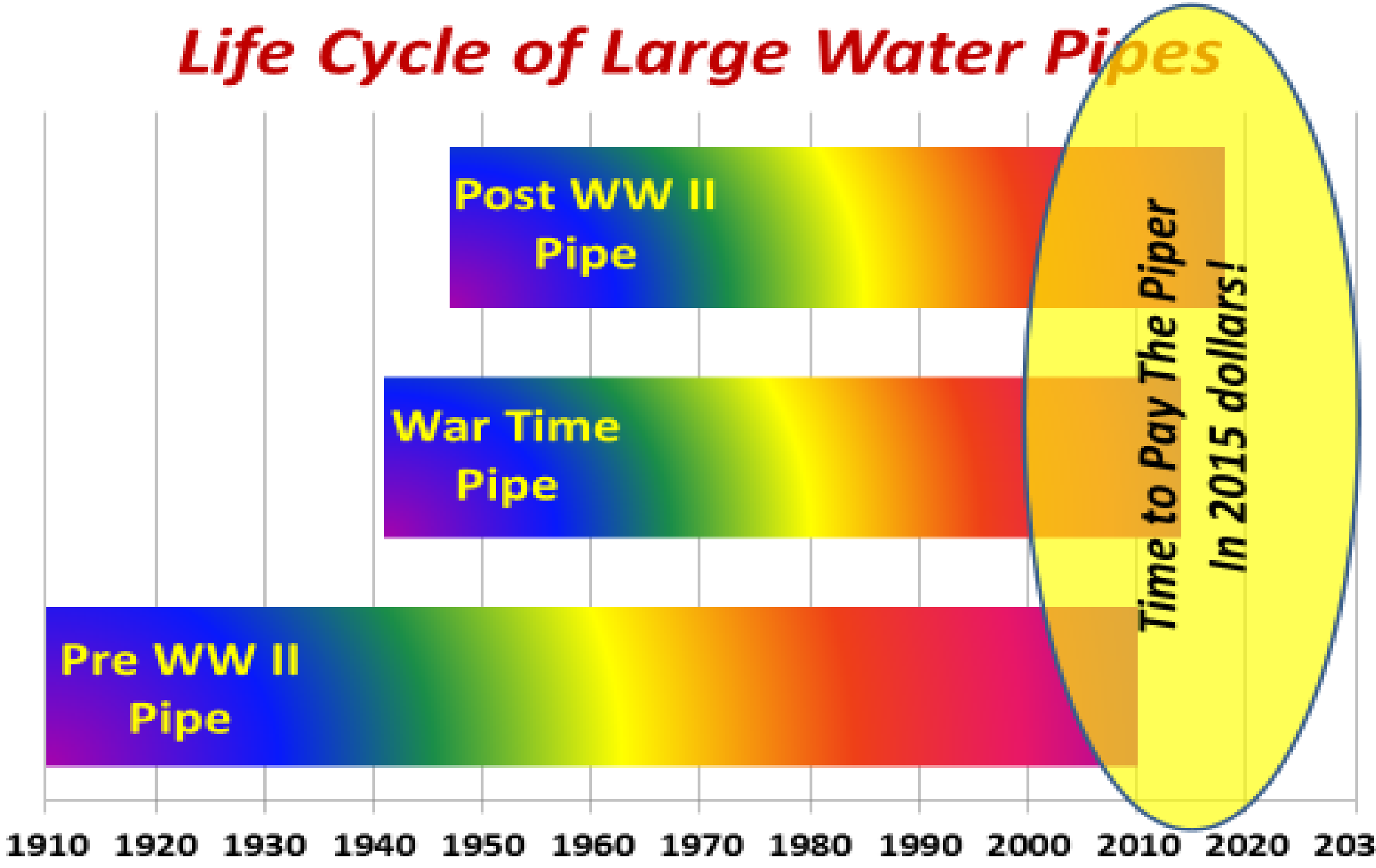
“Water is the oil of the 21st century.”

Andrew Liveris,
Chief Executive,
Dow Chemical Co.,
August 2008.

American Society of Civil Engineers
gives the nation's water systems
a grade of

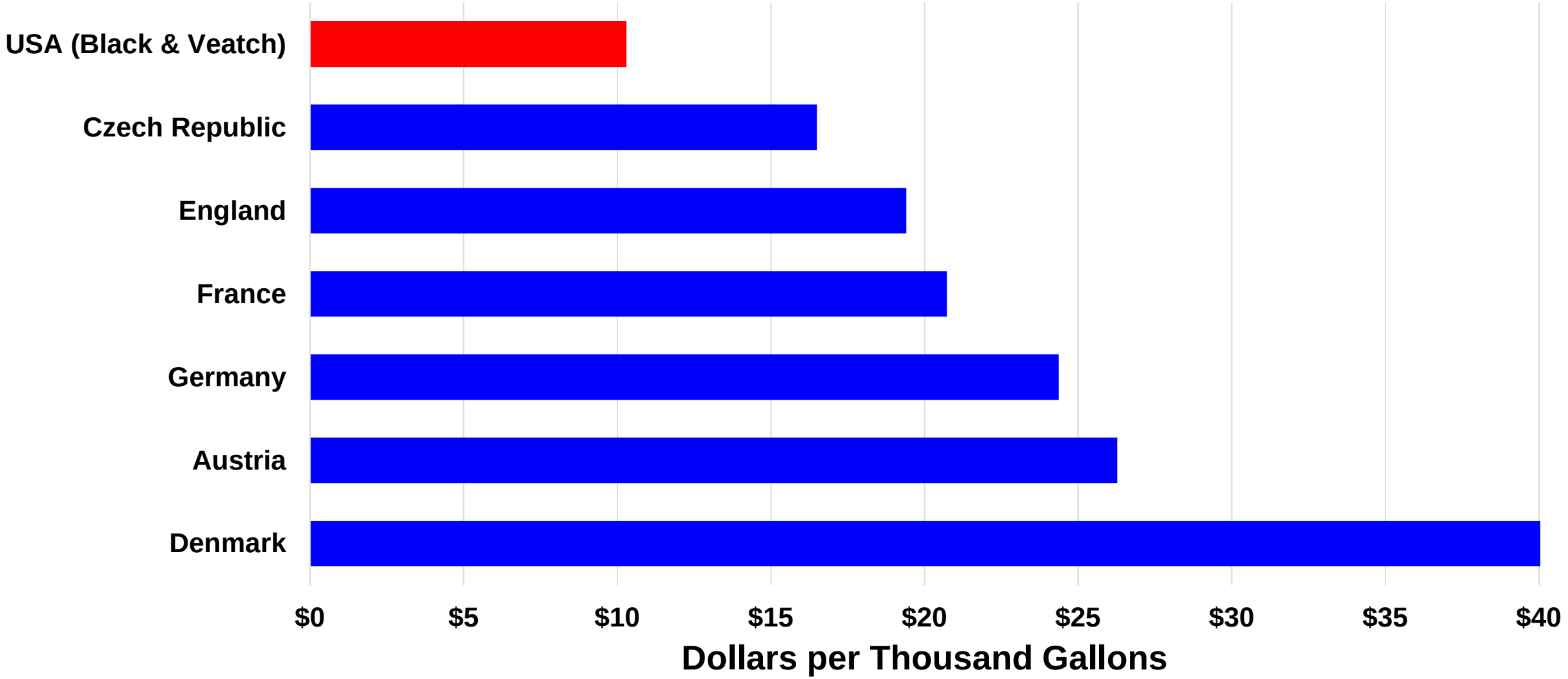
D,

the lowest grade of any infrastructure
including roads and bridges.


Life Cycle of Large Water Pipes
Post WW II Pipe
War Time Pipe
Pre WW II Pipe
Time to Pay The Piper
In 2015 dollars!
1910
1920
1930
1940
1950
1960
1970
1980
1990
2000
2010
2020
2030

Average Residential Water and Sewer Rates in European Countries Compared to USA

Sources of Information:
Europe -http://www.globalwaterintel.com/archive/12/9/market-profile/global-water-tariffs-continue-upward-trend.html
USA - http://bv.com/docs/management-c



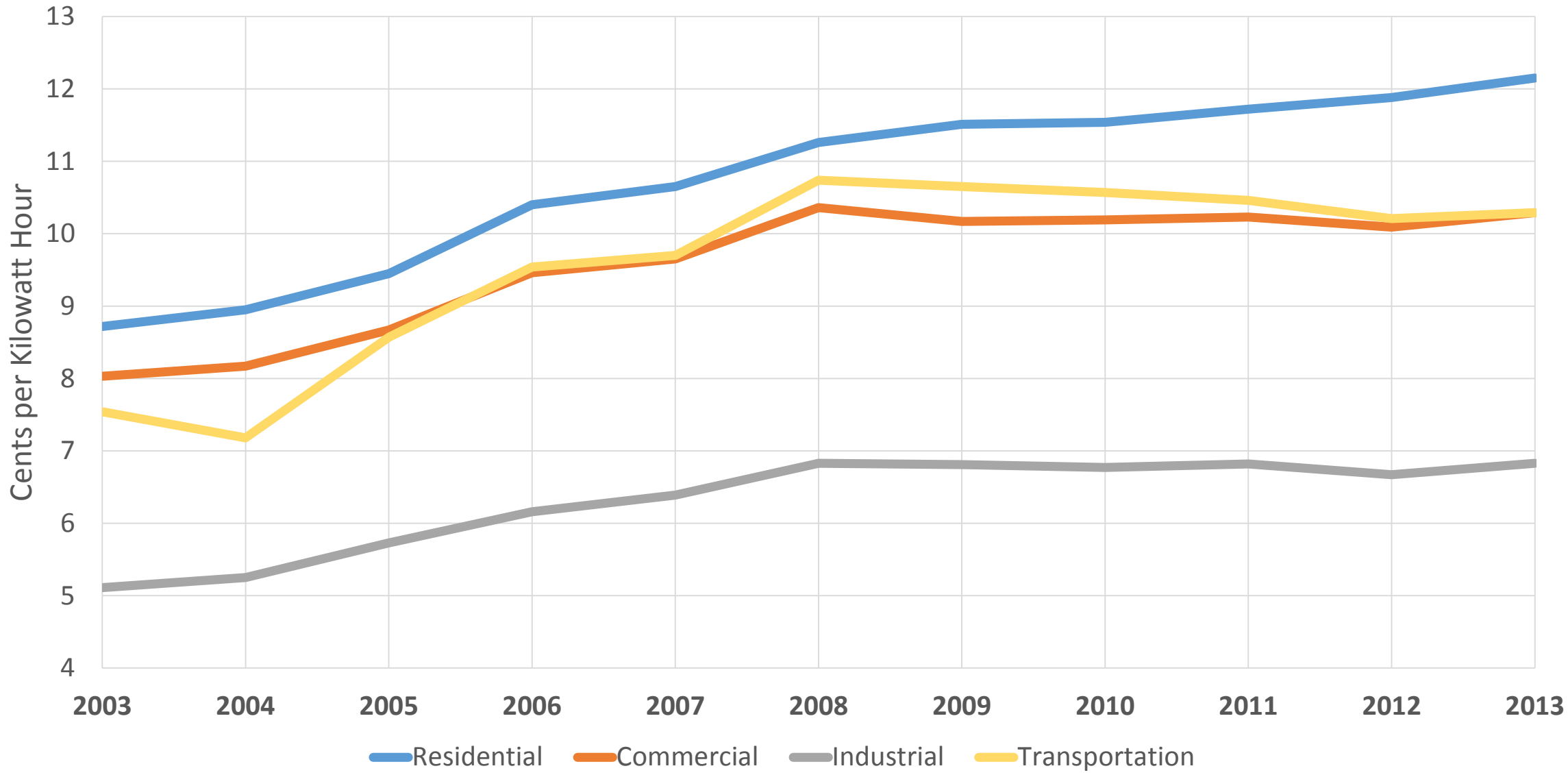
And again -

The True Cost of Water

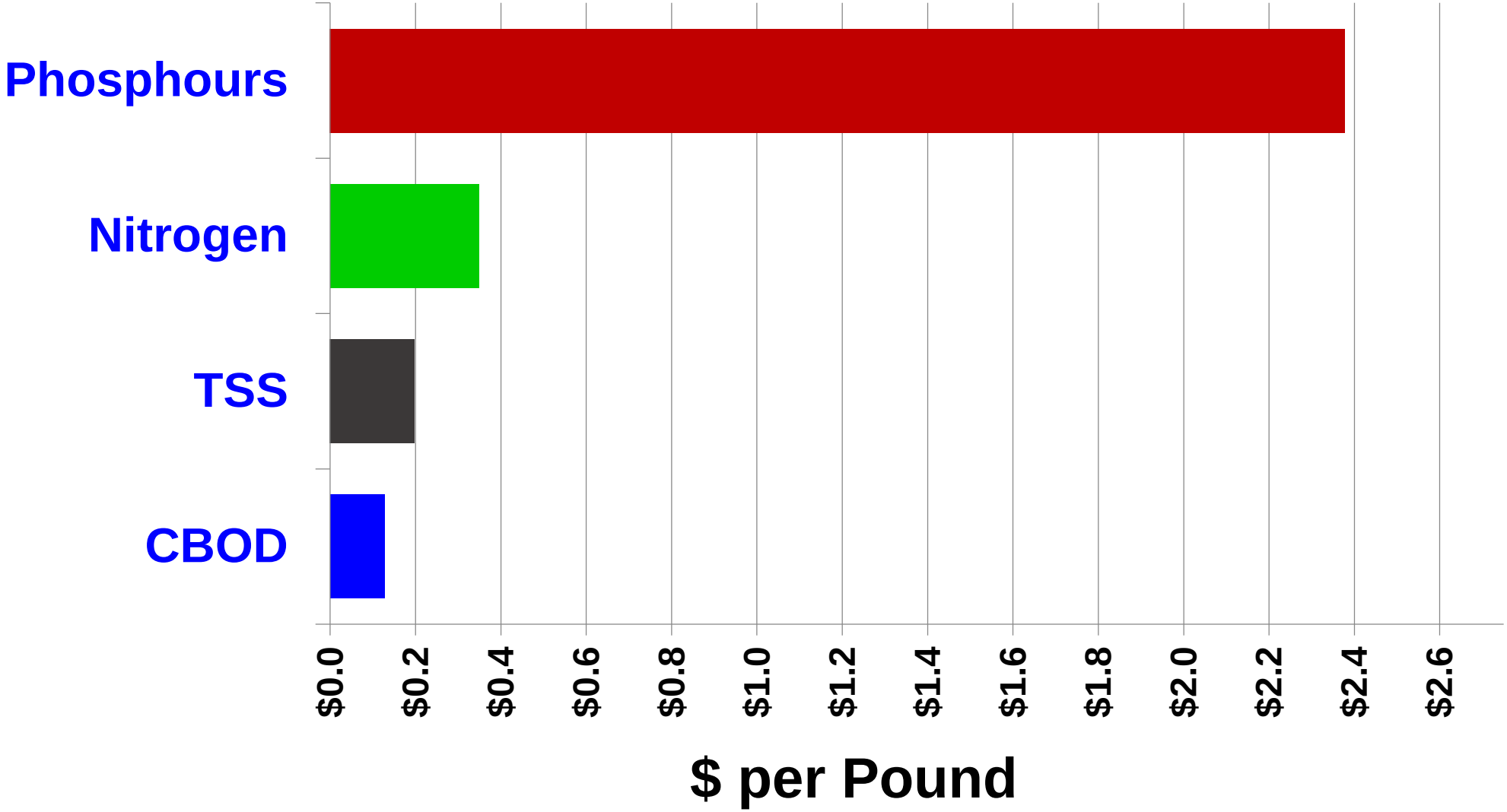
- Water Cost
- Sewer/Pre-treatment
- Energy
- Chemicals
- Solid Waste Disposal
- Capital Equipment
- Labor
- Liability

National Average Electricity Prices

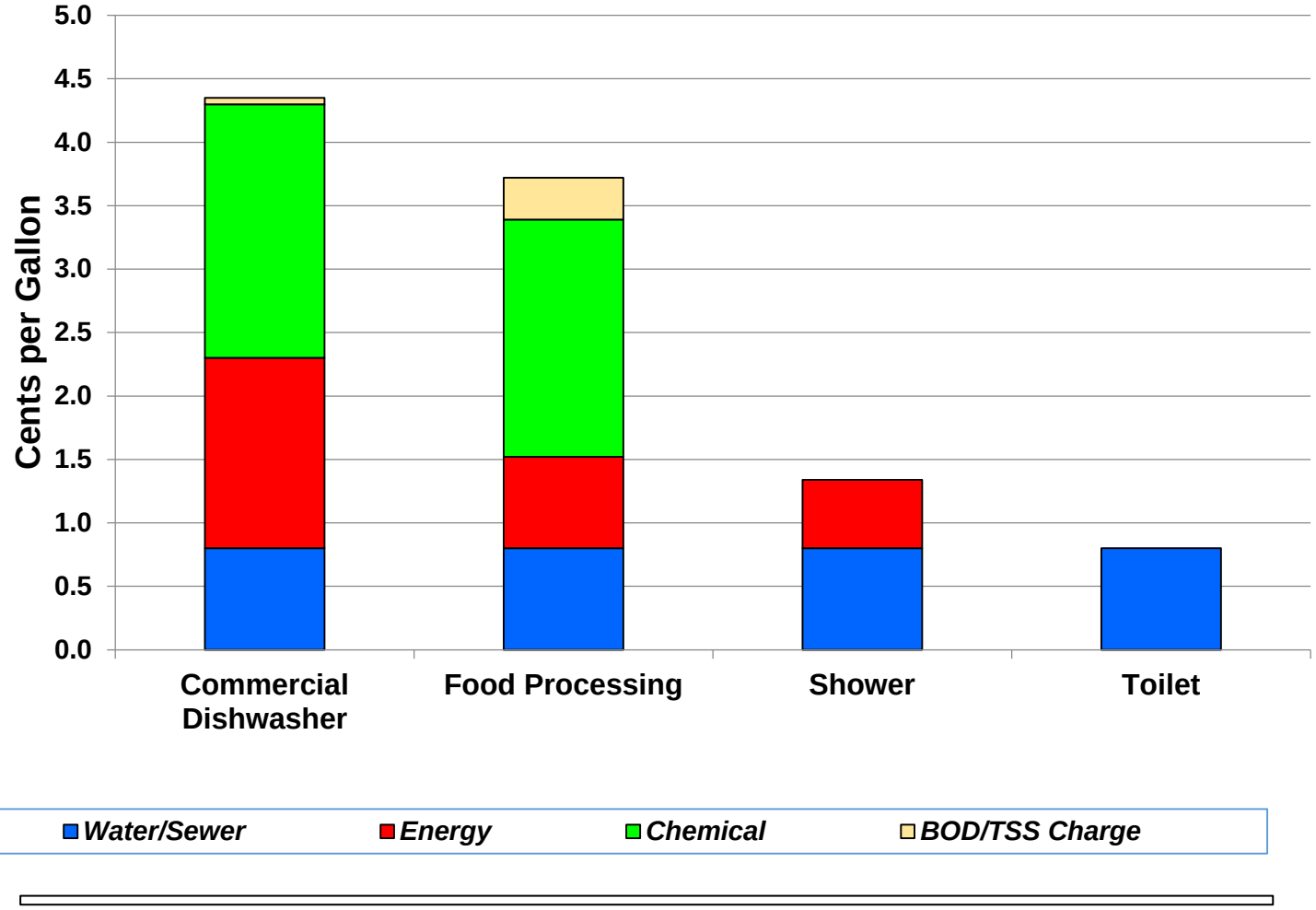
(Energy Information Administration)



Example of Pretreatment Wastewater Charges



Cents per Gallon of Water Used By Type of Use

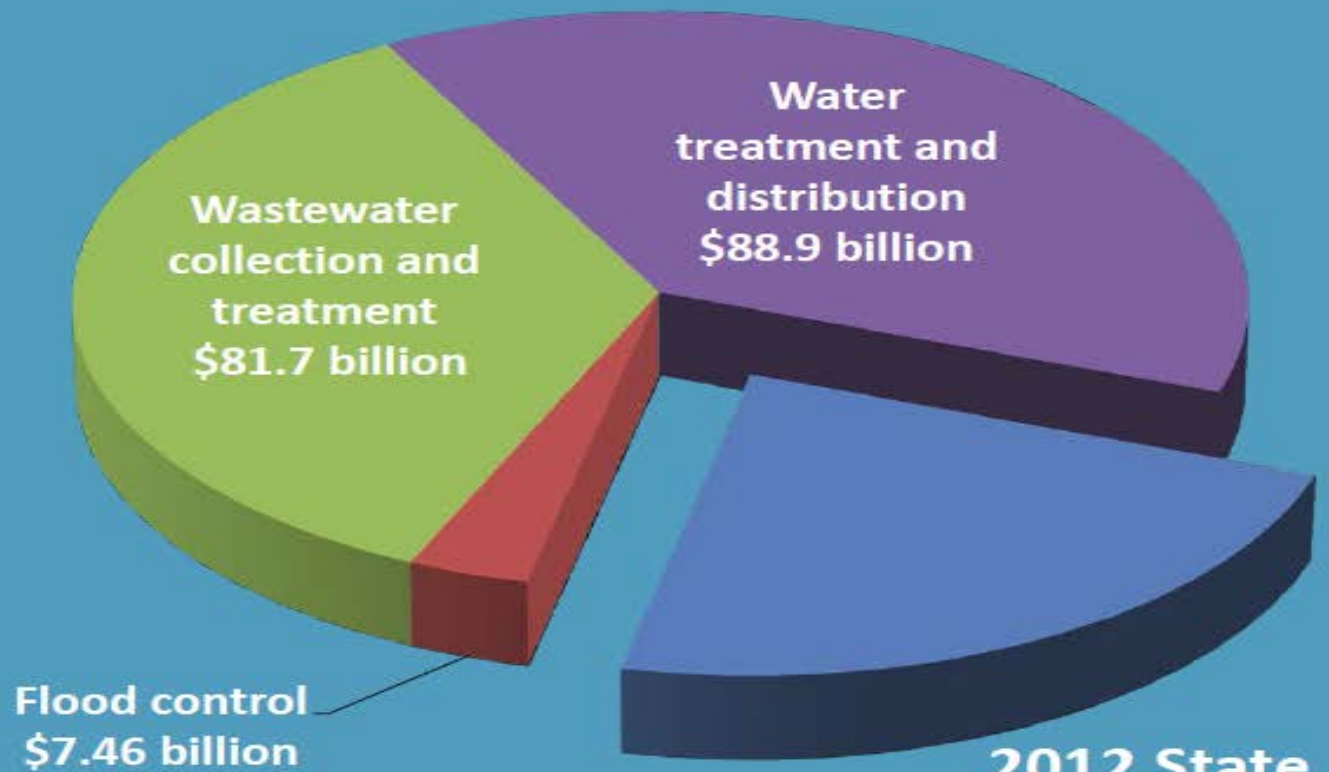


Texas Water Development Board

Texas' Water Needs

Total capital costs for water supplies, water treatment and distribution, wastewater collection and treatment, and flood control:

$231 billion

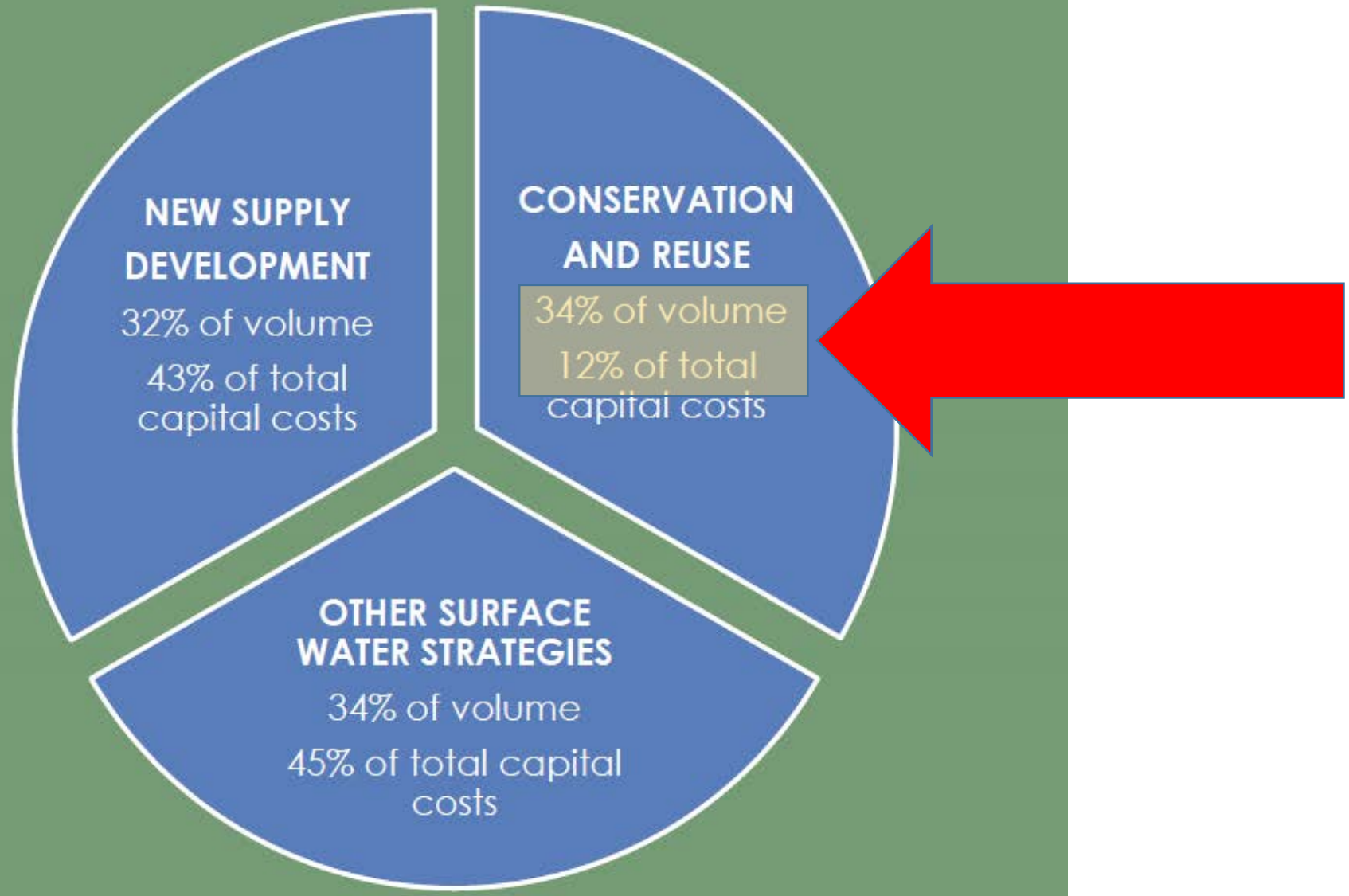


2012 State Water Plan $53.1 billion

Texas Water Development Board

What will the SWIFT fund?

SWIFT and SWIRFT will fund projects in the **2012 State Water Plan.**



The Cheapest Water You Will Ever Have Is The Water You Already Have!

Now, with water efficiency, a community can fit a larger economy on the same amount of water resources and the same amount of capital investment.

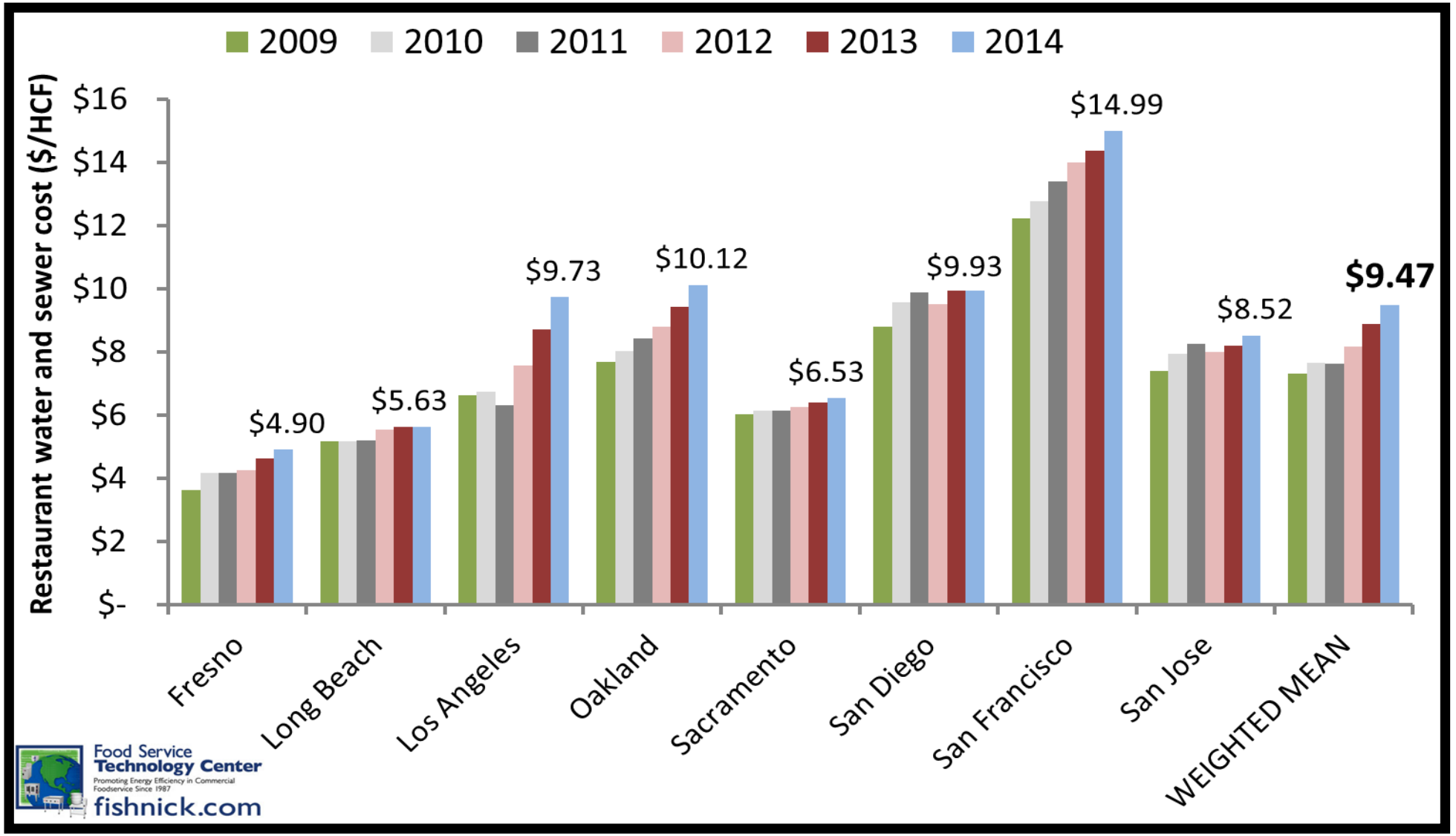
Say it so thy understand it!

GIBBERISH?

To the average person

- **Drachmas per Cubic Cubit**
- **Farthings per Cubic Furlong**
- **Dollars per Acre Foot**
- **Dollars per HCF or CCF**
- **Dollars per thousand gallons**

Water & Wastewater Costs for Restaurants in California in Dollars per hundred cubic feet

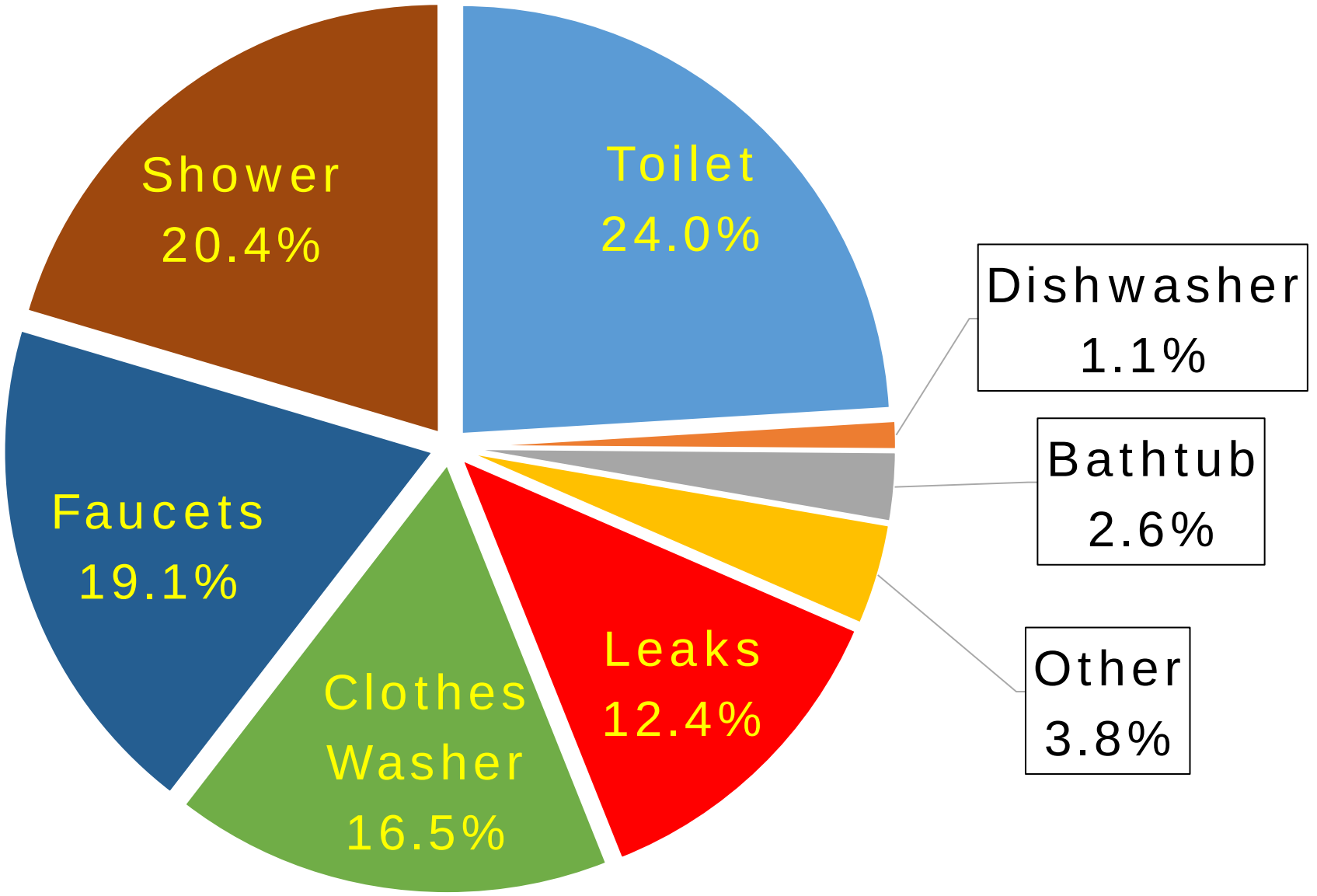


Example of Understanding Water Cost

City	$/HCF	$/kGal	Cents/ Gal	Cents/ Flush 1.28 gpf	Cents/Flush 5.0 gpf
Fresno	4.9	6.55	0.66	0.8	3.3
Long Beach	5.63	7.53	0.75	0.9	3.8
Sacramento	6.53	8.73	0.87	1.1	4.4
San Jose	8.52	11.39	1.14	1.5	5.7
Los Angeles	9.73	13.01	1.3	1.6	6.5
San Diego	9.93	13.28	1.33	1.7	6.6
Oakland	10.12	13.53	1.35	1.7	6.8
San Francisco	14.99	20.04	2.00	2.6	10.0

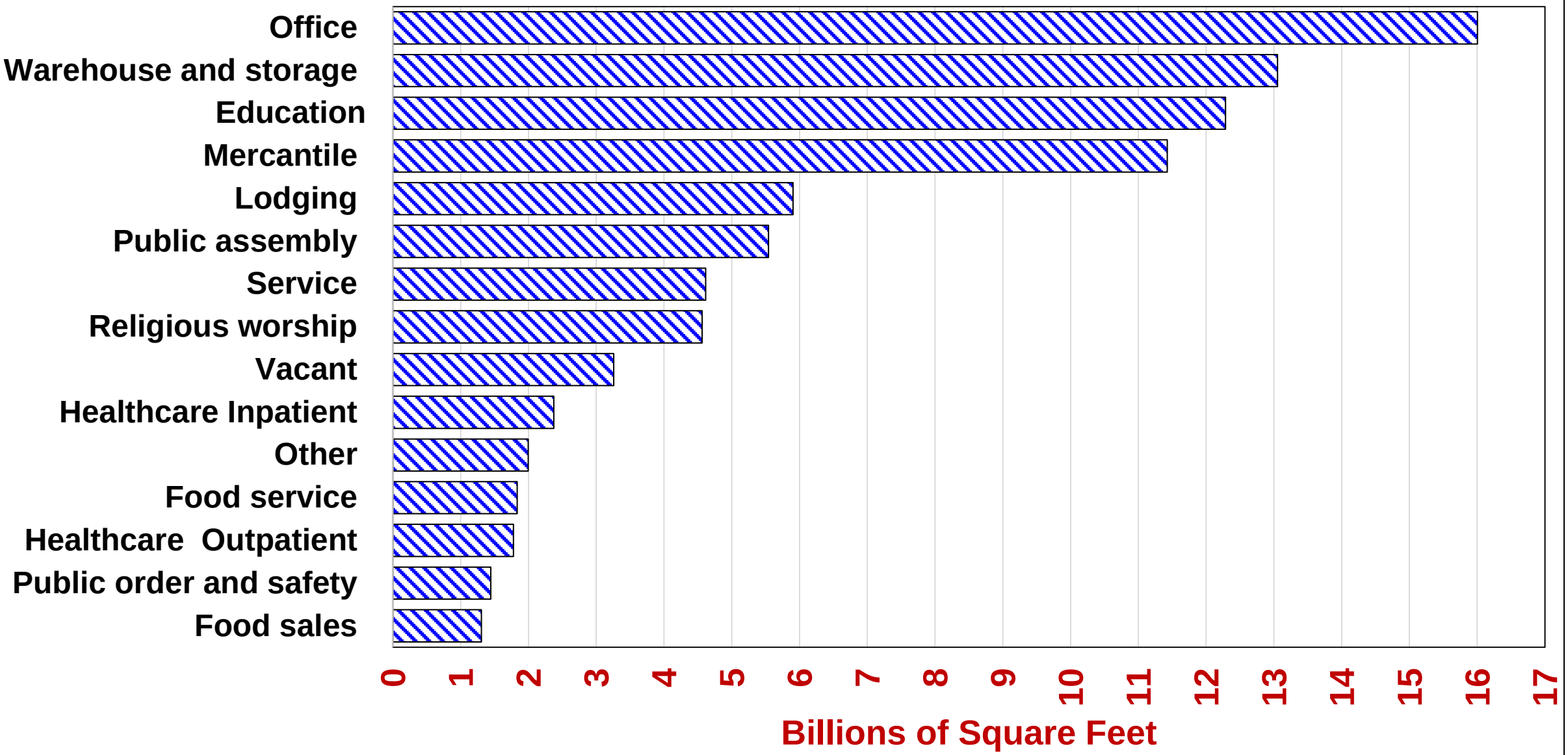
The Audience

Residential Indoor Water Use 2014

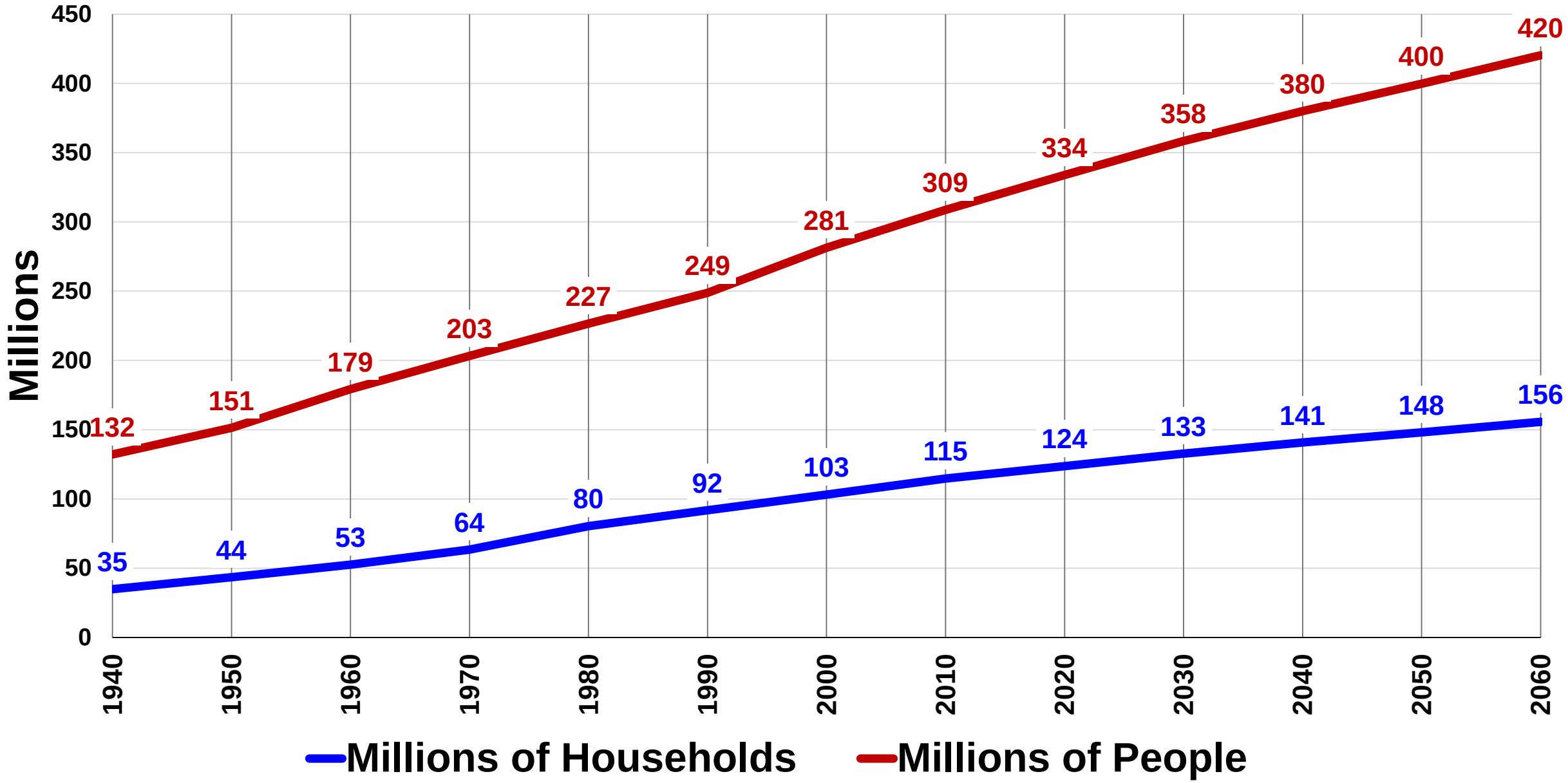


Commercial Buildings in USA

Billions of Square Feet in 2012

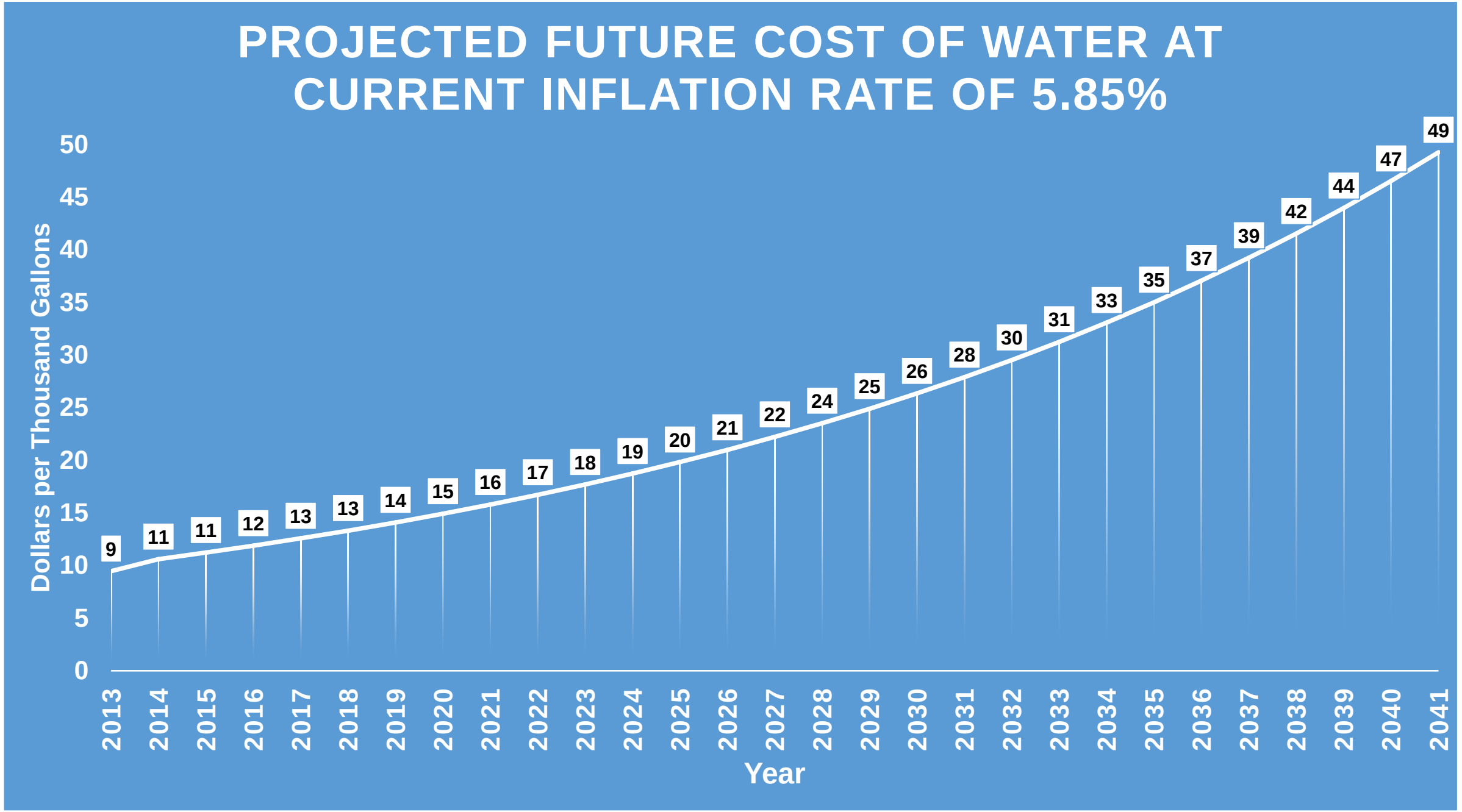


Population and Housing Statistics for USA

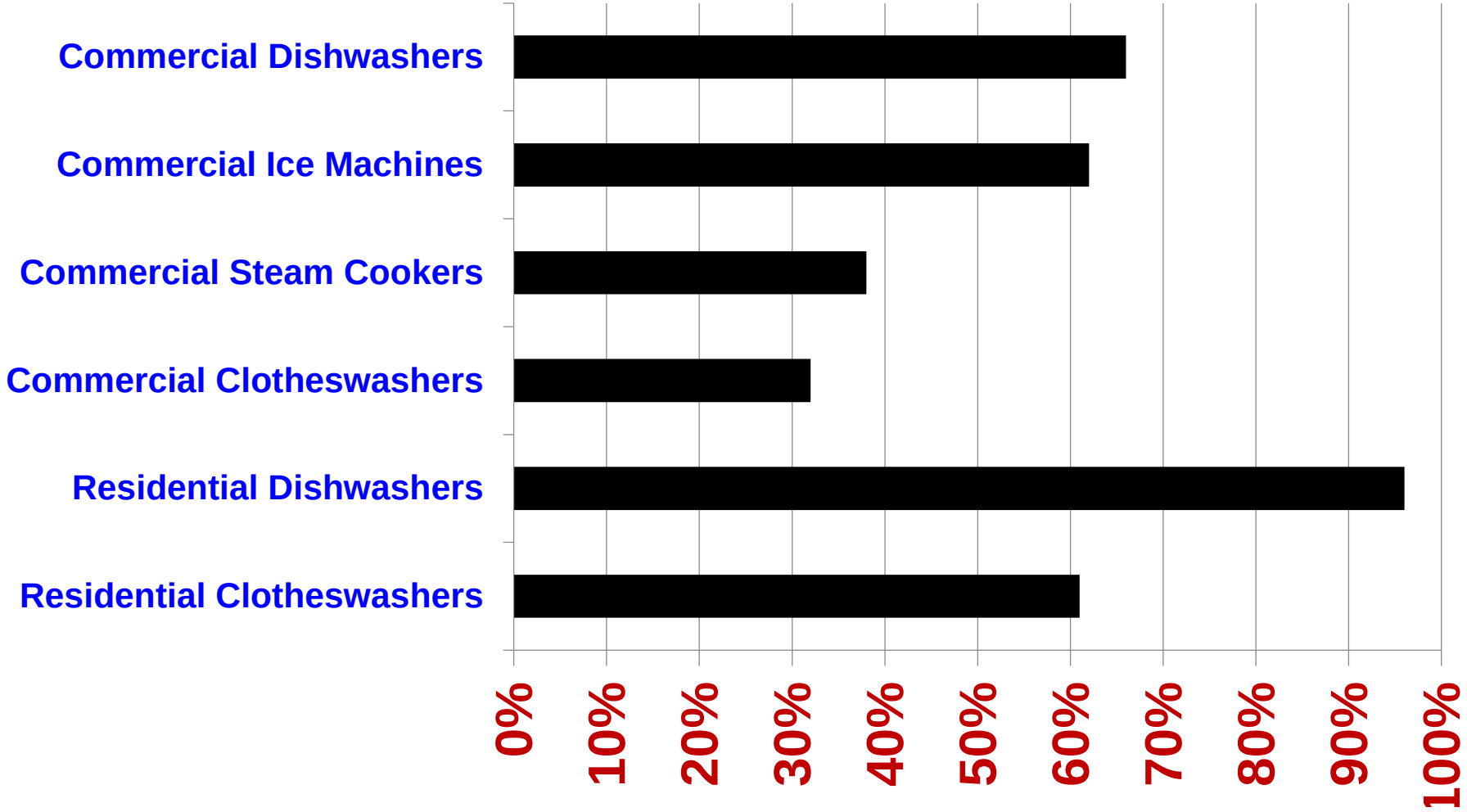


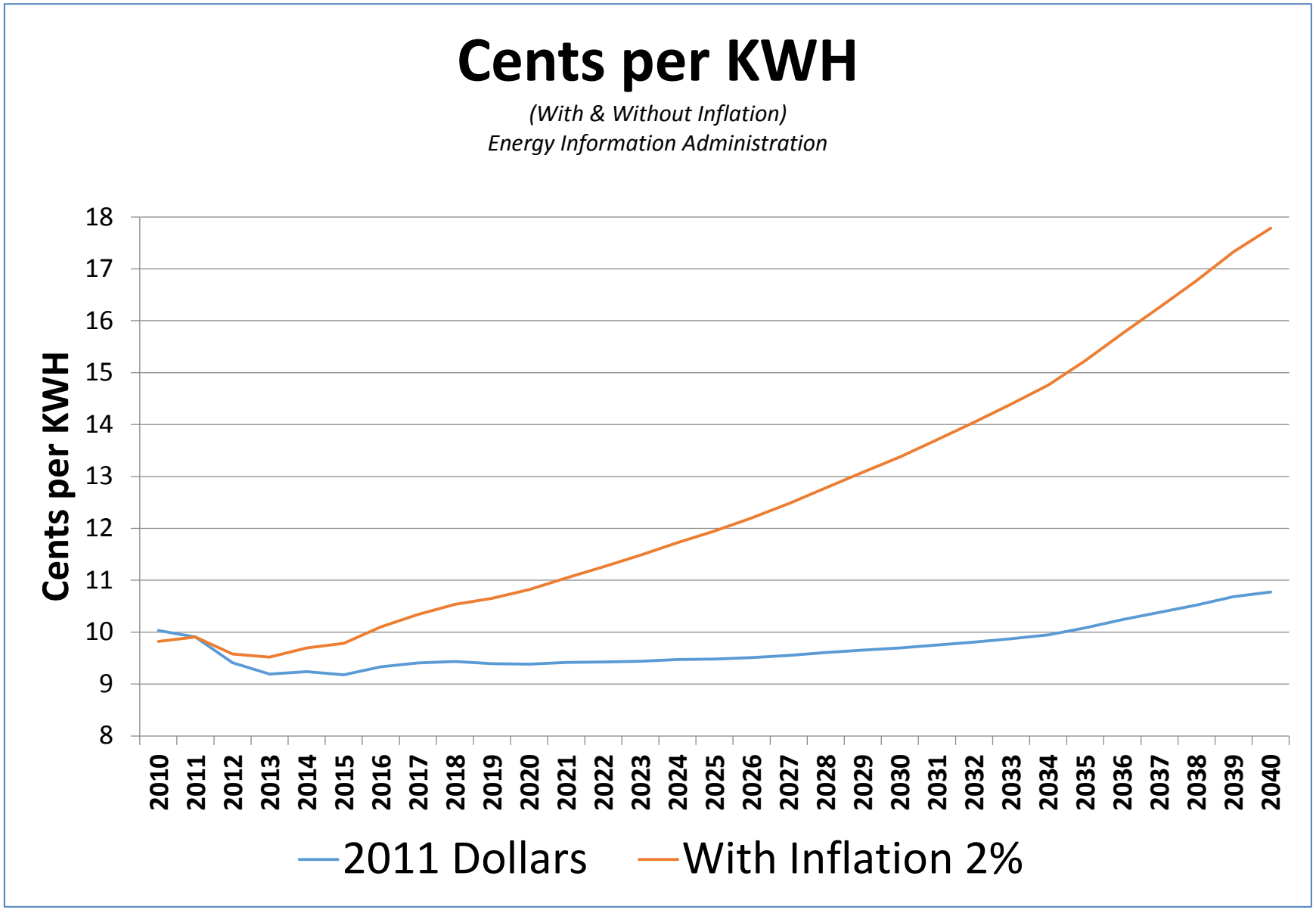
The Costs

In understandable terms.


PROJECTED FUTURE COST OF WATER AT CURRENT INFLATION RATE OF 5.85%
Dollars per Thousand Gallons
0
5
10
15
20
25
30
35
40
45
50
9
11
11
12
13
13
14
15
16
17
18
19
20
21
22
24
25
26
28
30
31
33
35
37
39
42
44
47
49
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
2025
2026
2027
2028
2029
2030
2031
2032
2033
2034
2035
2036
2037
2038
2039
2040
2041
Year

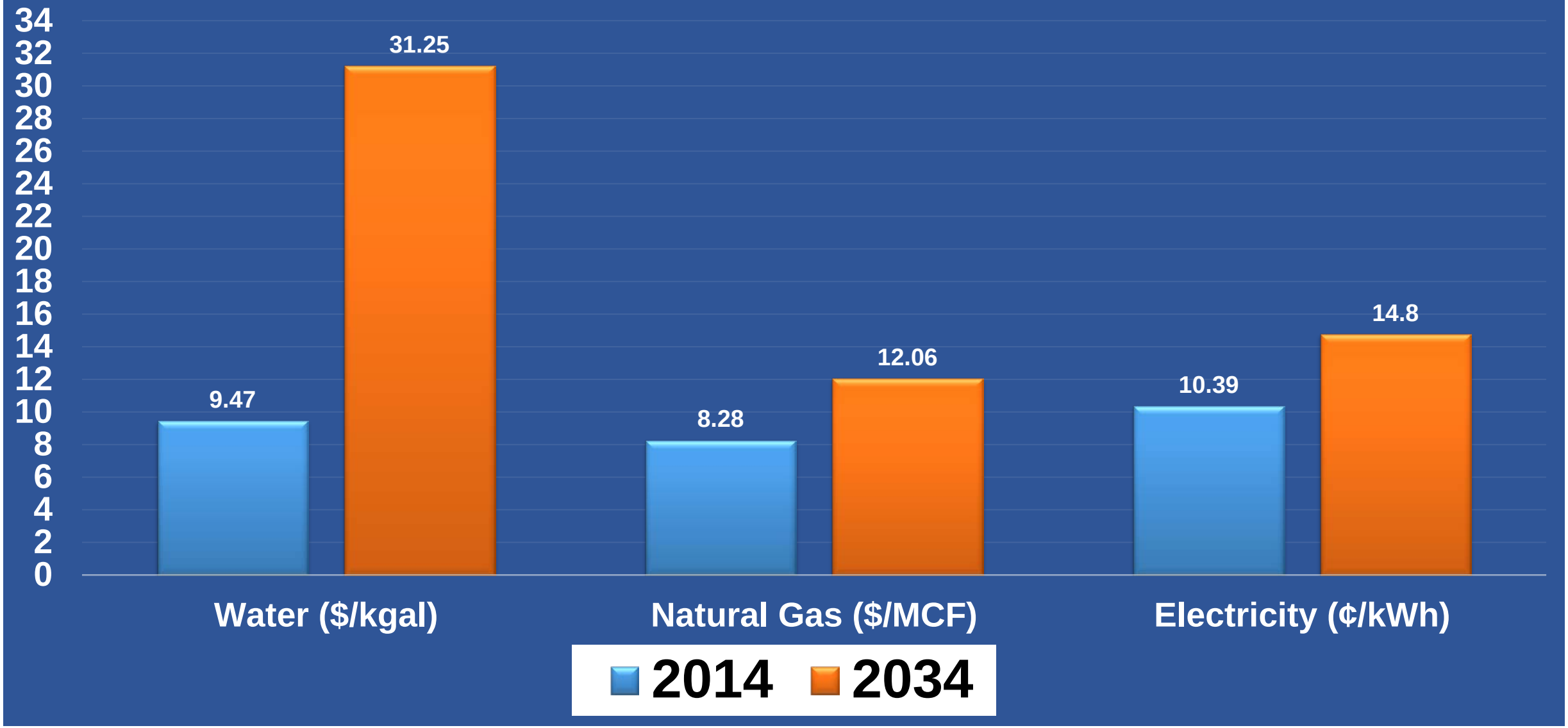
Water Using Appliance Energy Star® Market Penetration in 2011

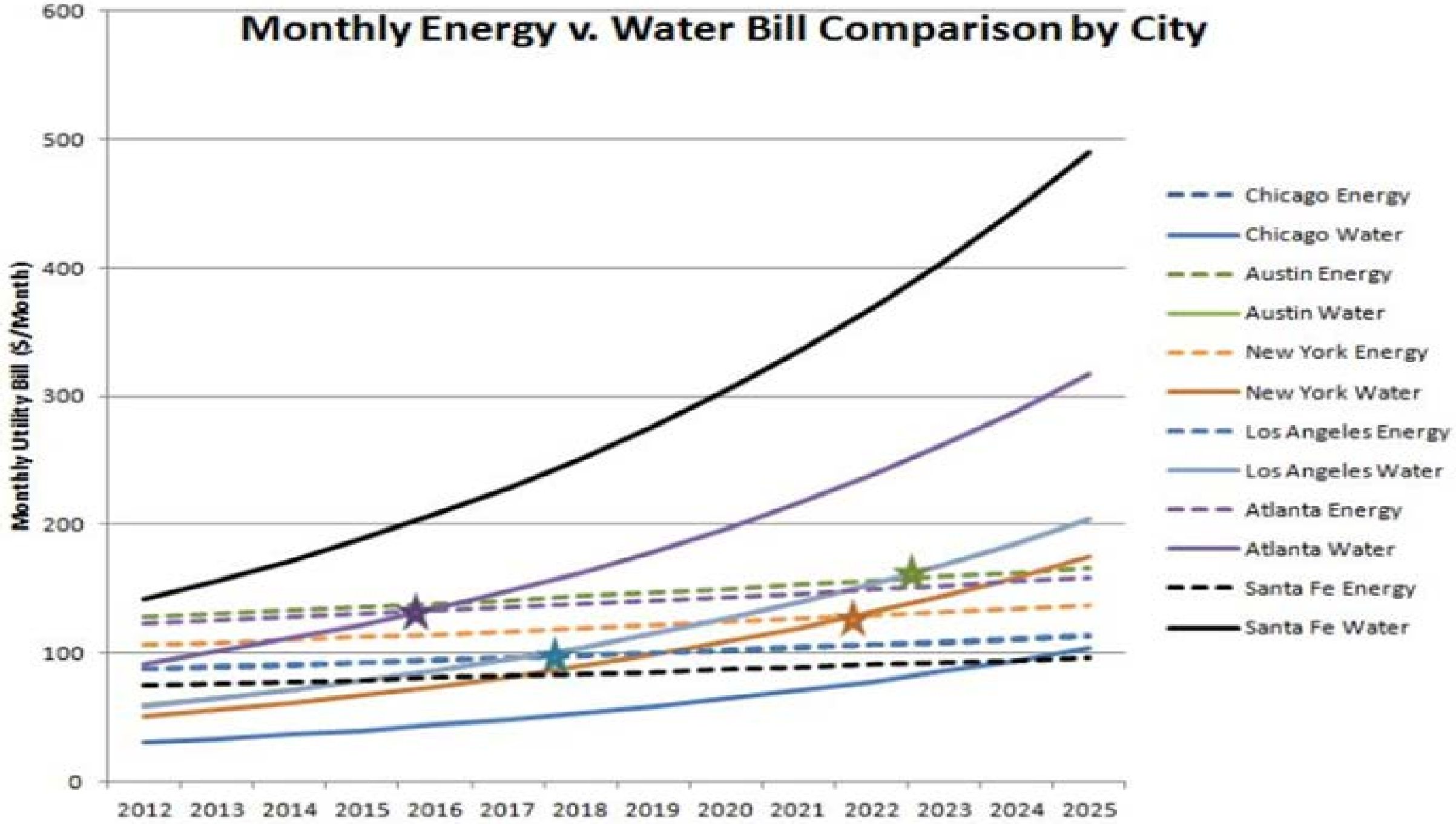



Cents per KWH
(With & Without Inflation)
Energy Information Administration
Cents per KWH
18
17
16
15
14
13
12
11
10
9
8
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
2025
2026
2027
2028
2029
2030
2031
2032
2033
2034
2035
2036
2037
2038
2039
2040
2011 Dollars
With Inflation 2%

Projected Future Costs

(water = 5.85%, Electricity & Nat. Gas = 2%)




Monthly Energy v. Water Bill Comparison by City
Monthly Utility Bill ($/Month)
600
500
400
300
200
100
0
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
2025
Chicago Energy
Chicago Water
Austin Energy
Austin Water
New York Energy
New York Water
Los Angeles Energy
Los Angeles Water
Atlanta Energy
Atlanta Water
Santa Fe Energy
Santa Fe Water

Cost to Flush a Toilet at Current Inflation Rate of 5.85%

Gallons per Flush	Cents per Flush in 2014	Cents per Flush in 2034
5	4.9	15.4
3.5	3.4	10.8
1.6	1.6	4.9
1.28	1.2	4.0

Dollars per Year for Toilet Flushing for 2014

Gallons per Flush	Cents per Flush	Type of Facility		
		Home	Office	Restaurant
		6 flushes per day (365 days)	35 flushes per day (260 days)	75 flushes per day (365 days)
5	4.9	$107	$446	$1,341
3.5	3.4	$74	$309	$931
1.6	1.6	$35	$146	$438
1.28	1.2	$26	$109	$329

Dollars per Year for Toilet Flushing for 2034

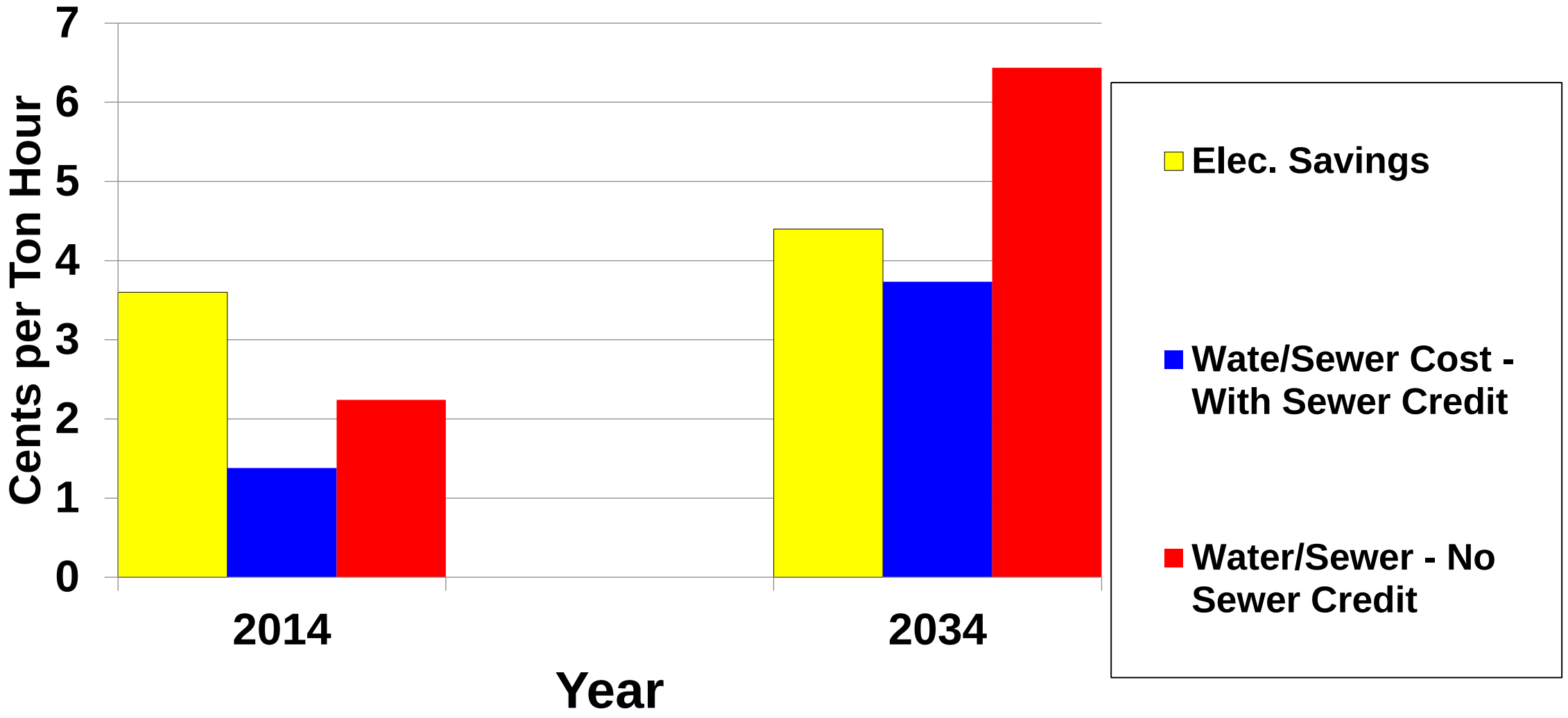
Gallons per Flush	Cents per Flush	Type of Facility		
		Home	Office	Restaurant
		6 flushes per day (365 days)	35 flushes per day (260 days)	75 flushes per day (365 days)
5	15.4	$337	$1,401	$4,216
3.5	10.8	$237	$983	$2,957
1.6	4.9	$107	$446	$1,341
1.28	4	$88	$364	$1,095

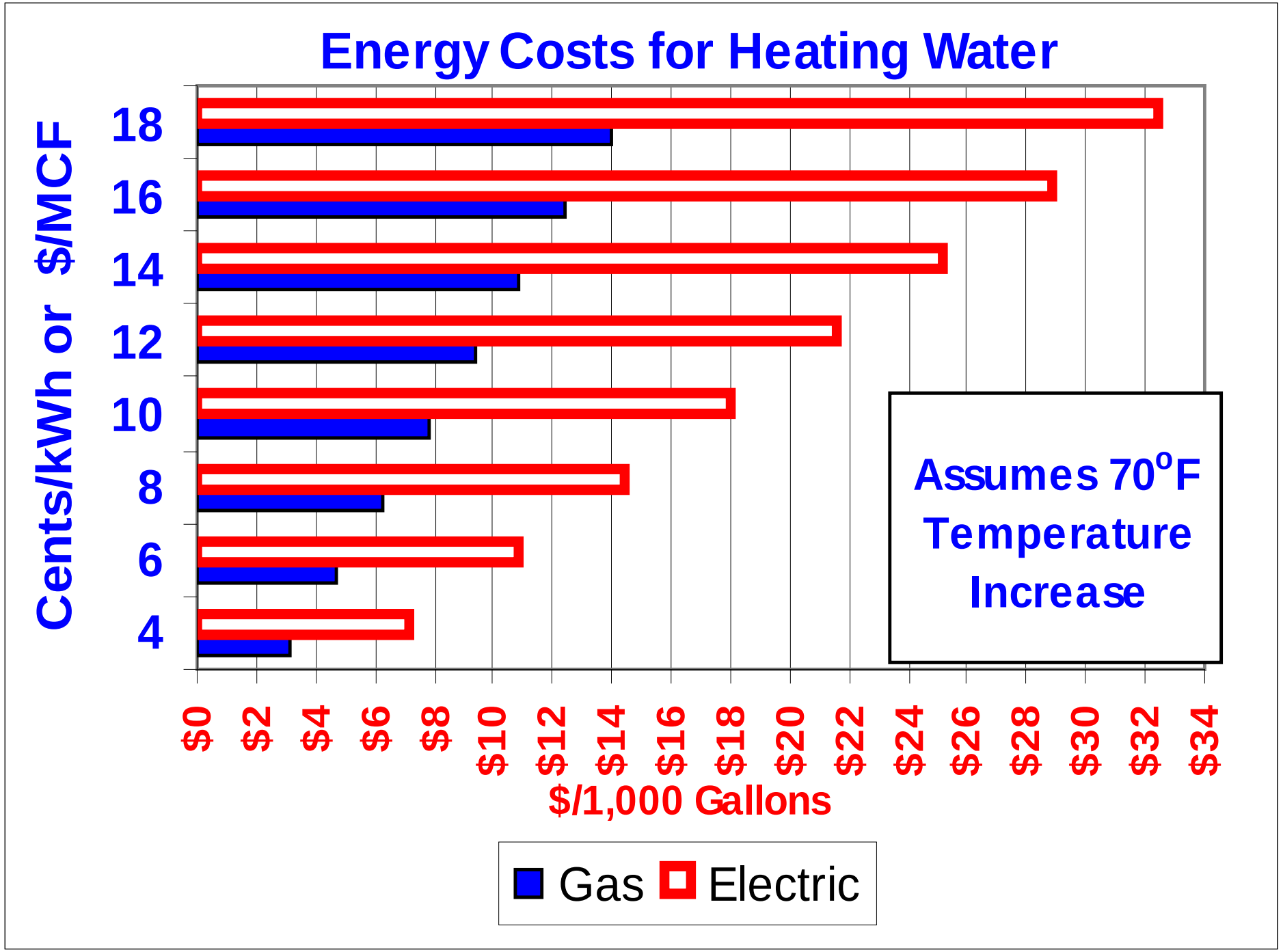
And again -

The True Cost of Water

- Water Cost
- Sewer/Pre-treatment
- Energy
- Chemicals
- Solid Waste Disposal
- Capital Equipment
- Labor
- Liability

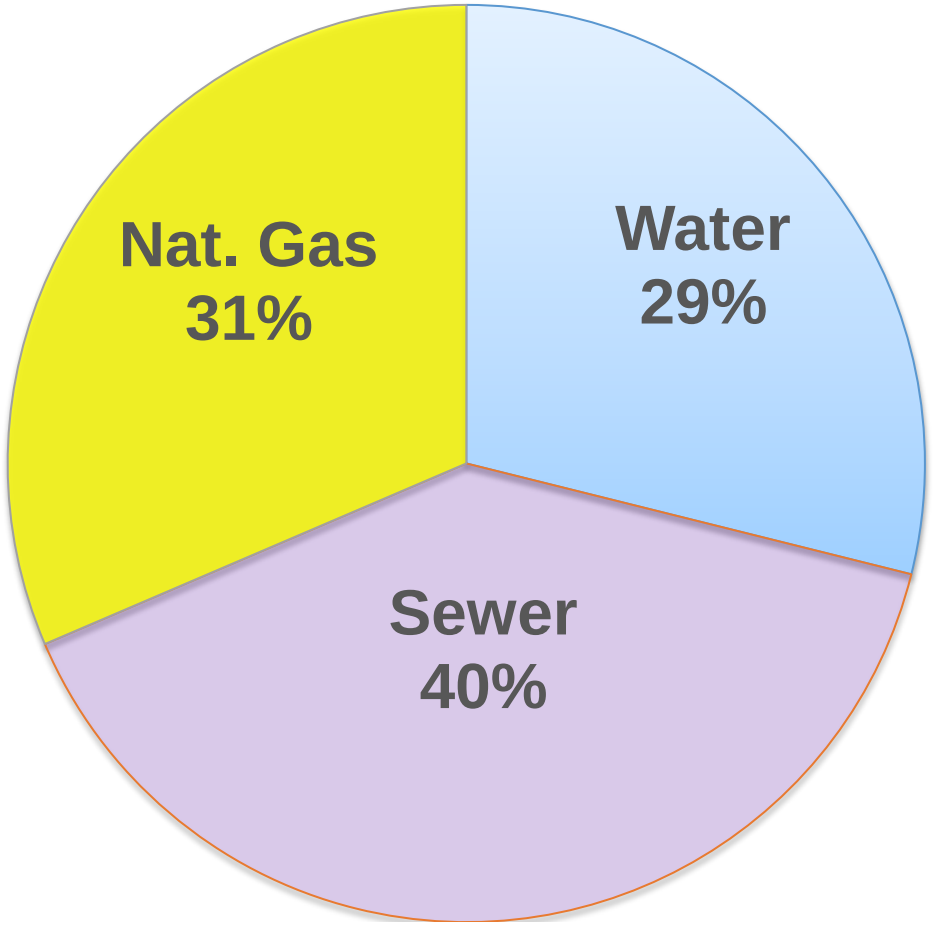
Cooling Tower Energy and Water/Sewer Cost per Ton Hour




Energy Costs for Heating Water
Cents/kWh or $/MCF
18
16
14
12
10
8
6
4
$0
$2
$4
$6
$8
$10
$12
$14
$16
$18
$20
$22
$24
$26
$28
$30
$32
$34
$/1,000 Gallons
Assumes 70°F Temperature Increase
Gas
Electric

National Average Cost for Water Heated with Natural Gas

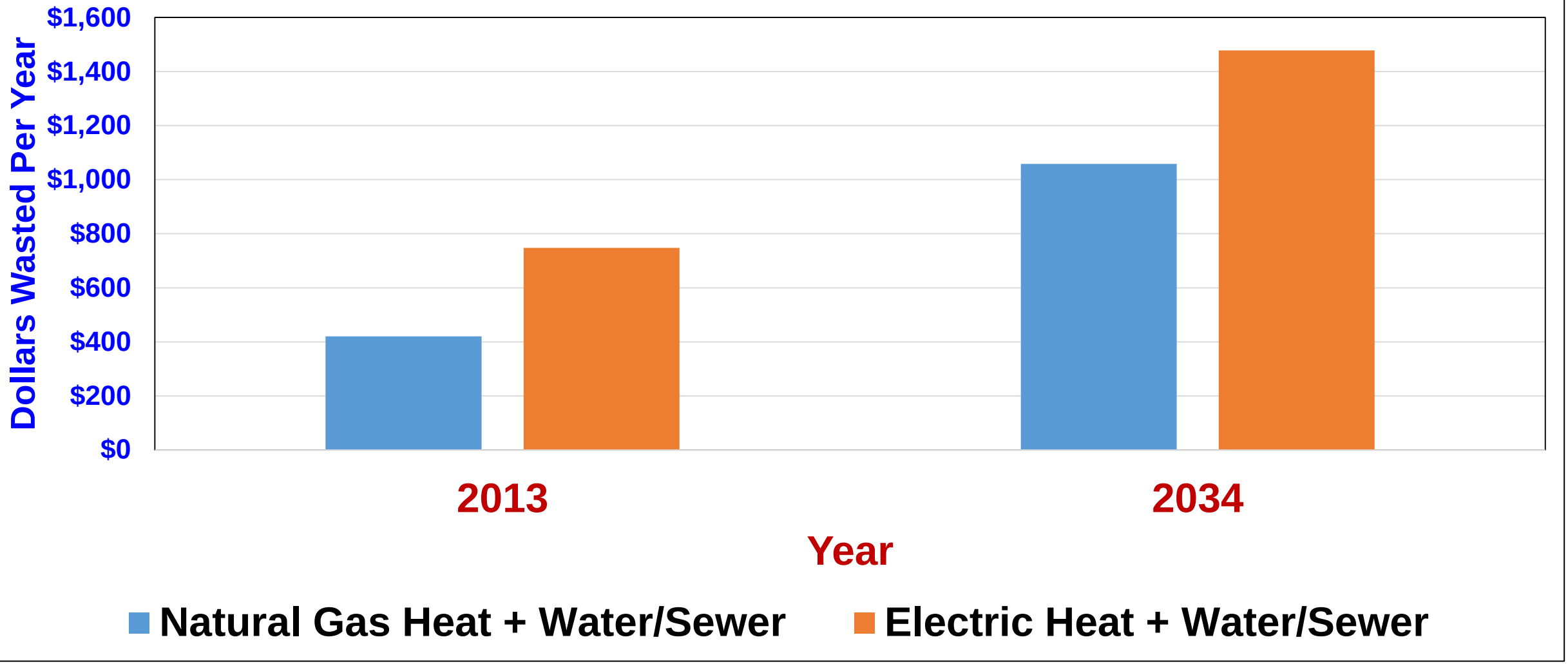
1.57 ¢/gallon, $15.70/Kgal, $11.75/HCF (ccf)



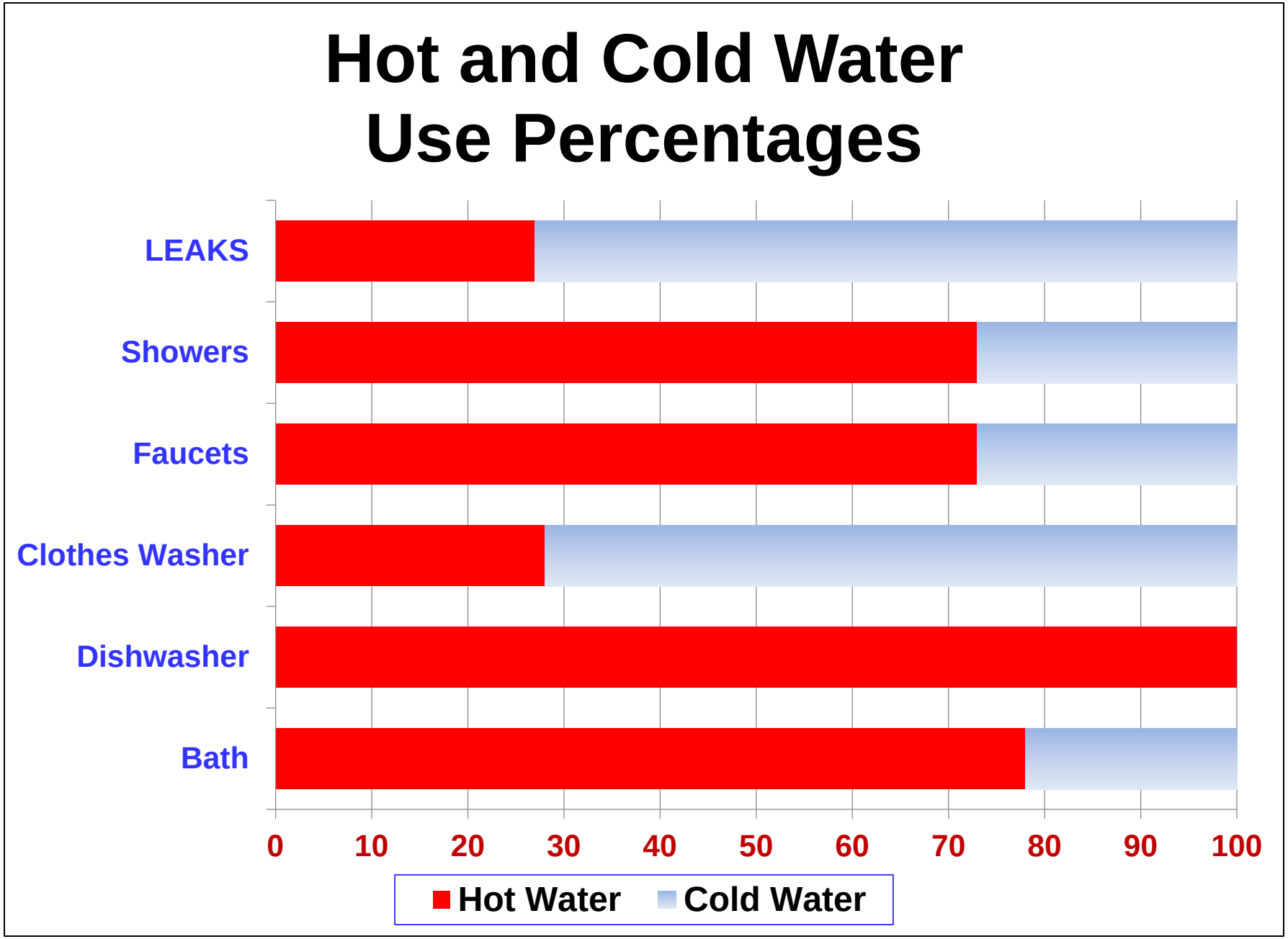
What does this 0.05 gpm leak mean to you in dollars & cents?

Cost of This Leak per Year		
Resource	2014	2034
Water & Sewer	*$249*	*$821*
Natural Gas	*$171*	*$237*
Electric	*$499*	*$657*

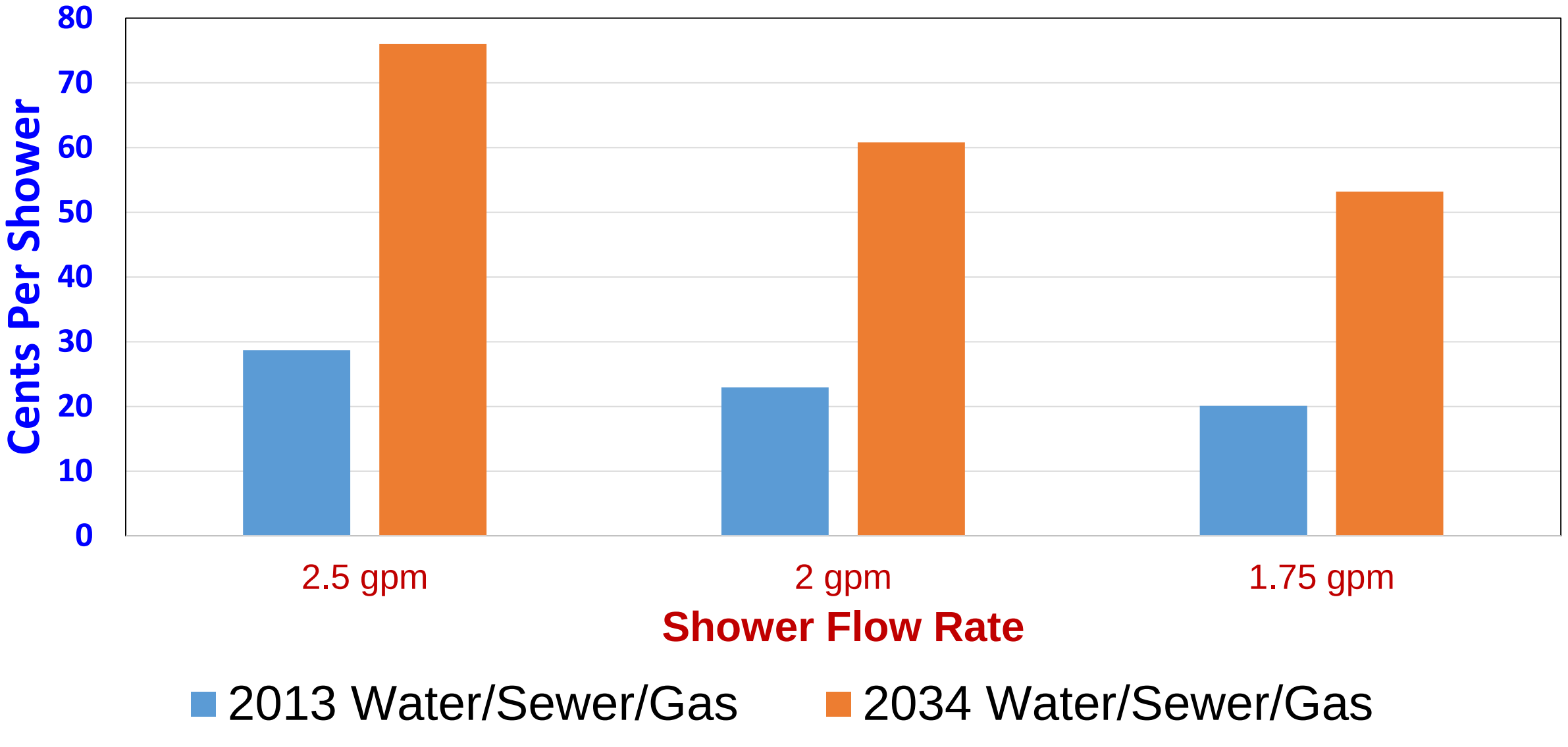
Cost of Leaking Faucet Example per Year



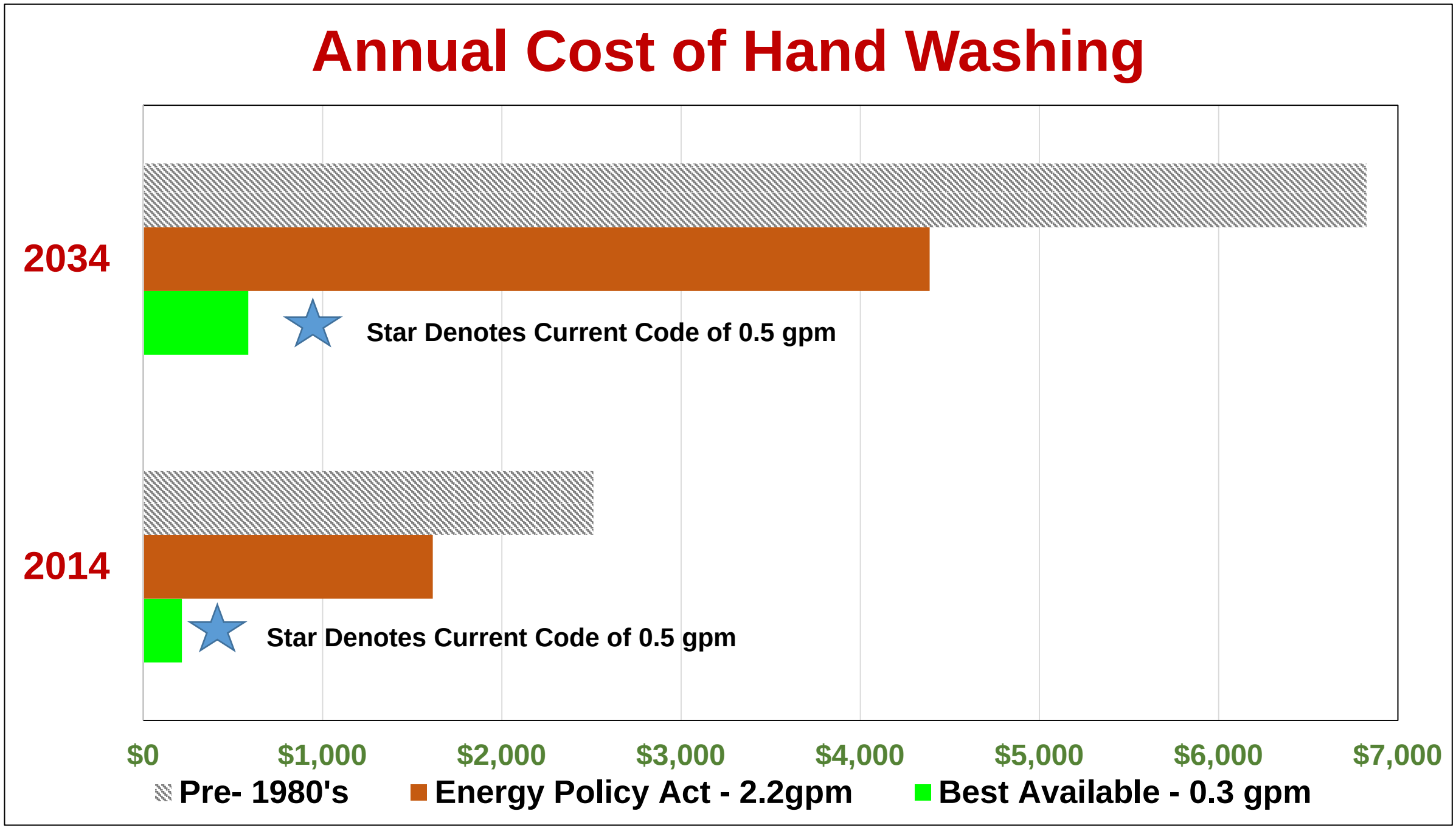
Hot and Cold Water Use Percentages



Cost of an 8 minute shower



Annual Cost of Hand Washing



Pre-Rinse Spray Valves

More water

Less pressure

Forceful

Spray

Old Spray Valve

- 4-6 GPM
- 8-12 Cents/Min.

New Spray Valve

- *1.28 GPM*
- *2.6 Cents/Min.*

Boilerless Steamers

- 90% less water
- 75% less energy
- No water hookup
- No sewer hookup
- No vent
- No de-liming

Once through cooling from refrigeration unit = 30,000 gallons a day!

At Avg. W/WW cost, 30,000 gallons a day

= $294

a day.

Pop up Sprinkler Heads Have Flow Rates of 1.5 gpm to 5.5 gpm

What does it cost to water?

- The old standard pop up uses 4 gpm.
- That is 4¢ per head per minute
- If there are 15 heads and you operate it for 20 minutes, it costs **$12**.
- That is equal to paying an employee **$36** per hour.
- Wow many zones do you have and how many times do you run them a week?
- By the way, at 5.85% inflation, in 20 years (2034) it will cost you **$38** to water 20 minutes which is equal to an employee at **$114** per hour.

When do they purchase new fixtures and appliances?

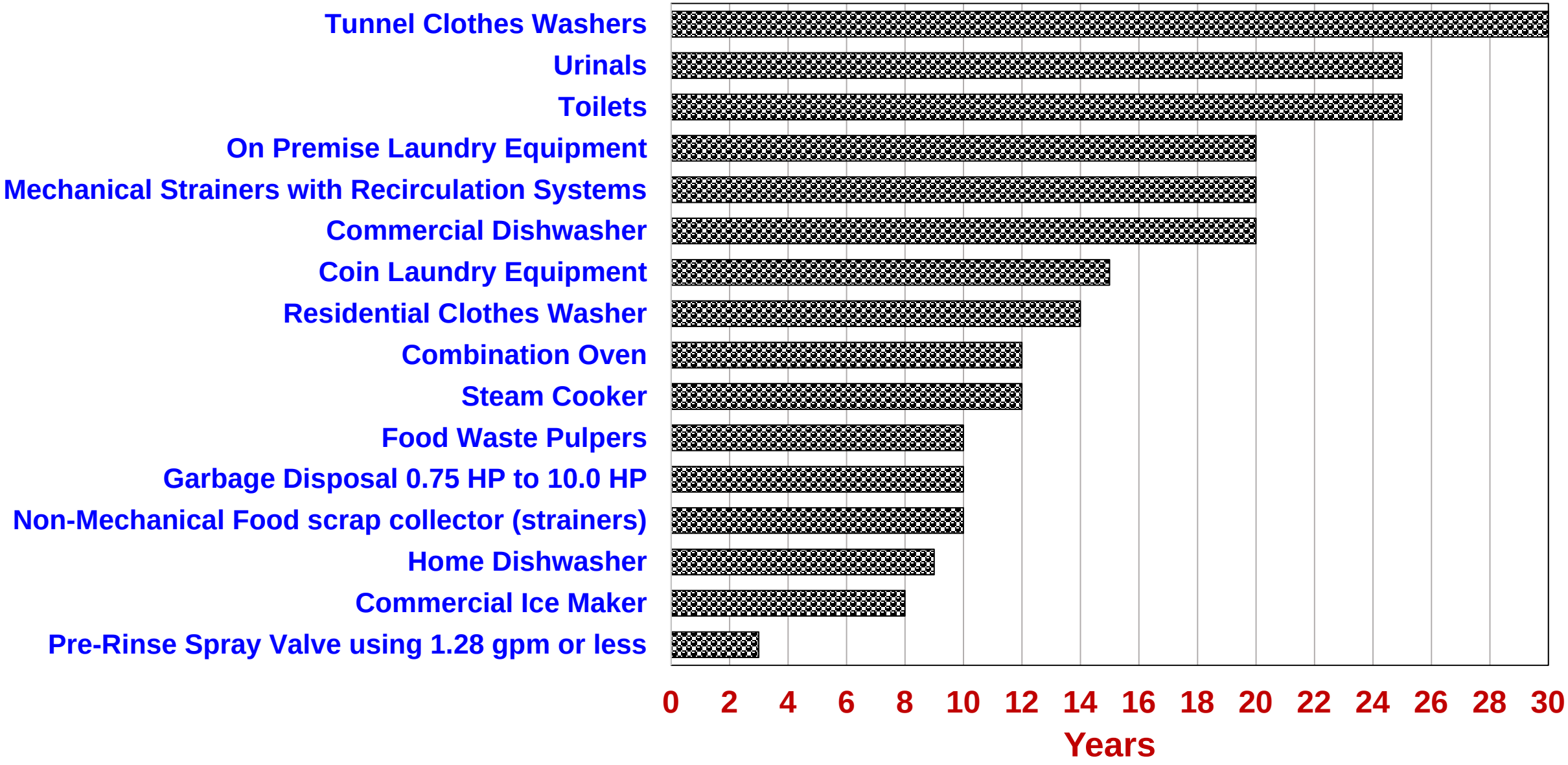
Average Age and Half Life of Selected Water Using Fixtures and Appliances

Type of Equipment	Average Age Years	Half Life Factor
Pre-Rinse Spray Valve - 1.28 gpm	3	16.67%
Commercial Ice Maker	8	6.25%
Home Dishwasher	9	5.56%
Non-Mechanical Food scrap collector (strainers)	10	5.00%
Garbage Disposal 0.75 HP to 10.0 HP	10	5.00%
Food Waste Pulpers	10	5.00%
Steam Cooker	12	4.17%
Combination Oven	12	4.17%
Residential Clothes Washer	14	3.57%
Coin Laundry Equipment	15	3.33%
Commercial Dishwasher	20	2.50%
Mechanical Strainers with Recirculation Systems	20	2.50%
On Premise Laundry Equipment	20	2.50%
Toilets	25	2.00%
Urinals	25	2.00%

Example

- A “widget with an eight year life.
- This means that half of the types of equipment will be replaced by attrition in eight years.
- The Factor = 50% / 8 = 6.25%
- If this is a “normal” Gaussian distribution curve, ***all*** will be replaced in 16 years, BUT??
- What this table and graph do tell you is the ***GENERAL*** rate at which equipment is replaced.

Average Life of Appliances

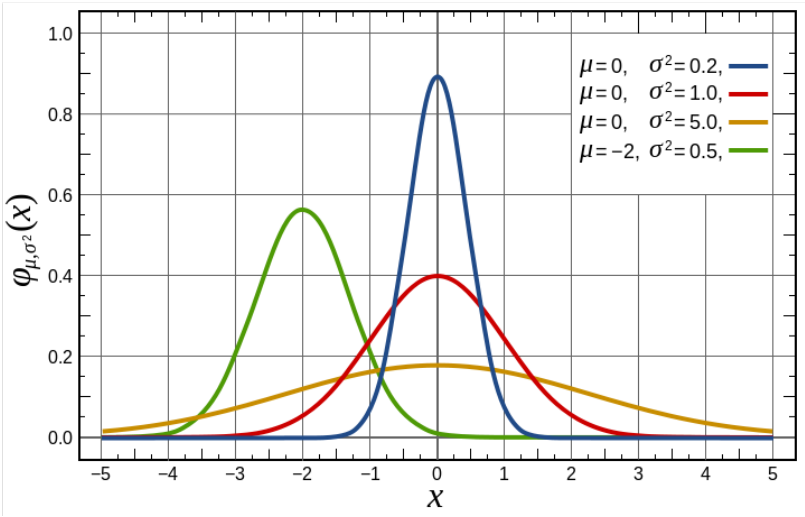


Cooling Tower Life Expectancy

Source: newOOMtable.doc

Construction Material	Typical Life Span	Cost
Wooden	10	Low
Galvanized Metal	12	Low
Epoxy Treated Metal	15	Med
Plastic	20	Med
Plastic Coated Metal	25	Med
Stainless Steel	30	High
Ceramic	35	Highest
Air Cooled	20-25	Low

Distribution of Data



Information on Cost of Commonly Used Fixtures, Equipment and Appliances

Type of Commercial Equipment	Typical Range of Cost per Piece of Equipment
ENERGY STARÒ rated Boilerless Steam Cooker	$10,000 to $35,000
ENERGY STARÒ rated Boilerless Combination Oven	$10,000 to $35,000
ENERGY STARÒ Dishwasher, Under Counter, Low Temp	$2,500 to $5,000
ENERGY STARÒ Dishwasher, Under Counter, High Temp	$2,500 to $5,000
ENERGY STARÒ Dishwasher, Door Type	$3,500 to $9,000
ENERGY STARÒ Dishwasher, Single Tank Conveyor Type	$9,000 to $30,000
ENERGY STARÒ Dishwasher, Multi-Tank Conveyor Type	$15,000 to $35,000
Pre-Rinse Spray Valve using 1.28 gpm or less	$80 to $200
ENERGY STAR® Commercial Ice Maker	$1,750 to $4,000 for up to 1,000 lb./day
ENERGY STAR® Commercial Ice Maker	$3,000 to $10,000 for very large ice makers
Non-Mechanical Food scrap collector (strainers)	$80 to $600
Garbage Disposal 0.75 HP to 10.0 HP	$200 to $6,000
Mechanical Strainers with Recirculation Systems	$1,800 to $12,000
Food Waste Pulpers	Over $25,000
Residential Clothes Washer	$400 to $2,000
ENERGY STARÒ Coin Laundry Equipment	$500 to$3,000
On Premise Laundry Equipment	Wide range
Tunnel Washers	$400,000 to One Million
Toilets	$150 to $400
Urinals	$150 to $400

Utility Life Cycle Cost Analysis

- The cost to operate the fixture, appliance, or piece of equipment over its useful life
- Look at all utility costs
- Most of the time the capital costs are small compared to the life cycle savings

Generalized Energy Recommendations from DOE for Ice Machines Used at Federal Facilities

Machine Capacity in Pounds of Ice Produced per Day	Kilowatt Hours for Air Cooled Machines	Kilowatt Hours for Water Cooled Machines	Difference	Energy Cost Savings (Cents per 100 pounds of ice @ 10)
500 to 750	<5.5	<4.1	1.4	14
750 to 1500	<5.0	<3.5	1.5	15
1500 up	<4.6	<3.4	1.2	12
Average Savings per 100 Pounds of Ice Based on Electricity at 10 Cents per kWh				***13.7***

Air Cooled Cost Savings Using DOE Latest Recommended Energy Standards for Ice Machines

At a water/wastewater cost of only *$2.50/Kgal!!!!*

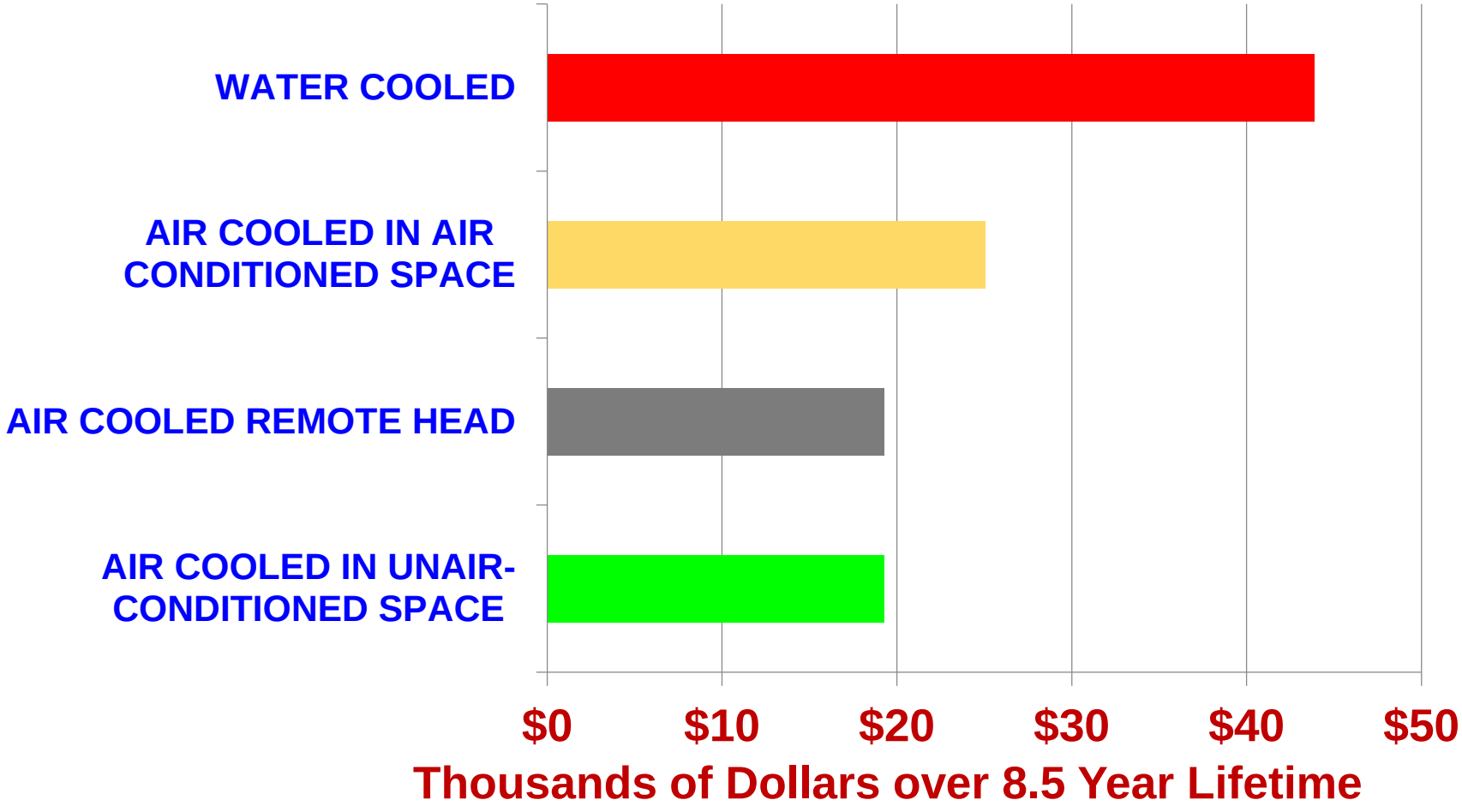
Nationally, cost = $9.74/Kgal in 2013

Gallons per 100 lb.	Cost of Water and Wastewater Combined $2.50 per kGal (Cents/100 Pounds)	Energy Savings per 100 Pounds With Water Cooled Equipment (Cents/100 Pounds)	Net Savings per 100 Pounds with Air Cooled Equipment (Cents/100 Pounds)
85	21.25	13.7	7.6
100	25	13.7	11.3
150	37.5	13.7	23.8
200	50.0	13.7	36.3

Lifetime Utility Costoveralysis

1,000 lb/day machine, Water $7.60/kGal. Elec. 10 cents/kWh, 120 gallons of cooling water, DOE Recommended Efficiencies

This size ice maker cost about $3,000.



Understandable terms

If you don't measure it, you can't manage it!

WATER
MANAGEMENT INC.

www.watermgt.com

(703) 370-9070

GSA Contract # GS-21F-0038T