Welcome to the 2015 OWEA Conference!

June 22nd, 2015

Sandusky, Ohio

Presenter: Scott Strahley, PE, CEA, Ohio RCAP Engineer

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Purpose of Presentation?

- What has Ohio done on Energy Audits?
  - Funding Sources
  - Outreach
- Energy Savings/Saving Money in Operations
- Energy Audit Benefits

Purpose of RCAP?

- TMF
  - Technical
  - Managerial
  - Financial

- Water Systems 
- Wastewater Systems 
- Other Village Resources?
- Holistic Approach?

Pitfalls?

- Certified Auditors
- Knowledge of Water Systems
  - Operations and Processes

    vs.
  - Equipment and Lights
- Alternative Energy

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Focus?

- Short-Term
- Long-Term
- Water Quality?
- Financial Goals?

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Energy Conservation vs. Efficiency

- Energy Conservation:
  - Doing Work With Less Energy
  - Human Behaviors: Habit, Knowledge, Understanding
  - Negative Reputation
    - Jimmy Carter's era of sitting in the dark with a sweater!
- Energy Efficiency:
  - Using Energy More Effectively
  - Use of Technological Advances, Equipment, Controls
  - Politically Correct
    - Being Green!

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Energy Efficiency Drivers

- Energy Demand from Generation Plants
  - Peak Demands
- Environmental Concerns
  - Greenhouse Gases
  - Depletion of Natural Resources
- Advances in Technology
  - Manufacturers, Regulatory Mandates
- National Security/Self Reliance
- Political Pressure
- Others???

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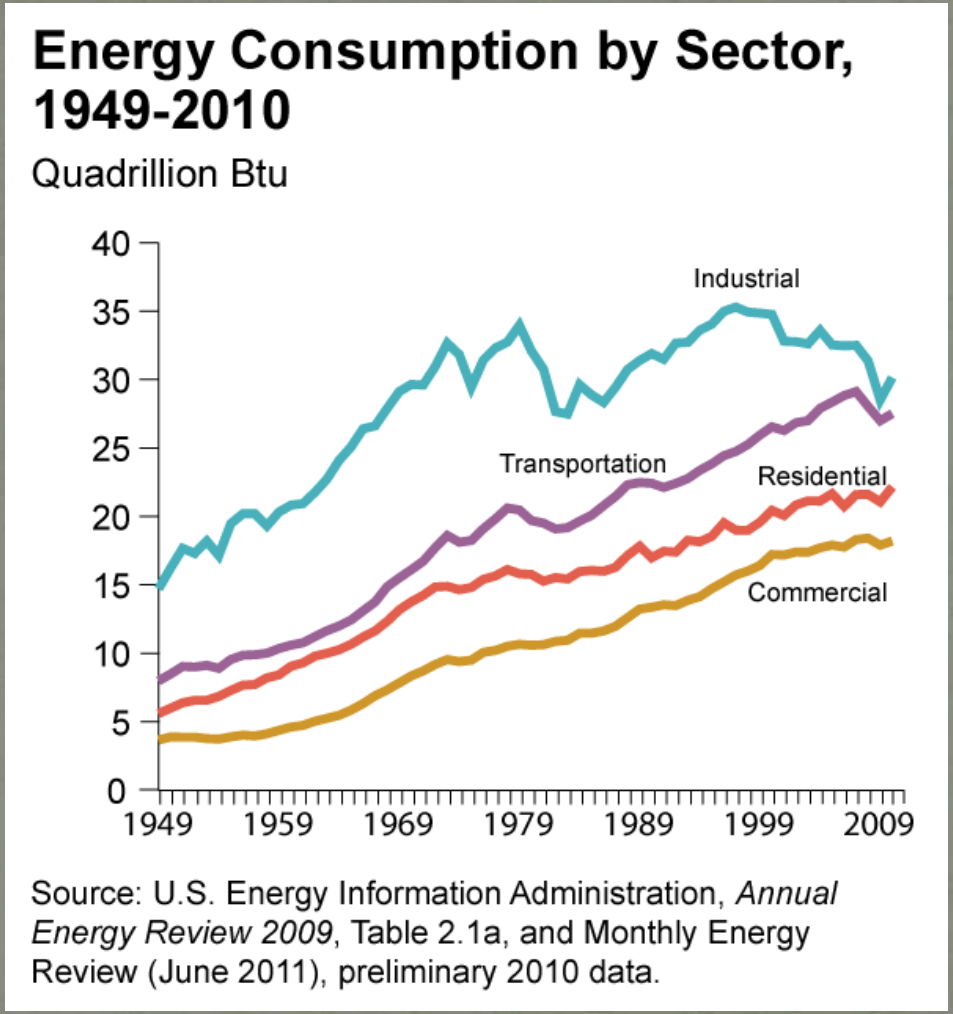
History of energy use in the U.S.



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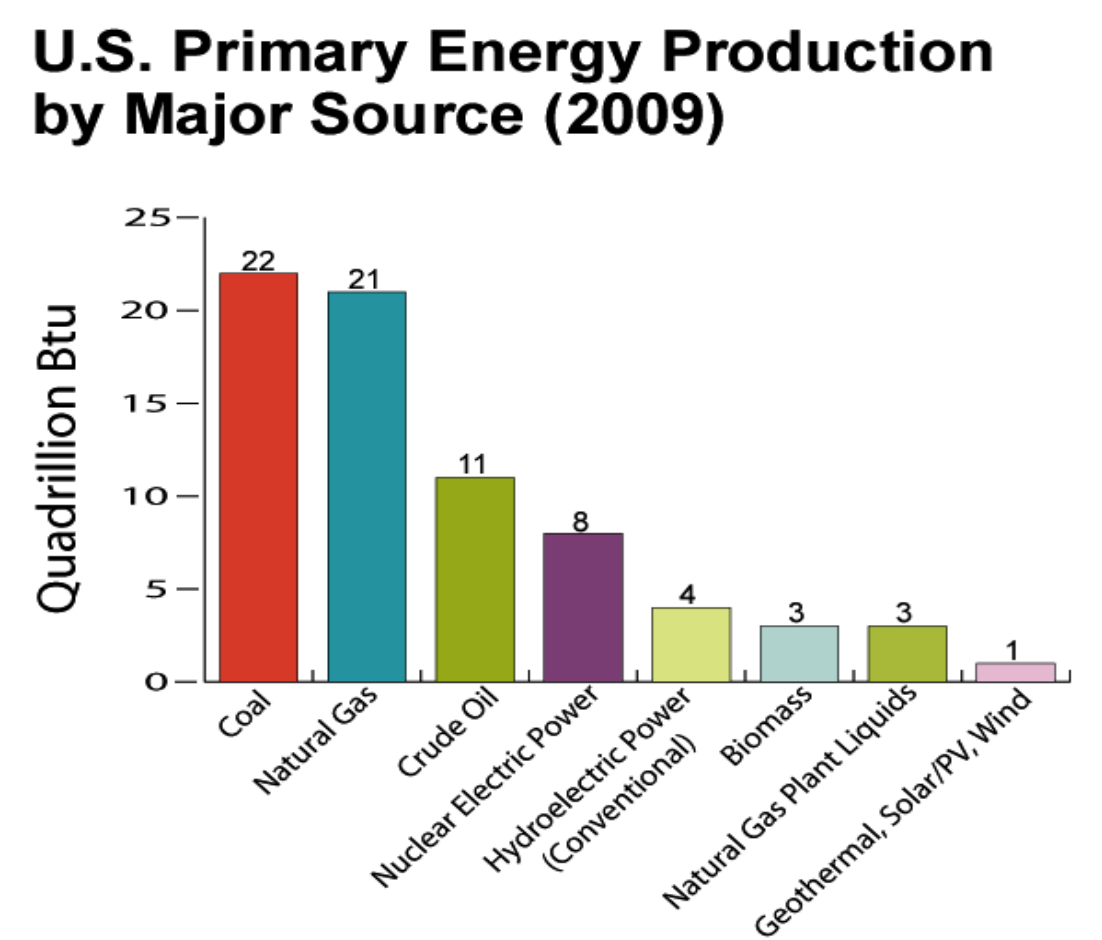
Energy production in the U.S.



Source: U.S. Energy Information Administration, *Annual Energy Review 2009*, Table 1.2 (August 2010)

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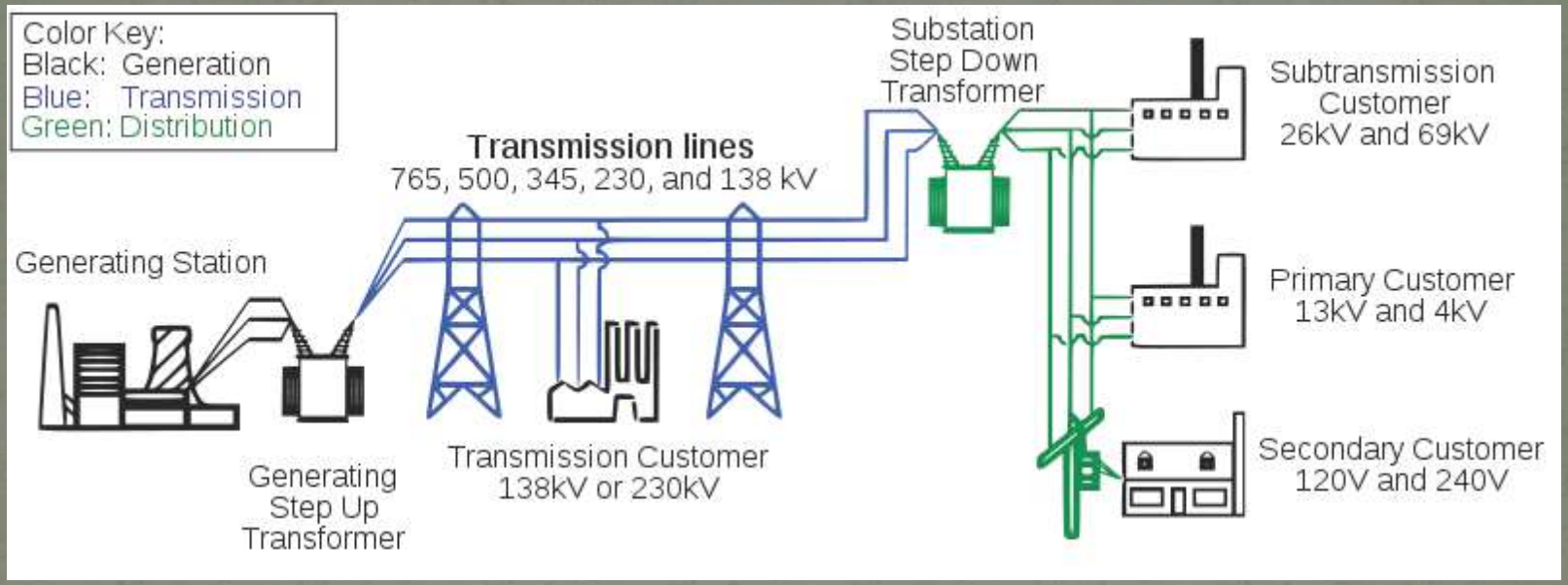
Simplified electric grid



The impacts of inefficiency:

Generation: average 50% efficient

Transmission/distribution: average 93% efficient

Demand side: industrial assume 90% efficient

residential assume 20% efficient

Impact: industrial demand = 239%

residential demand = 1,075%

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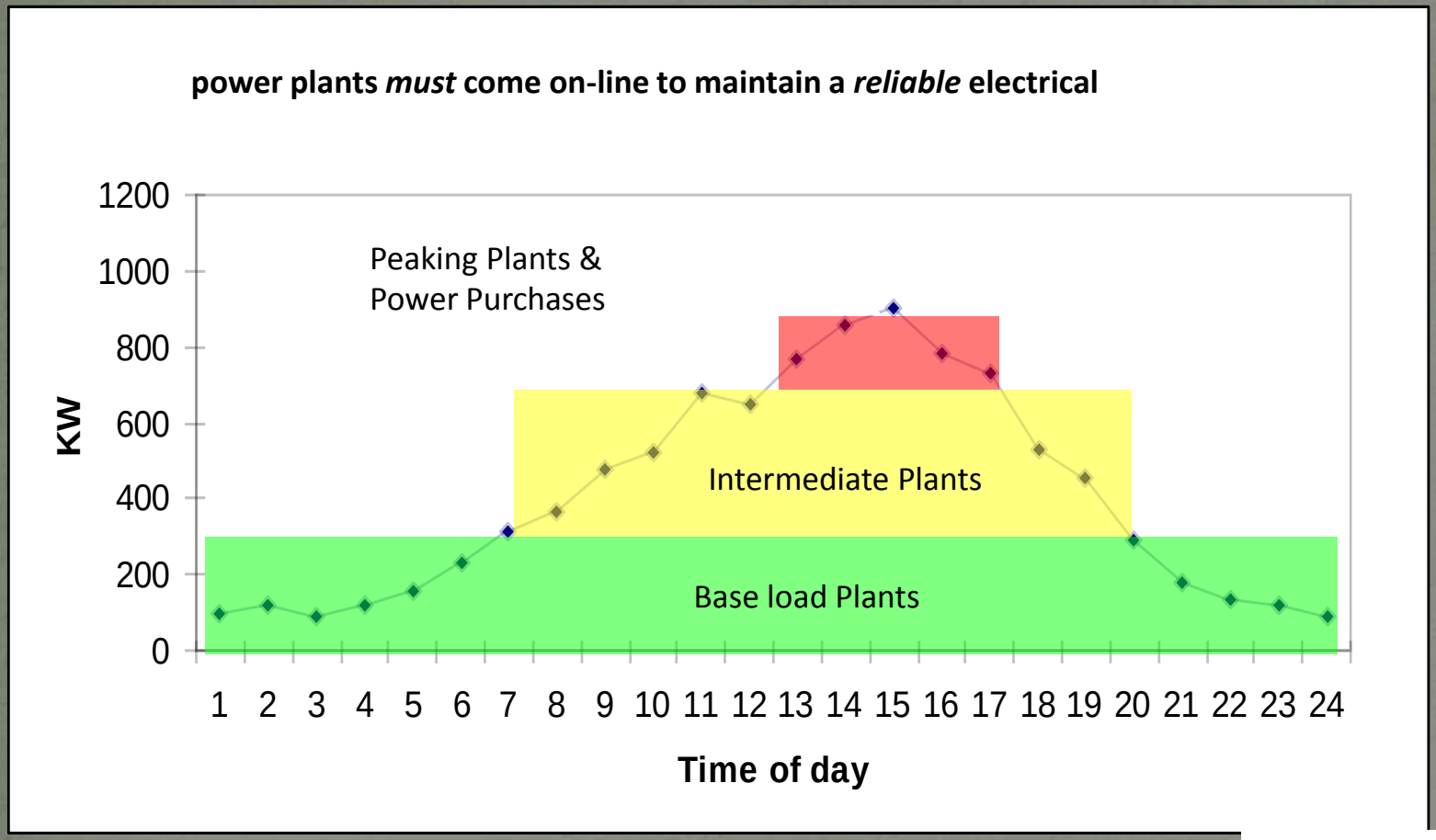
Why a "demand charge"?



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Energy Efficiency Actions

- Federal Government
  - Energy Star
  - EPACT (Energy Policy Act 2005)
    - Motors
    - T-12 Fluorescent Bulbs
    - Incandescent Bulbs (above 60 watts)
  - Tax Incentives
- State Government
  - State Mandated Energy Programs
    - Energy Efficiency
    - Demand Reduction
    - Renewable Energy

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What is Energy Efficiency?

- Energy Efficiency: Simply the process of doing more, with less. The goal is to accomplish the same tasks and functions as before, while using less energy.

  -*California Center for Sustainable Energy*

  - Through technology and practice
  - Without compromising quality, safety, or comfort

Lighting:
All of Them!
24 x 7 x 365!!!!

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What is Energy Efficiency?

- 16 4-lamp fluorescent fixtures
  - T-12: 0.163 kW per fixture
    - 2.608 kW total
  - T-8: 0.102 kW per fixture
    - 1.632 kW total (0.976 kW difference)
  - 24 Hours vs. 8 Hours - @ $0.07 = $2,793 savings

Lighting:
All of Them!
24 x 7 x 365!!!!

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How to Achieve Energy Efficiency?

- Track and Evaluate Monthly Energy Usage
  - Look for Trends and Unexplained Changes
    - Investigate Changes…
- Examine Costs of Operating Methods
  - Do you understand the energy costs associated with your Standard Operating Procedures (SOP's)?
- Implement Asset Management Program
  - Comprehensive Operation & Maintenance (O&M) program
    - Properly Maintained Equipment Operates Best!

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How to Achieve Energy Efficiency?

- Make Entire Team Aware of Energy Use
  - Share billing information with operators
    - 95% of Operators Typically **DO NOT** See The Energy Bill
    - 99% That Do See The Bills **DO NOT** Understand It!
  - Communicate your energy savings goals
- Understand your Operations and Processes
- Replace older Equipment with:
  - Premium High Efficiency Motors & Pumps
  - T-8, T-5 & LED lighting
  - High S.E.E.R HVAC

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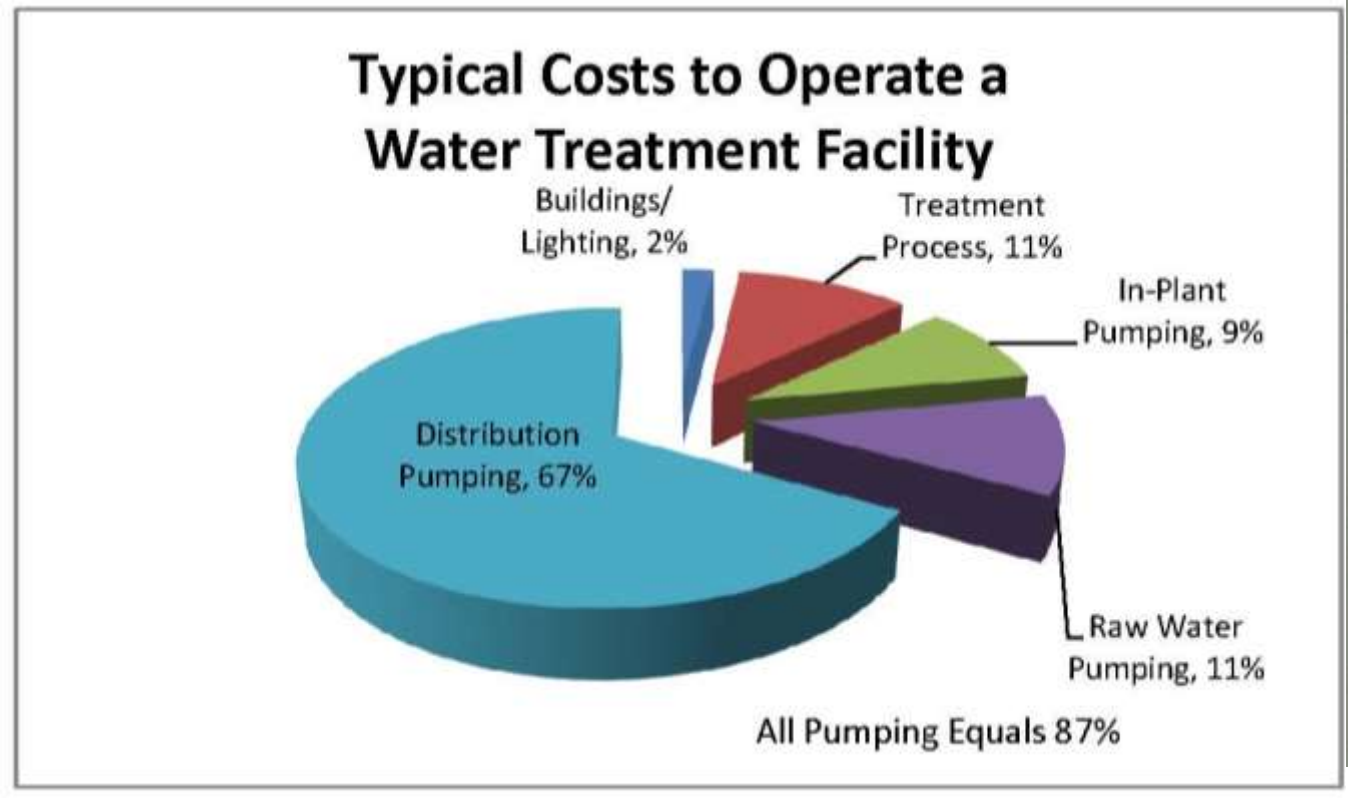
But, Why Is It Important?



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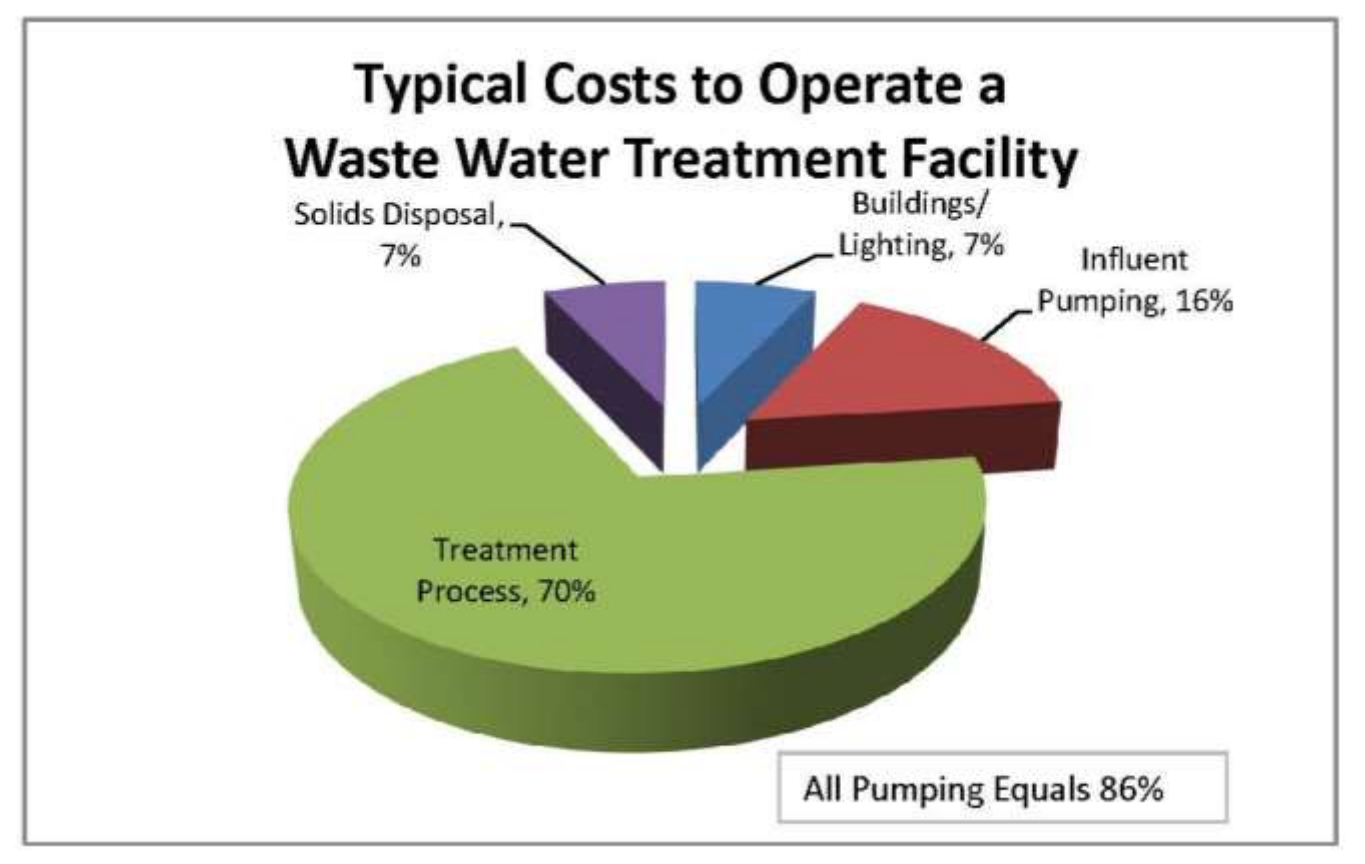
But, Why Is It Important?



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But, Why is it Important?

- Estimates Are Indicating That:
  - A large percentage of municipal energy use is associated with water and wastewater treatment
    - Approximately 30-60%of a municipal budget
  - "If drinking water and wastewater systems reduce energy use by just 10%…collectively they could save approximately $400 million and 5 billion kWh annually"
    - US EPA – Ensuring a Sustainable Future: An Energy Management Guidebook for Wastewater and Water Utilities

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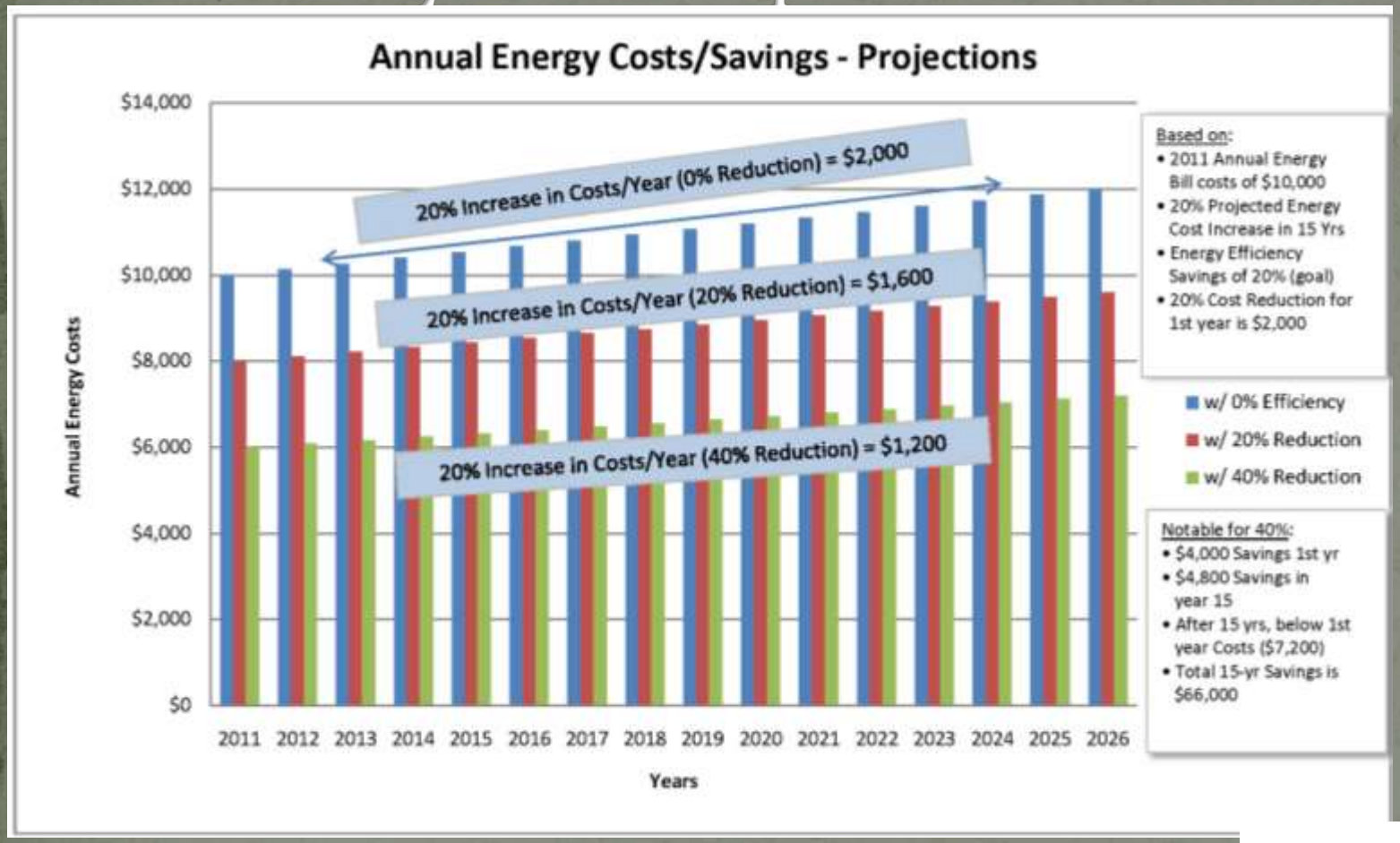
But, Why Is It Important?



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How Billing Works…

- Know your Rate Structures!!!
  - Each utility company has a published document detailing the available rate classifications, tariffs, and structures applicable for various uses.
    - If in doubt, ASK the utility company for HELP!

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Benefits of an Energy Audit…

- Benchmarking
  - KPI (Key Performance Indicators)
  - Identifying Trends
  - Decision Tool for Change
    - Equipment, Processes, System…
- Budget Planning
- Knowledge of the System
  - Water Loss / I&I (Inflow and Infiltration)
- Error Reduction
  - Billing, Payments, Meters, Chemicals

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Benefits of an Energy Audit…

- Use as Guidance, Not Gospel!
  - Inexact Science, At Best! – Scale of Magnitude!
    - Assumptions
    - Rate Fluctuations
      - Rates, Riders, Mid-year Changes
      - Sliding Scale Based On Usage
    - Operational Changes
    - Equipment Performance
    - Personnel Performance
    - Emergencies

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Opportunities to Save Energy…

- Water:
  - Pumping
  - Pressure
  - Throttled Valves
  - Variable Speed Drives
  - Controls
  - Operations
  - Etc.

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Opportunities to Save Energy…

- Wastewater:
  - Aeration
  - Pumping
  - Variable Speed Drives
  - Automatic Controls
  - Solids Management
  - Operations
  - Processes
  - Etc.

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ASHRAE Recognized Audits

- Energy Audit, Level I
  - Cursory Review and Analysis
  - Broad Generalizations – Low/No Cost
  - Intended To Be: Brief, Simple, Crude
  - To Determine if Additional Study is Warranted and/or Required

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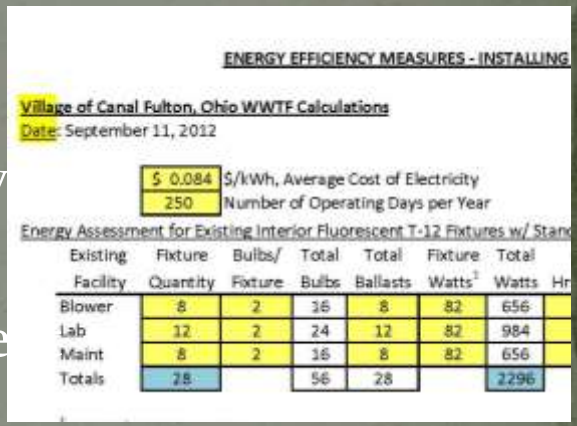
ASHRAE Recognized Audits

- Energy Audit, Level II
  - NOT a Definitive Analysis
    - Not Investment Grade or Capital Intensiv
  - More In-Depth Than a Level I
    - Thorough Review of Billing and Equipme
    - Analysis of Operations and Maintenance
    - A Broad Range of Savings Options
    - Detailed Calculations of Opportunities
    - Declarations of Assumptions and Constraints



ENERGY EFFICIENCY MEASURES - INSTALLING

Village of Canal Fulton, Ohio WWTF Calculations

Date: September 11, 2012

$ 0.084	$/kWh, Average Cost of Electricity
250	Number of Operating Days per Year

Energy Assessment for Existing Interior Fluorescent T-12 Fixtures w/ Stan

Existing Facility	Fixture Quantity	Bulbs/ Fixture	Total Bulbs	Total Ballasts	Fixture Watts[1]	Total Watts	Hr
Blower	8	2	16	8	82	656	
Lab	12	2	24	12	82	984	
Maint	8	2	16	8	82	656	
Totals	28		56	28		2296	

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ASHRAE Recognized Audits

- Energy Audit, Level III
  - A Definitive Analysis
    - Known as Investment Grade or Capital Intensive
  - Extensive Analysis
    - Sensors, Gauges, Metering, Computer Analysis
      - Typically for at least 3 months
    - Intensive Engineering
    - Economic Analysis
    - Building Simulations

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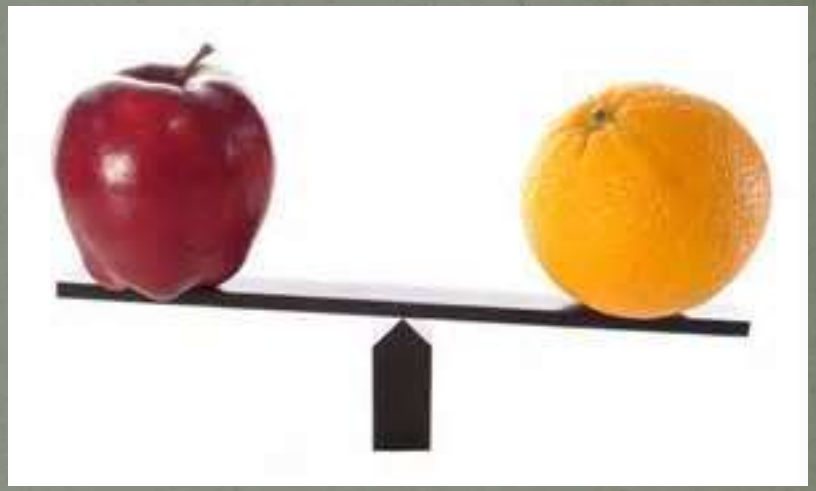
Key Performance Indicators:

- Determine Cursory Benchmarks:
  - Service Population
  - MG/Yr
  - Cost ($)/kWh
  - kWh/MG
  - Cost ($)/MG
    - Compare to similar facilities
    - Compare to similar regions



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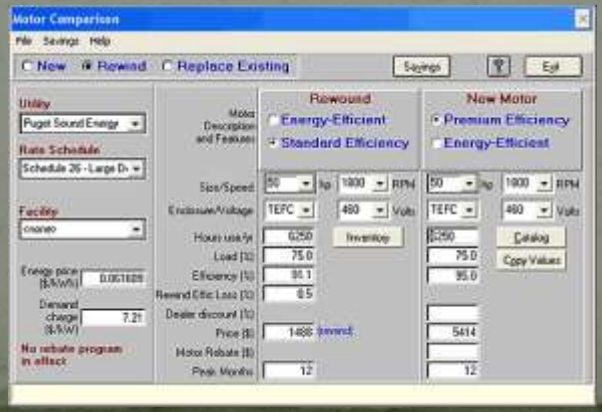
Benchmarking Tools

- USEPA's Energy Star Portfolio Manager
- USEPA's Energy Audit Tool
- US Dept. of Energy Equipment Evaluation Tools
  - PSAT – Pump System Assessment Tool
  - MotorMaster +
- Simple Excel Spreadsheet
- Or Other Program



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Is it Really Worth the Extra Cost?

- 100 hp TEFC motor costs ~ $4,543
  - It costs $12,707 **per year** to operate
    - **280%** of purchase cost!
      - @ 2,920 hours/yr, 75% load, $.07/kWh

Efficiency	Demand	Use/Year	Cost/Year	15-Yr Cost
90%	62 kW	181,536 kWh	$12,707	$190,605
95%	58 kW	171,959 kWh	$12,037	$180,555

    - 5%, $670/yr, $10,050/15-yrs

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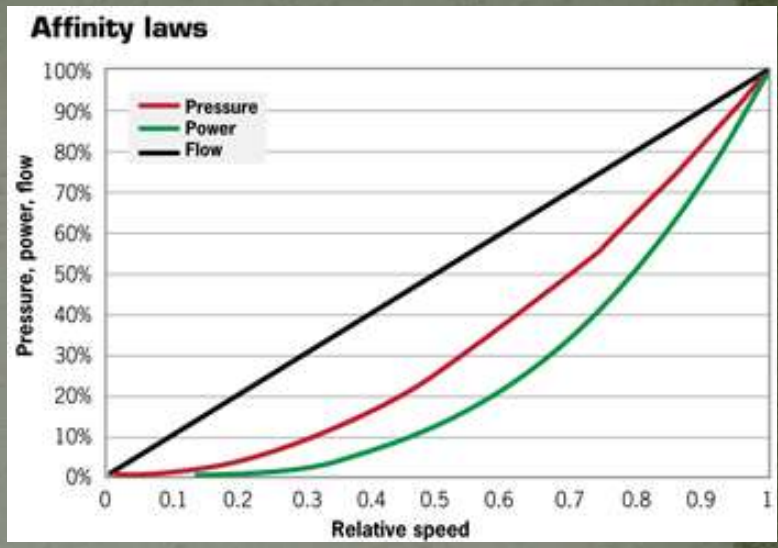
Calculations:



- Basic Pumping – VFD/VSD
  - Affinity Laws:
    - Power: BHP1/BHP2 = (N1/N2)^3
      - BHP = Brake Horse Power
      - N = Speed

If a 100 HP pump is slowed to 80%, how much HP is required?

100 BHP x (0.80^3) = 100 x .512 = <u>51.2 BHP</u>

(20% Reduction = 49% Savings)

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Equipment Data:

- Aeration
  - Can be 50-60% of energy use at Wastewater Plant
  - Coarse Bubble vs. Fine Bubble
    - Fine Bubble can be 35% more efficient
  - Blower Size and Data
  - Raw Data vs. Effluent Data
  - Design Flow vs. Actual Flow
  - Automate – Add D.O. Sensors
  - Summer vs. Winter Treatment
  - Think EARTH!

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Equipment Data:

- What is Aeration Used For:
  - Organic Treatment
    - Ammonia
    - Biological Oxygen Demand (BOD)
  - Mixing
- How is it Controlled:
  - Number of Diffusers, Size of Orifice
  - Air Flow Rate (relative to Blower Size)
  - Blower Controls (Sensors)

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Show Me The Money!!!

- Energy Efficiency Can Make a Difference!

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Case Studies…

- Examples
  - Wastewater Treatment Plant
    - Over-Treating
    - Inflow and Infiltration
    - Energy Rates (Tariff)
    - Controls
  - Water Treatment Plant
    - Water Loss
    - Production Levels
    - Pump System Analysis
    - Process Controls

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Case Study…

- Convoy WWTP

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Case Study…

- Analysis
  - Village Population 1,110
  - Facility Constructed 1938 (upgrade 1987)
  - Production (MGD): 0.200 Design, 0.248 Actual
  - Annual Energy Use = 391,036 kWh / yr
  - Annual Energy Cost = $26,548 / yr
  - Average Energy Cost = $0.068 / kWh
  - Energy Use = 4,320 kWh / MG (295%)
  - Treatment Cost = $293.75 / MG (277%)

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Case Study…

- Initial Assessment:
  - Small
  - Moderately Aged (over 25 yrs)
  - Low Energy Cost for Region
  - High Energy Use
  - High Production

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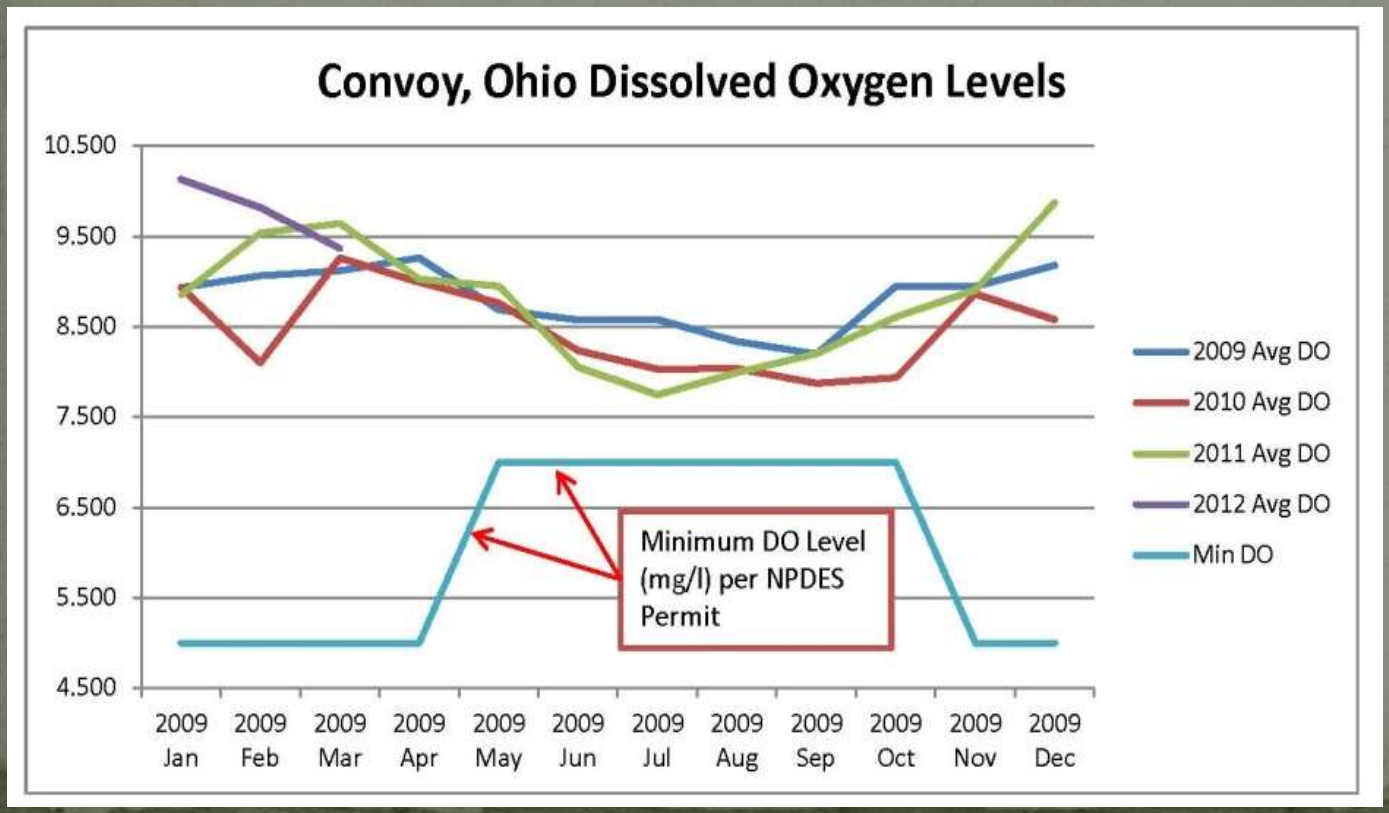
Case Study…

- Aeration Levels



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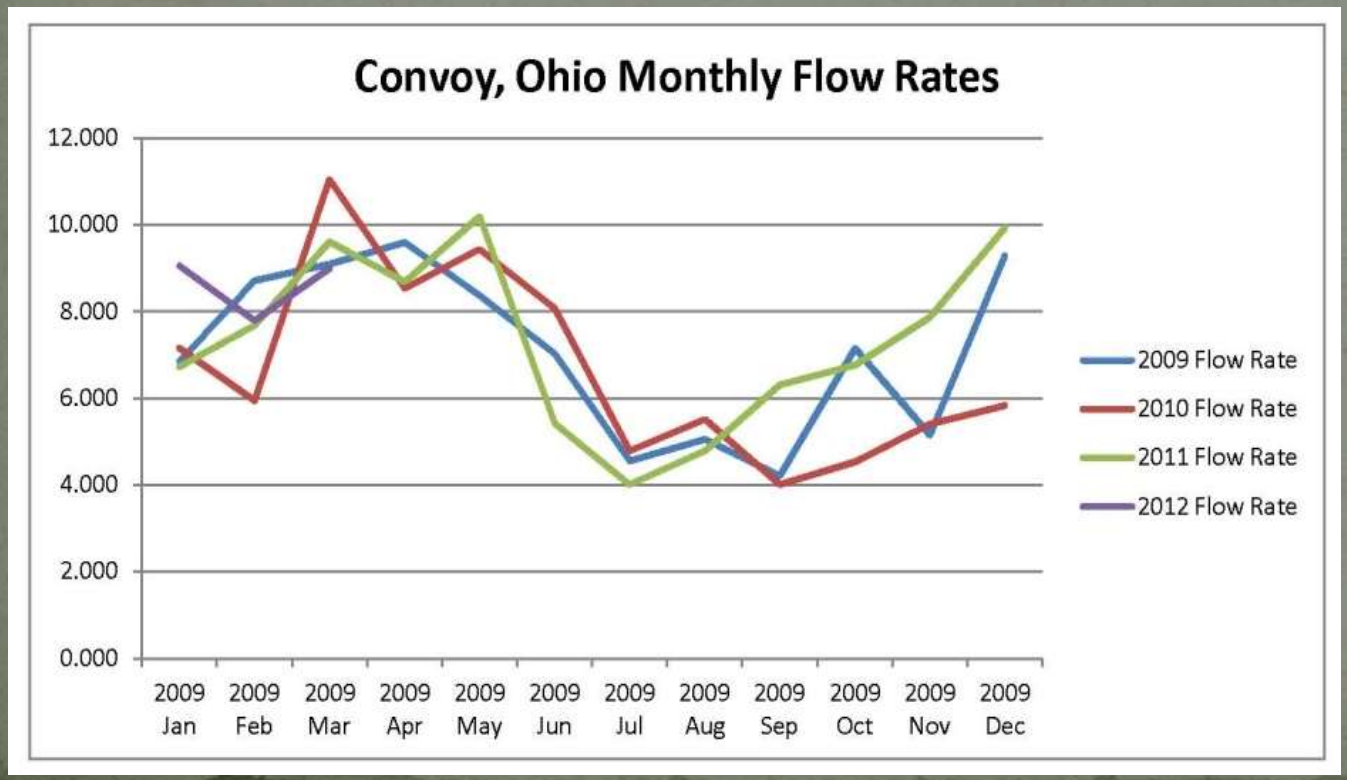
Case Study…

- Flow Analysis



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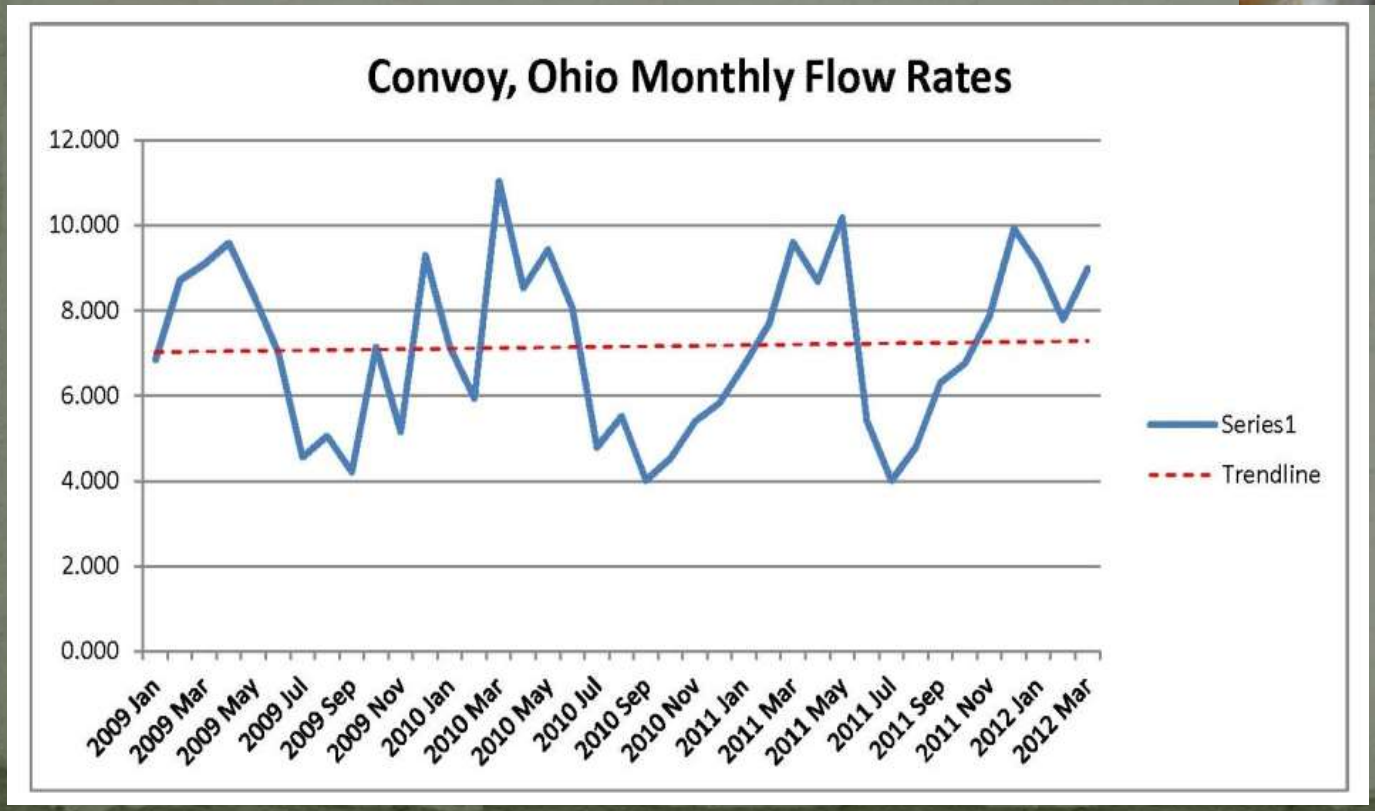
Case Study…

- Flow Trends



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Case Study…

- Water Use?
  - Water Production: 0.150 MGD
    - 500 Connections
      - 150 gpd per connection = 0.075 MGD
    - 0.040-0.075 MGD Reduction Potential

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Case Study…

- Results:
  - Focused Analysis –
    - Water Use and Disposal
  - Main Opportunity
    - Water Meter Installation
  - Additional Opportunities
    - Equipment
    - Controls
    - Aeration

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Case Study…

- Pending Capital Improvement Projects
  - Additional Water Well
  - Additional Storage Tank
  - Water Main Replacement
  - Upgrade/Replacement of Wastewater Plant

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Case Study…

- Energy Conservation Opportunities
  - Install Water Meters
  - Educate Community on Water Use
  - Seek Inflow and Infiltration
  - Eliminate need for Water Well, Water Tower, Main Replacement, and Wastewater Plant Upgrade

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Case Study…

- Summary:

TABLE 1.1 - SUMMARY OF ENERGY CONSERVATION OPPORTUNITIES:

ECO No.	Opportunity Description	Est. Cost ($)	Annual kWh Savings	Annual kW Savings	Annual Energy Cost Savings	Simple Payback Estimate (years)	Notes
1	Billing Tariff Reclassification	0	0	0.0	Unk	0	
2	Demand Management and Load Shifting	*n/a*	*n/a*	*n/a*	*n/a*	*n/a*	
3	Install Energy-Efficient Interior Lighting	$1,800	980	0.88	$65	27.5	1
4	Install Interior Occupancy Sensors	$50	715	0.0	$48	1.0	1
5	Install LED Exit Light Fixtures	$15	245	0.03	$16	0.9	
6	Address Building Envelope / Climate Control Issues	*n/a*	*n/a*	*n/a*	*n/a*	*n/a*	
7	Exterior Lighting Controls (sample only)	*n/a*	*n/a*	*n/a*	*n/a*	*n/a*	
8	Install Premium-Efficiency Motors (5 Hp)	$833	1,752	0.2	$117	6.95	2
9	Adjust Sludge Digestion Air Production	$2,700	43,131	0.0	$2,890	0.95	2, 3
10	Reduce Aeration (Nov – Apr)	0	11,388	0.0	$764	0	2
11	Reduce System I&I – Reduce Storm Pumps	Unk	65,370	0.0	$4,380	Unk	2, 3
	Pre-Conservation Totals (Refer to Table 4.1)		391,036		$26,548		
	Total Estimated Implementation Cost (From ECO's)	$5,398					4
	Total Potential Electrical Energy Savings (From ECO's))		123,581				
	Total Potential Electrical Demand Savings (From ECO's)			1.11			
	Total Potential Cost Savings (From ECO's)				$8,280		
	Total Simple Payback (calculated)					0.96	4
	Potential Post-Conservation Difference Totals		267,455		$18,268		
	Potential Post-Conservation Savings Percentages		31.6%		31.2%		

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Case Studies…#2

- Wasteville WWTP
  - Village Population 1,397
  - Facility Constructed 1979
  - Flow (MGD): 0.25 Design, 0.081 Actual
  - Annual Energy Use = 416,800 kWh / yr
  - Annual Energy Cost = $ 23,745 / yr
  - Average Energy Cost = $ 0.057 / kWh
  - Energy Use = 14,098 kWh / MG
  - Treatment Cost = $ 803.15 / MG

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Case Studies…#2

- Wasteville WWTP
  - Initial Assessment:
    - Small Size
    - Relatively Aged (over 30 yrs)
    - Low Energy Cost ($0.057/kWh) for Region
    - High Energy Use (14,098 kWh / MG)
    - High Treatment Cost ($803 / MG)

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Case Studies…#2

- Wasteville WWTP
  - Focused Analysis – Aeration System
    - 50-hp Blower Motor, 24 hrs / 7 days
    - Deteriorated Diffuser System
  - Main Opportunity
    - Repair/Replace Diffusion from Coarse to Fine
      - Over 35% increase in Oxygen Transfer
    - Decrease Blower Size
      - From 50-hp to 15-hp
    - Maintain Treatment Quality

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Case Studies…#2

- Wasteville WWTP
  - Energy Conservation Opportunities
    - Annual Energy Use = 162,223 kWh / yr
      - A 254,567 kWh Savings (61%)
    - Annual Energy Cost = $ 8,985 / yr
      - A $14,760 /yr Savings (62%)
    - Energy Use = 5,487 kWh / MG
    - Treatment Cost = $ 303 / MG
    - Cost of Opportunities = $29,970
      - 2.03 year Simple Payback

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Case Studies…#3

- Oopsburgh WTP
  - Village Population 3,308
  - Facility Constructed 1993
  - Production (MGD): 1.0 Design, 0.401 Actual
  - Annual Energy Use = 1,009,407 kWh / yr
  - Annual Energy Cost = $ 67,635 / yr
  - Average Energy Cost = $ 0.067 / kWh
  - Energy Use = 6,897 kWh / MG
  - Treatment Cost = $ 462 / MG

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Case Studies…#3

- Oopsburgh WTP
  - Initial Assessment:
    - Small Size
    - Moderately Aged (over 15 yrs)
    - Low Energy Cost ($0.067/kWh) for Region
    - Moderate Energy Use (6,897 kWh / MG)
    - High Production Cost ($462 / MG)

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Case Studies…#3

- Oopsburgh WTP
  - Focused Analysis – Distribution
    - 3 – High Service Pumps, 100-hp, 60-hp, 50-hp
    - 100-hp Pump Used Daily, Throttled Back
    - Pump Curves Indicated Capacity Same as 60-hp
  - Main Opportunity
    - Use 60-hp Pump at 100% (Optimum Efficiency)
    - A $ 9,275 No-Cost Savings
    - Maintain Production Volume

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Case Studies…#3

- Oopsburgh WTP
  - Energy Conservation Opportunities
    - Annual Energy Use = 813,801 kWh / yr
      - A 195,606 kWh Savings (19%)
    - Annual Energy Cost = $ 54,010 / yr
      - A $13,625 /yr Savings (20%)
    - Energy Use = 5,560 kWh / MG
    - Treatment Cost = $ 369 / MG
    - Cost of Opportunities = $10,300
      - 0.76 year Simple Payback

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Case Studies…#4

- Lift Valley WWTP
  - System with Multiple Lift Stations
    - Duplex, Submersible
  - Tariff Classifications
    - Tariff 211 – Small General Service
      - Usage Billing, No Demand
    - Tariff 215 – Medium General Service
      - Use and Demand Billing
      - Demand Over 10kW / 12-mo Time Period

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Case Studies…#4

- Lift Valley WWTP
  - Medilla Ave Pump Station
    - Tariff 211 – Small General Service

Meter 216596327

Energy Use (kWh)	Actual Demand (kW)	Demand Billed (kW)	Energy Cost ($)	Energy Cost ($/kWh)
102	0.684		$19.83	$0.194
93	0.922		$19.42	$0.209
94	0.432		$19.49	$0.207
106	0.774		$20.29	$0.191
89	0.405		$19.16	$0.215
111	1.327		$20.65	$0.186
71	0.981		$18.00	$0.254
142	1.008		$22.73	$0.160
113	0.684		$20.81	$0.184
113	1.048		$20.81	$0.184
93	0.436		$19.44	$0.209
117	0.409	0.400	$21.05	$0.180
1244			$241.68	$0.194
104			$20.14	$0.194

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Case Studies…#4

- Lift Valley WWTP
  - Maiden Ave Pump Station
    - Tariff 215 – Medium General Service

Meter 97255941

	Energy Use (kWh)	Actual Demand (kW)	Demand Billed (kW)	Energy Cost ($)	Energy Cost ($/kWh)
Dec-07	689	4.984		$82.14	$0.119
Jan-08	562	4.114		$76.21	$0.136
Feb-08	636	1.003		$80.41	$0.126
Mar-08	747	6.053		$91.42	$0.122
Apr-08	538	4.941		$74.87	$0.139
May-08	684	10.935		$108.57	$0.159
Jun-08	510	8.299	8.300	$87.55	$0.172
Jul-08	643	8.240		$94.69	$0.147
Aug-08	500	3.137		$72.86	$0.146
Sep-08	454	8.272	8.300	$84.36	$0.186
Oct-08	539	1.922		$75.07	$0.139
Nov-08	522	1.765	5.000	$74.11	$0.142
Total	7024			$1,002.26	$0.143
Average Per Month	585			$83.52	$0.143

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Case Studies…#4

- Lift Valley WWTP
  - Side-By-Side Comparison
    - Tariff 215 – Tariff 211

	Meter 97255941					Meter 216596327				
	Energy Use (kWh)	Actual Demand (kW)	Demand Billed (kW)	Energy Cost ($)	Energy Cost ($/kWh)	Energy Use (kWh)	Actual Demand (kW)	Demand Billed (kW)	Energy Cost ($)	Energy Cost ($/kWh)
Dec-07	689	4.984		$82.14	$0.119	102	0.684		$19.83	$0.194
Jan-08	562	4.114		$76.21	$0.136	93	0.922		$19.42	$0.209
Feb-08	636	1.003		$80.41	$0.126	94	0.432		$19.49	$0.207
Mar-08	747	6.053		$91.42	$0.122	106	0.774		$20.29	$0.191
Apr-08	538	4.941		$74.87	$0.139	89	0.405		$19.16	$0.215
May-08	684	10.935		$108.57	$0.159	111	1.327		$20.65	$0.186
Jun-08	510	8.299	8.300	$87.55	$0.172	71	0.981		$18.00	$0.254
Jul-08	643	8.240		$94.69	$0.147	142	1.008		$22.73	$0.160
Aug-08	500	3.137		$72.86	$0.146	113	0.684		$20.81	$0.184
Sep-08	454	8.272	8.300	$84.36	$0.186	113	1.048		$20.81	$0.184
Oct-08	539	1.922		$75.07	$0.139	93	0.436		$19.44	$0.209
Nov-08	522	1.765	5.000	$74.11	$0.142	117	0.409	0.400	$21.05	$0.180
Total	7024			$1,002.26	$0.143	1244			$241.68	$0.194
Per Month	585			$83.52	$0.143	104			$20.14	$0.194

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Case Studies…#5

- Askin' WWTP
  - Village Population 228
  - Facility Constructed 1977
  - Production (MGD): 0.40 Design, 0.39 Actual
  - Annual Energy Use = 28,064 kWh / yr
  - Annual Energy Cost = $ 10,255 / yr
  - Average Energy Cost = $ 0.37 / kWh
  - Energy Use = 1,776 kWh / MG
  - Treatment Cost = $ 649 / MG

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Case Studies…#5

- Askin' WWTP
  - Initial Assessment:
    - Very Small
    - Aged (over 35 yrs)
    - Very High Energy Cost for Region
    - Moderate Energy Use
    - High Production Cost

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Case Studies…#5

- Askin' WWTP
  - Focused Analysis – Operations
    - Equipment Age
    - Throttled Aeration Valves
    - Effluent Discharge Limits
  - Main Opportunity
    - Energy Rates

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Case Studies…#5

- Askin' WWTP
  - Energy Conservation Opportunities
    - Annual Energy Use = 18,747 kWh / yr
      - A 13,219 kWh Savings (41%)
    - Annual Energy Cost = $ 6,257 / yr
      - A $4,756 /yr Savings (43%)
    - Energy Use = 1,194 kWh / MG
    - Treatment Cost = $ 398 / MG
    - Cost of Opportunities = $1,913
      - 0.4 year Simple Payback

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Case Studies…#5

- Askin' WWTP
  - Energy Conservation Opportunities
    - Call to Kentucky Utilities
      - Incorrect Billing Structure
      - 60-70% Cost Savings Immediate!
      - Will Change Savings From Previous Slide…

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Case Studies…#5

Facility Name	**Livingston WWTP**
Facility Address	US 25 (PO Box 654)
Energy Provider	Kentucky Utilities
Account Number:	3000-0586-0782
Meter Number:	M536675
Tariff Structure:	Secondary Service

7/17/2013

228	Population
100	Service Connections/Meters
0.040	MGD Design Capacity
0.043	MGD Plant Avg Treatment/Production
1977	Year Built/Renovated
24	Hours of Operation per Day
189	Gallons per Person per Day
430	Gallons per Connection per Day

2011 Analysis Year

Bill Month	Initial Read	Final Read	Billing Days	Read Act/Est	Energy kWh	Demand kW	Load Factor[1]	Bill $	Cost $/kWh	Plant MG[3]	$/MG	kWh/MG
January	12/14/2010	1/17/2011	34	R	3,592	9.9	0.445	$ 852.87	$ 0.237	0.890	$ 958	4036
February	1/17/2011	2/14/2011	28	R	2,680	9.3	0.429	$ 818.19	$ 0.305	1.058	$ 773	2532
March	2/14/2011	3/16/2011	30	R	2,834	10.5	0.375	$ 799.51	$ 0.282	0.786	$ 1,017	3606
April	3/16/2011	4/14/2011	29	R	2,722	12.5	0.313	$ 814.41	$ 0.299	2.201	$ 370	1237
May	4/14/2011	5/16/2011	32	R	3,080	14.7	0.273	$ 957.60	$ 0.311	1.772	$ 541	1739
June	5/16/2011	6/15/2011	30	R	2,477	10.5	0.328	$ 943.76	$ 0.381	1.245	$ 758	1990
July	6/15/2011	7/15/2011	30	R	1,676	8	0.291	$ 912.90	$ 0.545	0.774	$ 1,180	2167
August	7/15/2011	8/16/2011	32	R	1,617	8	0.263	$ 900.56	$ 0.557	0.486	$ 1,852	3326
September	8/16/2011	9/15/2011	30	R	1,566	6.9	0.315	$ 897.05	$ 0.573	0.895	$ 1,003	1751
October	9/15/2011	10/18/2011	33	R	2,084	7.5	0.351	$ 788.70	$ 0.378	1.264	$ 624	1648
November	10/18/2011	11/14/2011	27	R	1,471	7.3	0.311	$ 771.54	$ 0.525	2.186	$ 353	673
December	11/14/2011	12/14/2011	30	R	2,265	12.5	0.252	$ 797.68	$ 0.352	2.244	$ 355	1009
Total			**365**		**28,064**	**117.6**	**0.027**	**$ 10,254.77**	**$ 0.365**	**15.8002**	**$ 649**	**1776**
												0.043

2013 Analysis Year

Bill Month	Initial Read	Final Read	Billing Days	Read Act/Est	Energy kWh	Demand kW	Load Factor[1]	Bill $	Cost $/kWh	Plant MG[3]	$/MG	kWh/MG
April	3/16/2013	4/17/2013	32	R	1,928			$ 240.87	$ 0.125			
May	4/17/2013	5/14/2013	27	R	1,688			$ 219.41	$ 0.130			
June	5/14/2013	6/13/2013	30	R	1,871			$ 243.55	$ 0.130			
Total			**89**		**5,487**			**$ 703.83**	**$ 0.128**			
												0.000

$ 7,439.45	$ 0.237

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RCAP Audit Results:

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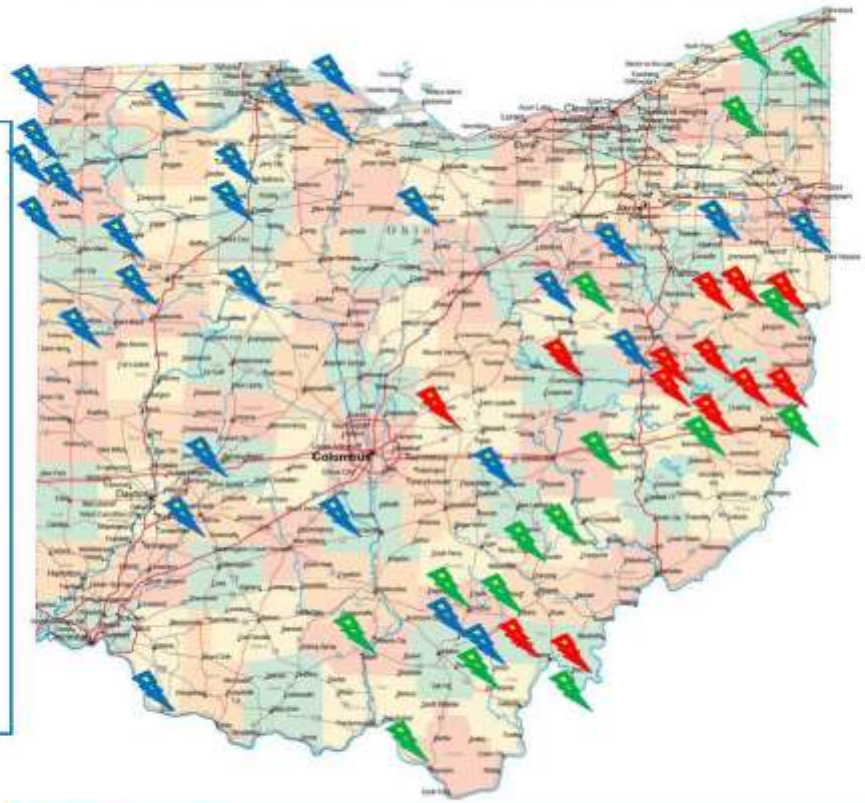
RCAP Energy Audits – United States of America

October, 2014

RCAP Energy Audits – State of Ohio

RCDI (USDA) Communities:

Alexandria, OH WWTP
Belmont Co., OH WTP
Belmont Co., OH WWTP
Buckeye Water WTP
Cadiz, OH WTP
Cadiz, OH WWTP
Carrollton, OH WTP
Coshocton, OH WWTP
Dillonvale, OH WTP
HCWSD Piedmont, OH WTP
HCWSD Tippecanoe, OH WWTP
Rutland, OH WWTP
Salineville, OH WWTP
~~Syracuse-Racine, OH WWTP~~
Tiltonsville, OH WTP
~~Wellsville, OH WWTP~~
(13 Communities, 16 Audits)



ARC Communities:

Albany, OH (Le-Ax) WTP
~~Andover, OH~~
Bethesda, OH WWTP
~~Coal Grove, OH~~
Holmesville, OH WWTP
~~McArthur, OH~~
Piketon, OH WTP
Piketon, OH WWTP
Pleasant City, OH
Racine, OH WTP
Rio Grande, OH WWTP
Rock Creek, OH
Stockport, OH WWTP
Tiltonsville, OH WWTP
Trimble, OH (SCVWD) WTP
Wellsville, OH WWTP
West Farmington, OH
(16 Communities, 15 Audits)

Other Communities:

Hicksville, OH WWTP
Vinton, OH WWTP
Canal Fulton, OH WWTP
North Baltimore, OH WWTP
Earnhart Hills WTP
Sandusky Co. Chamber
Convoy, OH WWTP
Earnhart Hills WWTP (3)
Yellow Springs, OH WTP

October, 2014

RCAP Opportunities

- Large Percentage of Operational Savings
  - Versus Equipment Costs
  - Typically Low/No Cost with Operations
- Build Comparable Database for Small Systems
  - Initial Assessments
  - Recommendations for Opportunities
- Create Continuity of Process
- Improve Overall Utility Operations
- Document Performance

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Ohio RCAP Results?

- Grant Efforts
- Direct Contracting
- Workshops
- Trainings

- Average 25% Savings
  - Energy and Costs
  - Less than 1-Year Simple Payback

Ohio RCAP
Rural Community Assistance Program

Questions?

- Thank you for your interest!

RCAP National Initiative

Ohio RCAP Initiative

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Ohio RCAP
Rural Community Assistance Program