How Utilities Can Use an Energy Management Plan to Reduce Greenhouse Gases

**FACT SHEET**

**QUICK FACTS**
- Water utility energy costs are typically 1/3 of a municipality’s total energy bill
- Rising energy costs and additional emissions regulations highlight the need for creating an energy management plan
- Greenhouse gas emissions have grown about 1% a year since 1990

**REASONS FOR AN ENERGY MANAGEMENT PLAN**
There are a number of important reasons for water utilities to develop energy management plans, including:
- Increasing energy costs;
- Increasing demand for energy to treat water;
- Increasing demand for energy to distribute water in areas of rapid population growth;
- A growing need to meet local, regional, and state goals to reduce carbon dioxide and other greenhouse gas (GHG) emissions.

Water utility energy costs are typically one-third of a municipality’s total energy bill (EPA 2008). In addition, energy costs, specifically electricity, often represent the second largest expense in a water utility’s budget (next to staffing). Energy represents the largest controllable cost of providing water services (EPA 2008).
Energy costs are expected to increase, and the impact of these increases on operating budgets underscores the need for water utilities to develop energy management plans (EPA 2008). An energy management plan can help water utilities control and reduce energy costs. According to some estimates, water utilities can achieve between 10% and 30% savings through such a plan (Leiby and Burke 2011).

**IMPLEMENTING AN ENERGY MANAGEMENT PLAN**

An energy management plan will result in a road map for a water utility to implement high-priority energy and cost reduction programs. For instance, a utility may focus on reducing consumption from the largest sources of energy usage. If pumping represents a major area of energy consumption, then the utility may evaluate options that enable improved pumping efficiency.

Water utilities can use a seven-step approach to implementing an energy management plan (Leiby and Burke 2011):

- **Step 1.** Establish a utility commitment
- **Step 2.** Establish a baseline
- **Step 3.** Identify opportunities for improvement
- **Step 4.** Evaluate and quantify changes
- **Step 5.** Implement changes
- **Step 6.** Evaluate and track progress
- **Step 7.** Communicate and promote success

**LEADING PRACTICES IN ENERGY MANAGEMENT**

Benchmarking is a tool for performance improvement through systematic search and adaptation of leading practices. It is a practical tool to help water utilities improve energy efficiency. Performance assessment and performance improvement are consecutive components of benchmarking (Cabrera et al. 2011).

A number of leading practices associated with energy management have been identified using a benchmarking methodology. These are interrelated and should be considered together as the water utility develops and implements an energy management plan (Jacobs, Kerestes, and Riddle 2003; SAIC 2006):

- Conduct facility energy assessments annually to identify opportunities to improve energy efficiency
- Monitor real-time energy to permit the collection and analysis of energy data for each treatment process and pump installation
- Educate facility personnel so that all system personnel (including board or council members) understand the relationship between energy efficiency and facility operations
- Reduce electrical peak loads to lower energy cost
- Manage electric rate structure; determine the most appropriate pricing structure based on peak demand and overall energy consumption
- Idle or turn off nonessential equipment, especially during periods of peak power demand
- Install high-efficiency motors
- Install variable-speed technologies
- Optimize pump system efficiency
- Clearly define goals and objectives, and set the design criteria for system improvements
- Evaluate renewable energy options

**UNDERSTANDING GREENHOUSE GASES**

Greenhouse gases (GHGs) are gases that trap heat from the sun and warm the planet’s surface. According to the U.S. Department of Energy, 87% of GHG emissions are related to energy consumption. Since 1990, GHG emissions in the United States have grown by about 1% per year (Huxley et al. 2009). There are six types of GHGs, but only three are important for drinking water utilities—carbon dioxide, methane, and nitrous oxide (Forster et al. 2007).

**MAJOR GREENHOUSE GASSES**

<table>
<thead>
<tr>
<th>Gas</th>
<th>Percentage</th>
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</thead>
<tbody>
<tr>
<td>Carbon Dioxide</td>
<td>54.7%</td>
</tr>
<tr>
<td>Methane</td>
<td>30%</td>
</tr>
<tr>
<td>Nitrous Oxide</td>
<td>4.9%</td>
</tr>
<tr>
<td>Other Gases</td>
<td>9.8%</td>
</tr>
<tr>
<td>Fluorinated Gasses</td>
<td>0.6%</td>
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</tbody>
</table>
The three categories for GHG emission sources are:

**Scope 1:** Sources that are owned or controlled by the utility (e.g., emissions from generators, natural-gas-fueled equipment, utility-owned vehicles, and from pipeline or refrigerant system leaks).

**Scope 2:** Emissions that occur outside of the utility’s boundary (e.g., emissions caused by production of electricity, steam, and hot or cold water used by the utility). The majority of drinking water utility emissions are Scope 2 emissions.

**Scope 3:** Emissions that result from the utility’s activities but are controlled by another person or company (e.g., emissions from employee commuting and business travel) (WRI/WBCSD 2004).

Global reporting regulations for the water and wastewater industry are highly regionalized with reporting mandated in some regions (e.g., Ofwat in England and Wales), voluntary in a majority of countries provided that emissions remain below a specified trigger level (e.g., Canada, United States, European Union, Australia, Japan), or mandated for specific portions of the economy and certain types of facilities (e.g., EPA coverage of municipal wastewater treatment facility operated landfills).

While many global and domestic tools exist for the voluntary accounting and reporting of GHG emissions by corporations and municipalities, none have been designed for U.S. water utilities. However, there are several resources that water utilities can consider to help them assess and control GHG emissions, including the Greenhouse Gas Protocol created by the World Resources Institute and the World Business Council for Sustainable Development; the Intergovernmental Panel on Climate Change Methodology; the U.S. Environmental Protection Agency Mandatory Greenhouse Gas Reporting Rule; and the United Kingdom Water Industry Research framework.
REFERENCES


