



G R E S H A M
S M I T H A N D
P A R T N E R S

Riding the Green Energy Wave – How to Hang 10 and Not Wipeout

TAUD Business EXPO

Property of Gresham, Smith and Partners





- Establish Understanding of Water Usage Trends
- Identify the Residual Effects of Water Conservation
- Present Energy Efficiency Solutions for Utility Operations
- Becoming “Green” is merely being a part of lessening the stress on our natural resources; accomplished primarily through energy efficiency methods and green energy solutions

- 97.5% of the water on Earth is salty; remaining 2.5% is fresh water (9.25M trillion gallons)
- Fresh water breakdown: 69.6% frozen (6.4M trillion) / 0.3% free flowing (0.05M trillion) / 30.1% groundwater (2.M trillion)
- Two thirds of our water is used to grow food
- 83 million people are added to the Earth each year
- The weight of water in China's Three Gorges Reservoir will tilt the Earth's axis by one inch
- New York City water supply tunnel over 85 miles leaks 35M gal/day; supply reservoirs hold 580B gallons
- Swimming pools lose 150B gallons to evaporation each year
- Golf Irrigation requires 2B gallons each day

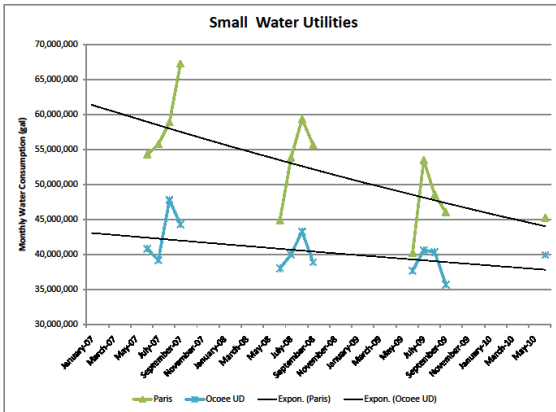
- LEED Certified buildings
 - Water Conserving Fixtures
 - Toilets, sinks, shower heads, washing machines, dishwashers
 - Stormwater Management
 - Reducing / treating runoff
- Rain Barrels
 - TN Residence: 2,000 ft² roof can yield 50k gal/year
- Reclaimed Water Systems
 - Public Utilities
 - Treated Wastewater Effluent
 - “Toilet to Tap”
 - “Purple Pipe” Reuse





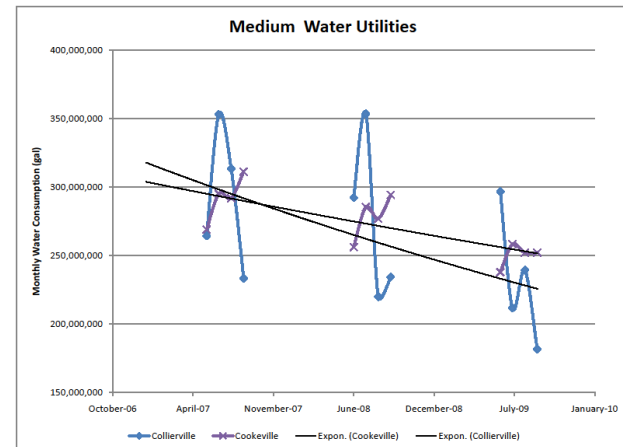
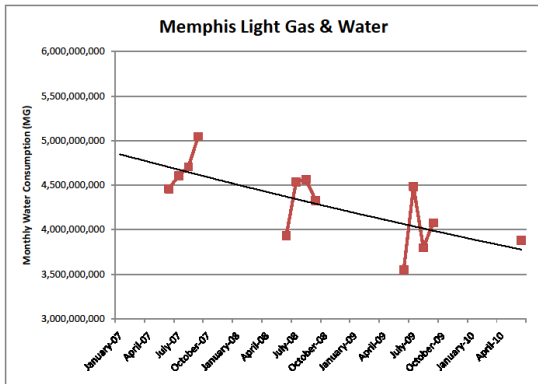
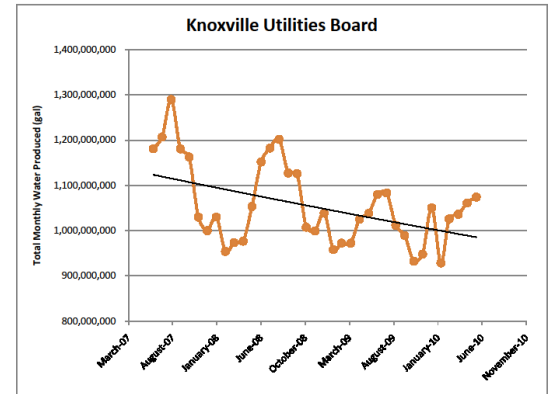
- Reclaimed Water Systems (cont'd)
 - Commercial / Industrial Facilities
 - Water Harvesting / Artificial Shallow Aquifers
 - Catchment Systems
 - Roofs
 - Parking Areas
 - Grey Water Systems

Water Usage Trends Across Tennessee



**June 2007-
June 2010**

**Economic?
or
Climatic?
or
Conservation?**



Effects of Reduced Water Usage on Water Utilities



Do the benefits outweigh the costs?

- Benefits

- Smaller Peak Demands
 - Reduces System Operation Costs
- Energy Savings
- Longer Equipment Life
- Capacity Threshold Extended
 - Asset useful life increased

- Costs

- Decreased Revenue
- Existing Oversized Distribution Systems > Additional Line Flushing



Retrofitting existing equipment with more efficient components may not be technically or financially feasible.

- Be aware and ready when situations do arise where energy efficient change outs can be a cost effective solution.

- Pump replacement

- Check operating conditions to ensure pump is operating as designed
- Add VFD controls to improve operation efficiency



- Adding SCADA monitoring stations

- Is solar power feasible?

- Water Storage Tank Mixers

- Is a solar powered mixer feasible?



- 4% of US power generation is used for water supply and treatment
 - Electricity represents ~75% of the cost of municipal water treatment and distribution
- Electricity providers are experiencing same conservation trends
 - Decreased revenues
 - Raising rates to cover debt service on existing infrastructure
 - Effects of proposed legislation
 - Cap and trade

- 5 Major Steps for Utilities
 - Energy Audits
 - Where is the power going?
 - Power monitoring
 - Understanding demand rates
 - Benchmarking
 - USEPA Energy Star tool
 - Optimizing Treatment Processes
 - Instrumentation to add flexibility
 - Distribution Operations
 - Pump scheduling



- Water will continue to be a valuable resource
 - Water and energy conservation are here to stay
 - TN WRTAC Goals & Principles Established
 - Limitations on surface water withdrawals; push for regionalization planning
 - Groundwater solutions in southeast; high to medium recharge rate

- Water & Sewer Utilities will need to adapt their rate structures to match future demands so as to address:
 - Aging infrastructure
 - Stricter regulations



Barron and Boyer(May/June 2010). Reducing Energy Cost in Water Utilities. *Water Utility Infrastructure Management*.

Biel and Inman(2010). Energy Optimization for Water Systems. *AWWA Journal*, Vol. 102, No. 6

Water: Our Thirsty World; Special Issue. *National Geographic*, April 2010

QUESTIONS?

