Digester Complex Rehabilitation Improvements for the Des Moines Metropolitan Wastewater Reclamation Authority

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Agenda

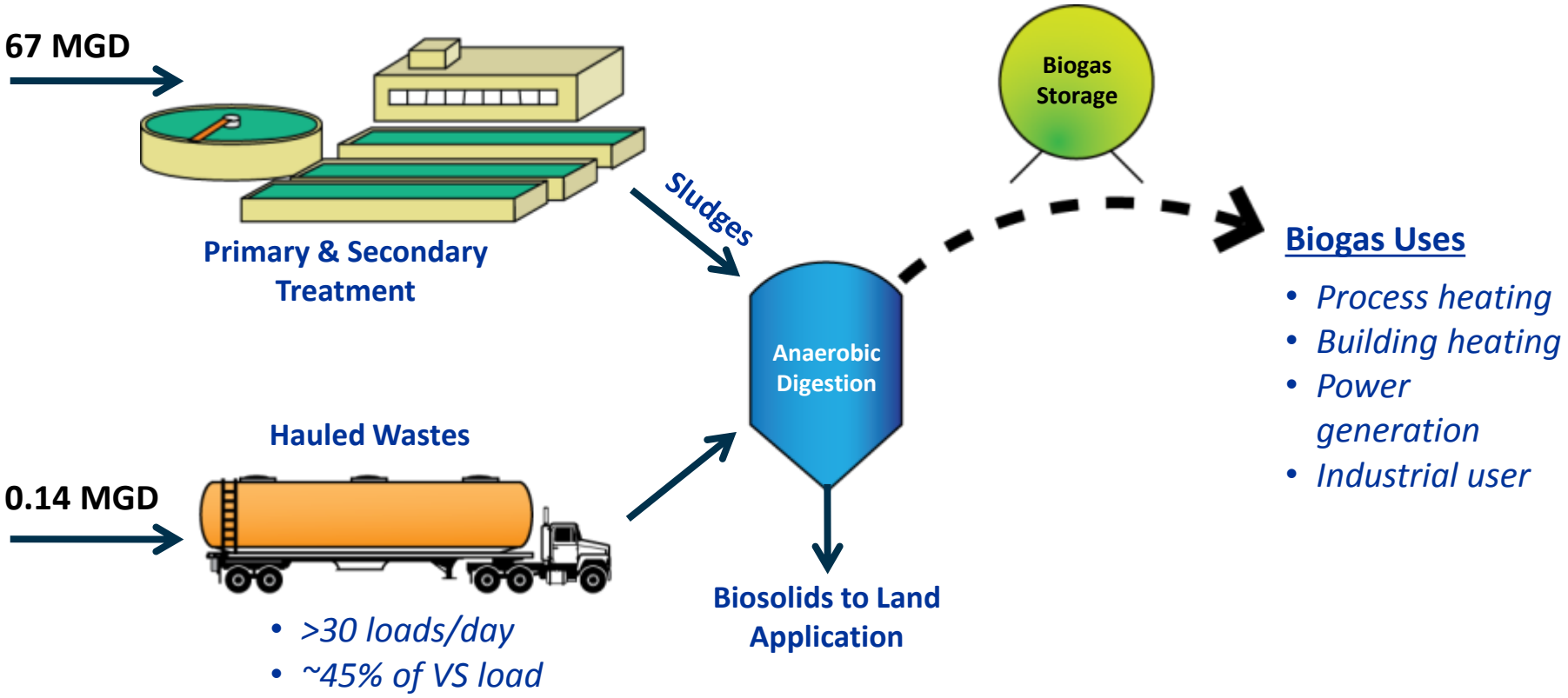
- Background
- Drivers for the project
- Key elements of the design
- Benefits to WRA and its customers

BACKGROUND

Des Moines Wastewater Reclamation Authority (WRA)

- WRA Serves 17 member agencies in three counties
- City of Des Moines is the contract operator of the WRA's wastewater reclamation facility (WRF)
- Average dry-weather flows of 67 million gallons per day (GPD)
- ***Mission Statement - Preferred hauled waste facility for Iowa and surrounding areas***

WRF Facilities Overview



A Wastewater and Hauled Organic Waste Treatment Center

Hauled Waste Program Provides a Valuable Service to Multiple Stakeholders

- Value of hauled waste program to WRA
  - *Generates > $1.5 million annually in hauled-in waste tipping fees*
  - *Diverts FOG from collection system*
  - *Creates biogas for beneficial use*
    - Produces ~1,300,000 cf/day
    - Generates electric power (1.8 MW existing, expanding to 4.8 MW)
    - Heats three plant boilers
    - Sells ~ 700,000 cf/day
- Valuable service to industries
  - *Receive wastes at competitive prices*
  - *Provide FOG haulers with outlet*
  - *Provides low cost energy to neighboring industry*
- Revenues help lower costs to rate payers

DRIVERS FOR THE PROGRAM

Key Drivers for the Improvements

Hauled waste receiving limitations

- Single tank limited ability to clean

Digester improvements

- Mixing systems had failed
- Floating covers failing
- Hauled wastes create excessive foam

Biogas handling improvements

- Storage needed to facilitate use

KEY ELEMENTS OF THE DESIGN

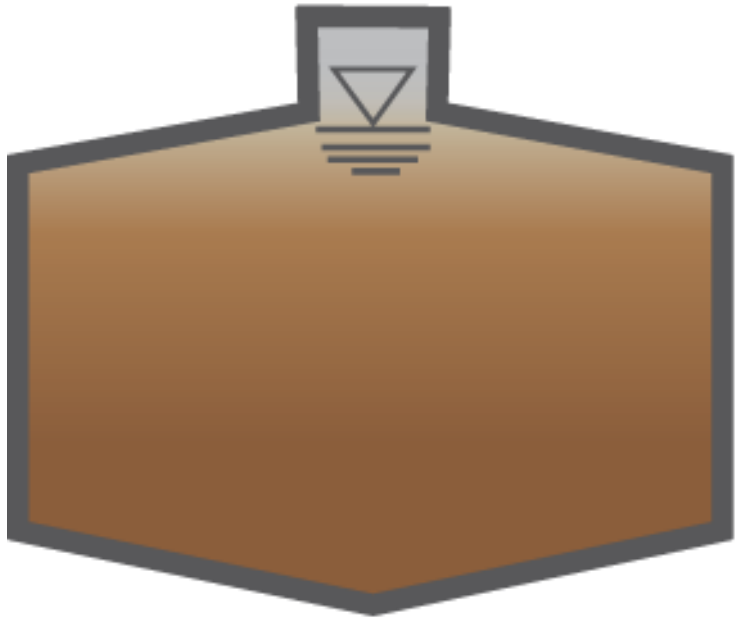
Hauled Waste Upgrade - 2010

- Small (~1,200 gal) “rock-boxes”
- Precast polymer concrete
- 4” and 6” quick-connects
- Connection to existing foul air system
- Traps grit and debris before larger tank

Hauled Waste Upgrade - 2010

Submerged Fixed Concrete Covers Selected for Primary Digesters

- Concentrate scum and foam at central point
  - *Allows spray suppression to be more effective*
  - *Large diameter draw-off for rapid removal*
- Additional benefits
  - *Ease of maintenance*
  - *Increases tank capacity 8%*



New Covers Required Extensive Support System

Interior Columns Used to Support the Cover

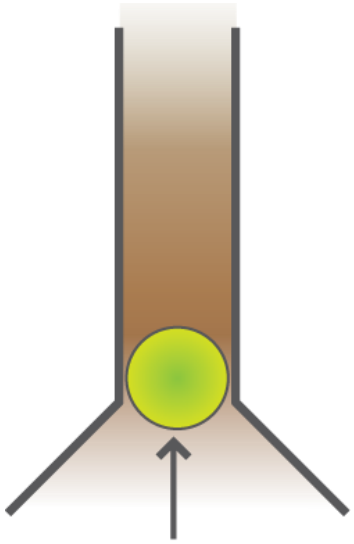
New Submerged Fixed Covers

New Submerged Fixed Covers

New Gas Membrane Cover on Secondary Digester

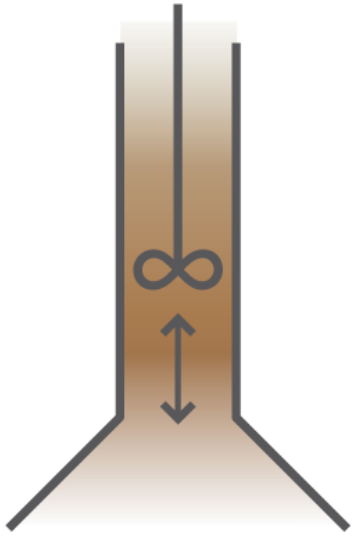
Mixing System Design

Typical Digestion Mixing Systems



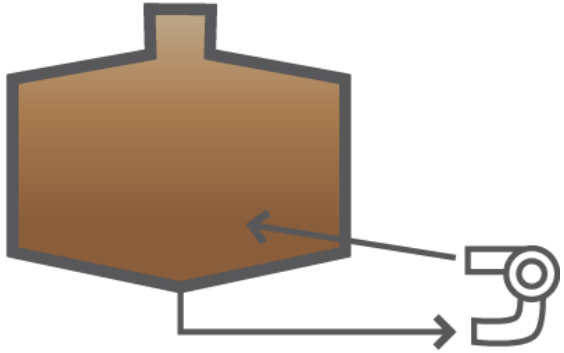
Gas Bubble

- Low energy input
- Bottom-to-top pattern
- Maintenance issues



Mechanical

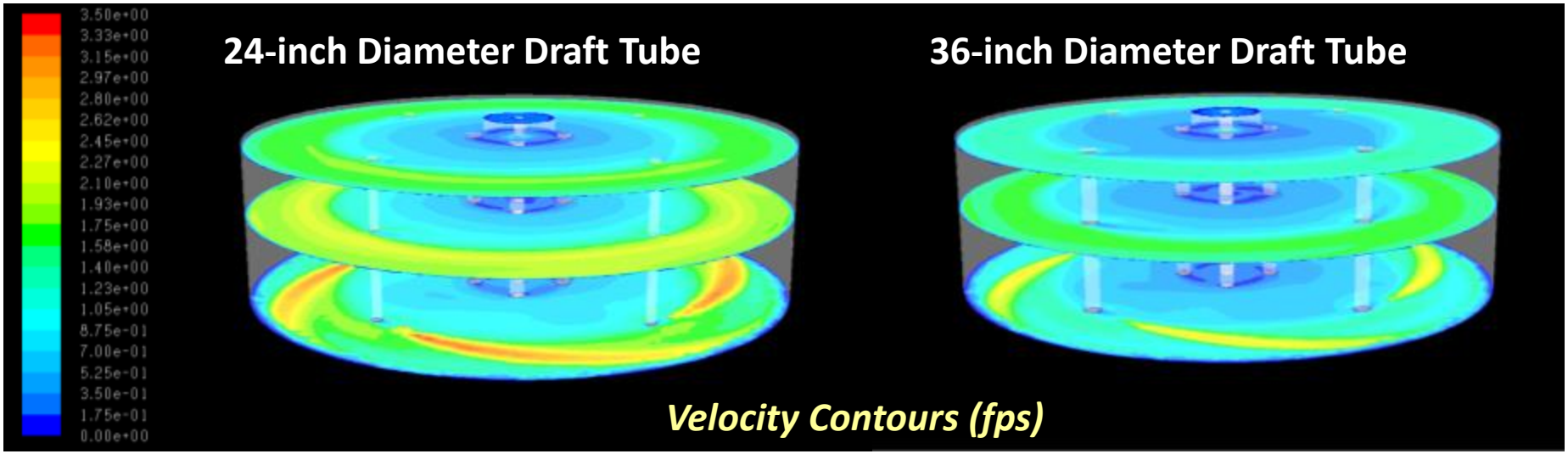
- Low energy input
- Top-to-bottom pattern
- Maintenance issues



Pumped Recirculation

- High energy input
- Highest induced velocity
- Tangential swirl pattern
- Suitable for diverse covers

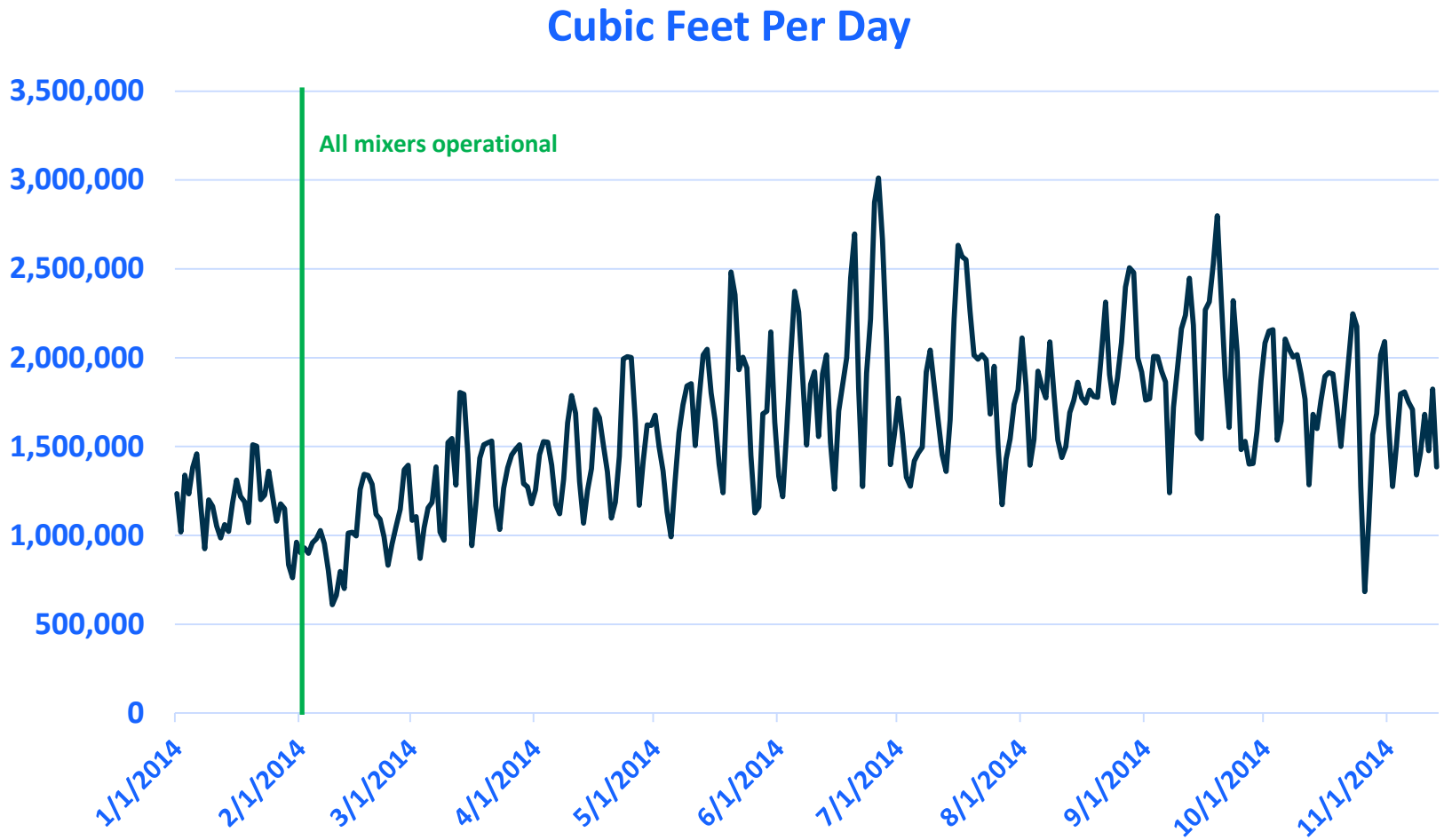
Computational Fluid Dynamics (CFD) Modeling



- Recommended 24-inch diameter draft tubes
- Cost savings:
  - *$700K in capital (4% of total project construction cost)*
  - *$36K/yr in O&M (800,000 kWh/yr in energy consumption)*

Draft Tube Mixers Installation

New Mixing Has Improved Biogas Production



BENEFITS TO WRA

Benefits to WRA

- New covers reduce maintenance requirements and increase capacity
- New mixing enhances digestion performance
- Less downtime for outside haulers
- Increased revenue for WRA

Thank You

CDM Smith