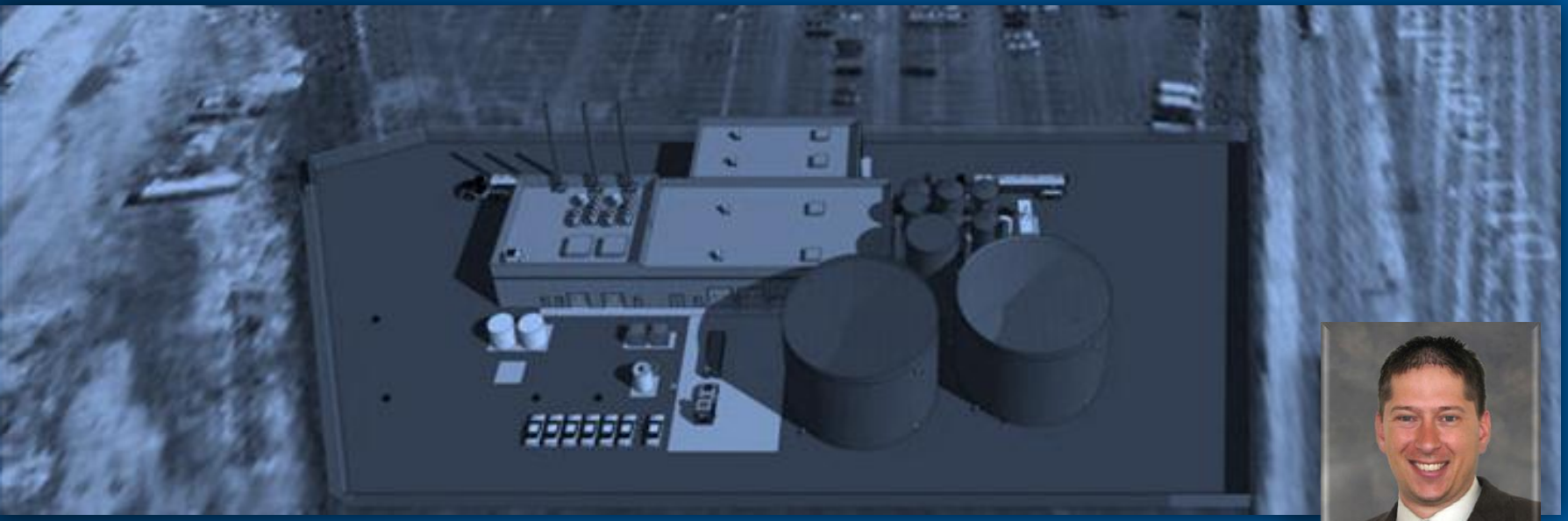
A Design-Builder's Perspective: Anaerobic Digestion

Forest County Potawatomi Community - *A Case Study*



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Discussion Points

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- Overview of the FCPC Renewable Generation Facility
- Biothane AnMBR Process Flow
- Progress update
- Advantages of the Design-Build approach
- Considerations when selecting your Design-Build partner
- Recommendations for Owners from a Design-Builder's perspective
- Lessons learned

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Overview of the Facility

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FCPC Renewable Generation Facility

- 2.0 megawatt biodigestion and biogas facility currently being constructed in Menomonee Valley of Milwaukee
- Will operate on liquid (i.e., pumpable) food wastes, utilizing anaerobic digestion to convert the feedstock material into a methane-rich biogas, a fuel similar to natural gas
- Will generate revenue from a combination of tipping fees and electricity sold through a WE Energies Tariff

Overview of the Facility

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Project Components

- Feedstock Supply Contract – Advanced Waste Services, Inc.
- Design-Build Contract – Miron Construction Co., Inc.
- Operation and Maintenance Contract – TBD

Overview of the Facility

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Design-Build Team

- Miron Construction Co., Inc. – Design-Builder
- Biothane, LLC – Process Technology Provider
- Symbiont – Balance-of-Plant Engineer and Integrator

Overview of the Facility

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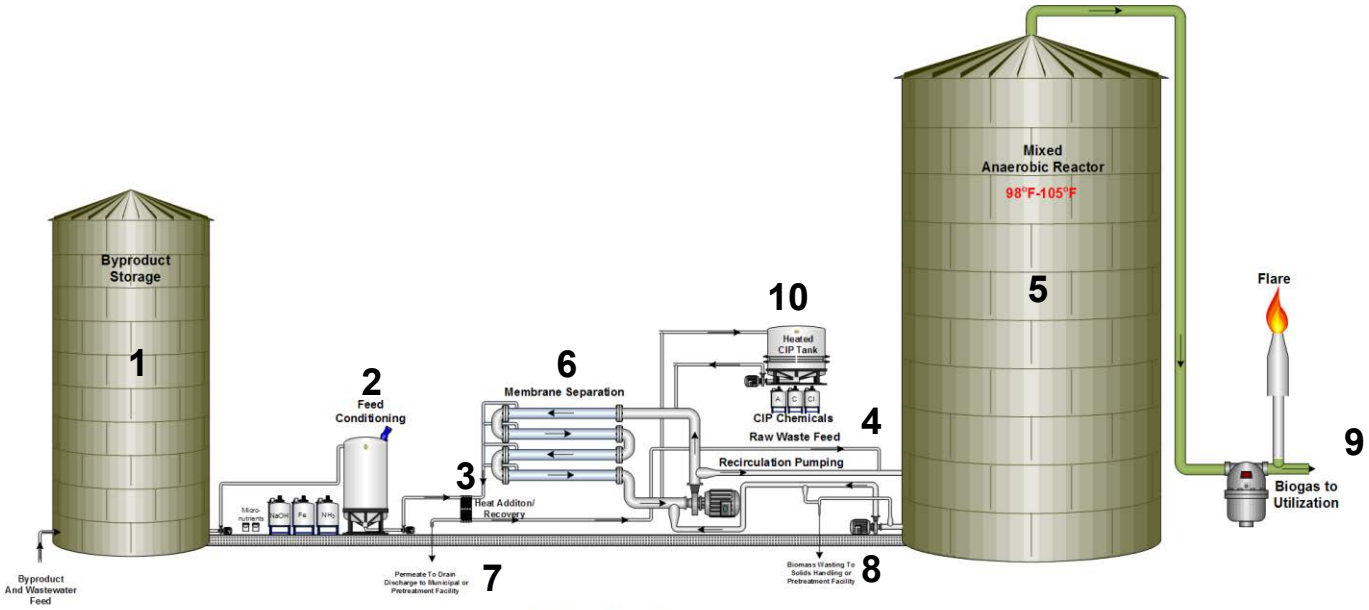
Biothane AnMBR Process Flow



Biothane AnMBR
Simplified Process Flow Diagram

1. Equalization (function of facility), acidification, existing storage integration possible
2. Chemical character adjusted appropriately
3. Heat applied/recovered (as required) – meso & thermo operations
4. Waste source fed to digester
5. Digested for required time with size meeting facility requirement
6. Recirculated through X-Flow membrane system with membrane number as required
7. Permeate sent to post treatment (COD <300 mg/L; TSS <1.0 mg/L)
8. Biosolids wasted as necessary to solids management system or sewer up to permitted limits
9. Biogas to energy recovery when appropriate
10. CIP system activated to clean membrane when required

Advantages of Biothane AnMBR System

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- Short Startup and Recovery Times
- Organic Removal Rates Exceed 99%
  - Allowing for discharge to municipal systems
- No Submerged/Inaccessible Membranes
- Automated Cleanings and Operation
- Precipitation Managed in Digester Vessel
- No Gas Scouring Required
- Accommodates Large COD Swings
- Enclosed Pressurized System

Progress Update

- Site Mobilization: November 2013
- Start Erection of Digesters: March 18, 2013
- Biogas Engine Generator Delivery: April 15, 2013
- Mechanical Completion (est): July 2013
- Substantial Completion (est): October 2013
- Project Completion (est): December 2013

Progress Update

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Progress Update

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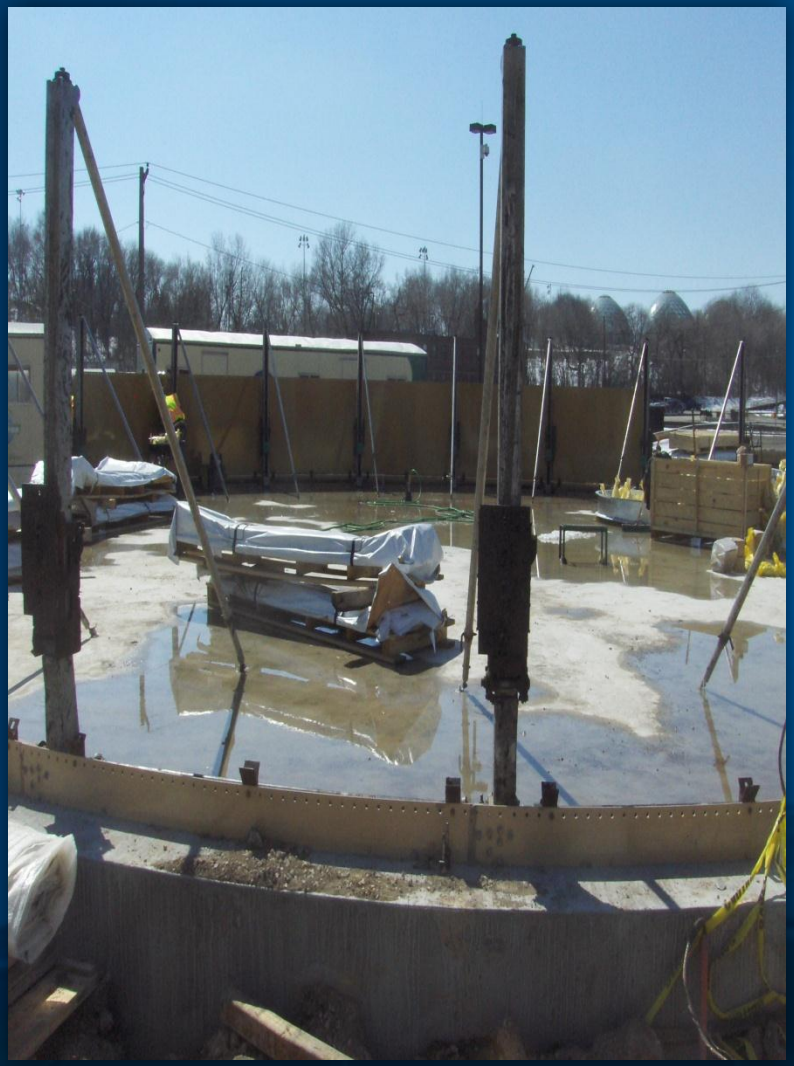

Progress Update

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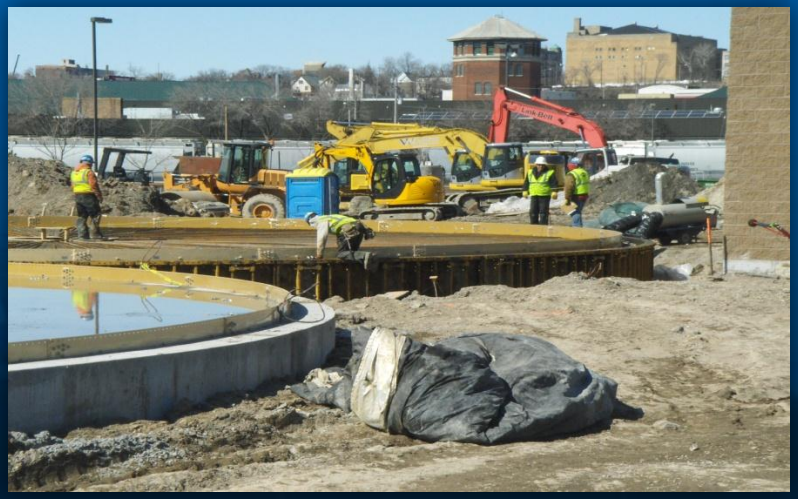

Advantages of the Design-Build Approach

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- Multiple Contracting Strategies are Available
  - Traditional Design-Bid-Build
    - Single General Contractor
    - Multiple Prime Contracts
  - Design-Build
    - Open Book Guaranteed Maximum Price (GMP)
    - EPC Target Price
    - EPC Lump Sum
  - Design-Build-Own-Operate
  - Many Variations of the Above
- Each Contracting Approach Carries Different Risk Profiles with Advantages and Disadvantages

Advantages of the Design-Build Approach

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- Design-Build structure allows an Owner to assign design and construction responsibility to one entity
  - Avoids finger pointing
  - Often a requirement when project requires outside debt and/or equity participation
- Design-Build structure offers an attractive combination of Owner, Engineer, and Contractor involvement throughout the planning, design, construction, and startup/ commissioning process
  - Decisions and available options can be made and/or developed with more accurate information readily available, particularly regarding constructability, cost, and schedule implications
  - An atmosphere of trust and collaboration can be developed that fosters a team relationship

Considerations when Selecting Your Design-Build Partner

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- Key Traits
- Financial Strength
  - Will they be around to fix a problem?
- Technical Capability
  - Understanding of the technical aspects of process-driven projects
  - Process technology agnostic
- Experience
  - Have they done this before?
- Depth of Team
  - Proven project management and market sector expertise
  - Backlog
- References

- Do you trust them?

Recommendations for Owners from a Design-Builder's Perspective

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Our Observations

- **Underestimation of Resources Required to Develop Project**
  - Owners and/or developers often underestimate the amount of time and resources required to execute the tasks that in some cases, only they can perform
  - Timely RFP process
  - Securing of financing
    - Feedstock identification, sourcing, contracts
    - Off-take agreements
  - Zoning and Permitting
- **Scope Definition**
  - Owners and/or developers can and often struggle to align the scope that they desire with the CAPEX and OPEX that is justified in their economic analysis

Recommendations for Owners from a Design-Builder's Perspective

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- Impact
  - Key Milestones in the Project Development are Delayed
    - Lack of financial and/or human capital to meet project demands
    - Owner/developer “soft” costs over-run proforma assumptions
  - Opportunity Costs for Key Players in the Project Rise
    - Erosion of project reputation within the marketplace
    - Lessened interest in project RFP
    - Less competitive installed cost

Lessons Learned

- Develop Your Team Early
  - Involve design-builder early in the process
  - A good design-builder can bring numerous resources to assist in the project development process
    - Financial/funding options
    - Legal support
    - Permitting support
    - Budgeting

Questions?

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