Ongoing Applied Research:
Water Sector Sustainability

INTRODUCTION

AEM Corporation has a center of strength and research in defining the nature and structure of water sector sustainability. In 2005, the American Council for an Energy Efficient Economy (ACEEE) called for adoption of The Leadership in Energy and Environmental Design (LEED) criteria into the water and wastewater utilities[1]. The water sector is becoming aware that sustainability is a business framework that encompasses cost effectiveness, reliability, resilience, security, management of assets, environmental stewardship and far more, and is looking for guidance on how to move towards a more sustainable future.

BENEFIT TO WATER SECTOR

A recent paper presented at WEF Sustainability 2008[2] talked to a utility's need for better decision-making tools to recognize and optimize the energy requirements embedded in water and wastewater systems. This paper was attended by a large and enthusiastic audience of water industry people who supported the need for increasing system sustainability through better understanding and control of its total energy requirements. A recurring theme expressed by these leaders is how to migrate to a sustainable business model, how to measure their progress, what it could cost in effort and capital and finally how to know when they have arrived. Few good tools currently exist.

Watergy

WATERGY is a spreadsheet model that uses water/energy relationship assumptions to analyze the potential of water savings and associated energy savings. WATERGY was originally developed in 1995 to support the Federal Energy Management Program (FEMP). The spreadsheet model was designed to serve Federal facilities when performing water audits as required by EPACT 1992. The latest revision was in 2000, when the tool was updated to MS Office 2000 format of Excel. Interest in the WATERGY model has increased over the past two years.

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[1] "Roadmap to Energy in the Water and Wastewater Industry", R. Neil Elliott, ACEEE Report IE054, August 2005.

[2] "Embodied Energy in Municipal Water and Wastewater", S. deMonsabert, A. Bakhshi & J. Headley, Green Practices for the Water Environment, June 22-24, 2008.

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Embodied Energy

Working with several water utilities to more fully define the energy embodied in each unit of water received by the consumer as a means for more effectively planning sustainable building systems. Based on LEED principles, this work helped the user to more clearly define the total carbon footprint embedded from raw water through treatment, storage and distribution.

Sustainability in Total Water Management

In this award winning research, AEM staff worked with a number of water utilities in using a triple bottom-line approach (financial, environmental and social) to meet total water management goals of the utility. Goal programming techniques were used to simultaneously solve the problem of meeting these three, sometimes conflicting, goals. AEM Developed a methodology to successfully generate a feasible set of alternative solutions while balancing all three goals, in 2009.

RELEVANT PAPERS AND PRESENTATIONS

Water Energy Nexus

"Embodied Energy in Municipal Water and Wastewater", Green Practices for the Water Environment, June 22-24, 2008.

"Incorporating Energy Impacts Into Water Supply and Wastewater Management," American Council for an Energy-Efficient Economy (ACEEE) Summer Study 2009

"ConservIT: An Integrated Water and Energy Conservation Planning Tool for Small- and Medium-Size Communities," American Council for an Energy-Efficient Economy (ACEEE) Summer Study 2002

"Integrated Energy and Water Conservation Modeling", ASCE Journal of Energy Engineering, April 1998

"WATERGY: A Water and Energy Conservation Model For Federal Facilities", CONSERV'96

Sustainability in Water Supply Planning

"Sustainability Goal Programming for Total Water Management." Proceedings of WEFTEC 2009.

"Goal Programming for Sustainability in Total Water Management." Chesapeake Water Environment Association 2009 Annual Conference

"Sustainability Goals for Total Water Management." Proceedings of American Water Works Association Annual Conference 2009

"Sustainable Goals for Total Water Management," Engineering Sustainability 2009

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