A Perspective on Texas' Water Future

Presented by

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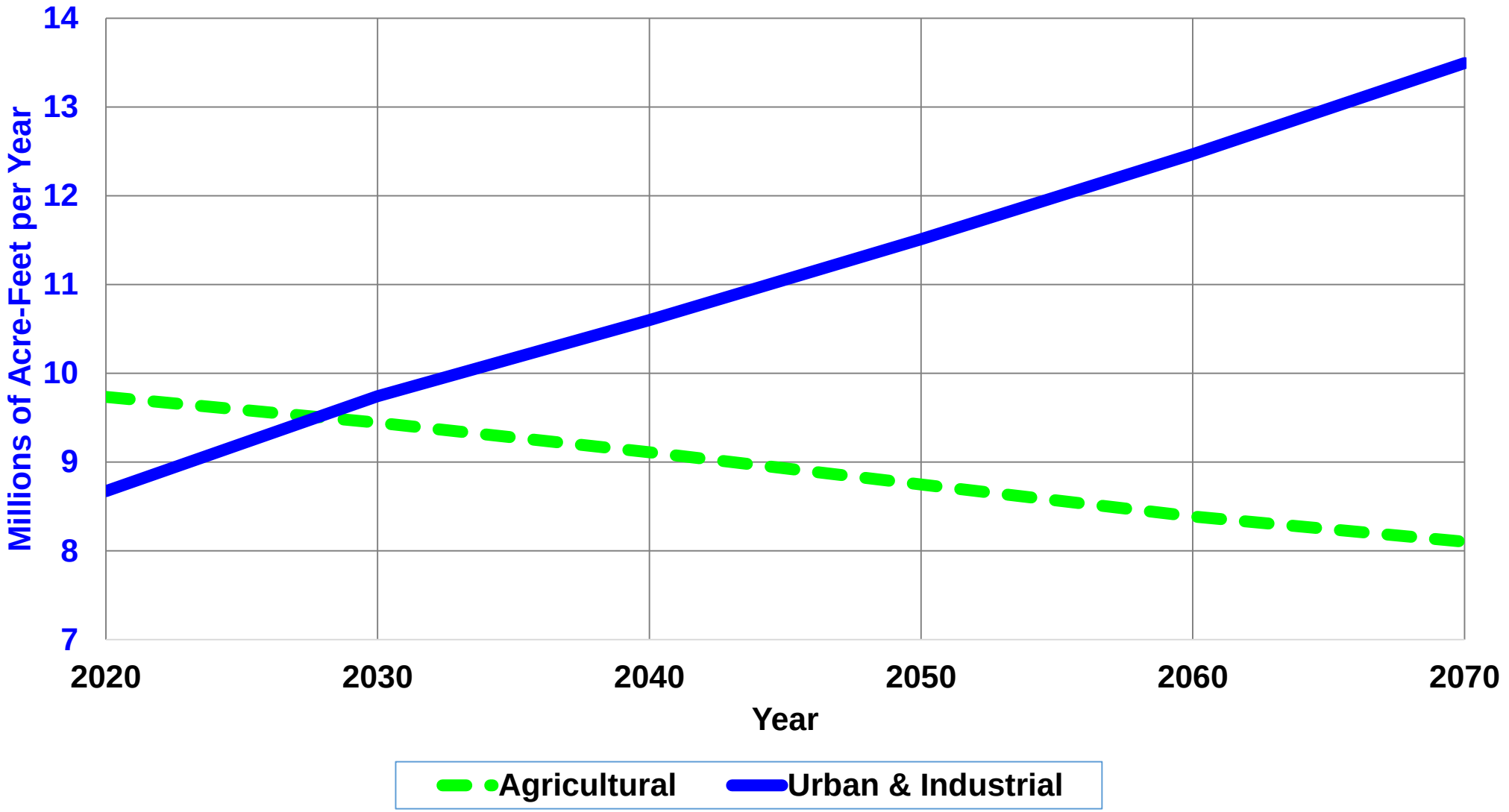
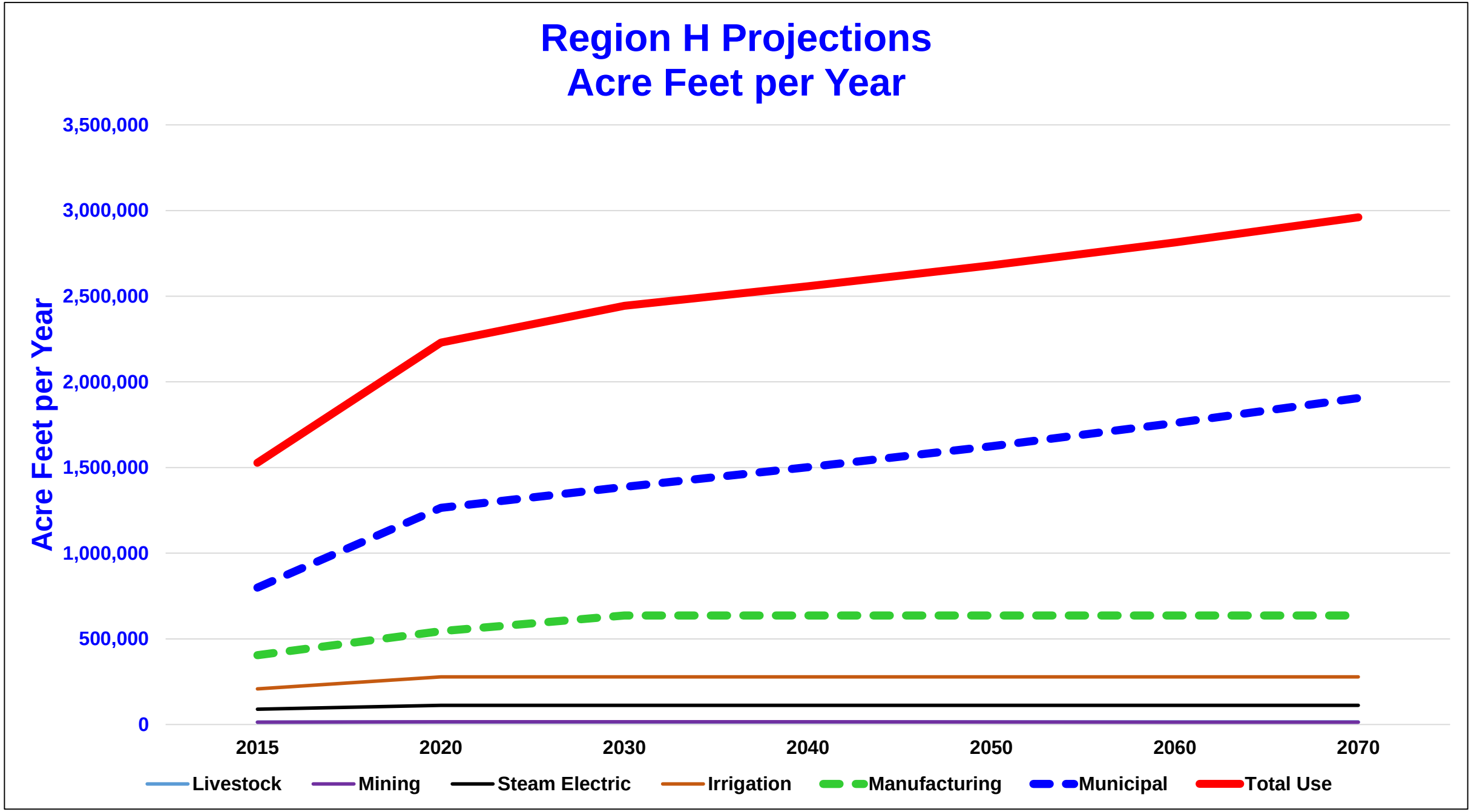
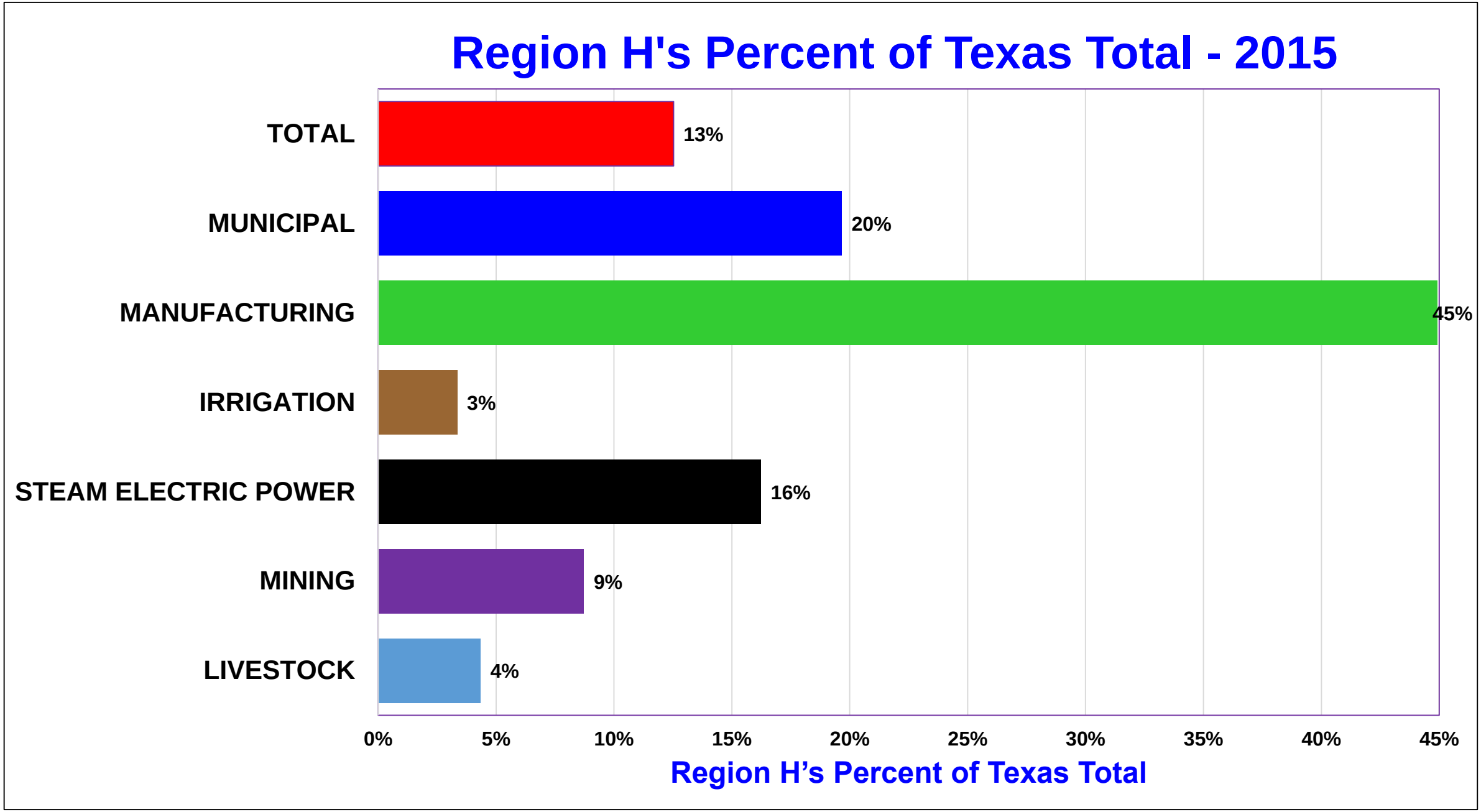
A Comparison of Use by Region H to Texas and USA

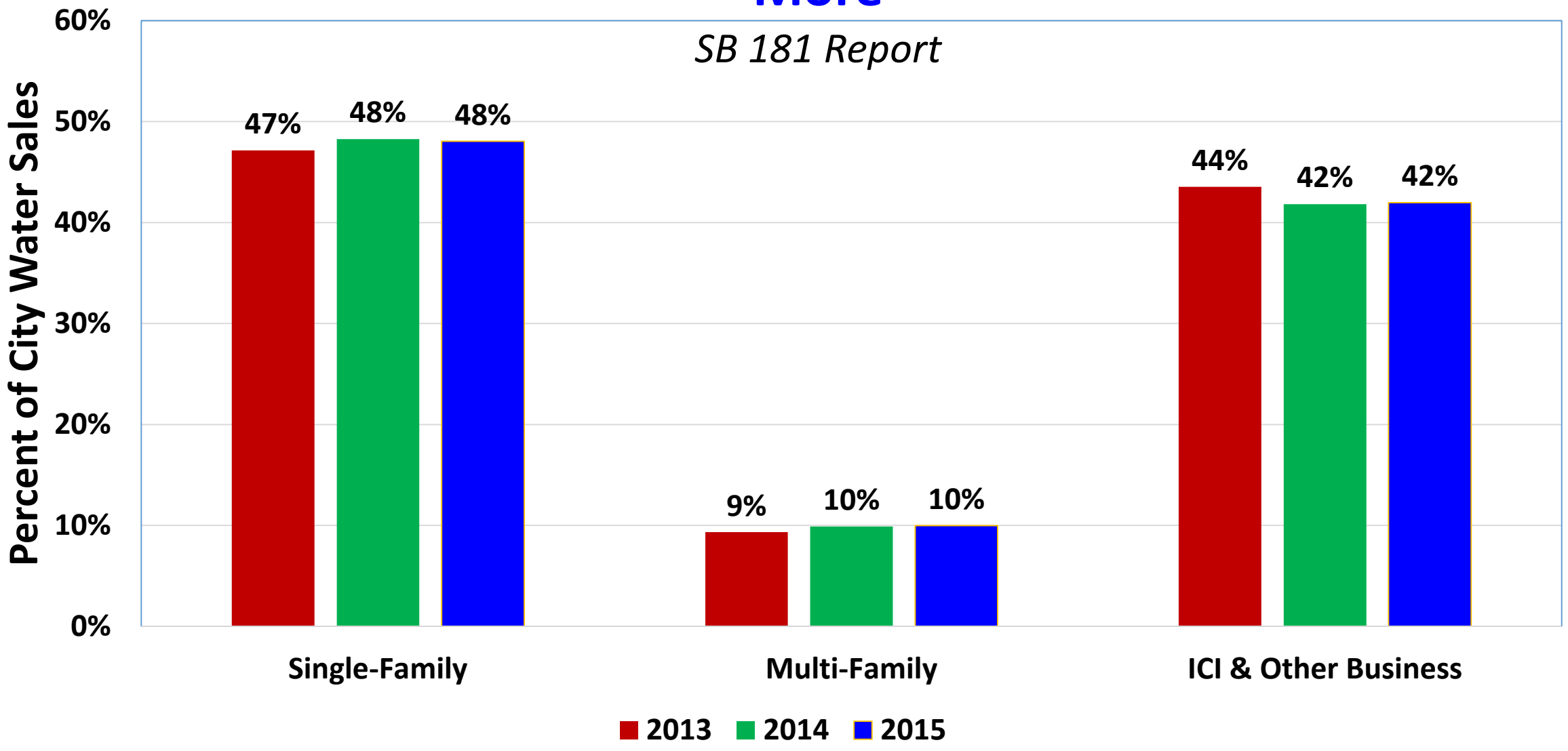
Future Texas Water Use
2017 Texas Water Plan



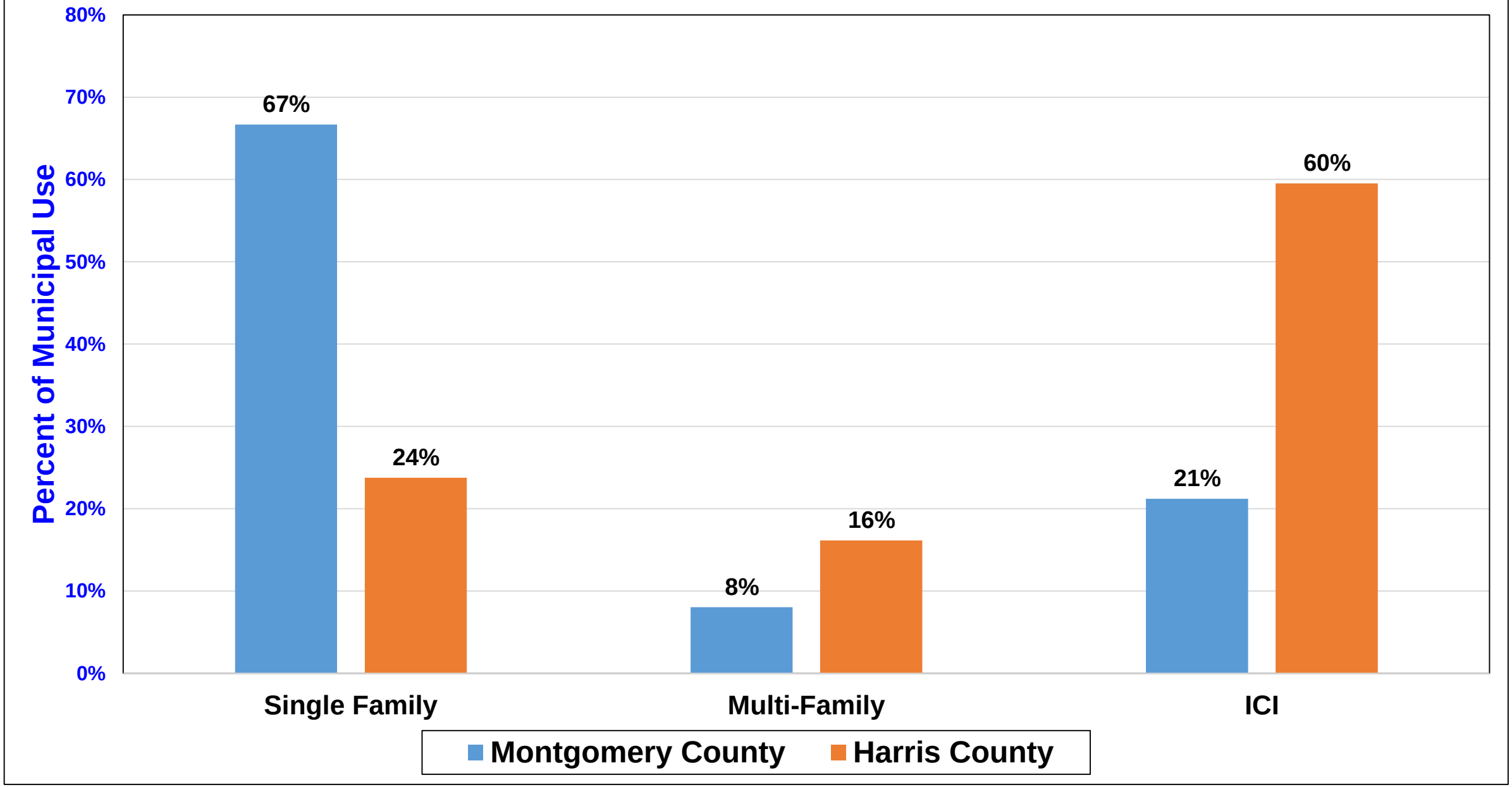

Region H Projections
Acre Feet per Year
Acre Feet per Year
3,500,000
3,000,000
2,500,000
2,000,000
1,500,000
1,000,000
500,000
0
2015
2020
2030
2040
2050
2060
2070
Livestock
Mining
Steam Electric
Irrigation
Manufacturing
Municipal
Total Use


Region H's Percent of Texas Total - 2015
TOTAL
13%
MUNICIPAL
20%
MANUFACTURING
45%
IRRIGATION
3%
STEAM ELECTRIC POWER
16%
MINING
9%
LIVESTOCK
4%
0%
5%
10%
15%
20%
25%
30%
35%
40%
45%
Region H's Percent of Texas Total

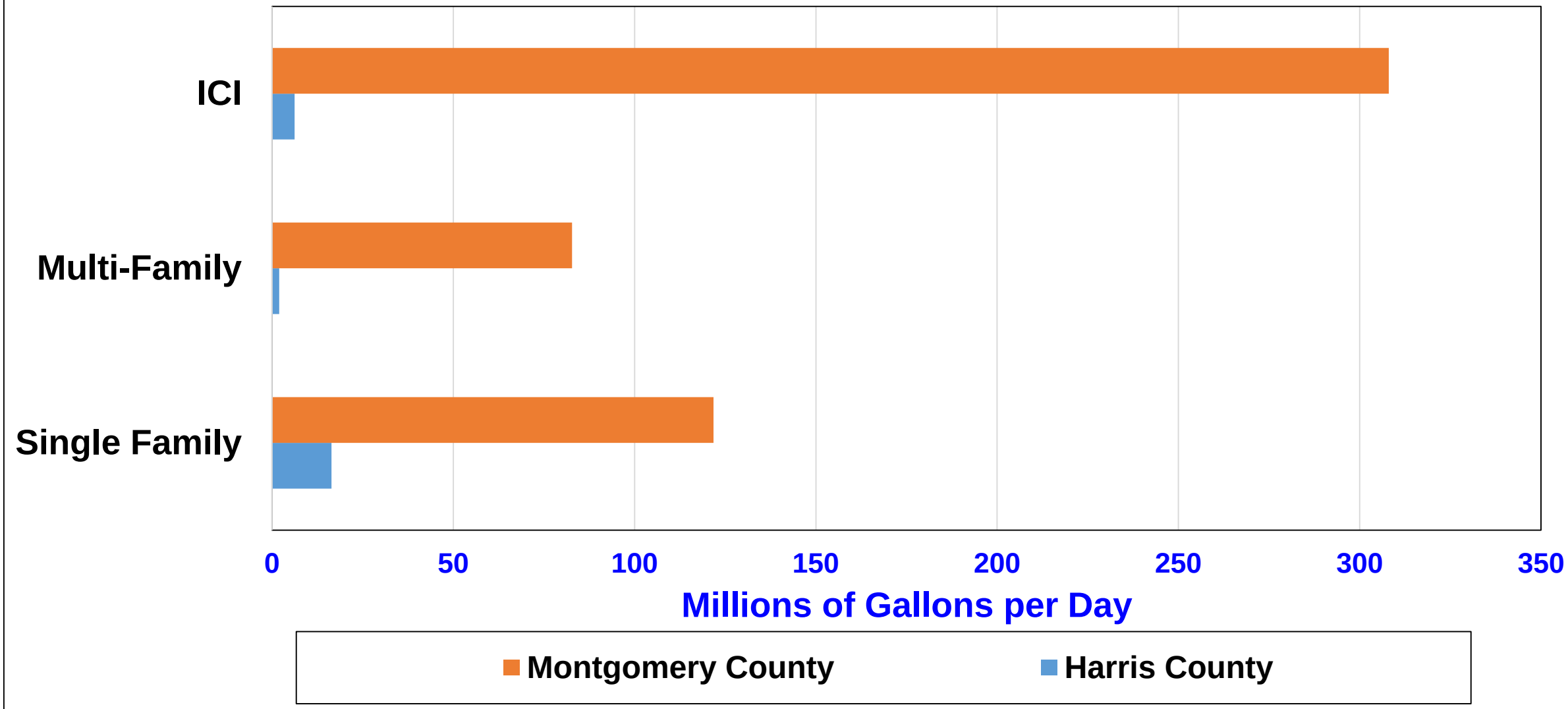
Water Use in Texas Cities of 3,300 Population or More



Comparison of Harris & Montgomery Co. Municipal Use -2015

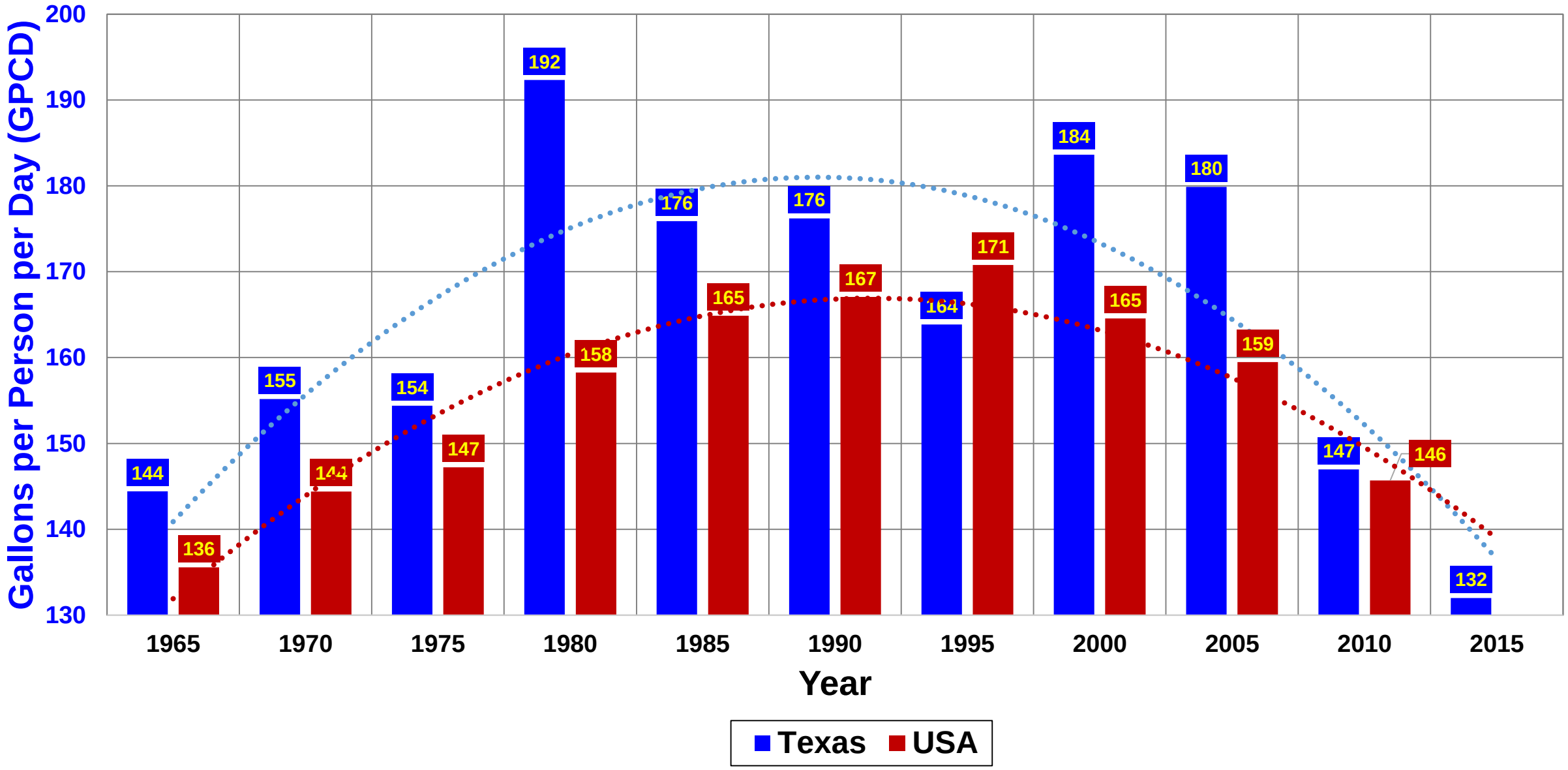


2015 Municipal Use Comparison

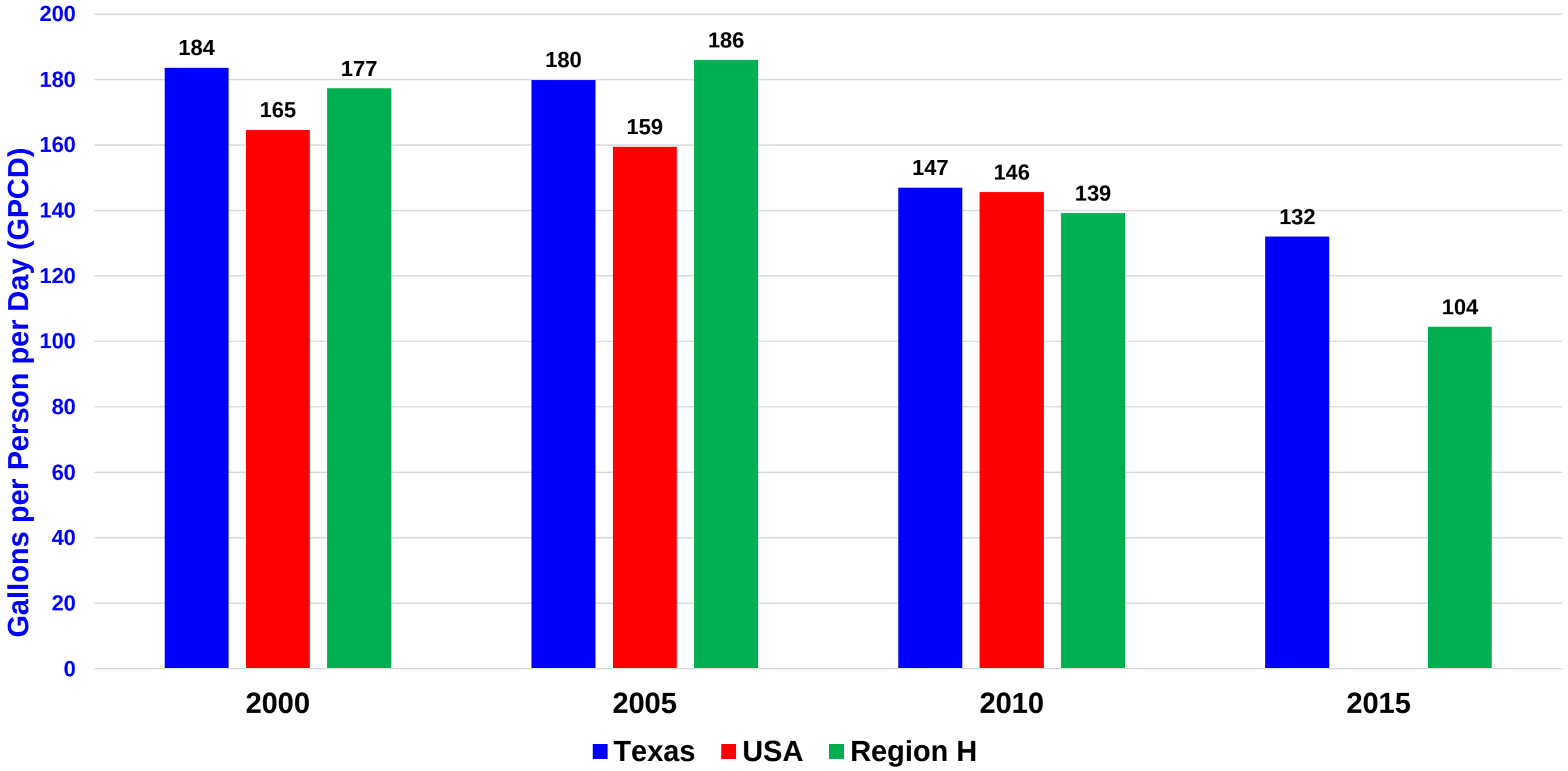


Per Capita Water Use in USA and Texas

Sources: TWDB and USGS

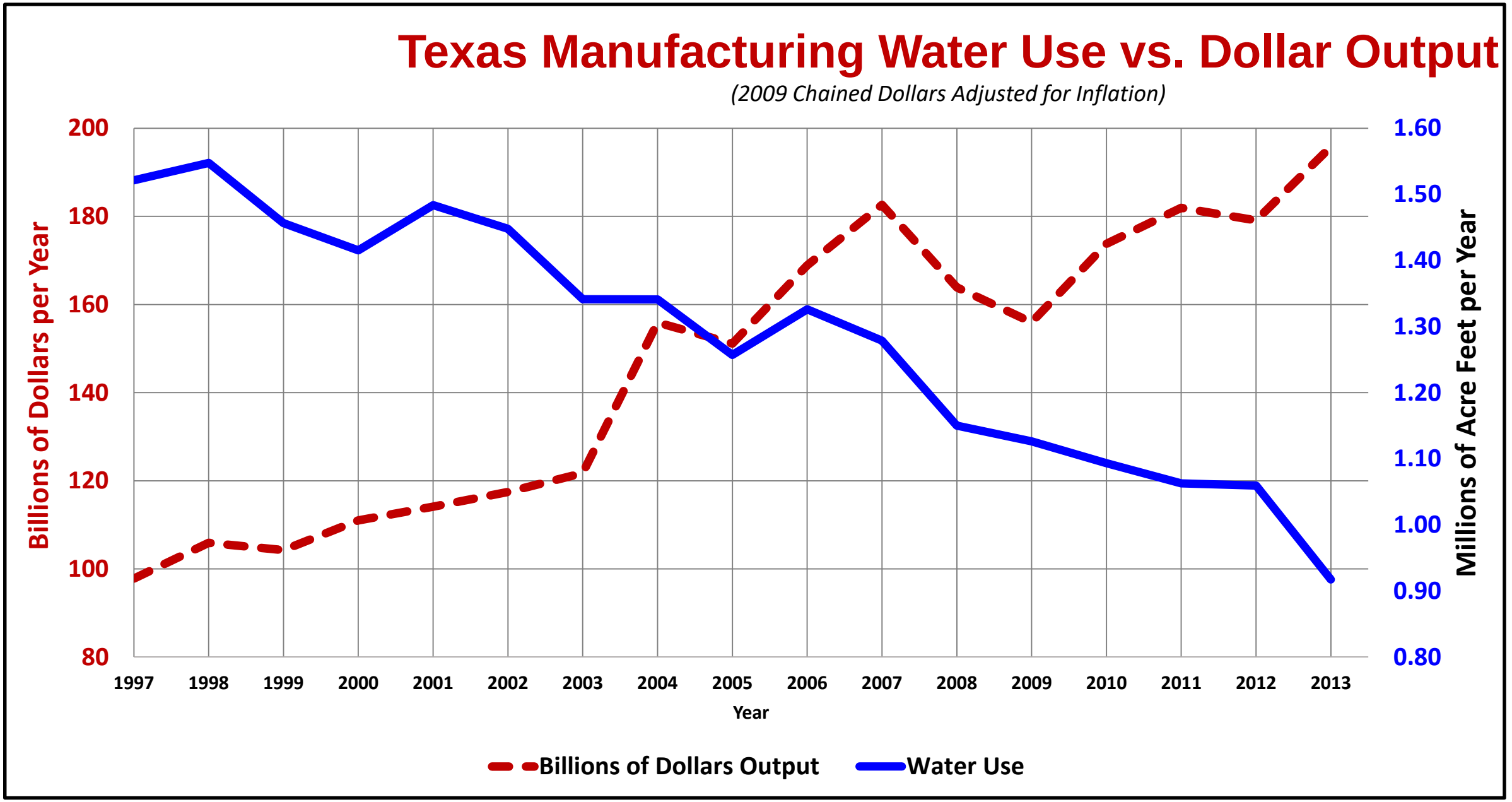


GPCD 2000 through 2015



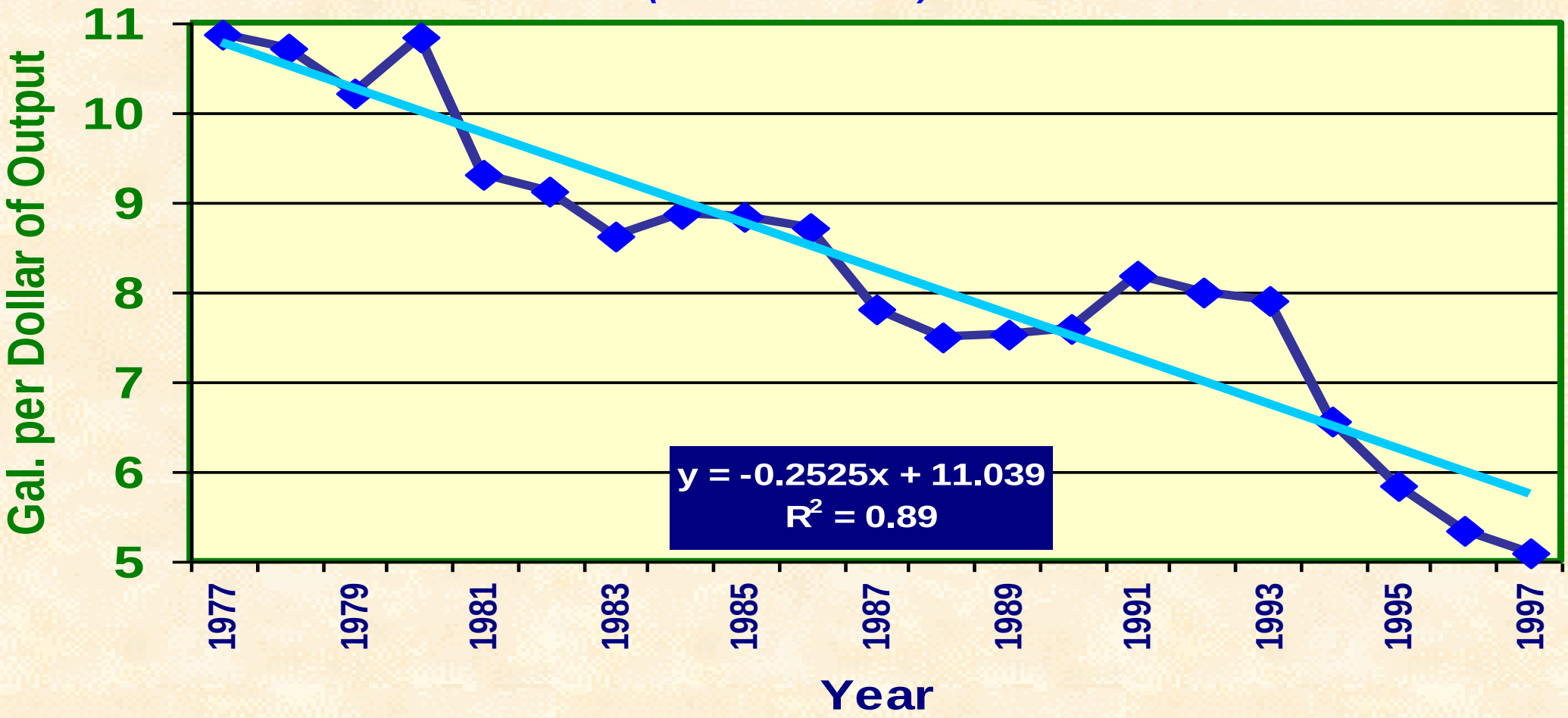
Texas Manufacturing Water Use vs. Dollar Output

(2009 Chained Dollars Adjusted for Inflation)



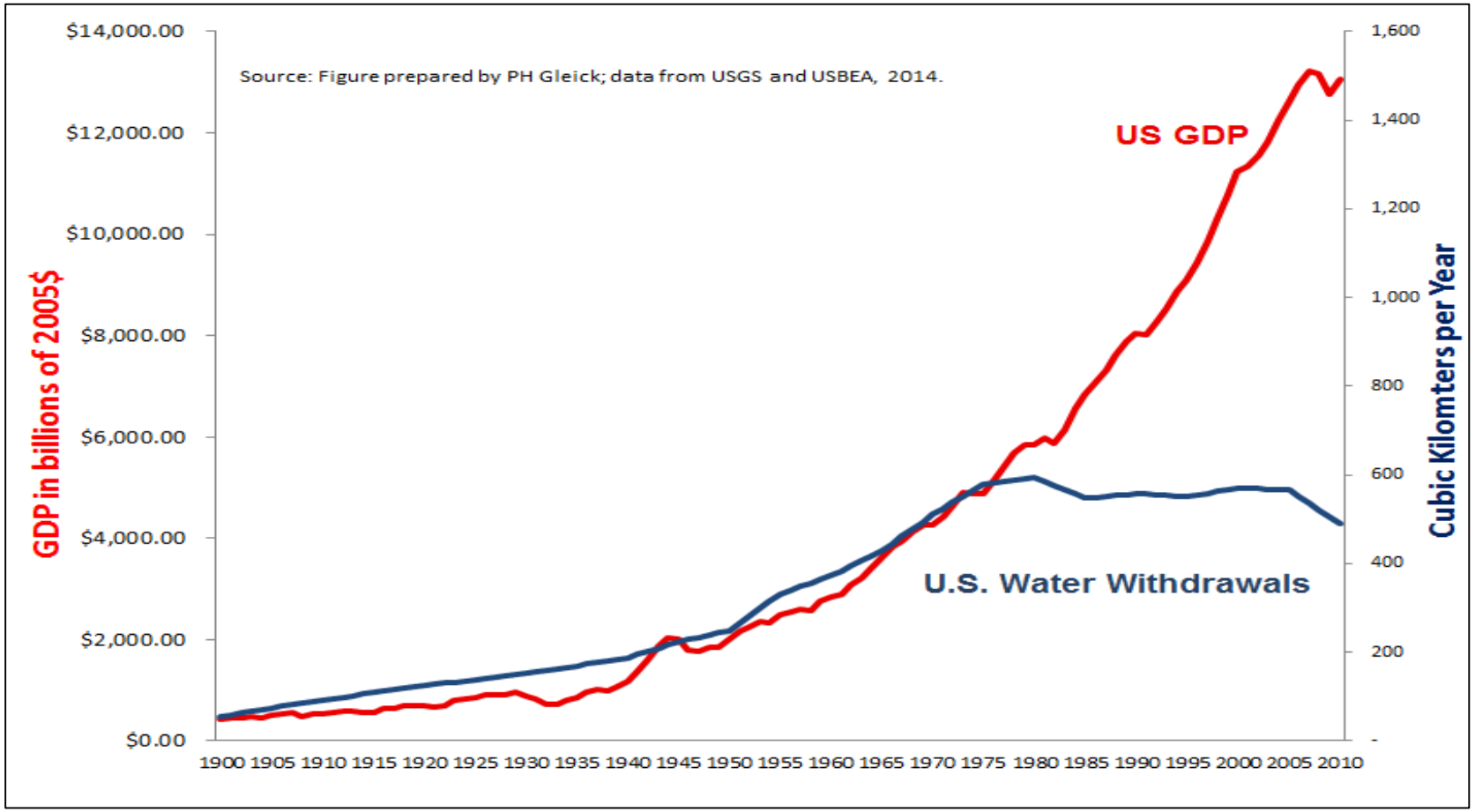
Manufacturing Water Use per Unit of Output In Texas

(1992 Dollars)

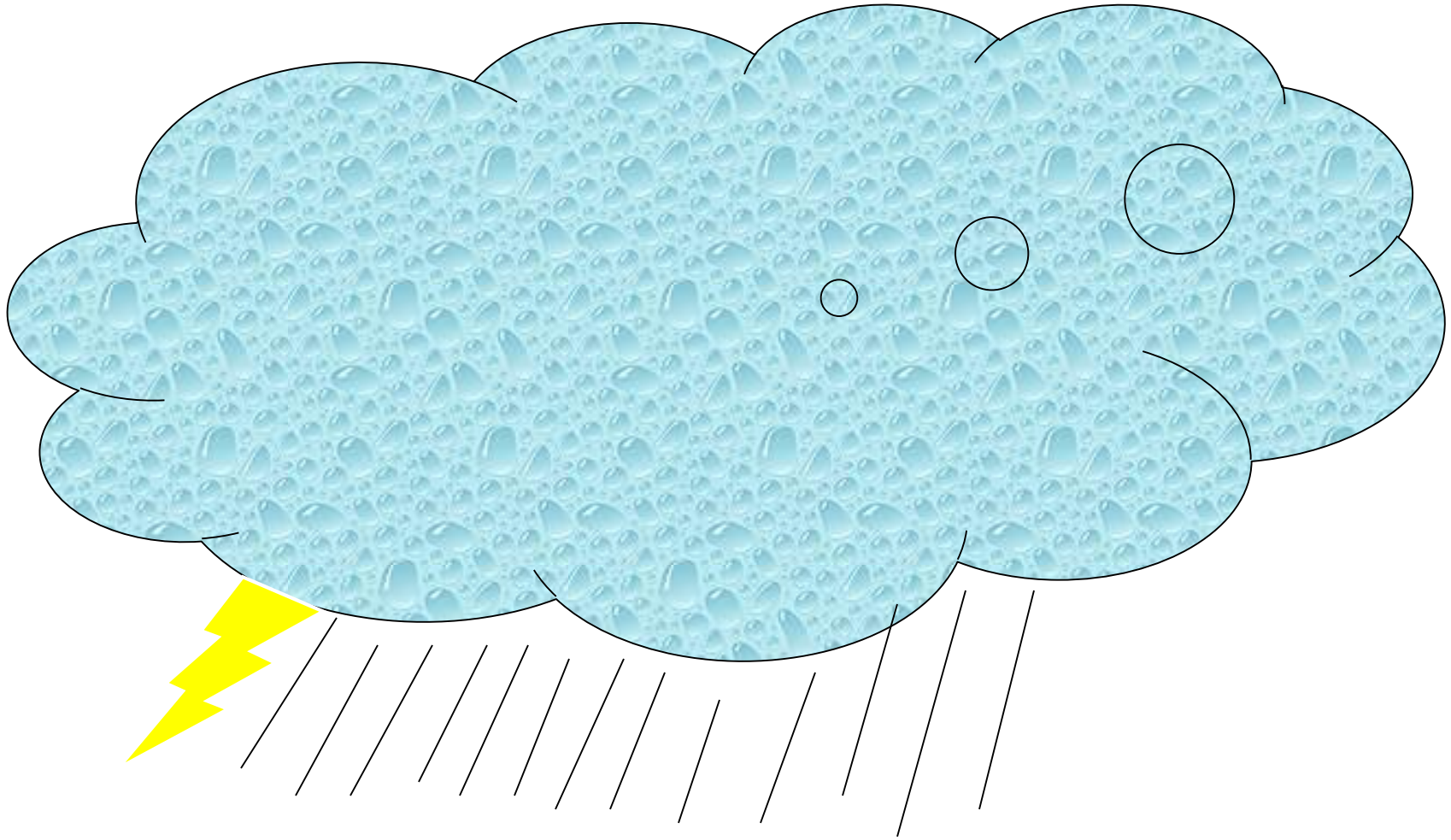


National Water Use vs. GDP

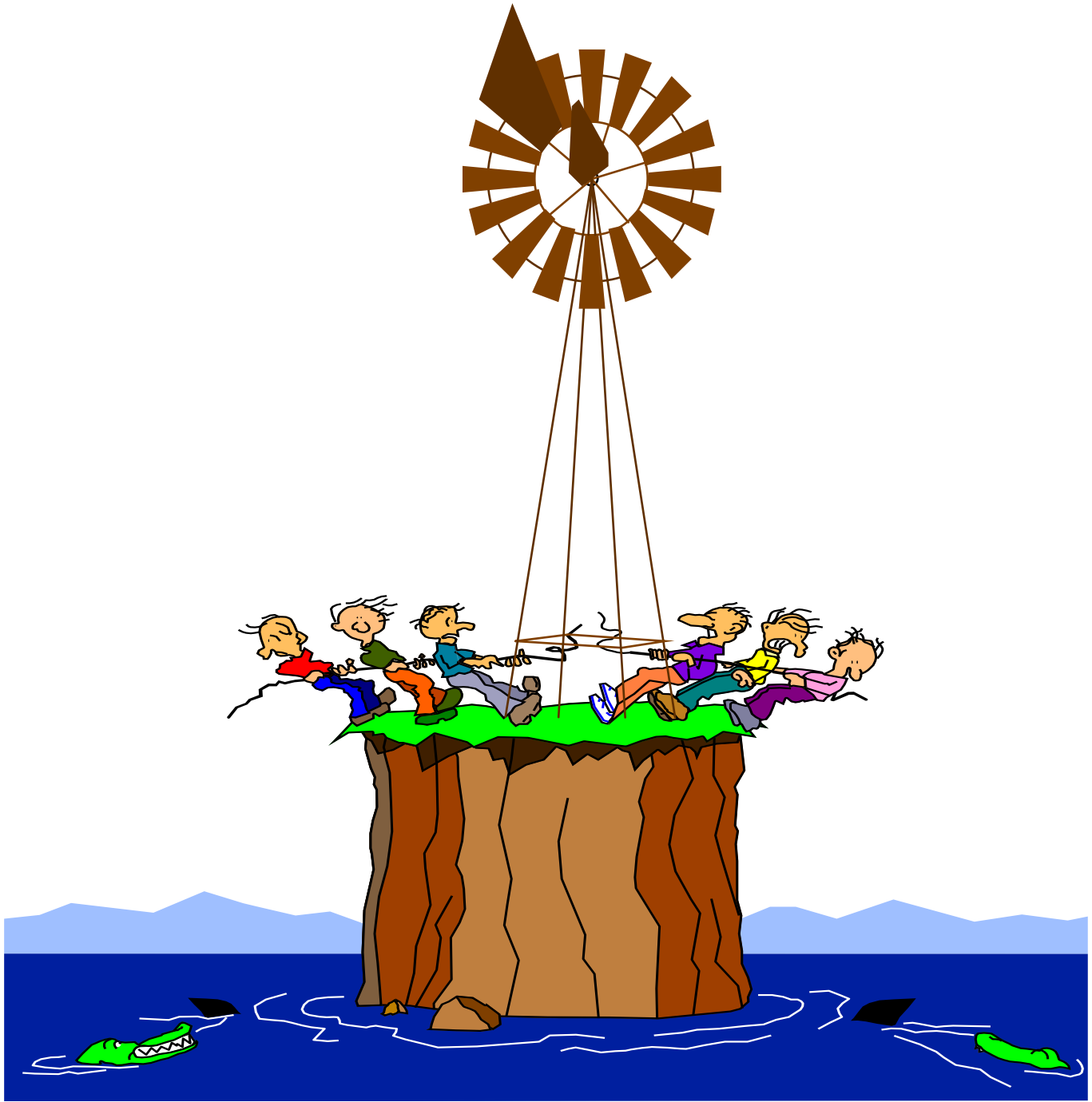
Source: Peter Glick, Pacific Institute



Some Basic Considerations



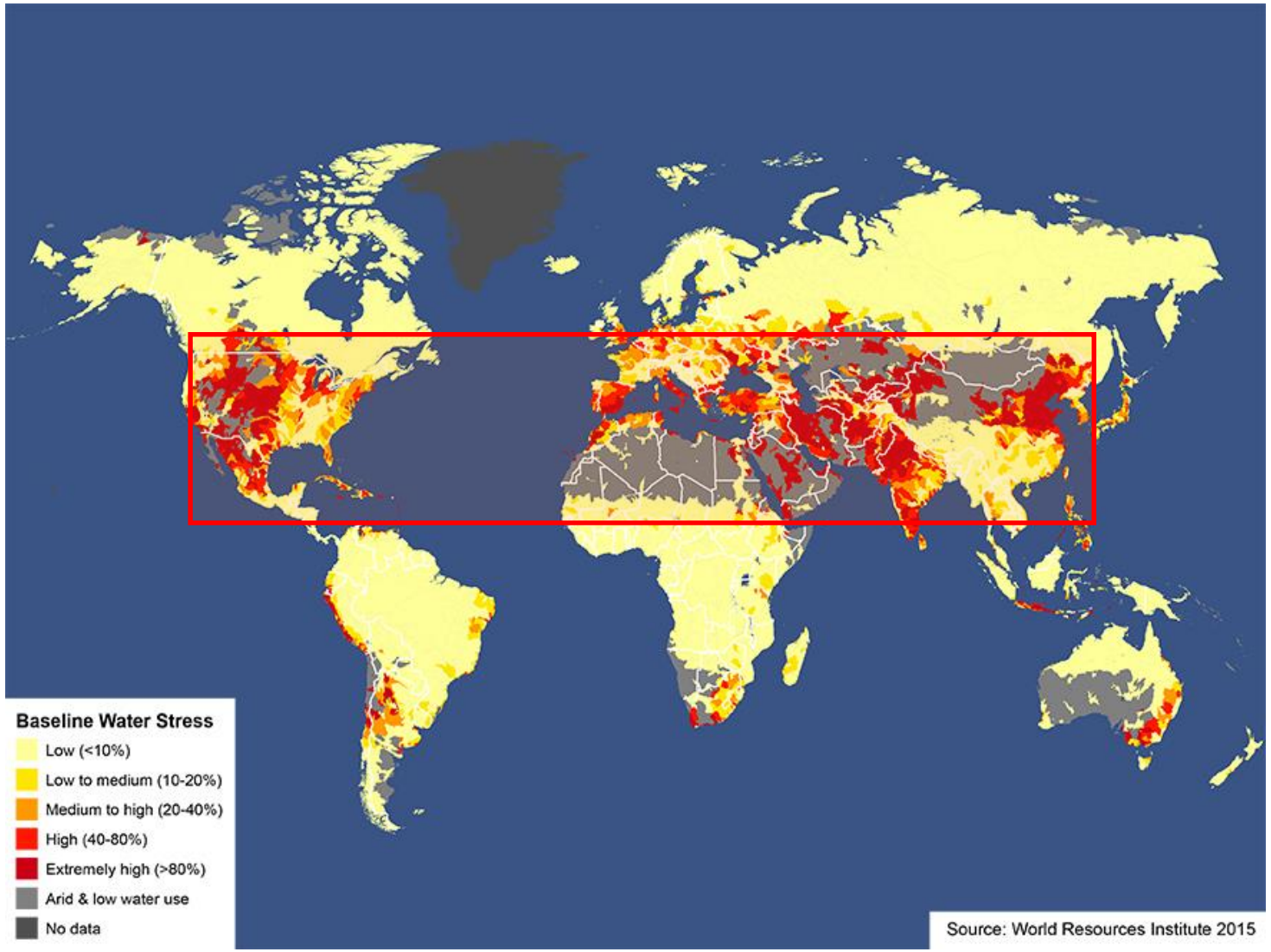
The ultimate source of all of our ***fresh*** water is precipitation



You can only get as much as mother nature allows you to. Any more & ????

Water Stress Index

And the latitude of stress.



Map of United States Showing Cumulative Groundwater Decline

Source: USGS, Konikow, L.F., 2013

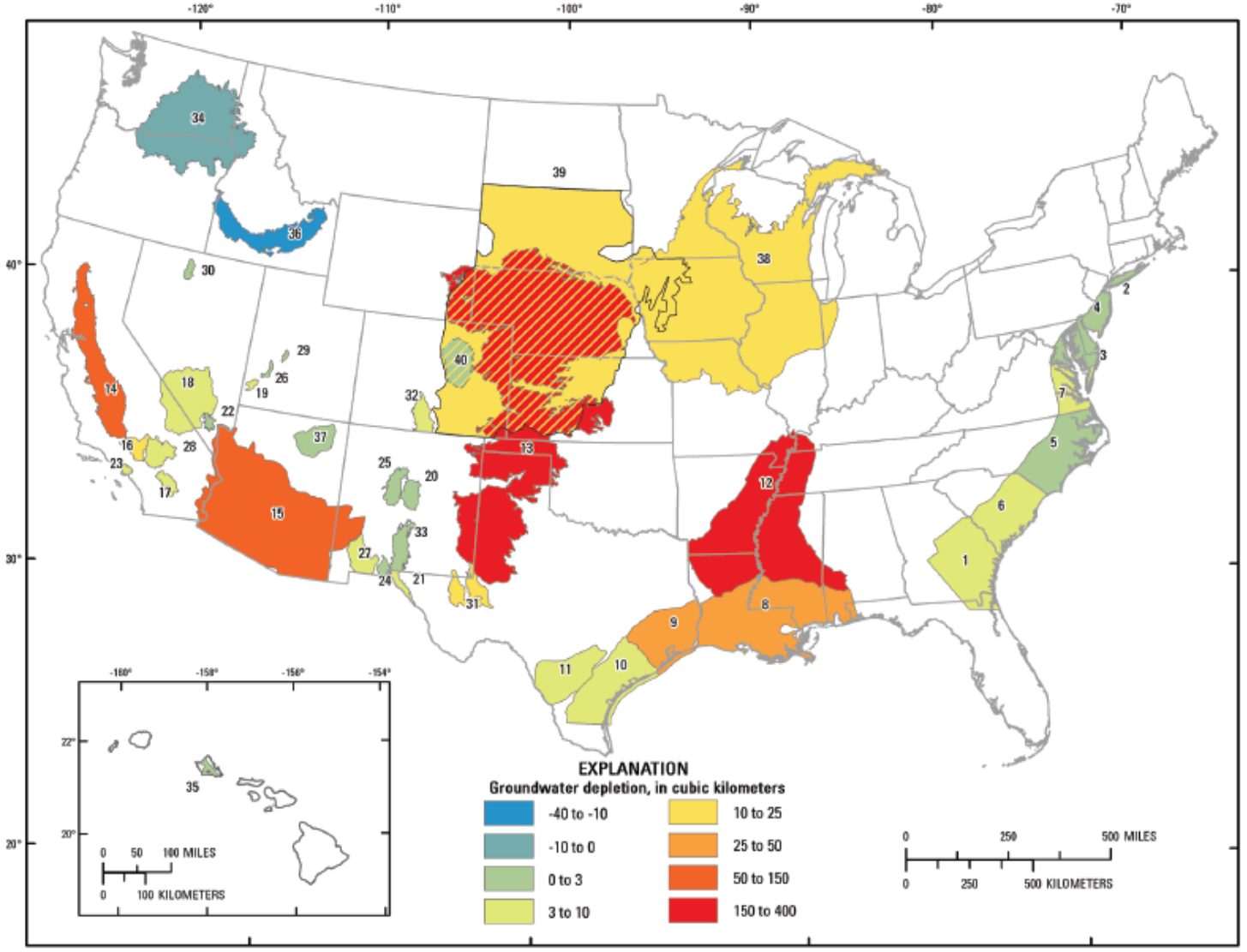
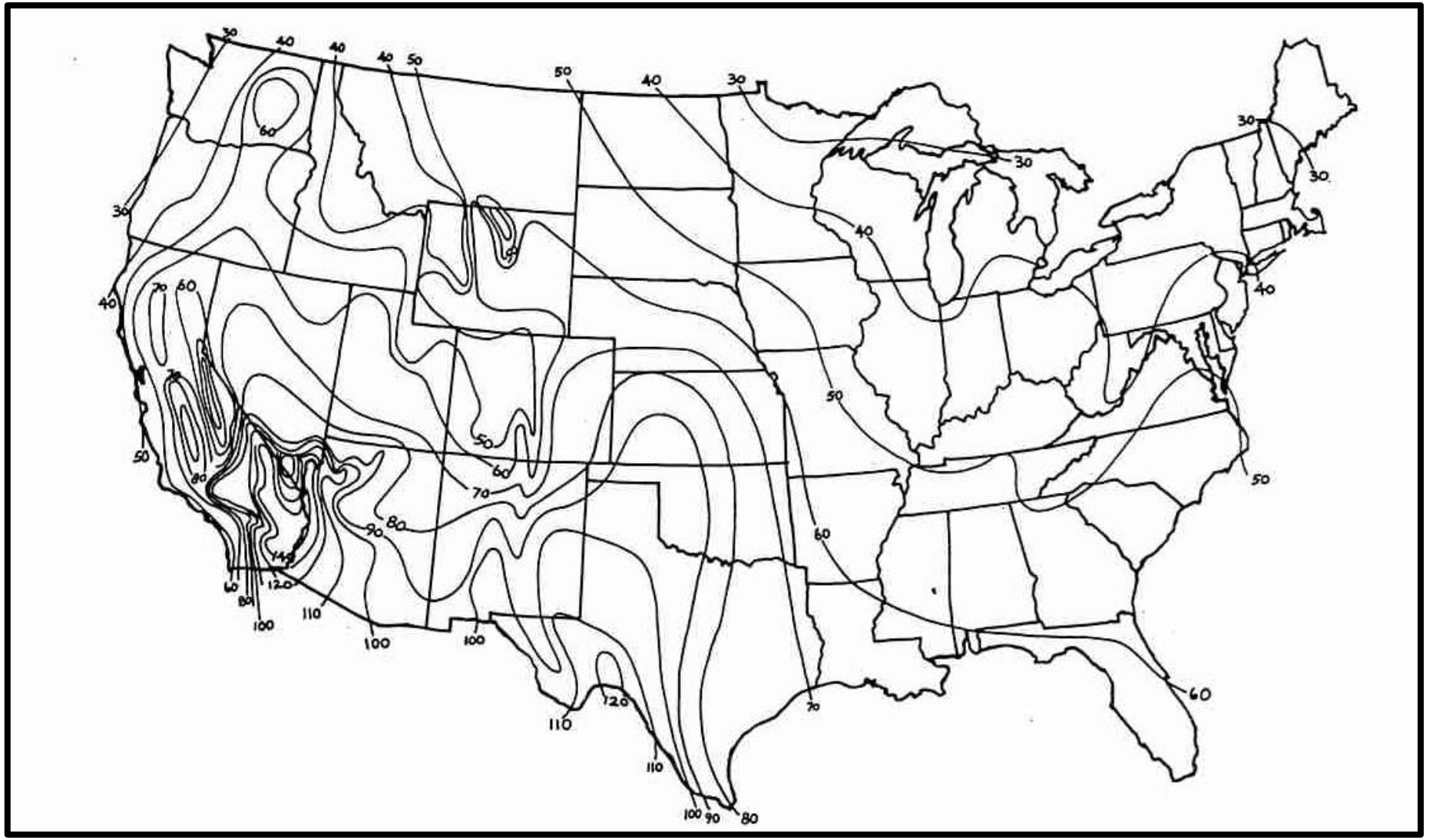


Figure 2. Map of the United States (excluding Alaska) showing cumulative groundwater depletion, 1900 through 2008, in 40 assessed aquifer systems or subareas. Index numbers are defined in table 1. Colors are hatched in the Dakota aquifer (area 39) where the aquifer overlaps with other aquifers having different values of depletion.

Annual evaporation map from the National Weather Service



Example of Net Evaporation on Water Loss

- **89,000 Acres of Lake Surface**
- **30 Inches or Net Evaporation per Year**
- **222,500 Acre-Feet of Evaporation per Year =**
- ***199 MILLION GALLONS lost daily***

Evaporation from Texas Reservoirs

Dr. Ralph Wurbs – TAMU

http://texaslivingwaters.org/wp-content/uploads/2013/03/EvaporationPaper.pdf

- There are 188 major water supply reservoirs in Texas and many smaller ones. (215 over 5,000 Ac Ft)(over 3,000 of all sizes total)
- The Texas Water Plan identifies an additional 26 water supply reservoir sites, but only a hand full of these will be built – ***ever.***
- The size of existing Texas reservoirs roughly equals total runoff. On an average day Texas looses
- ***5.4 billion gallons of water a day of gross evaporation.***
- This is compared to total municipal use in Texas of ***4 billion gallons a day***. – ***Reservoirs evaporate more water than all Texas Cities and towns use combined in 2015!!!!!!!!!!!!!***

Nationally, the age of dam building is nearing the end

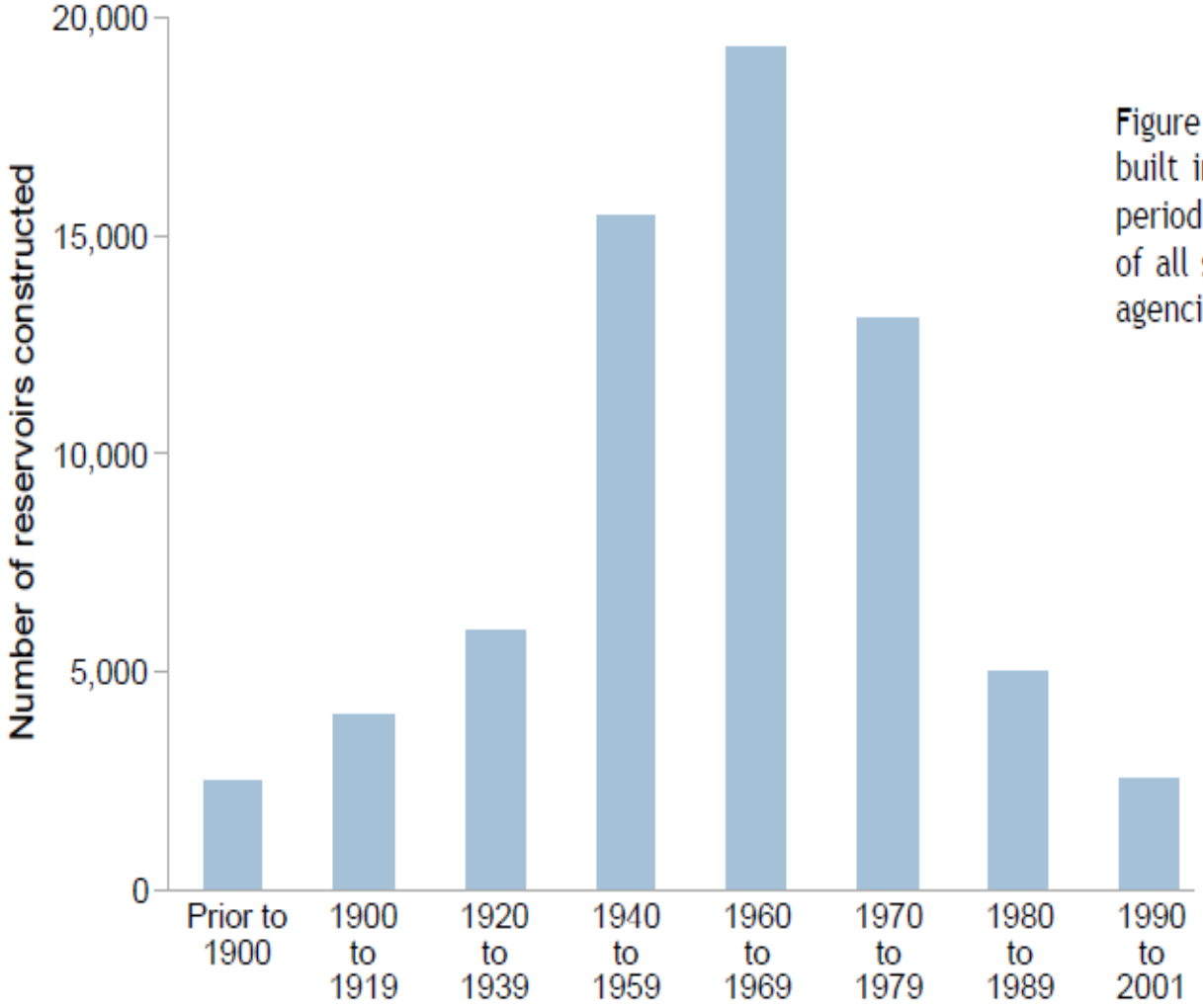


Figure 3.1. The number of reservoirs built in the United States by time period. This figure includes dams of all sizes recorded by regulatory agencies (Gleick, 2000).

From the 2012 Texas Water Plan!

The primary message of the 2012 State Water Plan is a simple one: In serious drought conditions,

Texas does not and will not have enough water to meet the needs of its people,

its businesses, and its agricultural enterprises.

No we will not run out of water, but our ability to provide for growth and economic development from *CONVENTIONAL FRESH WATER* is limited.

What We Will Cover

- **What is happening across the nation with water and wastewater rates;**
- **The Texas Example – Conservation, Reuse and Drought Management offer the *most water for the least cost*;**
- **A hypothetical case that shows how 10 homes; and**
- **The impact on increased efficiency on the expansion of future treatment capacity.**

Water & Wastewater Rates

Circle of Blue
April, 2016

http://www.circleofblue.org/waterpricing/

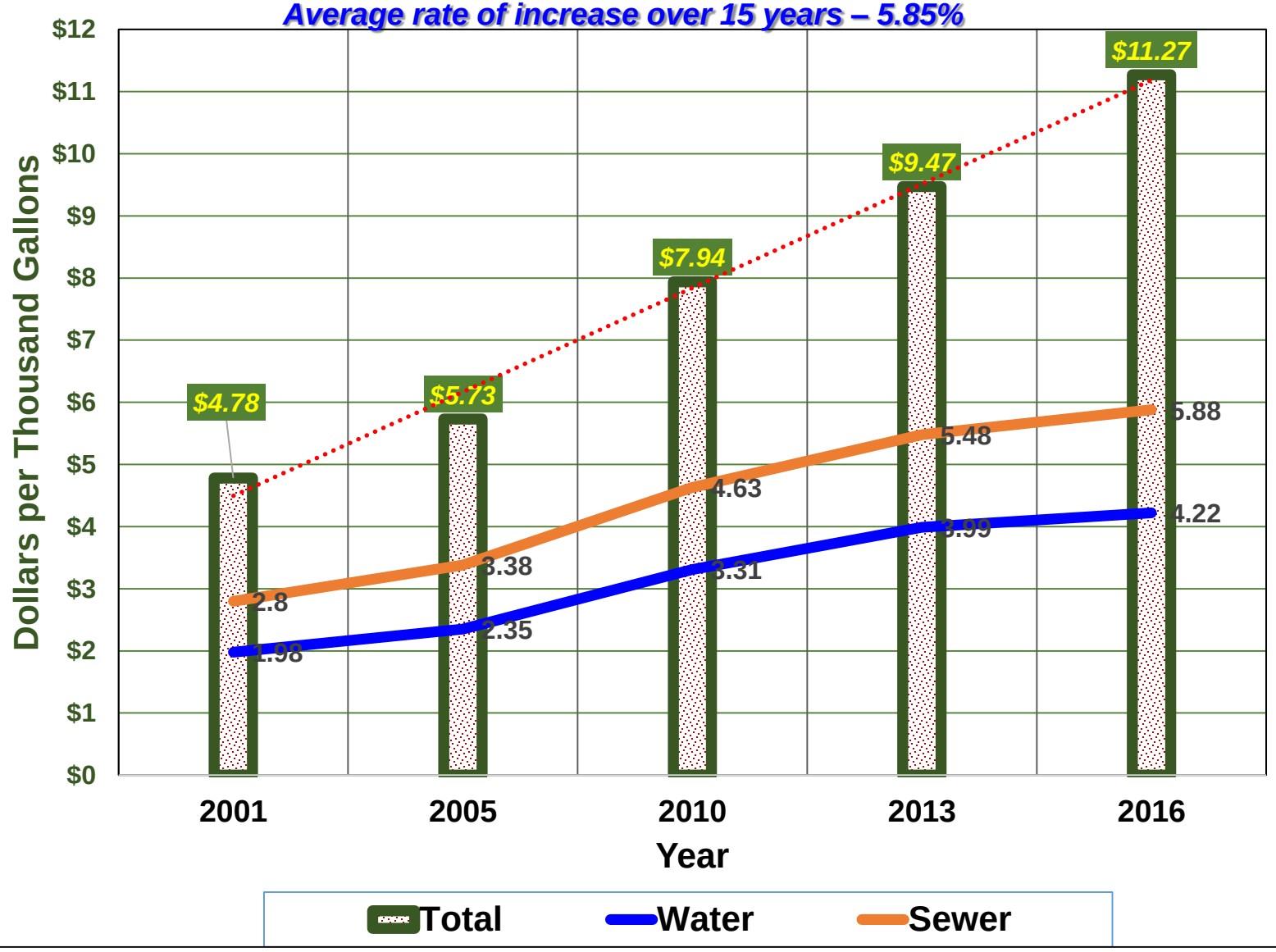
Price of Water 2015: Up 5 % in 2016 in 30 Major U.S. Cities;

48 % Since 2010!

Commercial Water and Sewer Rates for 100,000 gallons for Nation's 50 Largest Cities

Source: Black & Veatch - 50 Largest Cities Reports

Average rate of increase over 15 years – 5.85%



Consumer Price Index for Utilities

http://www.circleofblue.org/waterpricing/

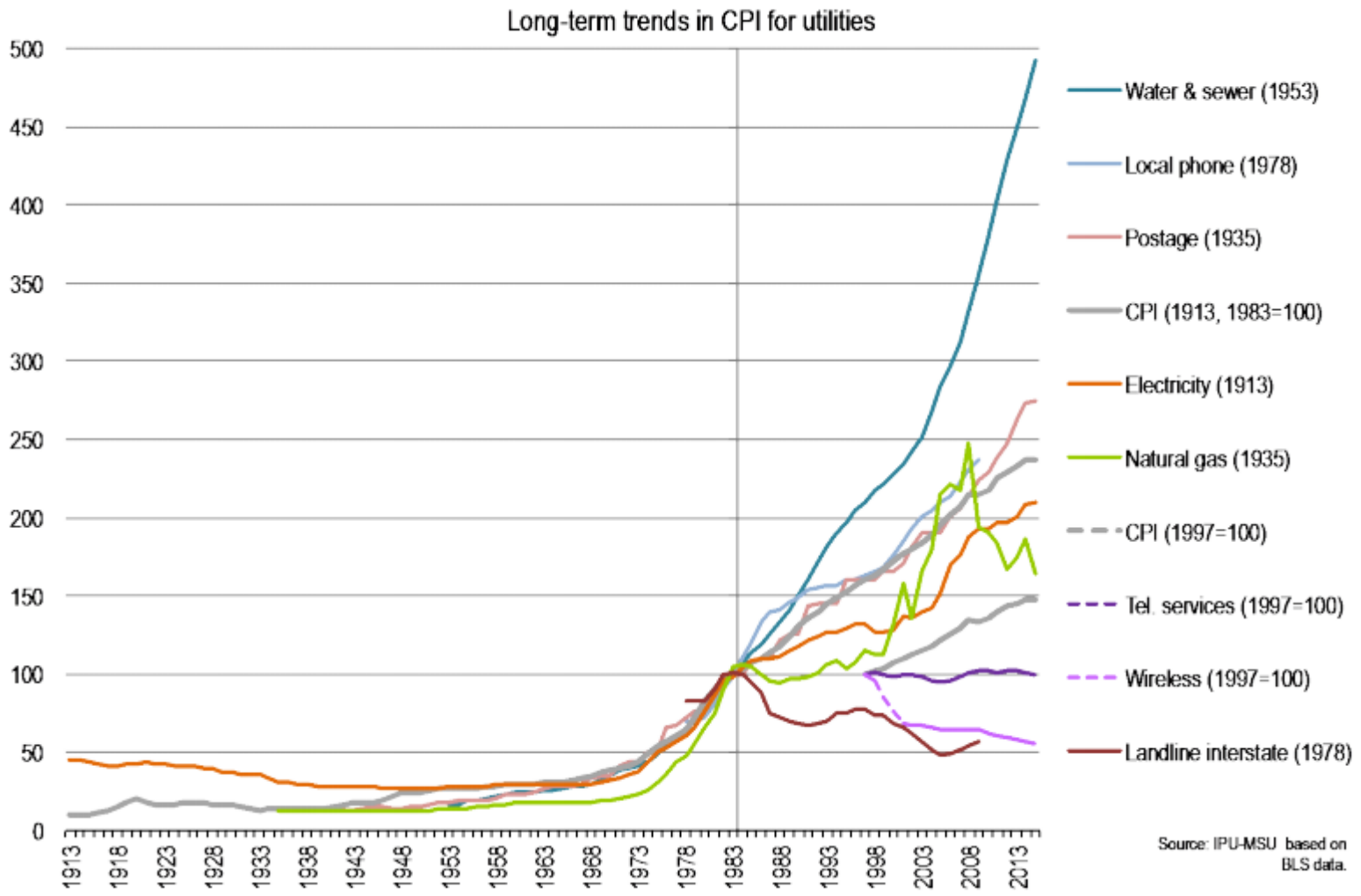


Exhibit 1. Long-term trends in the Consumer Price Index for utilities (1913-2015). The index is set to 100 for 1982-1984 except for telephone and wireless services, where the index is set to 100 for 1997. Year (*) indicates start of series.

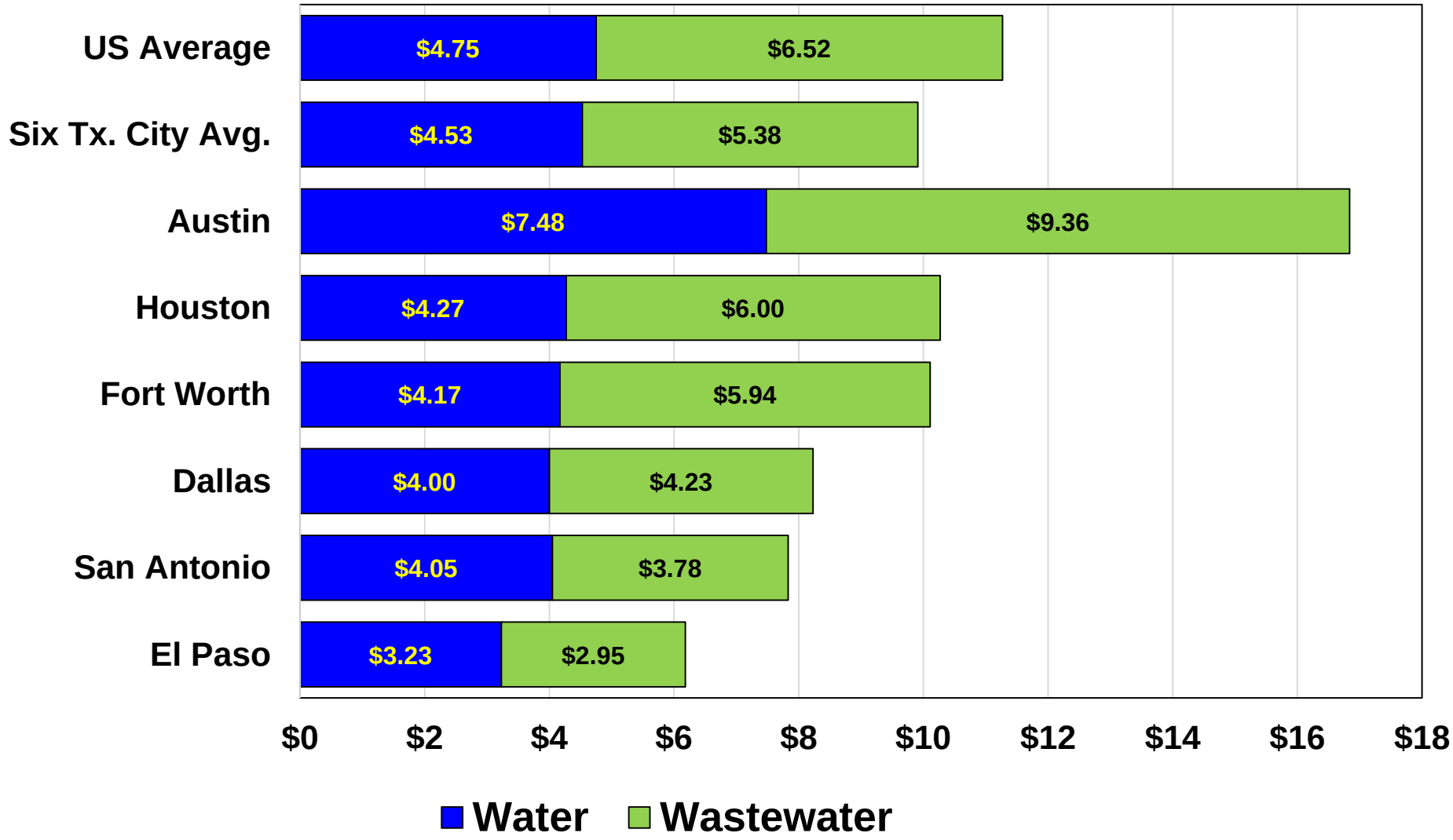
“Water is the oil of the 21st century.”

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

Commercial Water and Wastewater Rates 2016

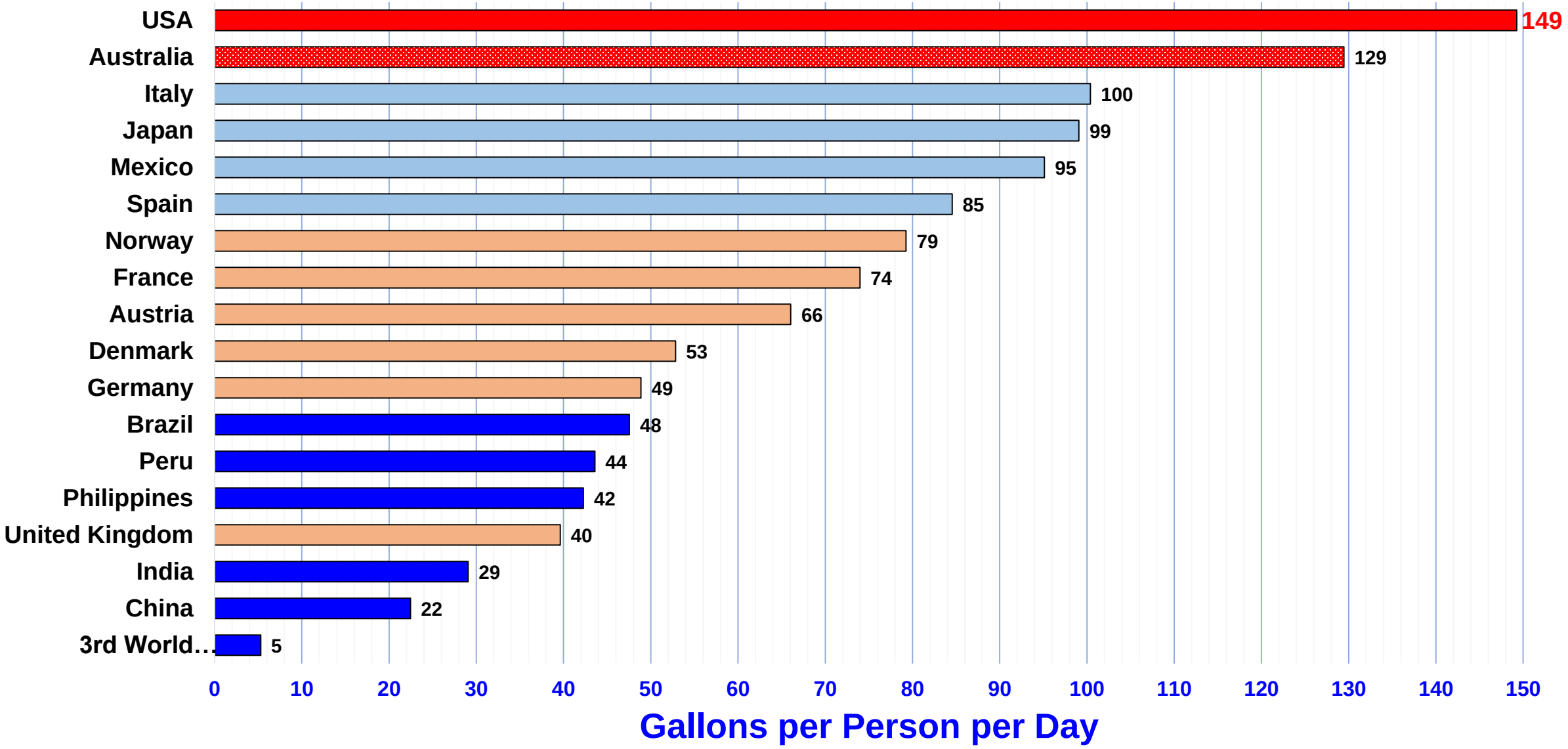
Based on total bill for 100,000 gallons per month.

Source: Black and Veatch
https://www.google.com/#q=black+and+veatch+50+largest+cities+water+and+wastewater+rate+survey+2016



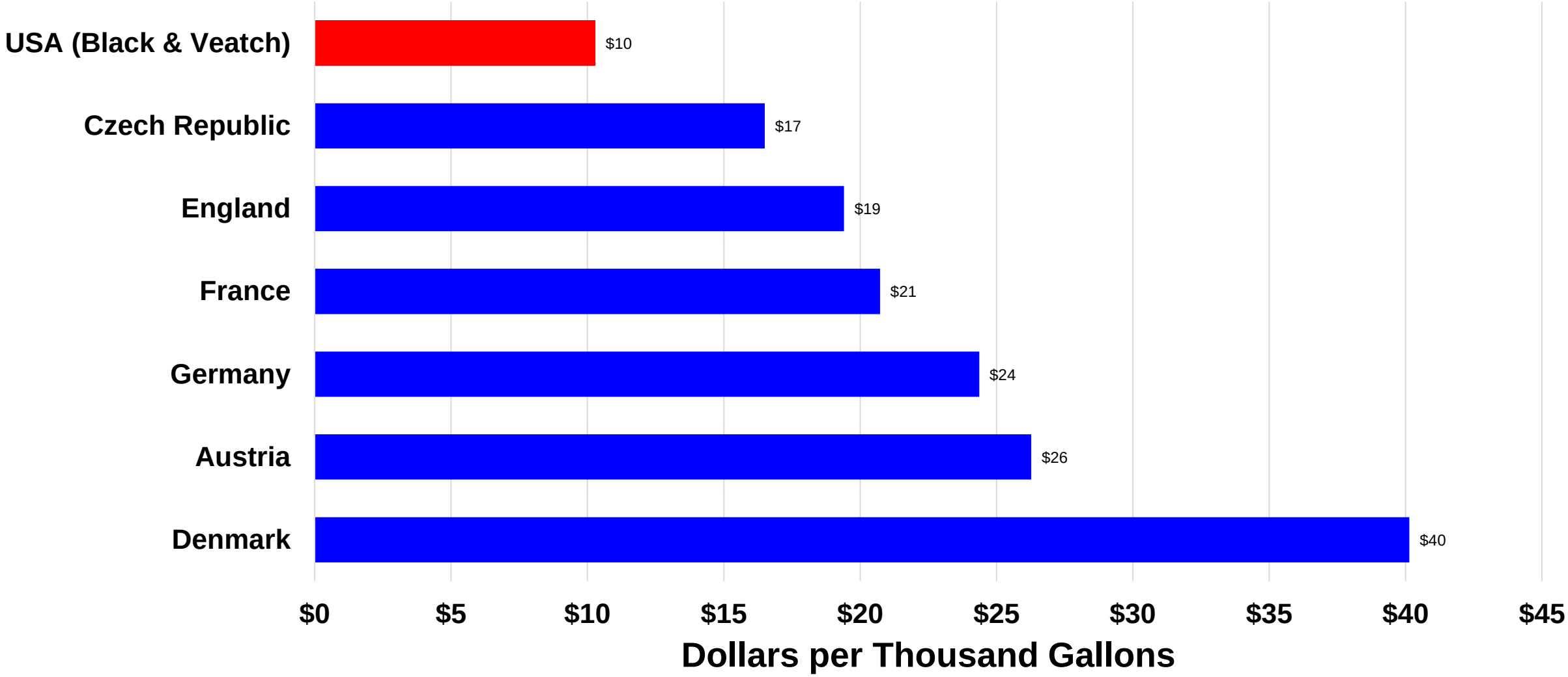
Worldwide Municipal Per Capita Water Use

Source: Data 360
http://www.data360.org/dsg.aspx?Data_Set_Group_Id=757



Average Residential Water and Sewer Rates in European Countries Compared to USA in 2013

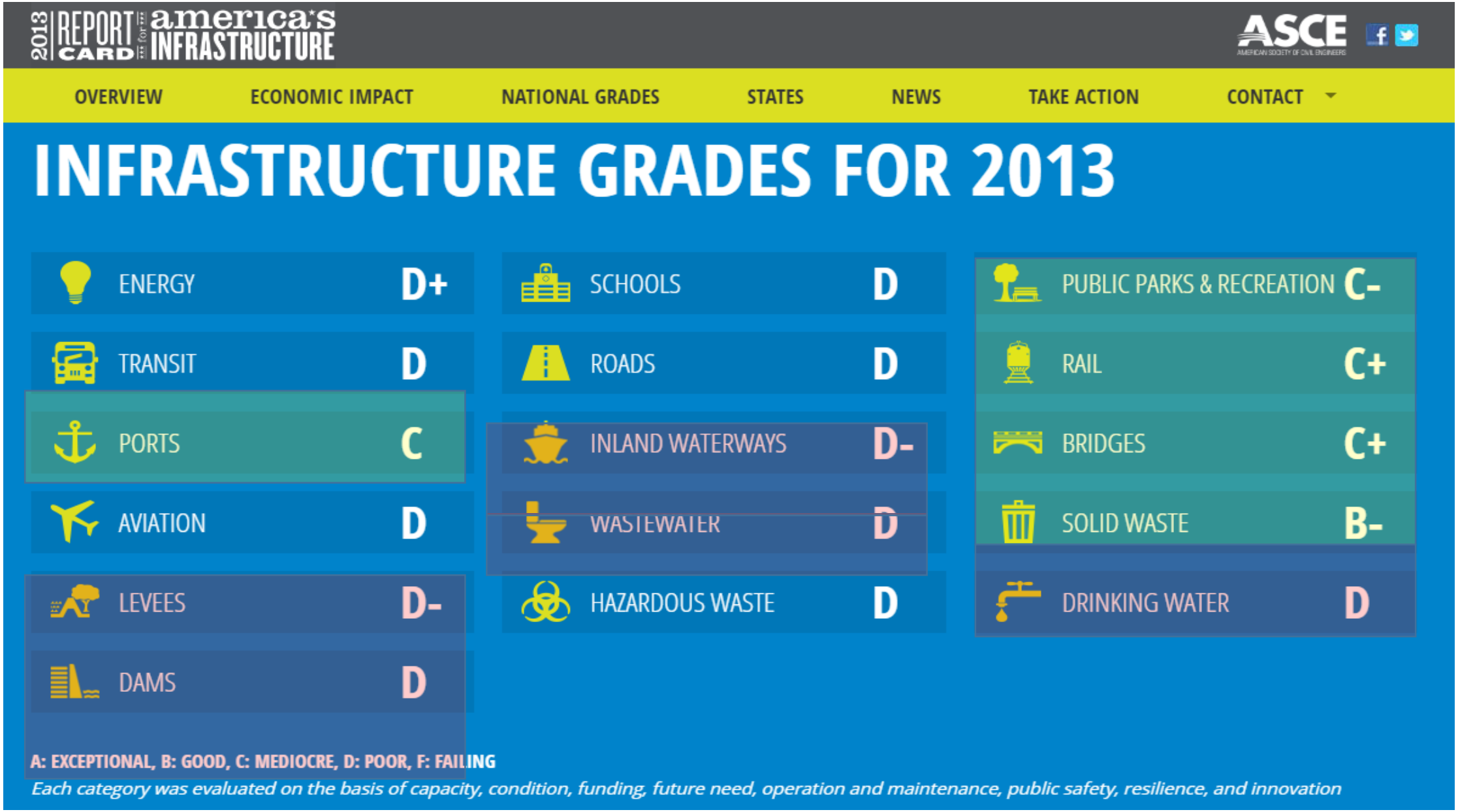
Sources of Information:
Europe -http://www.globalwaterintel.com/archive/12/9/market-profile/global-water-tariffs-continue-upward-trend.html
USA - http://bv.com/docs/mana



The Cost of One Toilet Flush

Cost to Flush a Toilet at Current Inflation Rate of 5.85%		
Gallons per Flush	Cents per Flush in 2017	Cents per Flush in 2037
5	5.6	17.6
3.5	3.9	12.3
1.6	1.8	5.6
1.28	1.4	4.5

Bridges have been the Poster Child for Infrastructure Needs!



http://www.infrastructurereportcard.org

Buried No Longer: Confronting America's Water Infrastructure Challenge

Investment needs for buried ***drinking water*** infrastructure total more than ***$1 trillion*** *nationwide* over the next 25 years.

This does not include wastewater!!!!!!!

(American Water Works Association, 2012)
www.awwa.org/Portals/0/files/legreg/documents/BuriedNoLonger.pdf

FAILURE TO ACT

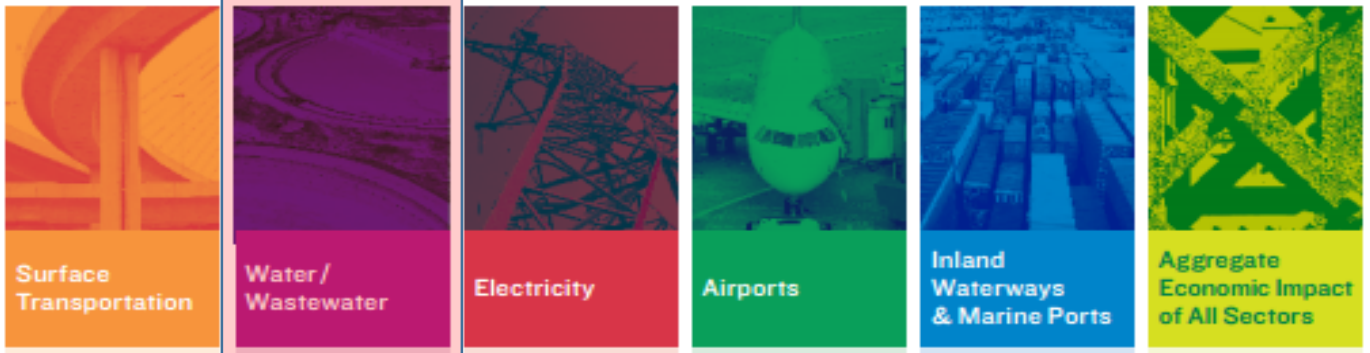
CLOSING THE INFRASTRUCTURE INVESTMENT GAP FOR AMERICA'S ECONOMIC FUTURE

American Society of Civil Engineers

www.infrastructurereportcard.org/wp-content/uploads/2016/05/2016-FTA-Report-Close-the-Gap.pdf

TABLE 1 ★ Losses to the National Economy Due to Infrastructure Investment Gaps

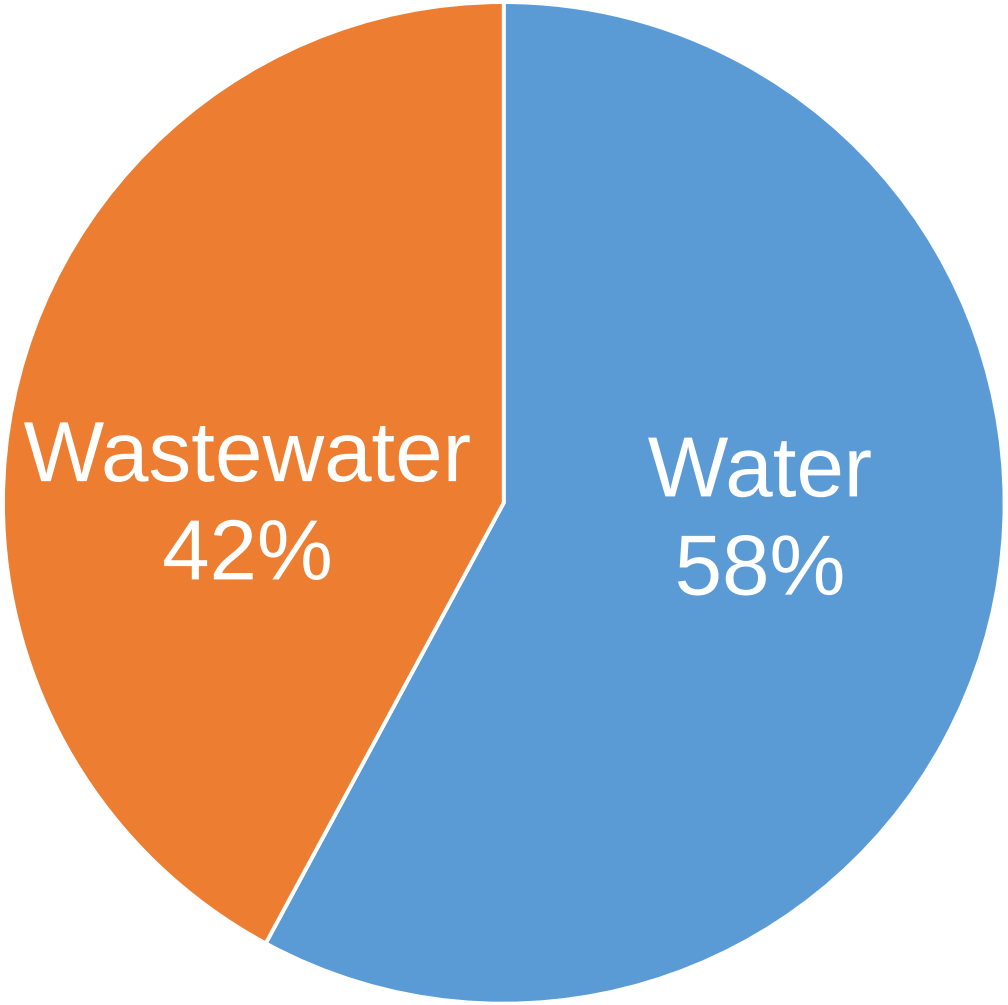
(All values are in billions of constant 2015 dollars)[4,5,6,7]



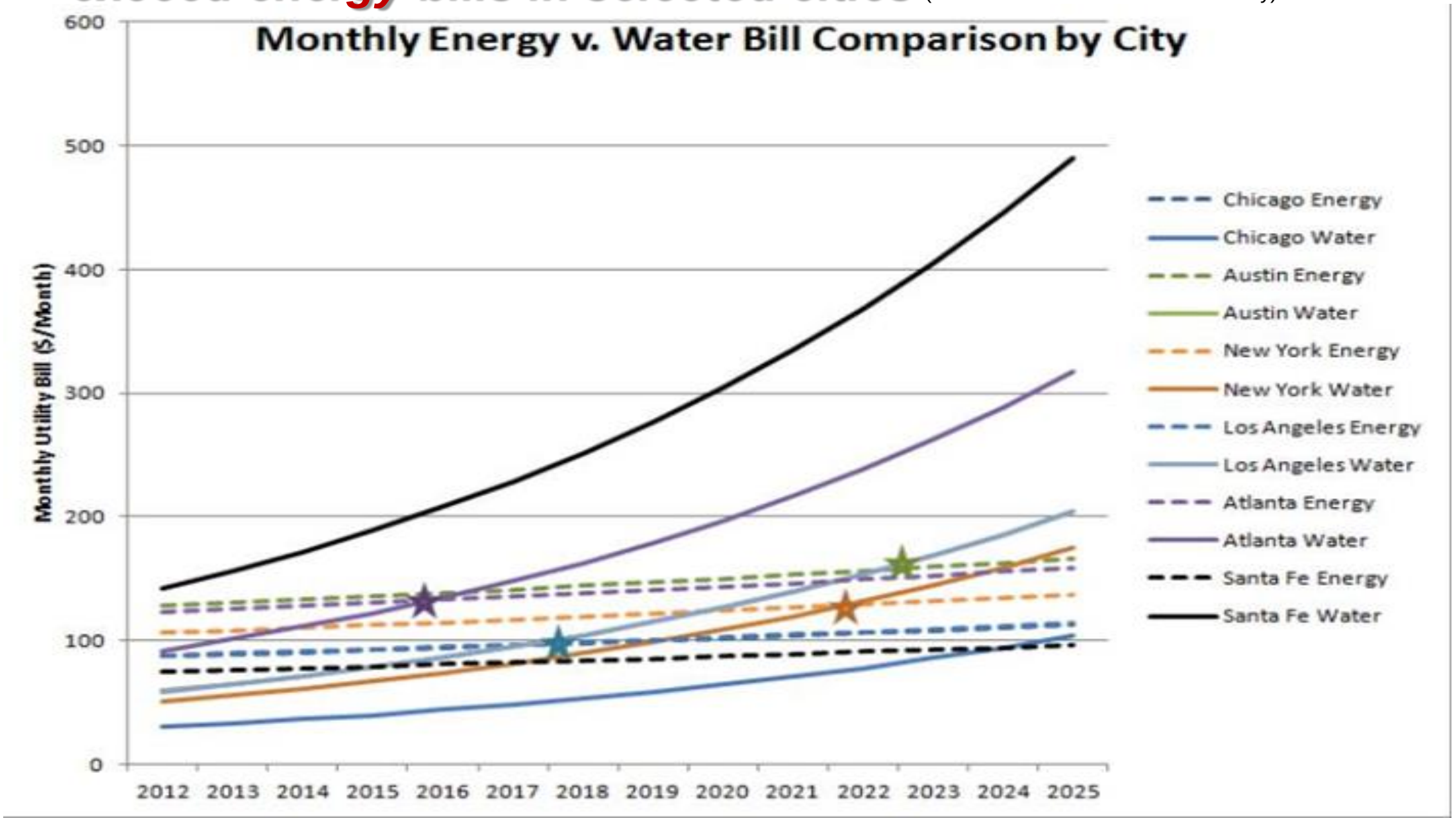
	Surface Transportation	Water / Wastewater	Electricity	Airports	Inland Waterways & Marine Ports	Aggregate Economic Impact of All Sectors
Business Sales						
2016–2025	$2,212	$896	$1,399	$625	$1,252	$7,038
2026–2040	$8,152	$5,907	$2,024	$2,397	$4,239	$29,292
GDP						
2016–2025	$1,167	$508	$819	$337	$784	$3,955
2026–2040	$1,981	$3,215	$1,071	$1,073	$2,003	$14,201
Jobs						
2025	1,052,000	489,000	102,000	257,000	440,000	2,546,000
2040	473,000	956,000	242,000	494,000	1,153,000	5,809,000

EPA Breakdown of Water and Wastewater Infrastructure Dollar Needs

http://www.usmayors.org/urbanwater/documents/LocalGovt%20InvtInMunicipalWaterandSewerInfrastructure.pdf



This graph shows when residential water and sewer bills will exceed energy bills in selected cities (source – Alliance for Water Efficiency)

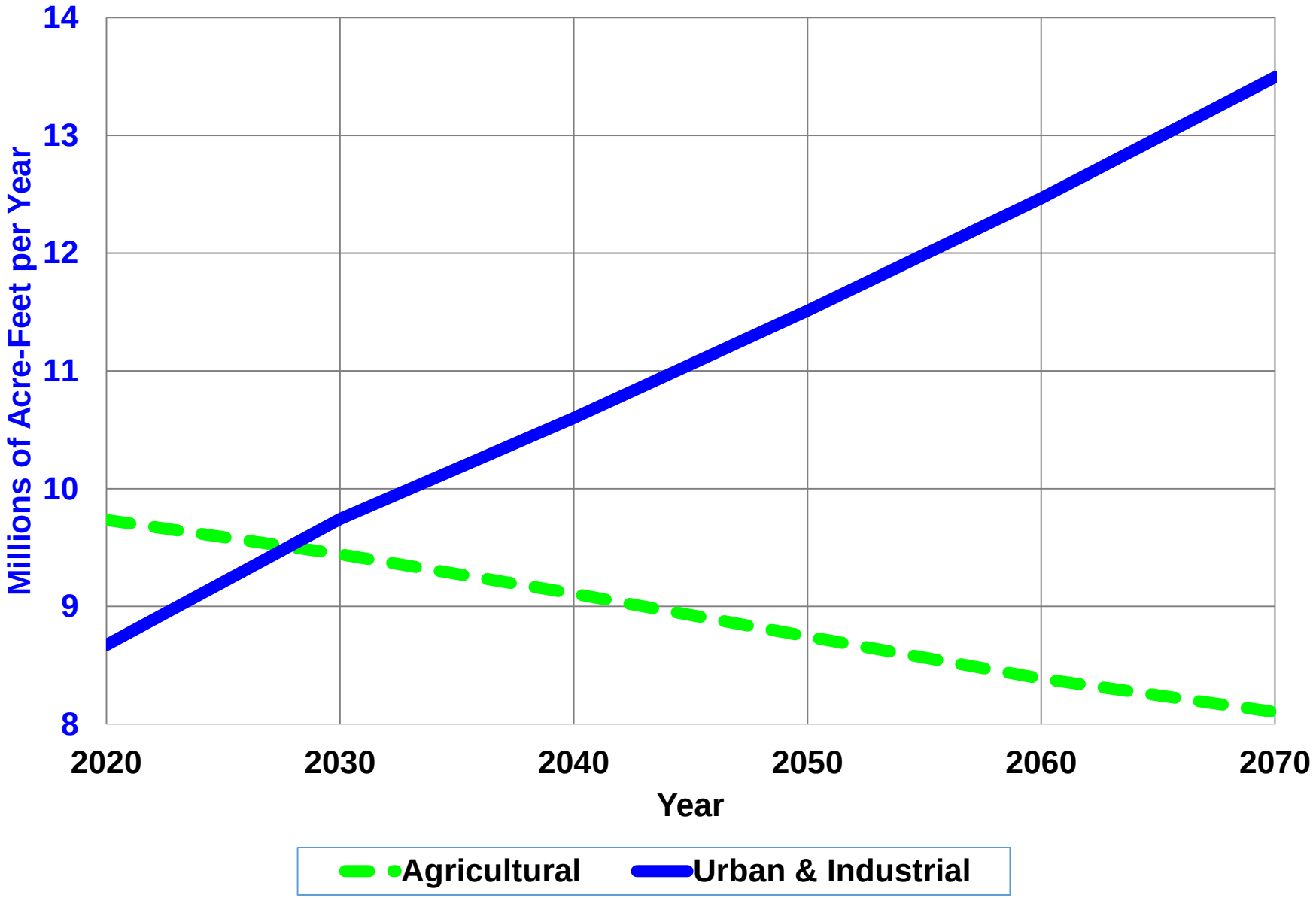


The Texas Example

Future Capital Cost Through 2070 in Texas

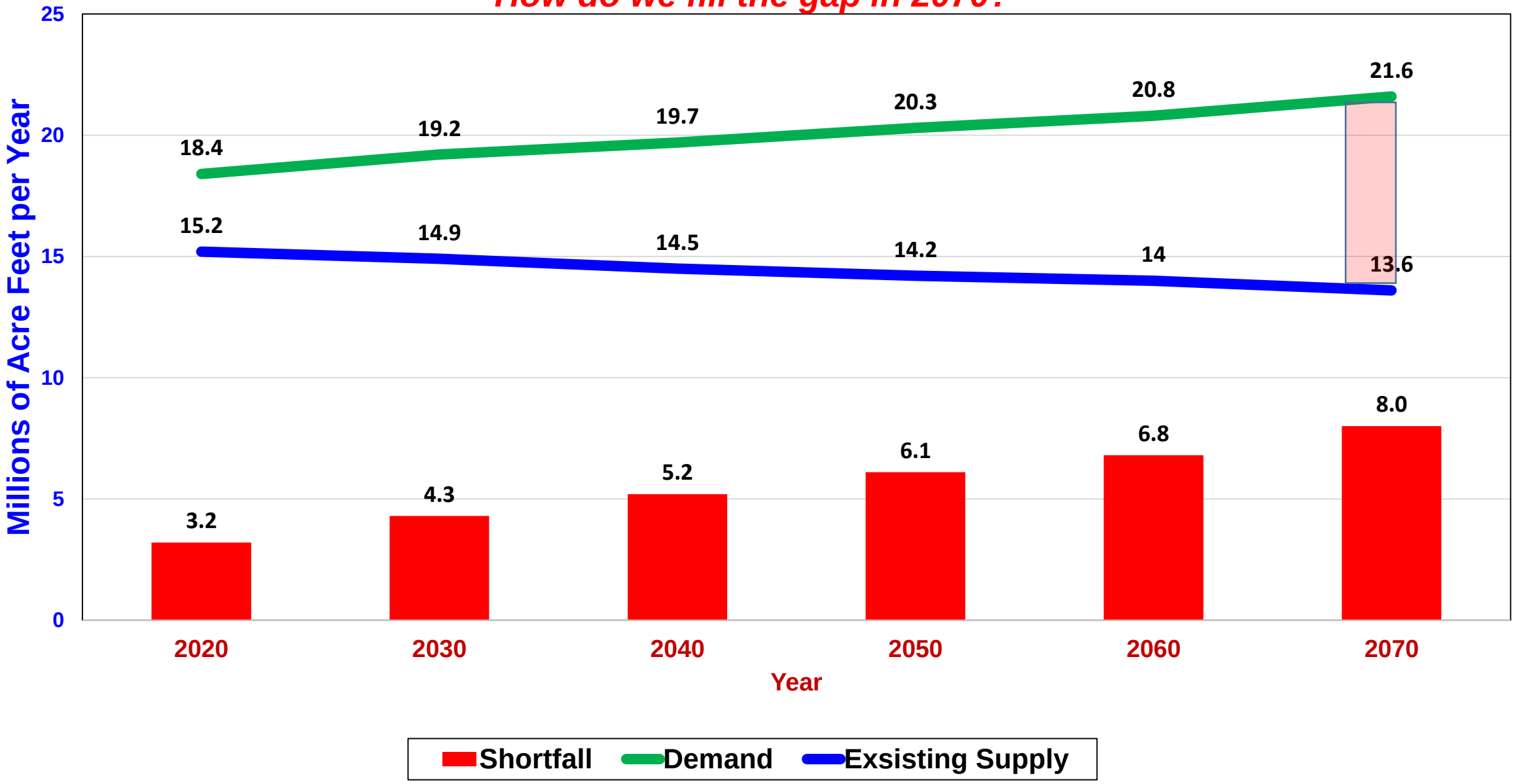
- **Total Future Capital Costs for Texas Water/Wastewater Related Resources = *$230 to $300 Billion***
- **75% to 80%** **of these costs *NOT RELATED TO NEW SUPPLY!***
- **New Supply** **is only about 20% to 25% of Future Capital Costs**
- **New Supply** **Costs = *$62.6 Billion***

Future Texas Water Use
2017 Texas Water Plan



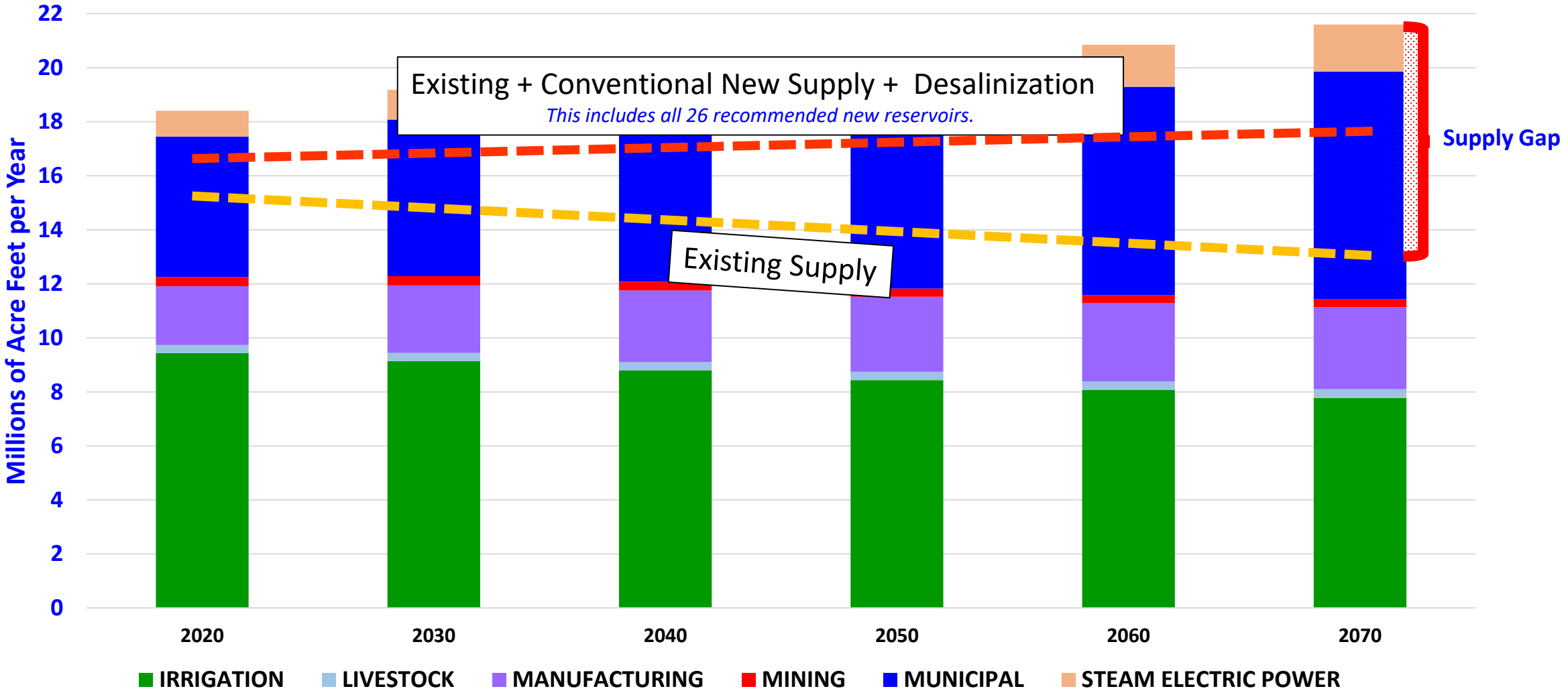
Total Demand, Existing Supply, & Shortfall in Texas

How do we fill the gap in 2070?

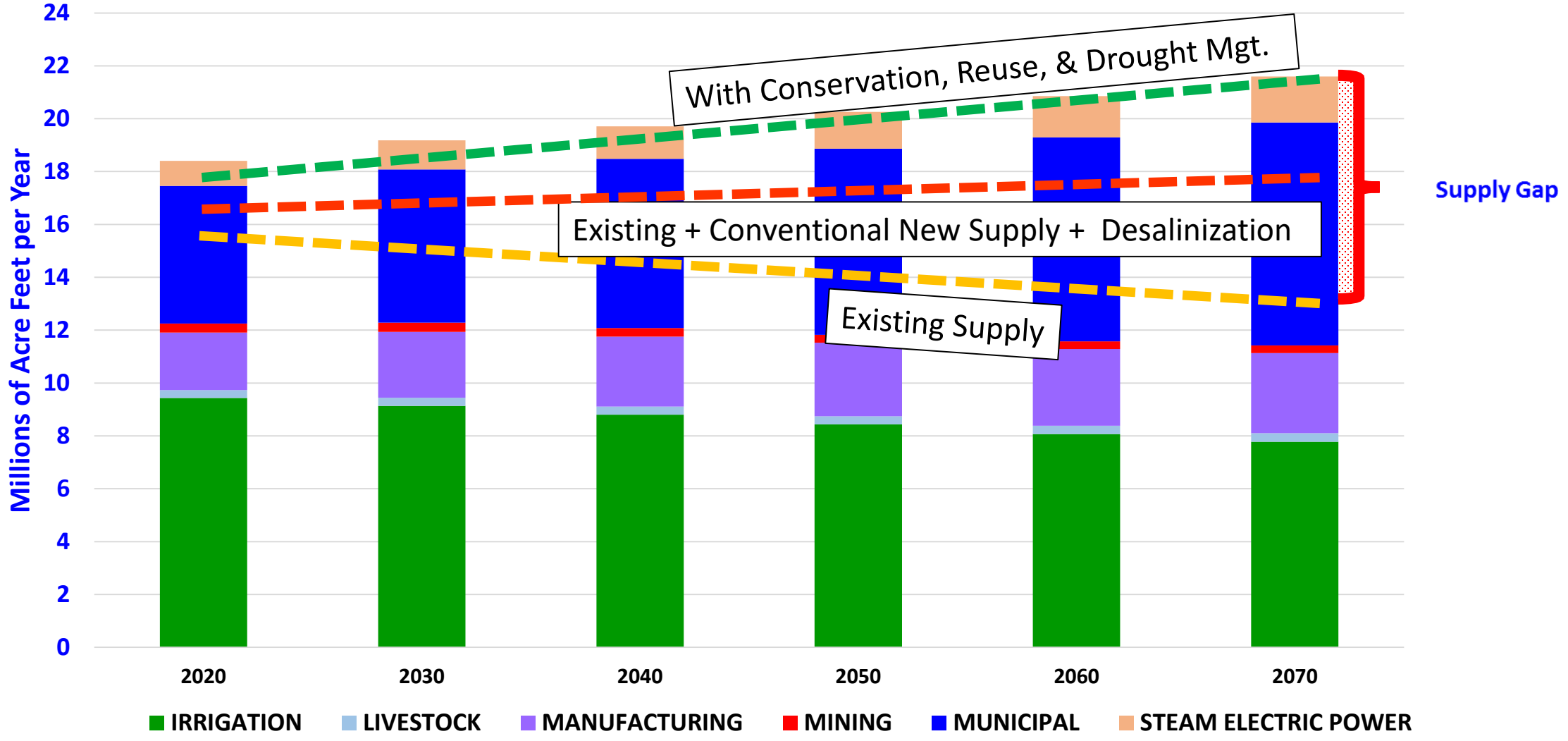


Texas Water Supply & Demand Projections

We are tapping our conventional supplies!



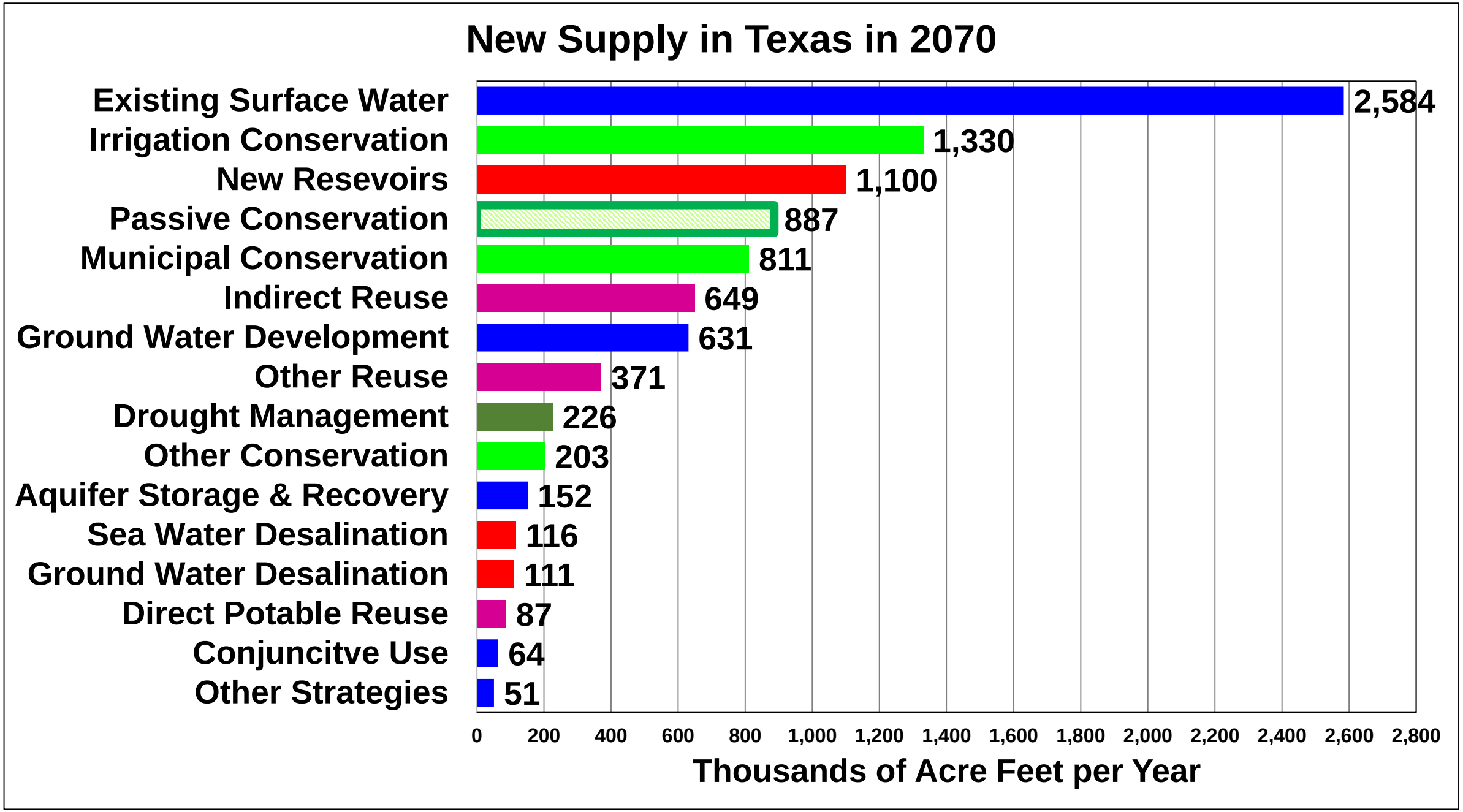
Texas Water Supply & Demand Projections
With Conservation, Reuse & Drought Mgt.



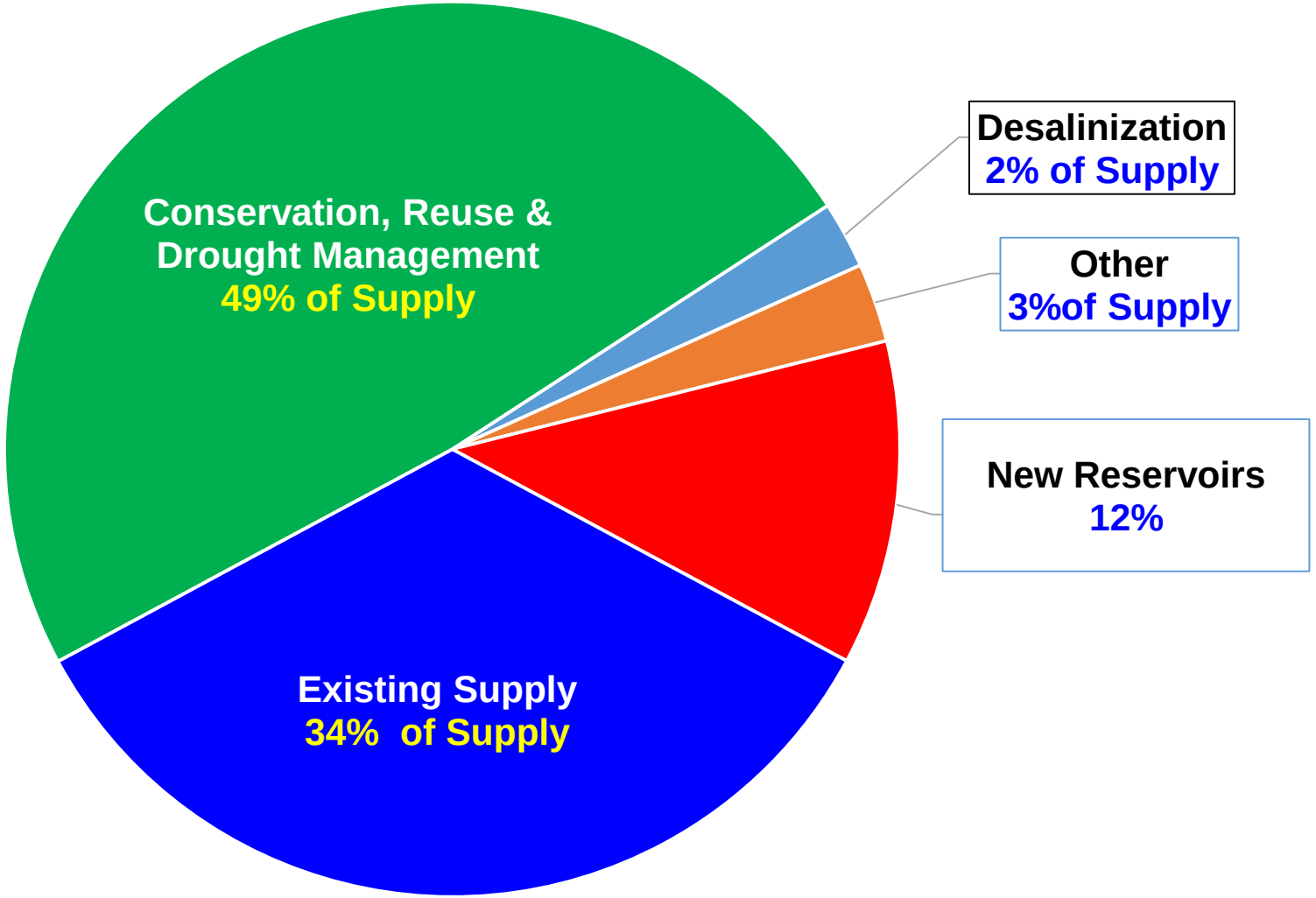
Passive Conservation Not in Supply Projections

2017 Texas Water Plan

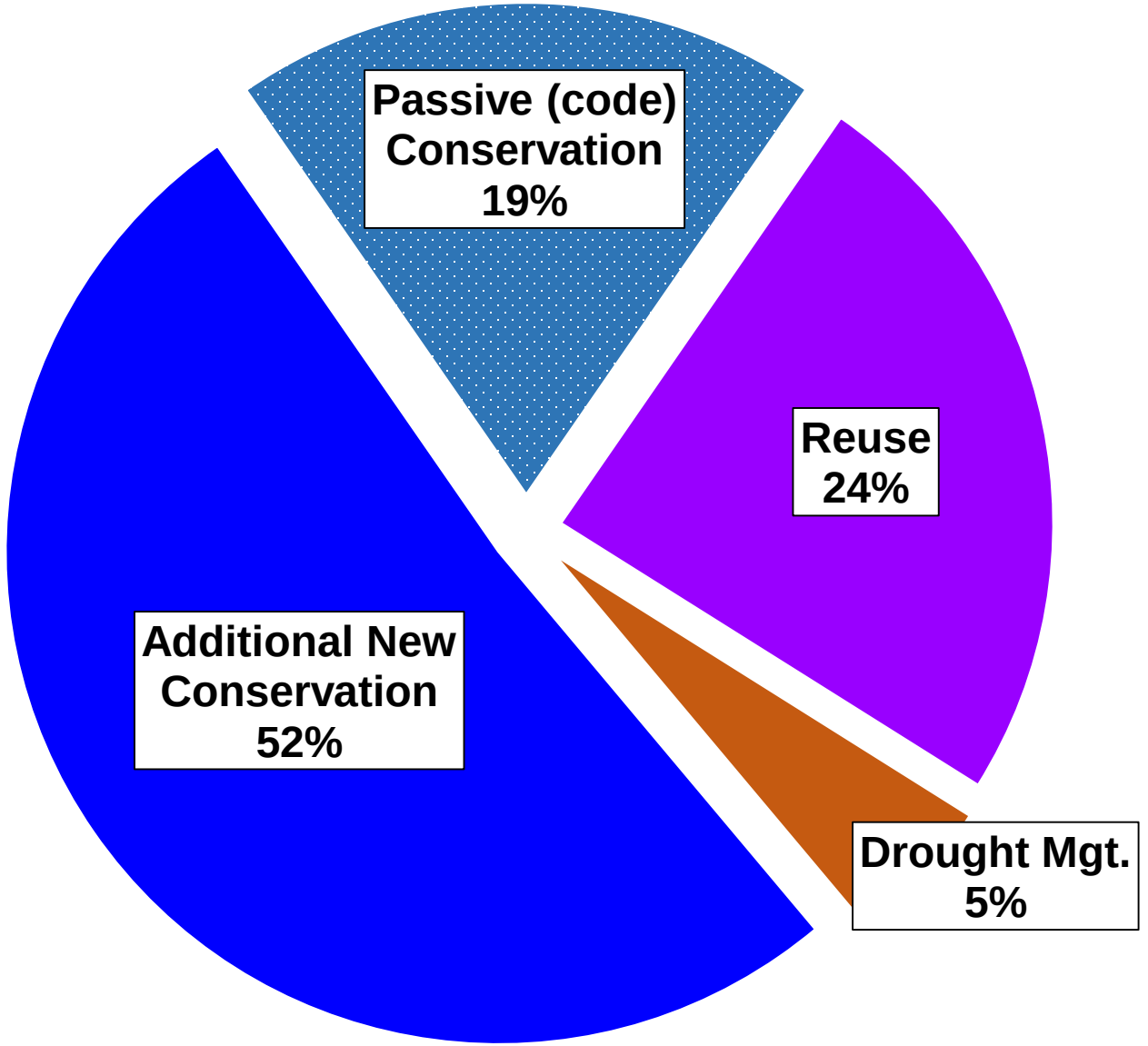
- **Passive conservation is conservation achieved by codes and standards.**
- **It is imbedded in the demand projections. I.E. passive savings are subtracted from the demand projections and does not show up as a supply.**
- **In 2060, passive savings are projected to be 887,000 acre feet.**


New Supply in Texas in 2070
Existing Surface Water
Irrigation Conservation
New Resevoirs
Passive Conservation
Municipal Conservation
Indirect Reuse
Ground Water Development
Other Reuse
Drought Management
Other Conservation
Aquifer Storage & Recovery
Sea Water Desalination
Ground Water Desalination
Direct Potable Reuse
Conjuncitve Use
Other Strategies
2,584
1,330
1,100
887
811
649
631
371
226
203
152
116
111
87
64
51
0
200
400
600
800
1,000
1,200
1,400
1,600
1,800
2,000
2,200
2,400
2,600
2,800
Thousands of Acre Feet per Year

Where Future Water Will Come From And its Capital Cost in Texas in 2070

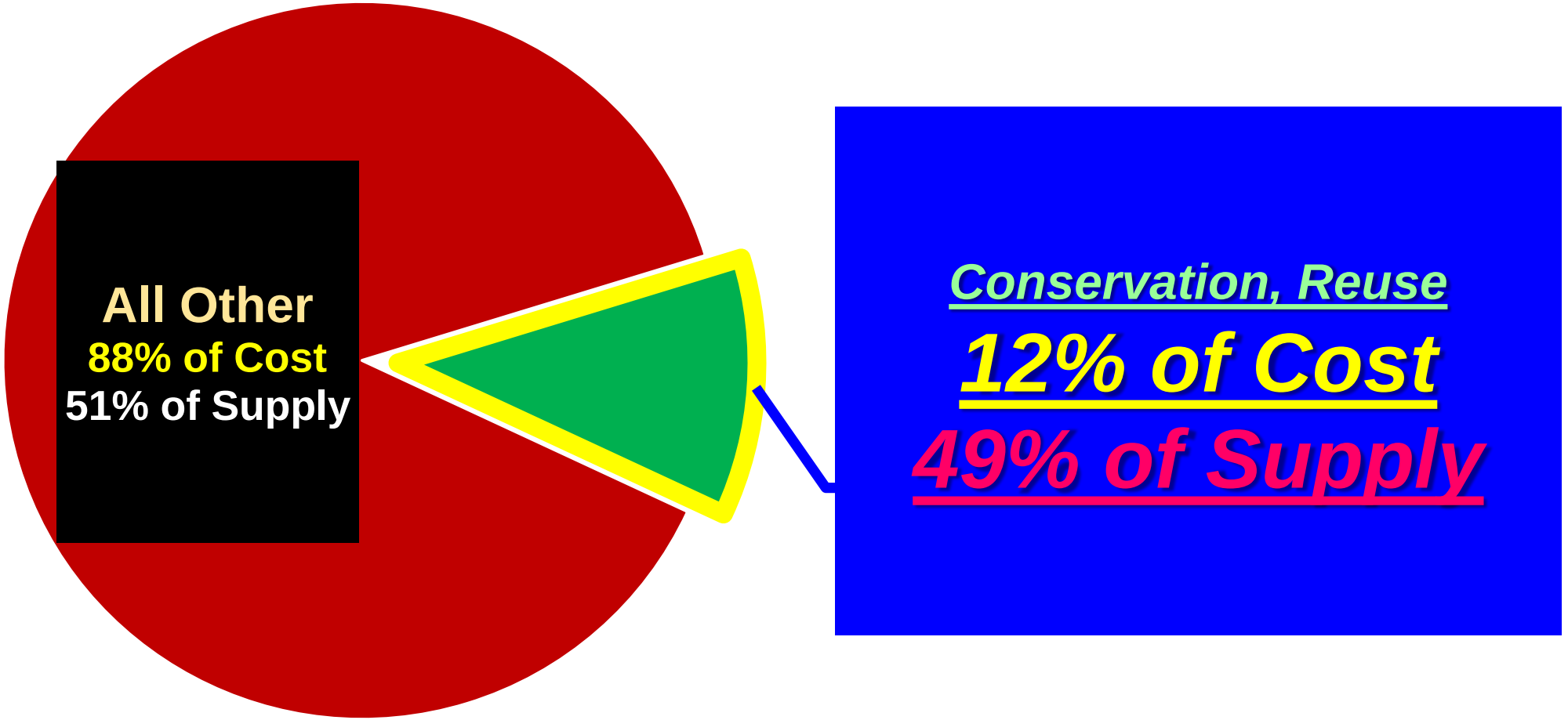


Conservation, Reuse, and Drought Management Provide 4.56 Million Acre Feet of Supply in 2060



Capital Cost of Future Projects in 2017 Texas Water Plan - $62.6 Billion

http://www.twdb.texas.gov/waterplanning/swp/2017/index.asp

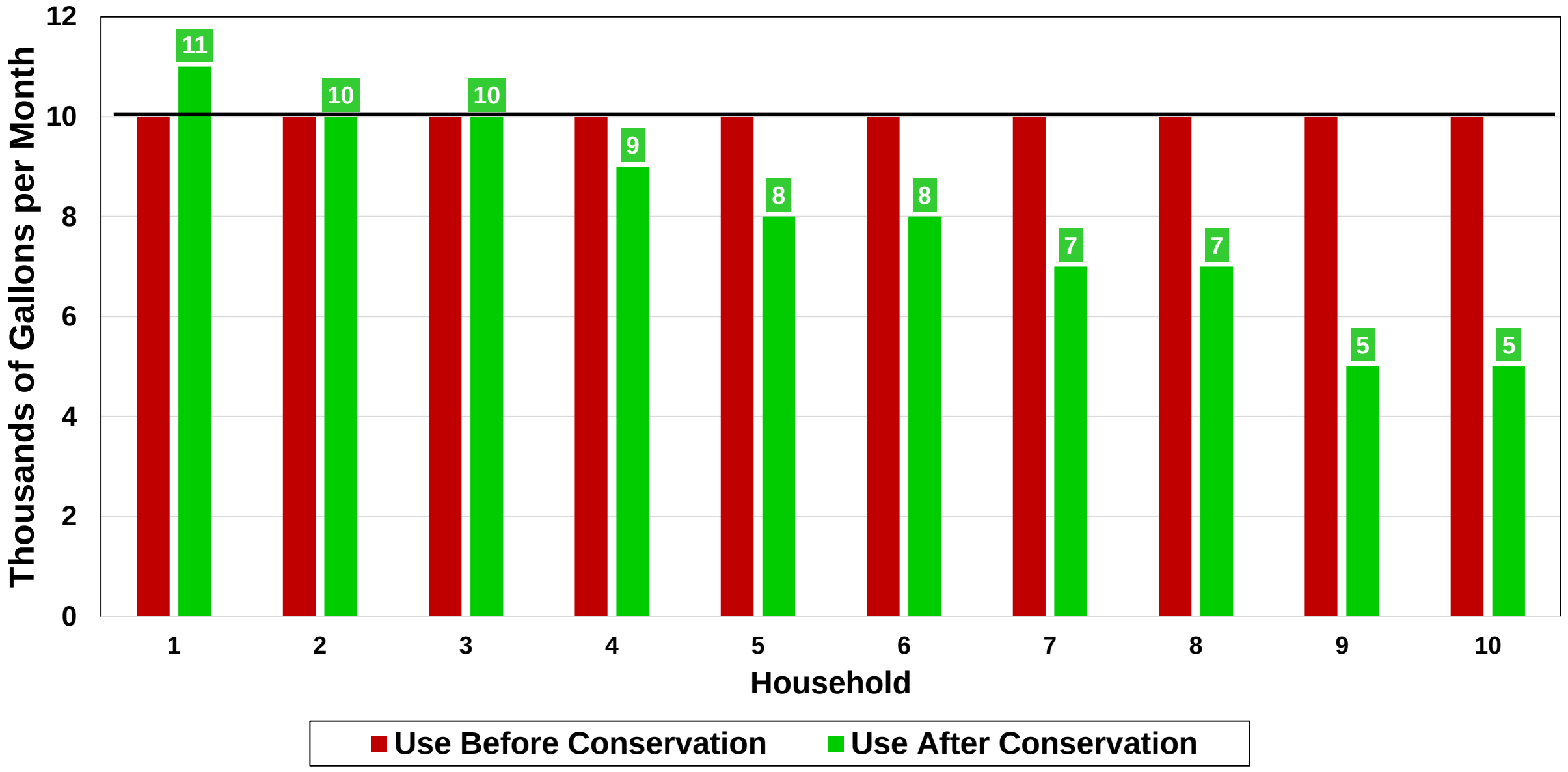


The Cheapest Water You Will Ever Have Is The Water You Already Have!

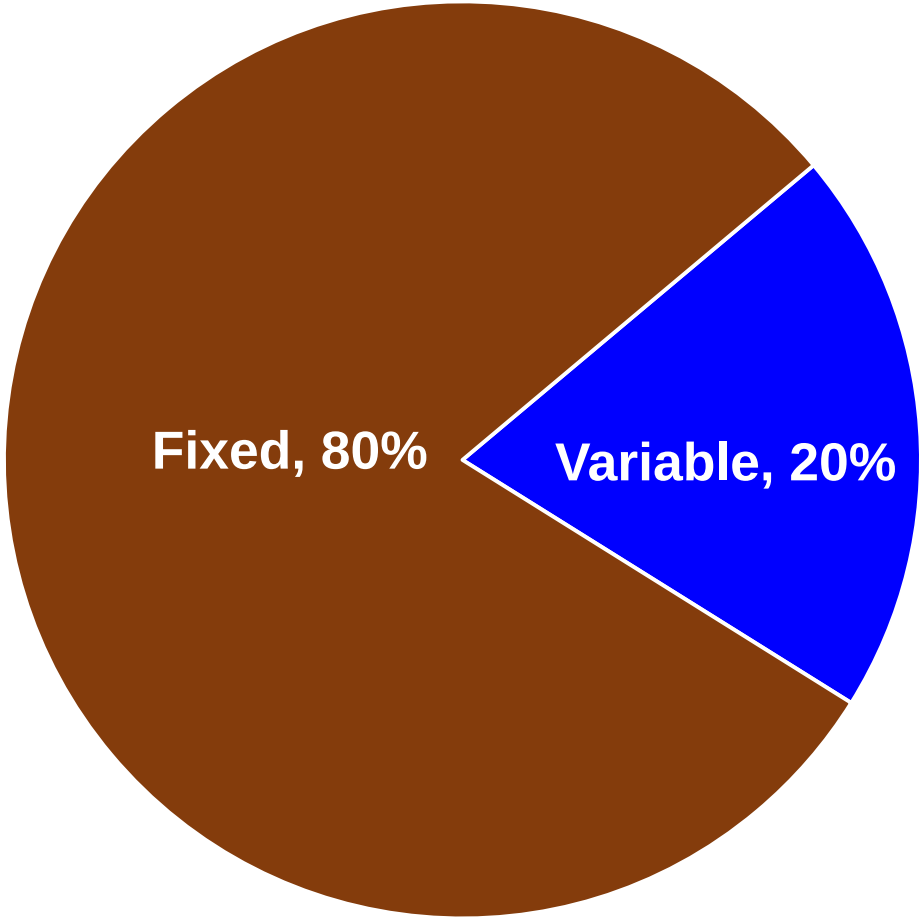
10 Homes in a Hypothetical City

Hypothetical Household Use for 10 Houses

Average Use - 10Kgal/Month Before - 8 Kgal/Month After

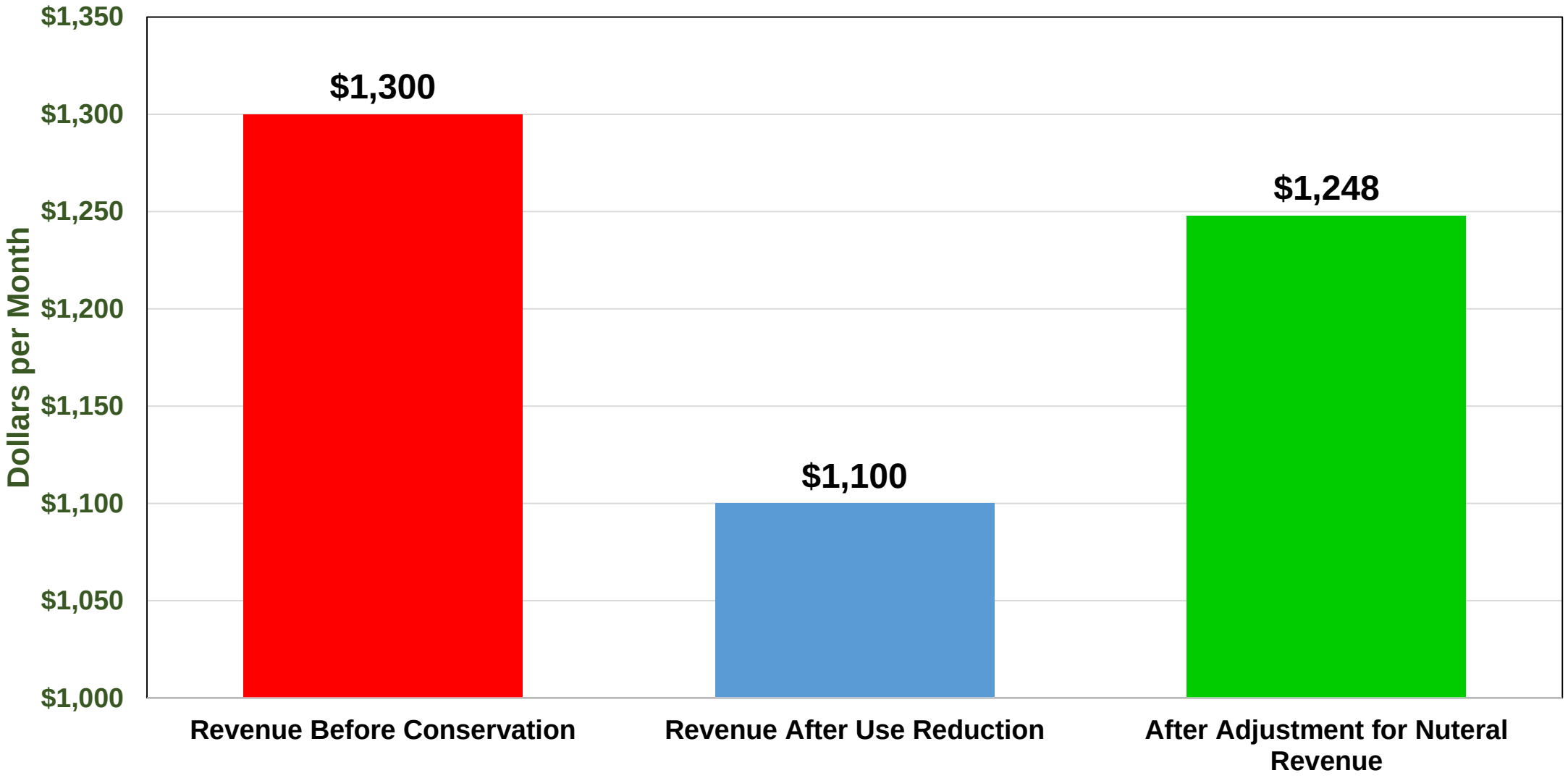


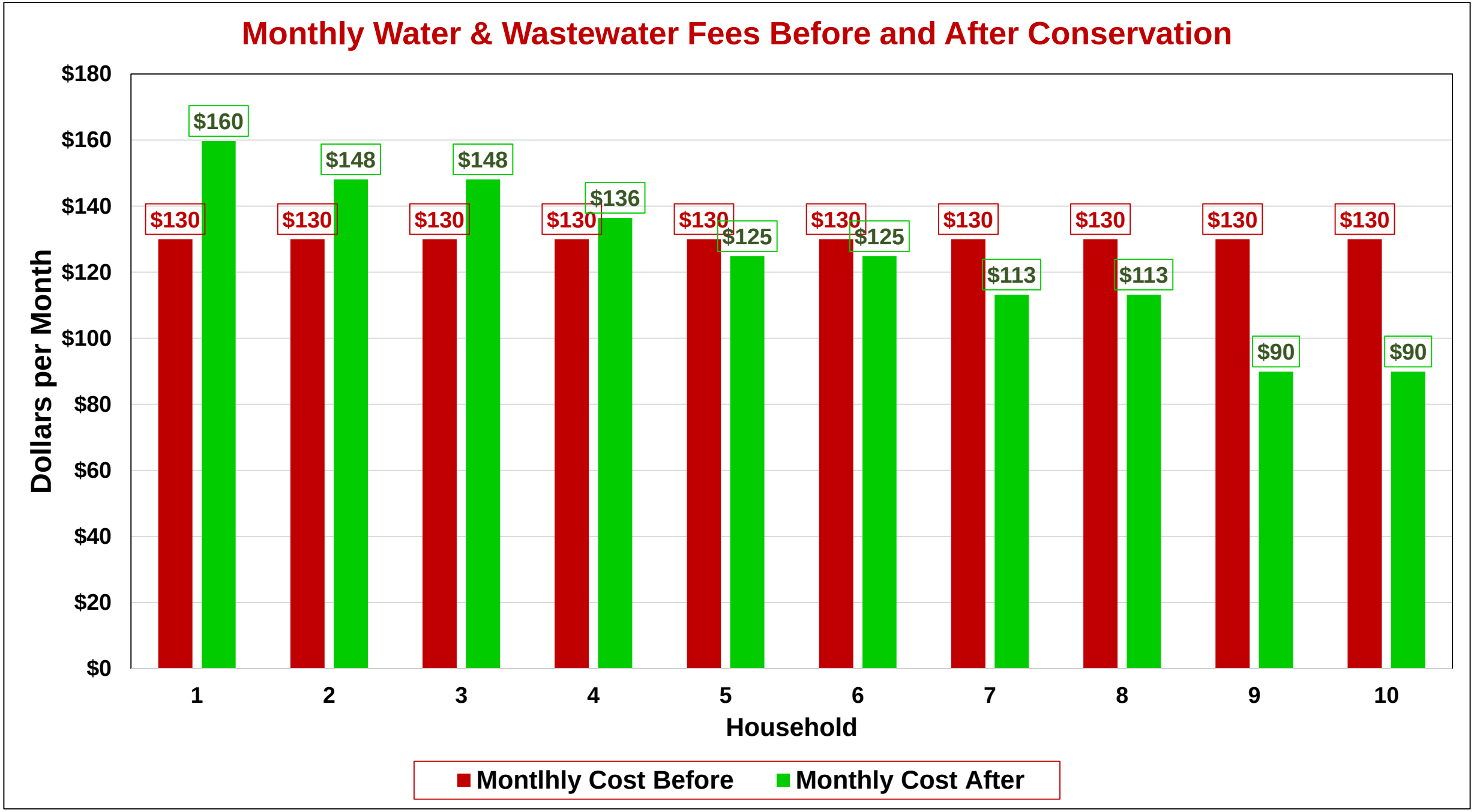
Typical Utility Water/Wastewater Cost Breakdown



Impact of Conservation on Revenue from 10 Homes

A $52 per Month Savings




Monthly Water & Wastewater Fees Before and After Conservation
$180
$160
$140
$120
$100
$80
$60
$40
$20
$0
Dollars per Month
$130
$160
$130
$148
$130
$148
$130
$136
$130
$125
$130
$125
$130
$113
$130
$113
$130
$90
$130
$90
1
2
3
4
5
6
7
8
9
10
Household
Montlhly Cost Before
Monthly Cost After

SO WHAT DOES THIS MEAN?

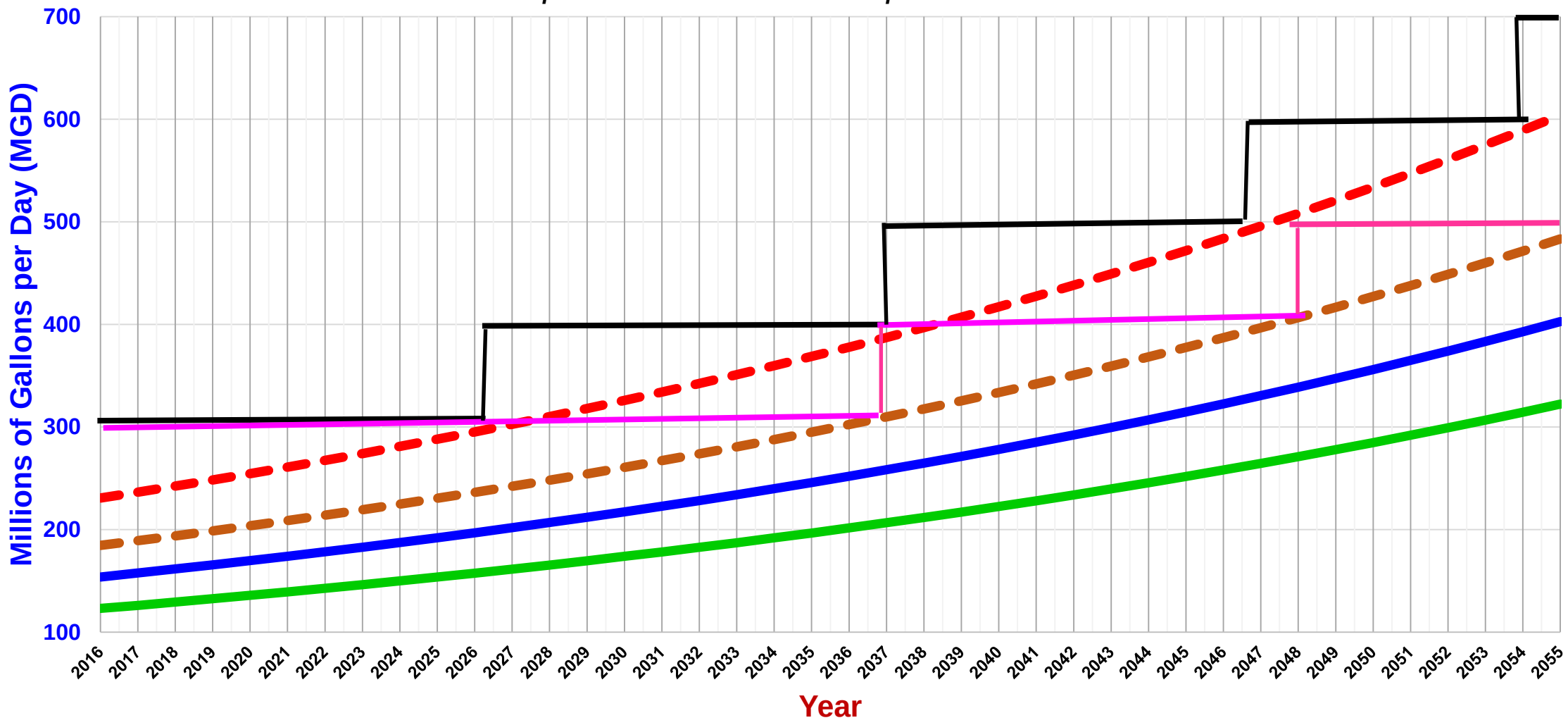
- **Those who did not conserve pay more.**
- **Those who do a good job pay less – *some way less.***
- **Total *bills* are actually *reduced* even though rates are higher and total revenue demands WENT DOWN!**
- **AND THE TOTAL CHARGE FOR WATER SERVICE TO THE 10 HOMES WAS *REDUCED* BY *$52* A MONTH!**

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

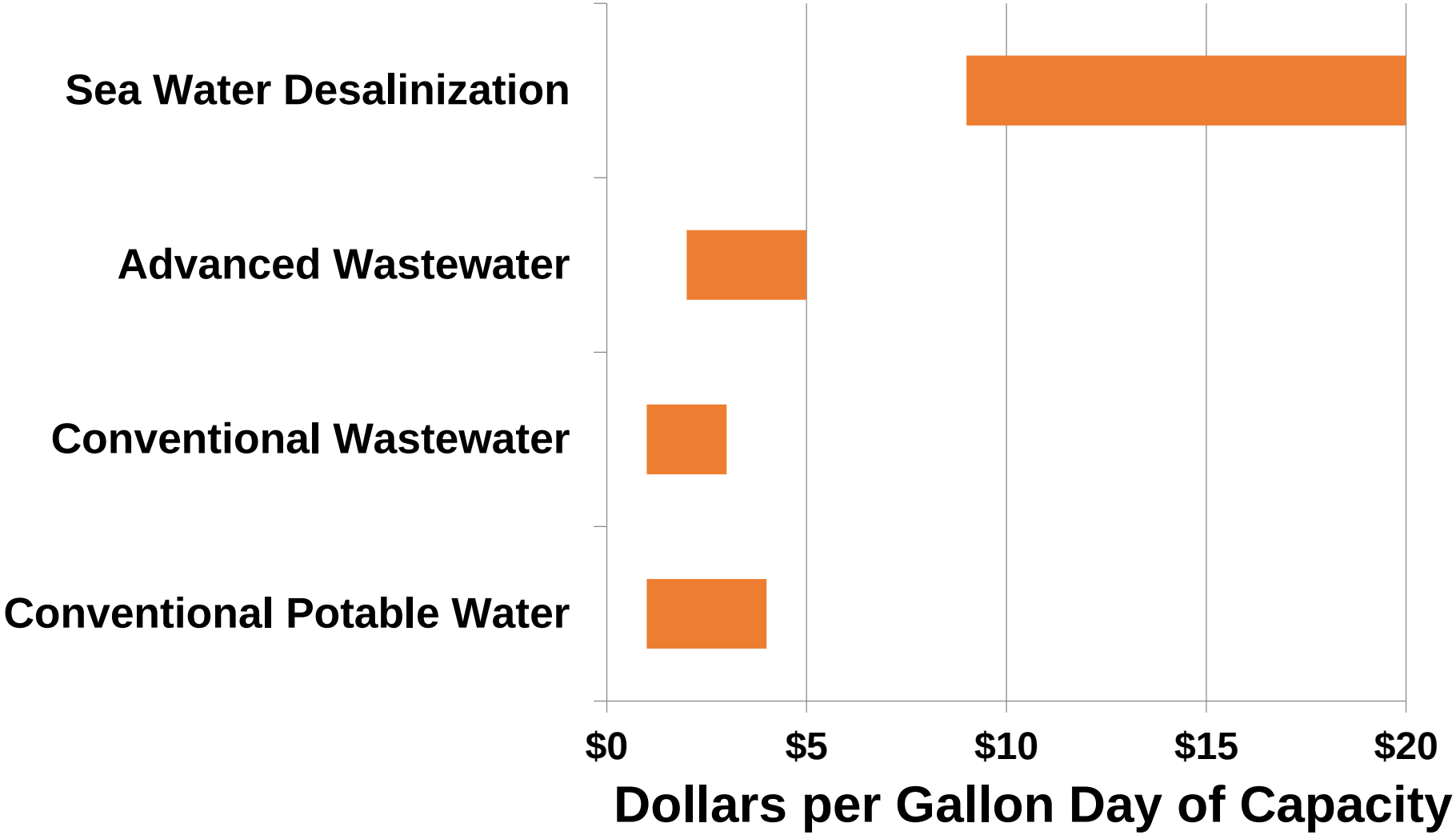
Water Treatment Capacity Impacts

Future Expansions of Water Treatment Capacity if Utility Population Grows at 2.5% a Year

4 expansions no conservation - 2 expansions with conservation



Capital Cost of Water and Wastewater Treatment



That is a $300 Million to $800 Million Dollar Capital Savings by not having to build 200 MGD of capacity and expanded supply!

Conservation Delays Future Capital Investment Needs.

The Bottom Line!

With Conservation & Reuse

1. **We get more economic expansion on the same infrastructure;**

2. **Delay when politically sensitive bond elections must be held;**

3. **Reduce future costs;**

4. **Keep rates as low as possible.**

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

An example of things to come.

Failure to Conserve & Reuse will leave us hanging out there!

Questions?

A Perspective on Texas' Water Future

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