The Importance of Asset Management: Optimization for Sustainable Clean Water Utilities

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Twin Challenges Facing Clean Water Utilities

• Main Purpose – Provide clean, safe water to protect the public health and the environment
• But must also do so at minimum cost to rate payers

Thus, utilities must always seek the best balance between optimizing performance and minimizing cost.
Increasing Challenges for Utilities

- Environmental
  - Increasing population
  - Climate Change
- Economic
  - Aging infrastructure \( \rightarrow \) increased economic pressures \( \rightarrow \)
    larger gap between needs & resources
- Demographic
  - Aging workforce \( \rightarrow \) potential loss of institutional knowledge
Thus, Utility Managers must:

- Improve environmental performance
- Replace aging capital
- Arrange for succession planning
- All, while keeping rates as low as possible!
Solution  Increased Efficiency

- The utility manager must accomplish “more” with “less”
- The public utility must adopt the private sector focus on efficiency and harness it to the public good, by optimizing operations & asset management
Camden County Municipal Utilities Authority (CCMUA)

- 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 four fundamental goals that are critical to its success:

• Optimization of Water Quality Performance
• Optimization of Air Quality Performance
• Cost Minimization
• Contribute to Long-Term Sustainability (infrastructure and environment)
Initial Conditions

- CCMUA obliged to raise rates by $22\frac{1}{2}\%$, from $275$ per household to $337$
- Numerous odor complaints from neighboring residents
- Plant struggling to meet state discharge limits, despite receiving only $70\%$ of rated capacity
Corrective Action Plan

• Implemented Environmental Management System (EMS)
  - Optimize internal efficiency
  - Improve environmental performance
  - Develop asset management plan to identify critical capital needs

• Utilized NJ Environmental Infrastructure Trust Financing Program to implement capital improvements to treatment plant and sewer facilities
Capital Improvements Funded Thru NJEIT

• Upgrade of Wastewater Treatment Plant - $170M
• Upgrades to regional sewer system - $130M
• $300M
Environmental Benefits

- Effluent Quality Improved by 40-50%
  - 22ppm TSS in 1999 to 5ppm in 2014
  - 25ppm BOD in 1999 to 2ppm in 2014
- Sludge Removed Improved by 45%
  - 11,000 dry tons removed in 1999 to 16,000 dry tons in 2014
- Odor Violations down from 16 in 1997/98 to 4 from April 1998 to December 2014
Economic Benefits

• Reduced O&M Costs by 25% within three years
• Annual Savings of $5,000,000 per year
• $75,000,000 saved since 1999
• In 1996, CCMUA’s annual rate was $337/household; In 2014, the rate was $342/household representing a 45% reduction in rates compared to the inflation rate total. Ratepayer savings - approx $430,000,000
Other Benefits

• Reduced Risk of:
  • Adverse impact to environment and public health
  • Fines from regulatory agencies
  • Public complaints or lawsuits

• Improved relations with Regulatory Agencies & Neighbors

• Creation of Positive Environmental Culture

• Capture of Institutional Knowledge
Sustaining Infrastructure, Environment and Rates

- CCMUA has replaced and upgraded the major process units of its treatment plant through the NJEIT
- Replacing under performing process units results in improved operational performance and reduced O & M costs
- Rate increase avoided by
  - Choosing projects for which operating cost savings exceed marginal debt service
  - Benefitfitting from lower cost state revolving funds which significantly reduce debt service requirements
**Vital Importance of SRF**

- Capital project of $20M; Annual O&M Savings- $2 million
- Funding through SRF- $1.5M in annual debt service
  - net annual savings of $0.5M
- Conventional Funding- $3.25M in annual debt service
  - net annual deficit of $0.75M
- SRF Financing is often the difference between a “go” or “no go” for important environmental initiatives
Camden’s Five-Pronged Plan for Its Combined Sewer System

- **Green Infrastructure** - capturing stormwater reduces the volume of flow in the sewer system
- **Water Conservation** - using less water also reduces the volume of flow in the sewer system
- **Infiltration/Inflow Removal** - eliminating extraneous rainwater and groundwater reduces the volume of flow in the sewer system
- **Optimization of Combined Sewer System Operations** - maximizes sewer storage capacity
- **Capital Improvements to Combined System**
Conclusion

• Clean water utilities face very significant challenges, especially aging infrastructure and climate change
• Optimizing efficiency and asset management are key cornerstones for the clean water utility of the future’s ability to meet these challenges
• Utilization of the NJEIT’s low cost loans were critical to the CCMUA’s ability to upgrade its capital, improve its environmental performance while reducing the cost to its ratepayers
Thanks for Listening!

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