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

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Presenters

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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

Agenda

- 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

- **Flows:**
  - 7.5 MGD ADDF
  - 27 MGD PWWF
- **Liquid Process:**
  - Fine Screening
  - Primary Clarification
  - VLRs w/ anaerobic & anoxic zones
  - Final Clarification
  - UV Disinfection
- **Solids Process (< 2013):**
  - Gravity Thickening
  - Anaerobic Digestion
  - Land Application

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, **<u>if it's worth it and reliable.</u>**

Conclusions:

WPCP has too many **<u>solids</u>** in wet stream = Contributes to NPDES violations

WPCP has too much **<u>water</u>** in the solids stream (WPCP and WTP) = $$$$$

Biosolids Processing / Disposal Alternatives

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.

Biosolids Processing / Disposal Alternatives

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".

Advantages	Disadvantages
Improves sludge processing capacity	High capital cost
Potential for increased gas production	More labor costs for O&M
Reduced hauling costs with dewatering hauler	Land application through

Total Construction Cost

w/o dewatering= $5,100,000

with dewatering = $7,300,000

Biosolids Processing / Disposal Alternatives

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.

Advantages	Disadvantages
Low capital cost to the City	Joint use of WRRF site
O&M of solids processing by others	Potential odor complaints
Increased gas production & cogen	Fees may exceed current hauling

Total Construction Cost

City = $1,400,000

Wooster WRRF

Biosolids Processing / Disposal Alternatives

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

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

Parameter	City Project	Company A Base Bid (10-yr term)	quasar Base Bid (10-yr term)	Company B Alternate Bid (15-yr term)	quasar Alternate Bid (15-yr term)
City Project Cost	$4,300,000	$600,000	$600,000	$2,100,000	$2,000,000
Annual O&M Cost	$1,050,000	$1,160,000	$1,290,000	$980,000	$920,000
Annualized Cost	$1,300,000	$1,190,000	$1,320,000	$1,100,000	$1,030,000

quasar Selected

May-Aug. 2012
URS Biosolids Study

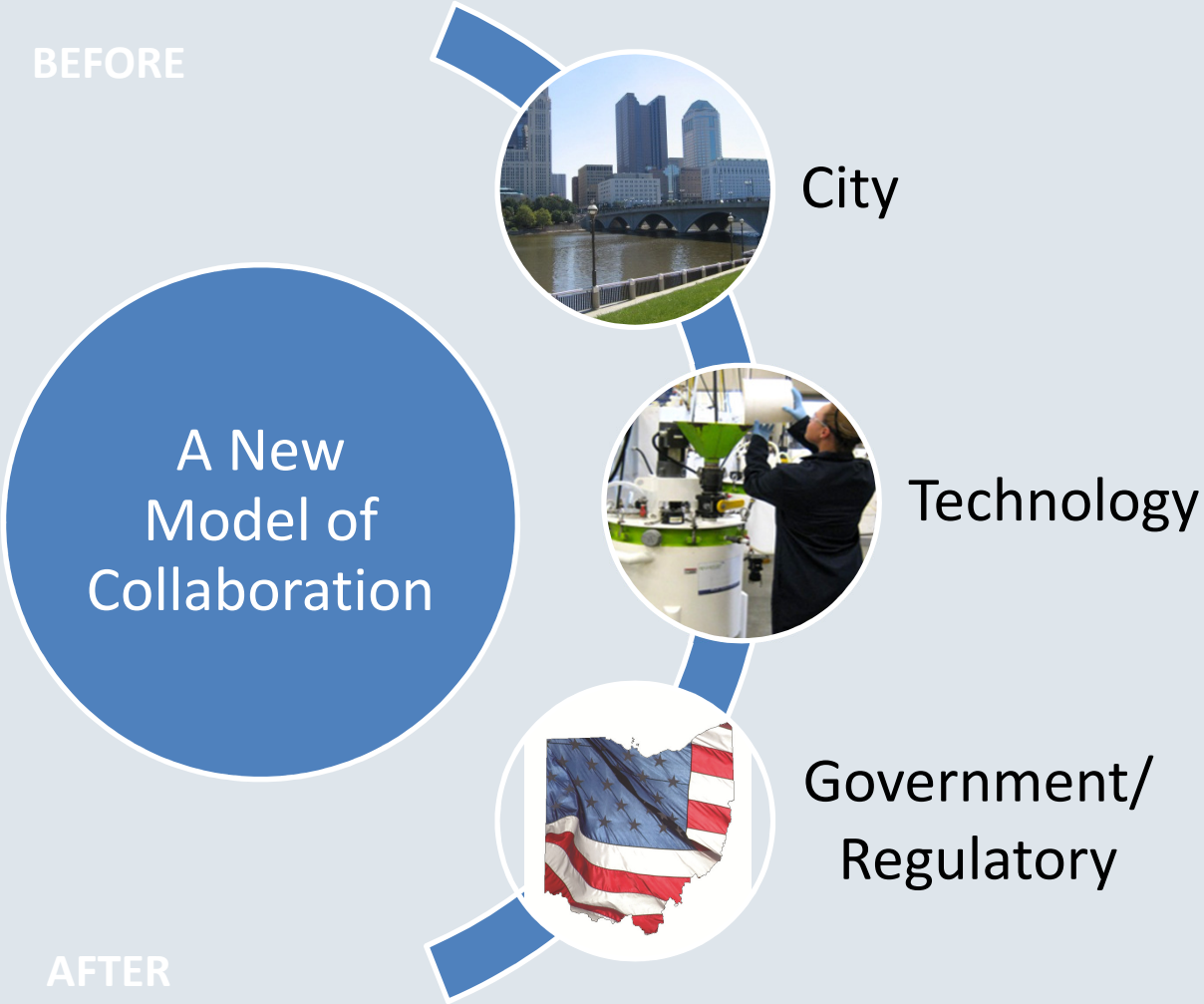
Oct. 2012-Jan 2013
RFP Process

Feb. 2013
Bid Evaluation

March-May 2013
Contract Negotiations with quasar

May-Sept. 2013
Design-Build of Facility by quasar

PUBLIC/PRIVATE PARTNERSHIP



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

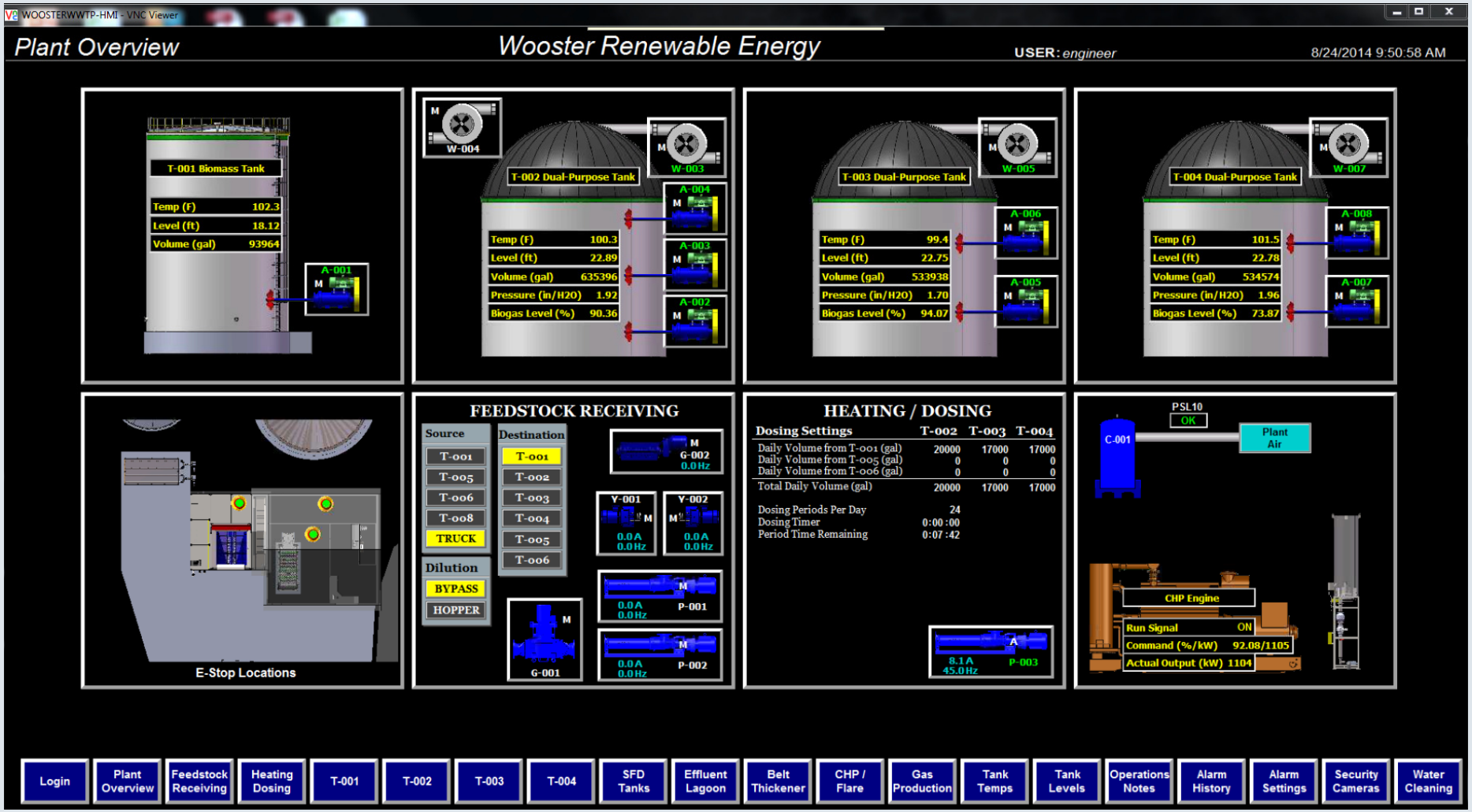
equate fertilizer (10-6-1)

City started septic receiving

Economic Development

1,100kw CHP

WOOSTER, OH – OPERATING SYSTEM



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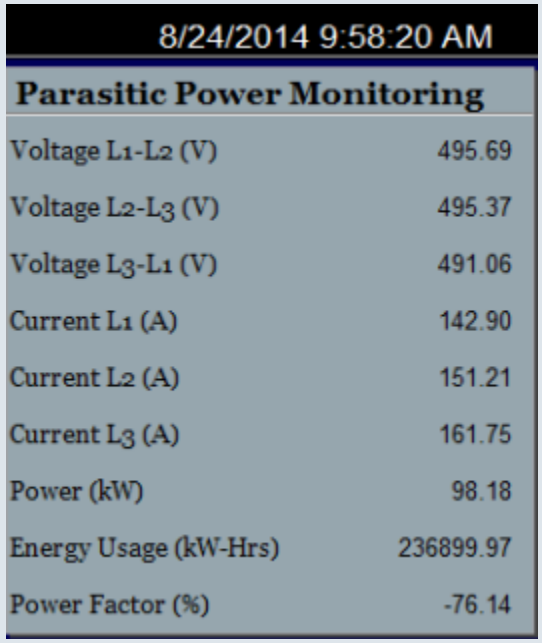
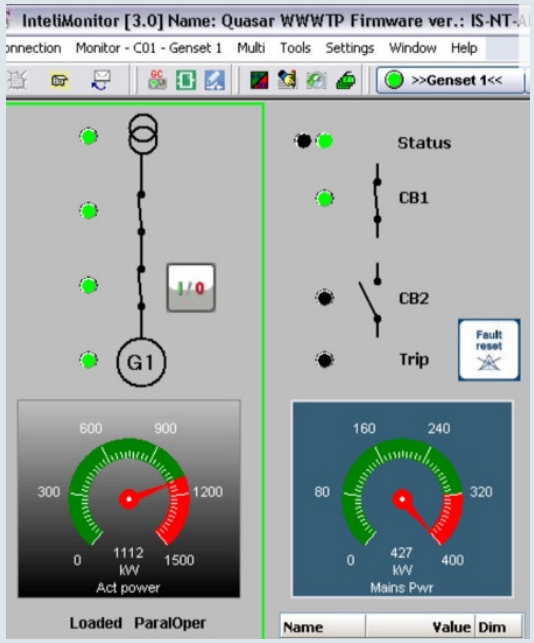
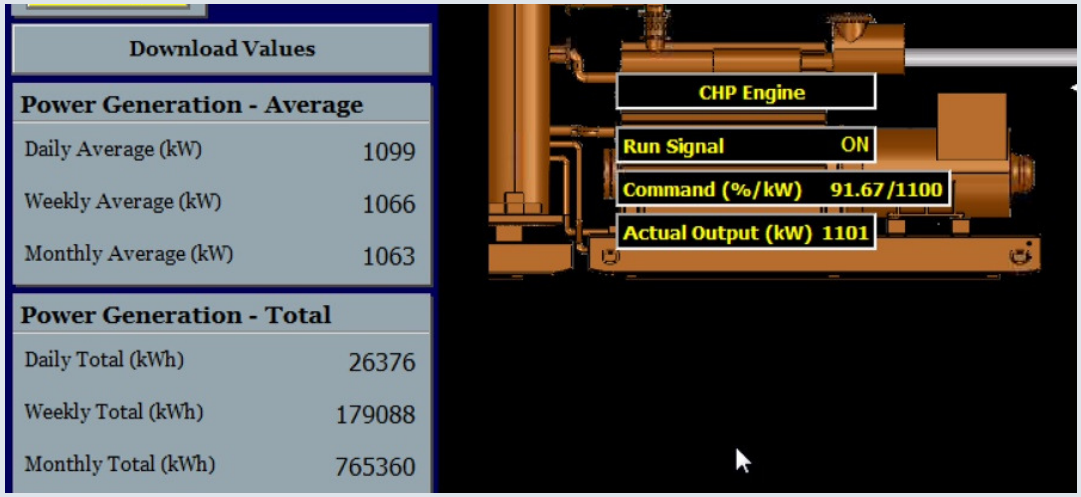
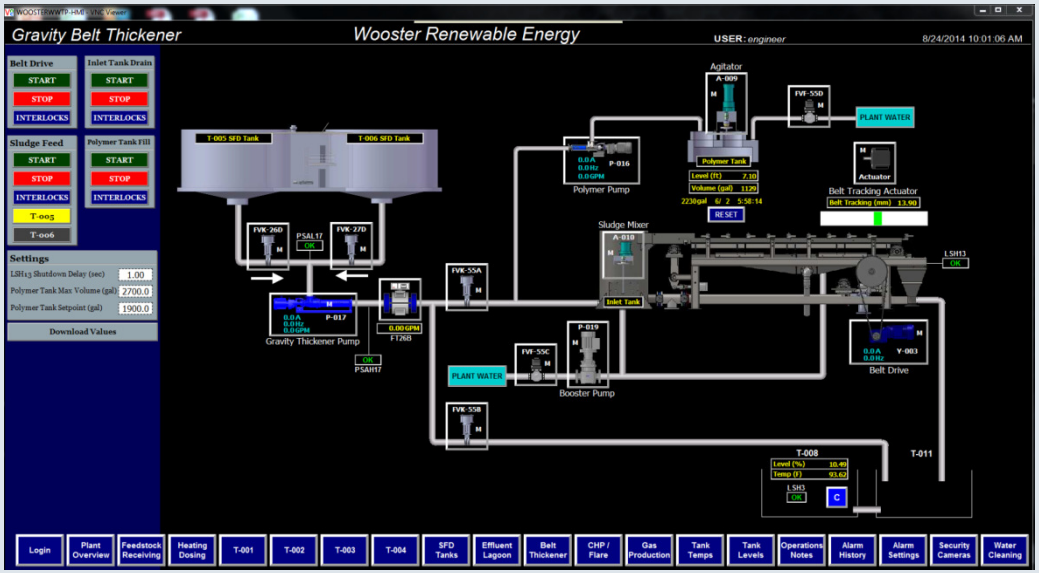


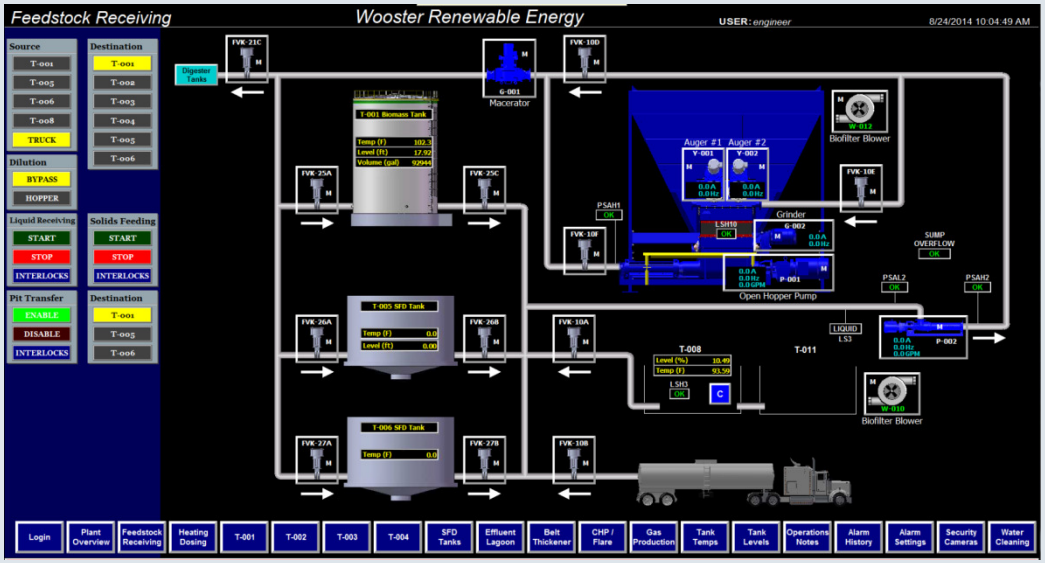




- WWTP is a net generator of electricity. No longer a consumer.
- New ADS plant generates 1,100 kW on average
- WWTP is provided 100% of it's power needs from the conversion of biosolids
- In the future, all of the surplus electric will be available for other City meters.
- City significantly reduced 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.

Effluent Management – Land Application Challenge

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The resolution adopted by Pittsfield Township states:

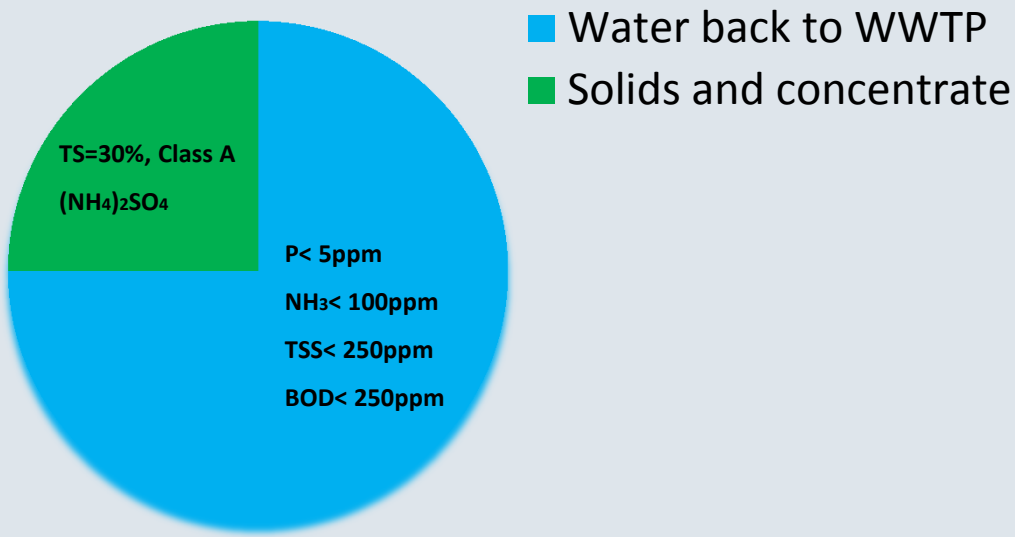
> *"No Pond, Lagoon, impoundment are or Storage Vessel shall be constructed or use to store sewage, industrial waste, or human waste, treated or untreated in a residential, agricultural, or business district. Except for wastes generated on premise either human, animal, or industrial. This prohibition 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

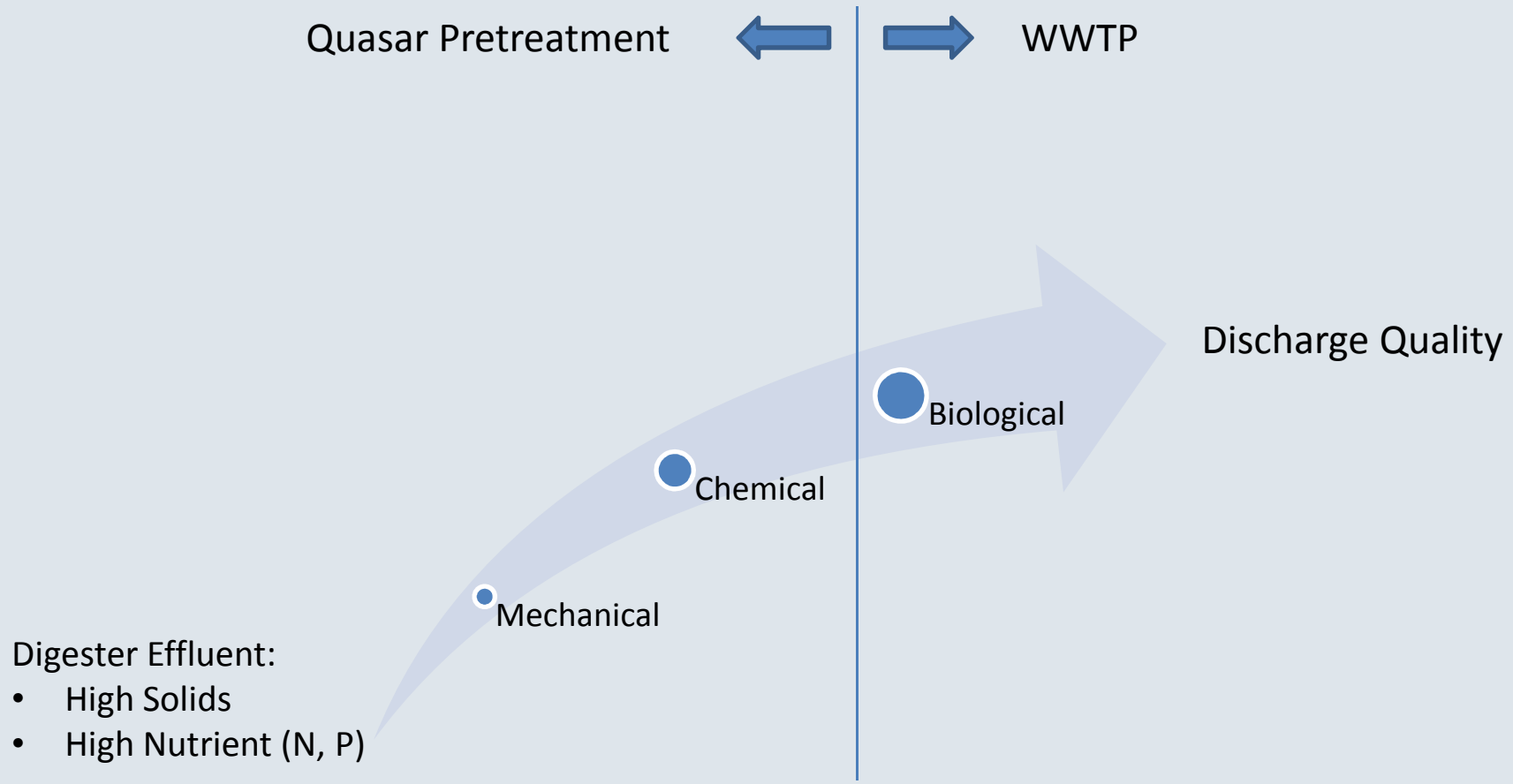
Engineered Solution for “highly concentrated, low volume”: TS>8%, NH3>3500ppm

- 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



Nutrient Resource Recovery



Digester Effluent:

- High Solids
- High Nutrient (N, P)

THE FUTURE - WWTPS

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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