Wooster, Ohio & quasar energy group
Public - Private Partnership for Biosolids Management

Ohio WEA
AWWA 2014 Technical Conference & Expo
One Water, Columbus, Ohio

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Presenters

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- Utilities Director

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- quasar energy group
- Chief Operating Officer
Acknowledgements

Wooster, OH
Robert Breneman - Mayor
Joel Montgomery, P.E. – Director of Administration
Dick Benson – Law Director
Steve Caruthers – Plant Superintendent
Steve Samuels – Outside Legal Counsel

quasar energy group
Mel Kurtz - President
Steve Smith – CFO
• Introduction and Agenda
• Wooster WRRF Process History & Overview
• Biosolids Needs Assessment
• Biosolids Processing / Disposal Alternatives
• Setting a New Standard for Public/Private Partnership
• quasar Operating Strategy
• Future Plans for the Partnership
• Questions
### Wooster, Ohio WRRF

#### Process Overview

<table>
<thead>
<tr>
<th><strong>Flows:</strong></th>
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<tbody>
<tr>
<td>– 7.5 MGD ADDF</td>
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<tr>
<td>– 27 MGD PWWF</td>
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<thead>
<tr>
<th><strong>Liquid Process:</strong></th>
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<tr>
<td>– Fine Screening</td>
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<tr>
<td>– Primary Clarification</td>
<td></td>
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<tr>
<td>– VLRs w/ anaerobic &amp; anoxic zones</td>
<td></td>
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<tr>
<td>– Final Clarification</td>
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<td>– UV Disinfection</td>
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<table>
<thead>
<tr>
<th><strong>Solids Process (&lt; 2013):</strong></th>
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<tbody>
<tr>
<td>– Gravity Thickening</td>
<td></td>
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<tr>
<td>– Anaerobic Digestion</td>
<td></td>
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<tr>
<td>– Land Application</td>
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Limited solids capacity was, in part, contributing to NPDES compliance issues.
Wooster WRRF
Biosolids Needs Assessment

Process Needs:
1. Thickening: Need to thicken sludge going into the digesters to 5-6%.
2. Anaerobic Digesters: Need to renovate the aging digesters.
3. Cogeneration: Would be good to generate electricity using cogen unit.

Disposal Needs:
1. Dewatering of biosolids and/or lime to reduce liquid hauling costs.
2. Sludge minimization to reduce the volume of solids being hauled, if it’s worth it and reliable.

Conclusions:
WPCP has too many solids in wet stream = Contributes to NPDES violations

WPCP has too much water in the solids stream (WPCP and WTP) = $$$$$
Alternatives:

1. **Digester Improvements:** Continue current practice of anaerobic digestion with or without dewatering.

2. **Third Party Biosolids Management:** Contract the sludge processing and biosolids disposal to a third party.

3. **Class “A”:** Convert the anaerobic digesters to Class “A” technology. Provided dewatering to market the cake product.
**Alternative 1: Improve Existing Anaerobic Digesters**

**Scope of Work**

1. **Thickening:** Add thickening equipment to increase % solids to digesters from 2% to 6%.
2. **Renovate the Anaerobic Digesters:** Install new covers, new mixing equipment, heat exchangers, process piping, valves.
3. **Lagoon Improvements:** Replace decanters to minimize clogging & solids recycling.
4. **Optional Biosolids Dewatering:** Add dewatering to reduce digester effluent % solids from 3% to 25%. Contract for land application of “cake”.

<table>
<thead>
<tr>
<th>Advantages</th>
<th>Disadvantages</th>
<th>Total Construction Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improves sludge processing capacity</td>
<td>High capital cost</td>
<td>w/o dewatering = $5,100,000</td>
</tr>
<tr>
<td>Potential for increased gas production</td>
<td>More labor costs for O&amp;M</td>
<td>with dewatering = $7,300,000</td>
</tr>
<tr>
<td>Reduced hauling costs with dewatering hauler</td>
<td>Land application through</td>
<td></td>
</tr>
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</table>
Alternative 2: Third Party Biosolids Management

Scope of Work

1. **Wooster Capital Cost**: Clean lagoons and anaerobic digesters and turn over to the private company.

2. **Third Party Biosolids Management Improvements**:
   1. Adding thickening equipment to increase % solids to digesters from 2% to 5%-7%.
   2. Renovating the anaerobic digesters.
   3. Utilizing the existing cogen unit and expand for additional power generation.
   4. Renovating two of the lagoons for product storage. No decant back to the WRRF.
   5. Adding tankage for processing of other biomass delivered to the WRRF.

<table>
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<tr>
<th>Advantages</th>
<th>Disadvantages</th>
<th>Total Construction Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low capital cost to the City</td>
<td>Joint use of WRRF site</td>
<td>City = $1,400,000</td>
</tr>
<tr>
<td>O&amp;M of solids processing by others</td>
<td>Potential odor complaints</td>
<td></td>
</tr>
<tr>
<td>Increased gas production &amp; cogen</td>
<td>Fees may exceed current hauling</td>
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</table>
## Wooster WRRF
### Biosolids Processing / Disposal Alternatives

<table>
<thead>
<tr>
<th>Alternative</th>
<th>Annual Debt Payment</th>
<th>O&amp;M Costs (Elec, Chemicals, Staffing)</th>
<th>Hauling Costs (Lime &amp; Biosolids)</th>
<th>Total Annual Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Third Party Biosolids Agreement</td>
<td>$90,000</td>
<td>$150,000</td>
<td>$940,000</td>
<td>$1,180,000</td>
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<tr>
<td>Digester Improvements (w/o Dewatering)</td>
<td>$360,000</td>
<td>$510,000</td>
<td>$630,000</td>
<td>$1,500,000</td>
</tr>
<tr>
<td>Digester Improvements (w/ Dewatering)</td>
<td>$520,000</td>
<td>$600,000</td>
<td>$450,000</td>
<td>$1,570,000</td>
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</tbody>
</table>

**Conclusion?**

Explore Concept of a Public Private Partnership to 1) Reduce City Capital Cost and 2) Reduce O&M Costs
Public Private Partnership Process

**RFP Goals**
1. Keep options open to promote innovation.
2. Obtain sufficient financial information to perform an evaluation of lowest overall cost.
3. Minimize risk to the City.
4. Bring WRRF into compliance as soon as practical.

**RFP Evaluation Criteria**
- Process Description
- Risk Register
- Construction Sequencing
- Schedule
- Enhancements
- Cost

Work Areas Available to Third-Party Provider
## Public Private Partnership Process

<table>
<thead>
<tr>
<th>Parameter</th>
<th>City Project Cost</th>
<th>Company A Base Bid (10-yr term)</th>
<th>quasar Base Bid (10-yr term)</th>
<th>Company B Alternate Bid (15-yr term)</th>
<th>quasar Alternate Bid (15-yr term)</th>
</tr>
</thead>
<tbody>
<tr>
<td>City Project Cost</td>
<td>$4,300,000</td>
<td>$600,000</td>
<td>$600,000</td>
<td>$2,100,000</td>
<td>$2,000,000</td>
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<tr>
<td>Annual O&amp;M Cost</td>
<td>$1,050,000</td>
<td>$1,160,000</td>
<td>$1,290,000</td>
<td>$980,000</td>
<td>$920,000</td>
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<tr>
<td>Annualized Cost</td>
<td>$1,300,000</td>
<td>$1,190,000</td>
<td>$1,320,000</td>
<td>$1,100,000</td>
<td>$1,030,000</td>
</tr>
</tbody>
</table>

### Project Timeline

- **May-Aug. 2012**: URS Biosolids Study
- **Oct. 2012-Jan 2013**: RFP Process
- **Feb. 2013**: Bid Evaluation
- **March-May 2013**: Contract Negotiations with quasar
- **May-Sept. 2013**: Design-Build of Facility by quasar
PUBLIC/PRIVATE PARTNERSHIP

A New Model of Collaboration

BEFORE

City
Technology
Government/Regulatory

AFTER
WOOSTER, OH – INTEGRATED MERCHANT DIGESTER

Quality: Plant is in compliance, state of the art technology

Cost: Low investment and reduced operating cost

Timing: 14 weeks

Performance: 360 wet per day capacity
- Primary and WAS & other solids and liquids
- equate fertilizer (10-6-1)
- City started septic receiving
- Economic Development
- 1,100kw CHP
WOOSTER, OH – OPERATING SYSTEM

- WWTP is a net generator of electricity. No longer a consumer.

- New ADS plant generates 1,100 kW on average

- WWTP is provided 100% of its power needs from the conversion of biosolids

- In the future, all of the surplus electric will be available for other City meters.

- City significantly reduced its electric rate per kW.
WOOSTER, OH – OPERATING SYSTEM

- GBT: Thicken Primary and WAS from 1.5-2.5% to 8+% TS
- Solids receiving: 15%-35% TS
- Liquids Receiving: < 15% TS
WOOSTER, OH — NEXT STEPS

**Capacity:**
- Increase throughput from 60 to 95%

**Energy:**
- Run CHP at 1100kw, connect the water plant across the street (additional 350kw load).
- Install biogas upgrade system: 1000 GGE CNG per day available for public fueling station

**Effluent Management:**
- Develop an alternative to conventional land application due to public and climate challenge.
The resolution adopted by Pittsfield Township states:

“No Pond, Lagoon, impoundment area or Storage Vessel shall be constructed or used to store sewage, industrial waste, or human waste, treated or untreated, in a residential, agricultural, or business district. Except for wastes generated on premise either human, animal, or industrial. This prohibition shall not apply to sanitary units approved by the Lorain County Board of Health or agency with authority to approve sanitary unit installations. A conditional use permit for such use may be issued to accordance with the standards set forth in Chapter 5 of this Zoning resolution.”
FUTURE Effluent Management

Engineered Solution for “highly concentrated, low volume”: TS>8%, NH3>3500ppm

- Compared to land application, non seasonal, 365 days available
- 75% of the effluent goes back to the WWTP, pretreated
- 25% is recycled (Class A Solids & Ammonium Sulfate)

**Digester Nutrient Recovery Process**

- Water back to WWTP
- Solids and concentrate

- TS=30%, Class A $(\text{NH}_4)\text{SO}_4$
- P< 5ppm
- NH$_3$< 100ppm
- TSS< 250ppm
- BOD< 250ppm
Nutrient Resource Recovery

Digester Effluent:
• High Solids
• High Nutrient (N, P)

Quasar Pretreatment ↔ WWTP

- Mechanical
- Chemical
- Biological

Discharge Quality
Anaerobic digestion technology deployed in collaboration with municipalities by third party providers is a paradigm shift that:

- Facilitates system upgrades without straining utility budgets,
- Relieves regulatory pressures,
- Results in net energy production,
- Promotes regional economic development, and
- Recycles nutrients
Questions?

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