Energy Use at Municipal Wastewater Plants

James W. Grassiano, P.E.
Alabama Department of Environmental Management

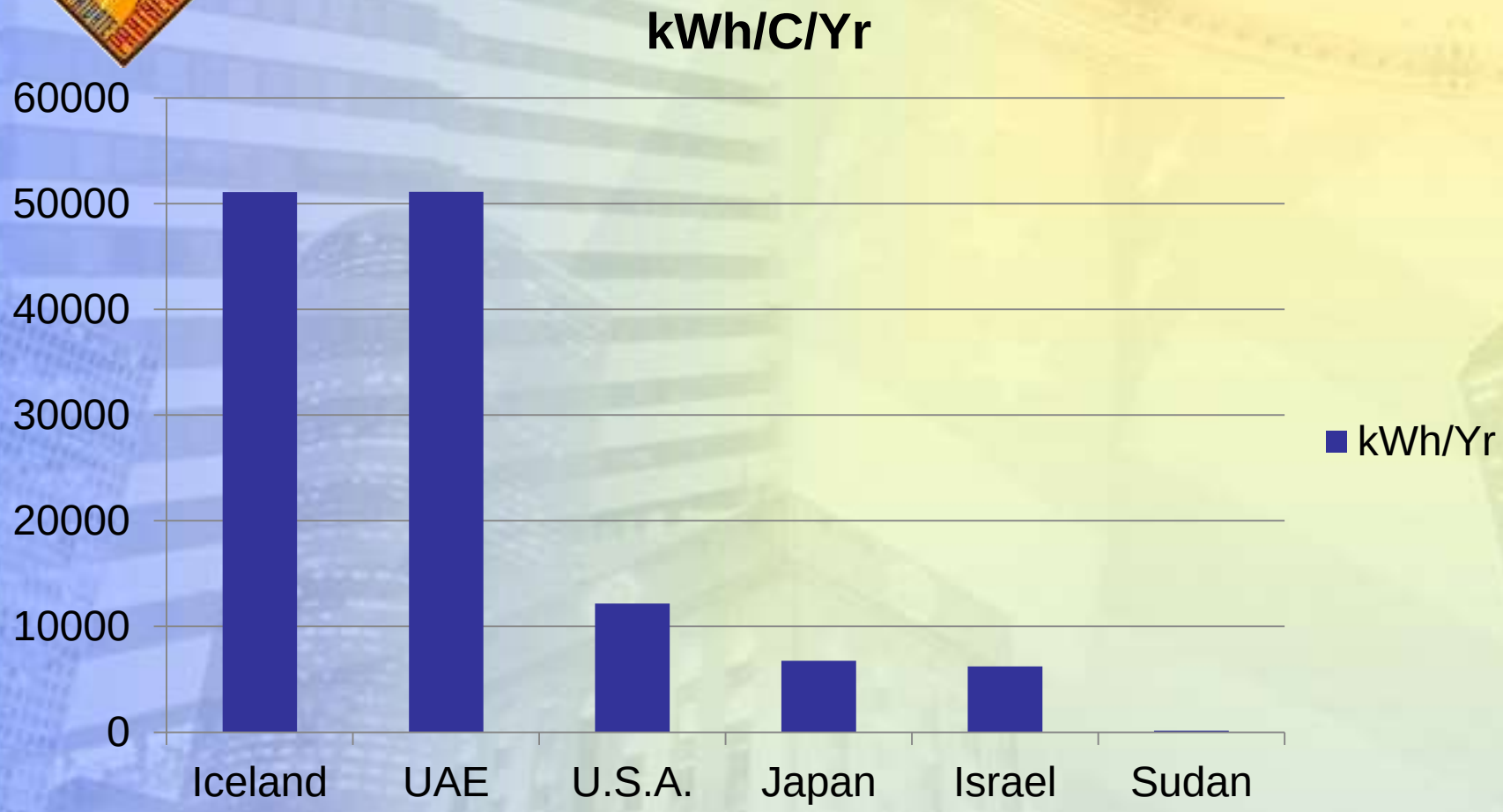
Power Usage in an Average U.S. Household

- In 2014: 10,932 kWh/Year
  (Per person or per capita)

- Source: U.S. Energy Information Administration

https://www.eia.gov/tools/faqs/faq.cfm?id=97&t=3

How is Our Country Doing?



http://www.indexmundi.com/g/r.aspx?v=81000

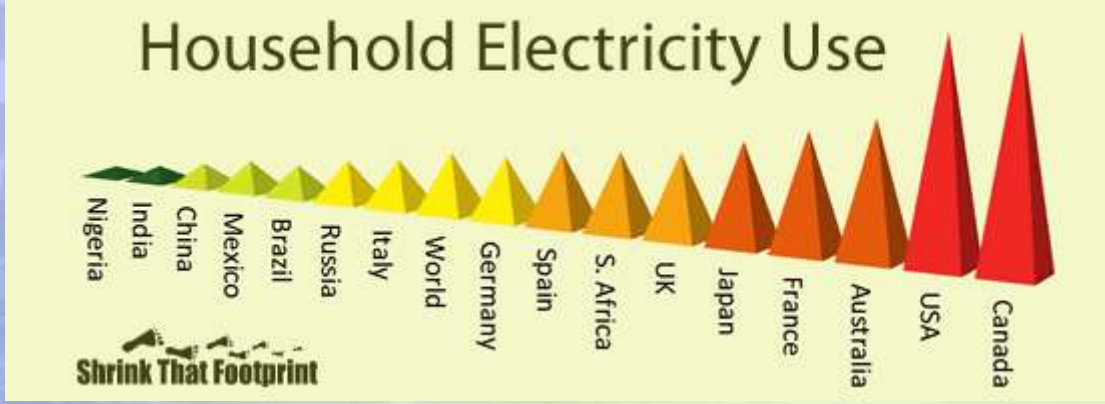
So, how much Energy do we use here in AL??

- **In Alabama --- About 17,300 kilowatthours (kWh)/person/year**
- Wyoming: **27,457 kWh/c/year**
- California: **6,721 kWh/c/year**

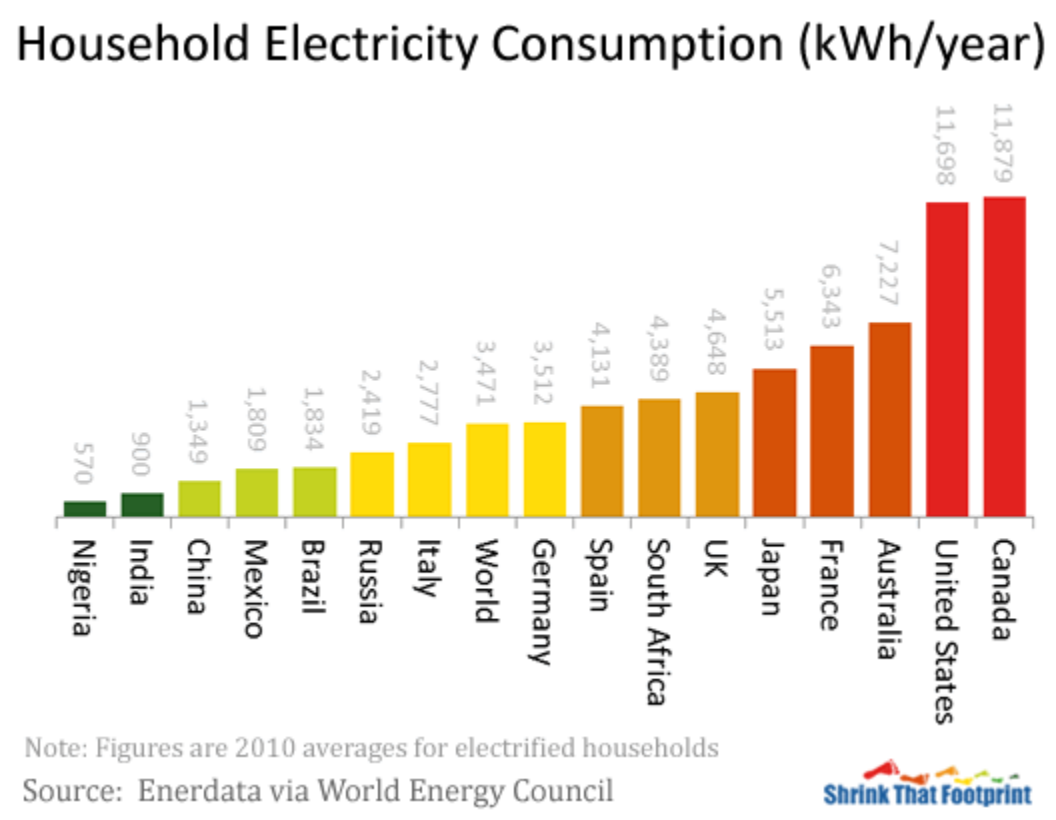
- **Source: http://www.eia.doe.gov/Ftproot/pub/electricity/f8262010.xls**

Regardless of the Information Source…

The overall power use pattern and values are very similar.

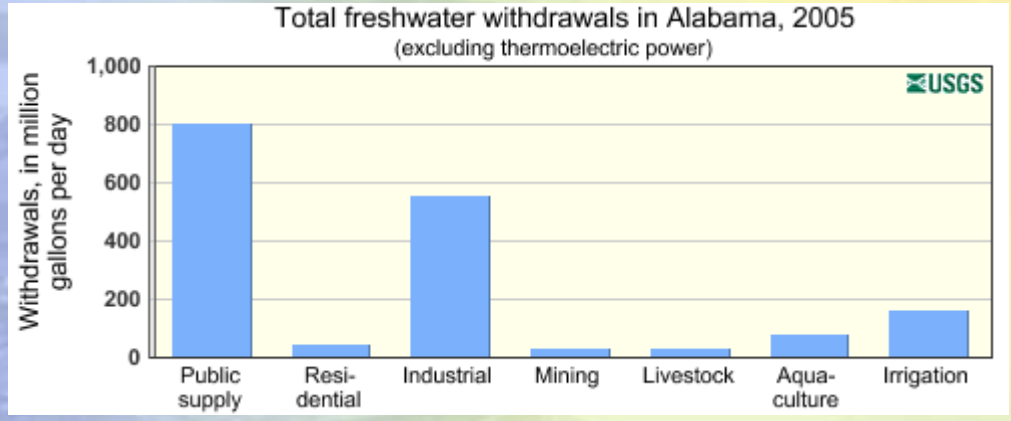


Regardless of the Information Source…



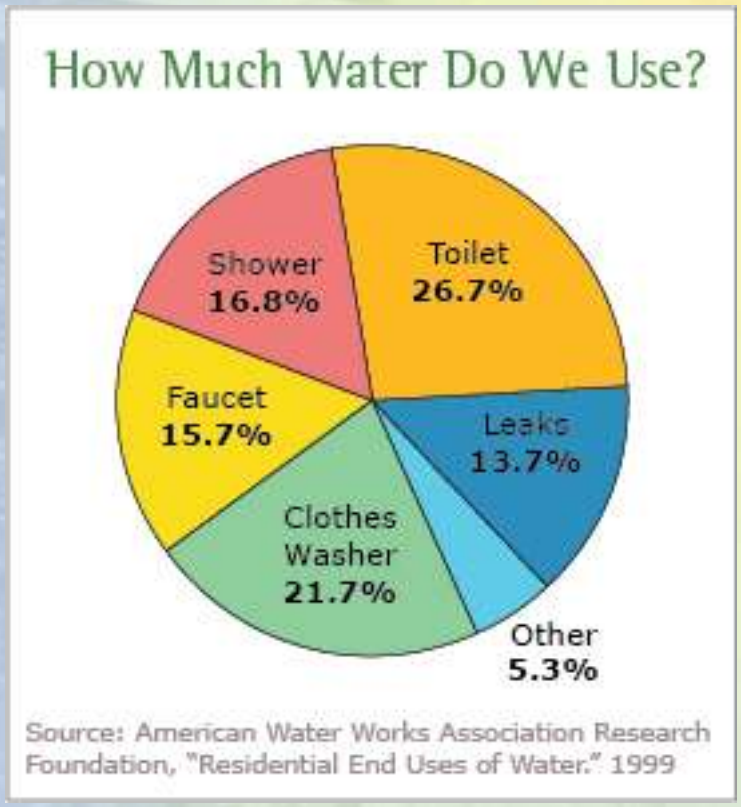
These values are pretty accurate…

Public Water Supply Uses In Alabama



http://al.water.usgs.gov/infodata/wateruse.html

Pumping Water is a BIG user of energy



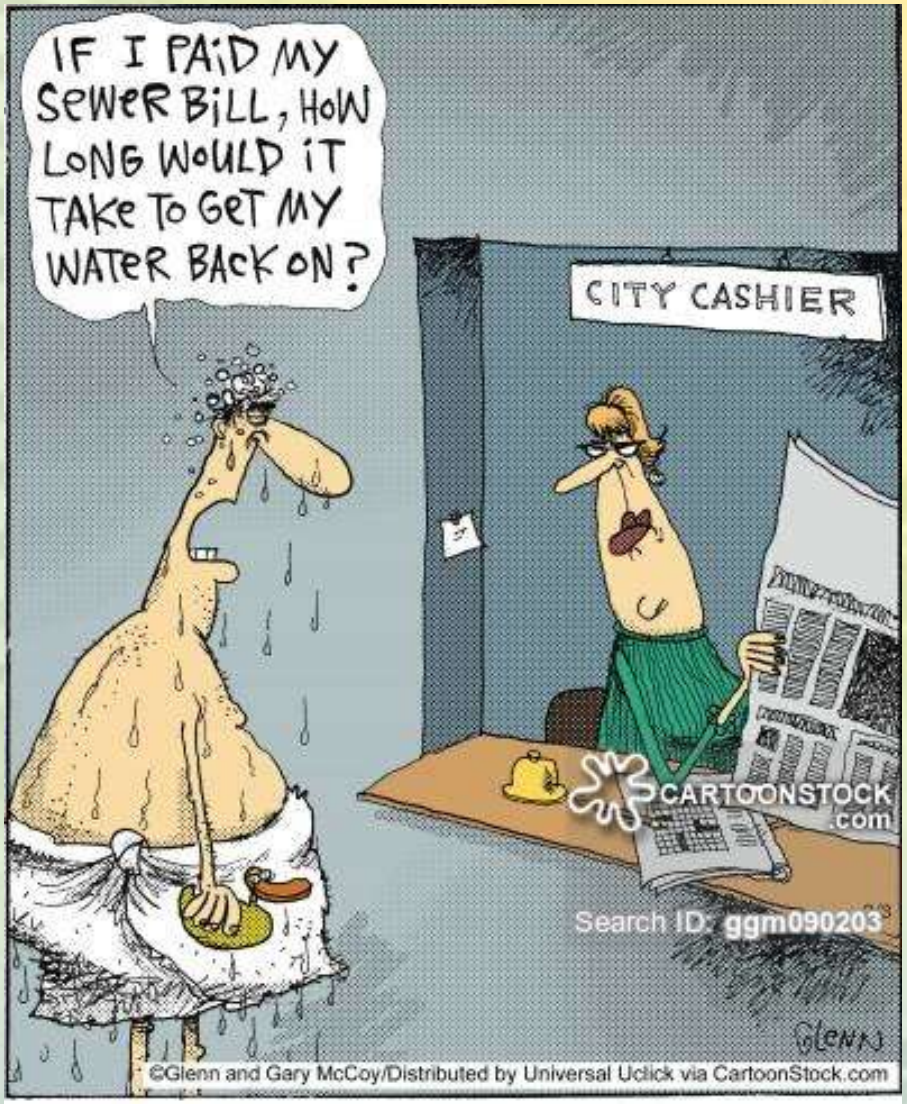
Water & Wastewater Electricity Costs

- Electricity use:
  - 25 to 40% of operating budget for wastewater utilities
  - 80 % of operating budget for drinking water treatment & distribution systems
- Energy use by Water & Wastewater Plants accounts for 35% of municipal energy budgets

Source: *Energy Efficiency in Water & Wastewater Utilities*, EPA, 2013

Wastewater Treatment

More than just
a reason to pay
a sewer bill.



Quiz

- When was the first wastewater plant installed in the U.S
  - 1827
  - 1887
  - 1907
  - 1937

Quiz

- When was the first biological wastewater treatment plant installed in the U.S.?
  - 1851
  - 1867
  - 1901
  - 1937

Quiz

- First high rate biological wastewater treatment plant in the U.S.??

  [First “Activated Sludge Plant]

  - 1900
  - 1916
  - 1935
  - 1947

Wastewater Plant Optimization Project

- ADEM and EPA Reviewed about 25 wastewater plants in Alabama in 2014/2015
  - Detailed energy use assessment
  - Detailed review of all plant equipment
  - Detailed review of all plant operations
- We recommended changes to plant operation & equipment to save energy $$

Wastewater Operators

It’s not really like that…

- Very technical
- Truly a profession requiring special skills
- Quite a lot of science behind what happens when you flush. ☺

We Identified…

- Most wastewater plants can make significant changes to plant operations
- These changes would save a great deal of money
- Optimizing the plant actually improves the quality of treated effluent
- [i.e., Produces CLEANER water]

Mr. Floatie

Beloved mascot in Seattle. Involved in a push to get neighboring Victoria BC to stop pumping raw sewage into the Strait of Juan de Fuca. Free Floatie to the person who guesses when this treatment system was installed.

Trick Question..!

The man behind the movement…

A typical Wastewater Plant in Alabama

	kWh/Mo	kWh/Million Gal	Optimized Cost Savings **
Sheffield	82,500	1,800	$1,000/Month
Alex City	350,000	9,700	$9,000/Month
Atmore	182,000	4,700	$4,000/Month
Wetumpka	230,000	5,100	$5,000/Month

** Monthly cost savings after ADEM/EPA plant optimization completed

Implementing the Changes

- Takes a different mindset
- Takes greater operator control
- But, Alabama's Certified Operators are proud to do the best job they can and they ARE optimizing their plants!

Challenges

- “No one cares about wastewater”
- We don’t ever see our power bill
- If we go to all of this trouble and save $$, City managers will just waste it on a pet project

Lessons Learned

- Appreciate your Water and Wastewater Operators. They do great things to protect public health.

- Operators CAN save the City/Utility Board a LOT of money by optimizing their plants

- Plant Optimization keeps utility rates lower (and produces cleaner effluent)

Energy Performance Contracting Potential

- EPC has potential cost advantages at Wastewater Plants
- Main opportunities for savings:
  - Optimizing plant aeration
  - Optimizing anaerobic digesters
  - Biogas generation and re-use
  - Cogeneration/Combined Heat & Power

Questions

Jim Grassiano

ADEM

334-279-3071

jgrassiano@adem.state.al.us

Alabama Department of Environmental Management