

Strength for Today, Power for the Future



MLGW

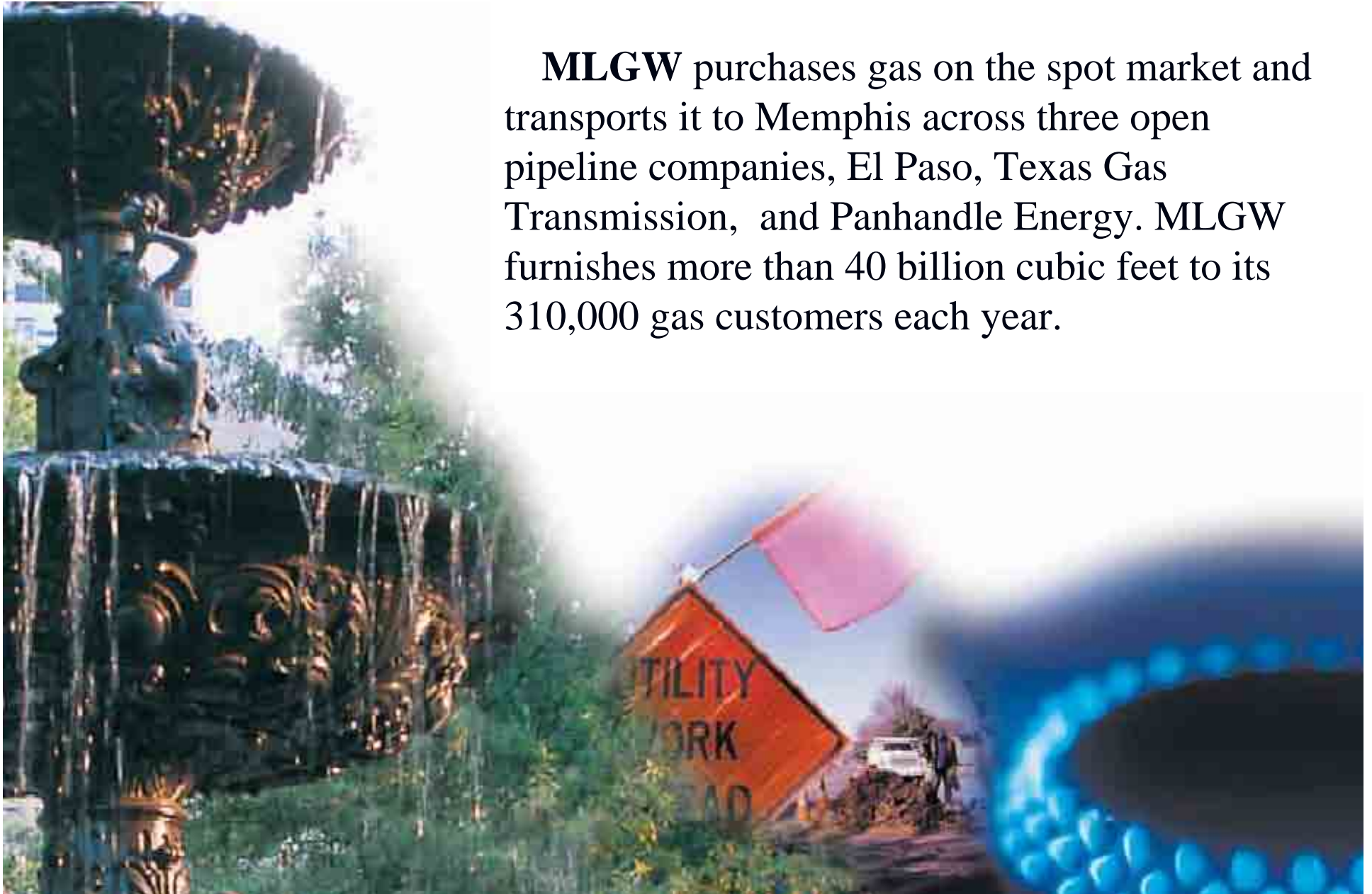


About Memphis, Light Gas and Water

MLGW is the nation's largest three-service municipal utility, serving 415,000 customers. Since 1939, MLGW has met the needs of Memphis and Shelby County residents by delivering reliable and affordable electricity, natural gas and water service.



MLGW purchases gas on the spot market and transports it to Memphis across three open pipeline companies, El Paso, Texas Gas Transmission, and Panhandle Energy. MLGW furnishes more than 40 billion cubic feet to its 310,000 gas customers each year.





MLGW is supplied with electricity by the Tennessee Valley Authority (TVA), a federal agency that sells electricity on a nonprofit basis to 159 distributors.

MLGW owns and operates one of the largest artesian water systems in the world. On a peak day, MLGW delivers more than 250 million gallons of water to its customers.



Breaking New Ground for Municipal Utilities

The South Shelby Landfill Gas to Energy Project

The Solae[®] Company.

- A concentrated protein food manufacturer and has operated the Memphis, TN plant, formerly known as Protein Technologies, since 1973.
- One of MLGW's largest industrial gas customers at a daily consumption of more than 8,000 MMBtu/day
- One of MLGW's largest industrial electric customers at a maximum demand of more than 18 MW.
- Located approximately 5 miles from the BFI South Shelby Landfill.

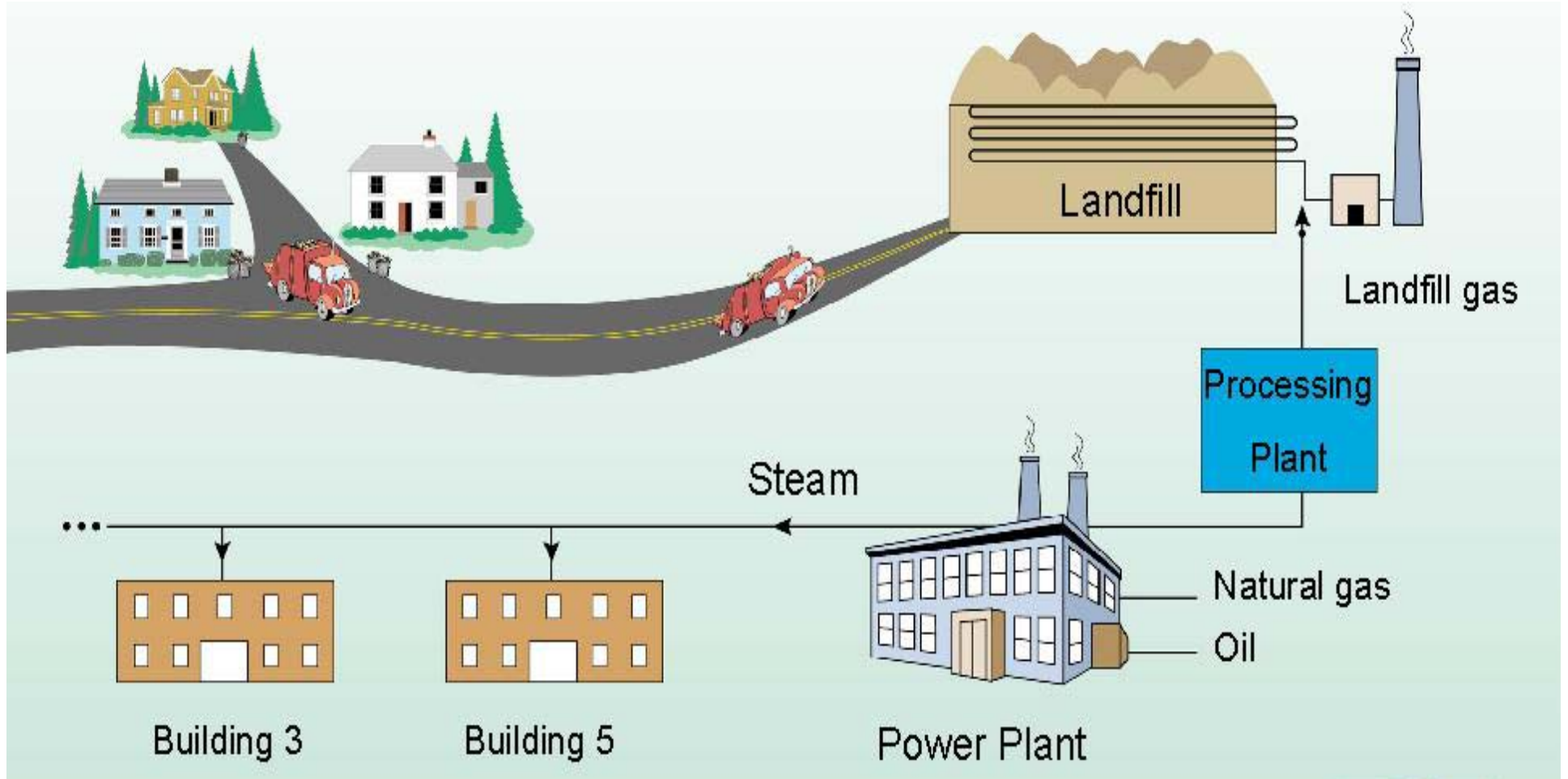


Project Concept

- SOLAE was to contract with CPL, BFI and MLGW for the delivered gas supply.
- BFI was to contract with CPL to work on and install facilities at the landfill to redirect the gas from the flares and be made suitable for usage at the plant.
- MLGW was to provide/purchase ROW and design, install, and operate the landfill gas pipeline.
- CPL was to design and build the burners and controls at the SOLAE plant and the compression station at BFI.



Project Schematic





What is our role?

- MLGW policy makers saw the importance of our participation in this “green” project.
- MLGW has the authority, operational capabilities, and assets to provide the transportation of the landfill gas from the landfill to the plant.
- This was one of the first projects was developed between a public non-profit and private partners.
- Key concerns were safety, risk, revenue, and schedule.



Hurdles to Overcome

- The transmission of low pressure LFG was a concern of MLGW as well as The Tennessee Regulatory Authority (TRA).
- MLGW had to become comfortable with and then create new standards for safely working with LFG.
- Integrity of the pipe had to be insured do to the unique nature of the gas.
- The ability to identify the gas in the case of a leak was important and whether to odorize the gas or not.



Regulatory Issues

- Federal DOT regulation 192 covers the transportation a hazardous gas.
- The Tennessee Regulatory Authority is the enforcement arm of the DOT on pipeline safety issues.
- According to DOT definition, this type of pipe is characterized as a transmission pipeline and subject to increased requirements.
- This different gas has to be addressed separately in O&M manuals with all records available for TRA inspections.



Important Things To Know About Municipalities

- Little to no risk and limited opportunity to invest capital.
- Allegiance to the customer and more importantly the rate payers as a whole.
- Equity among customers.
- Must have protection if the project were to fail.
- Projects need to make sense as well as the municipality's involvement.
- It is essential to have an executive sponsor to champion the project.
- “Seek first to understand...”



Safety Issues

- Presence of Vinyl Chloride and other constituents raised concern for the utility.
- To err on the side of caution, first responder is a contractor with “moon suits”.
- With collaboration with TRA, it was decided NOT to odorize the gas but to use Sulfur content as the gauge of detection.
- Needed an MSDS on the actual gas from the landfill to determine flammability limit, etc.
(required by OSHA)



Gas Quality

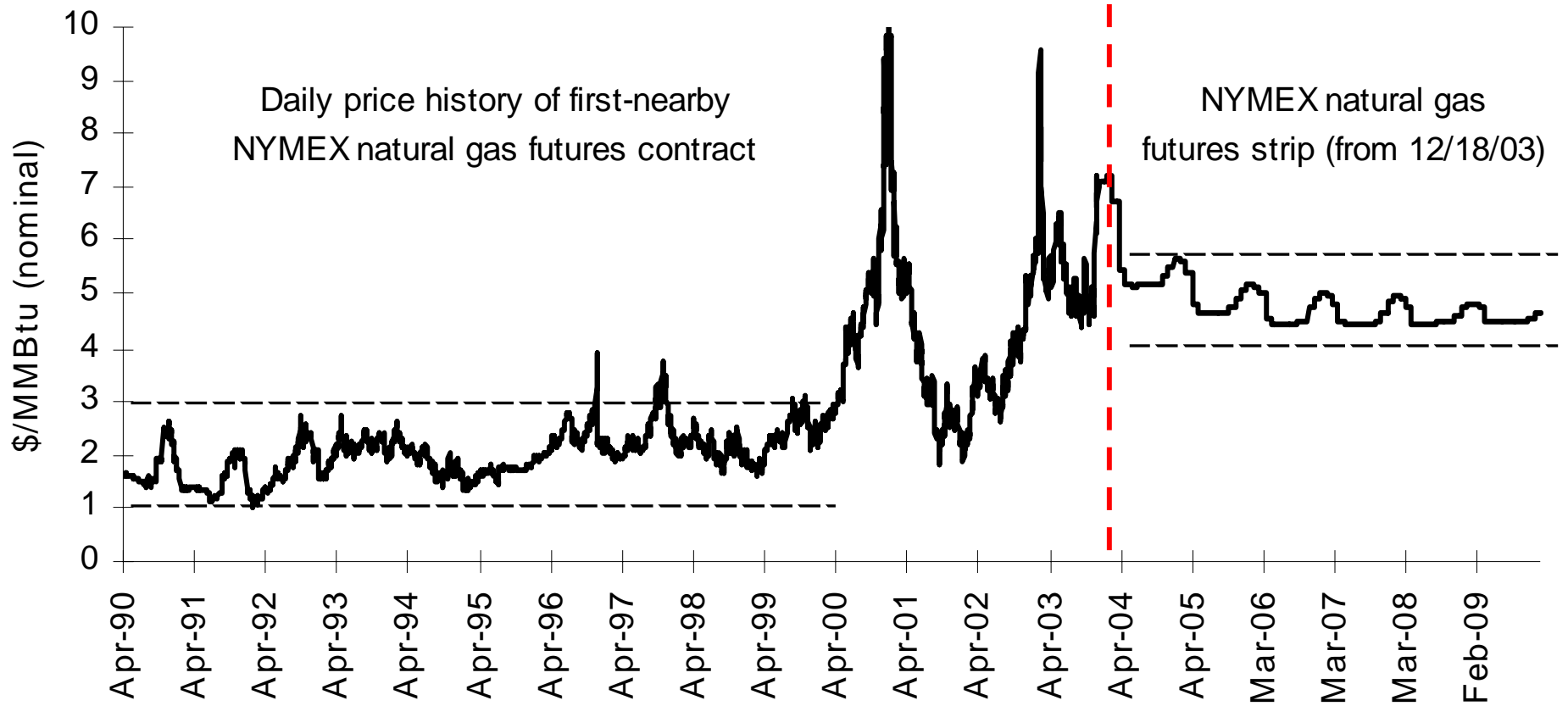
- Typical pipeline natural gas quality:
 - 95% Methane
 - 2-3% CO₂, maximum
 - <1% Nitrogen
 - 1,025 Btu/scf average (saturated)

- Typical landfill gas specifications:
 - 40-65% Methane
 - 30-50% CO₂
 - 0-10% Nitrogen
 - 500 Btu/scf average (saturated)



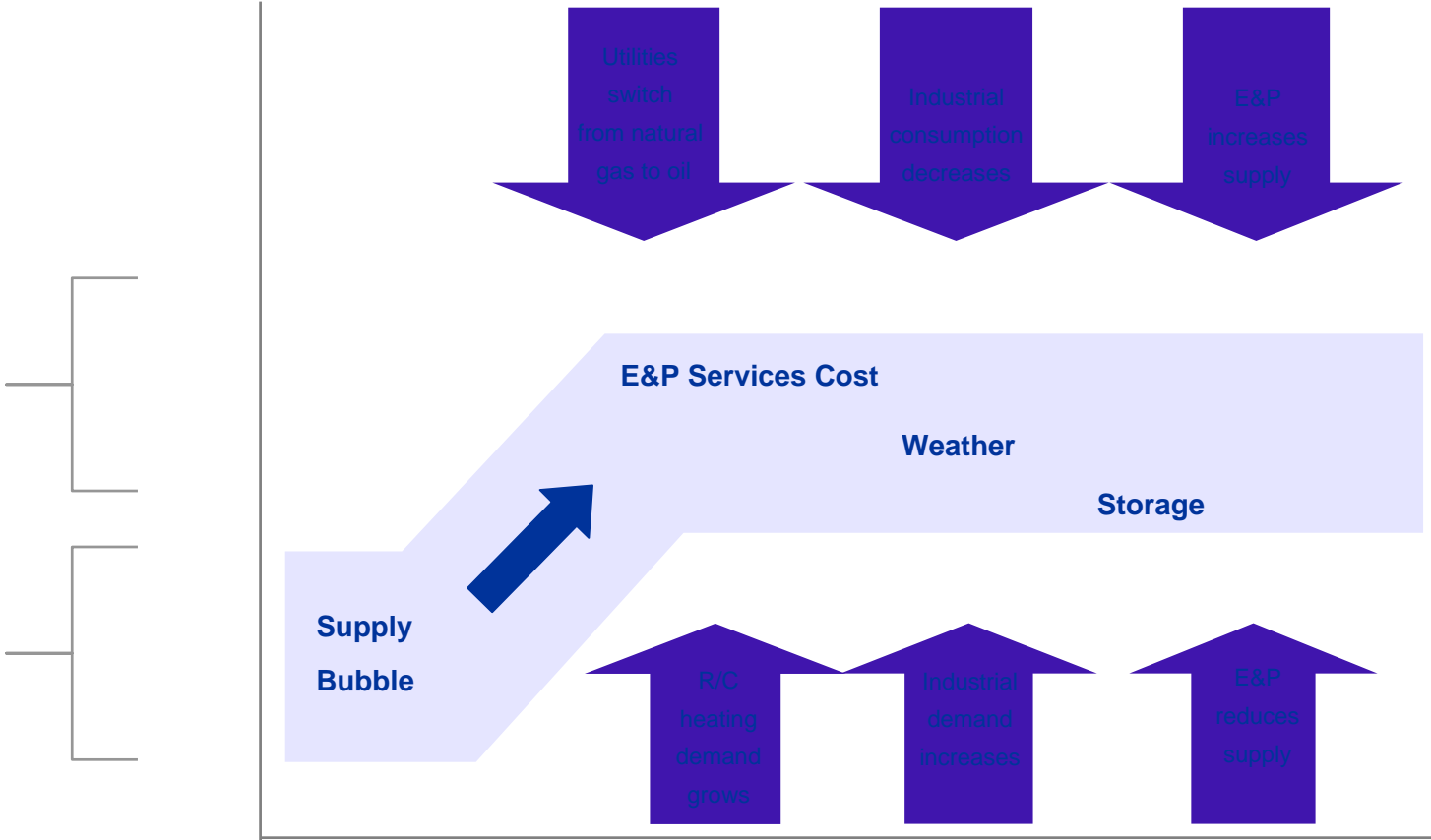
Economics

Natural Gas Prices



Source: NYMEX

Natural Gas Market Outlook



Landfill Gas Cost Breakdown

- Raw landfill gas costs \$0.75 - \$1.00 per MMBtu
- Gas treatment costs \$2.00 - \$3.00 per MMBtu
- Gas transportation costs \$0.25 - \$0.50 per MMBtu
- Total cost to customer \$3.00 - \$4.50 per MMBtu

(Costs are approximations based on total project cost of \$4,200,000)



Landfill Gas Pipeline

Pipeline Route



Pipeline Specifications

- Receipt Pressure : 29 PSIG
- Delivery Pressure : 10 PSIG
- Maximum Flow Rate : 5,000 SCFM
- Distance : Approximately 5 miles long
- Size : 12" diameter (to meet pressure and flow requirements)
- HDPE for corrosion resistance











Project Results

Contractual Arrangements

- Solae paid MLGW for the pipeline installation cost of \$1,315,000.
- Solae paid MLGW for the ROW acquisition costs of \$157,000.
- MLGW and Solae entered into an IT-2 gas transportation agreement that is billed on MMBTU rather than Ccf.
- The term is 5-years with consecutive 5-year extensions.
- MLGW is kept whole from the loss of revenue from the “offset” natural gas usage.

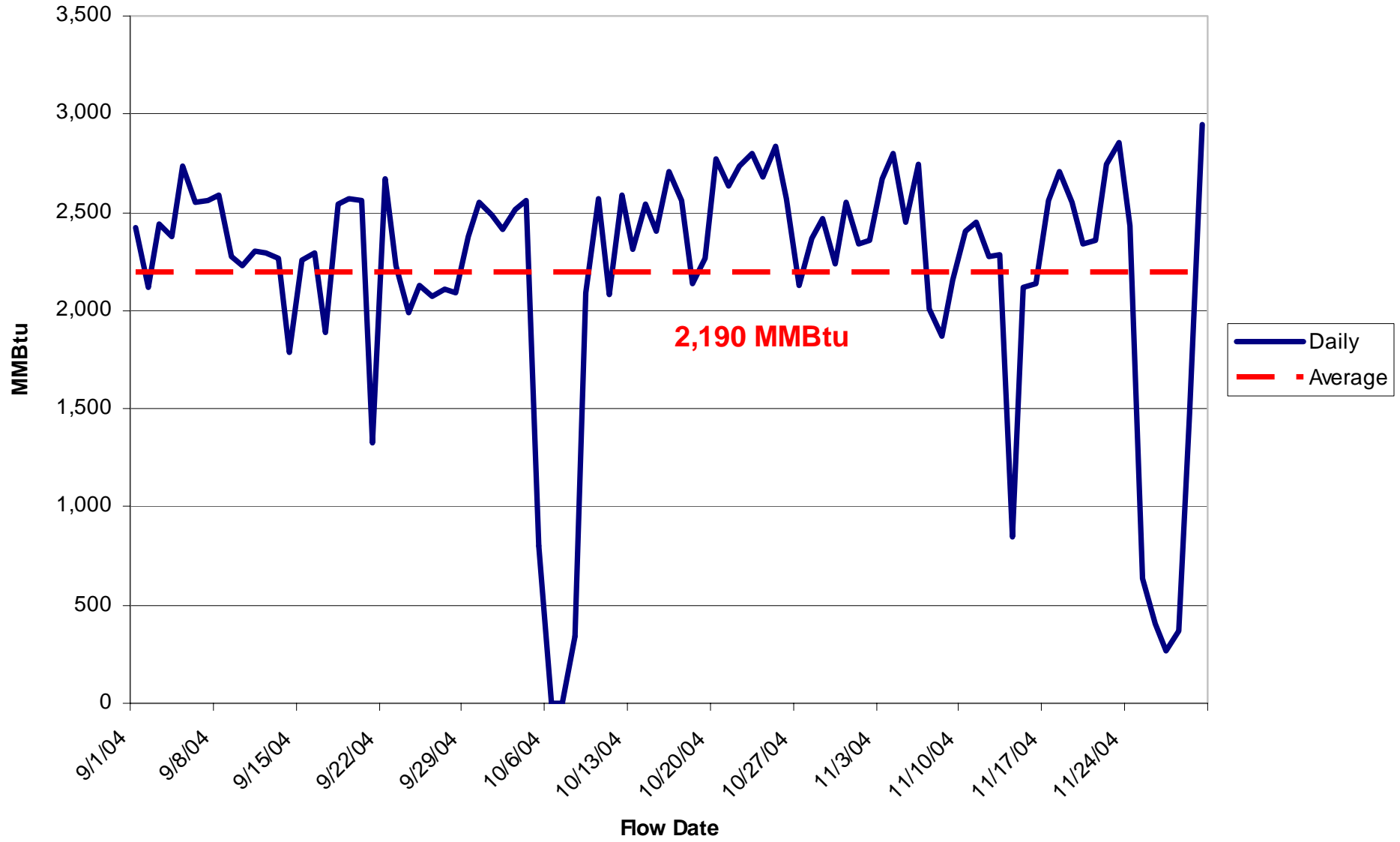


Summary

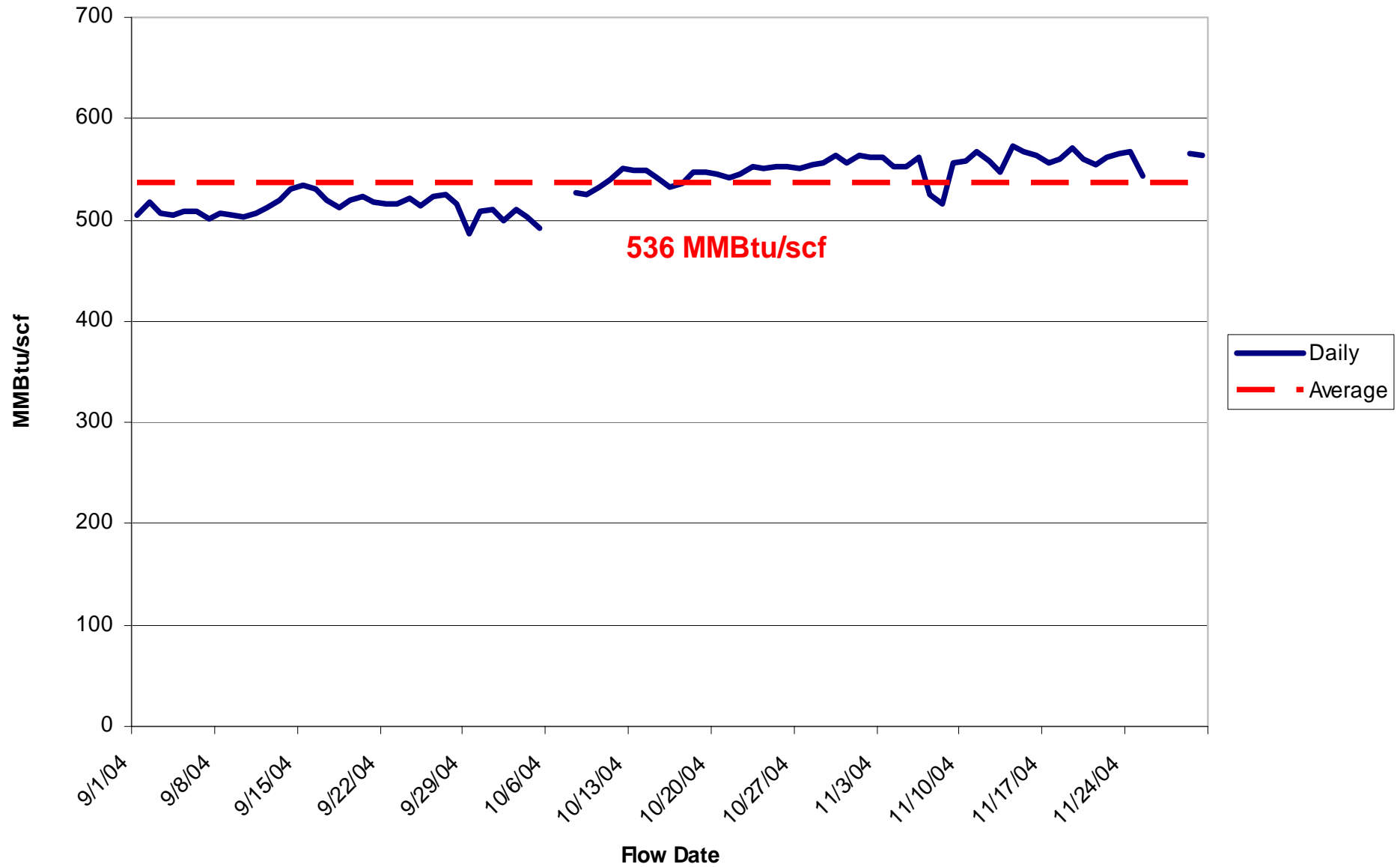
- Less than one year from proposal to light-off of boilers.
- MLGW installed the 12” HDPE line in 91 days.
- The project yields the same reduction in greenhouse gases as removing over 71,600 cars from the area roads for one year or planting 96,800 acres of trees.
- NOx emissions at the SOLAE plant boilers were reduced by more than 70-80% .



Solae Landfill Gas Flow



Solae Landfill Gas Heating Value



Ribbon Cutting Event

MLGW Comments



Presentations



Look Who's Energizing the Community



By supporting the development of landfill gas energy projects, the Tennessee Department of Environment and Conservation is

- Reducing greenhouse gas emissions
- Improving air quality
- Encouraging economic development
- Developing a local, renewable source of energy
- Creating a safer, cleaner landfill

The U.S. Environmental Protection Agency and the Tennessee Department of Environment and Conservation recognize The Soler Company as an innovator in creating the community and the environment by using landfill gas to create energy. The project, built and managed by The Soler Company in partnership with Homtek, Inc., Gas and Waste, IFF Waste Services, and IFF 121 Systems, captures landfill gas produced at IFF's North Shreve Landfill in East Shreve in the Trade Center. Using landfill gas for energy helps the community by reducing greenhouse gas emissions, improving air quality, and creating local jobs. IFF processes the gas to meet environmental levels, the amount of gas the project has the same effect as removing emissions of more than 25,000 tons of carbon every day for 200 years of fossil. The energy will produce 100,000 kilowatt hours per year, the use of more than 1 million pounds of oil. For more information on the benefits of using landfill gas, visit the Landfill Methane Outreach Program website at 1-800-256-7522 or visit www.soler.com.



The Soler Company

IFF Waste Services

DEC

MLGW

CPL-LEI Systems, Inc.



Questions??

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