

**Sustainable Energy Systems for
Western Washington Water and Wastewater Treatment Plants
Moving Towards Energy Independence
Pilot Project
July 2011 – June 2012**

Introduction

Water and waste water systems across Washington consume significant amounts of energy. Nevertheless, internal resources are seldom devoted to taking a comprehensive approach to reducing and managing the costs of energy at these facilities. As a result, the cost of energy to operate many of these facilities continues to rise. This project addresses one significant aspect of this problem – the need for training on energy management designed specifically for water and wastewater utility managers, operators and engineers.

The Environmental Protection Agency (EPA) and the Oregon Association of Clean Water Agencies developed and tested a model training effort aimed at this target population in 2010. This effort was sufficiently successful that, with adaptations and adjustments, it can serve as a template for such an effort in Washington.

Project Overview

The Washington State University Energy Program (WSU) proposes to make the identified adjustments and conduct a training series aimed at water and wastewater utility operators that focuses on energy management opportunities. The goal is for Washington water and wastewater utilities to gain greater control over and reduce their energy costs through application of energy management systems, energy efficiency processes and renewable energy technologies, while achieving excellent environmental standards. The series of workshops will provide training and robust tools to enable utility system managers, operators and engineers to achieve this goal.

The focus will be on efficiency opportunities in treatment plant operations. For wastewater, this may extend to include biosolids processing, transport, and land application, recycled water use and the collection system (both gravity and pumped systems). For water systems, the focus will include the entire water sourcing, treatment, storage, and distribution system. The participants will be managers and/or senior staff from water and wastewater utilities, with utilities in western Washington as the primary targets.

Approach

WSU will organize and oversee the training program. A variety of experts, including each of the key partners, will be knit together into an overall training and workshop program consisting of four onsite workshops and three webinars integrating each of the training topics. The full day, on-site workshops will rotate between participating facilities. Rotating workshops between facilities will allow for tours and on-the-ground information sharing of efficiency and renewable energy projects installed at each participating facility. Three three-hour webinars will be interspersed throughout the series to provide instructional information without requiring participant travel. In addition, a one-hour telephone conference call for 'check in' will be scheduled between workshops, which will include time for group information sharing and problem solving.

Training topics will include:

- Energy Management System - applying fundamental management principles of *plan, do, check, act* (PDCA) to energy and renewable power sources, and the training will be based on EPA's and the Global Environmental & Technology Foundation's *Energy Management Guidebook for Wastewater Utilities* (January, 2008). It will address the need for upper management buy-in including commitment of staff resources and funding; identifying current energy usage and opportunity for greater efficiency based on energy audits; harnessing ideas of staff; metrics and tracking. The use of a systematic approach is needed to achieve long-term sustained organizational improvement towards specific targets and goals. Further, the use of a management system avoids the 'book-of-the-month-club' sense and sets a long term, overall program in place to focus the organization on setting goals, evaluating progress towards meeting goals, and making adjustments.
- Energy Efficiency – review of accepted and innovative energy efficiency measures, including process optimization; systematic re-evaluation methods and measurements; energy billing systems and bill analysis; use of SCADA systems for routine tracking; low-cost, no-cost O&M optimization.
- Benchmarking – tools for benchmarking energy consumption of treatment plants across Washington, within the Pacific Northwest, and nationally by treatment system type and size. The EPA Energy Star *Portfolio Manager* program will be addressed, but other common metrics will be explored as well.
- Climate Action Plans – information on incorporating water and wastewater treatment department activities into an overall community or municipality-based climate action plan. Proactive efforts to inventory greenhouse gas emissions (GHG) and identify sequestering and GHG reduction opportunities related to efficiency and renewable energy efforts.

- Renewable energy opportunities - communities will evaluate and rank the highest priority renewable energy opportunities at their plants.
- Financing and Incentives – Information on the available financing and incentives for efficiency and renewable power sources. Washington state and federal agencies that provide incentives and financing for efficiency and renewable technologies will be incorporated as resources. Financing and incentives for both investor-owned supplied and publicly-supplied power will be reviewed. In addition, Department of Health, Department of Ecology and the Public Works Trust Fund requirements for investment grade energy audit will be discussed.
- Communication – designing and implementing communication strategies within the plant to Public Works Directors and City Managers, commissioners and council members, the community and sewer service ratepayers.

The core curriculum will be presented by Dorothy Atwood of the Zero Waste Alliance. Dorothy's ability and approach to energy efficiency education was effective in the Oregon Cohort, and her training was well-received. Ms. Atwood's expertise will be supplemented with third party technical experts on wastewater and water treatment, who will be selected to present specific parts of the training program. A committee of municipal or district managers that are interested in the training program will participate in selecting the participating speakers. Continuing Education Unit (CEU) credits will be requested for the training program.

At the conclusion of the workshops, the program will be evaluated for a training program that targets other regions of Washington state water and wastewater treatment facilities.

Expectations & Deliverables

Each participant should anticipate spending seven full days (plus travel) at the workshops and webinars. There will be work assignments between sessions to focus on plant-specific energy management systems, efficiency and renewable issues. Participants will be asked to track their time commitment to the project in order to provide better time commitment estimates to future participants.

Participant Production:

- There will be assignments for the organizations to complete between meetings. The program provides some direct one-on-one support for the organizations. The seven workshops and webinars will be scheduled over a twelve month schedule
- Utility Provider Energy Independence Summary Report—Each participating municipality or district will summarize their information on energy efficiency and technology projects identified and specific actions regarding instituting (or modifying) its management system based on the guidebook.

The summary reports will follow a master template developed for the project. Specific energy efficiency targets will be set and tracked; renewable energy

- projects will be identified and tracked. Each facility will report on its energy use, as benchmarked within the EPA *Energy Star Portfolio Manager* (high, medium, low). Each participant will be asked to report on:
- Baseline energy use for the previous two years; annualized energy consumption projection at completion of the project based on then current consumption; identified and implemented projects.
 - Actions taken around energy issues that are behavior-based, such as setting an energy policy, setting energy goals, tracking and reporting on energy performance.
 - Actions planned that are able to be incorporated into facility plans and/or the Capital Improvement Plan.
 - Efficiency opportunities identified/scheduled/implemented.
 - Renewable energy opportunities identified/scheduled/implemented.
 - Energy cost savings to date.
 - Energy cost savings anticipated.
 - Lessons learned and tips for facilities looking to initiate energy management systems at their treatment plants.
 - Time spent on the project.
- Up-to-date energy audits or assessments for each facility. Each organization will evaluate its existing energy audit or assessment as part of the training program. Energy audits will be arranged for facilities that need them through existing efficiency programs operated by key partners.
 - Presentation to City or District Council/Commission on energy opportunities at the treatment plant by each participating municipality or district.

WSU Production:

- WSU will post important information and supporting documents and electronic communication techniques will be established for project participants to easily communicate with each other quickly and efficiently.
- Final report that summarizes and documents the training, participating community reports, key partner reports, and workshop evaluation, including lessons learned and recommendations for future actions.

WSU is uniquely qualified to implement such a training series. First, WSU is one of the region's premiere energy systems training organizations, with a specific focus on large energy using systems. Second, WSU has significant technical expertise with water and wastewater systems and their key components. Third, some of the municipalities that own systems are currently members of WSU's Plant Operations Consortium, which means that we already have a relationship with them and communications/marketing paths for reaching them. All of these considerations combined with WSU's track record as a successful manager of federally funded projects work to ensure that the project will be successful.

Targeted Audience

For optimal success in designing and implementing an energy management system at a water or wastewater treatment plant, at least two individuals at each participating utility should make the commitment to attend the training. A maximum of three from each cohort member can be accommodated. As noted above, this training series is targeted toward water and wastewater systems, managers, operators and engineers in western Washington. Specific portions of the workshops will be designed for participation by senior management (Public Works Director or City Manager) along with the Sustainability Coordinator from the specific communities, as appropriate.

Our target is ten participating water and wastewater utilities. We will identify and recruit leaders in energy efficiency. These utilities will contribute to the funding of the project on a sliding scale based on size of the wastewater treatment plant with an average tuition cost of approximately \$2,000 per participant. Each community will be asked to sign a letter agreement outlining their interest in the project at the plant and public works director level.

Complementary registration to the workshop will be provided to key partners and regulatory agencies. This will help to insert the sustainability, efficiency and renewable technologies knowledge of trainers and technical assistance staff serving the Washington water and wastewater industry into discussions.

Key Partners

The key partners will be asked to support the project financially and through in-kind contributions, such as providing venues for training; outreach and follow-up guidance to facilities, web tool support, on-site technical assistance check-ins and other support efforts to institutionalize the lessons learned across the Washington water and wastewater industry. The following are current committed key partners:

- The US Environmental Protection Agency—Region 10 Sustainable Water Infrastructure Initiative
- Bonneville Power Administration
- Puget Sound Energy
- Zero Waste Alliance
- EPA Region 10 PEER Center