



2008 SUMMER CONFERENCE & 38TH ANNUAL MEETING

The Future of Clean Water is Now!

How Next Generation Issues are Impacting Utilities Today

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THE NATIONAL ASSOCIATION OF CLEAN WATER AGENCIES

tomorrow's solutions ... utilities get a head start on the future

Energy Management: Public Wastewater Utilities Role in the Sustainability of Our Communities

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July 17, 2008

Energy Management: Public Wastewater Utilities Role in the Sustainability of Our Communities

- Sustainability, Energy Management and Environmental Management Systems
 - Camden County Municipal Utilities Authority EMS Case Study
 - Conclusions
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Sustainability

Merriam- Webster Definitions

sus-tain-able \ *adjective*

- 1: capable of being sustained
- 2 a: of, relating to, or being a method of harvesting or using a resource so that the resource is not depleted or permanently damaged
- 2 b: of or relating to a lifestyle involving the use of sustainable methods

sus-tain-abil-i-ty \ *noun*

sus-tain \ *transitive verb*

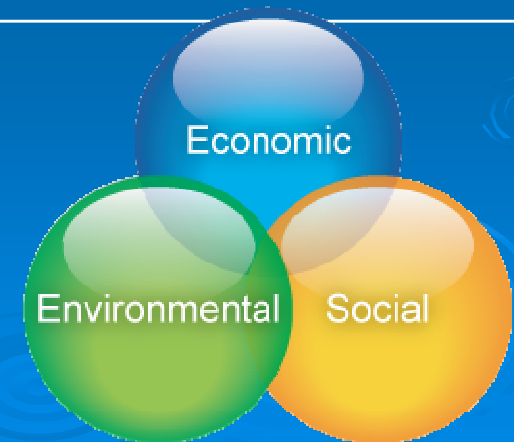
- 1: to give support or relief to
- 2: to supply with sustenance
- 3: to support the weight of, to carry or withstand
- 4: to buoy up

Bruntland Commission – 1987

Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs.

Public Utilities

Provide safe, reliable and effective services that integrate environmental, social and economic considerations.



Sustainability: Cities of the Future

CDM focus on fresh, proactive and stakeholder-based approaches to urban revitalization – improving quality of life, enhancing the urban environment, and creating economic opportunities for every citizen.

- Innovation in traditional engineering
 - Finding opportunities to create multiple community benefits in each project
- Integration across public infrastructure services
 - Working across institutional barriers to facilitate collaborative approaches
- Revitalization of urban centers
 - Restoring industrial sites and waterfronts to improve the urban landscape



http://www.cdm.com/knowledge_center/cities_of_the_future/

Sustainability: Climate Change



<http://www.usmayors.org/climateprotection/>

Mayors' Climate Protection Agreement

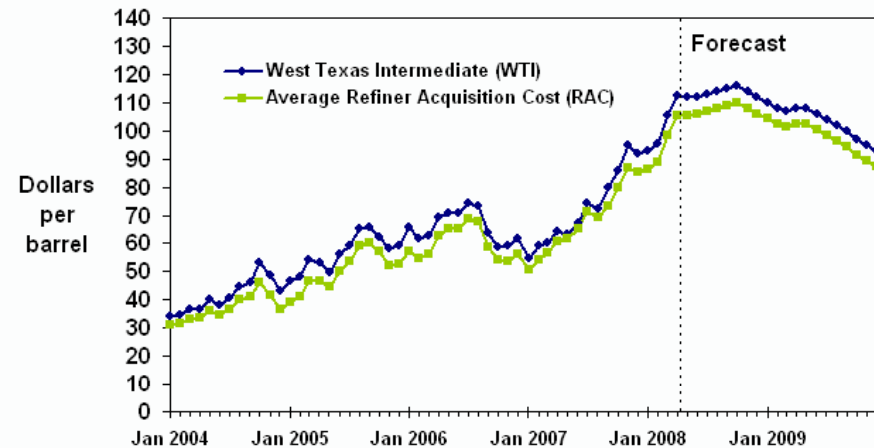
- ◆ Inventory global warming emissions in City operations and in the community, set reduction targets and create an action plan.
- ◆ Evaluate opportunities to increase pump efficiency in water and wastewater systems; recover wastewater treatment methane for energy production.

Sustainability: Energy Management

Sustainability

- Effective use of resources
 - Energy, Water ...

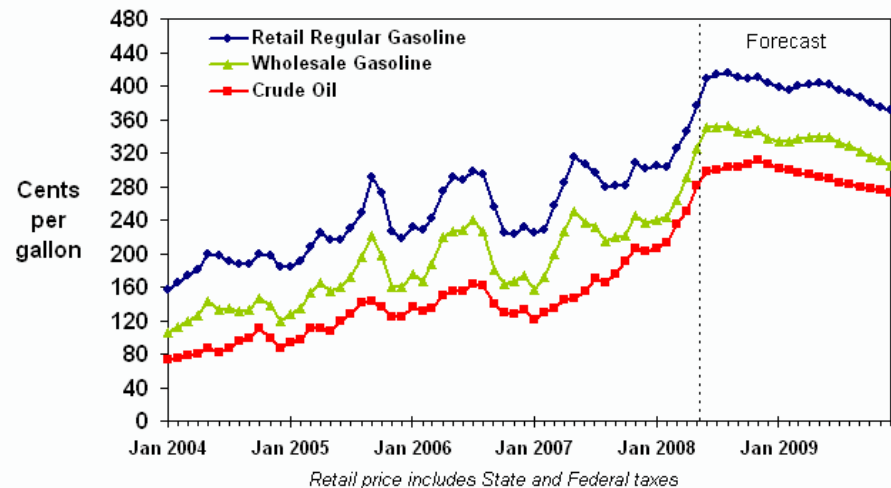
Crude Oil Prices



Outlook, May 2008



Gasoline and Crude Oil Prices



Short-Term Energy Outlook, June 2008



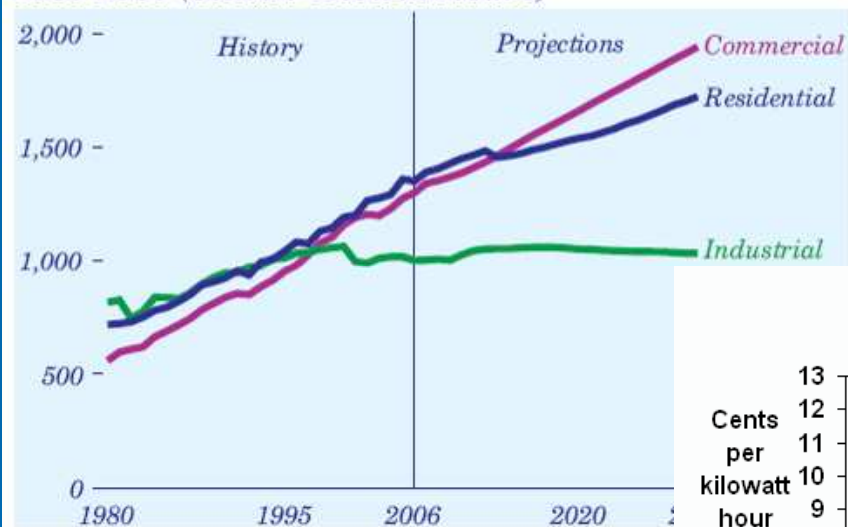
US Department of Energy
Energy Information Administration

<http://www.eia.doe.gov/steo>

Sustainability: Energy-Water Nexus

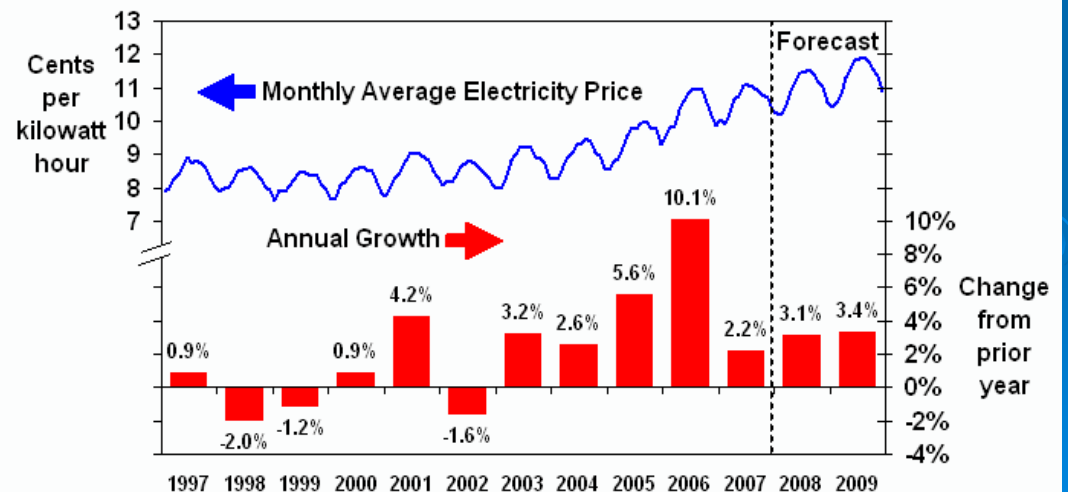
Residential and Commercial Sectors Dominate Electricity Demand Growth

Figure 60. Annual electricity sales by sector, 1980-2030 (billion kilowatthours)



<http://www.eia.doe.gov/oiaf/aeo/index.html>

U.S. Residential Electricity Price



Short-Term Energy Outlook, May 2008

<http://www.eia.doe.gov/steo>



Sustainability: Energy Management

Ensuring a Sustainable Future: An Energy Management Guidebook for Wastewater and Water Utilities



JANUARY 2008



Workshop

New England:
Cleaner Environment Through
Innovative Energy Management
How to Reduce Energy Use & Increase Savings for Water & Wastewater Treatment Plants in New England

December 11, 2007 • 8:30 am - 4:00 pm
300 Capital Ave. • Hartford, Connecticut
CT Legislative Office Building • Room 2E (2nd Floor)

"Rising energy costs can be a major challenge for water utilities in New England. The good news is that there are many opportunities to save money and help the environment by focusing on energy-saving techniques. EPA's new Energy Management Workbook has valuable information and tips for how utilities can minimize energy use and cost without sacrificing performance."

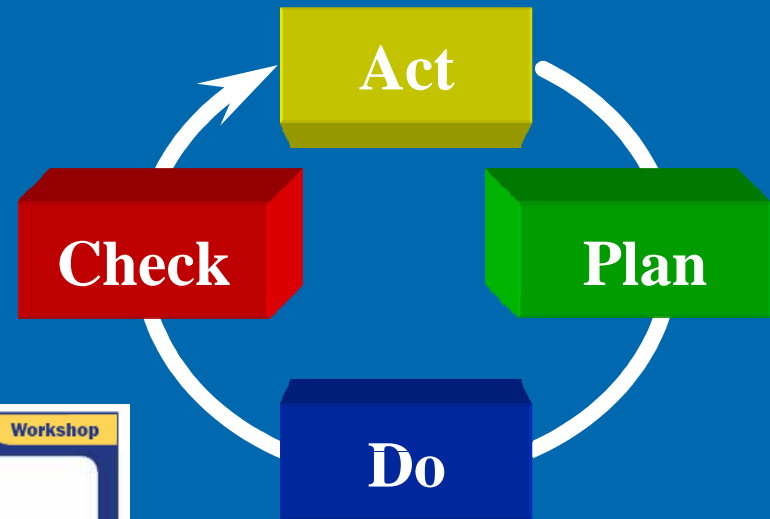

— Robert Vasey
U.S. EPA New England Administrator

This Workshop will help utilities:

- Develop energy management programs
- Prioritize energy improvements
- Set measurable energy goals to reduce consumption
- Manage energy to reduce operating costs
- Follow through on priority management goals

Each workshop participant will receive a copy of the Energy Management Systems Workbook (2007)

Co-Sponsors & Partners:



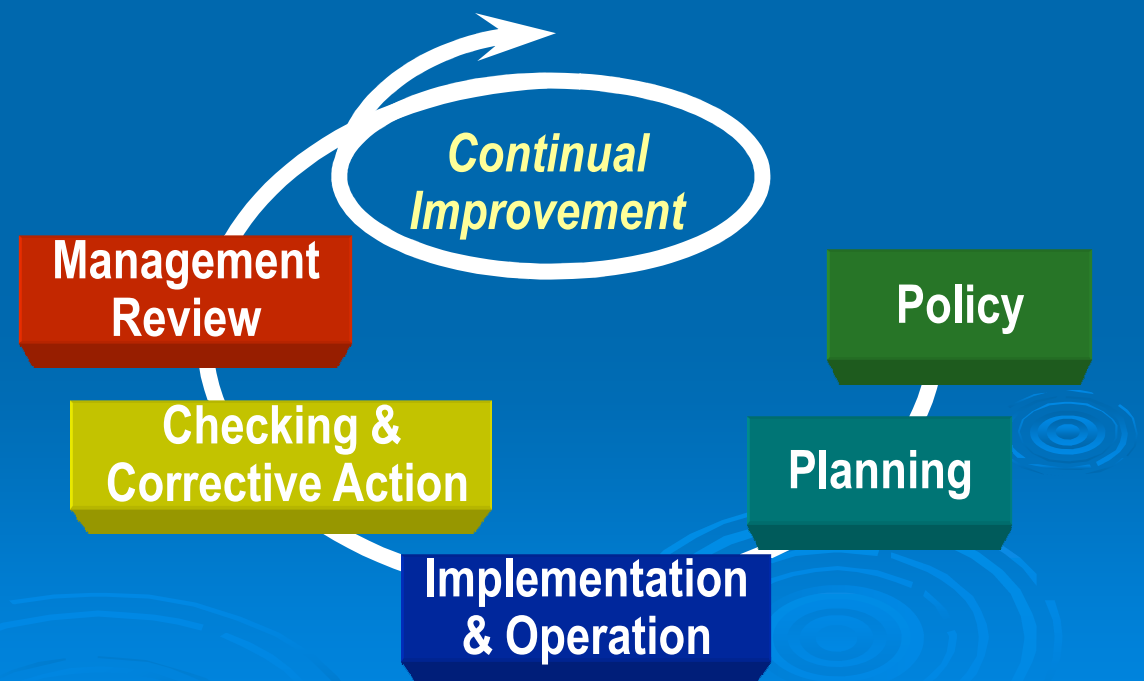
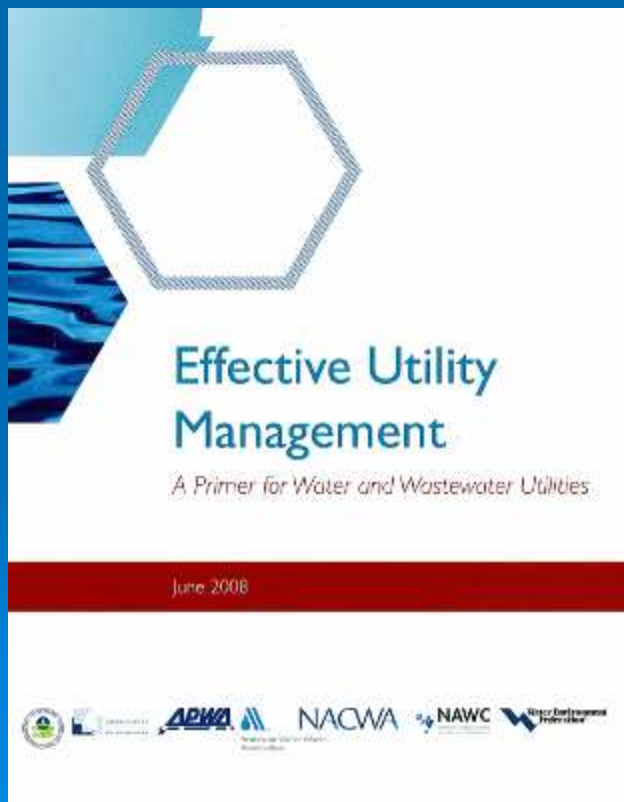
Jim Horne
USEPA

Office of Wastewater Management

horne.james@epa.gov

Sustainability: EMS

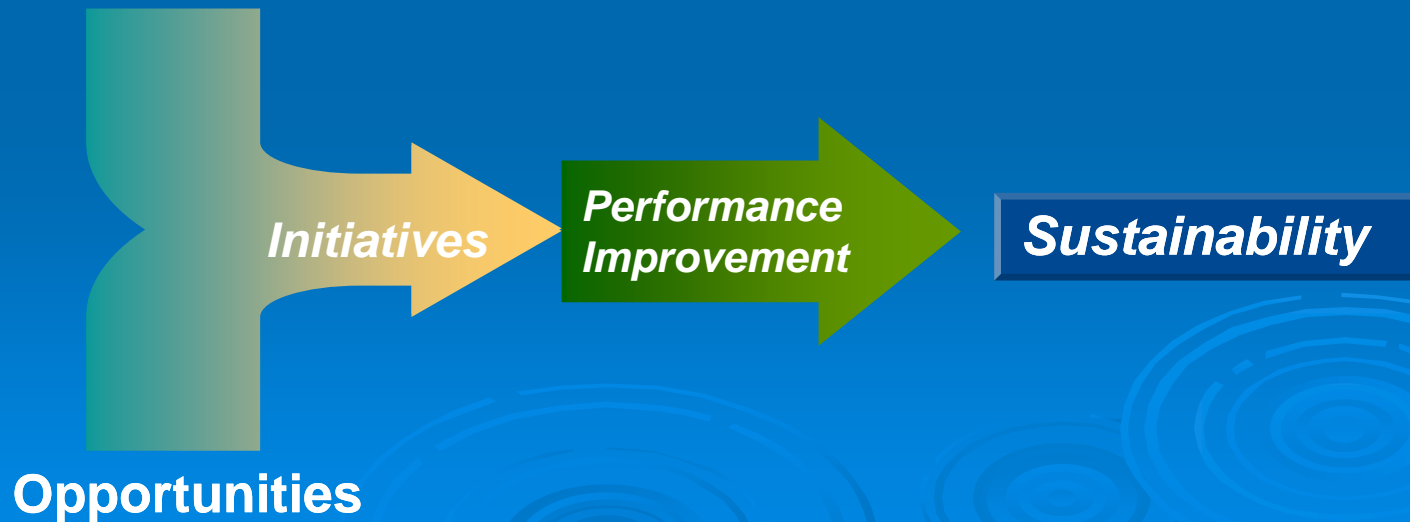
- Structured approach to sustainability performance improvement



Sustainability - Energy Connection

- EMS provides framework and structure for identifying, prioritizing and implementing environmental, social and economic improvement initiatives
 - *Think globally – Act locally*

Requirements



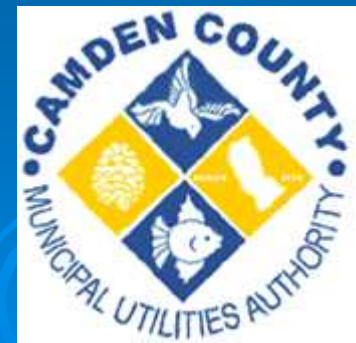
Camden County Municipal Utilities Authority Case Study

- Services 500,000 customers in Southern New Jersey
- Design Flow: 80 MGD
- Average Flow: 58 MGD
- Secondary, pure oxygen activated sludge treatment
- Discharges to Delaware River



Goals

- CCMUA has three fundamental goals that are critical to its success:
 - Optimization of Water Quality Performance
 - Optimization of Air Quality Performance
 - Cost Minimization



EMS Environmental Benefits

- Effluent quality improved by 40-50%
 - 22ppm TSS in 1999 to 10ppm in 2007
 - 25ppm BOD in 1999 to 15ppm in 2007
- Sludge removed improved by 45%
 - 11,000 dry tons removed in 1999 to 16,000 dry tons in 2007
- Odor violations down from 16 in 1997/98 to 4 from April 1998 to December 2007

EMS Economic Benefits


- Reduced O&M costs by 25% within three years
- Annual savings of \$5,000,000 per year
- \$50,000,000 saved since 1999
- No rate increases since 1996, with three rate cuts

EMS Organizational Benefits

- Help an organization identify its environmental performance goals
- Harness and direct the organization's collective wherewithal toward meeting performance goals

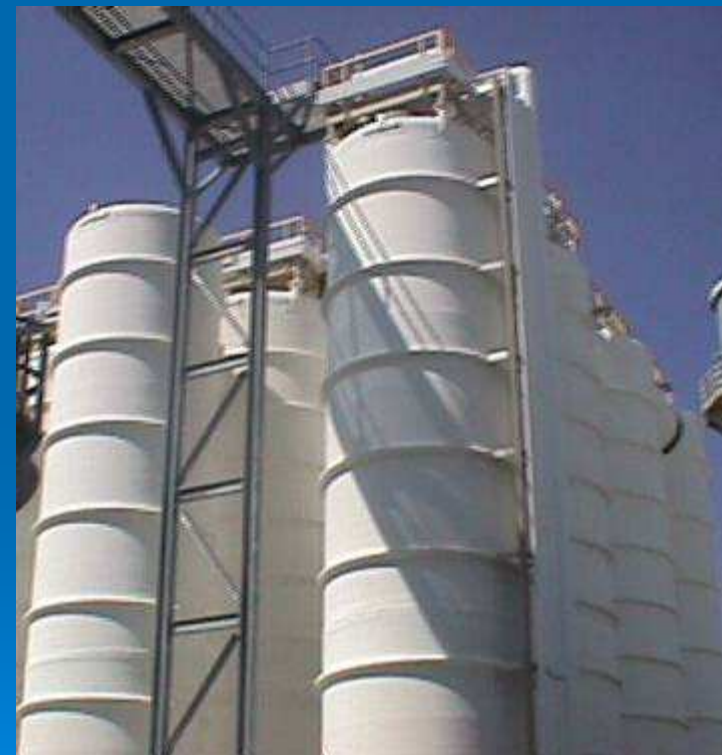


Implementation of EMS

- Identification of core corporate objectives
 - Optimization of water quality performance
 - Optimization of odor control performance
 - Cost minimization
 - Identification of core goals assures sufficient allocation of necessary resources
- 

EMS Development Steps

- Gap Analysis
- Team Chartering
- Awareness Training
- Environmental Policy
- EMS Manual Development
- Sustained Implementation



Pre-EMS State of Affairs

- Water Quality
 - Plant struggling to meet 30 ppm permit limit for suspended solids (TSS) and Biochemical Oxygen Demand (BOD)
 - 24 unauthorized plant bypasses in 1999 alone
- Air Quality
 - 16 NJDEP Odor control violations from April 1997 – June 1998
 - Numerous odor complaints from neighborhood; relations openly hostile
 - \$8 million in aggregate fines

Water Quality Improvement Initiatives

- Decided that merely meeting permit was unacceptable; effluent quality should be optimized
- Required that all systems must be maintained and available for service
- Installed new sludge thickening and dewatering facilities to improve plant's sludge removal capability
- Plant bypasses no longer permitted without express NJDEP approval

Results: Water Quality

- Improved effluent quality by 40-50%
 - 22ppm TSS in 1999 to 10ppm in 2007
 - 25ppm BOD in 1999 to 15ppm in 2007
- Increased TSS and BOD removal
 - TSS: 88% in 1999 to 95% in 2007
 - BOD: 85% in 1999 to 95% in 2007



Air Quality Improvement Initiatives

➤ Air Quality

- Closed odorous sludge composting facilities
- Odor inventory by independent consultant
- Installed new odor control systems at plant headworks
- Imposed zero tolerance policy with respect to odors from carelessness (doors left open; odor systems left off, etc)
- Numerous outreach attempts to neighboring community to improve relationship


Results: Air Quality

- Odor violations and fines down
 - from 16 in 1997/1998 (14 month period) to 3 from April 1998 to October 2007
- Odor complaints down by over 90%
- Friendship forged with neighborhood due to sincere and successful efforts to reduce odors
 - In addition CCMUA undertook several other positive initiatives, like building two parks in the neighborhood, etc.

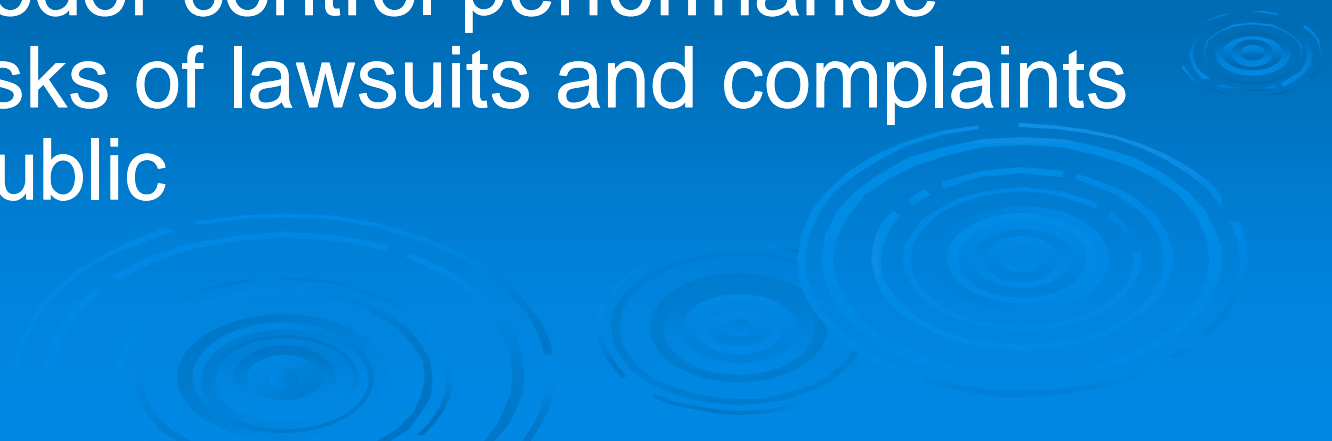
Results: Energy Savings

- Reduction of infiltration/inflow
 - Reduces pumping costs and treatment costs
- Elimination of municipal pumping stations via opportunistic gravity connections
- Computerized Electric Peak Shaving System
 - Reduces electric peak factor costs
- Optimization of primary sedimentation tanks
 - Reduces reliance on energy intensive secondary treatment process
- Upgrade of Pure Oxygen Aeration System to reduce energy costs

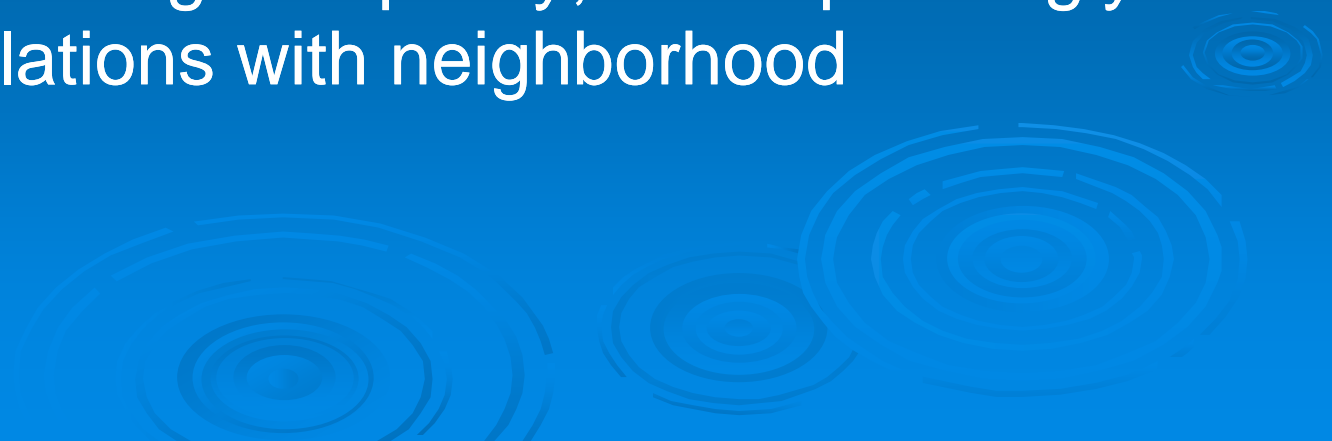
Results: Energy Savings continued

- Use of heating loops
 - Use of energy efficient equipment and Lighting
 - Retrofitting of diesel vehicles to ultra low sulfur fuel
 - Use of catalytic converters to reduce NOx and CO emissions
 - Investigating energy generation from sludge gasification
- 


Results: Risk Avoidance

- Improved performance reduces risk of adverse impact to the environment and public health
 - Improved water quality and air quality performance reduces risk of fines and violations from regulatory agencies
 - Improved odor control performance reduces risks of lawsuits and complaints from the public
- 

Results: Stakeholder Relations

- Improved relations with regulatory agencies and neighbors
 - Positive actions toward improving water quality and air quality performance correspondingly improves relations with regulatory agencies
 - Positive actions toward eliminating odors, plus general good neighbor policy, correspondingly improves relations with neighborhood
- 

Result: Organizational Culture

- Positive Environmental Culture
 - An effective two way chain of communication between top management and line workers was established to ensure that workers know management's performance goals and that management knows what workers need to achieve these goals
- 
- A decorative graphic consisting of several concentric circles, resembling ripples in water, located in the bottom right corner of the slide.

Results: Knowledge Management

- Capture of Institutional Knowledge
- Documenting standard operating procedures captures key knowledge held by experienced personal
- Cushions the blow when key personnel depart and reduces the subsequent learning curve time

Cost Implications

- Did improved environmental performance result in cost increases or rate increases?


NO!

- EMS team managers were directed not to choose between performance improvements and cost savings, but rather to look for initiatives that would both improve performance and reduce costs

Cost Implications

- CCMUA achieved a 25% reduction in operations and maintenance costs from \$21.2 million in 1996 to \$16 million in 2000
- This, combined with additional efforts to capture under reported revenue, resulted in user rate held for 12 years, 1996-2007, with three rate cuts during this period
- ***Achieving efficiencies in operations can, and did, result in improved operational performance and cost savings***

Public - Private Sector Really Not So Different

- Private Utility
 - Maximize Profit
 - Optimize Product Quality
 - Serve Customers
 - Outside Competition
 - Public Utility
 - Minimize Cost
 - Optimize Environmental Performance
 - Serve Ratepayers
 - Privatization or replacement
- 

Benefits of EMS

- EMS provided the structural framework:
 - To harness the company's internal capabilities organize it, and then direct it in an unified manner to address the organization's top priority objectives
- EMS ensures that:
 - Top goals are continually given top priority, at all levels of the operation, top to bottom
 - Ideas are followed up on, until they are implemented

EMS Benefits Available to All

- EMS resulted in improved efficiency which led to both improvement in environmental performance and significant cost savings as well
- CCMUA achieved significant improvements through EMS even though:
 - It was an average, borderline compliant, utility prior to EMS
 - Camden City is the poorest city in the nation

Conclusions

- Energy management is among the most crucial and visible of issues facing utilities managers
- Utilities managers must continue to provide safe, reliable and effective services to sustain our communities
- Utilities managers are driven to continually improve operational performance, “doing more with less”
- Utilities managers must increasingly integrate environmental, social and economic considerations in decision making
- An EMS provides a workable framework for sustainability performance improvement
- Utilities managers’ play significant roles in the sustainability of the communities they serve and the planet we inhabit

Energy Management:
Public Wastewater Utilities Role in the
Sustainability of Our Communities

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