

This presentation premiered at WaterSmart Innovations

watersmartinnovations.com



ICI and Multi-Family Water Conservation by the Numbers



Presented by
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at

WaterSmart Innovations 2019

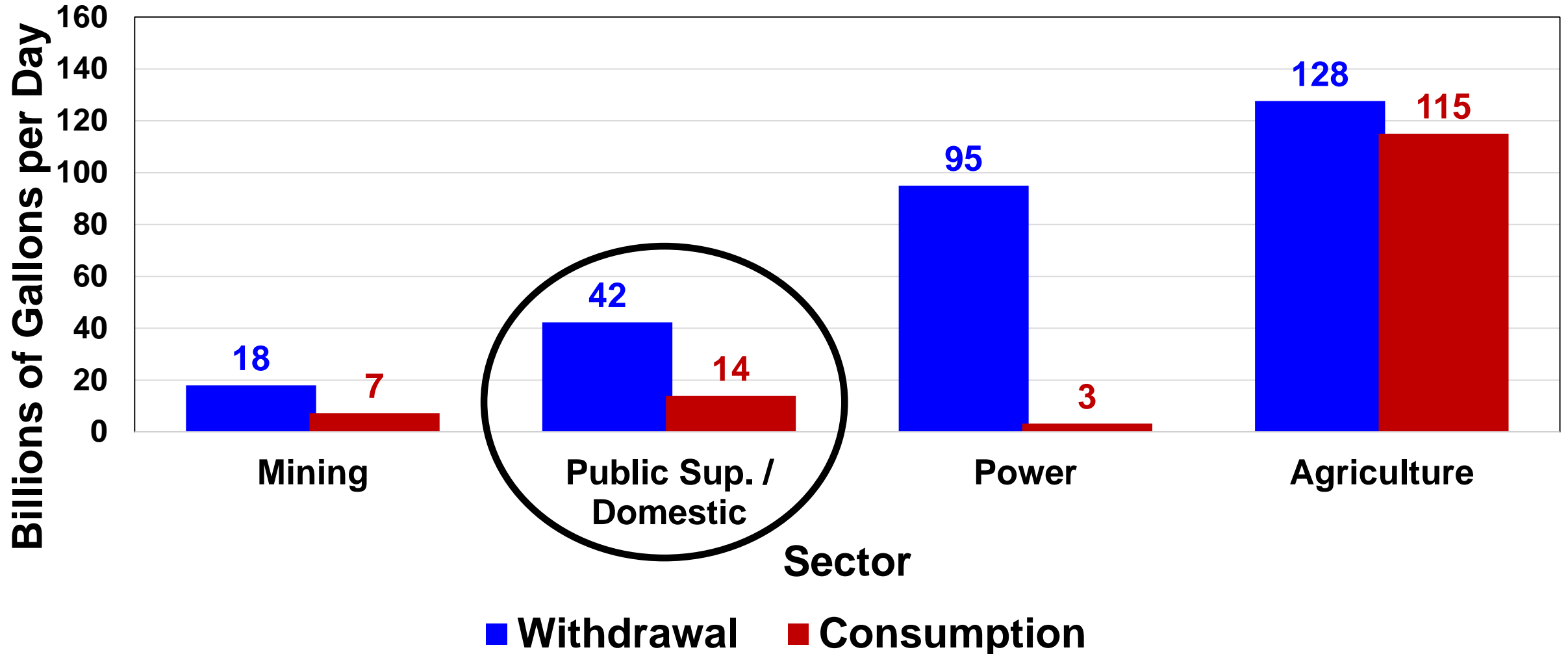
What we will cover

- How much water is used in these sectors
- Breaking down city wide use - **target conservation opportunities**
- Where water is used – **opportunities for targeted programs**
- Seasonal use – **the real numbers might surprise you**

Withdrawal vs. Consumption

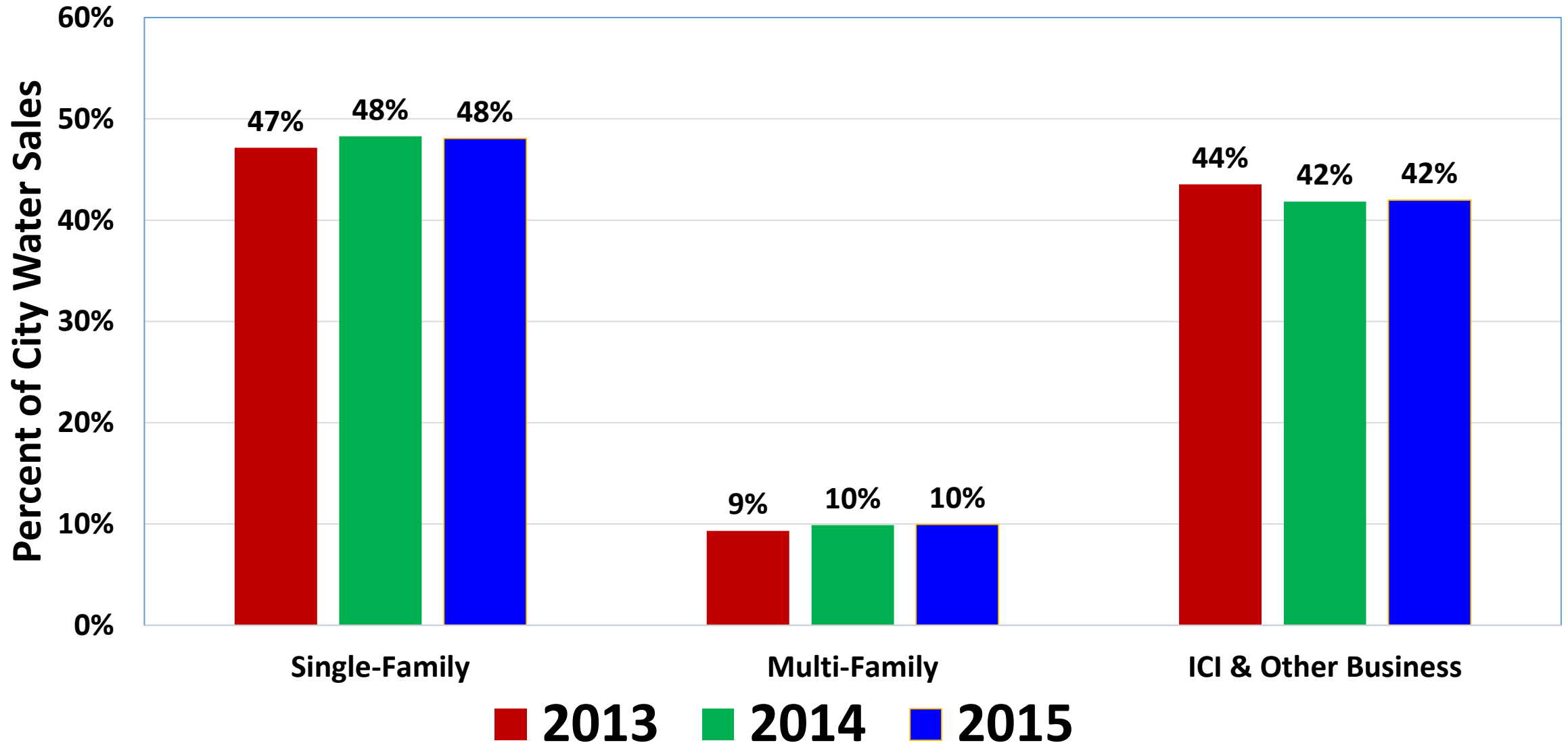
332 billion gallons a day in 2015

USGS and H.W.(Bill) Hoffman & Associates, LLC



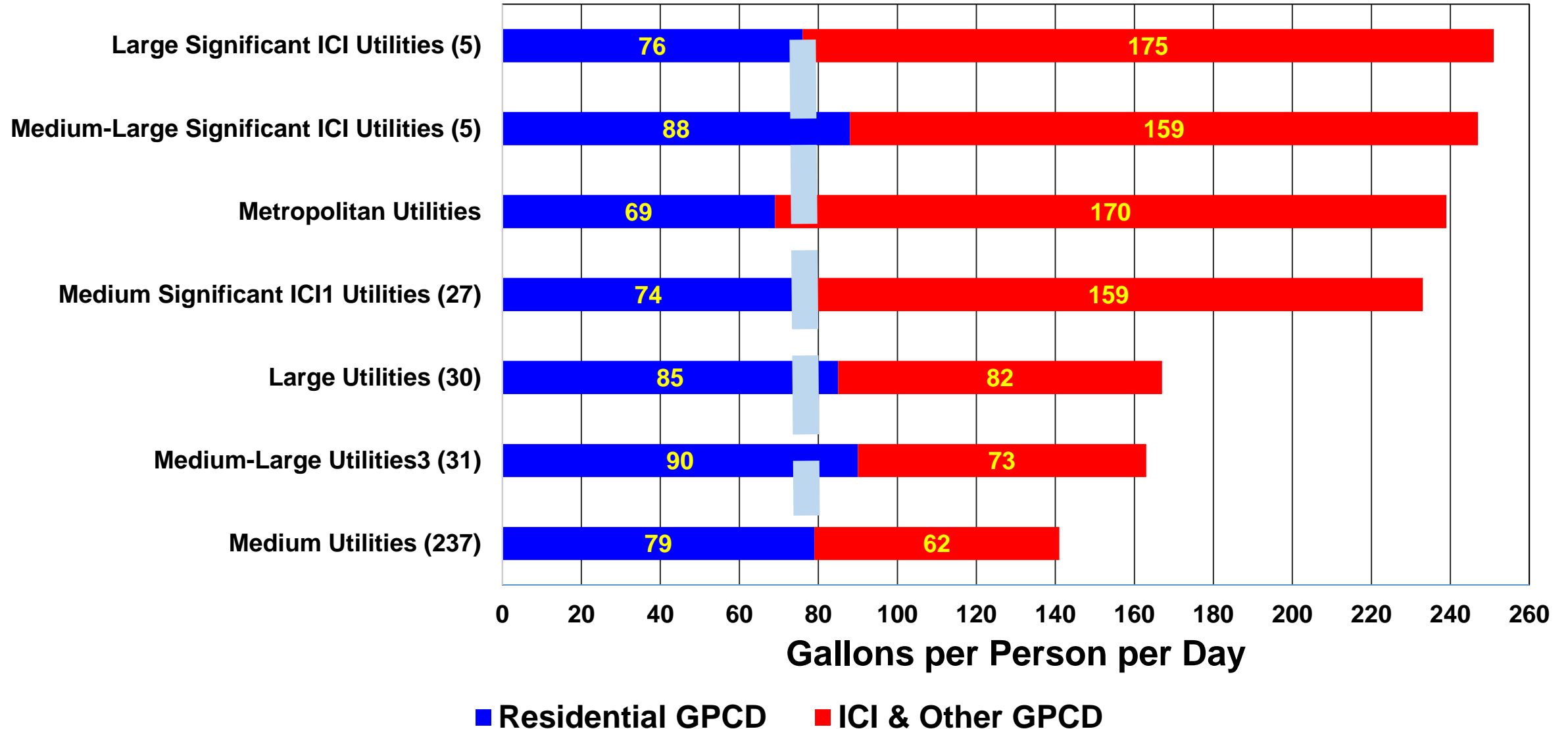
Water End Use in Texas Cities of 3,300 Population or More

Source: TWDB - Water Use of Texas Water Utilities



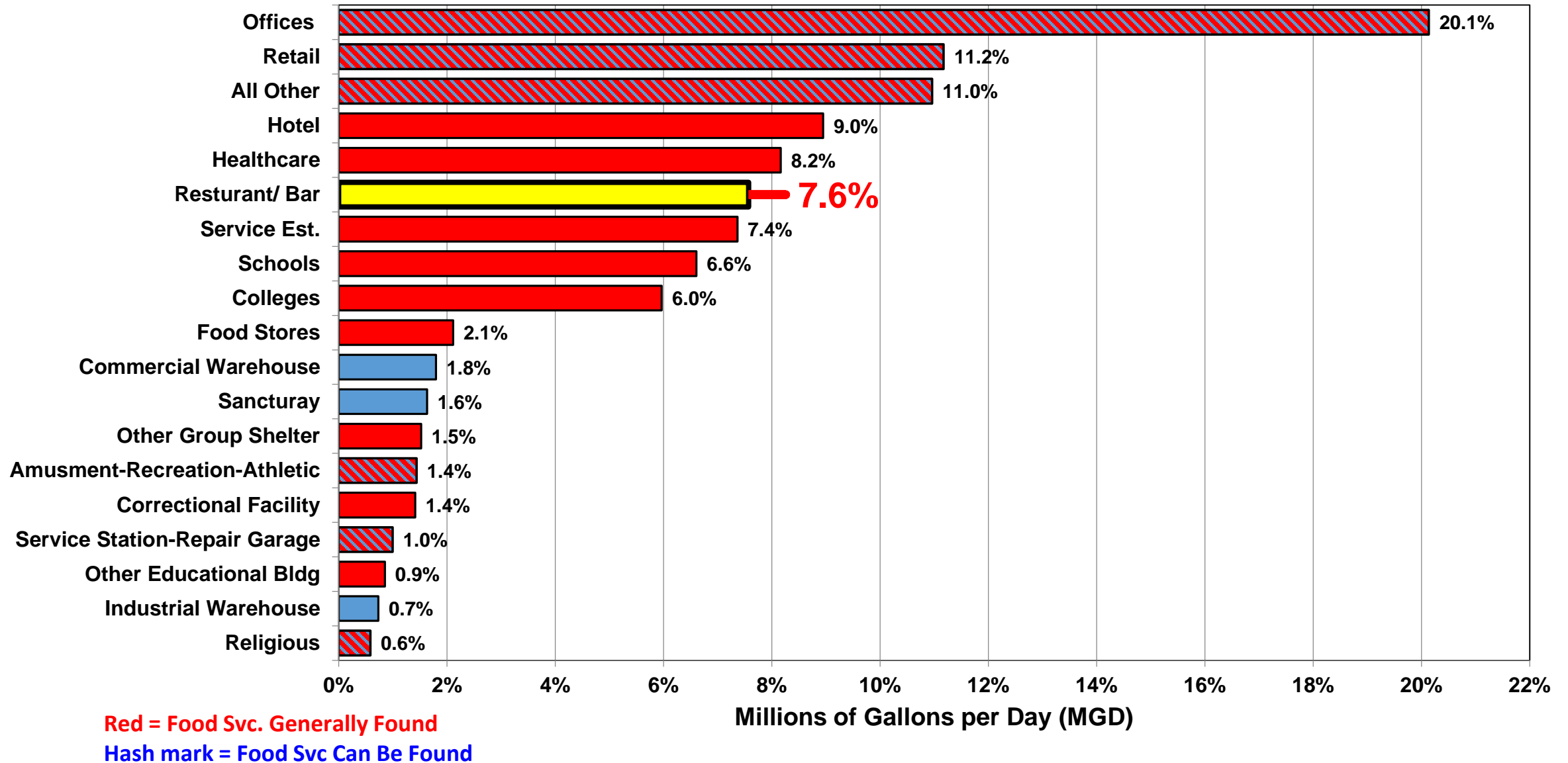
Water Use of Texas Utilities

TWDB 2015 - SB 181 Report

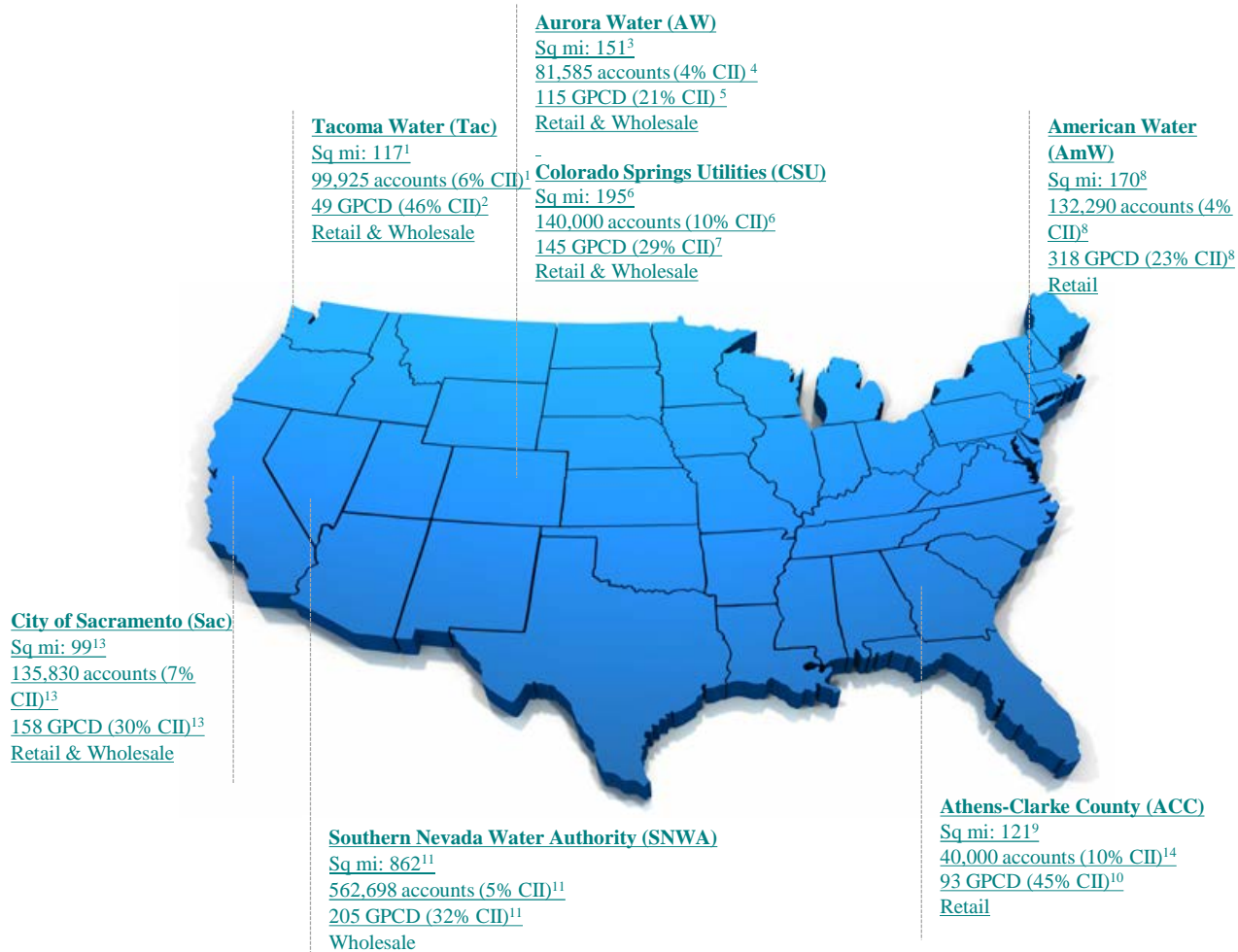


Commercial Water Use in Austin Texas

Water Use by Commercial/Institutional Users



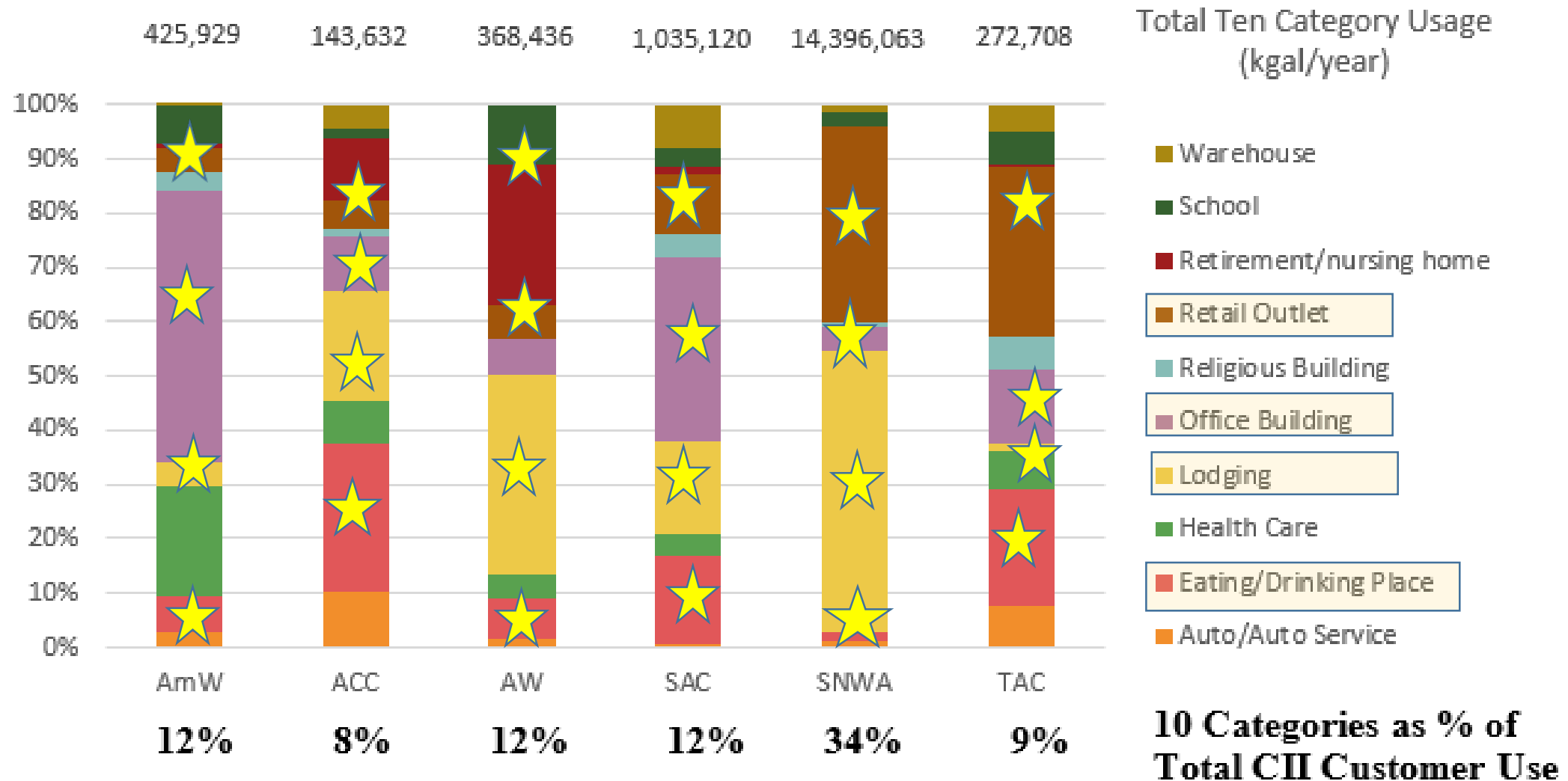
WRF report 4619 Map



- Sacramento California
- Tacoma Washington
- Southern Nevada Water Auth.
- Athens Clark County Georgia
- American Water New Jersey
- Aurora Water Colorado
- Colorado Springs Colorado

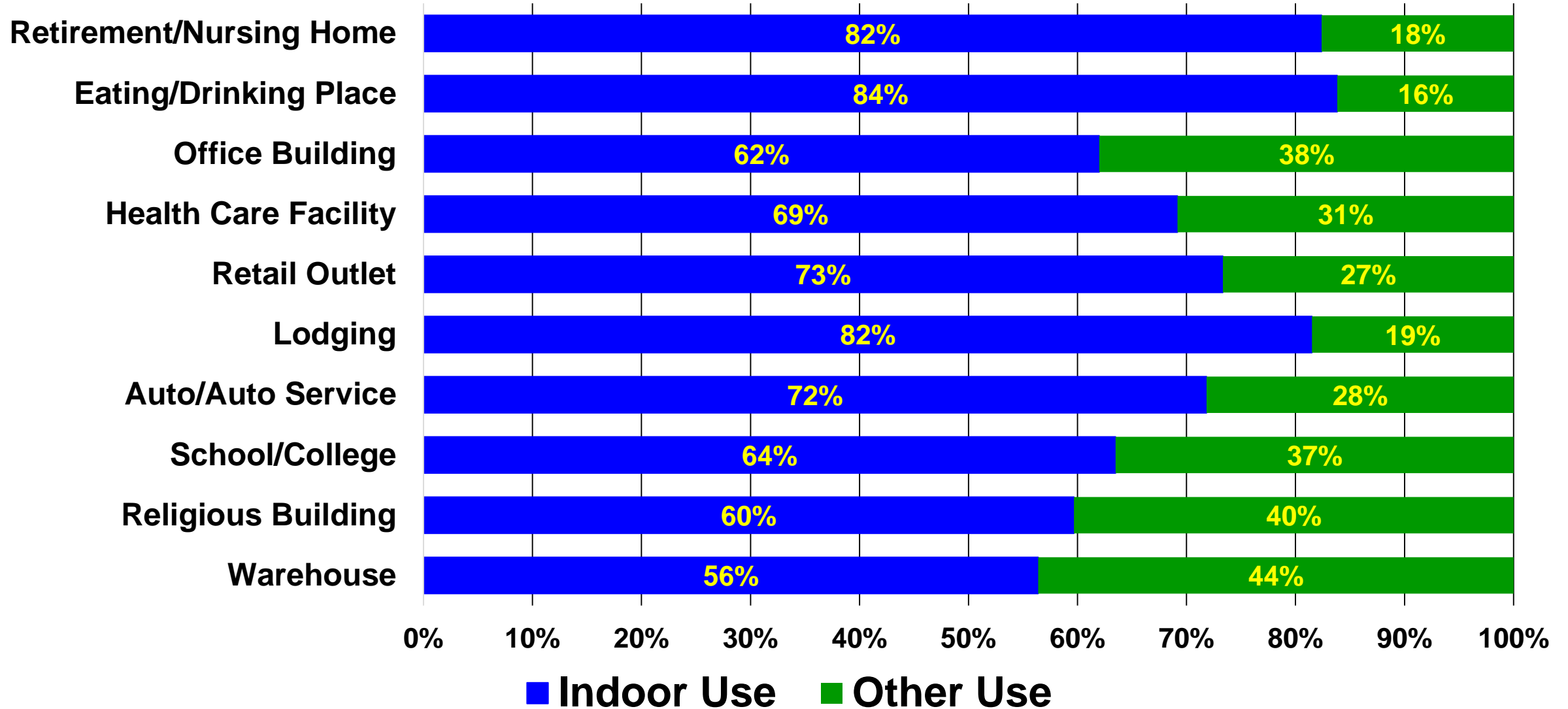
Water Use by Type of Establishment

Source: WRF #4619



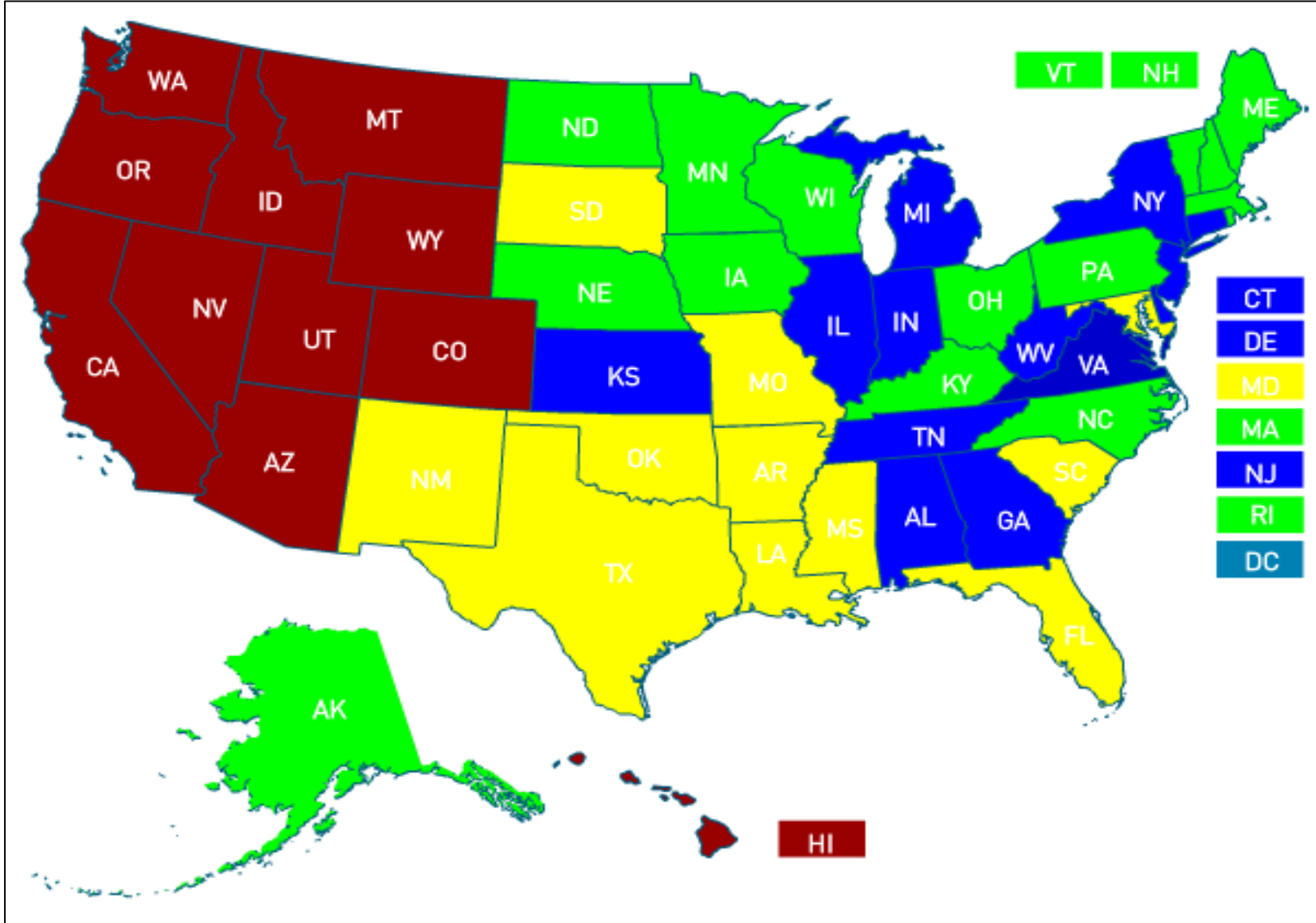
Indoor Use vs Other Uses

Source: WRF 3 4619



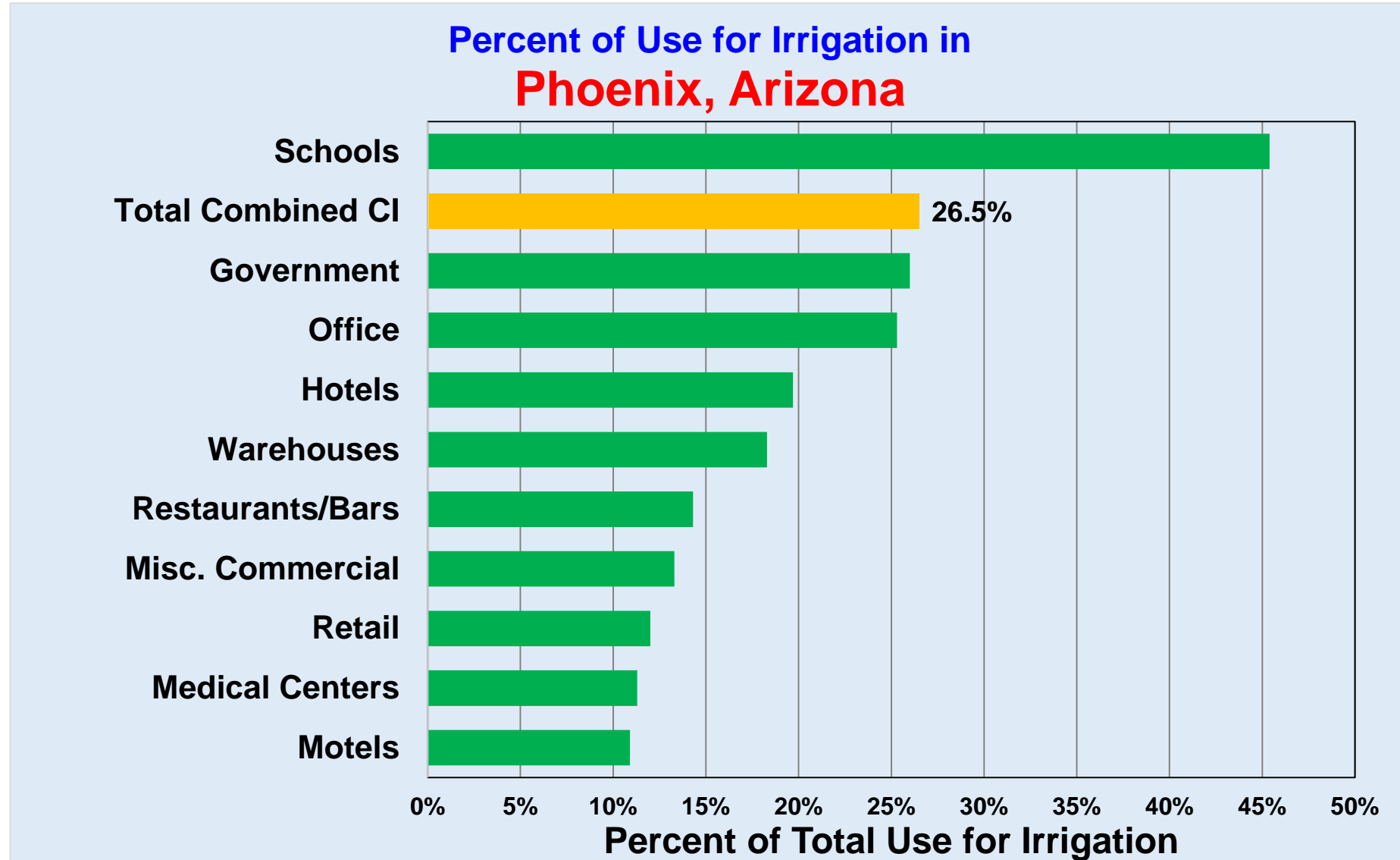
Percent of Domestic (residential) Estimated to be for Outdoor Use

Source: H.W. (Bill) Hoffman & Associates LLC based on USGS Circular 1405 (Tables 1-14)

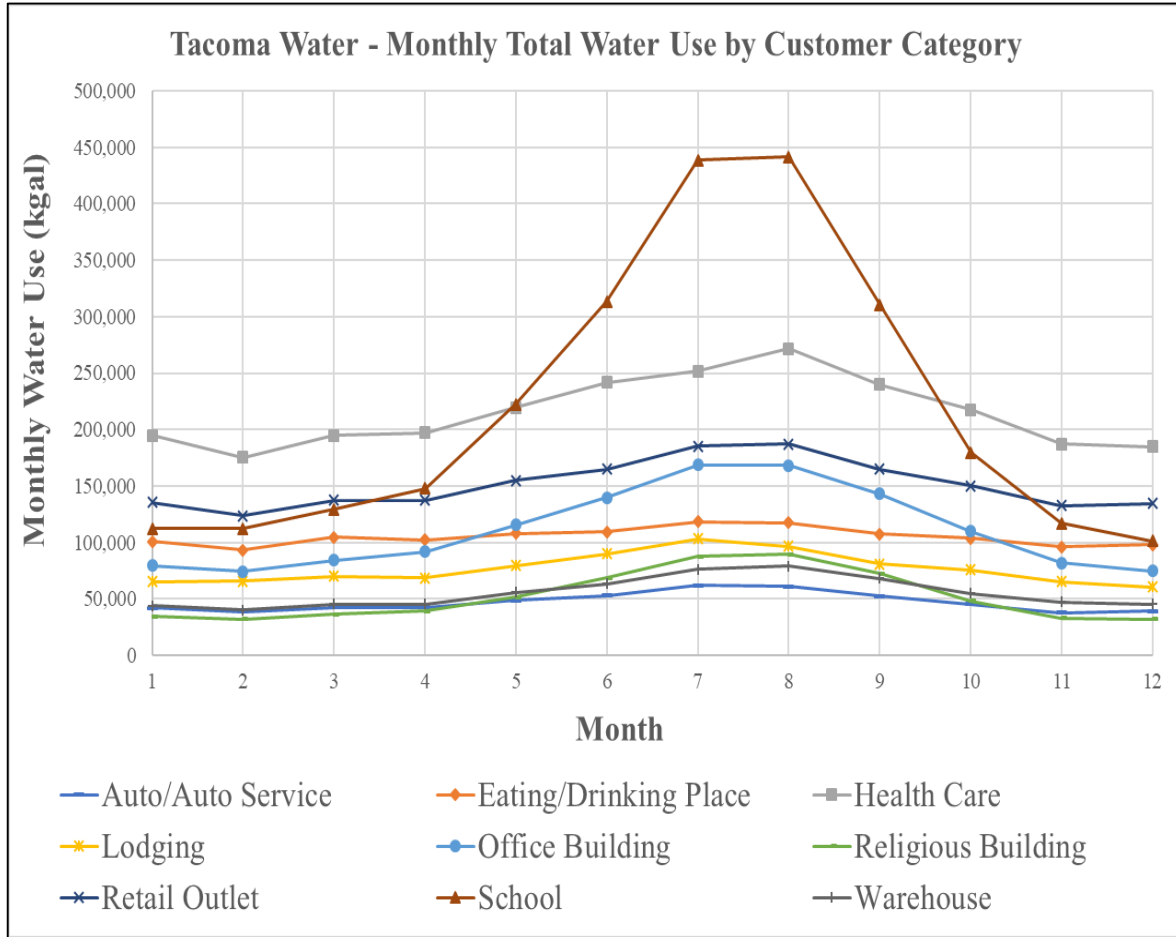


0-20 % outdoor
20-30 % outdoor
30-45% outdoor
**Over 45 %
outdoor**

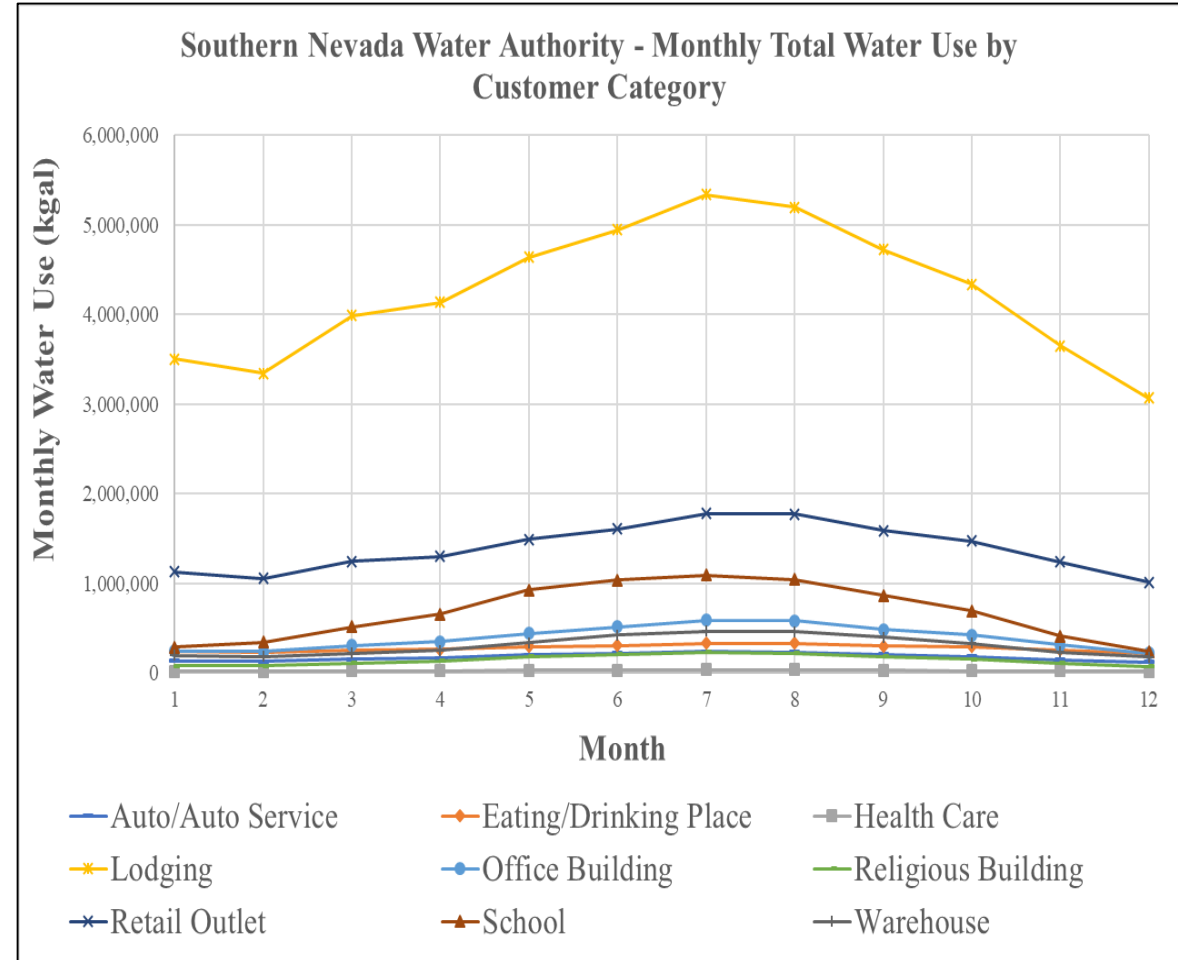
Commercial & Institutional Landscape use from **ARID** area



Monthly Water Use Patterns – WRF #4619

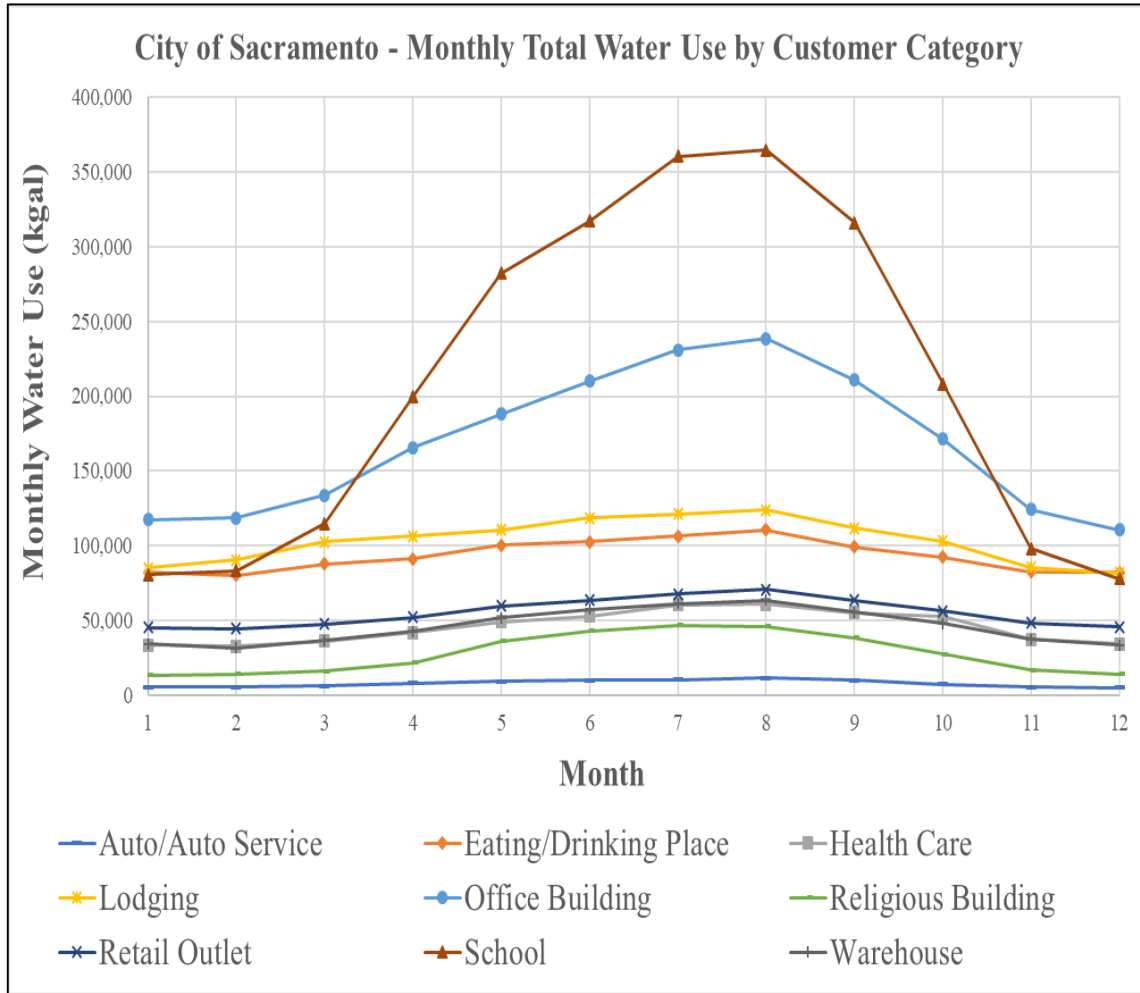


Washington

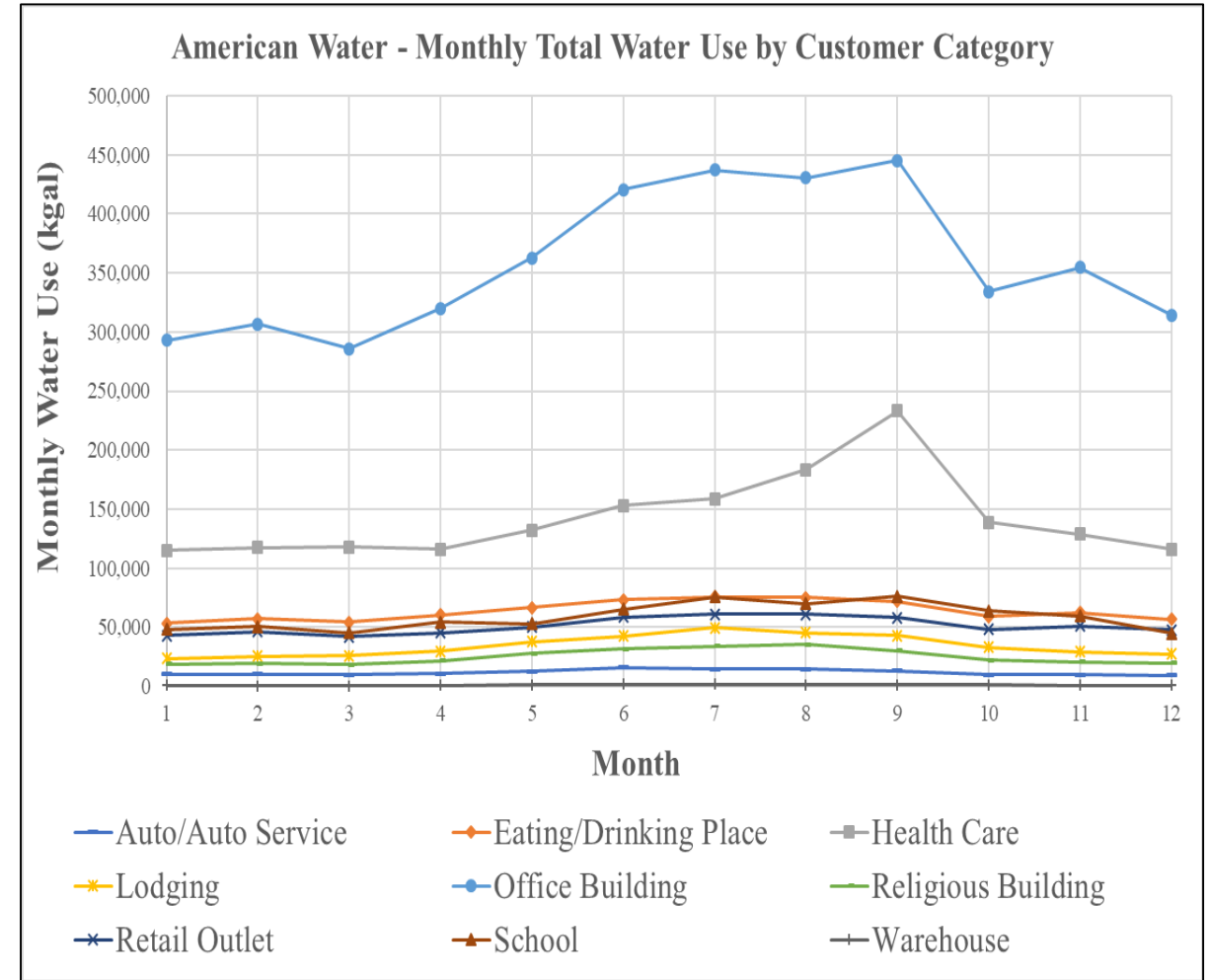


Nevada

Monthly Water Use Patterns – WRF #4619

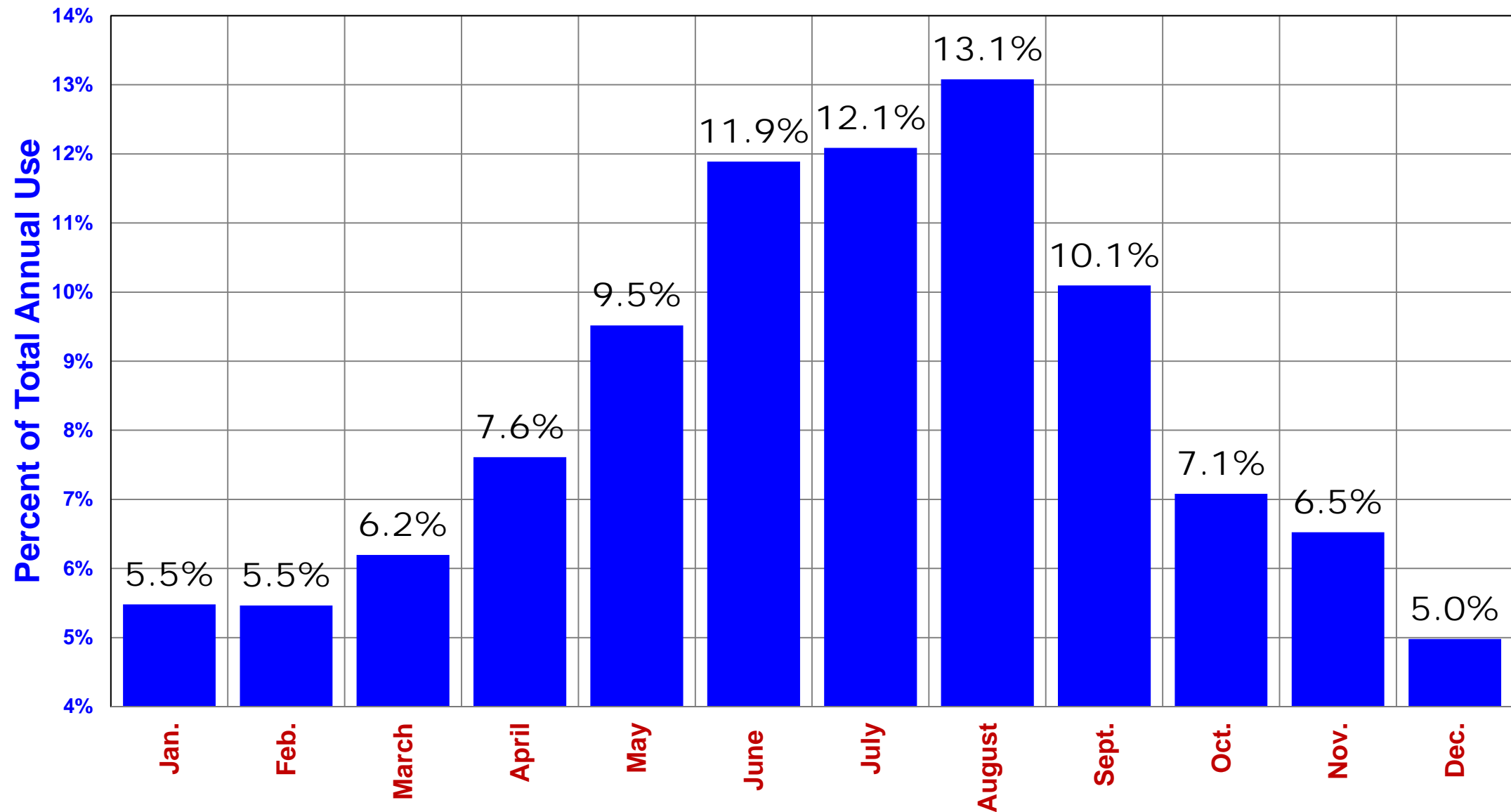


California

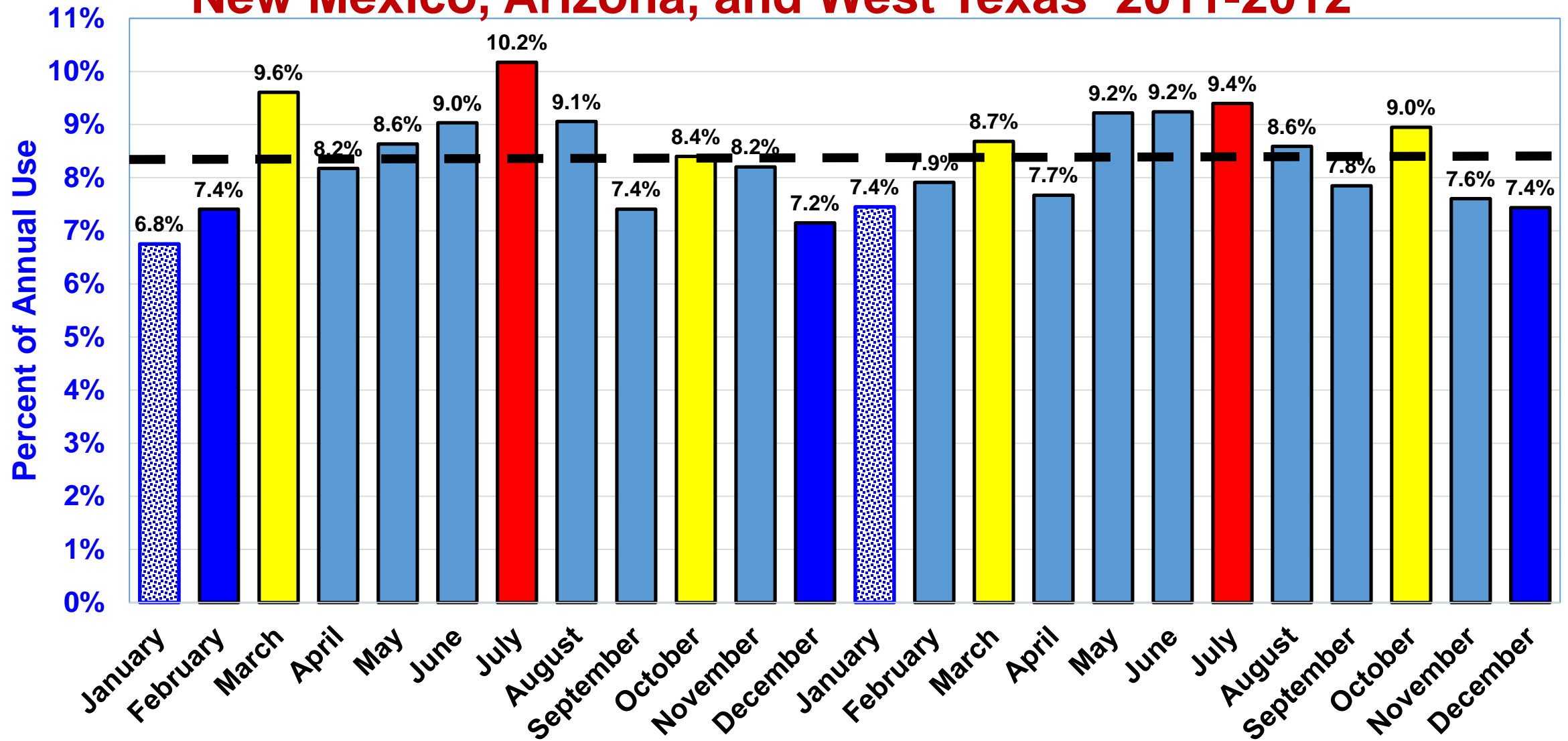


New Jersey

Distribution of Monthly Water Use by 44 Office Buildings in Texas With Cooling Towers



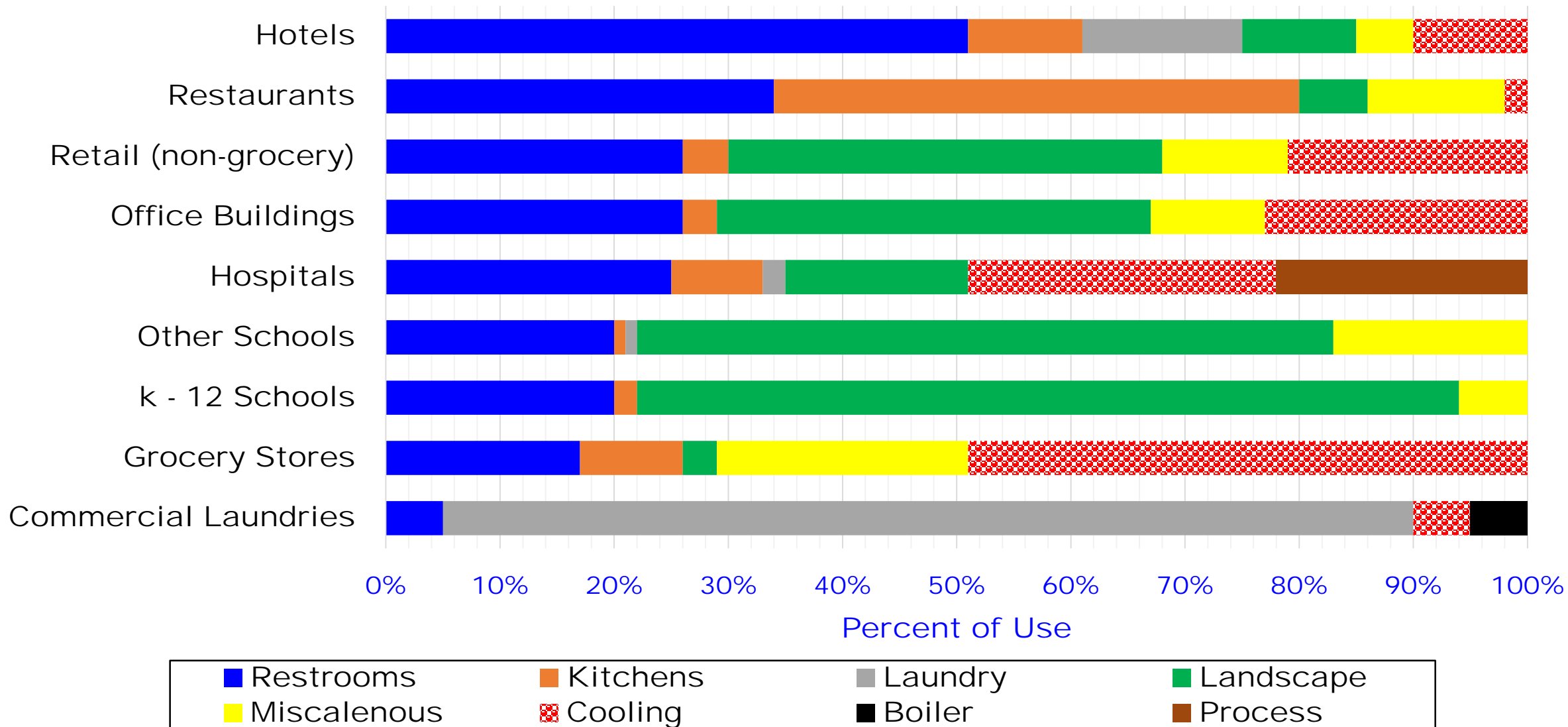
Monthly Percent of Annual Use for 15 Hotels In New Mexico, Arizona, and West Texas 2011-2012



Pacific Institute 2000 Study in California

Waste Not - Want Not Appendix E.

http://pacinst.org/wp-content/uploads/2013/02/appendix_e3.pdf



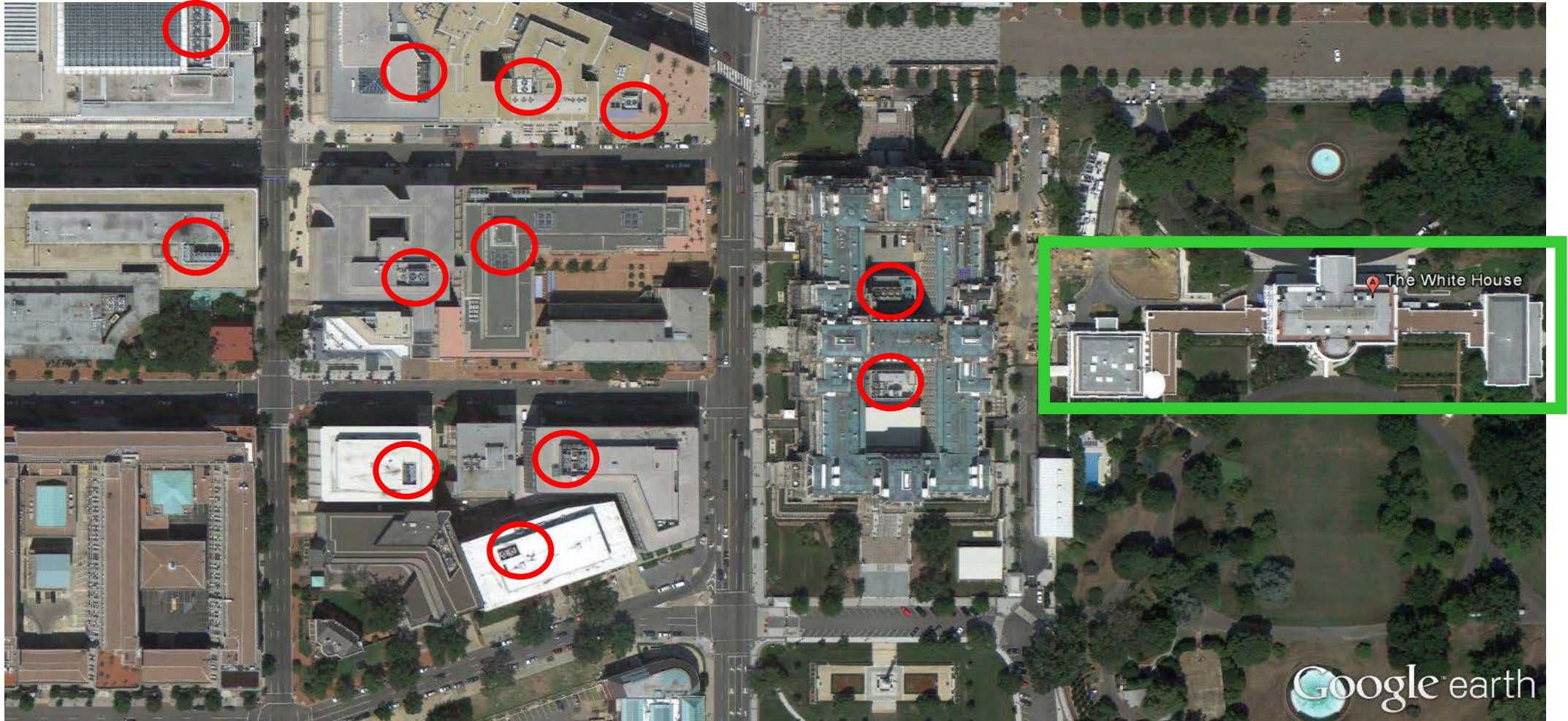
Cooling Towers



You may recognize the Building outlined in Green

Red circles show cooling towers

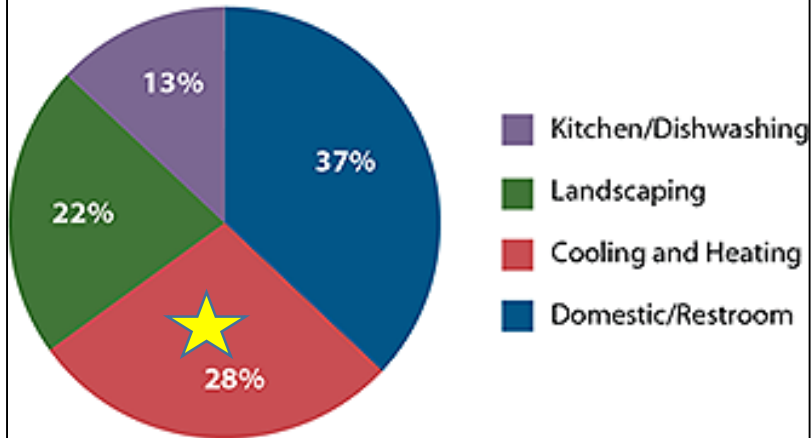
The Whitehouse and downtown DC



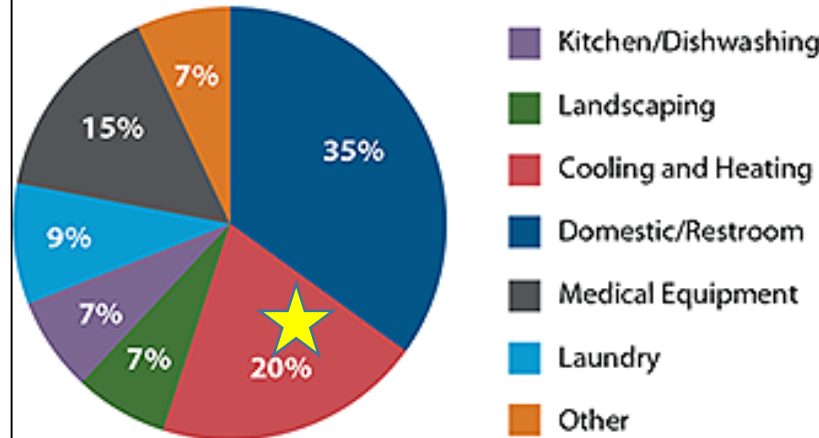
EPA WaterSense End Use Charts

<https://www3.epa.gov/watersense/commercial/types.html#tabs-educational>

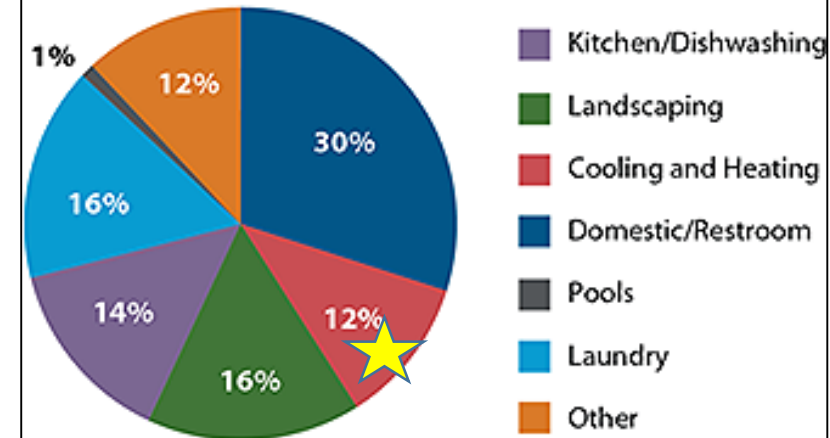
End Uses of Water in Office Buildings



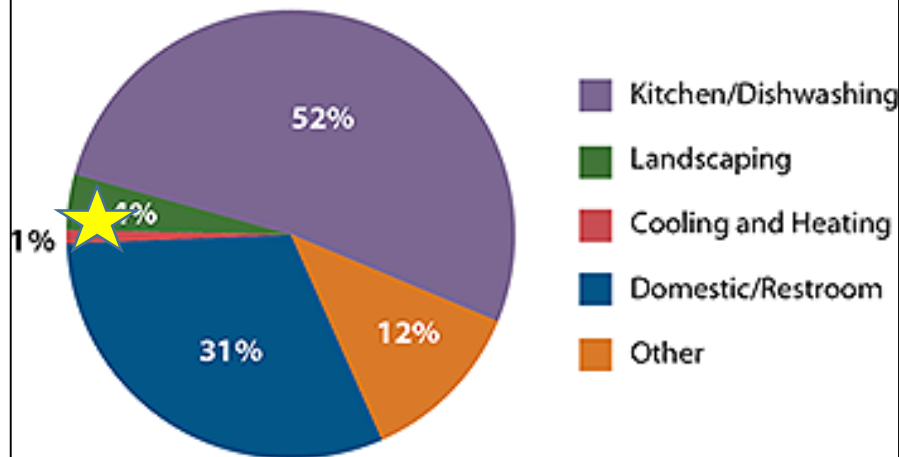
End Uses of Water in Hospitals



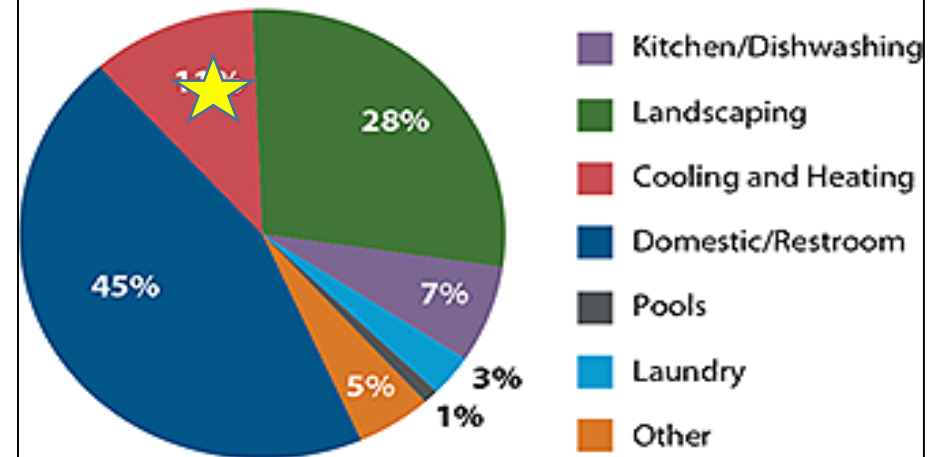
End Uses of Water in Hotels



End Uses of Water in Restaurants

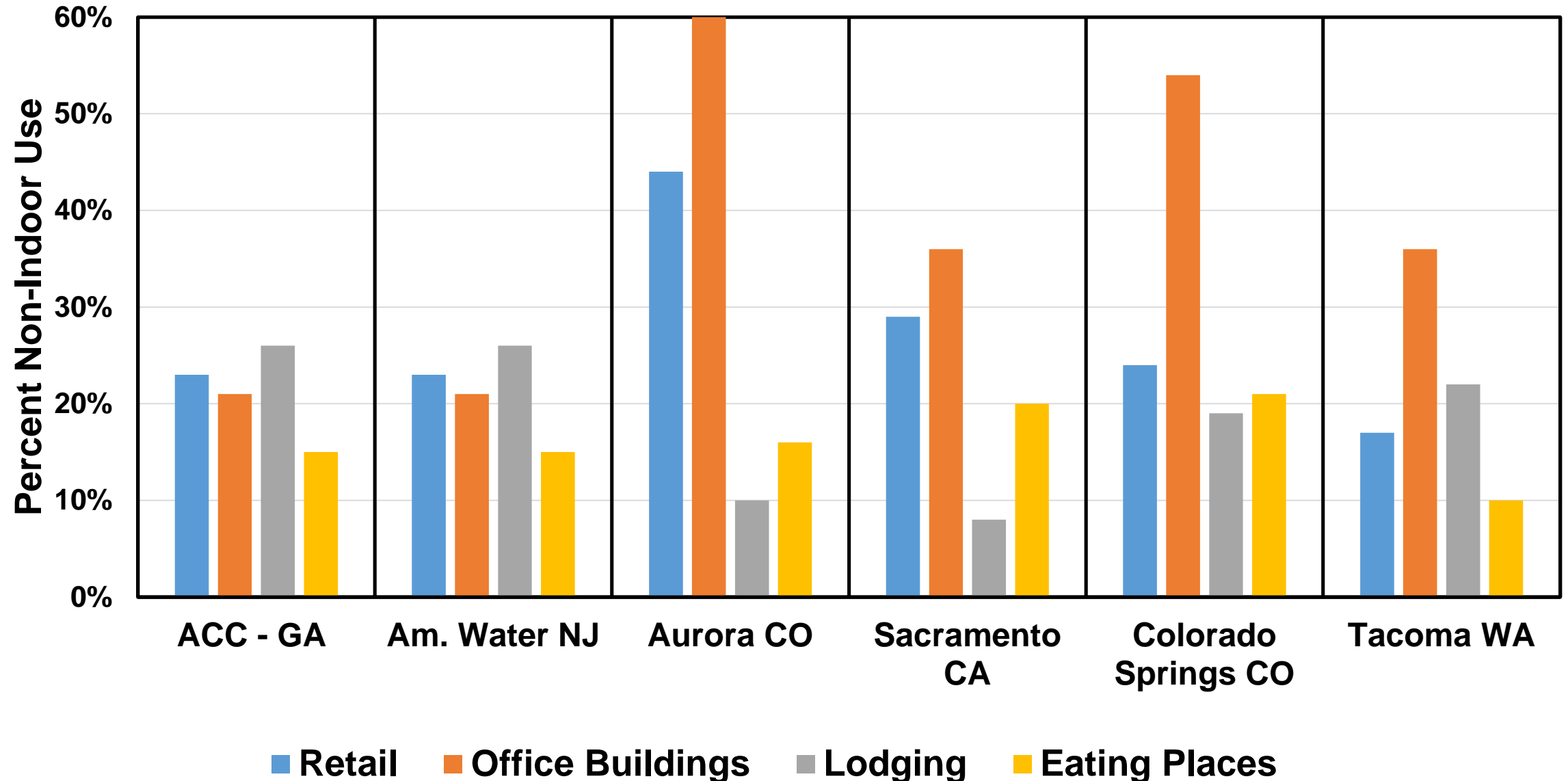


End Uses of Water in Schools



Percent Non-Indoor Use

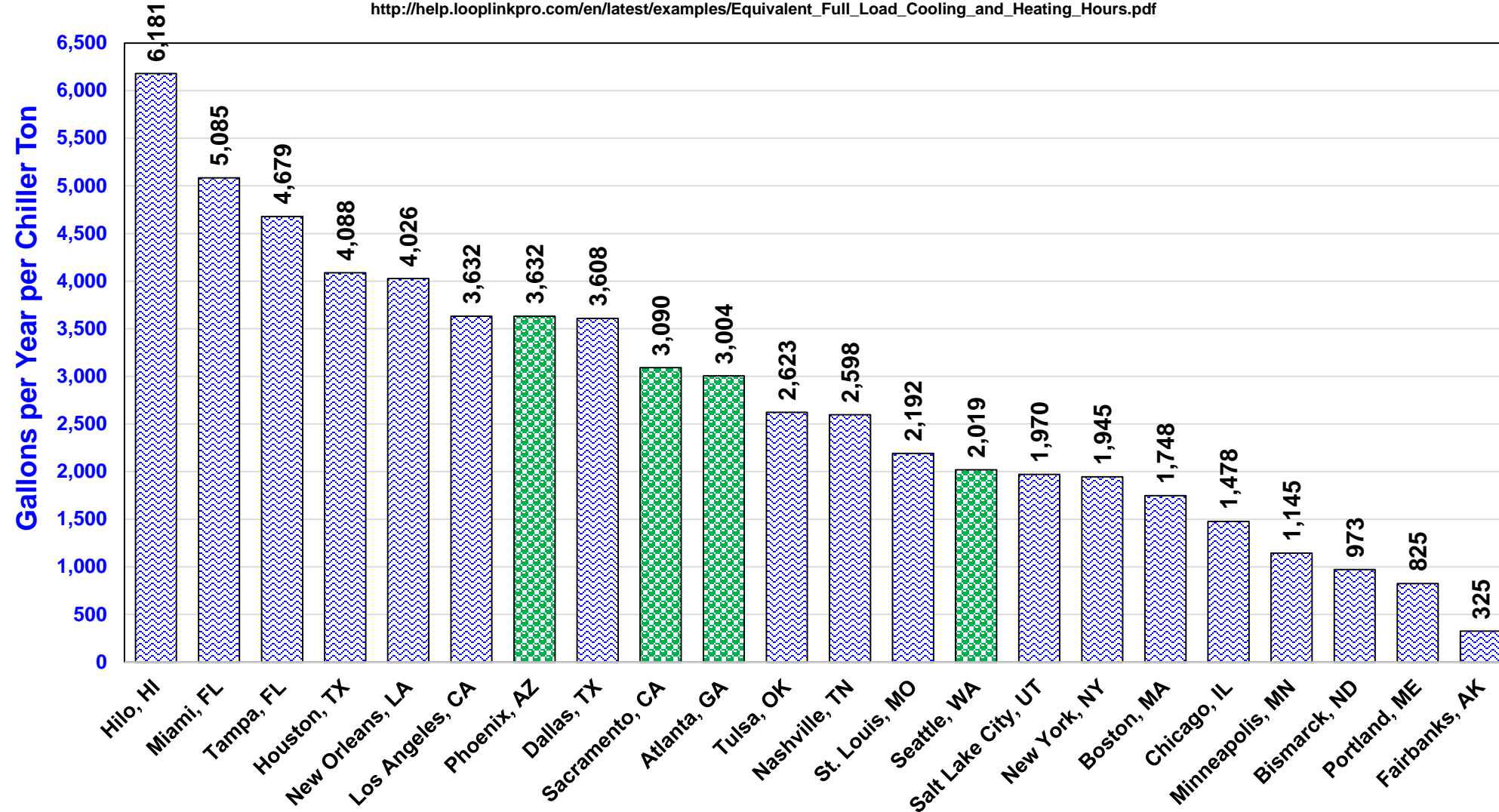
Source: WRF #4619



Impact of Geography on Cooling Water Use

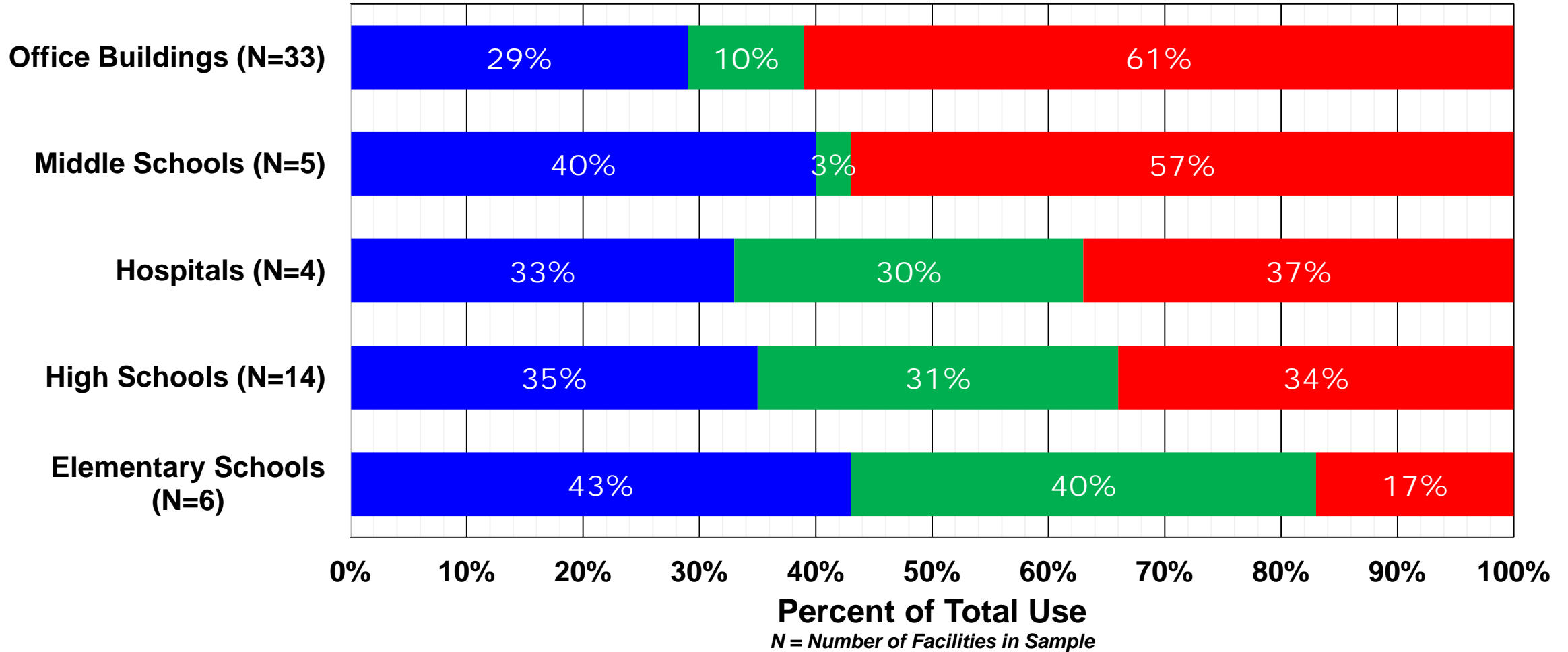
Estimated Annual Office Water User per Ton Hour of Capacity at 4.0 Cycles of Concentration

http://help.looplinkpro.com/en/latest/examples/Equivalent_Full_Load_Cooling_and_Heating_Hours.pdf



How Water is Used in Texas Facilities With Cooling Towers

Special Study of Audits in Austin, Dallas, and Fort Worth



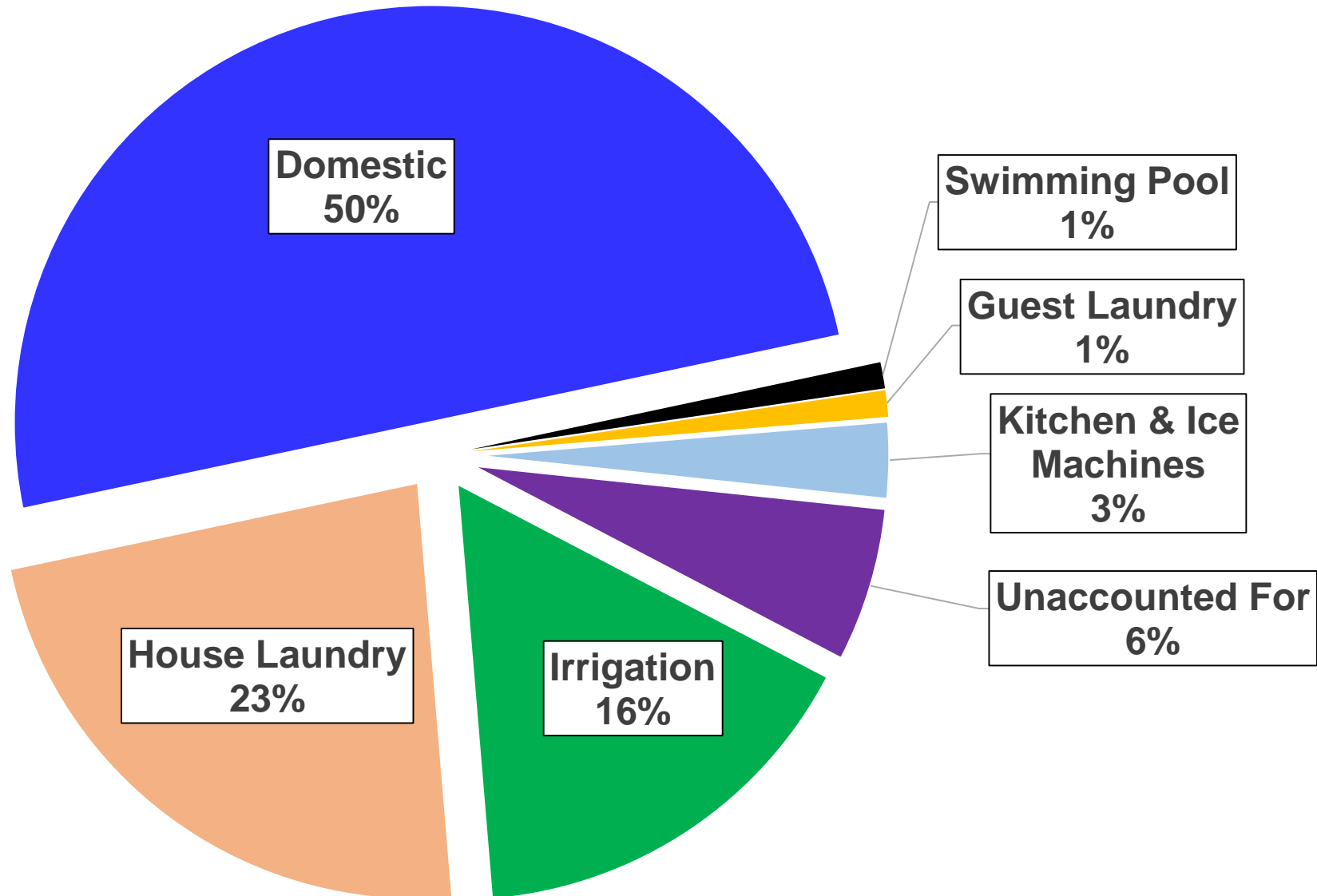
■ Indoor Use

■ Landscape Irrigation

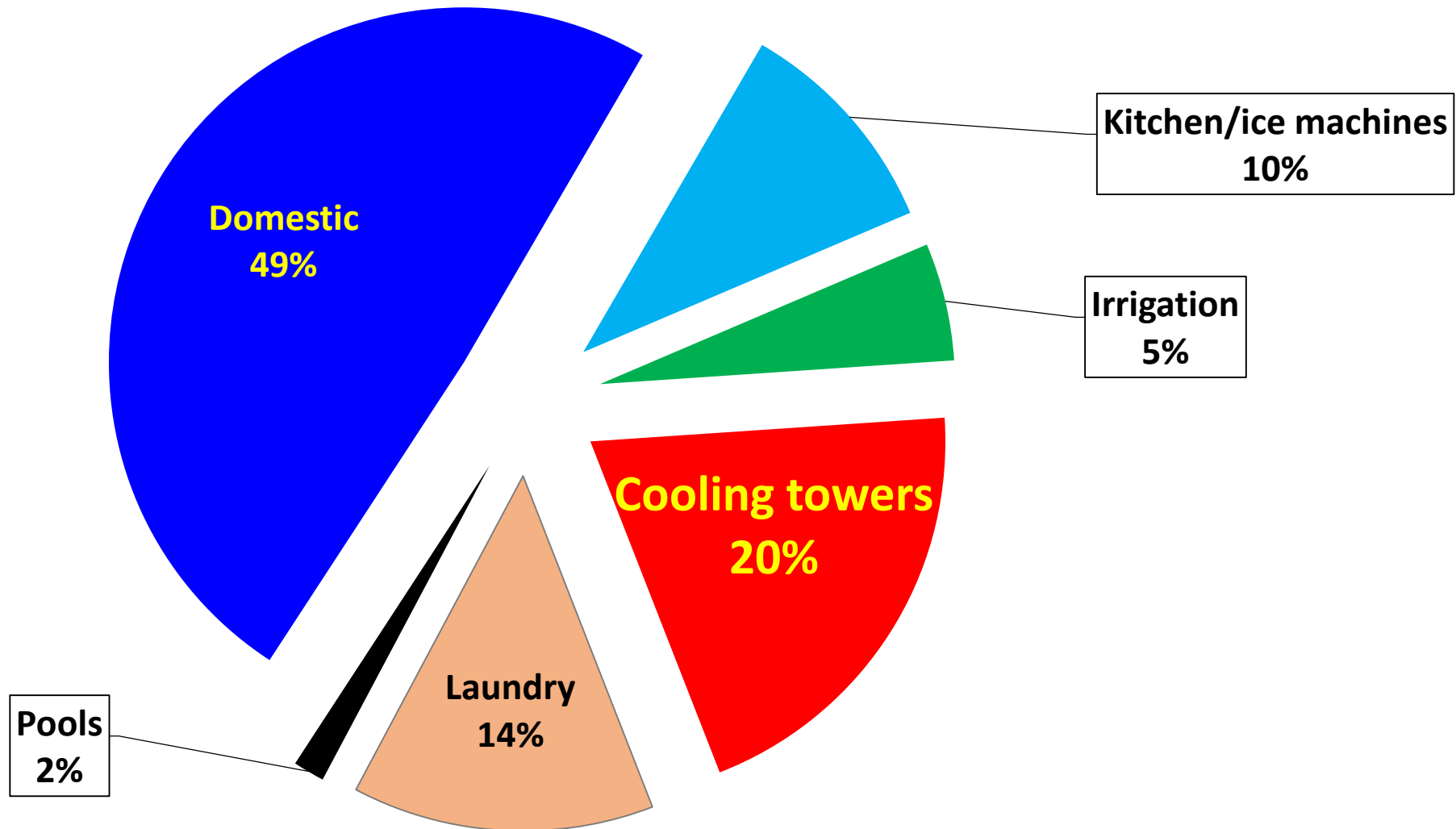
■ Cooling Towers

***Smaller* Hotels in the Southwest**

Without Cooling Towers

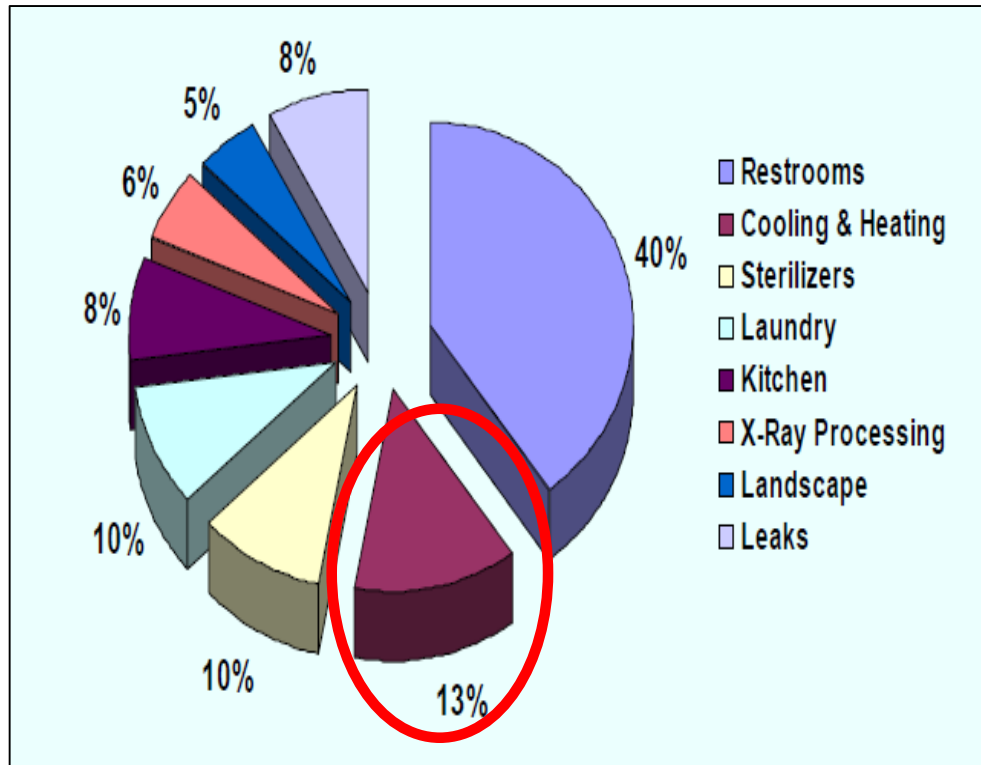


Hotel Water Use Based on Audits of 20 Larger Hotels With Cooling Towers

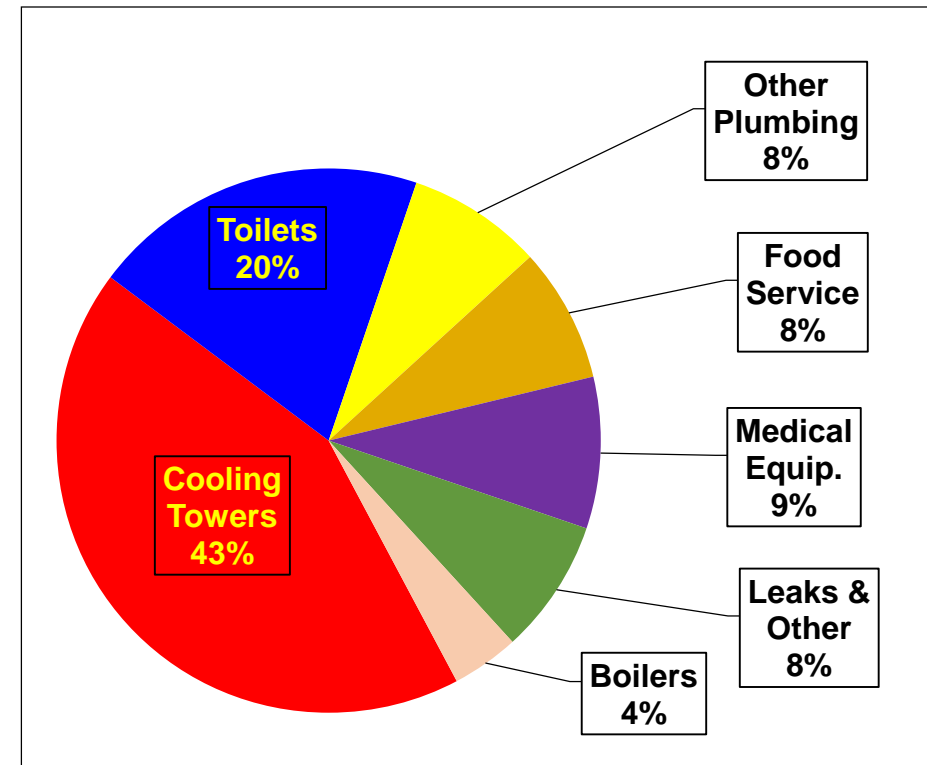


HOSPITAL USE CHARACTERISTICS

Northern Climate

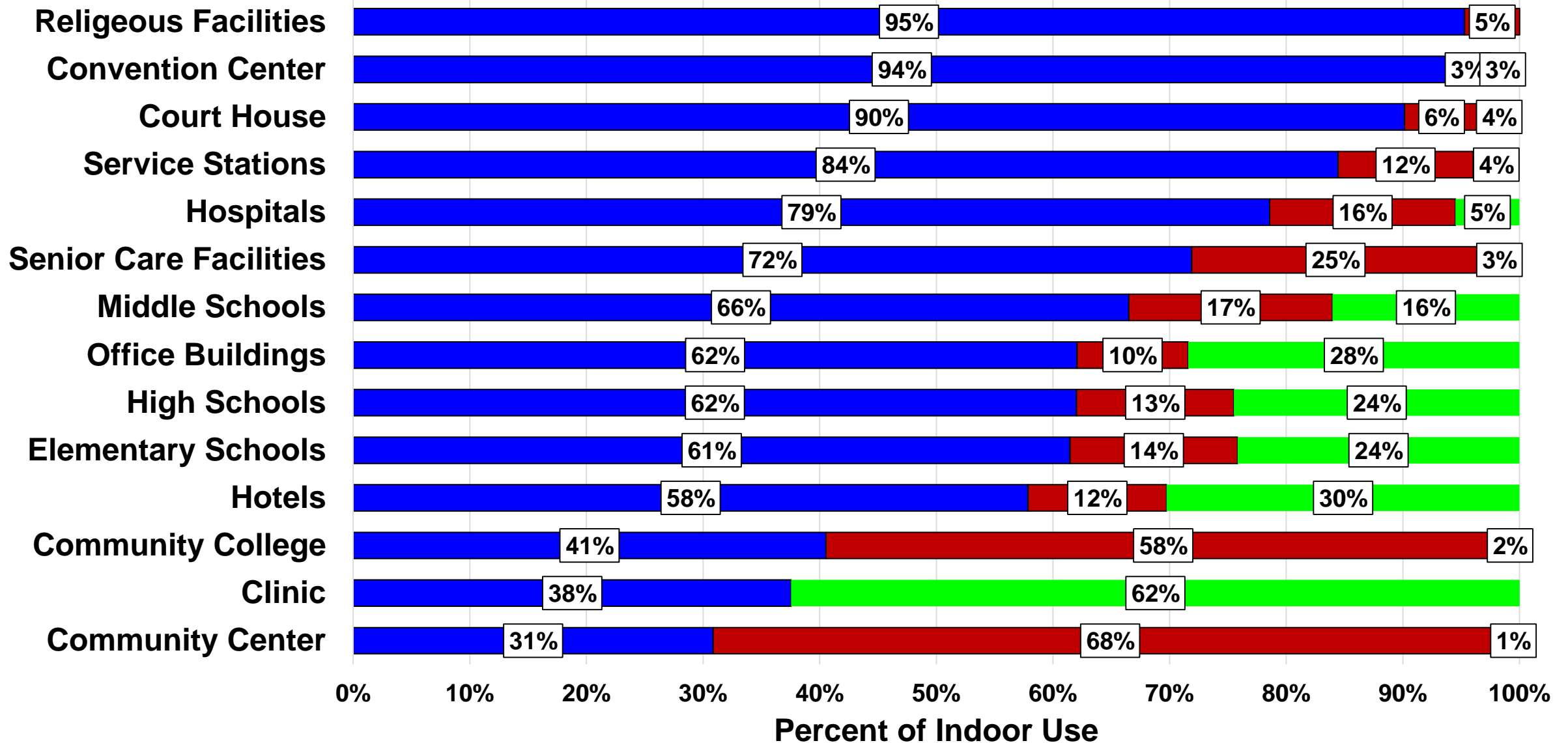


South & South West



How Water Is Used Indoors at Audited Facilities In Texas

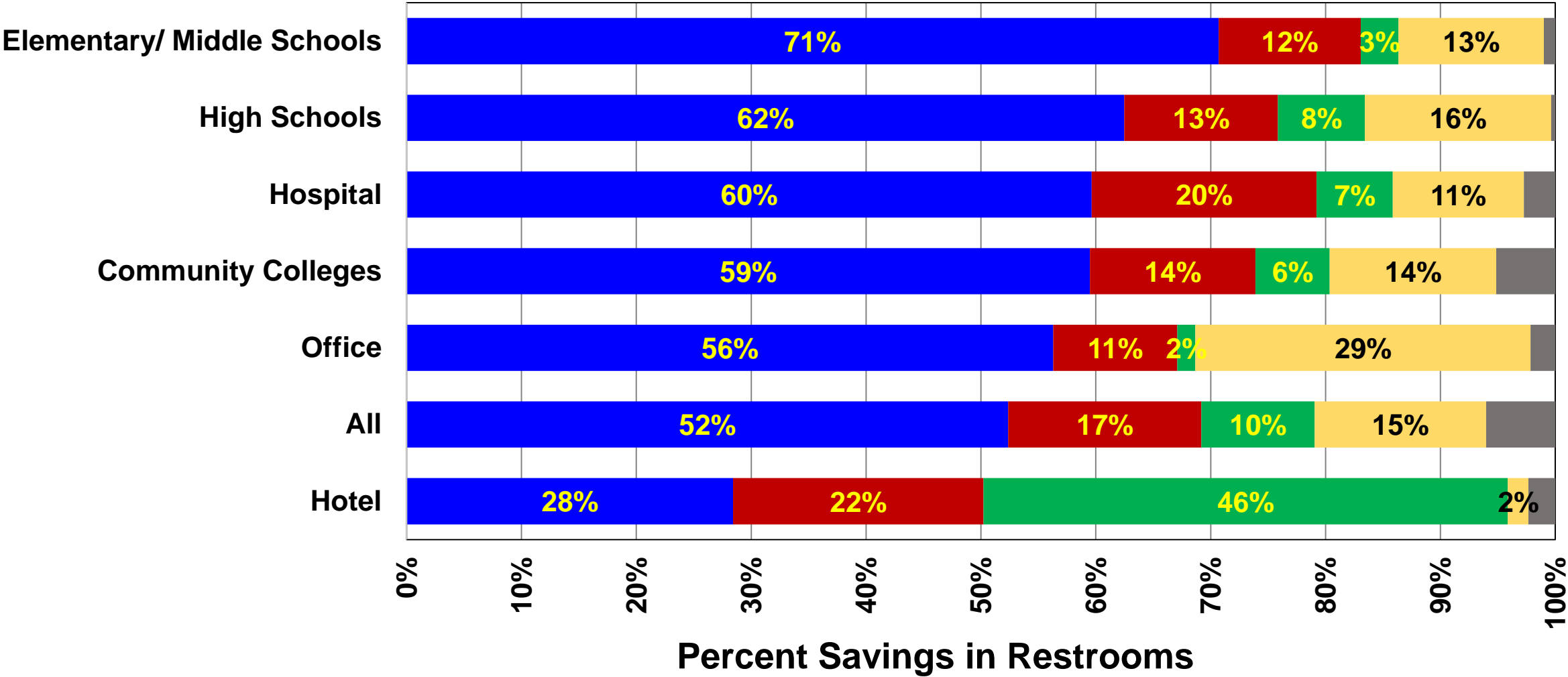
Audits in Austin, Dallas, and Fort Worth



■ Restroom Use ■ Food Service ■ Other (medical, water treatment, laundry, leaks, etc)

Percent Restroom Use by Type of Use

Based pm 173 audits in Texas



■ Toilets

■ Faucets/Lavatories

■ Showers/Bath

■ Urinals

■ Other

Water Use By Type of Activity

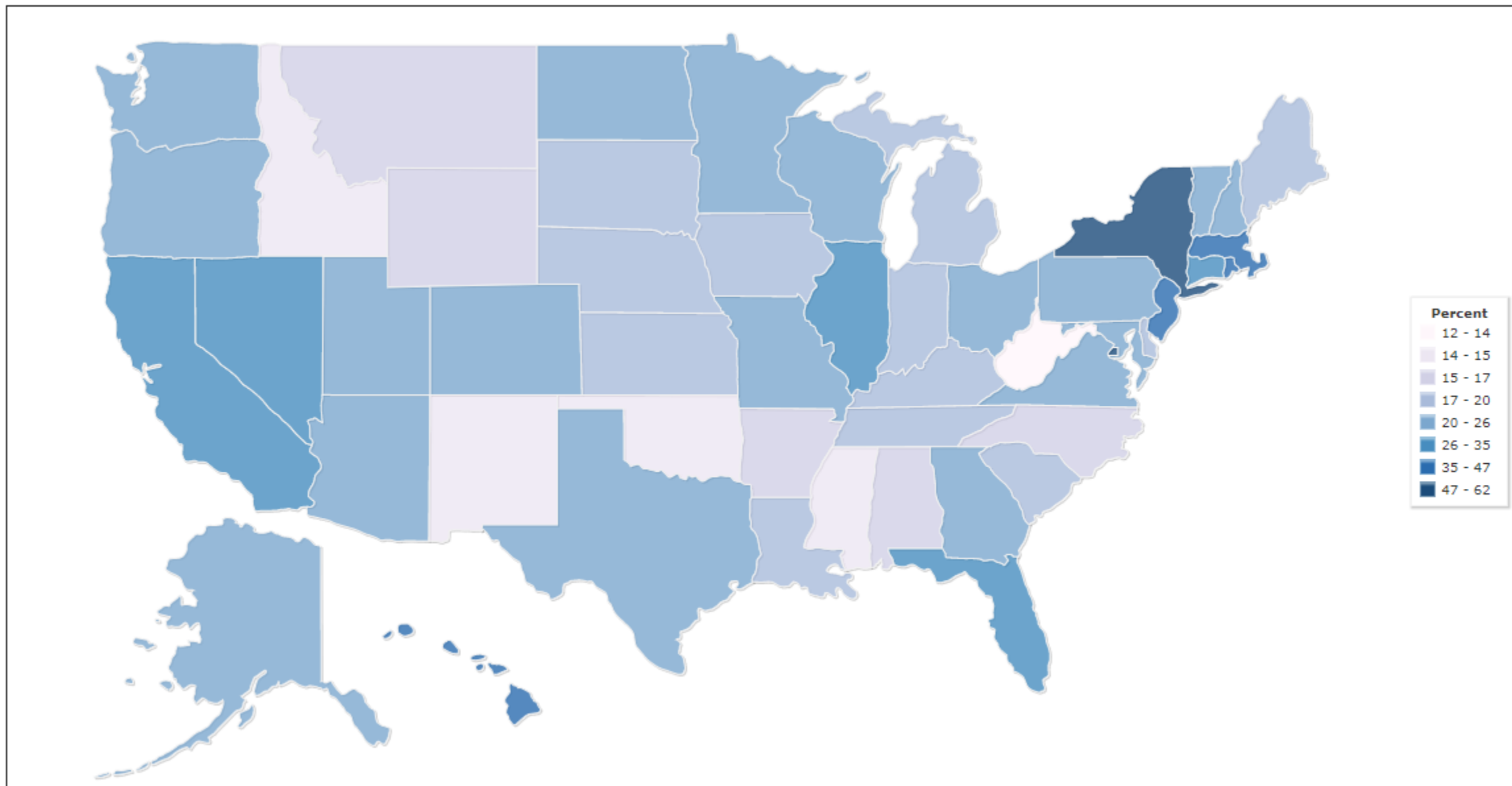
Facility Type	Type of Use									
	Domestic	Laundry & Dry Cleaning	Cooling & Towers & Boilers	Food Service	Medical / Lab Equipment	Landscape Irrigation	Water Features	Water Treatment	Washing & Outdoor Cleaning	Alternate Sources
Office	X		?	X		X	?	?	?	?
Restaurants	X	?	?	X		X	?	?	X	?
K-12 Schools	X	X	?	X	X	X	?	?	X	?
Universities	X	?	?	X	?	X	?	?	X	?
Other Educational Facilities	X	?	?	X	?	X	?	?	?	?
Lodging/Hotel	X	X	?	X		X	?	?	X	?
Theaters / Entertainment / Museums, etc.	X		?	X		X	?	?	?	?
Hospitals	X	?	X	X	X	X	X	X	X	?
Clinics of all types	X	?	?		X	X	X	?	X	?
Retirement Homes / Nursing Homes	X	X	?	X	?	X	?	?	X	?
Dormitory / Residence Hall	X	X	?	X		X	?	?	?	?
Multi-Family / Apartments	X	X	?	X		X	?	?	?	?
Religious Establishments	X		?	X		X	?	?	?	?
Warehouses (unrefrigerated)	X		?			X	?	?	?	?
Warehouses (refrigerated)	X		?			X	?	?	?	?
Supermarket/Grocery	X	?	?	X		X	X	?	X	?
Convenience Stores	X		?	X		X	?	?	?	?
All Other Retail	X	?	?	X	?	X	?	?	?	?
Gymnasiums	X		?			X	?	?	?	?
Meeting Places	X		?	?		X	?	?	?	?
Commercial Laundries	X	X	?	?		X		X	?	?

Multi-Family Is Commercial?

They are commercial facilities supplying domestic users

- The **company** owns and operates the property for profit.
- The **company** is responsible for plumbing repairs.
- Unless the utility meters each apartment, the **company** pays the water bill.
- On-property uses (irrigation, pools, common laundry, etc.) are all on the **company** bill.

Percent of US Population in Multi-Family Housing



Multi-Family Irrigation Use Low in These Cities

WRF 4554

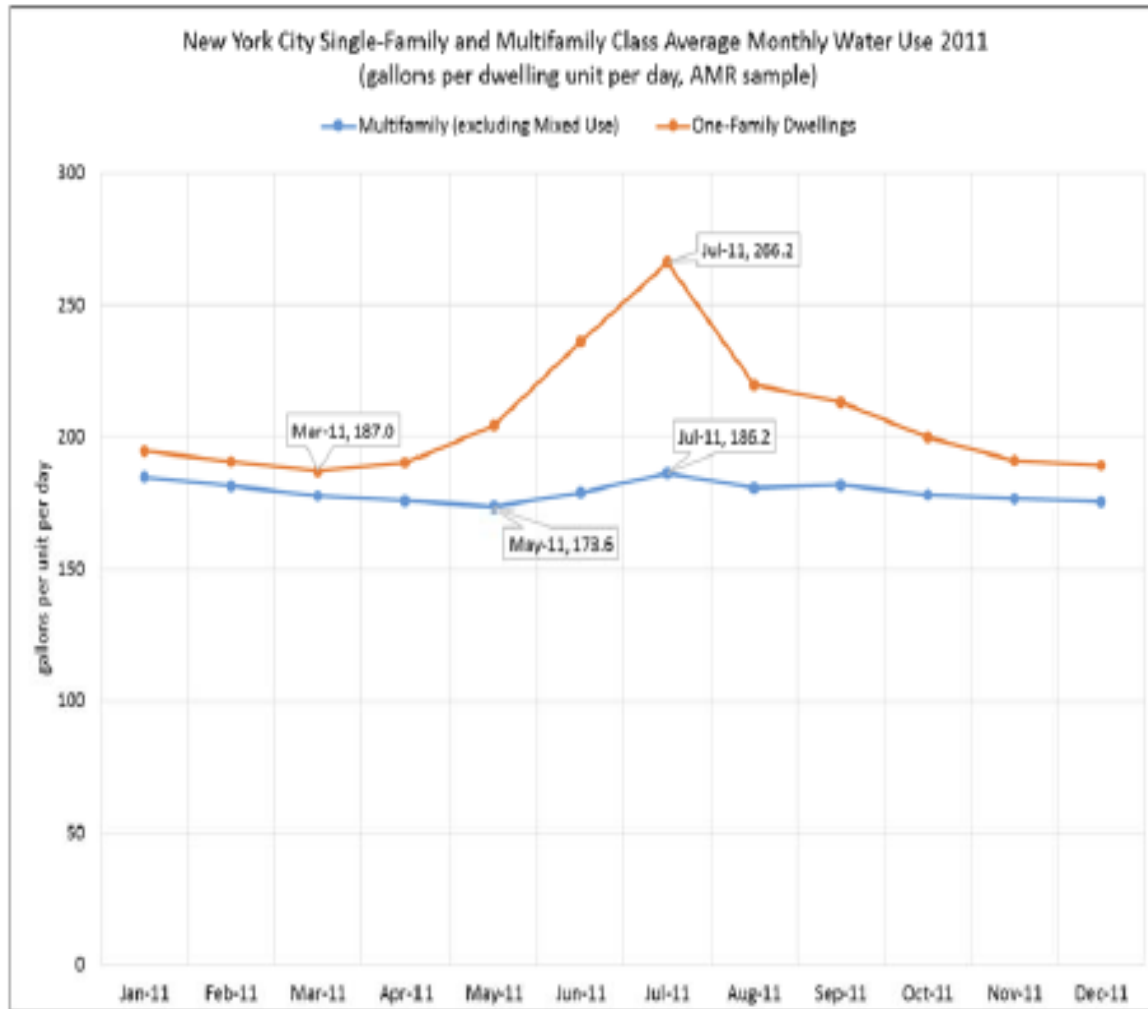


figure 3.2 Monthly residential water use patterns for New York City

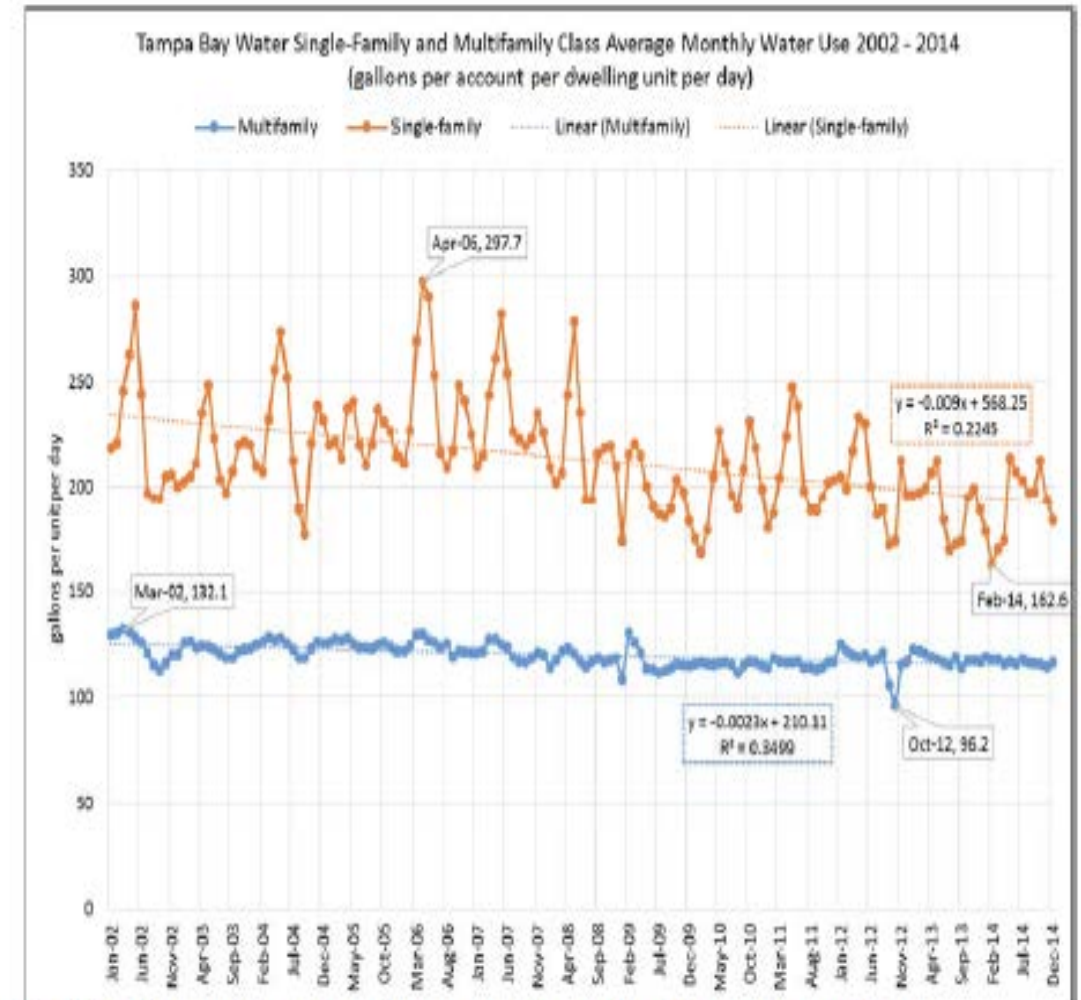


Figure 3.5 Monthly residential water use patterns for Tampa Bay Water

Multi-Family Irrigation Use High in These Cities

WRF 4554

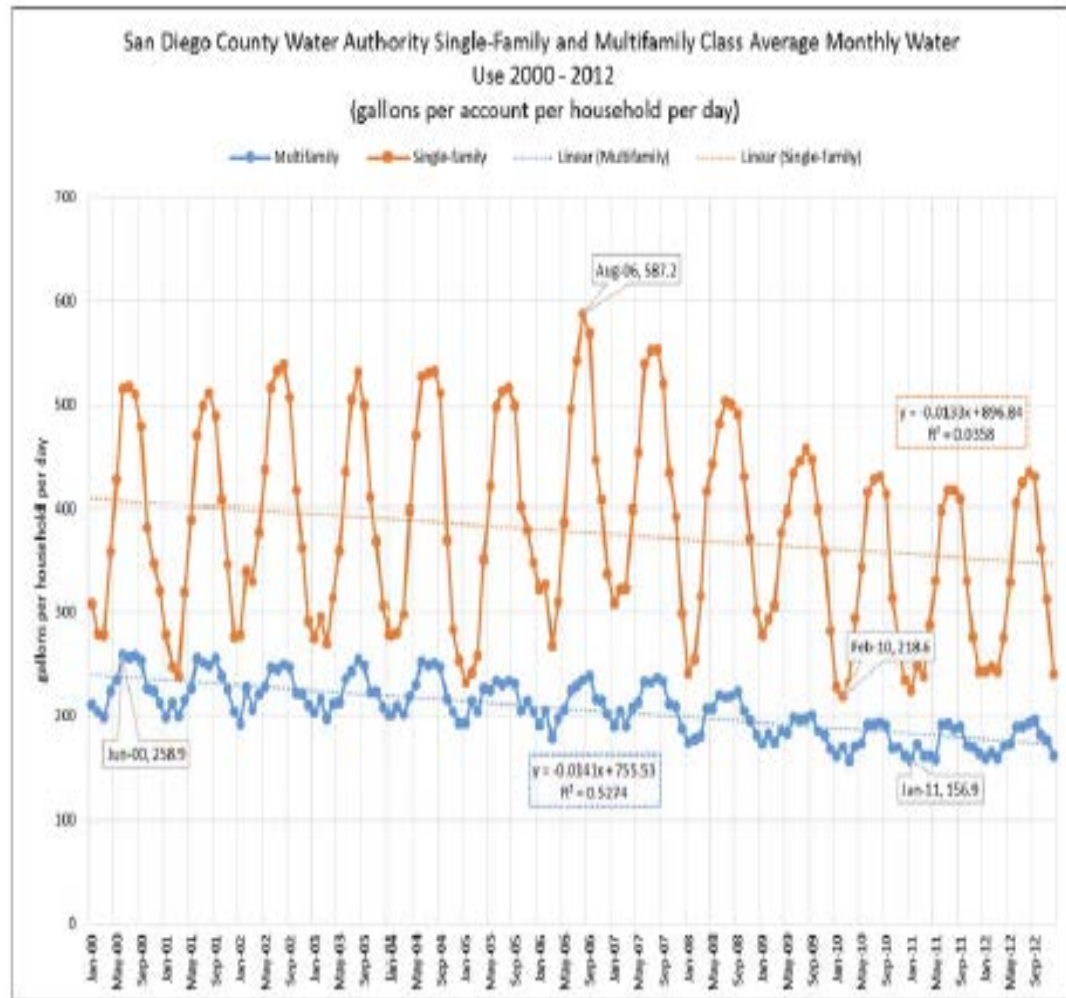


Figure 3.4 Monthly residential water use patterns for San Diego County Water Authority

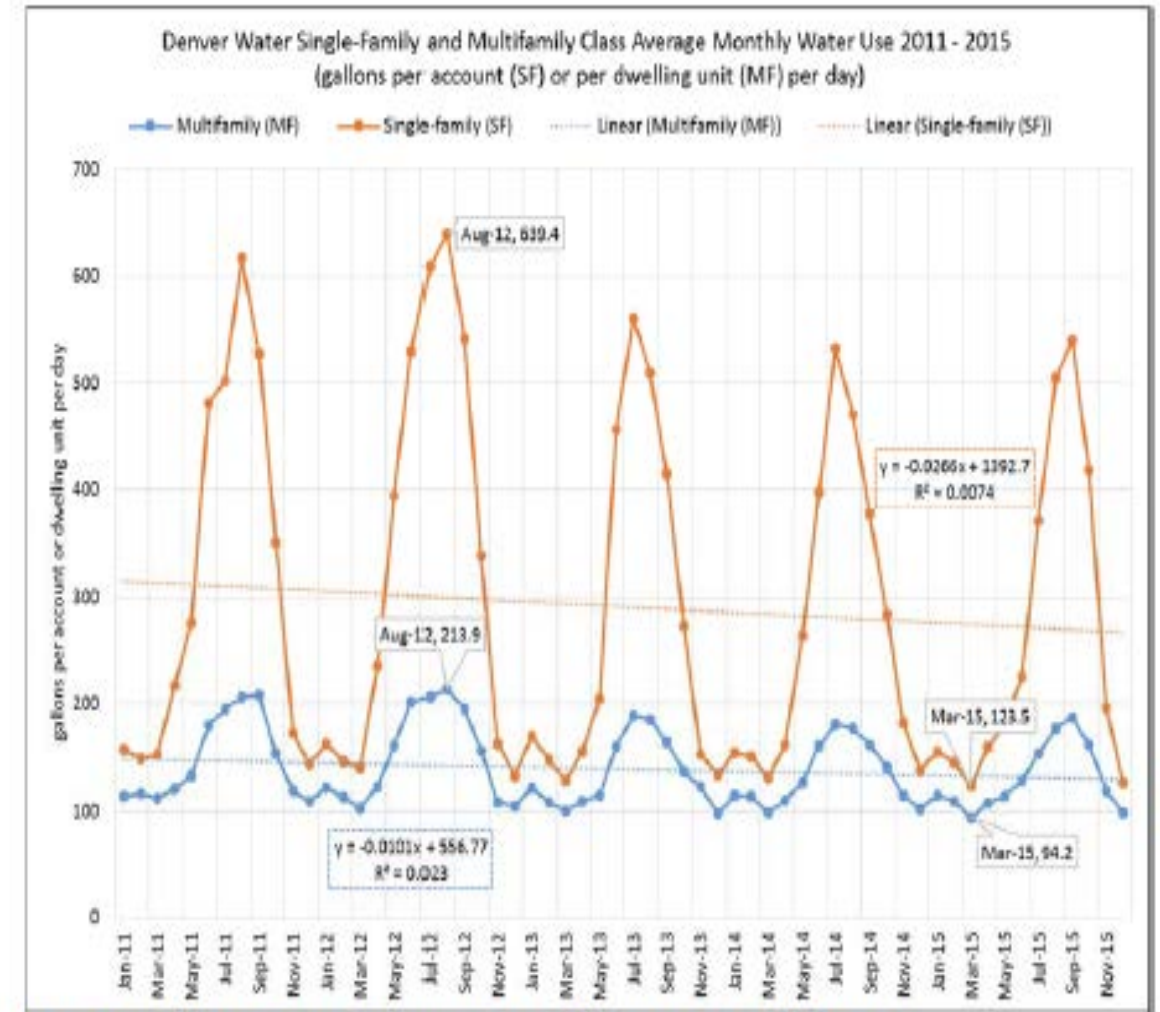
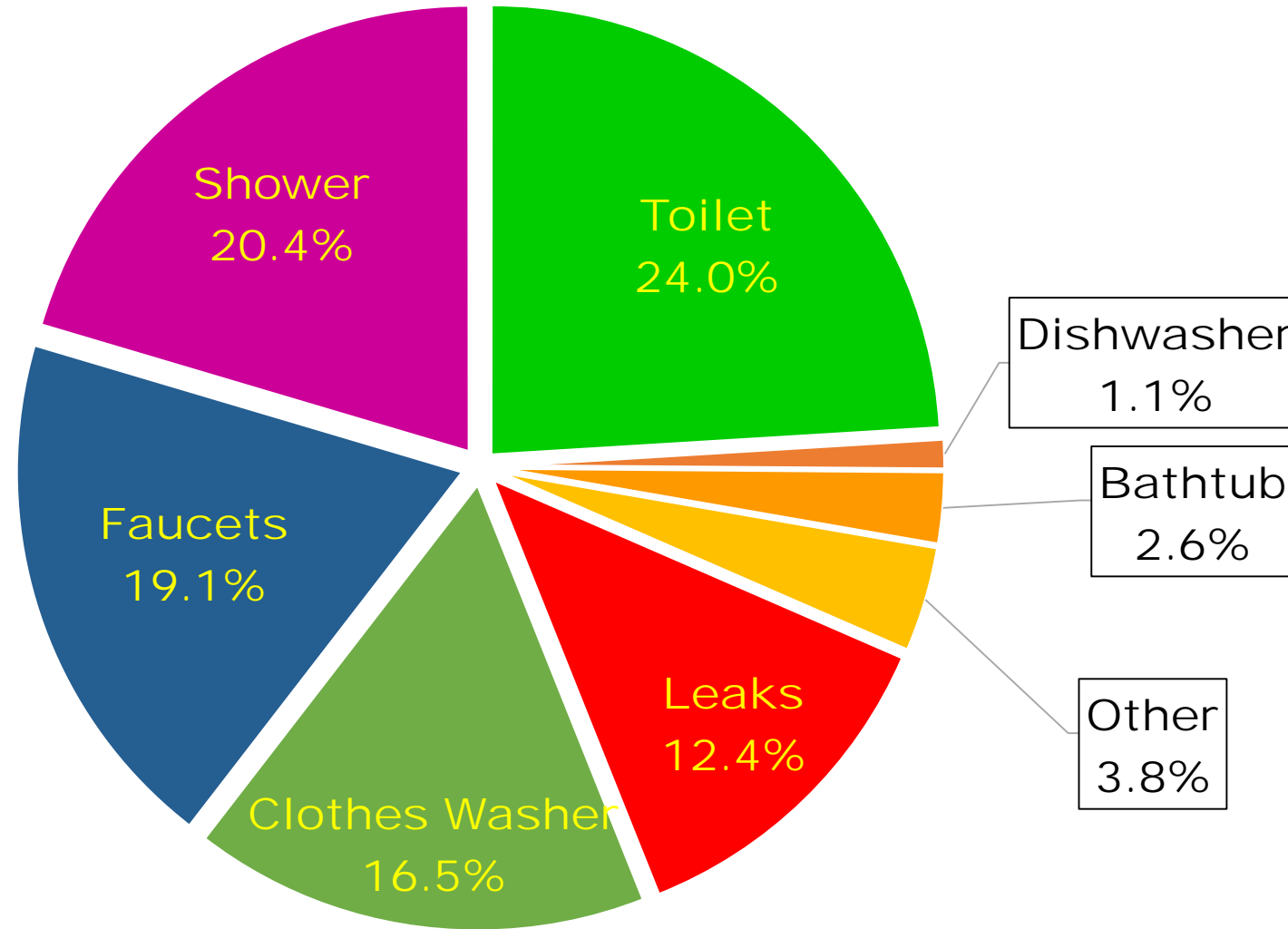


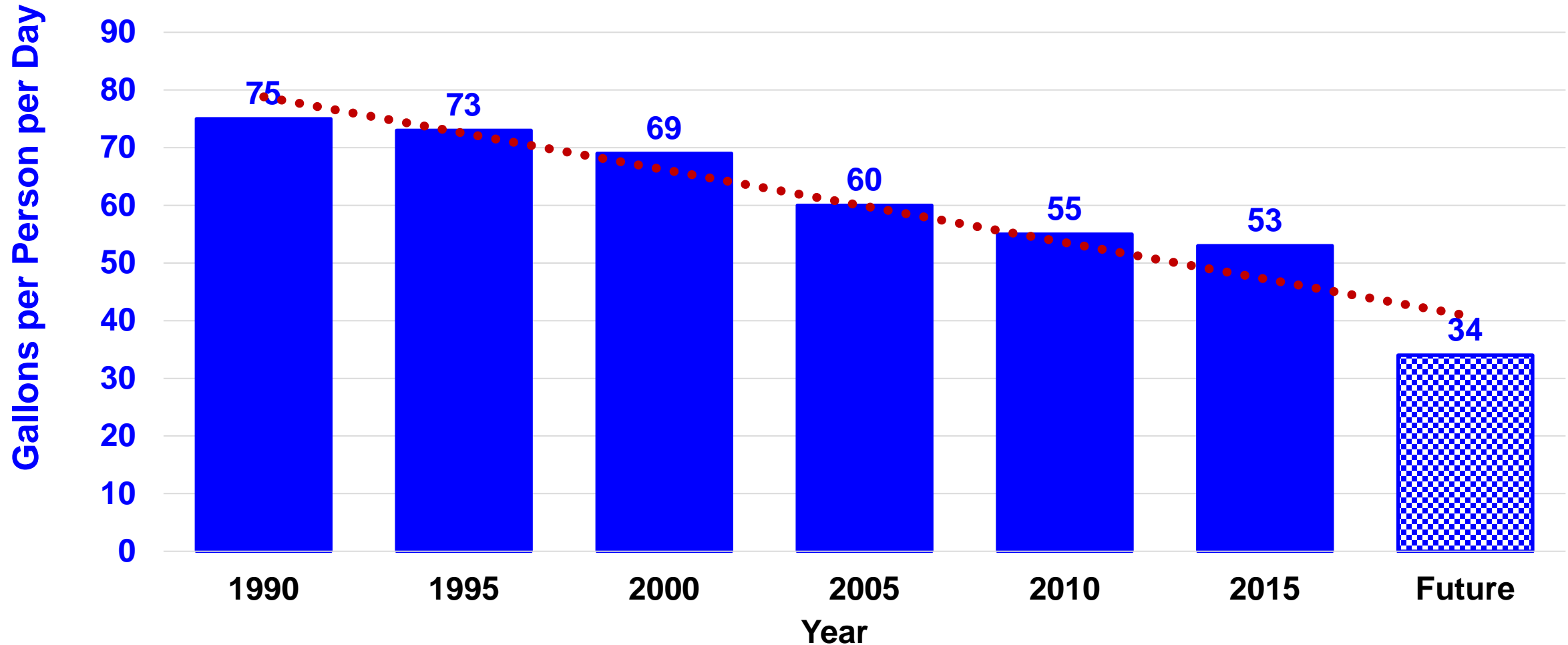
Figure 3.1 Monthly residential water use patterns for Denver Water

Residential Indoor Water Use 2016

AWWA 2016

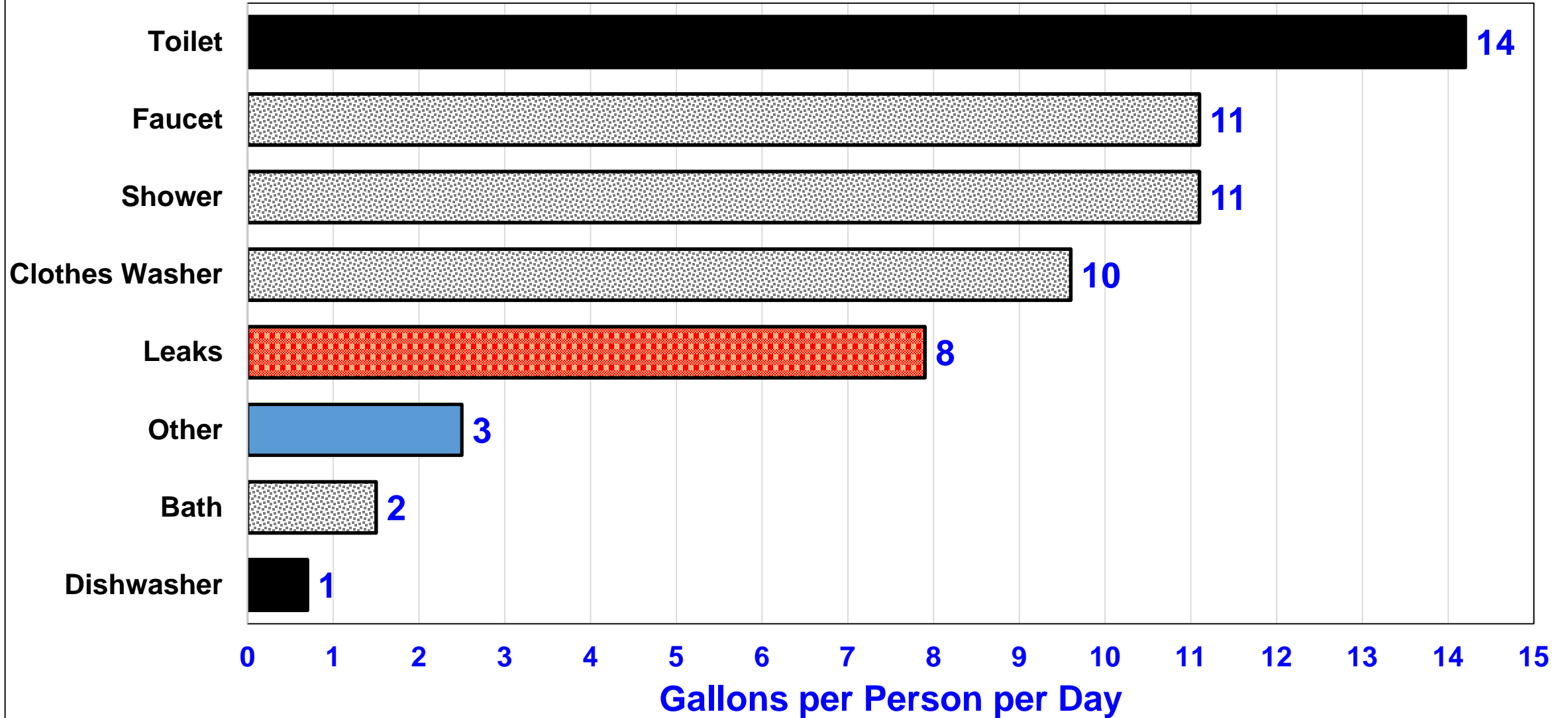


Estimated Change in
Indoor Residential
Per Capita Use in USA *a 55% Decrease*
Sources: AWWARF Studies



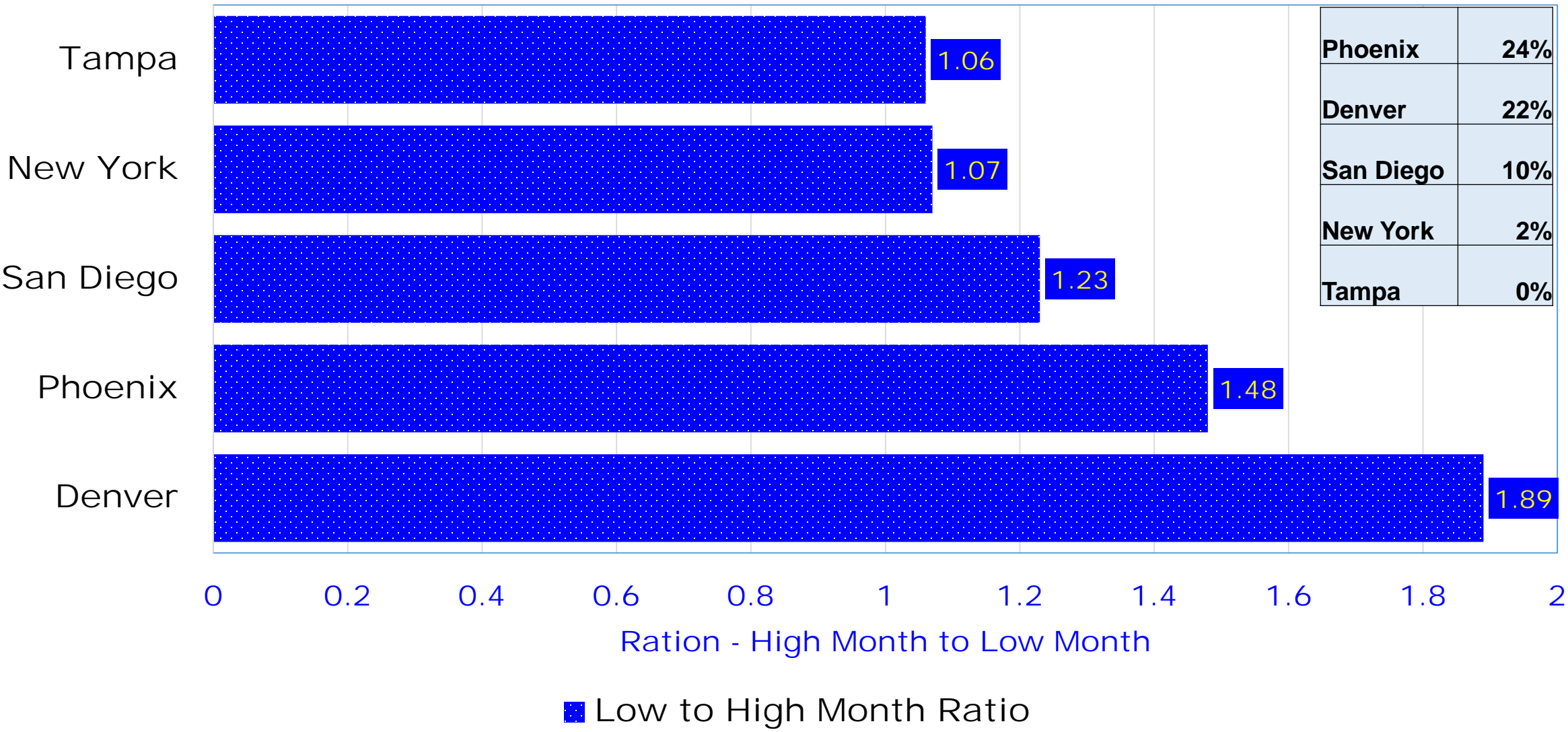
In Home Use Black, Gray, & Other GPCD

Based on 2016 Residential End Use Study



Multi-Family Ratio of High Month to Low Month and Percent of Water Above Winter Use

WRF 4554



Phoenix	24%
Denver	22%
San Diego	10%
New York	2%
Tampa	0%

WRF 4554 Study of Multi-Family Dwellings

Distribution of 2014 multi-family annual use per dwelling unit for four water utilities

Metric		Water Utility			
		Denver	New York City	Phoenix	Tampa Bay Water
Number of Premises		12,178	382,631	5,914	19,606
Number of Dwelling Units		192,560	2,143,108	181,101	280,865
Grand Mean (Units-weighted, gpud)		133.4	170.0	181.6	117.5
Premise-Level Mean (gpud)		148.0	166.8	192.8	146.3
Premise-Level Std. Deviation		95.3	164.9	656.4	655.0
Quantiles (gpud)	Minimum	0.0	-314.6	0.0	0.0
	1st	9.6	4.1	7.0	4.1
	5th	45.9	34.8	45.2	28.5
	10th	60.3	54.3	67.2	40.9
	25th	86.5	88.1	107.2	64.3
	50th (Median)	127.4	136.6	157.8	97.4
	75th	187.4	205.6	220.6	144.9
	90th	256.2	292.4	292.5	217.2
	95th	312.3	369.9	351.8	282.0
	99th	468.5	646.2	585.1	593.3
	Maximum	1,754.8	9,544.7	34,838.1	37,204.1

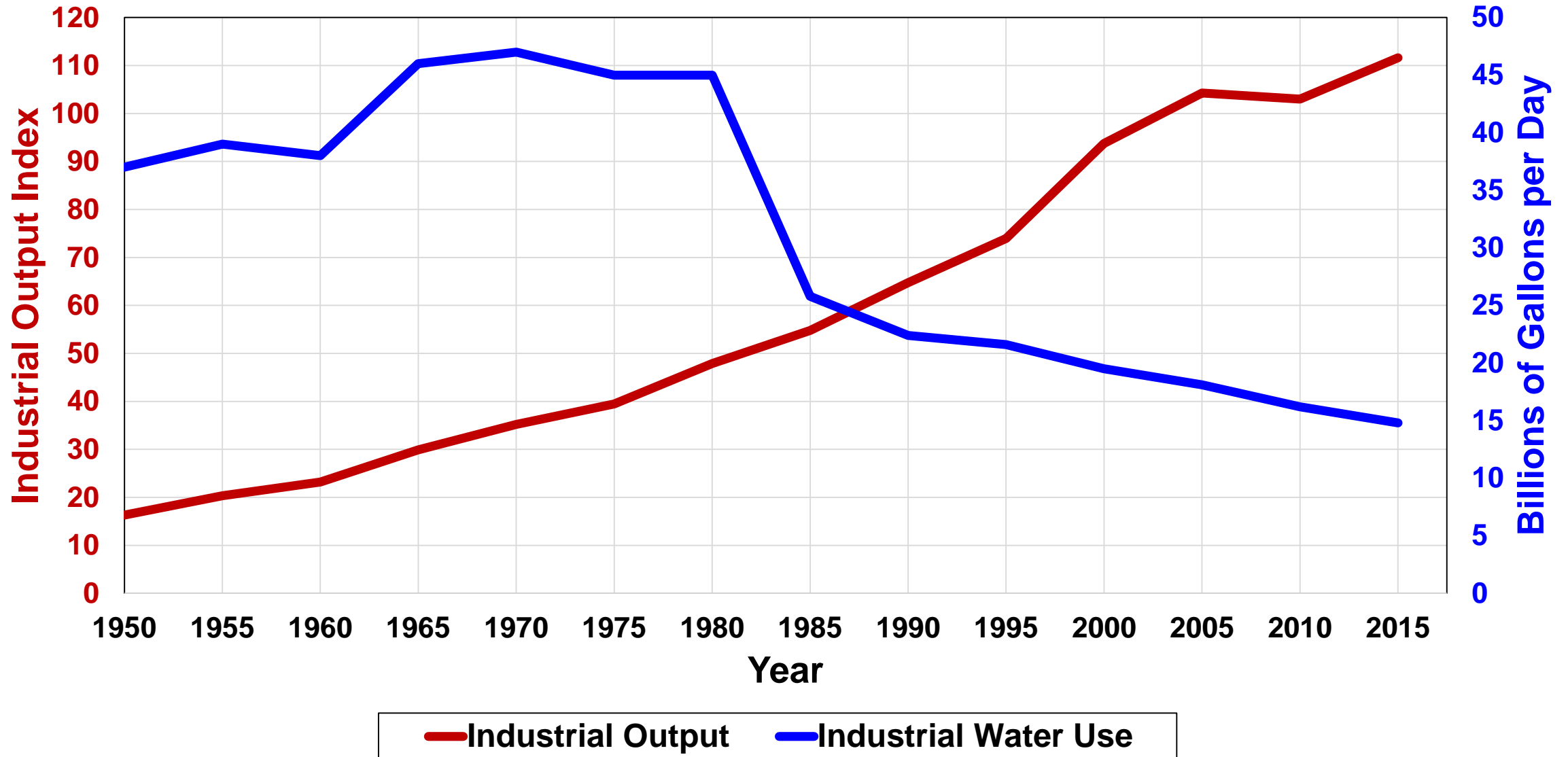
Industrial Water Use

- **Manufacturing**
- **Electric Power Production**
- **Mining**

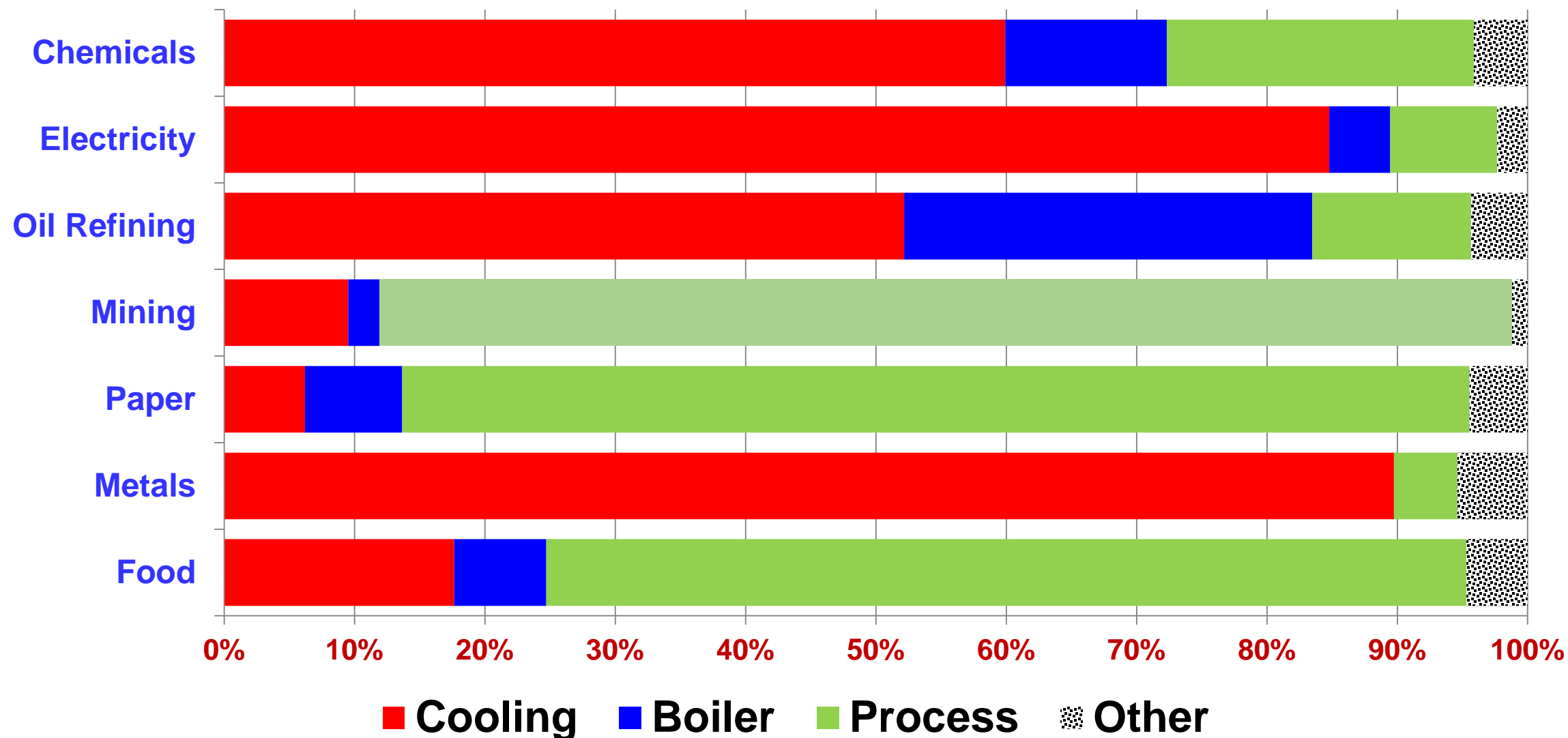
US Industrial Output Index vs Industrial Water Use

Index of Chained Dollars of Industrial Output (2009 = 100) VS Industrial Use in Billions of Gallons per Day

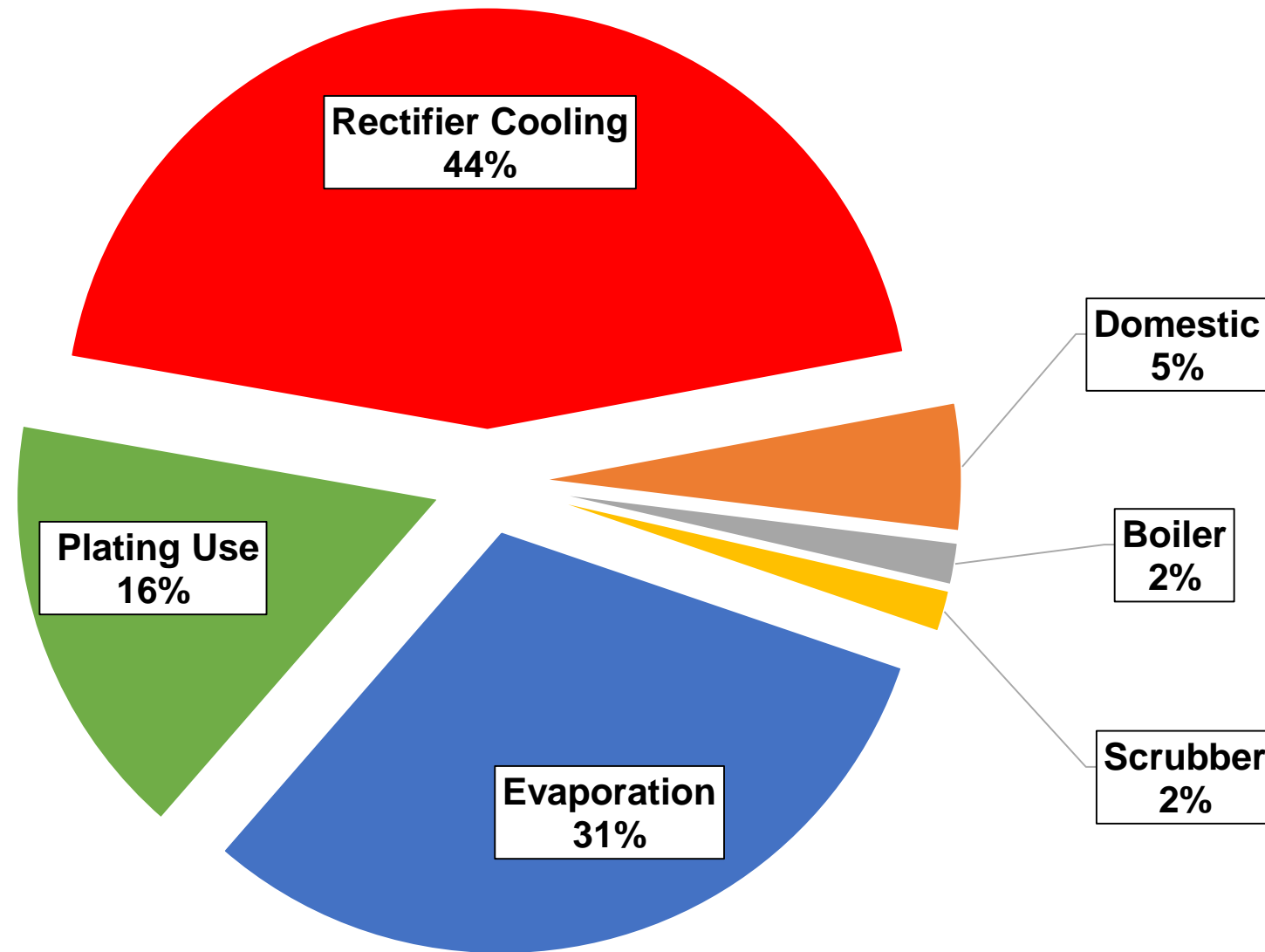
Sources: USGS and US Federal Reserve Economic Data



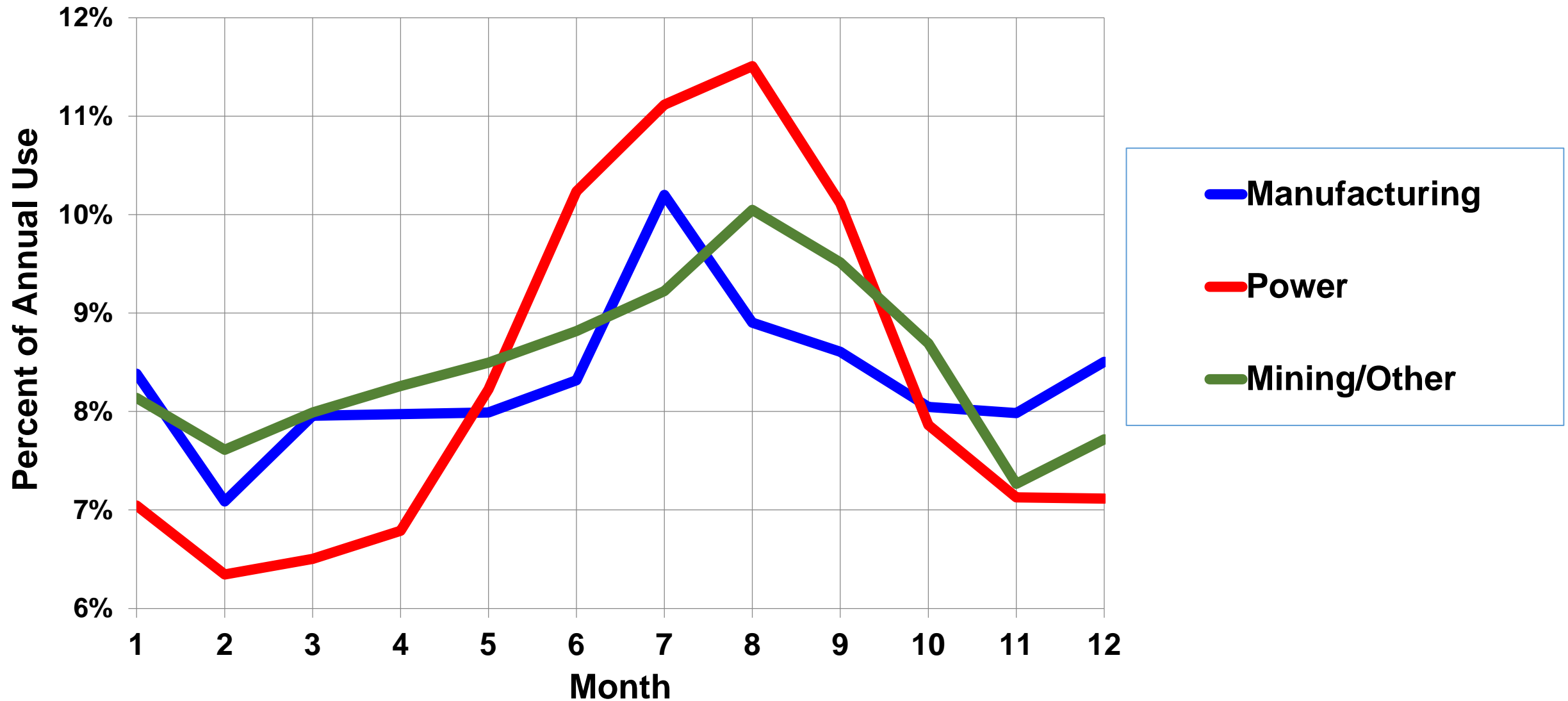
Typical Industrial Water Use Breakdown in Texas



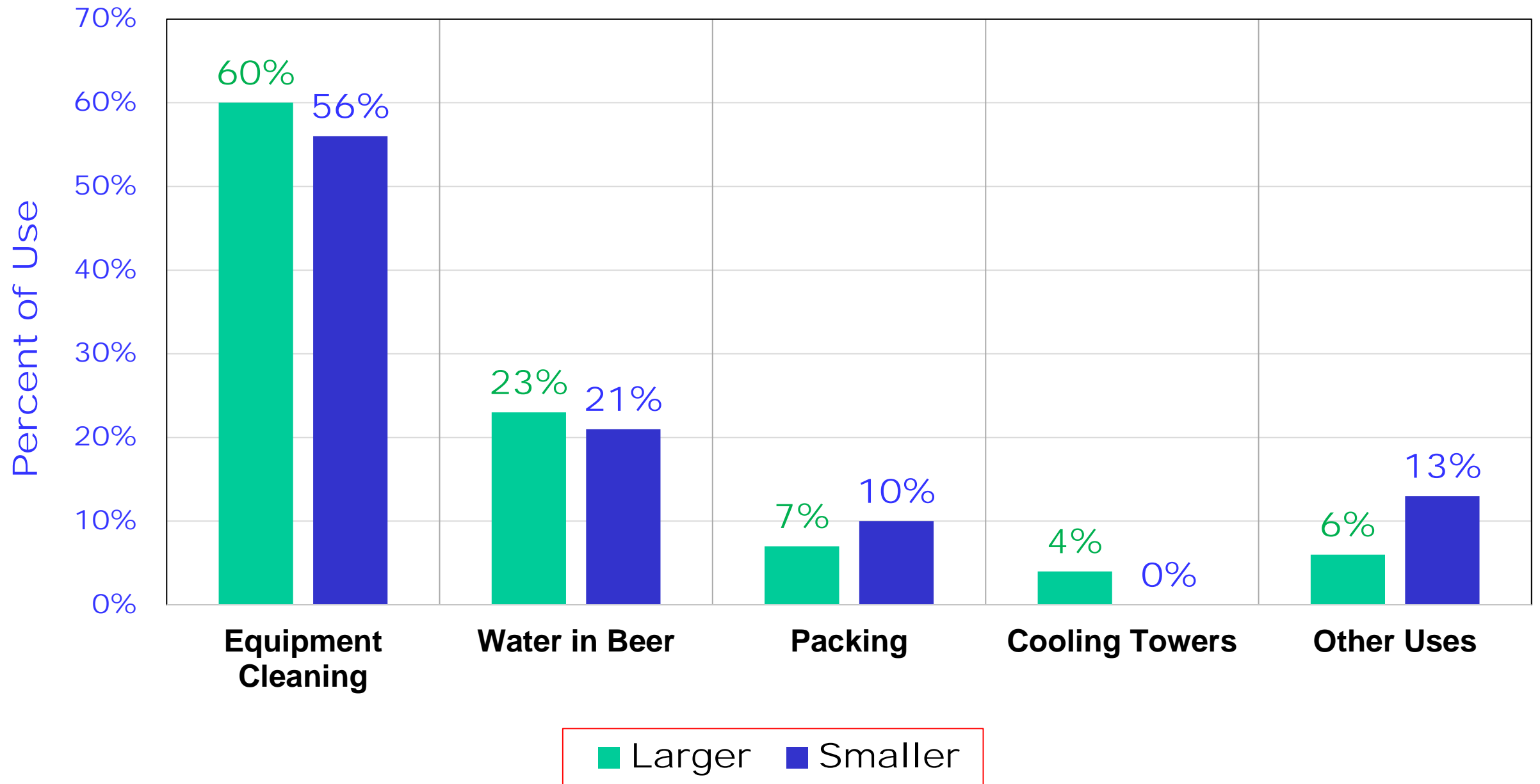
Large Chrome Plating Operation



Seasonal Distribution of Use for Industrial Water Use in Texas from 2010 Through 2015



Water Use Breakdown for Two Breweries



No Water

No Beer!

Conclusion and Observations

- **If you don't measure it, you can't know where you are going**
- **Knowing how water is used in the multi family and CII sectors can help direct the direction of the program**
- **Each utility is unique**

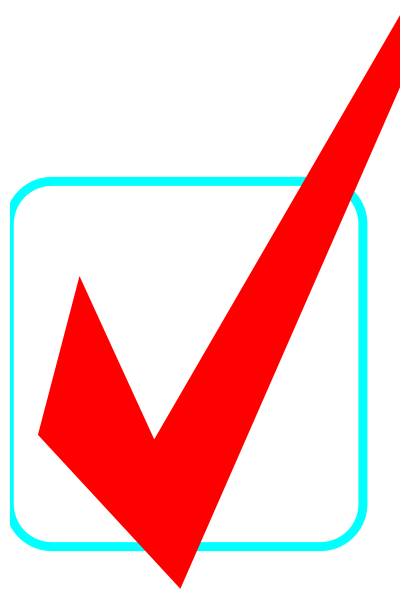
Four Takeaways

1. Each utility water use profile is different – *You need to gather YOUR data.*
2. Know the type of CII users in you area and quantify multi-family use.
3. Target those areas of highest potential
4. Seek Professional help where needed

Questions?



The



End