Department of
Environment &
Conservation

Tennessee Water and Wastewater Energy Efficiency Partnership

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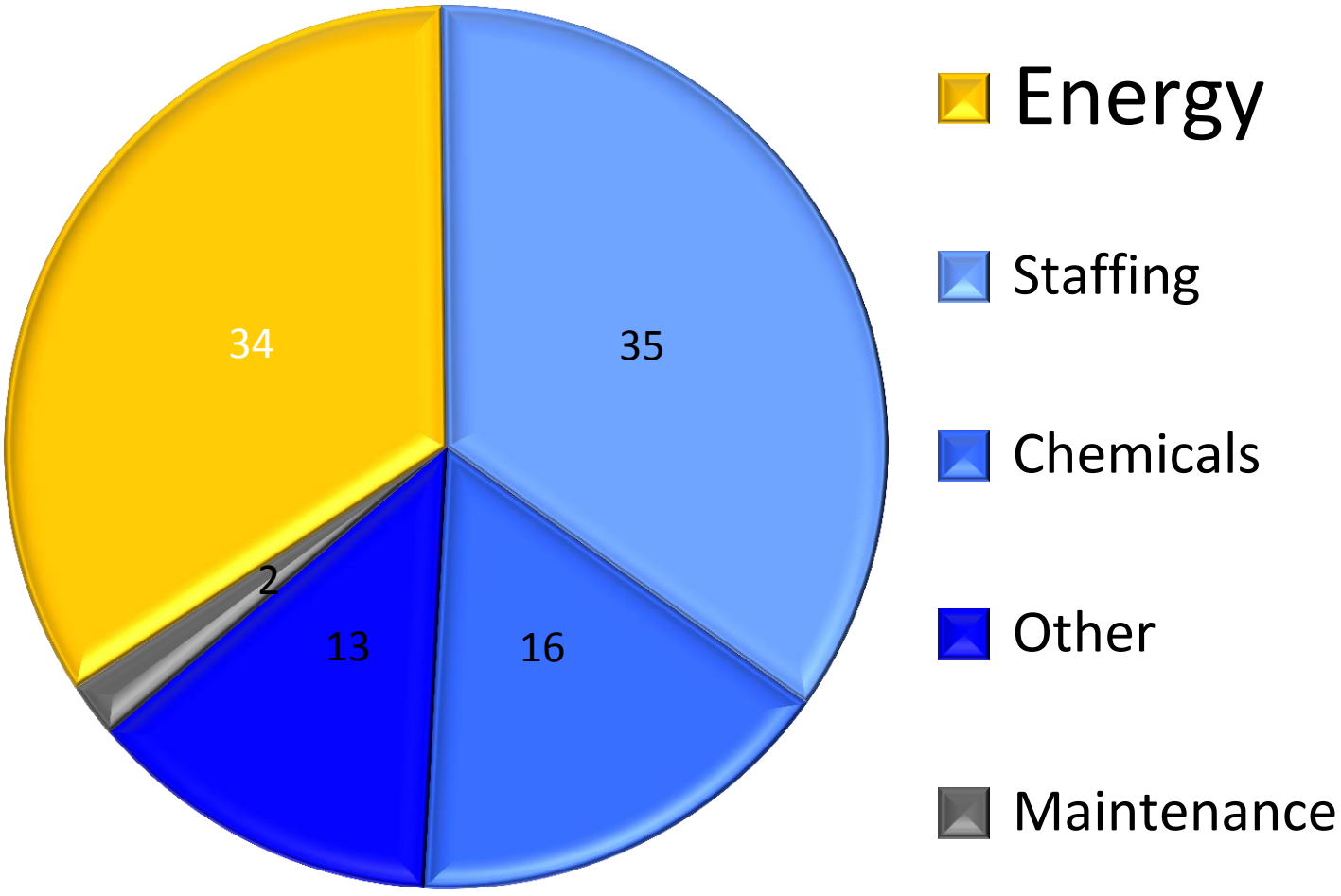
Overview

- Introduction
- Background
  - Tennessee Water and Wastewater Energy Efficiency Partnership
  - The team and its work process
  - Summary of total results to-date
- Individual examples
  - Fayetteville
  - Nashville Dry Creek
  - Columbia
  - Franklin
- Lessons Learned
- Next Steps

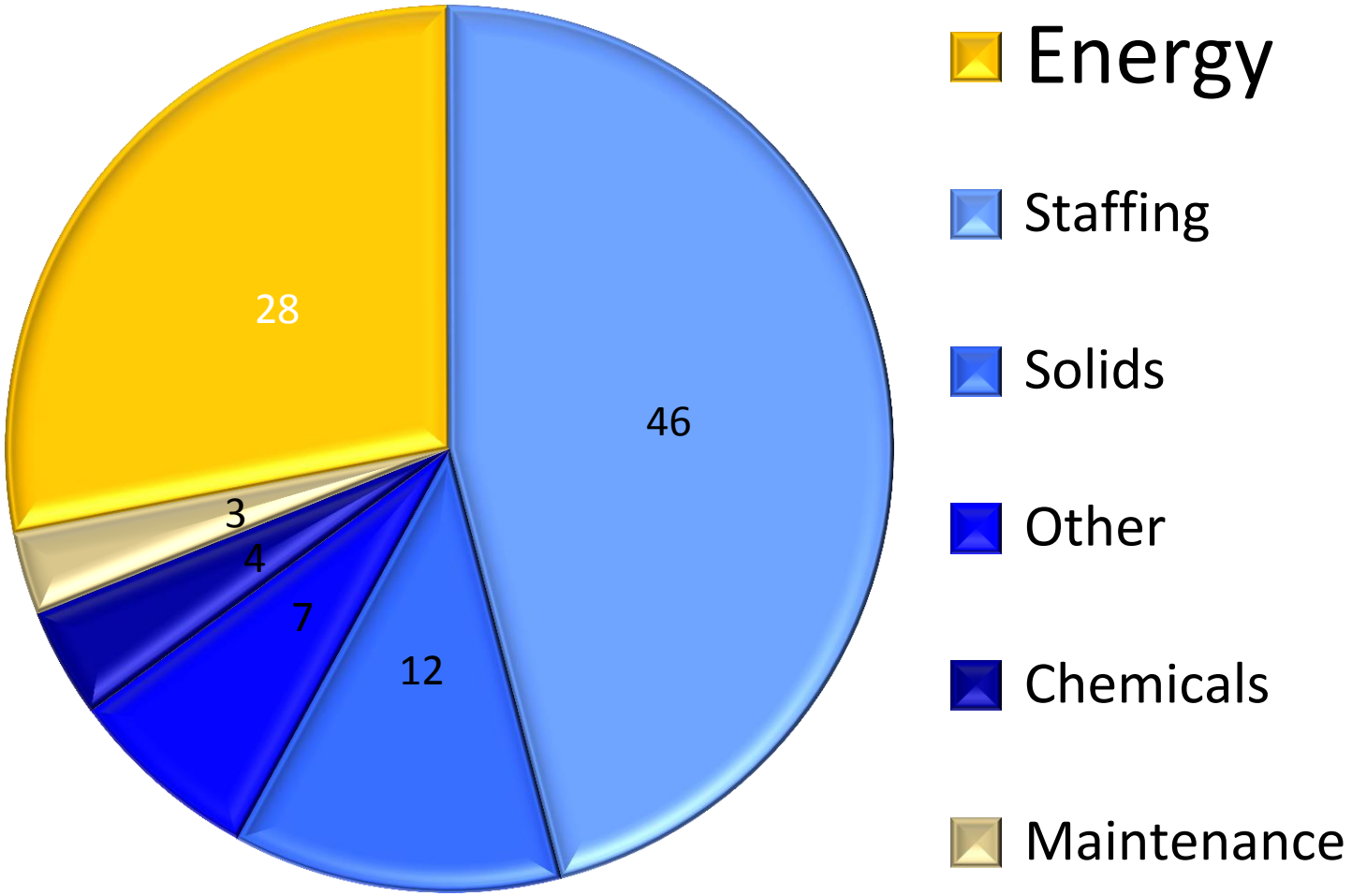
Water - Wastewater - Energy

- Water/Wastewater treatment is usually the largest energy demand for a city or county government
- Energy represents the largest controllable cost of providing water/wastewater services– typically 20-35% of total O&M costs for wastewater

Costs for Typical Water Facilities



Costs for Typical Wastewater Facilities

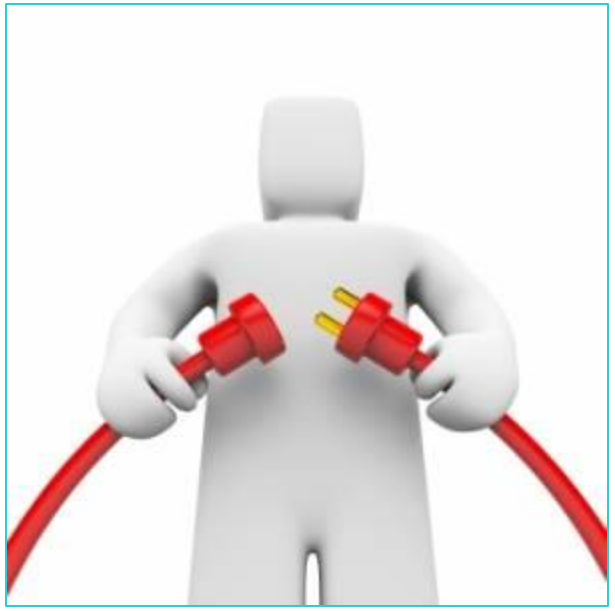


Cost of Energy as Fraction of Total O&M
2011 Actual O&M Costs

CITY	DESIGN FLOW mgd	ACTUAL FLOW mgd	ENERGY % OF TOTAL O&M COST
Fayetteville, TN	3.3	1.6	28
Columbia, TN	10	5	29
Franklin, TN	14	10	18

The Disconnect

- Plants are often operated without any regard to energy costs
- Energy bills are often paid without an understanding of operating constraints



The Big Disconnect

- Only **5%** of operators see plant energy bills

- Only **1%** see and understand plant energy bills

Source: Wisconsin Focus on Energy

Partnerships

Department of Environment & Conservation

THE UNIVERSITY OF MEMPHIS

TVA

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

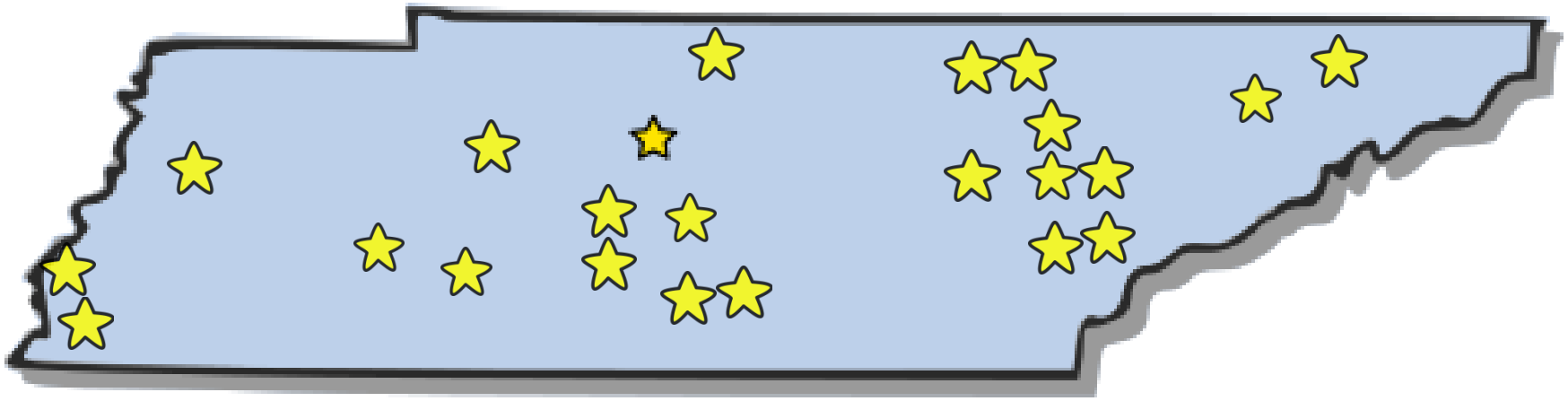
Region 4

THE UNIVERSITY of TENNESSEE

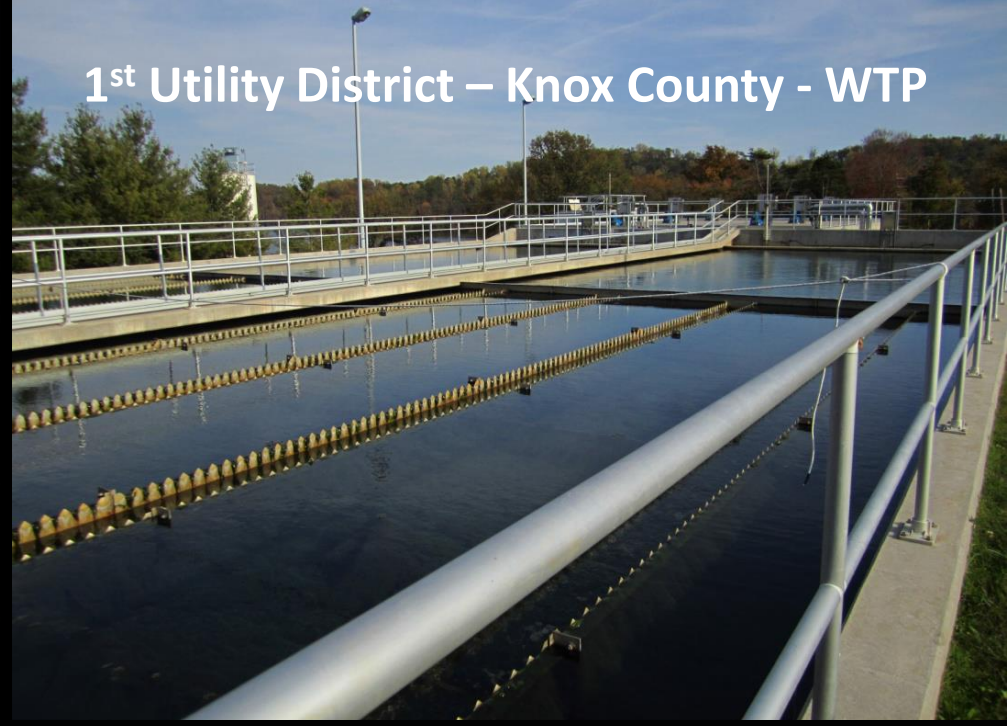
INSTITUTE for PUBLIC SERVICE

TN Utility Participants

Caryville-Jacksboro UC WWTP	Fayetteville WWTP	Humboldt WTP	Loudon WWTP	Portland WWTP
Clifton WTP	First Utility District Knox County WWTP	Jamestown WTP & WWTP	Millington WWTP	West TN Correctional Facility WWTP
Columbia WWTP	Franklin WWTP	Johnson City WTP & WWTP	Murfreesboro WTP & WWTP	Winchester WTP & WWTP
Dickson WWTP	Greeneville WTP	Knoxville UB WTP & WWTP	Nashville Dry Creek	
Dyersburg WWTP	Harriman UB WWTP	Lenoir City UB WWTP	Oak Ridge WTP & WWTP	



Columbia WWTP


1st Utility District – Knox County - WTP

Nashville Dry Creek WWTP

Lenoir City UD WWTP

OPERATOR TRAINING CENTER

Results To-Date

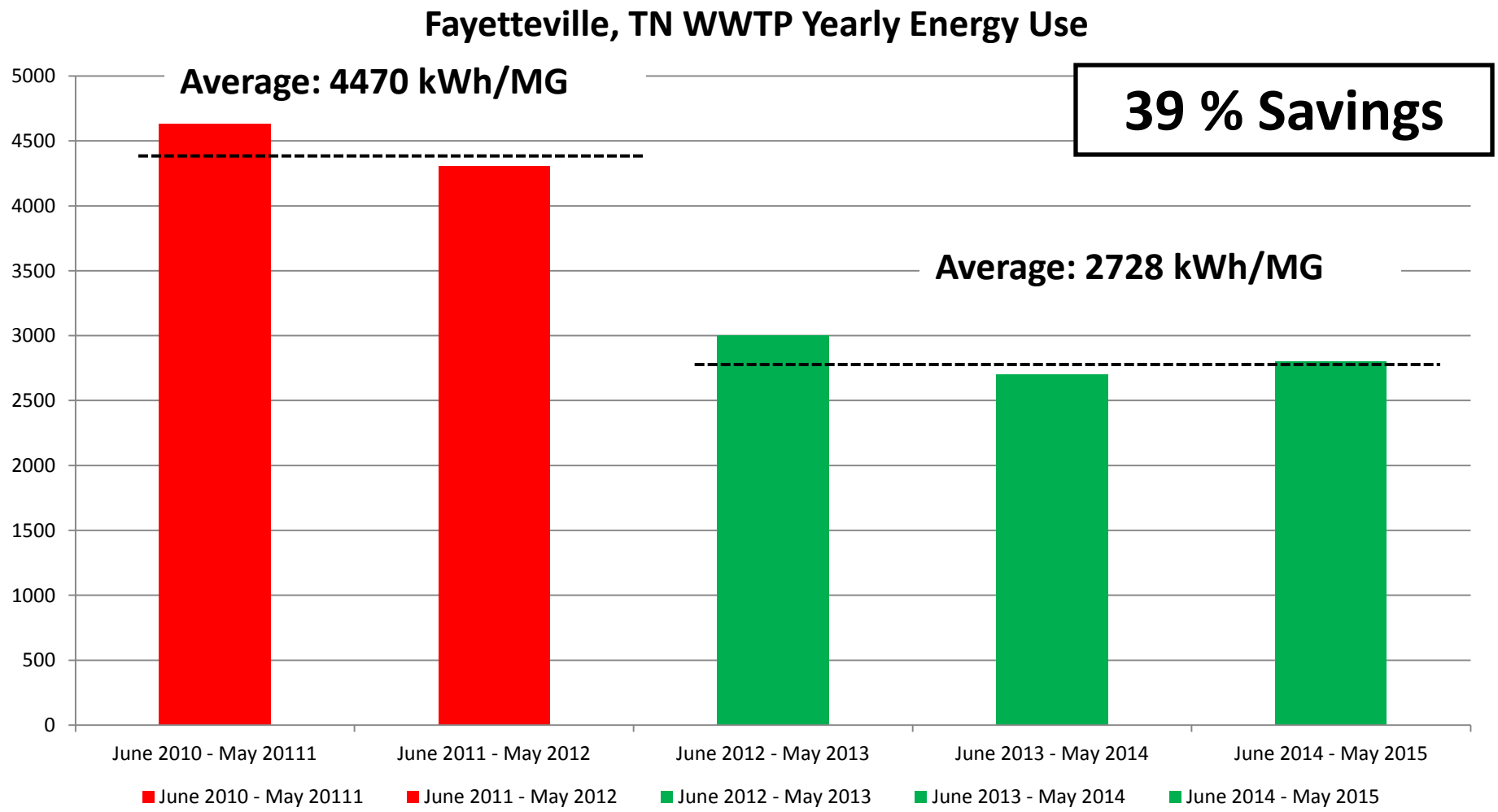
- Average Energy Savings – over 18-20%
- **Measured** Annual Savings
  - Over 15,000,000 kWh
  - Over $1,500,000/year savings
  - Over 13,000 tons/year CO2 Reduction
- **Additional Savings** of 1.5-2.0 million kWh is projected
- 50% of these savings implemented so far, all at little to no cost

Fayetteville WWTP

Fayetteville – Orbal Oxidation Ditch

Fayetteville – Aerobic Digesters

Fayetteville – Measured Energy Savings



Participant Results

- Metro Water Services
  - Installation of fine bubble diffusers at Dry Creek WWTP (17 MGD)
  - Initial estimated annual energy reduction of 2,400,000 kWh pear (16.7%)
- Columbia (5.7 MGD)
  - Adjustments to aeration and UV disinfection
  - Energy savings of almost 2 million kWh per year (20%)
  - $150,000 per year in reduced energy costs
- Franklin (9.7 MGD)
  - Aeration optimization and solar array instillation
    - Electric meter change
  - Energy savings of 1,911,000 kWh (>13%)

Lessons Learned

- Any size plant can find savings
- Minimal investment can produce big results – which does not necessarily require expensive upgrades
- Savings are savings – using savings money for upgrades motivates staff to find more opportunities
- Team approach works best – operations and governance share responsibility for effective energy management

Next Steps

- All of the partners and participants continue to support activity in the state of Tennessee
  - Tennessee is set to implement Wave IV of this initiative in the Spring of 2016 in cooperation with a new partner – the State of Alabama
- Mentor the State of Kentucky as they spearhead a similar program
- Grant from Department of Energy

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