Creating Financially Viable Landfill Gas Projects at Small Landfills

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SWANA Quad State July 2011

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

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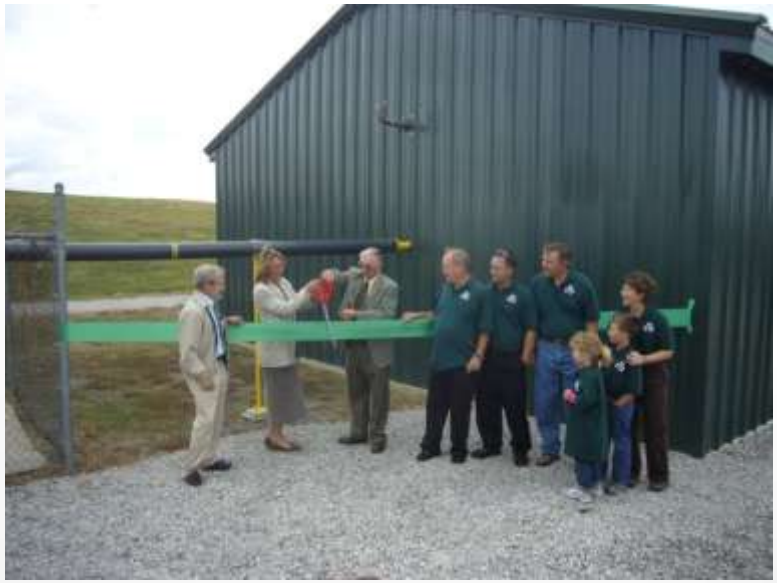
Owner Benefits

- 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



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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

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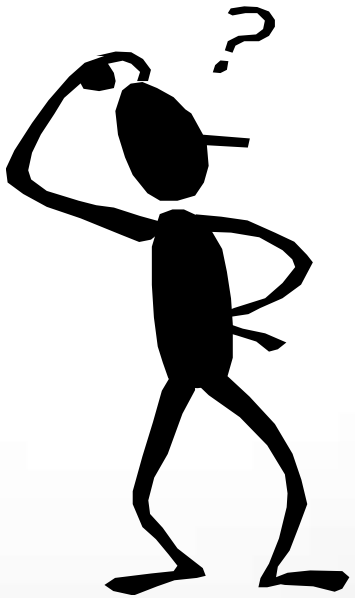
How Do We Get There?

- 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



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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

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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

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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

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Keys to Success

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

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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

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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

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Thank you

Questions

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