American Water Works Association

Coping With an Increase in Energy Usage at Drinking Water Facilities

Cynthia Lane
American Water Works Association
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Today's Presentation

- Energy usage at drinking water utilities
- Data sets:
  - Annual O&M expenses
  - Cost comparisons
  - Detailed energy usage
- Utility case studies
- Risks and benefits of energy optimization

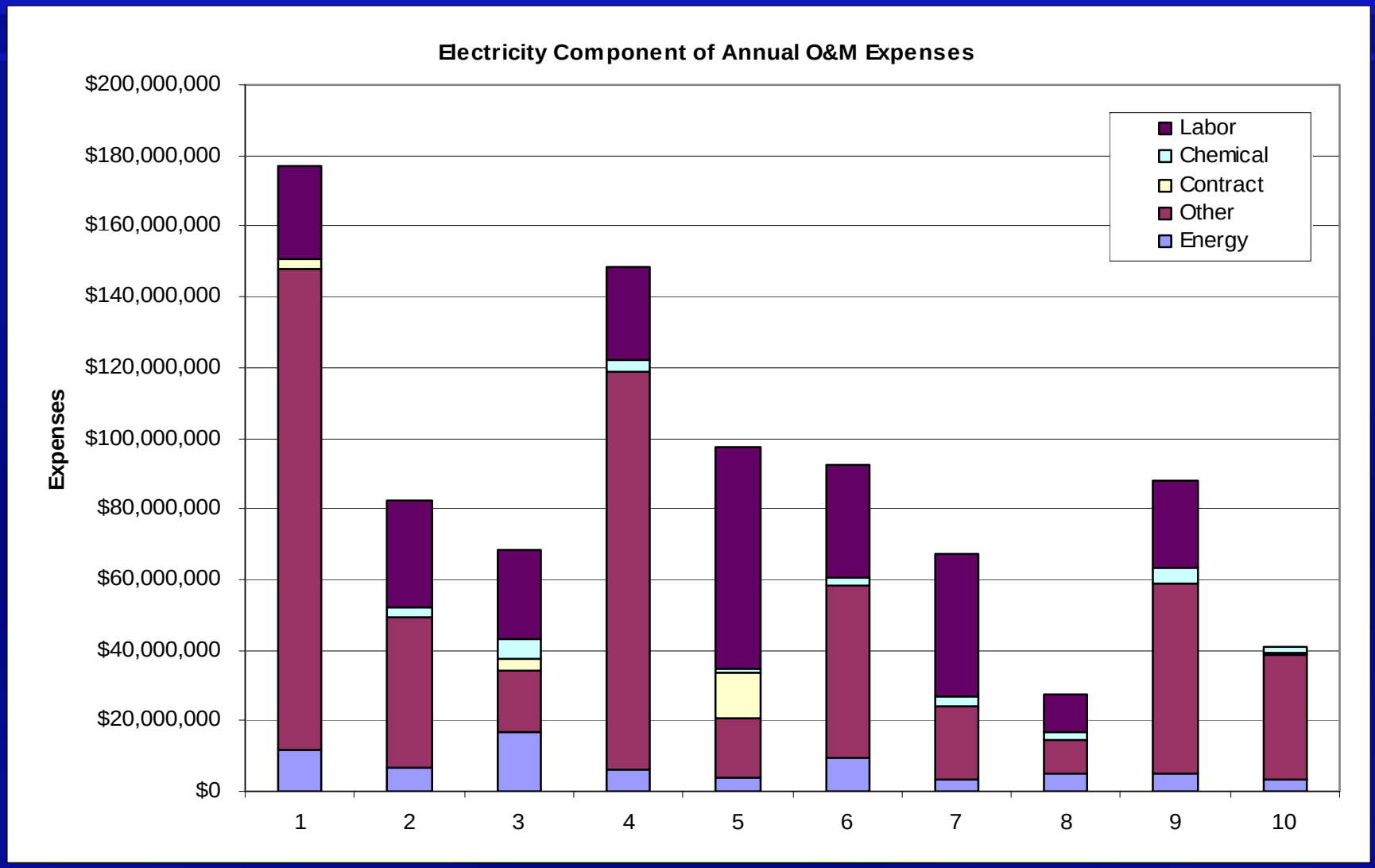
Energy Use at Water Utilties

- Water and wastewater utilities spend about $4 billion a year to pump, treat, deliver, collect, treat and clean water
- For drinking water utilities, electricity consumption by pumping systems constitutes 90% of total energy use
- Energy consumption by water and wastewater utilities will increase 20% in the next 15 years
  - Increased populations
  - More stringent regulations

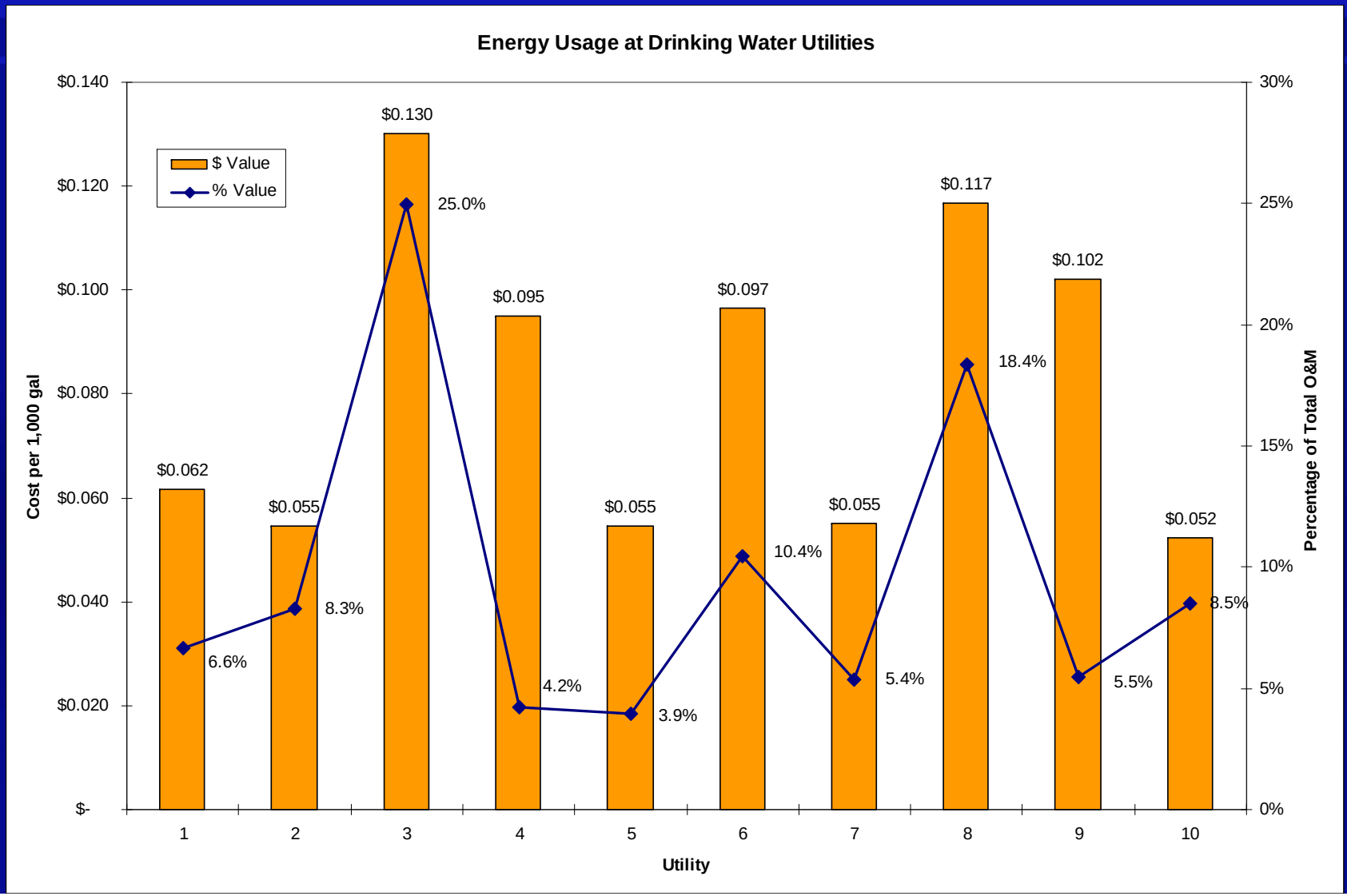
Data Analysis

- 10 drinking water utilities (+1,000,000)
  - California – 3; Virginia – 2; Arizona – 1; Colorado – 1; Florida – 1; Ohio – 1; Texas – 1
- Self-reporting
- Provided O&M cost breakdown for:
  - Supply/transmission
  - Treatment
  - Distribution
  - Other (administration)
- Includes energy, contracts, chemical and labor

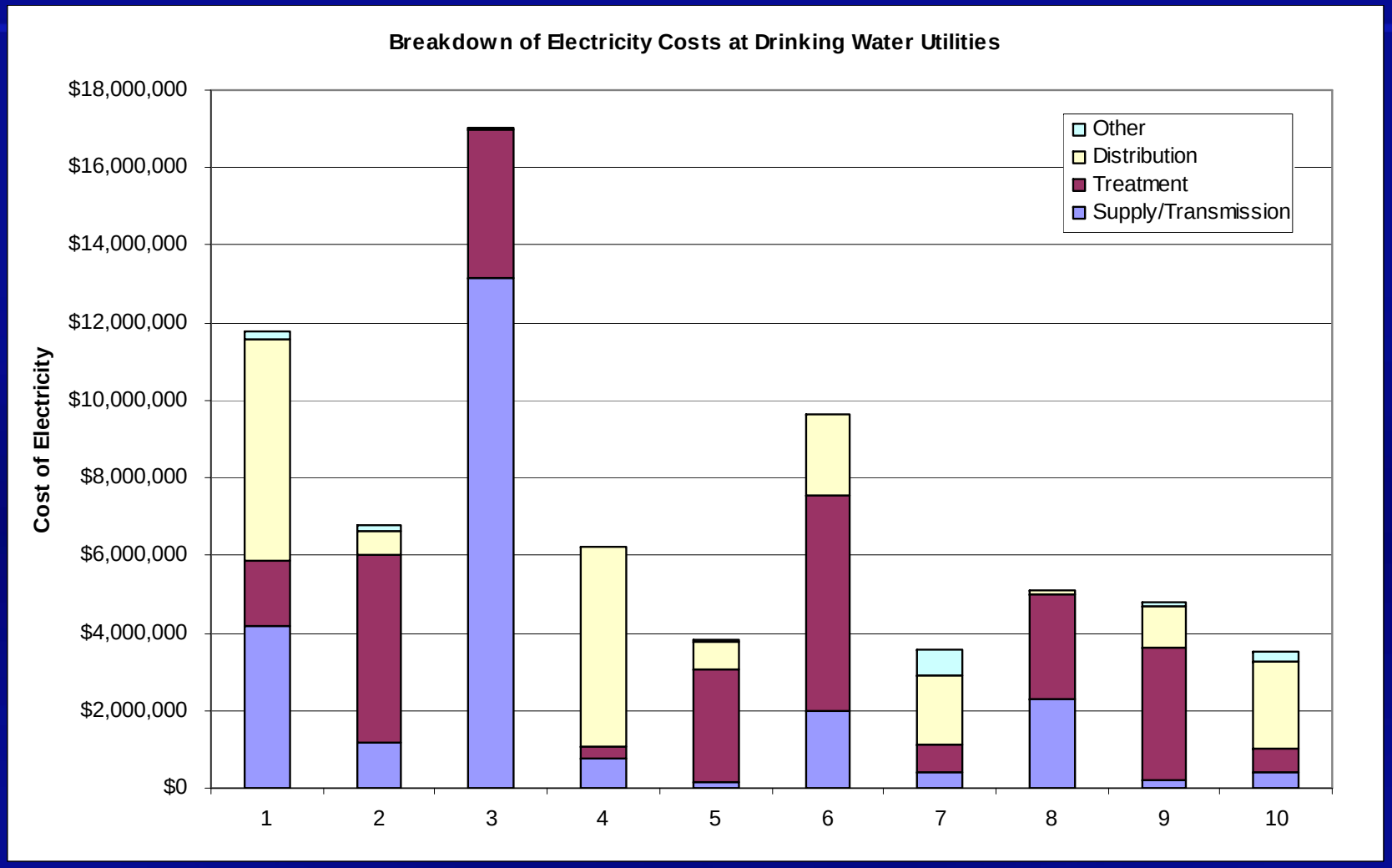
Annual O&M Expenses



Cost Comparison



Details of Electricity Usage



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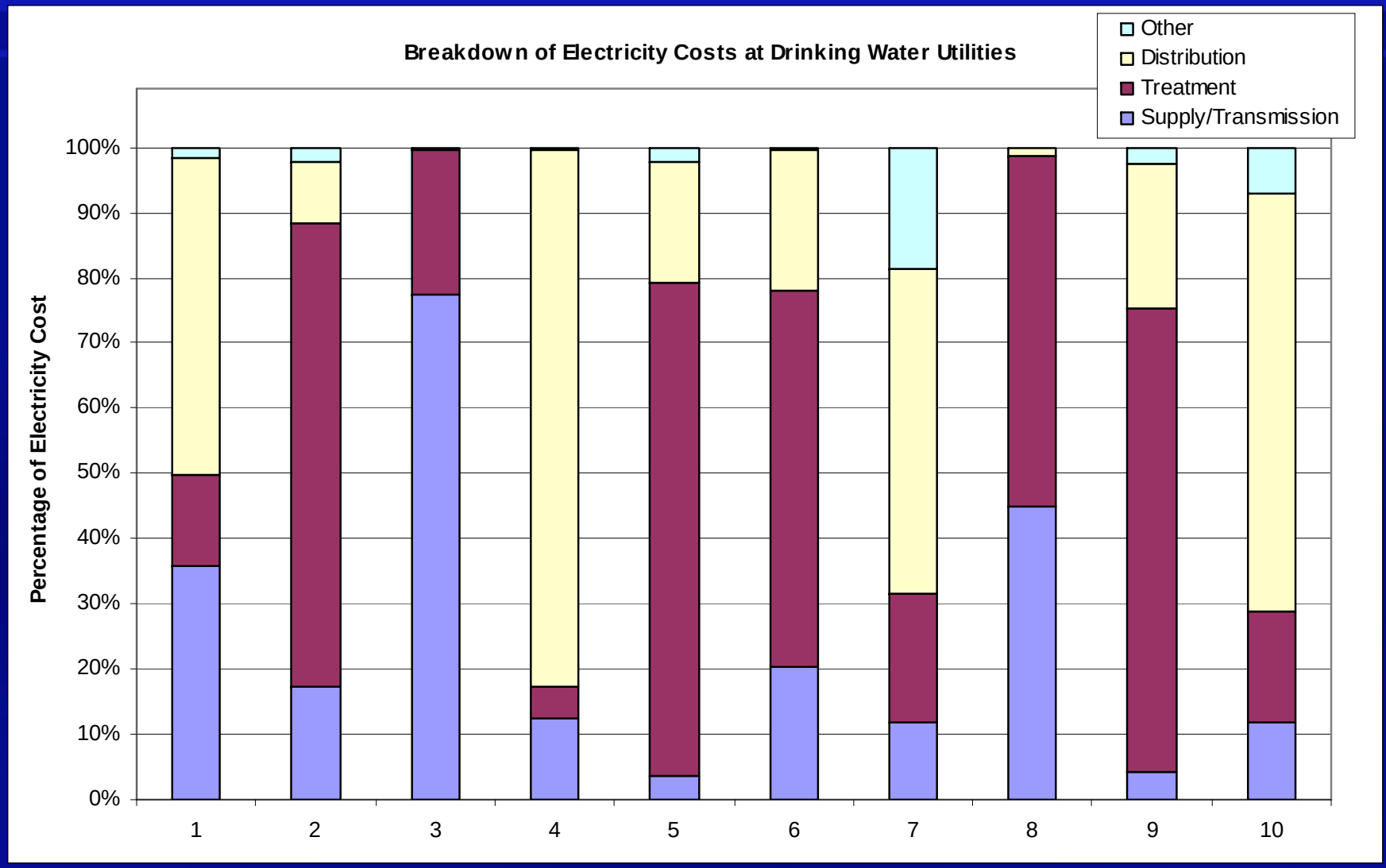

Utility #2: Miami-Dade Water

- High energy costs for water treatment (70%)
- Serves most residents of Miami-Dade County, FL
- Supplies water to 1.8 million customers
- Draws approximately 347 millions gallons a day from the Biscayne Aquifer
- Facilities:
  - Three major treatment plants plus five smaller plants (South Dade Water Supply System) with treatment capacity of 452 mgd
  - 7,500 miles of distribution piping

MIAMI-DADE COUNTY

Utility #2: Miami-Dade Water

- Energy = $3.5 million
  - $1,200,000 transmission
  - $4,800,000 treatment
  - $633,000 distribution
- Why so high?
  - Five different plants with identical processes
  - Distribution costs handled elsewhere
- Energy reduction methods
  - Not too much to consider
  - Changes in operating scheme
  - Reduction of water usage by customers – less water to treat
- Costs only going up due to increased use of desalination technology

Utility #10: Washington Aqueduct

- High distribution energy costs (60%)
- Supplies DC, Arlington County, and Falls Church
- Serves 1.1 million customers
- Facilities:
  - Intakes located on Potomac River and Little Falls
  - Two 12–mile long gravity conduit systems with a combined 200 mgd capacity
  - One 450-mgd raw water pumping station (Little Falls)
  - One 480-mgd finished water pumping station
  - Two major treatment plants with 400-mgd capacity
  - Three booster pumping stations
  - Seven finished storage reservoirs (44 mg capacity)

US Army Corps of Engineers®

Utility #10: Washington Aqueduct

- Energy = $3.5 million
  - $411,000 transmission
  - $601,000 treatment
  - $2,200,000 distribution
- Why so high?
  - Very large finished water PS (no gravity lines)
  - Several booster pumping stations
- Energy reduction methods
  - More efficient pumps
  - Revised operating scheme

Water-Related Energy Conservation and Production

- Improve Energy Efficiency at Water Utilities
- Includes:
  - Energy performance benchmarking programs,
  - Use of energy audits and energy tracking systems,
  - Use of alternative energy sources within plants (e.g., solar, wind, hydro),
- ENERGY STAR program
- Produce energy to offset purchases from local power utilities
- Installation of alternative energy power production facilities, such as including solar, wind, and hydro
- Energy efficient lighting and adequate installation
- Acceptance of simple energy saving measures can launch the next step of alternative energy production

Water Conservation – General

- Benefits from more efficient use of water:
  - Extension of the water supply
  - Reduction of greenhouse gasses
  - Since water usage by customers is reduced, less water will be pumped and treated
  - Reduced energy usage = water savings at power plants
- Areas of opportunity on both the supply and demand sides
  - Supply – Better planning, maintenance, and operation of water delivery systems
  - Demand side – Promotion of conservation programs can also effectively increase water and energy savings

WaterSense Program

- Goal of program to decrease indoor and outdoor nonagricultural water use through more efficient products, equipment, and programs
- Label helps consumers identify water-efficient products

- Water utilities promote the WaterSense program to their residential customers
  - Opportunity to save both water and energy by installing water-efficient fixtures and appliances
- Many utilities have rebate programs to encourage participation, ramped up during drought situations

Water Conservation and Management for Drinking Water Systems

- Implementing water and energy efficient fixtures and appliances result in a reduction in water demand
  - Climate change mitigation opportunities through lower energy usages for water treatment and distribution and fewer greenhouse gas emissions.
- Utilities have been implementing conservation programs (more than WaterSense)
- Developing alternative sources of water
  - Desalination, indirect water reuse, brackish GW

Water Conveyance Leak Detection and Remediation

- Identify and address leakage from water pipes
  - Leakage rates can be very significant
  - Major opportunity to recover water that would otherwise be lost from the system
  - Investments can result in significant water savings
  - Need continued development of technologies that are more precise and adaptable to utilities of all sizes
  - Anticipated that much of stimulus funds could go to ater main replacement
    - Survey of utilities had this project at top of list

Industrial Water Conservation Reuse and Recycling

- Industrial facilities consume large amounts of water
- Companies are becoming more and more aware of the importance of measuring, managing, and controlling water use
  - Water scarcity is a limit to growth.
- Economic incentive exists for facilities to use as little water as possible
- Utilities are working to reduce the amount of potable water provided to industrial facilities
- Reducing water usage in the industrial sector leads to savings in treatment costs:
  - Chemical consumption
  - Energy usage

“Green Building” Design and “Smart Growth”

- Previous activities focused on mitigating greenhouse gases by increasing the water and energy efficiency of water utilities
- May have short term effects b/c customers can revert to previous behaviors after a water crisis has passed
- Need to focus on long-term sustainability of water and energy efficiencies
- Commitment to water and energy efficiency must be incorporated into building codes and community design
  - “Green building” principles and “smart growth” policies

“Green Building” Design and “Smart Growth”

- Green Building Council’s LEED program and ANSI promote the “green buildings” concept and LEED rating systems within State and local governments
- Practices that are recognized as “green” within the various rating systems include:
  - Reduced use of energy and water;
  - On-site (decentralized) energy generation (e.g., solar power, geothermal); and,
  - Water retention (e.g., green roofs).
- LEED has begun to expand their traditional ratings to include other characteristics of sustainable cities such as smart growth and low impact design

Questions?

Cynthia Lane, PE
American Water Works Association
Government Affairs Office
clane@awwa.org