Energy Management Initiative for Water and Wastewater Utilities– Summer 2012

City of Derby

Overview

One of the most effective ways for cities to reduce their costs and improve environmental performance is to improve energy efficiency. In U.S. cities, an estimated 30 to 40 percent of municipal energy use and associated operating budgets are spent treating water and wastewater. Rising energy costs add to the other challenges that water utilities are facing that include the need to expand services, meet more stringent regulations, and replace aging infrastructure. Because most of the energy used to pump and treat water in the Midwest comes from coal-fired power plants, significant quantities of air pollutants are also emitted as a result. Energy conservation can be a mechanism to improve both air and water quality as well as save money.

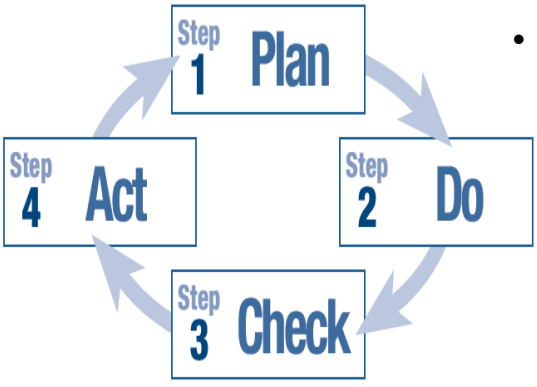
In May 2011, the U.S. Environmental Protection Agency (EPA) invited 10 Kansas communities to participate in an Energy Management Initiative for Water and Wastewater Utilities, a pilot program led by the Kansas Water and Energy Efficiency Partners (KANWE) which included the EPA Region 7 Office, Kansas Department of Health and Environment (KDHE), the Wichita State University Environmental Finance Center, Kansas State University, Kansas Municipal Utilities, and Schneider Electric. Five communities chose to participate in the pilot program which included developing an Energy Management Plan (EMP), implementing an energy efficiency project, maintaining data and sharing results.

About Derby's Water Treatment Utilities

The Derby Wastewater Treatment Plant (WWTP) treats approximately 1.8 million gallons of wastewater per day (MGD) and has a capacity of 2.5 MGD of wastewater influent at its maximum designed treatment level. The plant performs an activated sludge treatment process, with the majority of the wastewater process flow provided by gravity. The majority of the plant's effluent is released into the Arkansas River. The plant's wasted solid product is used in an agricultural land application.

Developing an Energy Management Plan

The KANWE partnership provided a low level energy assessment and a series of 4 workshops for community representatives during which each developed an Energy Management Plan for their respective communities. The training followed a plan/do/check/act sequence, as outlined in EPA's *Ensuring a Sustainable Future: An Energy Management Guidebook for Wastewater and Water Utilities.*



Prior to the initial workshop, the city was asked to compile an inventory of all major equipment at the wastewater plant. This assessment would provide energy efficiency project recommendations. During the workshops, participants set an energy goal and baseline, drafted an energy policy, formed an energy team, explored opportunities for saving energy, prioritized projects, developed near and longer term plans and developed a set of measures of success along with a schedule for implementation.

Derby's energy policy calls for the city to reduce energy use in wastewater utilities by 10% compared to their 2011 usage. The policy further sets out the following standards for day-to-day operations at each of their water treatment facilities:

- Lighting will be turned off in unoccupied areas, occupancy sensors installed, and compact fluorescent bulbs will replace halogen or incandescent bulbs.
- Regulate heating and cooling in buildings according to peak occupancy.
- Operate all electrical equipment at optimum ranges according to operation & maintenance plans.
- Provide training to employees to make sure each has knowledge and skills necessary to operate. equipment efficiently.

Project Selection

As part of Derby's Energy Management Plan, the city chose to implement one major project and one minor project. These were selected based on their regulatory impact, environmental impact, long-term impact, cost and constructability, and management support:

1. Install VFD's on Mixers
The energy audit report indicated that the city could find substantial savings associated with installing a better means for mixing inside the aerobic digesters through the use of VFD equipment to scale back energy output. It is estimated this will reduce the energy use by up to 20% on the mixers.

The VFD's allow the mixers to adjust according to the dissolved oxygen levels to meet the mandatory 2 mg per liter of processed wastewater. It became necessary to identify the benefit of reducing the energy consumption when comparing it to the costs to achieve the savings goal. The savings by implementing the VFD equipment is substantial. The total cost of equipment and installation would be paid for in 3.64 years. This would save the city more than $200,000 in energy savings over the life of the equipment which is estimated at 15 years.

2. Efficient Lighting Upgrades
Replacing five 1,000 watt high pressure sodium bulbs with 138 watt LED's with result in the city saving a total of $950 per year. Replacing 34, T12 fluorescents with T8 fluorescents, the city will save roughly $500 annually in lighting at the treatment plant.

By combining the $1,450 from the lighting changes with the $18,000 annual savings from the installation of the VFD project, it is reasonable to conclude the city will effectively reach their 10% energy savings goal, resulting in substantial savings.

"The program provided the framework for the city to identify savings opportunities and to understand how even the smallest operational changes could affect energy costs long term."

-Eddie Sheppard, Assistant Director of Public Works, City of Derby

Financing

To move forward with the projects, the city must determine how to approach funding. Typically the city uses two options for projects in this cost range. The first being to identify the project and add it to the Capital Improvement Plan (CIP) to be completed at a later date once funding is identified. In this case, it would most likely be funded with wastewater revenue, but this fund relies on the availability of funds at the end of the year. The City could also use an Energy Service Company (ESCO) to develop a performance contract to finance the project which would affirm the identified energy saving opportunities and then recommend a package of improvements to be paid by the energy savings over a

Next Steps

The next steps are for the city determine how the projects should be approached including, time, funding options, and how this project fits into the overall growth plan of the wastewater treatment plant. Looking for opportunities to save energy is going to be an important item as the city continues to face rising utility costs, slow economic growth, and steady budgets of the future. Savings opportunities like the VFD and lighting projects offer the city future relief. Proper planning to ensure project feasibility without jeopardizing already established plant funding will be important as the city looks to take on this project and others like it in the future.

The KANWE program provided an avenue for the city to identify energy saving projects that could provide savings for years to come. The search for energy efficiencies is an on-going process that often times translates to dollars saved for the city. Looking towards future projects, the city of Derby plans to apply the Energy Management System approach to other departments and programs.

Derby Wastewater Treatment Plant

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