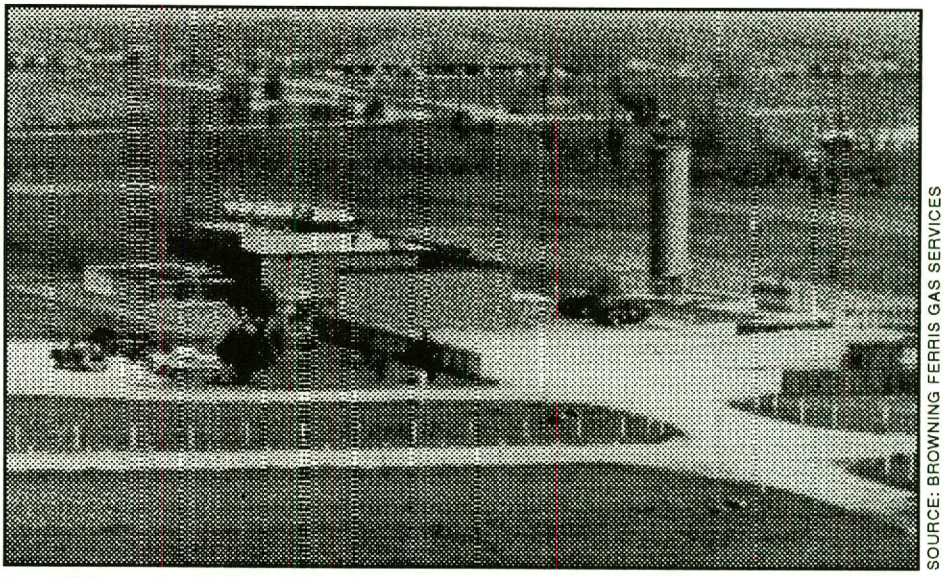
Clean Energy from Texas Landfills

RENEWABLE ENERGY
THE INFINITE POWER
OF TEXAS

SECO FACT SHEET **NO. 16**

HIGHLIGHTS

- **Capturing landfill gas turns a potential nuisance into high value products**
- **Landfill gas is cheap and reliable**
- **Several Texas landfills are already capturing and using landfill gas to generate additional revenue**
- **Landfill gas is a small yet valuable resource available in many Texas communities**



SOURCE: BROWNING FERRIS GAS SERVICES

Landfill gas into electricity *This small power plant located at a landfill in Austin produces low cost, reliable electricity.*

SUMMARY

Landfill gas (LFG) recovery may be the ultimate in recycling. It taps one of society's least desirable items, garbage, and turns it into useful, high value energy products such as electricity and natural gas. Turning hazardous LFG into marketable energy enhances landfill safety. It also reduces odors and greenhouse gases while generating revenue. Every large Texas city should carefully evaluate its LFG potential. Why? Because what used to be known as "the dump" has become one of America's most cost effective and reliable energy resources.

WHAT IS LANDFILL GAS?

Each Texan discards about a ton of trash per year. Even with our best recycling efforts, most of the discarded trash is still buried in municipal solid waste landfills, which are basically big piles of trash that are covered with dirt. Most trash is biomass, meaning it is derived from plants or animals. Examples of landfilled biomass include: food scraps, tree trimmings, dirty diapers, old newspapers, and discarded lumber.

When buried in the landfill, these materials break down and emit a mixture of methane and carbon dioxide along with a few other trace gases. The decomposition process will produce LFG for 30 years or more. Methane, which typically makes up half of all the gases emitted by a landfill, is a valuable energy product commonly known as natural gas. Although methane is a marketable commodity, methane is also a destructive "greenhouse gas" and landfill operators are required by

CANDIDATE LANDFILLS FOR ENERGY RECOVERY

City	Gas Volume (mmcf/d)	Electric Potential (MW)
Abilene	1.5	2.4
Altar	1.5	2.4
Alvarado	1.6	2.6
Arlington	1.7	2.8
Austin - A	1.8	2.8
Austin - B	1.4	2.2
Avalon	2.5	4.0
Beaumont	1.2	2.0
Clint	1.8	2.9
Columbus	4.4	7.1
Conroe - A	1.5	2.4
Conroe - B	2.0	3.2
Corpus Christi	1.3	2.1
Creedmore	2.5	4.0
El Paso	1.7	2.7
Farmers Branch	2.2	3.6
Ferris	2.3	3.6
Ft. Worth - A	1.5	2.3
Ft. Worth - B	1.6	2.6
Houston	5.4	8.7
Laredo	1.2	1.9
Longview	1.5	2.4
McKinney	1.3	2.0
Plano	2.9	4.7
Rosenberg	1.4	2.3
Sinton	1.6	2.6
Tyler	1.2	1.9
TOTAL	52.5	84.2

Candidate landfills for energy recovery *This list, compiled by the U.S. Environmental Protection Agency, identifies 27 of the more promising landfill sites in Texas. Many additional sites in Texas are also feasible.*

federal law to control it. Twenty times more destructive to the earth's atmosphere than carbon dioxide, methane currently accounts for about 12 percent of America's total greenhouse gas emissions.

TYPES OF PROJECTS

The simplest method of collecting and disposing of LFG is through the use of a flare. This technique was common 50 years ago for disposing of the explosive casinghead gas that came along with the black gold from oil wells. But the oil industry eventually developed markets and infrastructure to sell the valuable natural gas rather than wasting it. In similar fashion, landfill operators are developing markets for LFG, which can be used for many applications.

HEATING - burning gas for direct heating of homes and industry

CHEMICAL PRODUCTION - methane can be turned into a myriad of valuable compounds including plastics, fuel additives, solvents and chemicals of all kinds.

PIPELINE GAS - collected gases can be compressed, cleaned and separated into higher value products. LFG-derived methane can be sold as natural gas and transported to markets around Texas or in other states via natural gas pipelines.

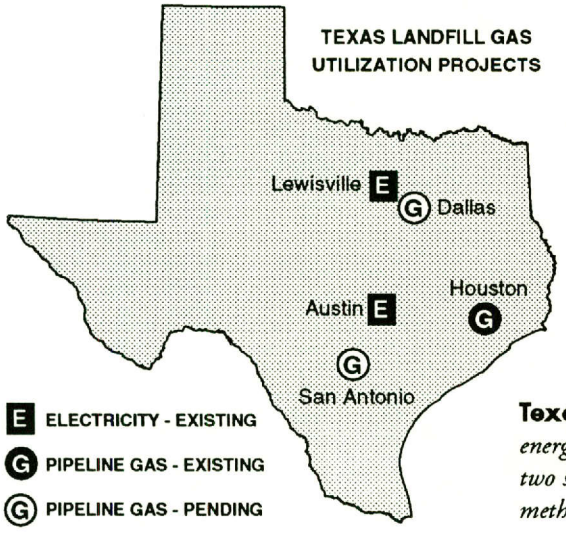
ELECTRIC POWER GENERATION - LFG can fuel an internal combustion engine (e.g. truck engine) or small combustion turbine (e.g. jet engine) connected to a generator to produce electricity.

TEXAS POTENTIAL

About 22 million tons of trash are landfilled in Texas each year. That trash, in turn, creates approximately 70 billion cubic feet of methane. That quantity is equivalent to 1 percent of the natural gas produced in Texas each year and equivalent to seven percent of the gas used by Texas' electric utility companies.

If the 70 largest landfills in Texas were fully developed for energy use, approximately 40 billion cubic feet of methane now drifting into the atmosphere or being wasted in flares would be utilized. It is estimated that nearly 200 MW of electricity could be generated from this LFG, providing the electric needs of more than 100,000 Texas homes.

Nationwide, more than 130 LFG utilization projects are in operation



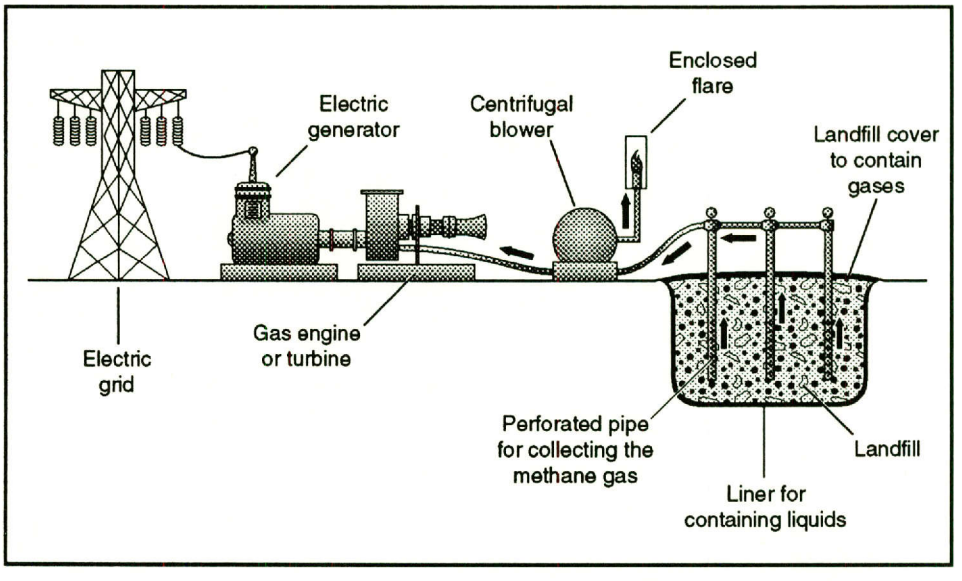
Texas LFG projects *Three LFG-to-energy projects are currently in operation, two selling electricity and one selling methane as natural gas.*

and perhaps 700 additional projects are feasible. In Texas, only three LFG-to-energy projects were in service by the end of 1997. At least two more are expected to be placed in service during 1998.

AUSTIN'S LFG -TO-ELECTRICITY PLANT

Since 1996, Browning-Ferris Industries has been generating electricity from LFG at its Sunset Farms Landfill in Austin. This installation uses three 1,500 horsepower engines that are fueled by the methane-carbon dioxide mixture coming from the landfill. These engines, which are similar to large diesel engines, have relatively high initial costs — about $1,200 per kilowatt or about three times the cost per kilowatt of a large, natural gas-fueled power plant. But because they operate nearly continuously and use free, on-site fuel, they produce electricity at rates comparable to the cheapest conventional power plants.

Landfill gas powered units are highly reliable, producing full power for 90 to 95 percent of the year — a level higher even than fossil fuel and nuclear power plants. And due to their small size, LFG projects such as the one at Sunset Farms create "distributed" electricity, meaning that they connect directly into the local power grid, in contrast to giant conventional power plants that require high-voltage transmission lines with large metal towers to deliver power to customers.



Schematic diagram of LFG-to-electricity plant *Major components include the collection system, engine and generator.*

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RESOURCES

TEXAS RENEWABLE ENERGY EDUCATION CAMPAIGN

Texas is in the midst of a major campaign to develop thought-provoking educational materials on renewable energy. The campaign includes: (1) the first-class video, "The Infinite Power of Texas," (2) 20 fact sheets for students and adults, and (3) a powerful World Wide Web site on the Internet. Begin your search for Texas-specific information on renewable energy at:
http://www.InfinitePower.com

INTERNET SITES:

http://www.InfinitePower.com/factsheets/fs16.html

Center for Renewable Energy and Sustainable Technology (CREST)
A comprehensive educational resource for renewables. A good place to start your search.
http://solstice.crest.org

Department of Energy. Web pages run by the Department of Energy on everything from cooling your home naturally to selecting a new water heater.
www.eren.doe.gov/erec/factsheets/factsheets.html

Florida Solar Energy Center. Information on photovoltaics, batteries, alternative buildings systems, solar heaters. The center is developing a test house which relies exclusively on PV power. **www.fsec.ucf.edu**

El Paso Solar Energy Association. Lots of good information. **www.epsea.org**

BOOK:

Texas Renewable Energy Resource Assesment: Survey, Overviews, and Recommendations. Virtus Energy Research Associates, 1995. ISBN 0-9645526-0-4. Detailed summary of each renewable energy resource in Texas. (source: SECO, 512-463-1889)

POSTER:

Our Energy Sources Are Outstanding in the Field. (source: SECO, 512-463-1889)
(web version: www.infinitepower.com/poster1.html)

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