



The Global Methane Initiative

Landfill Biogas Project Development: Economic and Operational Considerations

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Overview

- Pre-Project Considerations
- Landfill Biogas Recovery Modeling
- Landfill Biogas Collection System Design and Operation
- Energy Project Design and Operation
- Project Analyses
- Finding Project Developers
- Summary

Pre-Project Considerations

- Understand Project Scope
 - What is the Potential for Landfill Biogas Recovery?
 - What Type of Project Could be Developed?
 - Conduct Preliminary Technical and Economic Evaluations
 - Determine the Financial Roles of the Landfill Owner and Project Developer
- What is a Realistic Project Schedule?
- Understand Procurement Requirements

Landfill Biogas Recovery Potential

- Observation and Analysis of Landfill Operations
- Collection of Accurate Data
- Use of Landfill Biogas Modeling
 - Selection of Appropriate Model and Inputs Based on Landfill Characteristics
 - Close Scrutiny of Model Results via Comparison with Results from other Landfills (if possible)
- Development of Multi-Year Biogas Recovery Estimates



Biogas Recovery Modeling

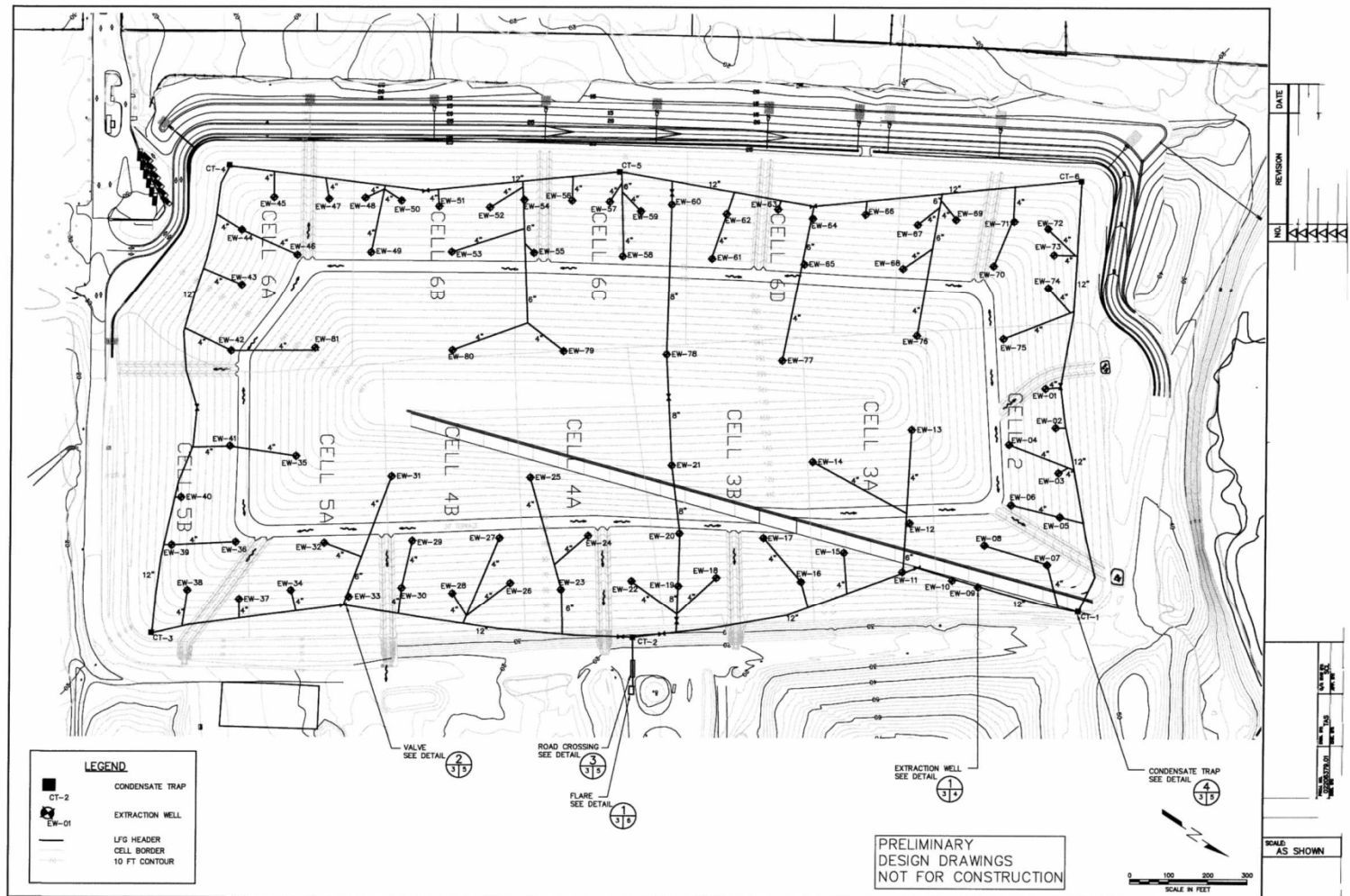
- Biogas Recovery Estimates are Used for:
 - Developing System Design and Sizing Requirements
 - Evaluating Project Feasibility and Economics
- Modeling can be Challenging
 - May Result in a Large Source of Error in Evaluating Project System Requirements and Project Feasibility
 - Many Models Based on U.S. Waste Profiles
 - Unrealistic Biogas Recovery Projections can lead to Investment in Uneconomical Projects (or neglecting opportunities)
 - Average International LFG Project Performance = 49% (actual recovery / modeled recovery)

Biogas Collection System Design and Operation

- Required for Both Emission Reduction and Energy Generation Projects
- Consider Economics of Collection System Design
 - Maximize Biogas Recovery per Well
 - Wells in Deeper Areas
 - Wells in Areas of New Waste
 - Utilization of High-Density Polyethylene (HDPE) in Low-Pressure/Vacuum Applications
 - Anticipate Future Landfill Expansions
 - Evaluate Different Types of Collection System Designs
 - Individual Lateral per Well
 - Header System with Shorter Laterals to Wells



Collection System with Headers and Laterals



Energy Project Design and Operation

- Evaluate Project Options
 - Electricity, Direct-Use, Combined Heat/Power
- May be Limited by Location
 - No Industry near Landfill
- Evaluate Risks For Each Option
 - Carbon and Energy Market Stability
 - Accuracy of Project Assumptions and Costs
- Consider Phased Approach
 - Phase 1. Flaring (emission credits)
 - Phase 2. Energy Generation After Establishing Biogas Recovery



Project Financial Components

- Costs (capital and operating)
 - Biogas Collection, Treatment, and Flaring Systems
 - Monitoring Systems
 - Energy Generation Equipment
 - Debt Service
 - Taxes
 - Administrative
- Revenues
 - Emission Credits
 - Energy Sales
 - Green Tariffs/Certificates
 - Grants/Incentives
 - Low-Interest Loans



Project Evaluation

- Costs and Revenues Should be Calculated and Compared on a Year-by-Year Basis over the Expected Life of the Project
- Develop Financial Model for all Reasonable Project Options
- Compare Results to Determine Best Project Option
 - Annual Cash Flows
 - Net Present Value
 - Debt Coverage
 - Rate of Return



Finding Project Developers for Biogas Projects

- Consider Competitive Bidding Process
 - To Evaluate Multiple Offers
- Develop Tender
 - Project Overview
 - Information on Landfill
 - Available Reports and Analyses
 - Scope of Project
 - Anticipated Ownership Structure
 - Technical Requirements
 - Schedule Requirements
 - Qualifications of Bidder
 - Submittal Instructions/Administrative Requirements
 - Evaluation Criteria



Summary

- Evaluate Pre-Project Considerations
- Prepare Biogas Recovery Modeling With Care
- Develop Project Scenarios Based on Estimated Landfill Biogas Recovery and Utilization Options
- Conduct Preliminary Project Analyses
- Recognize the Importance of the Tender Process

For More Information...

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