



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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- **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**

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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 NO_x, 130 ppm CO**
 - **Recips: bigger emissions problems**

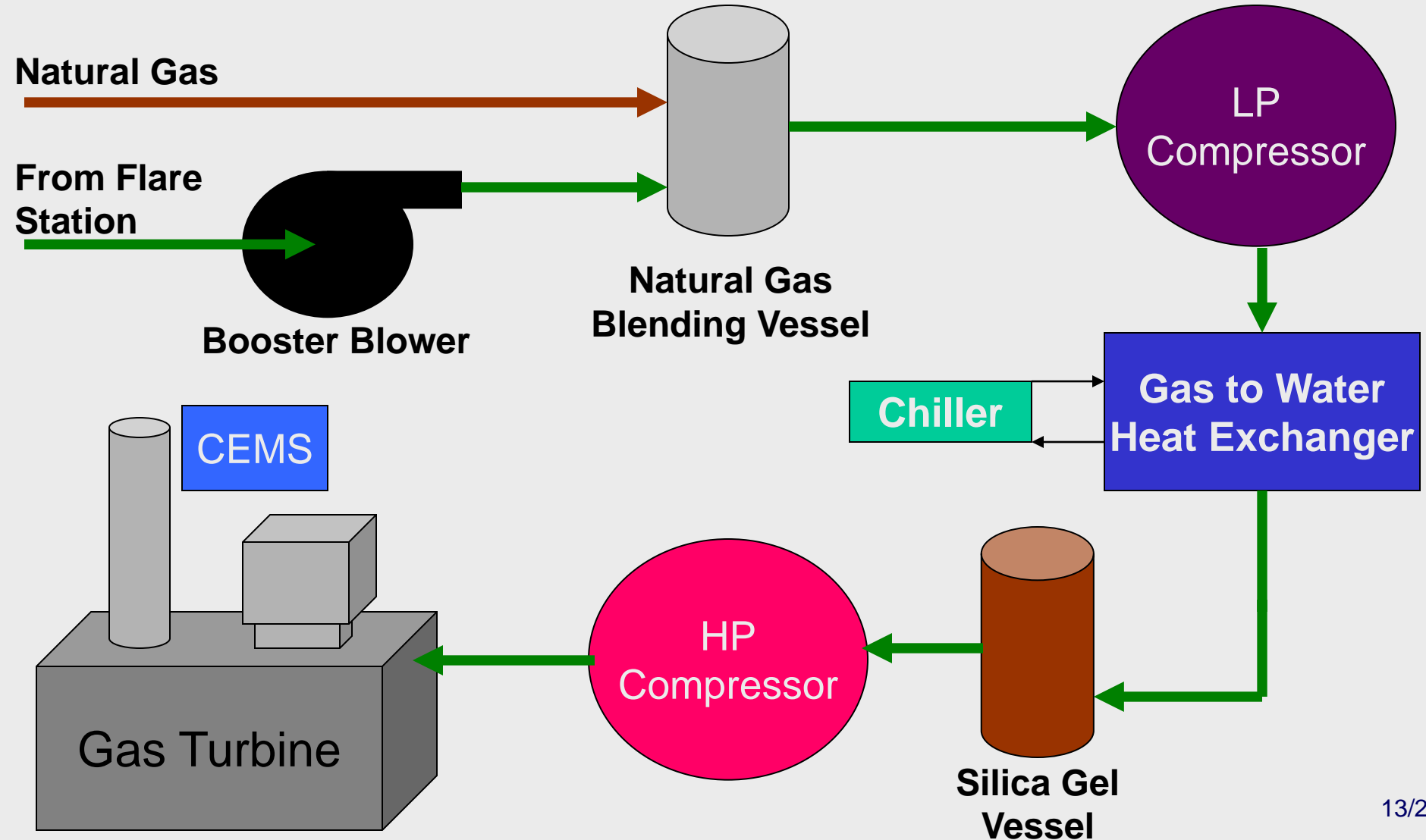


- **June 2004: approached Solar Turbines**
- **Suggested modifying Mercury 50**
- **Basis:**
 - **Centaur 40 GT experience at Puente Hills**
 - **Recuperated cycle: high efficiency**
 - **Demonstrated low emissions (natural gas)**
- **Convinced Solar to try**

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- **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**



- **Gas turbines: Solar Turbines**
- **Compressors: Vilter**
- **Gas chilling and drying: Johnson Thermal**
- **CEMS: CISCO**
- **Engineering: Jacobs Carter & Burgess**
- **Construction: Hobbs Bannerman**

Construction: The Beginning





Building the Base









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- **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**

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- **2 of 3 turbines operate continuously**
- **Plant output: 9.5 MW gross, 7.6 MW net**
- **Emissions:**
 - 7 ppm NO_x (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**

- **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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- **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%

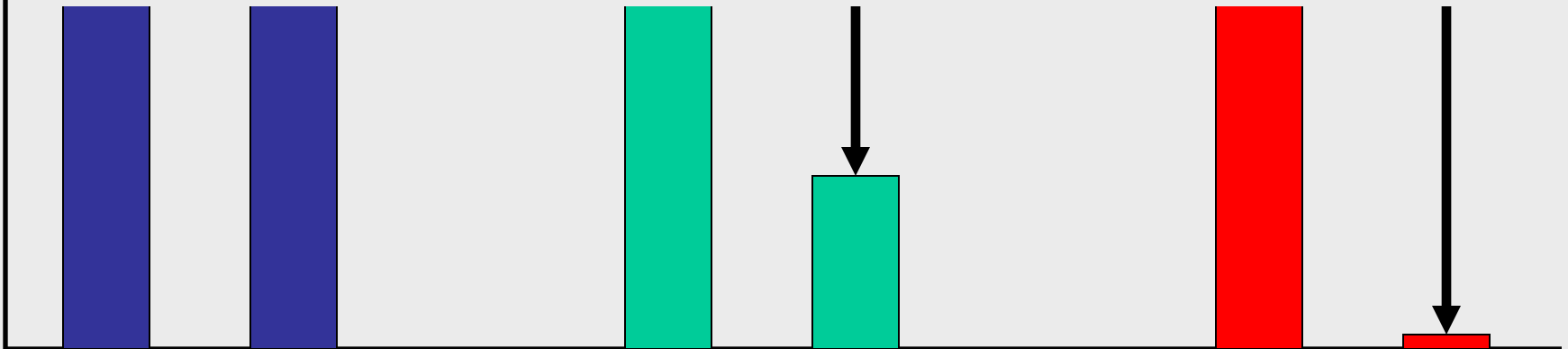


CO

Down 97%



**And these breakthroughs
were set with 260 Btu/ft³ fuel**



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