



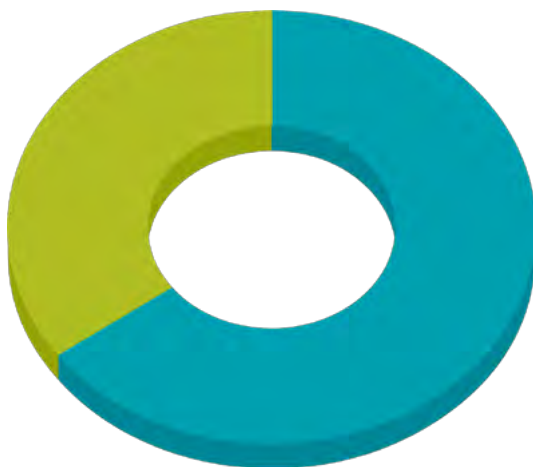
CAPEE Fact Sheet: Water/Wastewater Facilities

Community Action Planning for Energy Efficiency

WHY FOCUS ON THE ENERGY USE OF WATER/WASTEWATER FACILITIES?

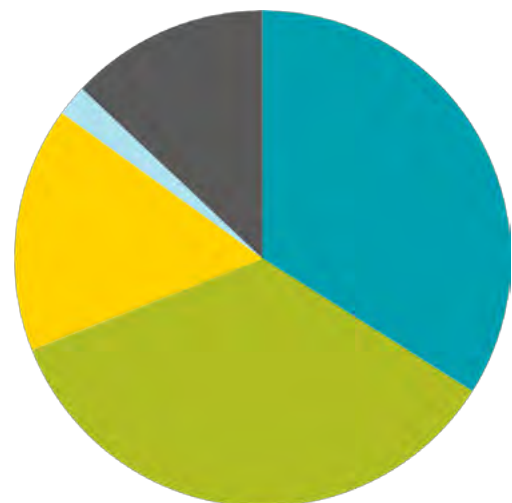
- For many municipal governments, water and wastewater plants are typically the largest energy consumers, often accounting for 30 to 40 percent of total energy consumed.¹
- Overall, water and wastewater systems account for approximately two percent of energy use in the United States, adding over 45 million tons of greenhouse gases annually.
- As much as 40 percent of operating costs for water systems can be for energy.¹
- By incorporating energy efficiency practices into their water and wastewater plants, municipalities and utilities can save 15 to 30 percent of their energy use, saving thousands of dollars with payback periods of only a few months to a few years.

Water & Wastewater Treatment Plants' Share of Typical U.S. Municipal Energy Budgets



● Other ● Water & Wastewater Plants

Typical Water Treatment Plant Operating Budget



● Energy
● Staffing
● Chemical
● Maintenance Materials
● Other

¹ <http://bit.ly/CAPEE-95>

WHAT IS STRATEGIC ENERGY MANAGEMENT?

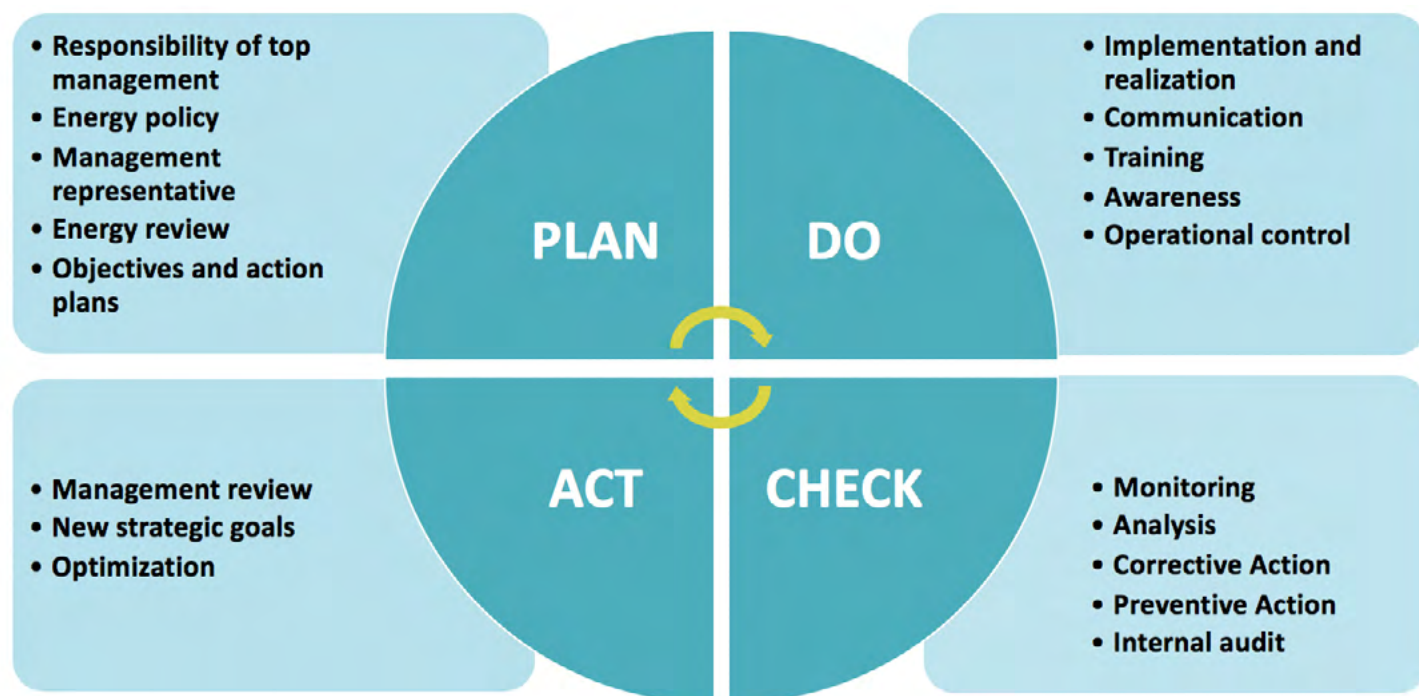
Strategic Energy Management (SEM) is the holistic approach to managing energy use in (but not limited to) industrial, commercial and municipal facilities in order to continuously improve energy performance and achieve energy, cost and carbon savings over the long term.²

SEM focuses on business practice change from senior management through ground level staff, improving organizational culture to reduce energy waste and improve energy productivity.³

SEM CORE ELEMENTS

Strategic Energy Management generally follows the Plan-Do-Check-Act model. A organization's level of SEM implementation falls on a continuum, often with a range of both breadth and depth when implementing the core elements of SEM.

- Reduced energy use and costs
- Reduced greenhouse gas emissions
- Improved processes
- Reduced risk to energy price fluctuations
- Pursue certification designating leadership in SEM



² <http://bit.ly/CAPEE-96>

³ <http://bit.ly/CAPEE-97>

WHAT IS THE ISO 50001 ENERGY MANAGEMENT STANDARD?

The ISO 50001 standard for energy management systems codifies SEM. It supports all organizations in all sectors to use energy more efficiently, through the development of an energy management system (EnMS).⁴

Manufacturers, corporations, utilities, energy service companies, and other organizations are using ISO 50001 to reduce costs and carbon emissions. As of 2016, more than 23,000 sites worldwide achieved ISO 50001 certification. The growth of ISO 50001 continues to accelerate as an increasing number of companies integrate ISO 50001 into their corporate sustainability strategies and supplier requirements.⁵

COMMON ENERGY EFFICIENCY IMPROVEMENTS AT WATER & WASTEWATER TREATMENT PLANTS⁶

- **Water plants:** Ninety percent of a typical water utility's energy consumption is used to pump water. Water utilities may achieve significant savings by improving pump efficiency and installing variable speed drives. Other common actions include installing more efficient lights and HVAC, as well as repairing or replacing distribution pipes to stop leaks.
- **Wastewater plants:** Approximately 50 percent of a typical wastewater utility's energy consumption is used in the aeration treatment process. Utilities may benefit from adopting improved system controls (such as oxygen sensor devices), efficient aeration blowers, and efficient bubble diffuser technologies. Wastewater plants may also benefit from efficient pumps, variable speed drives, lighting, and HVAC.

⁴ <http://bit.ly/CAPEE-98>

⁵ <http://bit.ly/CAPEE-99>

⁶ <http://bit.ly/CAPEE-100>

U.S. DOE PROGRAMS THAT ENCOURAGE AND RECOGNIZE SEM ADOPTION AND PROGRESS⁷

U.S. DOE's Advanced Manufacturing Office (AMO) has classified three levels of SEM as illustrated in the figure below. The first level is the most basic and includes the very core aspects of SEM. The next step is becoming certified to meet ISO 50001 energy management standards and the third tier of certification is Superior Energy Performance (SEP). In addition to the three tiers of SEM, U.S. DOE provides multiple resources for facilities interested in implementing SEM.

Strategic Energy Management Continuum



⁷ <http://bit.ly/CAPEE-101>

CASE STUDY: WATER/WASTEWATER, SEM, AND 50001 CERTIFICATION

Name of Facility: Des Moines Water Works (DMWW), Iowa

About the Facility

- DMWW is an independently operated, public utility providing drinking water to approximately 500,000 people in the Greater Des Moines area.
- DMWW is the largest water utility in Iowa, among the largest 100 water utilities in the country and is recognized as an industry leader.

Implementing ISO 50001 at the Facility

- Des Moines Water Works worked closely with U.S. DOE to implement ISO 50001 and Superior Energy Performance (SEP).
- The utility pursued energy-saving strategies for decades, but in 2014, the utility raised the bar by joining the SEP pilot for the water/wastewater sector.
- In 2016, Des Moines Water Works joined U.S. DOE's Better Plants program and set a goal to increase energy efficiency 25 percent utility-wide by 2026.
- In the following year (2017), the utility joined the Better Plants Challenge, which involved a commitment to share their solutions.
- By implementing a rigorous energy management system certified to ISO 50001 and Superior Energy Performance, Des Moines' Fleur Water Treatment Plant increased its energy performance 2.7 percent in a single year and is now well-equipped to continuously build on those savings in the years ahead.

The Process: How DMWW managed their energy more efficiently

- DMWW formed an energy team that actively involved personnel from across the organization. The team developed an energy policy, energy usage baseline, and energy performance improvement models.
- To better monitor energy consumption, more than 50 sub-meters were installed on pumps, buildings, and other systems that use large amounts of energy. Monitoring, measuring, and analyzing significant energy users helped to identify several large pieces of equipment that were not operating at peak efficiency, enabling the utility to take corrective steps.

⁷ <http://bit.ly/CAPEE-101>

How Adoption of SEM Changed the Culture at the Facility

- ISO 50001 and SEP helped the utility establish a formal structure to embed energy management processes and reporting into normal business procedures, ensuring the retention and growth of energy savings over time.
- ISO 50001 empowered employees at Des Moines Water Works to incorporate energy-saving actions in day-to-day operations: taking into consideration how and where energy is used, the cost of energy, and its impact on water rates.
- The increased employee engagement was shown by a doubling in energy-related employee suggestions.
- In addition, ISO 50001 directly involved budgeting and executive staff in evaluating energy projects and their impacts.
- For the future, the new culture of managing energy performance will help the utility expand its energy and cost savings to benefit the environment and all its water customers.
- This document will be updated to show "savings" results when they are available.

HOW TO GET STARTED: D.O.E.'S ISO 50001 READY PROGRAM - A USER-FRIENDLY PROGRAM TO ADOPT SEM PRACTICES

What is the 50001 Ready Program?⁸

U.S. DOE's 50001 Ready program is a self-guided approach for facilities to establish an energy management system and self-attest to the structure of ISO 50001, a voluntary global standard for energy management systems in industrial, commercial, and institutional facilities. The 50001 Ready program offers:

- A self-paced approach for any facility to implement an energy management system without certification
- Guidance to identify and analyze facility-wide energy use and to develop action plans around energy performance improvements
- DOE recognition for U.S. facilities that self-attested to completion of the 50001 Ready Navigator, without the need for external audits

⁸ <http://bit.ly/CAPEE-102>

What is the DOE Ready 50001 Navigator⁸ Tool?

The 50001 Ready Navigator is a free resource provided by the U.S. Department of Energy to help implement and maintain energy management systems according to the best practices of ISO 50001, the global standard to achieve continuous energy improvement.

The 50001 Ready Navigator is comprised of four assignments:

- Planning
- Energy Review
- Continual Improvement
- System Management

Each assignment has several tasks, with each task corresponding directly with establishing the energy management system requirements specified in ISO 50001. There are 25 tasks in total.

For more detailed support, see NEEP's 50001 Ready Program New User Guide.

ADDITIONAL RESOURCES

U.S. DOE's Programs and Tools that support the adoption of SEM at Water/Wastewater facilities

- [U.S. DOE's ISO 50001 Brochure](#)
- [U.S DOE's 50001 Ready Program](#)
- [U.S. DOE's Superior Energy Performance \(SEP\) Program](#)
- [U.S. DOE's Better Buildings Challenge Program](#)
- [U.S. DOE's 50001 Ready Navigator Tool](#)
- [U.S. DOE's Energy Performance Indicator Tool](#)

NEEP reports and documents that support the adoption of SEM at WWW facilities

- [Opportunities for Strategic Energy Management in the Municipal Water Sector](#)
- [U.S. DOE's 50001 Ready Program – New User Guide](#)

**Questions about Strategic Energy Management
or the 50001 Ready Program?**

Email us: SEM@neep.org