Calabasas Gas-To-Energy Facility

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1/20/2011
• Sanitation Districts
• Project Background
• Plant Design
• Project Timeline
• Operation and Lessons Learned
• Summary
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Sanitation Districts

- 23 independent districts
- Manages wastewater and solid wastes
- 1,400 miles of main trunk sewers
- 3 operating landfills
- 3 closed landfills
- 2 recycle centers
- 3 materials recovery/transfer facilities
- 2 refuse-to-energy facilities
- 7 landfill energy recovery facilities
• 1970’s: worked with EPA to develop gas collection system designs
• 1980’s: first gas-to-energy facilities, both landfill and digester gas
• 1990-2000’s: microturbine and fuel cell demonstration projects
• 2010: Calabasas GTE facility
Agenda

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- Began operation in 1961
- 20 millions tons in place
- 505 acres
- 850 tons/day
- 30 more years
- 5600 SCFM
- 25-28% methane
• All that gas...going to waste
• Boiler/steam turbine not viable
• No other technology available
• Emissions regs too:
  – GT BACT: 25 ppm NOx, 130 ppm CO
  – Recips: bigger emissions problems
• June 2004: approached Solar Turbines
• Suggested modifying Mercury 50
• Basis:
  – Centaur 40 GT experience at Puente Hills
  – Recuperated cycle: high efficiency
  – Demonstrated low emissions (natural gas)
• Convinced Solar to try
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Plant Design

- 3 turbines (one for growth)
- 3 fuel trains w/natural gas mixing
- 3 stages of compression
- Water removal
- Siloxane removal: passive silica gel towers
- CEMS for NOx
- Control room/maintenance building
Plant Design (x3)

- Natural Gas
- From Flare Station
- Booster Blower
- Natural Gas Blending Vessel
- Gas to Water Heat Exchanger
- LP Compressor
- Chiller
- HP Compressor
- Silica Gel Vessel
- Gas Turbine
- CEMS
Major Suppliers

- Gas turbines: Solar Turbines
- Compressors: Vilter
- Gas chilling and drying: Johnson Thermal
- CEMS: CISCO
- Engineering: Jacobs Carter & Burgess
- Construction: Hobbs Bannerman
Up And Running…
...Beautifully
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Project Timeline

- 06/17/04: Ed Wheless’ suggestion to Solar
- 10/12/06: Biogas Mercury 50 released
- 01/23/07: Calabasas project kickoff
- 07/28/07: Engineering contract awarded
- 11/27/07: Final permits issued
- 01/07/09: Construction commenced
- 06/01/10: Start plant commissioning
- 07/12/10: Commercial operation

SANITATION DISTRICTS OF LOS ANGELES COUNTY
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• 2 of 3 turbines operate continuously
• Plant output: 9.5 MW gross, 7.6 MW net
• Emissions:
  – 7 ppm NOx (0.08 g/bhp-hr)
  – 3 ppm CO (0.02 g/bhp-hr)
• Fuel quality: ~260 Btu/ft³
• Plant availability to date: 95%
• Used 99% of available LFG last 3 months
Lessons Learned/Issues

- Equipment delivery issues
- Construction delays
- Design coordination
- Water ingestion in process piping
- Oil carryover from compressors
- Compressor motor bearing failure
- Failed wire nut in GT enclosure fan
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What Did Project Accomplish?

- It didn’t:
  - Invent the cell phone
  - Or the laser beam
  - Perfect open heart surgery
  - Or find the cure for the common cold
  - Reinvent the wheel
  - Leave the state-of-the-art untouched
What Calabasas Did Do...

GT Efficiency
Up 29%

NOx
Down 72%

CO
Down 97%

And these breakthroughs were set with 260 Btu/ft³ fuel
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