City of Oconomowoc
Sustainable Energy Saving Design

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Oconomowoc Wastewater Treatment Facility

Facility Upgrade Project

2011 – 2012
Energy Utilization – Focus Area

New Biosolids Pumping and Vehicle Storage Building
Dual Fuel Boiler
Building Layout

Building Size 75 ft x 67 ft x 18 ft

- Electrical Room
- Pump Room
- Vehicle Storage Room
New Biosolids Pumping and Vehicle Storage Building
Vehicle Storage - HVAC

- Code – 0.5 cfm/sqft Requires 1,650 cfm - Continuous
- Alternative - Carbon Monoxide and Nitrous Oxide Detector
- Operation – 5 Hours per Day or When Detected
Sludge Pump Room - HVAC

- Code – 6 Air Changes per Hour
  - 2,400 cfm-Continuous
- Alternative – Flush Pumps and Operate HVAC During Pumping Operation - Seasonal
Building Heating Options

- Natural Gas Only
- Natural Gas with Exhaust Heat Recovery
- Digester Gas Heat Only
- Digester Gas Heat with Exhaust Heat Recovery
- Effluent Water to Water Heat Pump
- Ground Water to Water Heat Pump
## Alternative Analysis

<table>
<thead>
<tr>
<th>System</th>
<th>Installation Cost Dollars</th>
<th>Annual Energy Cost Dollars/Year</th>
<th>Simple Payback Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natural Gas</td>
<td>129,000</td>
<td>2,039</td>
<td>NA</td>
</tr>
<tr>
<td>Natural Gas w/ Heat Recovery</td>
<td>253,000</td>
<td>1,820</td>
<td>566</td>
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<tr>
<td>Digester Gas</td>
<td>149,000</td>
<td>200</td>
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<tr>
<td>Digester Gas w/ Heat Recovery</td>
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<td>152</td>
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<td>Effluent Water Heat Pump</td>
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<td>2,692</td>
<td>NA</td>
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<tr>
<td>Ground Water Heat Pump</td>
<td>391,000</td>
<td>2,487</td>
<td>NA</td>
</tr>
</tbody>
</table>
Analysis Results

- Digester Gas Offered the Best Payback
- Heat Pump Alternative
  - 2.5 times less natural gas
  - High electrical operational cost-more energy
- Exhaust Heat Recovery
  - Low benefit because low room temperature and reduced ventilation run time.
Additional Building Features

- Insulated Skylights
  - More natural daytime light – reduce electrical lighting
  - Insulated to reduce heat loss-R-9
- Outside lighting LED
  - Reduced energy
  - Low maintenance
Rain Gardens

- Three Rain Gardens-4500 sqft
- Reduce Run Off
- Remove Suspended Solids
- Improve Water Recharge
- Esthetics
Engineered Rain Garden
Rain Garden Plantings
Goals for the Future

- Develop consistent supply of high strength waste.
- Heat the existing Solids Handling Building and the new Biosolids Pumping Building without increasing natural gas usage.
- Utilize additional gas in the summer months for power generation, or absorption cooling.
Thanks for your attention!