

# THERE IS SOMETHING IN THE WATER! IT'S ENERGY SAVINGS

Midwest Energy Efficiency Alliance

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**focus on energy**<sup>®</sup>

Partnering with Wisconsin utilities

# FOCUS ON ENERGY

- Wisconsin's statewide energy efficiency and renewable energy program
- Began in 2001
- Leading innovator of energy efficiency and renewable energy programs
- Proactively addressed water related energy savings in the 2014 Quadrennial Planning Process
- In 2015 developed "Guidelines to Estimate Water-Related Energy Savings"

# FOCUS ON ENERGY

In February 2015 – “the Commission determined it is reasonable for Focus on Energy (Focus) to offer incentives for cost-effective energy savings resulting from water-saving measures that also reduce the energy involved with supplying water to and/or treating wastewater from homes and businesses.”

# FOCUS ON ENERGY

- Challenge – how to determine energy savings from water and/or wastewater collection, conveyance, treatment and distribution
- Forecast savings on simple ratios of energy use per gallon of water processed.
- Wisconsin was positioned to utilize local available data

# FOCUS ON ENERGY – WATER

- Analyze energy use based on number of customers served
- Class AB more than 4,000 customers; Class C between 1,000 and 4,000 customers and Class D less than 1,000 customers
- Analyze energy use on type of water source: groundwater or surface water
- Focus on Energy 2006 “Water and Wastewater Energy Best Practice Guidebook”, 2002 University of Wisconsin study and Commission staff 2013 analysis of energy use by water utilities
- Data used to identify kWh/1,000 gallons

# FOCUS ON ENERGY – WASTEWATER

- The Focus on Energy 2006 “Water and Wastewater Energy Best Practice Guidebook” provided the best in-state data
- Other studies were reviewed for reference: California Energy Commission, Electric Power Research Institute and River Network
- Water Environment Research Foundation (WERF) has also developed energy values for wastewater

# WASTEWATER METRICS

Wastewater System Type and Flow Range	kWh per 1,000 Gallons	Percent of Total WI Wastewater Treated	Weighted kWh per 1,000 Gallons
Activated Sludge: 0-1 MGD	5.44	2%	0.11
Activated Sludge: >1 MGD	2.40	73%	1.75
Aerated Lagoon and Oxidation Ditch: All	7.09	25%	1.77
Wastewater kWh per 1,000 Gallons for Prescriptive Measures			3.63

# WATER METRICS

Water Source	kWh per 1,000 Gallons	Percent of Total WI Water Supplied	Weighted kWh per 1,000 Gallons
Groundwater	2.05	55%	1.13
Surface	1.98	45%	0.89
Wastewater kWh per 1,000 Gallons for Prescriptive Measures			2.02



# IMPLEMENTATION

- Focus on Energy has financial incentives to help customers implement projects. Based on the Commission's recommended energy to water ratios, energy savings from water reduction can also be considered in incentive calculations.
  - Custom incentives are for non-standard projects and based on estimated energy savings for the first year of operation. Custom incentives can also include incentives for water savings.
  - Prescriptive incentives are for one-for-one replacements and use standard savings calculations (example: VFDs, lighting)

# PROJECT #1 – PULP AND PAPER CUSTOMER

## Project Description

- Switch the water source for chemical injection system from fresh water to clarified process water
- Process water was at the required temperature for the chemical systems resulting in thermal energy and freshwater savings

# PROJECT #1 – PULP AND PAPER CUSTOMER

Energy Savings

- -192,213 kWh (added pumping)
- 717,694 therms
- \$234,548 annual cost savings

Water Savings

- 44,064,000 gals/yr
- 193,181 kWh annually
- \$19,473 annual savings

Water Savings Derivation

- Supply  $\frac{1.98 \text{ kWh}}{1000 \text{ gals}} \times 44,064 \times 1000 \text{ gals} = 87,427 \text{ kWh}$
- Treatment  $\frac{2.40 \text{ kWh}}{1000 \text{ gals}} \times 44,064 \times 1000 \text{ gals} = 105,754 \text{ kWh}$

# PROJECT #2 – PACKAGING MANUFACTURER

## Project Description

- Customer had inefficient, water-cooled DX cooling unit. Unit utilized a cooling tower to reject heat
- Solution was to replace existing DX unit with a new air handler with chilled water coils, eliminating the compressor load and associated heat load on the chiller.
- Decreased heat load on the chiller translates to decreased heat rejection to the cooling tower, resulting in lower evaporative water loss (some water supply savings)

# PROJECT #2 – PACKAGING MANUFACTURER

Energy Savings

- 694,403 kWh
- \$56,593 annual cost savings

Water Savings

- 1,933,206 gals/yr
- 3,828 kWh annually
- \$312 annual savings

Water Savings Derivation

- Supply  $\frac{1.98 \text{ kWh}}{1000 \text{ gals}} \times 1,933 \times 1000 \text{ gals} = 3,828 \text{ kWh}$

# PROJECT #3 – CORRUGATED PACKAGING MANUFACTURER

## Project Description

- Install a new primary condenser on a heat recovery system
- The new condenser's design improved the heat recovery in the first stage, reducing the heat recovery in the secondary condenser, and ultimately reducing cooling water required.
- The new condenser reduced the amount of overflow from a hot water tank, reducing required supply water
- Reduced flow from the hot water tank of 469 gallons per minute
- Electric savings penalty for decrease in steam turbine generation

# PROJECT #3 – CORRUGATED PACKAGING MANUFACTURER

Energy Savings

- -4,583,256 kWh
- 1,380,527 therms
- \$265,681 annual cost savings

Water Savings

- 241,746,000 gals/yr
- 478,657 kWh annually
- \$24,635 annual savings

Water Savings Derivation

- Supply  $\frac{1.98 \text{ kWh}}{1000 \text{ gals}} \times 241,746 \times 1000 \text{ gals} = 478,657 \text{ kWh}$

# PROJECT #4 – PULP & PAPER MANUFACTURER

## Project Description

- Install a water filtration system to clarify process water for re-use in the showers on a paper machine
- Process water is already at desired temperature which eliminates the need to heat the water
- Recycling the water eliminates treatment of the same volume of water
- Electric penalty for increased pumping energy



# PROJECT #4 – PULP & PAPER MANUFACTURER

Energy Savings

- -110,602 kWh
- 525,480 therms
- \$148,827 annual cost savings

Water Savings

- 100,800,000 gals/yr
- 241,920 kWh annually
- \$14,325 annual savings

Water Savings Derivation

- Treatment  $\frac{2.40 \text{ kWh}}{1000 \text{ gals}} \times 100,800 \times 1000 \text{ gals} = 241,920 \text{ kWh}$

# PROJECT #5 – BREWERY

Project  
Description

- Install a heat recovery system to recover the heat from boiler exhaust
- Heat recovery reduces supplemental steam heat and therefore steam demand
- Decreased steam flow reduces water needed for the boiler
- Electric penalty for increased pumping energy

# PROJECT #5 - BREWERY

Energy Savings

- -151,814 kWh
- 340,050 therms
- \$84,893 annual cost savings

Water Savings

- 2,081,951 gals/yr
- 4,268 kWh annually
- \$376 annual savings

Water Savings Derivation

- Supply  $\frac{1.98 \text{ kWh}}{1000 \text{ gals}} \times 2,082 \times 1000 \text{ gals} = 4,268 \text{ kWh}$

# CONTACT INFORMATION

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