



Typical Energy Saving Opportunities at Water and Wastewater Treatment Facilities

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Typical Energy Saving Measures

Aeration Systems

- Dissolved Oxygen (DO) Monitoring Systems
- Automatic Blower/Intake Valve Controls
- Reduce DO Set-Points
- System Maintenance/Repair Leaks
- Increase Air Header Pipe Size to Reduce Losses
- Evaluate Blower Size/Type to Current Conditions



Typical Energy Saving Measures

Aeration Systems

- Consider “Lowest Load” Periods
- Turn Down on Centrifugal Blowers Limited by Surge Point
- Provide Positive Displacement Blower With VFDs
- Caution – Maintain Adequate Mixing



Typical Energy Saving Measures

Oxygen Transfer Efficiency

- Surface Aerators
- Coarse Bubble Diffusers
- Fine Bubble Diffusers



Pumping

Pumping Systems

- Evaluate existing pump efficiencies, install variable frequency drives, and pump controllers tied to level and/or process controls. Savings due to pump affinity law

Don't Throttle Pump Discharge

Influent Pumping

- Provide controls to maintain wet well level set point

Return Sludge Pumping

- Provide controls to match influent flow

Flow paced chemical feed pumping



Systems for Controlling the Rotational Speed of an Electric Motor

VFDs Control the Frequency of the Electrical Power Supplied to the Motor

Others

- Eddy Current Drives
- Liquid Rheostats



$$1. \quad \frac{Q_2}{Q_1} = \frac{n_2}{n_1}$$

Q = Flow (gpm)
n = Pump Speed (rpm)
H = Total Head (ft)
P = Power

$$2. \quad \frac{H_2}{H_1} = \left[\frac{n_2}{n_1} \right]^2$$

$$3. \quad \frac{P_2}{P_1} = \left[\frac{n_2}{n_1} \right]^3$$

If you can reduce the speed by 10%:
-You reduce your flow rate by 10%
-You reduce the system head by 19%
-You reduce your P by 27%



Pumping System Assessment Tool

- Developed by United States Department of Energy
- Returns Actual Pumping System Efficiency vs. Potential System Efficiency
- Utilizes Input of Simultaneous Pumping System Data
 - Influent/Effluent Pressure
 - Flow
 - Pump Speed
 - Power



High Efficiency Motor Energy

- Replace “standard” motors with premium efficient motors.
- Savings depends on:
 - Motor size
 - Equipment run time
 - Cost of motor
 - Cost of energy



Motor Master +

- Developed by the United States Department of Energy
- Free Download from DOE Web Site
- Database of Motors, Efficiencies, Pricing
- Calculates Simple Payback Periods of Motor Replacement Projects



Anaerobic Digestion

- Eliminate/Minimize Waste Gas Flaring
- Beneficial Use of Digester Gas
 - Co-Generation
 - Boilers
- Gas Conditioning
- 2/3 BTU of Natural Gas



Solids Handling

- Increase Percent Solids
- Polymer Addition
- Thickening/Presses/Centrifuges
- Minimize Amount of Water



Typical Energy Saving Measures

- Variable Frequency Drives
- Energy Monitoring Systems
- Opportunities for Recycling (i.e., waste heat recovery)
- Aeration System Optimization
- Cogeneration
- Peak Load Reduction
- Conservation and Training



Typical Energy Saving Measures

- Lighting Systems
- Building Envelope and Insulation Systems
- Utility Rate Structures
- Heating Controls
- Alternative Fuels
- Operation and Maintenance Procedures
- Equipment Replacement
- Energy Efficient Motors



Heating and Ventilation Energy

- Install Programmable Thermostats
- Evaluate Required Ventilation Rates Against Actual
- Reduce Areas that Require High Ventilation Rates (i.e., partition walls)
- Evaluate Heating Fuel Options

