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November 2002  
SFR-075/02

# Developing Landfill Gas Resources in Texas: A Status Report

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Prepared by  
Waste Permits Division

SFR-075/02  
November 2002



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Published and distributed  
by the  
Texas Commission on Environmental Quality  
PO Box 13087  
Austin TX 78711-3087

The Texas Commission on Environmental Quality was formerly called  
the Texas Natural Resource Conservation Commission.

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# Contents

Executive Summary .....	v
Purpose and Scope .....	1
Activities of the Agencies .....	2
Landfills with Gas Recovery Projects .....	3
Gas Produced from Landfill Gas Recovery Projects .....	4
Electricity Generated from Landfill Gas Recovery Projects .....	4
Environmental Benefits of the Recovery and Use of Landfill Gas .....	4
Reducing Local Air Pollution .....	5
Reducing Odors .....	5
Reducing the Risk of Fire or Explosion .....	5
Reducing Greenhouse Gases .....	5
Reducing Impacts on Local Vegetation .....	5
Converting a Waste into a Resource: Generating Electricity .....	5
Potential for Landfill Gas Recovery .....	6
Obstacles to the Further Development and Use of Landfill Gas .....	6
Appendix A. TCEQ-Published Paper on Landfill Gas Recovery (May 2001) .....	7
1. What Is Landfill Gas? .....	7
2. Hazards of Landfill Gas .....	7
3. Use of Landfill Gas .....	7
4. Design and Authorization of Landfill Gas Recovery Systems .....	8
5. The Role of EPA .....	8
6. Conditions in Texas .....	9
7. Conditions in California .....	9
8. Bioreactors .....	9
9. Environmental Aspects .....	9
10. Economics .....	9
11. Case Histories .....	10
Appendix B. Registrations Issued by or Pending with the TCEQ for Gas Recovery Facilities for Calendar 2002 (Type IX Landfill Gas Facilities) .....	11
Appendix C. Authorizations Issued at the PUC .....	12
Appendix D. Landfills with Gas Collection Potential (September 2002) .....	14
Appendix E. HB 3415 .....	16

## List of Tables

Table 1. Authorizations Issued by the TCEQ .....	3
Table 2. Registrations Pending with the TCEQ .....	4
Table B-1. Registrations Issued by the TCEQ since Sept. 1, 2001 .....	11
Table B-2. Registrations Pending with the TCEQ as of Nov. 1, 2002 .....	11
Table C-1. Power Generator Registrations since Sept. 1, 2001 .....	12
Table C-2. Renewable Energy Credit Certification Applications since Sept. 1, 2001 ..	13

# Executive Summary

This report is provided to comply with requirements of House Bill (HB) 3415, 77th Legislature, 2001, codified in Texas Health and Safety Code, Section 361.040. This legislation encourages the development and use of landfill gas for state energy and environmental purposes. In accordance with HB 3415, the Texas Commission on Environmental Quality (TCEQ) and the Public Utility Commission of Texas (PUC) must:

- # Publicize agency information on identified landfills with the potential for economic landfill gas development, including an estimate of that potential.
- # Assist gas developers, landfill owners and operators, electric utilities, and gas utilities in exploring partnership opportunities with regard to landfill gas.
- # Establish a clearinghouse of information on the development and use of landfill gas.
- # Present reports on the status of developing landfill gas in Texas to the Legislature November 1 of 2002, 2004, and 2006.

The TCEQ and PUC require the registration of landfill facilities that recover gas for beneficial use. The two agencies give applications for these registrations the highest priority.

## Activities of the Agencies

Through seminars at its annual Environmental Trade Fair and meetings with stakeholders, the TCEQ has promoted and encouraged the recovery and productive use of landfill gas in Texas. The TCEQ has also acted as a clearinghouse of information available on landfill gas recovery and use. So far in calendar 2002, the TCEQ has issued four registrations for new landfill gas recovery facilities; five other applications are pending. Also, 74 landfills have been identified that might be able to viably recover gas.

## Landfills with Gas Recovery Projects

A list of landfills that have gas recovery activities has been compiled. Six landfills have reported that they collected landfill gas during fiscal 2001, and a number of new projects have been initiated since the legislation went into effect. The first phase of one new project came on line April 30, 2002.

## Gas Produced from Landfill Gas Recovery Projects

The six landfills collected more than 3.9 billion cubic feet of gas in fiscal 2001. Four landfills used the collected gas for fuel; the other two, for electric generation.

## **Electricity Generated from Landfill Gas Recovery Projects**

In fiscal 2001, 38 million kilowatt-hours of electricity was produced from landfill gas. The new project that came on line in April 2002 has added another 5.4 million kilowatt-hours of generation capacity.

## **Environmental Benefits of the Recovery and Use of Landfill Gas**

A typical landfill gas collection system is a series of wells that are drilled into the landfill and connected by a piping system. Modern landfills must have these systems, and most landfill operators in Texas have chosen to flare the gas that is collected. In general, collecting and burning landfill gas has these environmental benefits:

- # ***Reducing local air pollution.*** Landfill gas contains not only volatile organic compounds, which contribute to the formation of ground-level ozone, but also trace levels of toxic compounds. When landfill gas is burned, these compounds are also burned.
- # ***Reducing odors.*** Although methane—the principal component of landfill gas—is odorless, many other gases produced by decaying waste have offensive odors. Collecting landfill gas prevents these gases from being emitted.
- # ***Reducing the risk of fire or explosion.*** Landfills can and often do generate concentrations of methane that are both flammable and explosive. Migrating through the soil, landfill gas can enter nearby buildings, bringing the hazards of fire or explosion to their occupants.
- # ***Reducing greenhouse gases.*** When methane is burned, this greenhouse gas forms carbon dioxide. Although carbon dioxide is also a greenhouse gas, it has less than 5 percent of the heat-trapping effect of methane.
- # ***Reducing impacts on local vegetation.*** Moving through soil or through the air, landfill gas can slow or stop the growth of nearby plants.

But this collected gas can also be put to use to produce electricity. In fact, the EPA has determined that 1 million tons of municipal solid waste in place in a landfill typically generates 300 cubic feet of gas per minute. When burned, this gas could be used to produce enough electricity to power 700 homes—that is, 7 million kilowatt-hours per year. In short, the recovery and productive use of landfill gas can increase local supplies of electricity while removing a source of environmental problems.

## **Obstacles to the Further Development and Use of Landfill Gas**

There are few obstacles to the development of projects for the collection and beneficial use of landfill gas, but there is a need for both the TCEQ and the PUC to continue to promote the development of these facilities. The two agencies should continue giving related applications priority in processing.

## Purpose and Scope

This report is provided to comply with requirements of legislation in House Bill (HB) 3415, 77th Legislature, 2001, codified in Texas Health and Safety Code, Section 361.040.

HB 3415 encourages the development and use of landfill gas for state energy and environmental purposes. In accordance with HB 3415, progress reports to the Legislature are due November 1, 2002, 2004, and 2006 regarding the status of the development of landfill gas in the state.

Furthermore, HB 3415 specifically requires the Texas Commission on Environmental Quality (TCEQ) and the Public Utility Commission of Texas (PUC) to jointly promote the economic development and use of landfill gas by, at a minimum:

- (1) publicizing agency information on identified landfills that have the potential for economic landfill gas development, including an estimate of that potential;
- (2) assisting gas developers, landfill owners and operators, electric utilities, and gas utilities in exploring partnership opportunities with regard to landfill gas; and
- (3) establishing a clearinghouse of information on landfill gas development and use.

The legislation mandates that if the TCEQ requires a person to register with the TCEQ before undertaking landfill gas recovery activities, the TCEQ shall give priority to processing applications for registration. The TCEQ and PUC presently require registrations for landfill facilities that recover gas for beneficial use. Actions regarding the authorization of landfill gas recovery have been given the highest priority.

In accordance with the legislation, the TCEQ and the PUC must jointly develop the three biennial progress reports. Each report must:

- (1) Summarize the activities of the agencies in fulfilling the requirements of Section 361.040, Texas Health and Safety Code.
- (2) Identify landfills with gas recovery projects.
- (3) State the amount of gas produced from landfill gas recovery projects.
- (4) State the amount of electricity generated from landfill gas recovery projects.
- (5) Identify the environmental benefits of the recovery and use of landfill gas.
- (6) Identify any legal, administrative, economic, or other obstacles to the further development and use of landfill gas.

The remainder of this report addresses the statutorily required information.

## Activities of the Agencies

The following are activities that constitute the agencies' outreach to promote landfill gas recovery:

- # A presentation was made at the quarterly Municipal Solid Waste Advisory Council (MSWAC) meeting September 7, 2001, to discuss aspects of HB 3415 regarding landfill gas recovery and the new procedures for streamlining the municipal solid waste registration process.
- # A half-day session at the Environmental Trade Fair at the Austin Convention Center May 6, 2002, was devoted to landfill gas recovery. Presentations were made on the following subjects:
  - ! ***Municipal Solid Waste Rule Requirements*** (topics included rule requirements, tips, and hints for receiving timely registration authorizations, and new streamlining policies for registration authorizations).
  - ! ***Legislative Requirements*** (this topic included state legislative mandates, legislative history, and background).
  - ! ***Texas Landfills—Success Stories*** (topics included actual case histories of operating landfills in Texas that are successfully recovering landfill gas for beneficial use).
  - ! ***Economic Benefits*** (this topic outlined the potential for profitably recovering landfill gas for beneficial use).
  - ! ***Environmental Benefits*** (topics included the known environmental and public safety benefits to be derived from the recovery of landfill gas).

A paper regarding landfill gas recovery was prepared for the Trade Fair and was published in the *2002 Environmental Trade Fair Sessions*. A copy of this paper is attached as Appendix A. Speakers at the Trade Fair were: (1) Mr. Wayne Harry, TCEQ regarding MSW rules; (2) Mr. Wayne Lee, TCEQ regarding the new law and policies; (3) Mr. Mark Kapner of Austin Energy, regarding a case history of use of landfill gas; (4) Ms. Leslie Cook of Energy Developments regarding case histories; (5) Mr. Andy Curtis of the Public Utilities Commission regarding PUC requirements; and (6) Mr. Patrick Kelly of US Environmental Protection Agency, Region 6, regarding the EPA perspective on landfill gas recovery. Attending these presentations were state legislators; landfill owners and operators; employees of cities, counties, and energy companies; consultants; TCEQ staff; and staff from the PUC.

- # A presentation was made at the quarterly MSWAC meeting to discuss the gas recovery subjects presented at the Environmental Trade Fair. The Trade Fair paper regarding gas recovery was made available to the members and the public. This second MSWAC presentation was made June 7, 2002.

- # A meeting was held in Austin September 20, 2002, with staff from EPA headquarters and Region 6 to discuss joint activities of the state and EPA to promote and encourage landfill gas recovery activities.
- # The agencies have reviewed applications and issued registrations for new landfill gas recovery facilities. Within the TCEQ, during calendar 2002, four registrations for new facilities have been issued and five other registration applications are pending. See Appendix B for the TCEQ's recently issued (Table B-1) and currently pending (Table B-2) registrations. Tables C-1 and C-2 in Appendix C show work done by the PUC during calendar 2002.
- # The TCEQ has compiled numerous technical reports and other documents to act as a clearinghouse of information to assist in the development of new landfill gas recovery projects.

## Landfills with Gas Recovery Projects

Tables 1 and 2 list landfills that have gas recovery activities:

**Table 1. Authorizations Issued by the TCEQ** (in order of date issued)

Registration or Permit Number	Name	Landfill Name	City	County	Date Issued
MSW-1777	GSF Energy LLC	BFI McCarty Road Landfill	Houston	Harris	Sept. 30, 1985
MSW- 48000	APLP Sunset Farms Electric	BFI/Sunset Farms	Austin	Travis	Oct. 16,1996
MSW- 48002	Ecogas Corporation	Nelson Gardens Landfill	San Antonio	Bexar	April 16, 1999
MSW- 48003	Ecogas Corporation	Fort Bend County Landfill	Rosenberg	Fort Bend	Dec. 3, 1999
<i>— HB 3415 took effect Sept. 1, 2001 —</i>					
MSW- 48005	BFI Tessman Road Landfill Gas Power Station	BFI Tessman Road	San Antonio	Bexar	March 6, 2002
MSW- 48006	Reliant Atascocita Landfill Gas Facility	Waste Management Atascocita RDF	Houston	Harris	May 30, 2002
MSW- 48008	Reliant Security LFGTE Facility	Waste Management of Texas Security Landfill	Conroe	Montgomery	May 30, 2002
MSW- 48007	City of Waco	City of Waco	Waco	McClennan	Aug. 13, 2002

**Note:** The term "authorizations" includes both permits and registrations. The process of obtaining a permit is more rigorous than the registration process.

**Table 2. Registrations Pending with the TCEQ**

Registration Number	Name	Landfill Name	City	County	Date Received
MSW- 48009	Reliant Coastal Plains LFGTE Facility	BFI Galveston County Landfill	Alvin	Galveston	April 16, 2002
MSW- 48010	Reliant Bluebonnet LFGTE Facility	Waste Management Bluebonnet LF	Houston	Harris	Aug. 22, 2002
MSW- 48011	Reliant Energy— Baytown	USA Waste of Texas— Baytown	Baytown	Chambers	Sept. 16, 2002
MSW- 48012	Renovar Energy Corp	City of Arlington	Arlington	Tarrant	Sept. 23, 2002
MSW- 48013	Reliant Energy— Conroe	City of Conroe	Conroe	Montgomery	Sept. 16, 2002

## **Gas Produced from Landfill Gas Recovery Projects**

Six landfills have reported that they collected landfill gas during fiscal 2001. Of those six, four used the collected gas for fuel, and two for generating electricity. These landfills collected more than 3.9 billion cubic feet of gas.

## **Electricity Generated from Landfill Gas Recovery Projects**

In fiscal 2001, 38 million kilowatt-hours of electricity was produced from landfill gas. A new project that came on line in April 2002 has added another 5.4 million kilowatt-hours of generation capacity.

## **Environmental Benefits of the Recovery and Use of Landfill Gas**

In general, the recovery and use of landfill gas produces environmental benefits in these areas:

- # reducing local air pollution
- # reducing odors
- # reducing the risk of fire or explosion
- # reducing greenhouse gases
- # reducing impacts on local vegetation
- # converting a waste into a resource by generating electricity

Modern-day landfills are required to have a landfill gas collection system, which typically consists of a series of wells drilled into the landfill and connected by a piping system. Gas produced by the landfill can thereby be collected for beneficial uses; however, most landfills in Texas that collect landfill gas have chosen to flare it instead.

## **Reducing Local Air Pollution**

Landfill gas contains not only volatile organic compounds, which contribute to the formation of ground-level ozone, but also trace levels of toxic compounds. When landfill gas is burned, these compounds are also burned. The practice of burning landfill gas, whether by simply flaring it or by using it to generate electricity, does emit various pollutants—for example, particulates, traces of heavy metals, and organic compounds such as dioxins. However, because of the more controlled combustion conditions employed in the energy recovery process, energy recovery produces some of these pollutants—notably, carbon monoxide—at lower levels than does flaring.

## **Reducing Odors**

Although methane—the principal component of landfill gas—is odorless, many other gases produced by decaying waste have offensive odors. Collecting landfill gas prevents these gases from being emitted.

## **Reducing the Risk of Fire or Explosion**

Landfills can and often do generate concentrations of methane that are both flammable and explosive. Migrating through the soil, landfill gas can find its way into nearby buildings, bringing the hazards of fire or explosion to their occupants.

## **Reducing Greenhouse Gases**

In researching scientific literature it can be found that methane is associated with greenhouse gases. Some scientific articles describe methane as a significant contributor to global warming. According to scientific literature, methane has been found to be over 21 times more effective at trapping heat in the earth's atmosphere than carbon dioxide.

## **Reducing Impacts on Local Vegetation**

Moving through soil or through the air, landfill gas can slow or stop the growth of nearby plants. In fact, landfills that were closed early in the 20<sup>th</sup> century can sometimes be located fairly precisely by noting where trees and shrubs repeatedly fail to grow in an open space.

## **Converting a Waste into a Resource: Generating Electricity**

Collecting and flaring landfill gas reduces the amount of methane in emissions, but converting the methane into a renewable energy resource conserves fossil fuels and makes good economic sense. In fact, the EPA has determined that 1 million tons of municipal solid waste in place in a landfill typically generates 300 cubic feet of gas a minute. When burned, this gas could be used to produce 7 million kilowatt-hours of electricity a year—enough energy for 700 homes.

When compared with large-scale hydroelectric power and other renewable energy technologies, landfill gas projects show great economic potential. Future costs of landfill gas-to-electricity projects are expected to decrease because of increased sales volumes and increased competition between suppliers of electric generator sets. It is also likely that gas collection costs will be borne as part of a landfill site's environmental control system and will not be costed into the overall landfill gas utilization process.

Finally, using landfill gas for energy generation provides an additional incentive to maximize gas collection at a site and reduces uncontrolled methane emissions. While some noise is generated by the gas utilization equipment, appropriate siting and design can keep noise levels within acceptable limits.

## **Potential for Landfill Gas Recovery**

Landfills that have the potential to generate recoverable and economically viable amounts of landfill gas will have the following minimum characteristics:

- # Each landfill must have at least 1 million tons of municipal solid waste in place.
- # The landfill must be at least 40 feet deep.
- # The landfill should receive greater than 25 inches of rainfall annually.

A list of landfills in Texas that meet these characteristics is attached in Appendix D. There are 74 candidates on the list.

## **Obstacles to the Further Development and Use of Landfill Gas**

At this point in time there are few obstacles to the development of landfill gas collection and beneficial use projects. As can be seen from Table B-2, nine projects have been initiated in calendar 2002. Things that can be done to further the development of these projects are to conduct additional outreach projects, to develop a primer for distribution that provides information on opportunities for project development, and to develop a Web page that provides general information for the promotion of landfill gas recovery. Another workshop to present goals, outline progress, and facilitate project development is tentatively scheduled for May 2003. Writing a primer with the assistance of EPA is tentatively scheduled to be completed by April 2003. The agencies should continue giving these applications priority in processing.

# Appendix A. TCEQ-Published Paper on Landfill Gas Recovery (May 2001)

## *Recovery and Beneficial Use of Landfill Gas*

As presented by Jerry Allred and Wayne Lee

Collecting and flaring landfill gas reduces the amount of methane in emissions, but converting the methane into a renewable energy resource conserves fossil fuels and makes good economical sense. Of the renewable energy technologies such as large-scale hydro power, landfill gas projects show great economic potential. Using landfill gas in a beneficial way means converting a potentially harmful gas to a reliable energy source.

### **1. What Is Landfill Gas?**

Landfill gas is a byproduct of solid waste decomposition. Landfill gas is generated by the natural degradation of municipal solid waste by anaerobic (without oxygen) micro-organisms. The gas is composed mostly of methane and carbon dioxide. The major constituents of landfill gas are methane and carbon dioxide, although oxygen, nitrogen, and hydrogen sulfide are also produced. In an actual case, the dry composition of landfill gas had a methane concentration of 57 percent methane (natural gas), 42 percent carbon dioxide, 0.5 percent nitrogen, 0.2 percent hydrogen, and 0.2 percent oxygen. In addition, a significant number of other compounds were found in trace quantities. These include alkanes, aromatics, chlorocarbons, oxygenated compounds, other hydrocarbons and sulfur dioxide. Landfilling is the main method for disposal of municipal and household solid wastes in Texas.

### **2. Hazards of Landfill Gas**

Methane in the concentrations commonly generated by landfills is both flammable and explosive.

In addition to emitting directly into the atmosphere, landfill gas can migrate through surrounding soils, penetrating nearby buildings and affecting vegetation growth. Modern-day landfills are required to have a landfill gas collection system. Once the gas is produced, the gas can be collected by the collection system, which typically consists of a series of wells drilled into the landfill and connected by a piping system. Most landfills in Texas that produce landfill gas collect the gas and then flare the gas.

In researching scientific literature it can be found that methane is associated with greenhouse gases. Some scientific articles describe methane as a significant contributor to global warming. According to

scientific literature, methane has been found to be over 21 times more effective at trapping heat in the earth's atmosphere than carbon dioxide.

### **3. Use of Landfill Gas**

Methane from landfills is a valuable source of energy, and there are many opportunities for reducing methane emissions through initiating landfill gas recovery and utilization projects. Landfill gas utilization technologies include direct use, electricity generation, treatment to produce pipeline quality gas, landfill leachate evaporation, and emerging technologies.

Landfill gas entering the landfill gas collection system is saturated with water, and that water must be removed prior to further processing. After dewatering, the landfill gas can be used directly in reciprocating engines. It can also be further processed into a higher-British thermal unit (Btu) gas (suitable for use in boilers for manufacturing processes, as well as for electricity generation via gas turbines.) The most important part of the scrubbing process is the removal of sulfur dioxide from the gas since it results in corrosion within the combustion equipment.

### **4. Design and Authorization of Landfill Gas Recovery Systems**

Landfill gas recovery systems are required to be registered by TCEQ. These facilities are termed Type IX facilities. The Municipal Solid Waste Permits Section implements rules requiring a registration for these systems that capture the gas and put it to productive use.

Since landfill gas recovery facilities are located at existing landfills, there are generally fewer issues associated with them compared to other MSW-to-energy facilities. Some of the issues associated with landfill gas treatment and power generation equipment include:

1. Design and construction of landfill gas recovery and energy production systems.
2. Operation and monitoring of landfill gas recovery and energy production systems.
3. Evaluation of proposed systems and operations.
4. Ability to meet air quality requirements.
5. Handling and disposal of the condensate from the dewatering process.
6. Safety Aspects.
7. Protection of the landfill cover

### **5. The Role of EPA**

Through the Landfill Methane Outreach Program the U.S. Environmental Protection Agency (EPA) works with communities to investigate opportunities for cost-effective recovery and use of methane in landfill gas. EPA works with municipal solid waste landfill operators and owners to promote the use of landfill gas as an energy resource and to overcome barriers that prevent progress in landfill gas recovery programs.

EPA believes that the recovery and use of methane created in municipal solid waste landfills has local and global environmental and economic benefits. Nationally there are approximately 270 operating landfill gas recovery for energy facilities, with many more under development or under consideration. EPA estimates that there are hundreds of other landfills in the nation that could install economically viable landfill gas recovery systems.

## **6. Conditions in Texas**

In Texas we estimate that there are 59 landfills that are candidates for beneficial landfill gas recovery. Sites with greater than 1 million tons of methane generating waste in place are considered to be candidates for beneficial gas recovery. Although maintained in an oxygen-free environment and relatively dry conditions, landfill waste produces significant amounts of landfill gas. With Texans disposing of approximately 25 million tons of waste per year, the total amount of landfill gases produced in Texas is tremendous.

## **7. Conditions in California**

California has about 56 landfill gas recovery facilities; 14 of them collect only gas and 42 are gas to electricity production facilities. These electricity production facilities have an installed capacity of about 246 megawatts.

## **8. Bioreactors**

Future developments in the area of landfill gas recovery involves the recirculation of the leachate generated in the landfill by the anaerobic decomposition process. The recirculation of the leachate through the waste in a lined and covered landfill effectively accelerates and enhances the generation of methane gas. This form of landfill design and operation converts the landfill into a bioreactor.

## **9. Environmental Aspects**

Odors and safety hazards are commonly associated with landfill gas emissions. In general, emissions from landfill gas combustion will include (at different concentrations) all the pollutants produced by flaring landfill gas at sites that do not have gas utilization equipment, but at different concentrations. These emissions include particulates, traces of heavy metals and organic compounds such as dioxins. Emissions of some pollutants (e.g., carbon monoxide) are less than those from flaring, because of the more controlled combustion conditions employed in energy recovery schemes. Using landfill gas for energy generation provides an additional incentive to maximize gas collection at a site and so reduces uncontrolled methane emissions. While some noise is generated by the gas utilization equipment, appropriate siting and design can keep noise levels within acceptable limits.

## **10. Economics**

Collecting and flaring landfill gas reduces the amount of methane in emissions, but converting the methane into a renewable energy resource conserves fossil fuels and makes good economical sense. Of the renewable energy technologies such as large-scale hydro power, landfill gas projects show great economic potential. Future costs of landfill gas schemes are expected to decrease because of increased sales volumes and increased competition between suppliers of generator sets. It is also likely that gas collection costs will be borne as part of a landfill site's environmental control system and will not be costed into the overall landfill gas utilization scheme.

Current regulations require landfills to collect and manage landfill gas. There are two compliance options: flare the gas, or install an landfill gas to energy system. Landfill gas to energy offers communities and landfill owners the opportunity to reduce the costs associated with regulatory compliance by turning pollution in a valuable community resource.

Large landfill sites can find that it is economically feasible to recover methane as a fuel to generate electricity. Based on estimated costs, the payback period is expected to be between 2.3 and 4.6 years.

According to EPA, 1 million tons of waste in place can generate enough gas to produce electricity for 700 homes for one year.

## **11. Case Histories**

There is an existing 3 megawatt electrical generation facility that burns methane gas extracted from the Sunset Farms landfill methane project located off Giles Lane in Austin.

Several landfill gas recovery and beneficial use programs are being planned in Texas. Landfill gas recovery and beneficial use facilities are proposed for landfills in San Antonio, Houston, and Hutchins.

For an existing landfill facility, the ongoing gas recovery process utilizes gas extraction wells to recover gas from the landfill. Field tests were conducted in this case to determine gas generation rates, oxygen penetration through the cover material, and methane purity. Results indicated that over 292 cubic feet per minute of gas, at 50 percent methane concentration, was generated at one location on the site and 450 cubic feet per minute of landfill gas, at 50 percent methane concentration, was generated at another location. Therefore, at this large landfill site, it was economically feasible to recover the methane as fuel to generate electricity.

Case Studies of facilities that are producing energy from landfill gas are available online.

# Appendix B. Registrations Issued by or Pending with the TCEQ for Gas Recovery Facilities for Calendar 2002

## *Type IX Landfill Gas Facilities*

The Municipal Solid Waste Permits Section of the TCEQ issues registrations for Type IX gas recovery facilities on municipal solid waste landfills. The following activities have taken place since the effective date of HB 3415. In these tables, LFTGE stands for landfill gas-to-electricity.

**Table B-1. Registrations Issued by the TCEQ since Sept. 1, 2001**

Registration Number	Name	Landfill Name	City	County	Date Issued
MSW- 48005	BFI Tessman Road Landfill Gas Power Station	BFI Tessman Road	San Antonio	Bexar	March 6, 2002
MSW- 48006	Reliant Atascocita Landfill Gas Facility	Waste Management Atascocita RDF	Houston	Harris	May 30, 2002
MSW- 48007	City of Waco	City of Waco	Waco	McClennan	Aug. 13, 2002
MSW- 48008	Reliant Security LFGTE Facility	Waste Management of Texas Security Landfill	Conroe	Montgomery	May 30, 2002

**Table B-2. Registrations Pending with the TCEQ as of Nov. 1, 2002**

Registration Number	Name	Landfill Name	City	County	Date Received
MSW- 48009	Reliant Coastal Plains LFGTE Facility	BFI Galveston County Landfill	Alvin	Galveston	April 16, 2002
MSW- 48010	Reliant Bluebonnet LFGTE Facility	Waste Management Bluebonnet LF	Houston	Harris	Aug. 22, 2002
MSW- 48011	Reliant Energy—Baytown	USA Waste of Texas—Baytown	Baytown	Chambers	Sept. 16, 2002
MSW- 48012	Renovar Energy Corp	City of Arlington	Arlington	Tarrant	Sept. 23, 2002
MSW- 48013	Reliant Energy—Conroe	City of Conroe	Conroe	Montgomery	Sept. 16, 2002

## Appendix C. Authorizations Issued at the PUC

The PUC Electric Division, Engineering Section, registers power generators in Texas and certifies facilities qualified to earn renewable energy credits (RECs) under the SB7 Renewable Energy Mandate.

Table C-1 (below) shows the power generator registrations processed since September 1, 2001, the effective date of HB 3415, which encourages the use of landfill gas. Table C-2 on page 13 shows the current status of REC applications received during the same time period.

**Table C-1. Power Generator Registrations since Sept. 1, 2001**

Project No./ Registration Effective	Company Name	Facility Name	City/ County	Utility Service Area	Generator Capacity MW
Proj. 25454 Reg. 20077 02/21/02	Bio Energy Austin, LLC	Tessman Road Landfill Power Generation Station	San Antonio Bexar	Reliant Energy HL&P	5.4 initial 8.1 final
Proj. 26425 Reg. 20084 08/14/02	Reliant Energy Renewables Conroe, LP	Reliant Energy Renewables Conroe Units 1-3	Conroe Montgomery	Entergy	2.9
Proj. 26426 Reg. 20085 08/14/02	Reliant Energy Renewables Security, LP	Reliant Energy Renewables Security Units 1-3	Conroe Montgomery	Entergy	5.0
Proj. 26427 Reg. 20086 08/14/02	Reliant Energy Renewables Coastal Plains, LP	Reliant Energy Renewables Coastal Plains Units 1-4	Alvin Galveston	TNMP	6.7
Proj. 26428 Reg. 20087 08/14/02	Reliant Energy Renewables Bluebonnet, LP	Reliant Energy Renewables Bluebonnet Units 1-4	Houston Harris	Reliant Energy HL&P	3.9
Proj. 26429 Reg. 20083 08/14/02	Reliant Energy Renewables Baytown, LP	Reliant Energy Renewables Baytown Units 1-4	Baytown Chambers	Reliant Energy HL&P	3.9
Proj. 26430 Reg. 20088 08/14/02	Reliant Energy Renewables Atascocita, LP	Reliant Energy Renewables Atascocita Units 1-5	Houston Harris	Reliant Energy HL&P	8.4

**Table C-2. Renewable Energy Credit Certification Applications since Sept. 1, 2001**

<b>Project No./ Date Action Taken</b>	<b>Company Name</b>	<b>Facility Name, City, and (County)</b>	<b>Utility Service Area</b>	<b>In-Service Date</b>	<b>Generator Capacity (MW)</b>
<b>Approved:</b>					
Proj. 25512 Received 04/01/02; Approved 04/30/02	Bio Energy Austin, LLC	Tessman Road Landfill Power Generation Station San Antonio (Bexar)	Reliant Energy HL&P	3 phases:  1. Apr. 30, 2002 2. Aug. 2003 3. Aug. 2004	8.1 total:  5.4 + 1.35 + 1.35
<b>Pending:</b>					
Proj. 26808 Received 10/17/02	Reliant Energy Renewables Conroe, LP	Reliant Energy Renewables Conroe Units 1-3 Conroe (Montgomery)	Entergy	Jan. 2003	2.9
Proj. 26426 Received 10/17/02	Reliant Energy Renewables Security, LP	Reliant Energy Renewables Security Units 1-3 Conroe (Montgomery)	Entergy	Jan. 2003	5.0
Proj. 26427 Received 10/17/02	Reliant Energy Renewables Coastal Plains, LP	Reliant Energy Renewables Coastal Plains Units 1-4 Alvin (Galveston)	TNMP	Dec. 2002	6.7
Proj. 26428 Received 10/17/02	Reliant Energy Renewables Bluebonnet, LP	Reliant Energy Renewables Bluebonnet Units 1-4 Houston (Harris)	Reliant Energy HL&P	Dec. 2002	3.9
Proj. 26429 Received 10/17/02	Reliant Energy Renewables Baytown, LP	Reliant Energy Renewables Baytown Units 1-4 Baytown (Chambers)	Reliant Energy HL&P	Dec. 2002	3.9
Proj. 26430 Received 10/17/02	Reliant Energy Renewables Atascocita, LP	Reliant Energy Renewables Atascocita Units 1-5 Houston (Harris)	Reliant Energy HL&P	Dec. 2002	8.4

## Appendix D. Landfills with Gas Collection Potential (September 2002)

The following 74 landfills meet the practical requirements for having gas collection potential—that is, they contain at least 1 million tons of municipal solid waste, have a height of at least 40 feet, and receive on average at least 25 inches of rain a year.

Permit No. and Permittee	Tons	Waste Height
42. Waste Management of Texas, Inc.	5,261,900	240
44. North Texas Munic. Water Dist.	6,086,772	58
47. City of Weatherford	1,269,773	80
62. City of Dallas	24,584,571	183
69. City of Lubbock	7,257,738	110
73. City of Amarillo	5,125,665	127
79. City of San Angelo	2,778,529	65
81. City of Conroe	3,871,480	95
151. R.E. Wolfe Enterprises	3,118,936	55
208. Crow Landfill Tx LP	3,964,742	62
218. City of Fort Worth	4,019,098	100
241. BFI Waste Systems N. Amer.	2,522,442	215
249. Waste Management of Texas, Inc.	10,983,172	120
261. BFI Waste Systems N. Amer. Inc.	40,739,410	179
288. City of Big Spring	1,365,184	100
358. City of Arlington	10,497,772	80
360. City of Austin	4,666,334	52
423. City of Corpus Christi	7,661,559	86
523. Waste Management of Texas, Inc.	3,920,000	99
534. City of Cleburne	2,649,028	75
556. Mesquite Landfill Tx LP	8,036,953	110
568. North Texas Munic. Water Dist.	6,144,824	135
576. Western Waste, Inc.	1,399,500	84
692. City of Temple	3,844,357	220
729. City of El Paso	3,461,780	95

797. City of Mount Pleasant	1,397,505	64
948. City of Waco	1,164,844	120
956. City of Edinburg	1,202,105	66
996. City of Grand Prairie	3,753,070	105
1019. Waste Management of Texas, Inc.	9,547,500	260
1025. Waste Management of Texas, Inc.	19,800,000	240
1062. City of Garland	6,475,921	95
1149. BFI Waste Systems N. Amer. Inc.	10,540,173	84
1193. BFI Waste Systems N. Amer. Inc.	8,701,907	146
1195. Republic/Maloy Landfill & San.	1,719,757	75
1209. Republic Waste Services of Texas	2,485,722	331
1273. City of Brownsville	2,087,900	43
1279. Waste Management of Texas, Inc.	2,563,800	132
1307. Waste Management of Texas, Inc.	9,201,916	145
1312. City of Farmers Branch	7,081,248	100
1327. Pine Hill Farms Landfill Tx LP	6,128,629	177
1394. City of Irving	1,904,451	255
1405. Williamson County	2,215,190	90
1410. BFI Waste Systems N. Amer. Inc.	10,371,426	240
1417. Turkey Creek Landfill Tx LP	3,577,298	181
1422. US Army/Fort Bliss	1,133,136	45
1444. Brazos Valley Swma	3,154,045	91
1447. BFI Waste Systems N. Amer. Inc.	9,755,368	90
1454. Waste Management of Texas, Inc.	2,059,500	75

<b>Permit No. and Permittee</b>	<b>Tons</b>	<b>Waste Height</b>
1469. BFI Waste Systems of N. Amer.	2,475,051	163
1482. City of El Paso	4,600,817	100
1486. City of Beaumont	3,089,274	48
1503. Waste Management of Texas, Inc.	1,439,577	84
1505. BFI Waste Systems N. Amer. Inc.	6,874,481	88
1522. City of Victoria	2,653,196	99
1535. USA Waste of Tx Landfills Inc	6,882,968	135
1539. Republic Waste Svcs. Of Texas	6,392,019	78
1562. City of Brownwood	1,105,042	240
1571. IESI Tx Landfill LP	1,019,490	276
1590. City of Denton	2,053,140	99
1605. City of Midland	2,961,912	153
1646. City of Lacy-Lakeview	1,298,528	68
1663. BFI Waste Systems of N. Amer.	2,431,732	134
1693. City of Laredo	6,923,934	206
1721. Waste Management of Texas, Inc.	5,531,757	210
1745. Ellis County Landfill Tx LP	1,698,984	305
1752. Waste Management of Texas, Inc.	3,425,492	47
1948. BFI Waste Systems N. Amer. Inc.	1,750,134	51
1972. Laidlaw Waste Systems	4,123,418	100
2027. BFI Waste Systems N. Amer. Inc.	4,189,210	80
2093. Waste Management of Texas, Inc.	10,273,286	250
2123. Texas Disposal Systems Landfill	4,666,503	187
2158. Republic Waste Services	1,161,428	150

# Appendix E. HB 3415

## AN ACT

relating to the development and use of landfill gas for state energy and environmental purposes.

BE IT ENACTED BY THE LEGISLATURE OF THE STATE OF TEXAS:

SECTION 1. Subchapter B, Chapter 361, Health and Safety Code, is amended by adding Section 361.040 to read as follows:

Sec. 361.040. DEVELOPMENT AND USE OF LANDFILL GAS.

(a) The legislature finds that:

(1) there are many municipal solid waste landfills in this state that produce economically recoverable amounts of methane gas;

(2) those landfills currently generate approximately 100 million cubic feet of methane gas per day;

(3) cost-effective recovery of landfill gas will have both environmental and economic benefits; and

(4) it is in the state's interest to encourage and assist the development and use of landfill gas in a timely fashion.

(b) The commission and the Public Utility Commission of Texas shall jointly promote the economic development and use of landfill gas by, at a minimum: (1) publicizing agency information on identified landfills with the potential for economic landfill gas development, including an estimate of that potential; (2) assisting gas developers, landfill owners and operators, electric utilities, and gas utilities in exploring partnership opportunities with regard to landfill gas; and (3) establishing a clearinghouse of information on landfill gas development and use.

(c) If the commission requires a person to register with the commission before undertaking landfill gas recovery activities, the commission shall give priority to processing applications for registration.

(d) The commission and the Public Utility Commission of Texas shall jointly report to the legislature by November 1 of 2002, 2004, and 2006 on the status of the development of landfill gas in this state. Each report shall:

(1) summarize the activities of the agencies in fulfilling the requirements of this section;

(2) identify landfills with gas recovery projects;

(3) state the amount of gas produced from landfill gas recovery projects;

(4) state the amount of electricity generated from landfill gas recovery projects;

(5) identify the environmental benefits of the recovery and use of landfill gas; and

(6) identify any legal, administrative, economic, or other obstacles to the further development and use of landfill gas.

(e) This section expires September 1, 2007.

SECTION 2. This Act takes effect September 1, 2001.