The Nexus Between Asset Management & Energy Efficiency
There are many ways to approach energy efficiency for water and wastewater facilities
One way is to look at the linkages between the process of asset management and the process of energy efficiency
Asset Management

Current State of the Assets

Long-Term Funding Strategy

Core Components

Required Level of Service

Minimum Life Cycle Costs

Critical Assets
Energy Efficiency Process

1. Planning for Energy Efficiency
2. Implementing Improvement Programs
3. Monitoring and Measuring Energy Improvement Program
4. Maintaining Energy Improvement Programs
Natural Links: AM & EE
Inventory Overview

• Asset Management
  – Current state of the Assets
    • What do you own
    • Where is it
    • What’s its condition
    • What’s its value
    • What’s its useful life

• Energy Efficiency
  – Initial Planning
    • Energy baseline
      – What uses energy
      – Where are these facilities located
## Sample Blended Inventory

<table>
<thead>
<tr>
<th>Asset ID</th>
<th>Asset Category</th>
<th>Asset Type</th>
<th>Condition</th>
<th>Useful Life</th>
<th>O&amp;M Cost</th>
<th>Energy User (Y/N)</th>
<th>Type of Energy</th>
<th>Energy Usage per month</th>
<th>Energy Cost per month</th>
</tr>
</thead>
<tbody>
<tr>
<td>WP66 54</td>
<td>Pumps</td>
<td>Main Street Pump Station Pump 1</td>
<td>3</td>
<td>10 years</td>
<td>250/mo</td>
<td>Y</td>
<td>Electric</td>
<td>120 kW</td>
<td>$50</td>
</tr>
<tr>
<td>WWM 3422</td>
<td>Mixer</td>
<td>Aeration Basin Mixer 3</td>
<td>4</td>
<td>25</td>
<td>35/mo</td>
<td>Y</td>
<td>Electric</td>
<td>50 kW</td>
<td>$20</td>
</tr>
</tbody>
</table>

- Inventory database including energy usage information
- Ability to sort database based on energy usage, type of energy used, amount of energy used, or cost
Natural Links: AM & EE

Level of Service

• Asset Management
  – Level of Service
    • What do you want your assets to do?
    • What are your goals?
    • Measuring results against goals to determine how well you’re doing

• Energy Efficiency
  – Monitoring & Measuring Energy Improvement
    • Set goals for energy improvement
      – What do you want your program to achieve?
    • Measure improvements to determine how well you’ve met goals
Natural Links: AM & EE Level of Service

Asset Management
- What do the customers want?
- What are they willing to pay for?

Energy Efficiency
- Are customers willing to pay more for green energy?
- Are customers willing to pay for conversion of carbon energy to green?

Will customers agree to water conservation to reduce wear and tear on assets and reduce energy usage. Water conservation benefits both.
# Blended Level of Service

<table>
<thead>
<tr>
<th>Goal</th>
<th>Target Level</th>
<th>Actual Level</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Replace all incandescent light bulbs with CFLs in all facilities by January 2011</td>
<td>200 bulbs replaced</td>
<td>100 bulbs replaced</td>
<td>Waiting on new shipment of CFLs</td>
</tr>
<tr>
<td>Reduce water consumption by 25 gallons per household per year</td>
<td>25 gallons per household</td>
<td>15 gallons per household</td>
<td>Working with schools to achieve additional reductions</td>
</tr>
<tr>
<td>Replace diesel pumps with electric pumps</td>
<td>All 10 diesel pumps replaced by 2012</td>
<td>2 diesels replaced</td>
<td>Awaiting further funding</td>
</tr>
</tbody>
</table>
Natural Links: AM & EE
Criticality

• Asset Management
  – Which assets are critical to sustained performance?
  – Which assets are most likely to fail?
  – Which assets cause the greatest consequence if they fail?

• Energy Efficiency
  – Which assets contribute the most to overall energy usage/cost?
  – Which assets use the most carbon based energy?
  – Which assets have the lowest energy efficiency?
Blended Criticality Evaluation

<table>
<thead>
<tr>
<th>Energy Usage</th>
<th>Probability of Failure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>Low Importance for Energy Efficiency</td>
</tr>
<tr>
<td>High</td>
<td>High Importance for Energy Efficiency</td>
</tr>
</tbody>
</table>

Consequence of Failure

Carbon Based Energy Usage
Natural Links: AM & EE

• Asset Management
  – Life Cycle Costing
    • When is the appropriate time to replace an asset?
      – O&M costs
      – Capital costs
    • What are total costs of running asset over time
      – Includes energy costs when appropriate

• Energy Efficiency
  – Costs of reducing energy use
    • Full cost of replacing an asset with a more efficient or “greener” asset over time
      – Can a case be made for this replacement using life cycle costing
Blended Life Cycle Costing

- Initial Capital Cost
- Operation Cost
- Maintenance Cost
- Repair Cost
- Rehabilitation Cost
- Disposal Cost
- Replacement Capital Cost
- Other $$: Legal, environmental, social, impact on other operations
Blended Life Cycle Costing

Energy Efficiency considerations may tip the scales in favor of replacement earlier than AM alone would say.
Natural Links: AM & EE

- **Asset Management**
  - Funding
    - What will the funding be for the overall program?
    - Where will money come from for O&M and capital?

- **Energy Efficiency**
  - Funding
    - Where will funding come from to run the program?
    - Will energy efficiency create sufficient reductions in costs to offset costs?
    - Can energy efficiency result in funds that can be used for other purposes?
What funding do we need to properly operate the assets?

Where will the funding come from?

- Capital
  - Impact Fees
  - Special Funds
  - Bonds
- Operation & Maintenance
  - Energy Cost Reductions
  - Customer Rates
  - Customer Fees
- Operation & Maintenance
  - Grants
  - Loans
  - Taxes
Natural Links: AM & EE
Overall Plan

• Asset Management
  – Asset Management Plan
    • Summarizes the approach
    • Defines the goals
    • Communicates results
    • Continuous improvement, so reviewed annually and modified periodically

• Energy Efficiency
  – Energy Management Plan
    • Summarizes the approach
    • Defines the goals
    • Communicates results
    • Continuous improvement, so reviewed annually and modified periodically
Natural Links: AM & EE
Who can complete the plans?

• Asset Management
  – Current Staff – KEY
  – Professional Consultants/Assistance Providers
  – Elected Officials

• Energy Efficiency
  – Current Staff – KEY
  – Professional Consultants/Assistance Providers
  – Elected Officials
  – Power Utility Staff
Why would you want to do either?

• Asset Management
  – Ability to provide good information to upper management & elected officials
  – Planned vs. Reactionary
  – Sustainable Systems
  – Customers who support you and what you’re doing
  – Sound financial decisions
  – Ability to benefit from cost savings over time

• Energy Efficiency
  – Decrease energy costs, therefore reducing overall costs of operation
  – Reduce greenhouse gas emissions
  – Meet funding program requirements
Why would you want to do both together?

- Similar approach and work for each effort
- Same types of personnel required
- Benefits in one can benefit the other
- Goals may overlap
- Greater sustainability
- Doing both together will result in reduction of time and money rather than doing both separately
- One plan with both may be easier to manage
- Energy considerations may impact the asset decision-making process