Operation and maintenance of wastewater treatment facilities: Challenges and opportunities

Binational Border Sanitation and Water Quality Summit
San Antonio, Texas
March 18, 2011
Challenges: Institutional Capacity

• WWTP Operators Training & Certification
  - Inadequate training of WWTP operators.
  - High Turn-Over rate of WWTP staff.
  - Lack of a WWTP operators certification program.

• Change of Administration in local authorities (Municipal/water utilities).
  - Change of priorities.
  - Allocation of resources for WWTP operation and maintenance.
  - Consequently, there is an inadequate operation and maintenance of WWTP facilities.
Challenges: Regulatory Framework

• Change of regulations during the construction phase of a WWTP.

• Differences of standards that apply to a binational water body. (CPDs, TMDLs, etc.)
  - 30/30 versus 75/75
  - Chlorination/de-chlorination, UV versus chlorination

• Pretreatment: Municipal jurisdiction versus Water Utility Jurisdiction.

• More stringent regulations to control the maximum loads of contaminants to water bodies.
Challenges: Financial and Socioeconomic

• When wastewater flows have reached the 75% WWTP design capacity planning to increase the treatment capacity of a plant is required.

• More stringent regulations to control the maximum loads of contaminants to water bodies will be required.

• Lack of funds impedes water utilities to improve their wastewater treatment plants in accordance with the population growth.
Challenges: Financial and Socioeconomic

- Pretreatment versus Socioeconomic Development.
- Lack of pretreatment programs or lack of enforcement.
- Not initially considered industrial wastewater loads are affecting the operation of wastewater treatment plants and the quality of its effluent.
- Population growth not as expected (oversized facilities)
Meeting the Challenge

- **Sufficient Investment in Planning**
  - Identify Funding Sources
    - US-Mexico Border Water Infrastructure Program - PDAP
    - Green Building Guidelines
  - Inspiring Community Participation / Education Outreach

- **Local Initiatives and Partnerships**
  - Capacity Building at all levels – “Best Practices”
  - Water and Energy Audits / Benchmarking
  - Enhanced Rate Structures

- **Policy Consideration**
  - Funding Source Prioritization Schemes
    - US-Mexico Border Water Infrastructure Program - BEIF/PDAP
    - State Revolving Fund – Capitalization Policies
    - Pretreatment enforcement
Opportunities: Institutional Capacity

• Keep periodic training of WWTP operators.

• Promote actions to reduce Turn-Over rate of WWTP staff.

• Develop a WWTP operators certification program.

• Promote workshops with new municipal/water utilities authorities (Municipal/water utilities).

  ➢ To keep allocation of resources for WWTP operation and maintenance.

  ➢ To balance pretreatment enforcement and needs of economic development.

  ➢ To keep/improve institutional capacity of utility.
Opportunities: Regulatory Framework

• Better planning considering near future change of regulations.

• In order to protect binational water bodies and in accordance with local regulations, promote a scheme to achieve effluent quality based on modeling.

• Promote agreements between Municipal governments and water utilities to develop and enforce pretreatment programs.

• Promote investment from three levels of government to upgrade WWTPs to comply with more stringent regulations to protect water bodies.
FOCUS: Water Infrastructure Strategies

- Infrastructure Planning
  - Green Building Guidelines

- Water Management:
  - Demand Management
  - Conservation Practices
  - Financial Sustainability

- Energy Management:
  - Water Demand Reduction
  - Capacity Strengthening
  - Clean and Renewable Energy

Potential Impact: Improved Resource Management, Reduced Operational Costs, Reduced Greenhouse Gases
• **Key sustainability principles for applying green building concepts, include:**
  - Designing for Operating Efficiency
  - Seeking to Not Overbuild
  - Using Local Materials
  - Looking Beyond Initial Costs

• **Support the achievement of an efficient use of resources - energy, water, and materials.**

• **In coordination with EPA, BECC developed a set of guidelines to incorporate green building decision-factors in all phases of the project cycle.**
Planning - Green Building

- **Planning** – Activities for selecting a process, site, system layout, product, and materials – supported by Life Cycle Costing methods.

- **Design** – Activities to promote operating efficiency, determine appropriate capacity, and evaluate the use of green products and practices.

- **Construction**: Activities supported by formal construction specifications – adapted, whenever possible, to reflect green building practices and supplemented by additional “green” decisions that may be determined in coordination between the owner, designer and contractor before and during construction.
Energy Management

Conservation and Efficiency

• Demand Reduction
  • Water Resource Management

• Capacity Strengthening
  • Energy Audits
  • Facility and Process Lighting
  • Equipment Replacement
  • Load Management / SMART software

• Clean and Renewable Energy:
  • Wind, Solar
  • Biomass

Figure 1. Energy consumption of VFDs and throttling valves.
Project Close-Out

• **Evaluate Constructed/Operational Conditions vs Anticipated Conditions at Certification**
  - Were all outputs (construction works) completed?
  - Is the infrastructure operating as expected?
    - Technical – flows, energy, quality, operator training
    - Financial – connections/hook-ups, revenue
  - Were anticipated outcome targets achieved?

• **Influences for any Deviations**
  - Identify what may have influenced the deviation
    - Insufficient Funding / Fluctuating Costs
    - Design or Operation issues
    - Unanticipated conditions – climate, land, customer characteristics
    - Slow connections, unmet population projections, etc

• **Creating a Feedback Loop**
  - Identify if the lessons can improve the project development or expectations of the next project
Thank You.

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