

NYSERDA and Strategic Energy Management at Municipal Wastewater Treatment Facilities

by Gregory Lampman, Kathleen O'Connor and Amy Santos

Approximately 1.5 to 2 percent of the energy consumed in New York State is consumed by municipal wastewater treatment facilities. Subsequently, energy represents a substantial cost to New York State's municipal wastewater treatment sector. While some facilities have undertaken projects to improve energy efficiency, reduce energy consumption and recover energy from various treatment processes, many are just beginning to grasp the potential economic and environmental benefits of strategic energy management. However, the "perfect storm" of aging infrastructure, increasingly stringent environmental regulations and rising energy costs may be helping to bring these benefits to light.

To address the needs of municipalities as they become more aware of the opportunities and benefits of strategic energy management, the New York State Energy Research and Development Authority (NYSERDA) has developed a Municipal Water and Wastewater Efficiency Initiative. An overview of its programs is given later in this article.

Energy Consumption

Energy is consumed in all stages of the water use and treatment cycle, and the rate of use is increasing as facilities install new, energy-intensive technologies to address a variety of issues. **Table 1** displays electricity consumption data collected in a recent survey conducted by NYSERDA. On average, New York State municipal wastewater treatment plants consume between 1,100 and 4,620 kilowatt-hours (kWh) of electricity for every million gallons of wastewater treated.

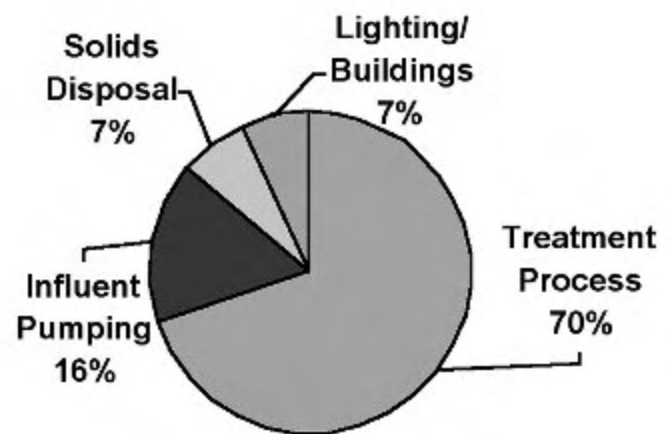
Coincidentally, energy prices are also on the rise. Based on current electricity prices, costs to treat and convey a million gallons of wastewater in New York State range from \$100 to \$500. In fact, approximately 35 percent of a typical municipality's energy budget is allocated to municipal water use and treatment.

Significant energy efficiency opportunities exist for most, if not all, municipal treatment facilities. In the survey conducted by NYSERDA, it is estimated that energy consumption at most facilities could be reduced by 10 to 20 percent with opportunities to reduce energy consumption at some facilities by up to 50 percent.

The most energy intensive processes at a typical wastewater treatment facility are shown in **Figure 1**. These processes represent the majority of opportunities to optimize energy at a typical facility. Specific opportunities include the installation of premium efficiency motors and variable speed drives; re-sizing of pumping systems, alternative pumping schemes and pump system upgrades;

installation of controls; building upgrades (e.g., lighting and HVAC improvements); and aeration system upgrades, including installation of automated dissolved oxygen control. It is important to remember that each facility is unique and, as such, not all opportunities are equally beneficial to all facilities. Individual facility evaluations to develop site-specific plans of action are recommended prior to beginning an energy project.

Figure 1. Average Percentage of Energy Use by Process in Wastewater Treatment Facilities



NYSERDA-Funded Programs

NYSERDA is a public benefit corporation established by the New York State Legislature in 1975. NYSERDA offers a variety of programs aimed at developing and implementing projects to improve energy efficiency, reduce energy consumption, and recover energy from various treatment processes through its **Municipal Water and Wastewater Efficiency Initiative**. These programs are described briefly here.

- The **FlexTech Program** provides cost-shared funding for customized facility evaluations aimed at developing energy projects. These evaluations are performed by pre-qualified consultants, and range in complexity depending on the requirements of the facility. Since 1998, NYSERDA has provided more than \$2.2 million in cost-shared funds for evaluations at more than 100 municipal treatment facilities.

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Table 1. Average Electricity Consumption per Million Gallons Treated for New York State Municipal Wastewater Treatment Facilities

Million Gallons per Day (MGD)	Average kWh/MG	% Statewide Capacity Capacity	% Statewide Energy Use*
<1	4,620	3.8	11.0
1 to <5	1,580	7.5	8.5
5 to <20	1,740	13.1	14
20 to <75	1,700	23.8	26.8
<75	1,100	51.8	39.7
Statewide	1,480	100	n/a

*kWh/MG = kilowatt-hours per million gallons. Values shown include collection system usage.

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- The **Enhanced Commercial Industrial Performance Program (ECIPP)** provides financial incentives for the implementation of energy projects. The ECIPP has three tiers, ranging from incentives for pre-qualified equipment (e.g., NEMA premium efficiency motors and variable speed drives) to performance based incentives for kWh savings guaranteed by a contractor/Energy Service Company (ESCO) for installed equipment. To date, 28 municipal treatment facilities have participated in the ECIPP, and will receive an estimated \$4.5 million in incentives.
- The **Anaerobic Digester Gas (ADG)-to-Electricity Program** provides incentives for the implementation of ADG-to-electricity projects at wastewater treatment facilities and farms. The program is one component of the Customer-Sited Tier of the New York State Renewable Portfolio Standard program, and offers capacity and performance-based electricity production incentives of up to \$1 million per facility.
- The **Research, Development and Demonstration (RDD) Program** provides cost-shared funding to develop, demonstrate, and pilot test innovative, energy efficient technologies. To date, approximately 40 projects have been funded, including the demonstration of an innovative anaerobic pretreatment technology, an evaluation of coarse mono-media filtration for treatment of combined sewer overflow sanitary sewer overflow, and development of ultraviolet light emitting diodes for water treatment disinfection applications.

Additional Resources

NYSERDA is also in the process of developing the **Energy Smart Focus on Municipal Water and Wastewater Facilities (Focus)** to help municipalities, their local elected officials, and the public they serve, breach the knowledge gap associated with energy efficiency as it relates to the municipal treatment sector. The goal of the Focus program is to raise awareness of the economic, environmental and operational benefits of energy efficiency, and to help overcome the institutional, political and financial barriers to implementing energy efficiency improvements. The Focus program will provide customized energy efficiency-related tools and resources including marketing/outreach materials and technical documents (e.g., self-assessment energy checklist, best practices fact sheets, “Ask the Expert” web link). The program will also offer energy-related operator training, as well as presentations developed for elected municipal officials and the public that is aimed at raising their awareness of the value of investing in energy efficiency improvements. As part of the Focus program, an **Infrastructure Alliance for Energy Efficiency** has been formed, which is comprised of various public, private and nonprofit organizations. The Alliance provides a statewide network for dissemination of materials and services developed through the Focus program.

NYSERDA has several other programs available to the sector, which are offered outside of the Municipal Water and Wastewater Efficiency Initiative. These include incentives and technical support for grid-integrated photovoltaics, wind energy, and combined heat-and-power systems; high-performance building design assistance; an

interest rate buy-down program for energy project-related loans; and peak load reduction incentives.

Further Information

Energy is consumed in all stages of the water use and treatment cycle and represents a substantial cost to New York State’s municipal wastewater treatment facilities. However, there are significant opportunities to cost effectively improve energy efficiency at these facilities, and NYSERDA funding is available to help develop and implement energy projects.

For detailed information on the programs offered through NYSERDA’s Municipal Water and Wastewater Efficiency Incentive, contact Gregory Lampman at 1-518-862-1090, extension 3372/ggl@nyserderda.org; Kathleen O’Connor, extension 3422, kmo@nyserderda.org; and visit <http://water.nyserderda.org>, or email water@nyserderda.org.

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