

FOCUS ON ENERGY

WVOA 49TH ANNUAL CONFERENCE

Focus on Energy, Incentives,
and Energy Saving Opportunities



Neil Howell – Agriculture, School and Government
Joseph Cantwell P.E. – Large Energy Users

October 7, 2015



focus on energy™

Partnering with Wisconsin utilities

WHAT IS FOCUS ON ENERGY?



Wisconsin utilities' statewide program for energy efficiency and renewable energy.

WHAT IS FOCUS ON ENERGY?

- A partnership of all of Wisconsin's investor owned utilities (WPS, Xcel Energy, Alliant Energy, We Energies, etc.), as well as most of the state's electric cooperatives and municipal utilities
- A single statewide energy efficiency and renewable energy program, rather than separate programs in each utility territory

PROGRAM OVERVIEW

- The Focus on Energy Program provides financial incentives through the AgSG and the Industrial LEU Program to encourage implementation of energy efficiency modifications to water and wastewater systems
- Energy Advisors are available throughout the state to assist on energy savings projects
- Examples of Focus on Energy prescriptive incentives for installation of equipment for your facility include:
 - Lighting
 - Heating and Cooling Systems
 - Variable speed drives

PROGRAM ELIGIBILITY

- **Customers eligible for the program include:**
 - Residential
 - Business
 - Industrial (LEU)
 - Water/Wastewater
 - Agriculture, Schools & Government (AgSG)
 - Water/Wastewater

FOCUS ON ENERGY BUSINESS INCENTIVES

- Large Energy User Program
 - Facilities, municipal and/or industrial, with a utility bill that was at least \$60,000 in one month in the past year, and used over:
 - 1,000 kW of demand for any given month in the past year **OR**
 - 100,000 Therms for any given month in the past year
- Agriculture, Schools and Government Program
 - Municipal facilities under 1,000 kW of annual demand
 - Generally smaller water and wastewater systems

2015 AgSG ENERGY ADVISOR TERRITORY MAP

- **Bobbi Rongstad**
 brongstad@cesa10.k12.wi.us
 715.893.2305
- **Al Bohl**
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 715.720.2154
- **David Voss**
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 715.720.2166
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- **Chris Seitz**
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 715.720.2129



Depending on the type of project and level of participation, customers may be assigned to other Advisors that better match their needs. This may include reassigning based on Advisor's experience in a specific industry, past project experience, or customer relationship.

- **Nicole Zaidel**
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- **Bill Plamann**
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 715.720.2135
- **Joe Kottwitz**
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 715.720.2157
- **John Berget**
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 715.720.2151

PRESCRIPTIVE INCENTIVES

Direct replacement of qualifying equipment

1. Verify customer and product eligibility;
Applications available at
focusonenergy.com/applications
2. Purchase and install the equipment
3. Submit completed incentive application with
proof of payment
4. Receive incentive check in the mail

CUSTOM INCENTIVES

1. Contact the Energy Advisor
2. Work with Energy Advisor to calculate energy savings and incentive amount
3. Customer signs Incentive Agreement. This document serves as pre-approval.
4. Purchase and install equipment
5. Submit completion documentation and receive incentive!

TAKEAWAYS FROM FOCUS ON ENERGY

- Energy awareness – management
- Energy use knowledge is critical
- Energy efficiency without impact to effluent limits
- Significant savings available
- System assessment necessary
- Long-term savings
- Publicize need for energy efficiency

WHY ENERGY EFFICIENCY OPPORTUNITIES EXIST AT WASTEWATER UTILITIES

- Equipment selection driven by design conditions (design codes) and meeting peak design conditions
- Equipment has limited turndown capability
- Focus on operating all equipment on site
- Community did not grow as forecasted in the Facilities Plan
- Major contributor(s) (industries) closed down or moved
- Many WWTF's are operating at 30 to 35% design conditions
- No requirement to meet low flow or existing conditions
- Presently no code for energy efficiency

WHY BECOME ENERGY EFFICIENT?

- Reduce energy use
- Right action to take
- Environmental steward
- Become a community leader
- Manage your energy budget - control operating costs
- Improve equipment and process operation

ENERGY BENCHMARKING

Top performance quartiles and best practice benchmarks for Wisconsin wastewater facilities

Facility Type	Flow Range (MGD)	Average Energy Use (kWh/MG)	Top Performance Quartile (kWh/MG)	Best Practice Benchmark (kWh/MG)	Average Potential Savings ¹
Activated Sludge	0 - 1	5,440	< 3,280	3060	44%
	1 - 5	2,503	< 1,510	1650	34%
	> 5	2,288	< 1,350	1760	23%
Aerated Lagoon	< 1	7,288	< 4,000 ²	3540	51%
Oxidation Ditch	< 1.2	6,895	< 4,000 ³	4320	37%

ENERGY USE INCREASE

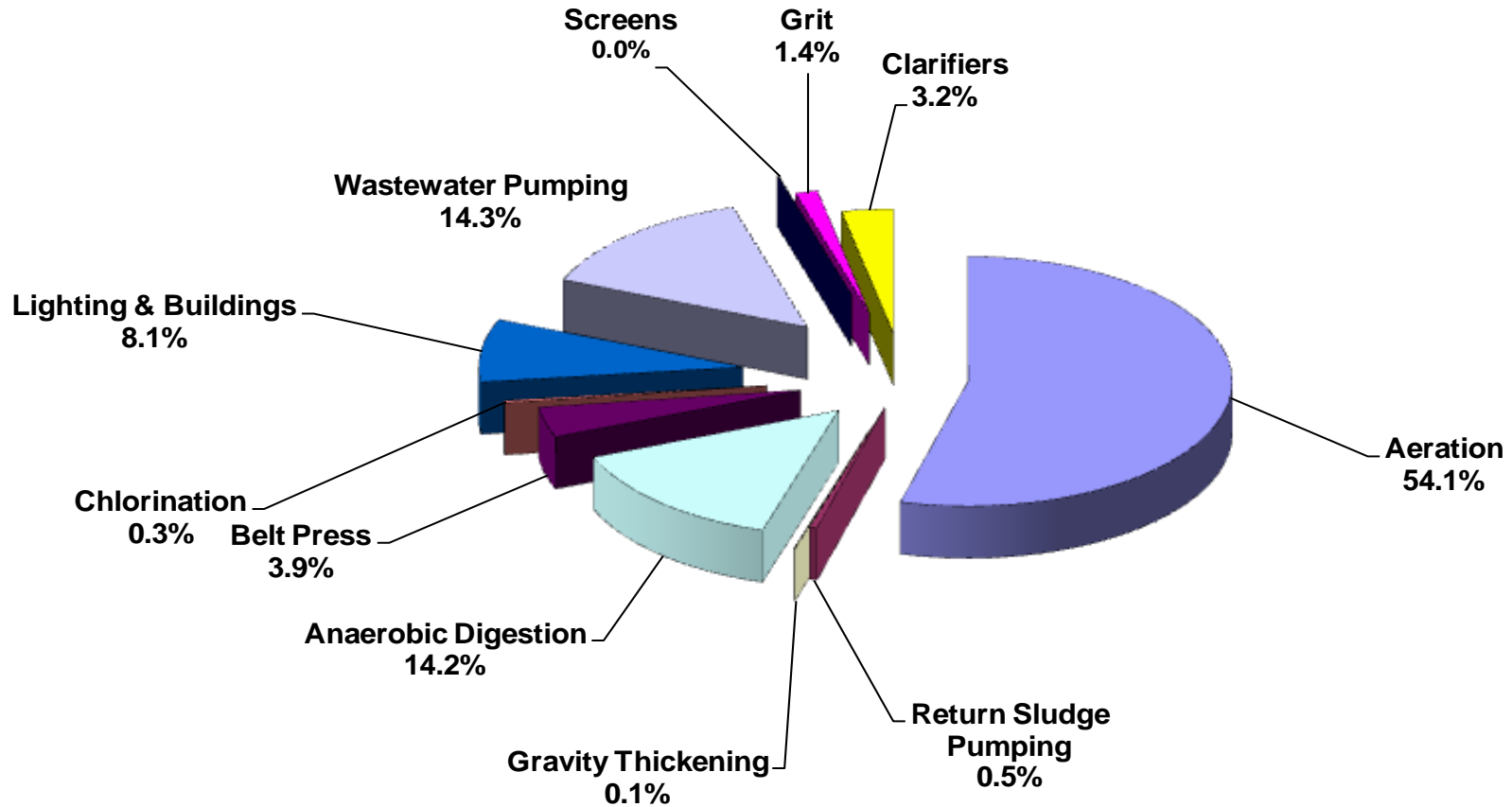
Table ES-1

Comparison of Annual Electricity Use Between 1996 Report and Now

	Annual Electricity Use (billion kWh/yr)		Percent Increase
	1996 Report	Current Study	
Public Water Supply and Treatment	28.3	39.2	39%
Municipal Wastewater Treatment	17.4	30.2	74%

Electricity Use and Management in the Municipal Water Supply and Wastewater Industries,
Nov 2013 – S. Pabi, A. Amarnath, R. Goldstein, L. Reekie

WASTEWATER ENERGY ASSESSED USE



Electricity requirement for typical activated sludge facilities (WEF)

Data derived from the Water Environment Energy Conservation Task Force *Energy Conservation in Wastewater Treatment*

ENERGY AWARENESS

Identify where you're at today **(baseline)** ...
... so you can figure out where
you want to go tomorrow
(benchmark).

Energy awareness leads to ...
...energy management.

ENERGY EFFICIENCY OPPORTUNITIES



- Install flexible membrane diffusers
- Reduce blower size
- Update blower technology
- Check sheave sizes on positive displacement blower
- Install dissolved oxygen monitoring, controls
- Enhance primary treatment

ENERGY EFFICIENCY OPPORTUNITIES

- Thicken waste solids
- Beneficially utilize generated biogas
- Improve equipment size selection
- Apply fine-bubble technology – applicable in aerated lagoons
- Install variable speed drives, DO control in oxidation ditches
- Assess modular systems
- Recycle “used” water
- Design flexible treatment process



ENERGY EFFICIENCY OPPORTUNITIES



- Manage on-peak electric demand
- Rotate lead-lag blowers, pumps
- Switch ultraviolet banks
- Change time for pump (equipment) maintenance
- ‘Bump’ aeration diffusers
- Operate sludge tank mixers
- Turn on blower to raise DO concentration

SIMPLE ACTIONS TO TAKE

Simple Energy Efficiency Opportunities:

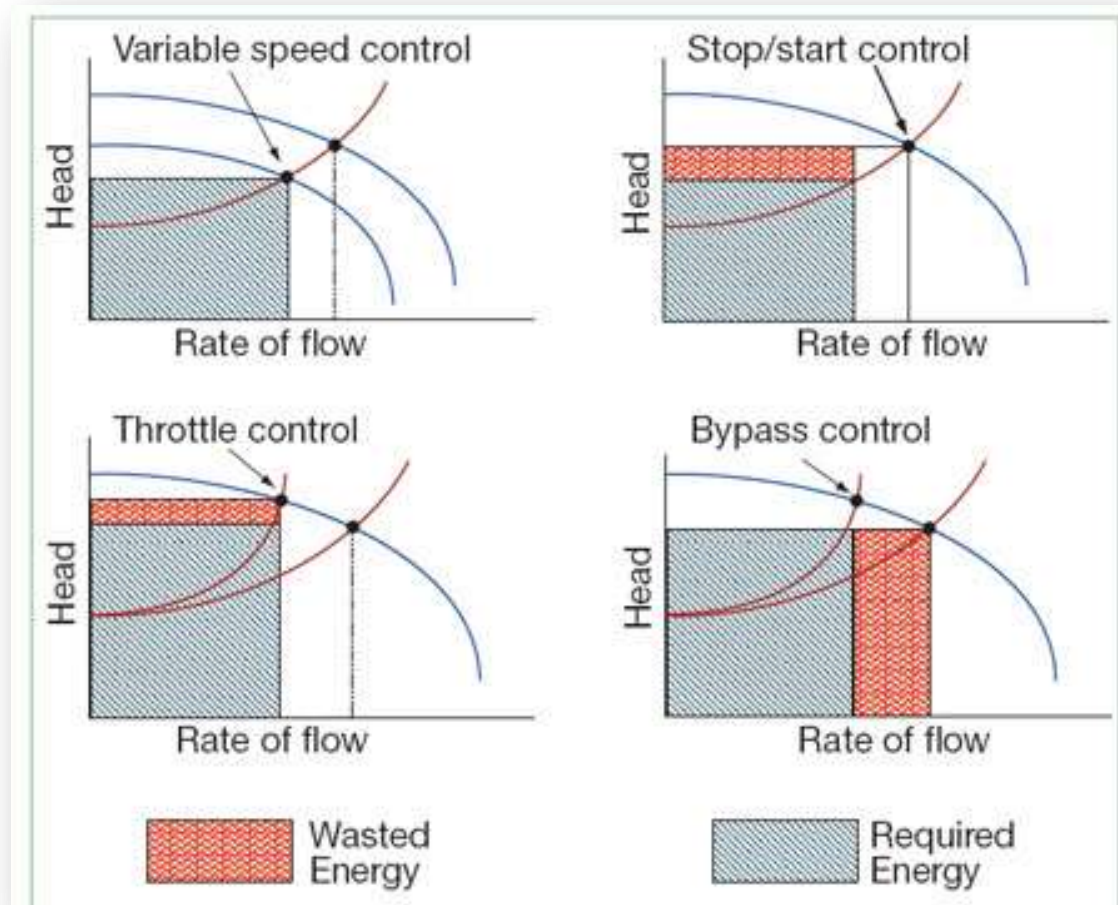
- Air main leaks?
- Does piece of equipment need to be operating?
- What sheaves are on blower?
- A major contributor (industry) closed...were operations adjusted?
- Do all the lights need to be on?
- Do all aeration tanks need to be operating?
- Can blower to digester be turned off?
- Are exterior lights on continuously?
- What about demand management?
- How do you manage peak hydraulic flows?

IS VARIABLE SPEED ALWAYS BENEFICIAL?

- Do you pump a wide range of flows?
- How much of system headloss is static?
- How much is dynamic?
- Can the existing pump accept a VSD?
- Will existing pump curve work well with speed variations?

VSD is not always applicable – a detailed assessment should be completed

WASTED ENERGY IN ALTERNATIVE CONTROL SCHEMES



Courtesy of Hydraulic Institute, Parsippany, NJ, www.pumps.org

BEST PRACTICES

Best Practices – *techniques or technologies generally recognized as being economical and more energy-efficient than common or typical practices*



WASTEWATER PLANT PROJECT A

- New flexible membrane fine-bubble diffusers
- New DO monitoring and control
 - Pre-project 3-5 MG/L
 - Post-project 5+ MG/L with blowers as low as they can possibly go
- New high efficiency turbo-blowers with VFD's
- Pump upgrades, controls improved, SCADA modernized
- Aeration energy consumption:
 - Previously averaged 90 KW (120 HP)
 - New average of 30 KW (40 HP)
- Also found the new turbo blowers to be low maintenance because there are no wearing parts or lubricants



WASTEWATER PLANT PROJECT A

- \$427,011 project cost
- 60 peak kW saved
- 521,112 annual kWh saved
- \$43,388 annual savings
 - Pre-project = \$230/MG treated
 - Post-project = \$180/MG treated
- \$32,375 Focus on Energy Incentive
- ~ 9 year payback



MUNICIPAL WASTEWATER TREATMENT FACILITY B

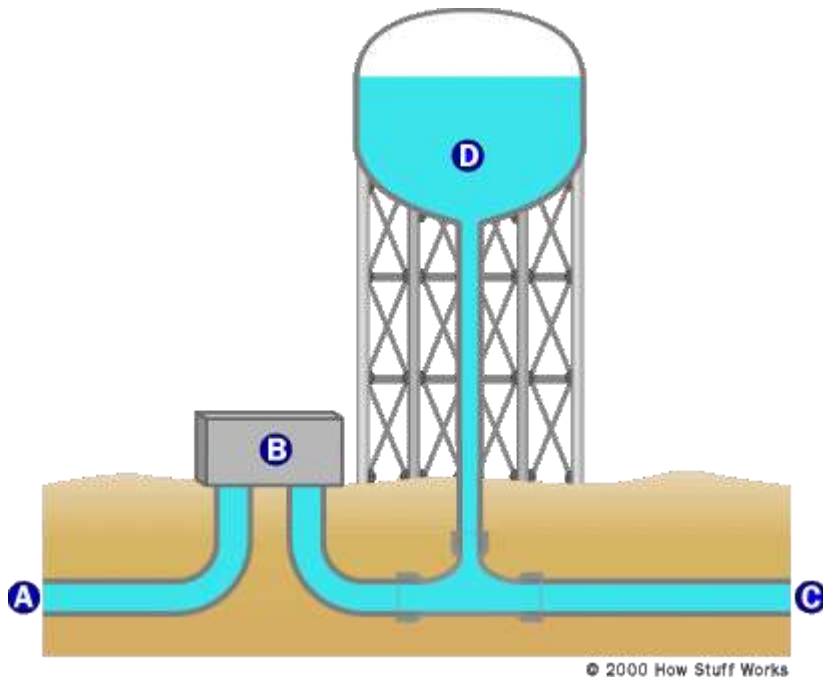
- Dual package, activated sludge treatment system design flow of 0.6 MGD
- Annual electric consumption of 474,590 kWh or 4,334 kWh/million gallons
- Fine-bubble aeration system with DO control, smaller capacity blowers installed
- 326,700 kWh/year savings resulted

MUNICIPAL WASTEWATER TREATMENT FACILITY C

- Aerated lagoon wastewater treatment facility consisting of three lagoons – two aerated, one settling
- Two aerated lagoons work using helixor aerators with 3 – 40 HP blowers
- Annual electric consumption 494,710 kWh/yr relating to 7,340 kWh/million gallons
- Village installed fine-bubble diffusion system, reduced existing blower's speed
- 264,000 kWh/yr energy savings



QUESTIONS ?



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