

# WERF's Energy Management Challenge – Exploring Common Interests with Programs

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## Water Environment Research Foundation (WERF)

**OUR MISSION:**  
*The Water Environment Research Foundation is dedicated to advancing science and technology addressing water quality issues as they impact water resources, the atmosphere, the lands, and quality of life.*



## What is WERF?

- Non-profit organization founded in 1989
- Funds & manages water quality research through a diverse public-private partnership between municipal utilities, corporations, academia, industries, & the federal government
- Research investigators are academia, consultants, utilities, & others
- Project oversight by volunteer experts from many perspectives
- Research portfolio valued at nearly \$75M with more than 200 completed & ongoing research projects

## Who supports WERF?

- WERF's subscribers are wastewater & stormwater utilities, industry, state agencies, corporate consulting & engineering firms, and wastewater equipment manufacturers
- Local municipal wastewater agencies in 40 states representing 70% of the sewered US population, as well as in Australia, Canada, New Zealand, & the United Kingdom are represented
- WERF also receives federal funds



# PROGRAM-DIRECTED RESEARCH

A NEW APPROACH TO •  
WATER QUALITY SCIENCE



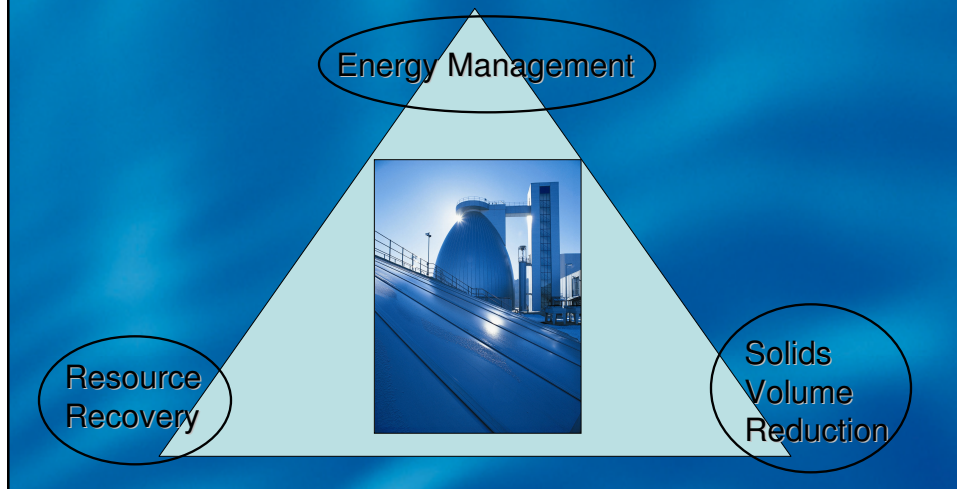
## Program Areas

- Infrastructure Management
- Conveyance Systems
- Wastewater Treatment and Reuse
- Solids Treatment, Residuals, and Reuse
- Stormwater
- Watershed Management and Water Quality

## Challenges

- **“Energy Management”**
  - Develop strategies, methods, processes, and tools for cost-effective management of energy used in wastewater operations.
- **“Solids Volume Reduction”**
  - Cost-effective methods to minimize the volume and quantity of wastewater treatment solids generated, without sacrificing product value and quality.
- **“Resource Recovery”**
  - Identify new resource recovery opportunities for wastewater solids, including biosolids.

## Optimization of Wastewater and Solids Operations (OWASO)



## Background

- Energy use accounts for about 35% of WWTF's total cost to provide wastewater service – 2<sup>nd</sup> only to labor costs
- Solids treatment operations and sludge handling, transport, and disposal account for a significant portion of energy use at these facilities
- Disposal of biosolids offsite require transportation and land availability

## “OWASO” Goal

To develop and demonstrate economical and environmentally responsible processes that improve wastewater and solids treatment operations efficiencies and costs by 20%

## Focus Areas & Desired Outcomes

- Minimize and conserve energy use
- Maximize opportunities for biogas recovery for bioenergy production
- RD&D of innovative and emerging technologies
- Exploration of innovative uses for solids
- Reduction of solids volume
- Economics of facility performance
- Reduction of the environmental footprint
- Etc.

## Energy – First Steps

- Collaboration and knowledge sharing with other organizations
  - Workshops
  - Web seminars
- Leverage ongoing and completed research
  - WERF (LCAMER Tool)
  - Non-WERF projects

# **Cost-Effective Energy Recovery from Anaerobically Treated Wastewater Solids**

Completion Summer 2006  
WERF Project 01-CTS-18-UR

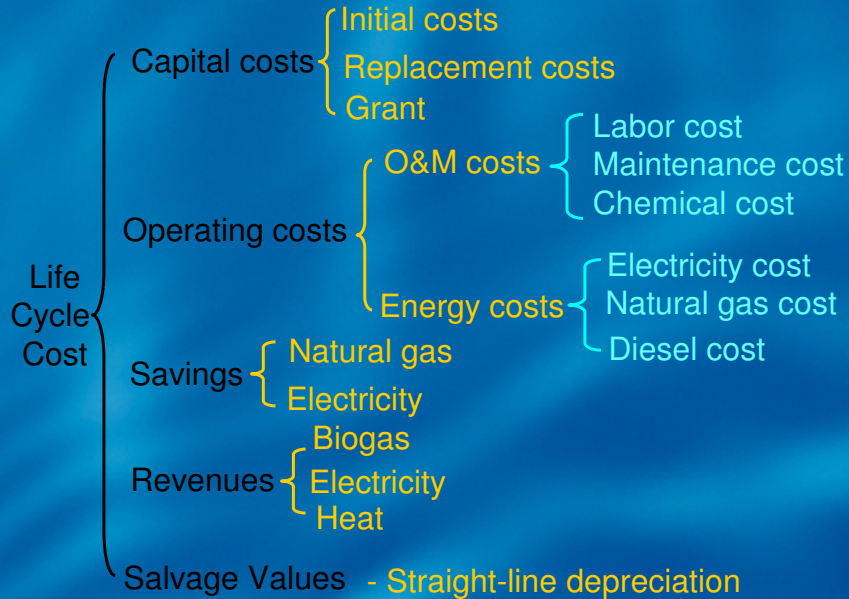
PI: Hugh Monteith, M.Sc., P.Eng.,  
*Hydromantis, Inc.*

WERF PD: Roy Ramani, Ph.D.

## **Study Objectives**

- Develop a method for comparing the benefits and costs of energy recovery over the lifetime of a POTW
- Predict the most economically viable solids treatment and energy recovery alternatives for given data sets
- Provide WERF subscribers with a spreadsheet-based tool and user manual for use at their facilities

## LCAMER Tool



## Key Findings

- Technical and cost function development hindered by lack of data for some digestion processes (e.g. acid-gas phased)
- Boilers are lowest cost, fuel cells highest
- Price of purchased electricity, and O&M costs for biogas pretreatment, have greatest effect on life cycle costs

## Key Recommendations

- Expand LCAMER to a plant wide energy management tool that includes other processes including solids thickening and dewatering, biosolids disposal, and liquid treatment processes
- Collect additional data to validate LCAMER models
- For functions in LCAMER based on limited data, collect additional data to refine accuracy of functions
- Convert LCAMER to web-based tool that can be more user friendly
- Consider adding social and health costs to external costs for true environmental “footprint”.

## WERF's Next Steps

- Continue talks with key organizations of “knowledge exchange”
- Issue Area Team (IAT) for OWASO will meet and discuss research projects and strategies Summer 2006
- WERF's Energy Management Web Seminar October 2006

# Thank You!

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*Collaboration. Innovation. Results.*