SCI Laurel Highlands
Landfill Gas Cogeneration Plant
Somerset, PA

Pennsylvania Public Utilities Commission
En Banc Hearing
Combined Heat and Power Technology
October 7, 2014
Project Overview

- SCILH treats landfill leachate @ WWTP
- Landfill provides methane gas (LFG) to SCILH
- SCILH burns LFG in gas turbine w/heat recovery
- Steam & electricity meets SCILH needs + grid sales
- Backup - natural gas and grid electricity
- Specialized supporting & backup equipment is required
- Implemented as a GESA project
Original Conditions – circa 2005

- 647,000 SF facility with 888 residents
- 3- 550 HP Riley Bituminous coal stoker steam boilers
- Peak steam load 20,000 lb./hr. @ 120 psig
- 1,188 kW peak electric demand with a 0.75 load factor
- On-site laundry facility provided a summer thermal load
- Coal-fired plant becoming a concern with future pending legislation
Opportunity

- Nearby landfill needed leachate treatment capability
- Landfill gas provided a renewable energy source.
- GESA program enabled project without capital funding.
- 19 ECMs $33 million
  LFG CHP $25.5 million
Delays & Expansion

Land ownership issues delayed installation.

Purported LFG levels higher than expected - increased electric generation equipment.

Inmate population increased by over 50% to 1385 in 2010. Currently at 1,500.

Facility Peak steam demand @ 36,000 lb./hr.

Projected LFG generation capacity increased to 5.8 MW in 2019. Institution peak load is 1.5 MW.
Cogeneration plant installed during 2011 with initial startup in August 2012.

Landfill installed 4+ mile pipeline and DOC expanded sewage treatment plant to handle leachate.

Natural gas line was installed as a back-up fuel source for steam boilers.
Equipment

Primary - 7.46 MW and 53,700 lb./hr. capacity
(Facility load: 1.5 MW and 36,000 lb/hr)

• 1 - 3.76 MW Solar LFG turbine with
• 1 - Indeck 19,200 lb./hr. heat recovery boiler
• 1 - 500 kW Elliott condensing steam turbine
• 2 - 1.6 MW LFG Cat generators
• 1 – Johnston 500 HP (17,250 lb./hr.) LFG/NG boiler
• 2 - Muira 8,625 lb./hr. NG steam boilers

Supporting Equipment

• 3 - low-pressure compressors
• 2 - duplex scrubbers
• 1 - high pressure compressor (for Solar Turbine)
Issues

- Loss of project manager
- LFG 1,300 vs. 2,400 cfm - reduced electric generation
- Landfill waste insertion went from 2,000 to 800 ton/day
- Landfill Coordination issues = downtime
- Equipment failures caused downtime
- Financial model used retail electric price

Project completion & commissioning issues resulted in withholding final payment
Items Requiring Resolution

- Defined maintenance and service responsibilities related to annual service contract
- Failed equipment repair responsibilities
- Landfill gas generation potential discrepancies
- More equipment installed than needed
- Significant negative cash flow
Lessons Learned
Complex and “hidden” costs associated with selling and buying back-up electricity and natural gas

- Effort, complexity, & cost of buying utilities during planned plant maintenance and unplanned downtime
- Complexity and effort of selling generation (skillset required, risk, timeliness)
- Organizational distraction from core business
**Real Lifecycle Cost**

- Limited technical support for turbine
- Cannot self-perform most maintenance
- What happens at the end of 10 to 15 years???

**Risk**

- Business case impact of fluctuations in utility pricing over duration of project
- Unplanned equipment downtime
Contract Issues

- Landfill gas agreement
- Inability to control landfill waste volume and LFG availability and reliability
- Maintenance contracts and cost
Contact information:

John Hajduk, Associate Director
(814) 867-4897  jhaduk@engr.psu.edu

Kurt Homan, Facilities Engineering Consultant
(814) 867-0774  kurt.homan@engr.psu.edu