

Creating Financially Viable Landfill Gas Projects at Small Landfills

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What is a Small Landfill?

▶ Small Landfill

- <1,000,000 in-place tons
- <60,000 tons disposed per year
- <400 scfm of LFG

▶ Many municipal landfills fall into this category.

- Landfill accepting 40,000 tons per year for 20 years is producing approximate 300 scfm.

How Many Landfills?

▶ LMOP Information

- 2,395 Potential Landfills
- 515 Candidate Landfills
- 522 Landfills with Operational Projects
- 1,358 Remaining Landfills

▶ Significant Potential

- Reduction in Greenhouse Gas (GHG) Emissions
- Energy Generation/Fossil Fuel Offsets

Owner Benefits

- ▶ Revenue.
 - Sale of Carbon Credits
 - Beneficial Use of LFG
- ▶ Offset Post Closure Care Costs
- ▶ Reduction in Emissions
- ▶ Turn Liability into Asset
- ▶ Good “PR” for Landfill



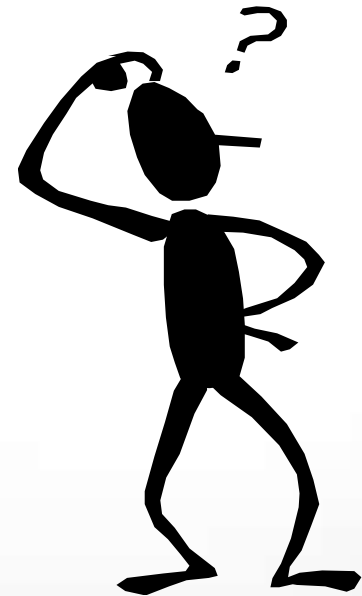
Challenges to Financial Viability

- ▶ Money
- ▶ No Infrastructure in place
- ▶ Unknown LFG Quantity and Quality
- ▶ Locating End-Users
- ▶ Long-term Contracts
- ▶ Changing Marketplace and Regulatory Requirements



How Do We Get There?

- ▶ 2-Phase Process
- ▶ Phase 1
 - Model LFG Production
 - Conduct Pump Test on Existing Wells
 - Carbon Credits Eligibility
 - Potential End-Users
 - Developer/Partnership Interest
- ▶ Develop pro-forma
- ▶ If Viable, Move Forward with Construction of Landfill Gas Collection System



Phase 1

- ▶ **Landfill Gas Collection System**
- ▶ **Active Landfills**
 - Install Wells as Final Grades are Reached
 - Use of Horizontal Collectors
 - Surface Header Lines
- ▶ **Closing/Closed Landfills**
 - Convert Vents to Extraction Wells
 - Install System with Closure



Keys to Success

- ▶ **Plan Ahead**
 - **Combine Construction Projects**
- ▶ **Purchase Basic Blower Flare Station**
- ▶ **Must have Variable Frequency Drive (VFD)**
- ▶ **Consider Using a Small/Local Contractors**
- ▶ **Good CQA Engineer**
- ▶ **Experienced Wellfield Balancing Staff**



Phase 2 – Beneficial Use

- ▶ **Begin Evaluation with Stable LFG Quality and Quantity**
- ▶ **Evaluate Surrounding Land Use**
- ▶ **Review Options**
 - **Gensets**
 - **Microturbines**
 - **Direct Use**
 - **CNG/High Btu**



Keys to Success

- ▶ Stable LFG Flow Rate and Quality
- ▶ Scalability (Up & Down)
- ▶ Simple Setup
- ▶ Low Capital Costs
- ▶ Reliable Technology
- ▶ Low O&M costs



Case Study #1

- ▶ **Virginia Landfill**
 - Closed December 2007
 - Approximately 700,000 tons in place
 - Model/Pump Test Indicated 225 scfm
- ▶ **LFG collection System Installed May 2011**
 - Flow rate 230 scfm at 45% methane
 - Generating Carbon Credits
- ▶ **Evaluating two Potential End-Uses**
 - Combined Heat and Power
 - Electricity Generation

Case Study #2

- ▶ **North Carolina landfill**
 - Closed 1993
 - 4 LFG Extraction Wells
 - Pump Test Indicated ~50 scfm
- ▶ **LFG Collection Piping Installed in 2004**
- ▶ **Begun Construction on Beneficial Use Project June**
 - Electricity Generation
 - Waste Heat to Warm On-site Greenhouses

Why has Joyce been Successful

- ▶ Thinking Outside the Box
- ▶ Grant Experience
- ▶ Experienced Wellfield Balancing Staff
- ▶ Partner with Clients
- ▶ Good Understanding of Clients' Position
- ▶ Small Genset Technology

Come by Booth 40 to Discuss Your Project

Thank you

Questions