ANALYSIS OF NO_X EMISSIONS LIMITS FOR DISTRIBUTED GENERATION IN TEXAS

June 2002

Prepared for:

Oak Ridge National Laboratory/U. S. Dept. of Energy

and for:
The Texas Natural Resource Conservation Commission
The Public Utility Commission of Texas

Prepared by:

Distributed Utility Associates
1062 Concannon Blvd.
Livermore, CA 94550

Joe Iannucci, Principal Investigator
Susan Horgan, Associate
James Eyer, Senior Analyst
Lloyd Cibulka, Associate

Table of Contents

TABLES

FIGURES

Executive Summary

Overview

The potential exists for distributed generation (DG) to serve a growing portion of the needs of electricity users in the deregulated electricity marketplace in Texas. For this study DG is defined as generation with nameplate output rating of no more than 10 MW, and connected to the electric distribution system. If DG is used extensively, then the aggregate emissions of oxides of nitrogen (NO_X) from DG in Texas could be significant.

The objective of this study is to provide an estimate of the potential emissions of NO_X from cost-effective DG for the years 2002, 2006, and 2010 for the entire state of Texas, and for the evaluation zones of West Texas, Dallas – Fort Worth (DFW), Houston – Galveston (HGA), and the rest of East Texas, given various possible maximum allowable NO_X emission levels.

Methodology

Estimates are made of the potential amount of NO_X emissions that could occur due to cost-effective use of DG to serve load in Texas for the three discrete years of 2002, 2006 and 2010. These estimates are made individually for the aforementioned evaluation zones, and collectively for the entire state of Texas, given three scenarios of varying levels of allowable NO_X emissions.

The emissions scenarios are defined as follows: Scenario 1 represents NO_X emission standards contained in the Texas Air Quality Standard Permit for Electric Generating Units (Standard Permit) effective June 1, 2001 for electric generating units installed prior to January 1, 2005. Scenario 2 represents NO_X emission standards contained in the Standard Permit for electric generating units installed on or after January 1, 2005. Scenario 3 represents alternative NO_X emission standards which are not contained in the Standard Permit. Table ES-1 summarizes these scenarios. For a more detailed description of the Scenarios, please see Section 4 of this report.

Table ES-1. Emissions Scenarios and NO_X Emission Limits, lb/MWh

	East Texas			West Texas		
Scenario	≤300 hr/yr	>300 hr/yr	Oilfield/ Landfill Gas	≤300 hr/yr	>300 hr/yr	Oilfield/ Landfill Gas
1	1.65	0.47	1.77	21.0	3.11	3.11
2	0.47	0.14	1.77	21.0	3.11	3.11
3	0.47	0.23	1.77	21.0	3.11	3.11

The DG technologies considered as candidates for applications in Texas include microturbines, combustion turbines, natural gas fired engines, diesel engines and fuel cells. The distributed power applications considered in this study are standby generator activation, reliability enhancement, on-site power production, combined heat and power (CHP, classified as either small (1 MW or less) or large (over 1 MW)), demand charge reduction, oilfield/flare gas utilization, and landfill gas utilization.

The first step in the analysis is to estimate application-specific technical market potential, i.e., the amount of electric load for which DGs are technically feasible, for each of the eight applications. Estimates are made for a specific evaluation zone, year and emissions scenario.

Next, application-specific "load in play" is estimated. Load in play is defined as that portion of the technical market potential that might actually be adopted in a given application, if it were economically feasible.

The third step in the process involves calculating economic market potential for a given DG, for a given application. The annual cost for the DG in $/kW-yr is compared to the range of benefits that would accrue if the DG were used; this determines the fraction of load in play for which the DG is cost-effective (the economic market potential).

Fourth, the total NO_X emissions from all cost-competitive DGs for a given year are estimated. Calculations are based on the economic market potentials in MW, the emission factors in lb/MWh of NO_X, and the number of hours per year of DG operation specified by the applications.

Finally, only the <u>most</u> cost-effective DG technology (i.e., the one with the most market share) in each application is assumed to serve that application. Market shares and emissions for the eight applications are then totaled for the specific zone/year/scenario specification.

Results

The graphical results show economic market potential for DG, in units of gigawatts (GW), and amounts of NO_X (ton/yr) that could be emitted if <u>the most cost-effective DG</u> were used to meet all of the economic market potential in the emissions scenarios specified. The results of the analysis are presented in graphical form in Figures 2 – 25, supported with summary data in Appendix C and detailed tabular data in Appendices D – I. Appendices D – I also contain market potentials and estimated NO_X results for <u>all</u> of the competitive technologies.

Six separate cases were run to evaluate the effects of variations in certain parameters:

1. Base Case: uses 0.15 fixed charge rate (FCR) for financial calculations.
2. Low Finance Cost: uses 0.1 FCR.
3. High Finance Cost: uses 0.2 FCR.
4. No Microturbine: assumes that the microturbine is not available as a DG technology option.
5. No Microturbine, no Fuel Cell: assumes that both the microturbine and the fuel cell are not available as DG technology options.
6. High Electricity Cost in Dallas/Fort Worth zone (DFW): add 1¢/kWh to electricity cost in DFW area only, to simulate the cost of transmission congestion.

Conclusions and Recommendations

The results of the study are interesting from three perspectives:

- Emission standards setting
- Market, applications, and technology insights
- Research agenda implications

Emission Standards Setting

- For the Base Case for all of Texas in 2006, the emissions limits of Scenario 2 would appear to limit the distributed generation markets to 9,218 MW, in comparison to 14,655 MW under the emissions limits of Scenario 3. In 2002 and 2010, the DG market potentials are the same for both Scenario 2 and Scenario 3.
- Statewide NO_X emissions are not significantly different between Scenarios 2 and 3, even though the allowable NO_X levels of Scenario 2 are more restrictive than for Scenario 3. For example, in the Base Case in 2002 and 2010, estimated NO_X emissions are the same for both scenarios. In 2006, estimated NO_X emissions are 5,890 ton/yr under Scenario 2, and 6,287 ton/yr under Scenario 3.
- If new, low-NO_X technologies such as advanced microturbines and fuel cells are not economically feasible or cannot cost-effectively meet the NO_X targets before 2006 and 2010, the DG markets in 2006 will be reduced from 14,655 MW to 12,774 MW in Scenario 1; from 9,218 MW to 6,323 MW in Scenario 2; and from 14,655 MW to 11,761 MW in Scenario 3. In 2010 with no microturbine, DG markets drop from 19,619 MW (all scenarios) to 15,134 MW in Scenario 1 and 14,602 MW in both Scenarios 2 and 3. Assuming no advanced microturbine or fuel cell, these markets drop in 2010 to 12,815 MW in Scenario 1, 10,970 MW in Scenario 2, and 11,780 MW in Scenario 3.
- Also, if advanced microturbine and fuel cell technologies do not become available, NO_X emissions could increase in 2006 from 6,790 ton/yr to 9,204 ton/yr in Scenario 1; from 5,890 ton/yr to 7,080 ton/yr in Scenario 2; and from 6,287 ton/yr to 7,477

ton/yr in Scenario 3. In 2010 with no microturbine, NO_X emissions could increase from 3,866 ton/yr (all scenarios) to 5,676 ton/yr in Scenario 1 and to 4,436 ton/yr in both Scenarios 2 and 3. Assuming no advanced microturbine or fuel cell, NO_X emissions in 2010 could increase to 9,263 ton/yr in Scenario 1, 7,296 ton/yr in Scenario 2, and 7,526 ton/yr in Scenario 3.

Market, Applications and Technology Insights

- The market potential for DG in Texas appears to be substantial.
- Five DG market applications appear to be economically feasible in all three years studied: Small CHP, Large CHP, Demand Reduction, Oilfield Gas Utilization and Landfill Gas Utilization.
- The Standby Generation application was not economically feasible in any of the years studied.
- The Reliability Enhancement application was cost-effective only in the West Texas zone, with a 7% market share in all years and scenarios.
- The On-Site Power application was cost-effective only in 2010, with the fuel cell capturing 8% market share in all zones and scenarios.
- Diverse distributed generation technologies appear to capture the market depending on variables such as application, emissions limits in various Texas locales, and technology maturity.

Research Agenda Implications

- Improving the DG technologies (e.g., lower cost, higher efficiency and reduced NO_X emissions) is just as effective at lowering NO_X levels in Texas as lowering the allowable NO_X levels through the permitting process.
- Texas can make the NO_X standard for distributed generation less restrictive if it can safely assume that advanced microturbines will be cost-effective in 2006, and that advanced fuel cells will be cost-effective in 2010. This assumption will depend upon the cost and performance advances expected from manufacturer R&D efforts being achieved as predicted.
- Reducing DG costs (e.g., capital and interconnection costs, heat rate, O&M) will accelerate market entry, especially for the more expensive, lower-NO_X technologies.

Issues That Could Affect the Accuracy of Study Results

In addition to the potential uncertainty in advanced microturbines and fuel cells alluded to above, other factors could play a significant role in affecting study results, if variations were to occur in those parameters. Some of these include:

- Uncertainty in the cost and performance data for all technologies, such as heat rate, capital and O&M costs, and in the ability to achieve expected NO_X levels, especially for engines in future years.
- Fuel and electricity price variability.
- Financial parameters assumed, such as fixed charge rate (FCR).
- Assumption that multiple DGs could be aggregated to meet an application size with no additional increase in costs: for example, two 500 kW engines installed for a 1 MW application are assumed to cost twice what a single engine would cost. Installed cost assumptions would change if additional costs would be incurred in such application schemes, such as additional engineering, piping and wiring, etc.
- Percentages assumed for load in play.

1. Introduction and Overview

Background

The potential exists for distributed generation (DG) to serve a growing portion of the needs of electricity users in the deregulated electricity marketplace in Texas. For this study DG is defined as generation with nameplate output rating of no more than 10 MW, and connected to the electric distribution system. If DG is used extensively, then the aggregate emissions of oxides of nitrogen (NO_X) from DG in Texas could be significant.

Objective

The objective of this study is to provide an estimate of the potential emissions of NO_X from cost-effective DG for the years 2002, 2006, and 2010 for the entire state of Texas, and for the evaluation zones of West Texas, Dallas – Fort Worth (DFW), Houston – Galveston (HGA), and the rest of East Texas, given various possible maximum allowable NO_X emission levels.

Approach

Estimates are made of the potential amount of NO_X emissions that could occur due to cost-effective use of DG to serve load in Texas for the three discrete years of 2002, 2006 and 2010. These estimates are made individually for the aforementioned evaluation zones, and collectively for the entire state of Texas, given three scenarios of varying levels of allowable NO_X emissions.

The DG technologies considered as candidates for applications in Texas include: microturbines, combustion turbines, natural gas fired engines, diesel engines and fuel cells. The distributed power applications for which they are considered in this study are standby generator activation, reliability enhancement, on-site power production, combined heat and power (CHP, classified as both small and large), demand charge reduction, oilfield/flare gas utilization, and landfill gas utilization.

The four fundamental calculations required for NO_X emissions estimates are:

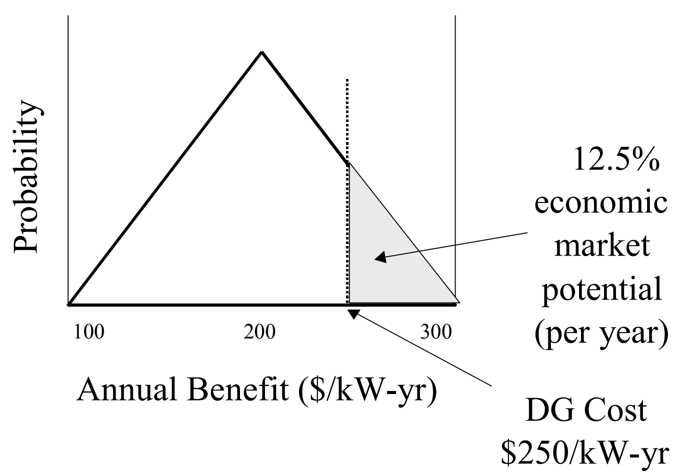
1. technical market potential for DG use for the various applications considered (MW in a given year) and the portion of technical potential that is “in play,”
2. economic benefits and costs associated with DG use for the various applications considered ($/year),
3. economic market potential for DG use for the various applications considered, (MW in a given year), and
4. total annual NO_X emissions expected if all application-specific cost-competitive distributed generation is used (tons per year).

The first step in the analysis is to estimate application-specific technical market potential. The result, expressed in units of megawatts (MW), is the amount of electric load for which DGs are technically feasible. Next, application-specific "load in play" is estimated; that is the portion of technical potential that may actually be served by DGs, given what would generically be referred to as institutional constraints.

The next step involves making estimates of the benefits and the costs associated with application-specific DG use. Benefits are primarily defined as costs and charges that can be avoided if a DG is used, such as electric energy purchases, electric demand charges, and reliability and power quality (PQ) improvements. In some cases, it may also be possible to sell excess electricity to the grid; the resultant revenue stream would be added to the aforementioned avoided costs to determine total benefits for DG use.

Estimates are calculated both for the "average" benefits for a given application, and for the variation of those benefits, e.g., variations from site to site and among customer classes. The result is an application-specific triangular distribution of benefits. This is shown graphically in Figure 1.

Figure 1. Example: Annual Benefits, Cost, and Economic Market Potential for DG Use



DG cost is defined as the total cost to own and to operate a DG, including fuel cost, plant financing charges, operations and maintenance, etc. In the example in Figure 1, the annual DG cost indicated is $250/kW-yr. The percentage of the total market for which DG is more cost-effective than the alternatives is the economic market potential. In the example shown, this is 12.5% of the load in play.

To develop DG costs, currently available (2002) cost and performance data were gathered from leading manufacturers of reciprocating engines, microturbines, combustion turbines, and fuel cells. In addition, manufacturers were asked to provide best estimates of technology data for the years 2006 and 2010. The cost and performance parameters associated with NO_X controls required to meet the scenario emissions limits were critical items.

Key data parameters provided were:

- plant installed cost ($/kW)
- fuel efficiency (BTU/kWh, high heat rate)
- variable operations and maintenance cost ($/kWh)
- NO_X emission factors (lb/MWh)
- the type of NO_X emissions control technologies used

Complete technology details are discussed in Section 3 of this report.

The third step in the analysis process involves calculating economic market potential for a given DG, for a given application. The annual cost for the DG in $/kW-yr is calculated based on the factors enumerated above, and this cost is compared to the spread of benefits that would accrue if the DG were used. As shown in Figure 1, the area under the triangle that falls to the right of the line where DG cost is plotted represents the application-specific economic market percentage. That percentage is multiplied by the load in play to estimate the application-specific economic market potential in units of MW of load.

Finally, the total NO_X emissions from all cost-competitive DGs for a given year were estimated, given the economic market potential in MW, emission factors in lb/MWh of NO_X for competitive DGs, and the number of cost-effective hours per year of operation (application-specific). The calculation is as follows:

$$\text{Ton/Year } NO_X = \text{MW} * \text{Hour/Year of DG Operation} * \text{DG } NO_X \text{ Emission Factor (lb/MWh)} \div 2{,}000 \text{ lb/ton}$$

Applications

Applications evaluated for this study were chosen and refined in collaboration with study sponsors, based on the following criteria:

1. they are likely to materialize,
2. the benefits from DG use are significant, and
3. there is a large market potential (MW of deployment and hours of use) such that a significant amount of NO_X could be emitted.

A listing of the applications is provided in Table 1.

Also shown in Table 1 are key application-specific data. Application-specific annual hours of operation range from a low of 10 for the reliability enhancement application, to a high of 8,760 for landfill gas and oilfield gas utilization. Typical loads served by the DG range from 200 kW in the Standby Generation application to 5,000 kW for the Large CHP application.

Table 1 includes the mid point and the spread of the monetary benefits associated with DG use for each application. The resulting range of benefits, the Market Value Range, is also given. Benefits are expressed in units of $/kW of DG capacity, per year ($/kW-yr).

Table 1. DG Applications Summary

	DG		Benefits		Market Value Range
Application	**Operation hr/yr**	**Load Served kW**	**Mid Point $/kW-yr**	**Spread $/kW-yr**	**$/kW-yr**
Standby Generator Activation	200	1,000	20.0	4.0	18 - 22
Reliability Enhancement	10	200	45.0	30.0	30 - 60
On-Site Power Production	6,000	1,000	293.7	136.2	226 - 362
Small CHP	6,000	1,000	293.7*	136.2*	226 - 362
Large CHP	6,000	5,000	293.7*	136.2*	226 - 362
Demand Charge Reduction	600	1,000	143.7	82.2	103 - 185
Oilfield Gas Utilization	8,760	200	331.5	133.8	265 - 398
Landfill Gas Utilization	8,760	1,000	272.8	89.6	228 - 318

* Electricity only; does not include heat benefit.

Application Descriptions

Standby Generator Activation

This application involves dispatch by the electric utility of new <u>user-owned</u>, natural gas fueled backup generation for 200 hours per year. Owners are those customers who install on-site generation primarily for emergency back-up, but who can offset their costs by allowing the utility to use their DGs to satisfy the utility's need for peaking capacity – some combination of generation, transmission, and distribution – and/or on-peak energy needs.

Reliability Enhancement

DG located at commercial and industrial sites provides backup power when utility electric service fails. Utility service is assumed to be interrupted for 3 hours per year. In addition, maintenance and testing requires about 7 additional hours per year, so that the DG is assumed to operate for a total of ten hours per year. Typical generator size (kW rating) is assumed to be 200 kW.

On-Site Power Production

Commercial and industrial customers reduce their overall electricity bills by using DG to generate some or all of their own power. The annual number of full-load hours of operation for the DG are assumed to be 6,000 hours per year. Typical loads served are assumed to be 1 MW.

Combined Heat & Power (CHP): Small and Large

For this study, combined heat and power (CHP) involves commercial and industrial users with significant compatible heat and electricity loads. The DG simultaneously generates thermal and electrical energy. In many situations CHP can reduce the overall energy bill for the user. The CHP plant operates for an annual full load equivalent of 6,000 hours per year.

Small CHP is for situations requiring less than 1 MW of electric generation. **Large CHP** plants are assumed to have output capacity averaging 5 MW.

Demand Charge Reduction

DG is used by customers to limit their peak electric demand, thereby avoiding high demand charges by the utility. Application size is 1 MW, for 600 hours per year, depending on the most common commercial or industrial tariff structure in Texas that includes a substantial demand charge.

Oil Field/Flare Gas Utilization

DG is installed to burn oilfield gas that would otherwise be flared off, providing electric power and reduced emissions. Application size is assumed to be 200 kW, for 8760 hours per year; energy generated is used to power compressors or other continuous on-site loads, such as water pumping.

Landfill Gas Utilization

DG is installed at a landfill to burn the methane produced. Application size is assumed to be 1 MW, 8760 hours per year; power is sold to the grid or to nearby customers.

Detailed descriptions of the Applications are provided in Section 2.

Evaluation Zones

Separate emission standards apply for the East and the West regions of the state, with the regions defined geographically in Texas air regulation 30 TAC Chapter 117. The East Texas Region includes all counties traversed by or east of Interstate Highway 35 north of San Antonio, or traversed by or east of Interstate Highway 37 south of San Antonio, and also including Bexar, Bosque, Coryell, Hood, Parker, Somervell and Wise Counties. The West Texas Region comprises all counties not contained in the East Texas Region.

For this study, the West Texas Region is evaluated as a single zone. The East Texas Region is evaluated as three separate zones: Dallas/Forth Worth, Houston/Galveston, and Rest-of-East.

The Dallas/Forth Worth zone (abbreviated DFW) is defined as the Dallas/Fort Worth ozone nonattainment area, as per Texas air regulation 30 TAC Chapter 117. The DFW zone encompasses Collin, Dallas, Denton, and Tarrant counties.

The Houston/Galveston zone (HGA) is defined as the Houston/Galveston ozone nonattainment area, as per Texas air regulation 30 TAC Chapter 117. The HGA zone encompasses Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery and Waller counties.

The Rest-of-the-East zone includes all counties in the East Texas Region not included in the DFW or HGA zones.

Emissions Scenarios

Table 2 summarizes the NO_X emissions limits defined for the scenarios, by region. Data were supplied by the Texas Natural Resource Conservation Commission (TNRCC).

Emission Scenario 1 represents NO_X emission standards contained in Air Quality Standard Permit for Electric Generating Units (Standard Permit) effective June 1, 2001 for electric generating units installed prior to January 1, 2005. Emission Scenario 2 represents NO_X emission standards contained in the Standard Permit for electric generating units installed on or after January 1, 2005. Emission Scenario 3 represents alternative NO_X emission standards not contained in the Standard Permit. Detailed descriptions of the scenarios are provided in Section 4.

Table 2. Scenarios and Emission Limits, lb/MWh

	East Texas			West Texas		
Scenario	≤300 hr/yr	>300 hr/yr	Oilfield/ Landfill Gas	≤300 hr/yr	>300 hr/yr	Oilfield/ Landfill Gas
1	1.65	0.47	1.77	21.0	3.11	3.11
2	0.47	0.14	1.77	21.0	3.11	3.11
3	0.47	0.23	1.77	21.0	3.11	3.11

Market Technical Potential and Electric Demand

Statewide loads assumed for the respective evaluation zones are shown in Table 3. Details about demand estimates for Texas and for zones are given in Appendix A.

Table 4 shows how loads are allocated among the key load sectors: residential, commercial, and industrial. Load data for this study were provided by the Public Utility Commission of Texas (PUCT).

Table 3. 2002 Coincident Peak Load Estimate (MW) and Percentage by Zone

Zone	2002	Portion
DFW	16,159	24%
HGA	16,629	24%
Rest-of-East	23,411	34%
West	12,259	18%
All of Texas	68,458	

Table 4. 2002 Customer Sector Loads (MW)

Sector	2002	Portion
Residential	20,537	30%
Commercial	20,537	30%
Industrial	27,383	40%
Total	68,458	100%

2. Distributed Generation Applications

Application Benefits Overview

Benefits are the elements of the total monetary value associated with DG operation. The benefits that apply vary among applications, but generally include revenues or avoided costs associated with:

- electric energy (kWh or MWh) generated
- power/capacity (kW or MW) provided
- electric service reliability enhancement
- ancillary services provided
- (for CHP applications) the heat recouped from the generator as it offsets the need to purchase fuel to make heat directly.

Electric Energy Benefit

The annual financial benefit associated with electric energy from DGs depends on energy prices (¢/kWh) and hours of operation, both of which are application-specific.

For this study, the Public Utility Commission of Texas (PUCT) provided information on energy prices in Texas from energy tariffs. Based on this data and its proprietary knowledge of energy markets, Distributed Utility Associates developed price estimates for its economic models and presented them to the project team for review and consensus approval. The resulting values of <u>average</u> electric energy prices are assumed to be 3.0 ¢/kWh, with a range of 2.5 to 3.5 ¢/kWh. Typical <u>on-peak</u> electric energy prices are assumed to be 5.0 ¢/kWh on average and to range from 4.5 to 5.5 ¢/kWh [Ref. 10, 11].

Capacity Benefit

For energy end-users the annual financial benefit associated with electric capacity provided by DGs depends upon the ability to avoid demand charges assessed by the utility. Demand charges are a function of the peak power demand from a customer in a given month, and are assessed in dollars per kW per month ($/kW-mo). Avoidable demand charges are assumed to range from 4.0 to 7.7 $/kW-mo, based on a survey of expected demand charges within Texas, provided by the PUCT. Typically, peak demand hours occur on Monday through Friday, 12 pm to 6 pm, June through September.

Demand charges do not vary between months when electric demand is high and those when demand is lower as much as they have in the past. This effectively reduces the financial incentive to reduce demand during periods of peak demand on the utility system.

Reliability Benefit

If DG reduces the likelihood that electric service is interrupted to commercial or industrial loads, then the DG may provide a reliability benefit. This benefit comprises the financial losses that are avoided by operating the DG when the grid service is not available.

The benefits of reliability enhancement were based on utility industry information in a paper authored by R. Pupp and C-K Woo [Ref. 8]. The monetary impacts of unexpected outages for industrial end-users range from 10 to 70 $/kWh, and for commercial end-users the range is 20 to 50 $/kWh; this is the value ascribed to unserved energy, and is also referred to as value of service (VOS). For this study, a conservative assumption was used: for commercial and industrial customers the assumed range of VOS is assumed to be 10 to 20 $/kWh [Ref. 10, 11].

Based upon information provided by the PUCT and on DUA's proprietary industry information, an estimate of the average hours of service interruption per customer of three hours per year was developed [Ref. 10, 11]. Therefore, the total VOS figure for the reliability benefit is 30 to 60 $/kW-year.

Ancillary Services Benefit

Ancillary services include maintaining the balance between electric load and electric supply by generation dispatch, maintaining system voltages and frequency, and other attributes of the bulk power system that relate to system reliability, security and integrity. These functions have historically been provided by central utility generation, and there does not yet exist a formal marketplace for ancillary services that could be provided by DGs. However, it can be argued that, depending on how and when DGs operate, and depending on how much DG capacity is in use, DGs could indeed provide these services. At minimum, by providing electric energy on-site, load on the grid is reduced, thus reducing the need for ancillary services from central generation.

While there is some precedent in recent energy markets as to the potential value of ancillary services on a capacity basis, the actual monetary values that have been seen in these markets range widely due to time- and location-specific factors. For this study, ancillary benefits associated with DG use are assumed to be worth 10 $/kW-yr, with a range of 9 to 11 $/kW-yr. This figure was arrived at in consultation with a knowledgeable industry expert, and is deemed to be a reasonable estimate based on experience in the industry to date [Ref. 9].

Market Value Range

The range of market value for a given application is the sum of all applicable benefits. Market value ranges are expressed in $/kW-yr.

Application-Specific Market Size – Load In Play

Load in play is the term used to identify the maximum possible load within Texas that could be served by DG, for a given application. It is a function of what is often referred to as technical potential, the total amount of load that exists within a given application. For this study, the maximum technical potential possible for an application is the total commercial and industrial sector peak load of 47,200 MW. Table 5 contains a summary of the technical market potential for DG by application and evaluation zone.

Table 5. DG Technical Market Potential by Zones, MW

		Technical Market Potential (MW of Load), by Zone				
	Application	Dallas-Fort Worth (DFW)	Houston-Galveston (HGA)	Rest-of-East	West	**TOTAL**
1	**Standby Generator Activation**	23.6	24.3	34.2	17.9	**100**
2	**Reliability Enhancement**	2,262	2,328	3,278	1,716	**9,584**
3	**Power Production for On-site Use**	2,828	2,910	4,097	2,145	**11,980**
4	**CHP-small**	665	1,157	964	505	**3,290**
5	**CHP-large**	757	1,316	1,097	575	**3,745**
6	**Demand Charge Reduction**	2,828	2,910	4,097	2,145	**11,980**
7	**Off-grid Gas/Oil Field Fuel Utilization**	0.1	5.9	81.2	278	**365**
8	**Landfill Gas Utilization**	50.4	48.7	105.1	55	**259**

Load in play will be some fraction of the total technical potential in a given application, with various factors to consider. If only *some* potential DG users are likely to adopt technically viable DGs, then technical potential is scaled down accordingly to estimate load in play. For example, experience has shown that, even if DG appears to be cost-effective, some potential users are not predisposed to adopt DG. DG may be considered a technological risk or an uncertain investment compared to other investment opportunities, financing may not be easy to obtain, or the user's business may be in a contraction phase.

A recent industry survey reported that 2% of commercial and industrial customers said they were "extremely interested" in on-site power generation, 12% said they were "very interested," and 26% were "somewhat interested" [Ref. 14]. Adding the first two categories plus half of the "somewhat interested" totals 27%, meaning that in general approximately 1 out of 4 potential users would consider installing DG.

In the case of CHP, the technical potential is limited by the number of locations that have thermal loads that are highly coincident with electricity use, such coincidence being critical to the cost-effectiveness of CHP.

The actual amounts of load in play determined for the individual applications are explained individually in the next section.

Application Specifications

The application specifications were developed in the context of ongoing discussions with project participants and in project meetings [Ref. 10, 11]. Applications were defined according to a consensus of what and will be typical industry circumstances in the Texas electric markets.

Standby Generator Activation

Description

This application involves dispatch by the electric utility of new, user-owned, natural gas fueled backup generation for 200 hours per year. Owners are those customers who have installed on-site generation initially or primarily for emergency back-up, but who can offset their costs by allowing the utility to use their DGs to satisfy the utility's need for generation, transmission or distribution capacity, or for on-peak energy supply.

In general this is a somewhat rare practice and may not happen at all in Texas. However, it is conceivable that what might generically be classified as "distributed resources aggregators" will exist who could combine individual DGs into dispatchable blocks of generation resources. In this case the utility would pay the aggregator, who in turn pays the DG owners and coordinates the dispatch of the customer DGs according to utility requirements. This situation was not considered for this evaluation.

Benefits

For the utility, dispatching the customer's DG offsets the need for energy or capacity, whether provided by internal resources or via purchases from third parties. For the DG owner, if payments offered by the utility for dispatch of the onsite generator exceed the marginal cost to operate the generator plus transaction costs and "hassle factor," then owners might be inclined to accept the offer.

Benefits include on-peak energy and the ancillary services credit of 9 to 11 $/kW-year. The DG is assumed to operate for 200 hours per year during periods of peak demand. At 5 ¢/kWh for on-peak energy (ranging from 4.5 - 5.5 ¢/kWh throughout Texas) the value amounts to 10 $/kW-yr. As a result, total benefits for DG use for this application are assumed to be 20 $/kW-yr on average, and the market value range is 18 to 22 $/kW-yr.

Load In Play

For this application no specific data could be found that would provide basis for a rigorous estimate of the load in play. A placeholder of 100 MW was used, after consultation with the project review team [Ref. 10, 11].

Reliability Enhancement

Description

DG located at commercial and industrial sites provides backup power when utility electric service fails. Utility service is assumed to be interrupted for 3 hours per year. Maintenance and testing to make sure the generator will run when needed is assumed to require an additional 7 hours of operation per year. Therefore, total run hours for this application are 10 hours per year. Typical generator size (kW rating) is assumed to be 200 kW.

Benefits

The primary purpose of using DG for reliability enhancement is to avoid financial losses associated with outages. A common metric used to represent this benefit is value of service (VOS). The VOS comprises the economic impacts incurred by customers experiencing outages [Ref. 8]. For this study, the range of value of service for commercial and industrial customers is assumed to be 10 to 20 $/kWh, for 3 hours per year, for a market value range of 30 to 60 $/kW-yr [Ref. 10, 11].

Load In Play

In consultation with project participants during project review meetings [Ref. 10 and 11] it was assumed that 20% of the total commercial and industrial loads (47.9 GW) are in play for this application, for a total of 9,584 MW. [See also Ref. 14.]

On-Site Power Production

Description

For this application, commercial and industrial customers use DG to reduce their overall electricity bills. The annual full load hours of operation for the DG are assumed to be 6,000 hours per year. Typical loads served are assumed to be 1 MW.

Benefits

Because the DG operates for so many hours per year in this application, the benefits that accrue can be substantial. The most significant benefit is avoided charges for electric energy from the grid. Other benefits include demand charge reductions and enhanced reliability. It is also assumed that the plant provides ancillary services to the grid and that the DG owner-operator receives the full ancillary services credit.

The market value range for this application is 226 to 362 $/kW-yr.

Load In Play

It was assumed that 25% of the total commercial and industrial load of 47.9 GW is in play for this application, for a total of 11,980 MW [Ref. 10, 11, 14].

Combined Heat and Power (CHP)

For this study, combined heat and power (CHP) involves commercial and industrial users with significant compatible heat and electricity loads. The DG simultaneously generates thermal and electrical energy. In many situations CHP can reduce the overall energy bill for the user. The CHP plant operates for an annual full load equivalent of 6,000 hours per year.

Small CHP is for situations requiring less than 1 MW of electric generation. **Large CHP** plants are assumed to have output capacity averaging 5 MW.

Benefits

The most significant benefit is the avoided charges for electric energy from the grid. Other benefits include demand charge reductions and enhanced reliability and ancillary services.

The Market Value Range for electricity only is 226 to 362 $/kW-yr.

The value of the heat depends on several criteria, primarily:

1. the price for fuel that would be used if CHP heat were not available,
2. the fuel efficiency of the heat production process (e.g., gas fueled boiler) that the CHP replaces, and
3. the characteristics of the DG prime mover, most importantly its operating temperature and available heat per kWh.

Load In Play

Technical potential for CHP in Texas was estimated based on information published by the American Council for an Energy-Efficient Environment (ACEEE), www.aceee.org. As a result of discussions at project review meetings with TNRCC personnel [Ref. 10 and 11] it was agreed that these data would be acceptable for estimating CHP potential in Texas.

Detailed CHP market potential estimates by CHP plant size for specific end-use categories were provided for the HGA evaluation zone (i.e., the Houston/ Galveston ozone nonattainment area). Table 4 shows the breakdown by percentage of load per customer sector, and Table 5 shows total MW of potential for commercial CHP applications in the HGA zone. The resultant CHP market potential in the HGA zone is shown in Table 6.

These CHP market potential estimates for the HGA zone were scaled up to estimate statewide values using the ratio of the statewide totals to the Houston-Galveston totals, as shown in Table 6.

The portion of the statewide technical potential that is not within the HGA zone is assumed to be divided evenly among the other three zones.

For small CHP the technical potential assumed in HGA was 2,313 MW. Further it is assumed that 50% of that potential [Ref. 10 and 11], or 1,157 MW, is in play. For the entire state, the technical potential is 6,580 MW, 50% of which is 3,290 MW in play.

Table 6. CHP Market Potential (MW) – State/ HGA Ratio

Region	Commercial	Industrial
Texas	7,330	7,872
HGA	2,452	1,824
Ratio	2.99	4.37

For large CHP the technical potential in HGA is assumed to be 2,632 MW. Further it is assumed that 50% of that potential [Ref. 10 and 11], or 1,316 MW is in play. For the entire state, the potential is 7,490 MW. Of that, 3,745 MW (50% of the total) was assumed to be in play.

Demand Charge Reduction

Description

Commercial and industrial customers with 1 MW of load install DG primarily to reduce monthly demand charges. Demand charges are a function of the peak power demand from a customer in a given month, and are assessed in dollars per kW per month ($/kW-mo). It is assumed that the DG operates for a total of 600 hours per year during peak demand periods, to avoid the demand charges that would otherwise be applied.

In the time since this application was defined, deregulation has had a notable effect on electricity pricing in Texas that may affect the value proposition of this application.

Benefits

For this application, total benefits include reduced overall electricity cost associated with demand charges, electric energy purchases during periods of peak demand on the utility grid (600 hours per year), and credits for reliability and ancillary services.

The Market Value Range for this application is 103 – 185 $/kW-year.

Issue

It should be noted that newer electric rate structures may make it more difficult for customers to benefit from reducing loads during peak demand periods than in the past. To the extent that newer rates do not differentiate between peak load and average load, electric service end-users have decreased monetary incentive to reduce peak demand.

For example, demand reduction is relatively less attractive if demand charges apply in all months and if those demand charges are based on average load rather than peak load.

Also, without time-of-use energy pricing there is reduced benefit associated with avoiding on-peak energy use.

Load In Play

Technical potential for demand charge reduction comprises all commercial and industrial loads. Load in play is assumed to be 25% of each, as shown in Table 7 [Ref. 10, 11, 14].

Table 7. Demand Charge Reduction Application Load In Play

Sector	Technical Potential (GW)	Portion in Play	Load in Play (MW)
Commercial	20.5	25%	5,125
Industrial	27.4	25%	6,850
Total	47.9	25%	11,975

Oil Field/Flare Gas Fueled Generation

Description

DG installed to burn oilfield gas that would otherwise be flared off, providing electric power and reduced emissions. Application size is assumed to be 200 kW, for 8760 hours per year; energy generated is used to power compressors or other continuous on-site loads such as water pumping or gas compressors. Fuel is assumed to cost 50 ¢/MMBtu [Ref. 1].

Benefits

Benefits associated with this application include the financial value of the electric energy, reduced demand charges, and an ancillary services credit.

The Market Value Range for this application is 265 – 398 $/kW-yr.

Load In Play

Table 8 indicates the technical potential in each zone. These data were developed based on an assessment of data from the Texas Railroad Commission about both methane gas associated with oil production that is currently vented or flared and county-by-county distribution of producing oil wells. The amount of gas vented or flared was allocated to zones based on the number of operating wells in each respective zone.

Landfill Gas Fueled Generation

Description

DG whose electric power generation capacity is 1 MW, generating electricity 8,760 hours per year using landfill gas for fuel. It is assumed that power not needed for on-site loads can be sold via the grid, either to the local utility or to the greater electricity marketplace.

Table 8. Oil Field Flare Gas Technical Potential

Zone	Market Potential, MW
DFW	0.1
HGA	5.9
Rest-of-East	81.2
West	278.3
Total	**365.5**

Landfill gas is assumed to cost 40 ¢/MMBtu [Ref. 2].

Benefits

Benefits associated with this application include the value of the electric energy generated (based on the annual average energy price) plus the ancillary services credit.

The Market Value Range for this application is 228 – 318 $/kW-yr.

Load In Play

Table 9 indicates the technical potential in each zone. Load in play was estimated based on data from the U.S. EPA's Landfill Methane Outreach Program (LMOP) [Ref. 3]. That information includes an inventory of sites, by city, including gas production rates. Using that data, DUA estimates that there is a technical potential of about 260 MW of generation from landfill gas with an average output of about 4 MW per site.

Table 9. Landfill Gas Technical Potential

Zone	Market Potential, MW
DFW	50.4
HGA	48.7
Rest-of-East	105.1
West	55.0
Total	**259.2**

3. Distributed Generation Technology Characterization

Overview

The purpose of this part of the project was to collect the most current and accurate cost and performance data for all commercially available distributed generation (DG) that would qualify for inclusion in the Texas air emissions scenarios as defined by the TNRCC. Candidate technologies included:

- fuel cells
- microturbines
- combustion turbines
- natural gas engines
- diesel engines

For each technology description, the key data points are:

- manufacturer and model designation
- size or size range (kW)
- year
- capital cost ($/kW)
- installed cost ($/kW), all-inclusive: labor, materials, engineering, overhead, etc.
- cogeneration (CHP) configuration or not
- heat rate (Btu/kWh), high heat value (HHV)
- variable O&M costs ($/kWh)
- fixed O&M costs ($/kW-yr)
- NO_X emissions rate, primarily lb/MWh; for engines, grams per horsepower-hour (g/hp-hr) are provided, and for turbines, parts per million (ppm).
- method(s) of attaining the stated NO_X emissions rate, e.g., low- NO_X combustion, selective catalytic reduction, etc.

The complete technology data sets are given in the tables in Appendix B.

Selection Parameters

Scenarios

The Texas scenarios examine potential NO_X emissions due to economic market penetration of DG in three discrete years: 2002, 2006 and 2010. For each year, the scenarios looked at different NO_X limits, hours of operation, and regions of Texas (please see Section 4 for complete details of the scenarios). For 2002 all currently available DG vendor offerings within the selection parameter ranges were included. For 2006 and

2010, vendors were asked to provide data on any technologies, fitting the application specifications and meeting the scenario NO_X limits, that had a reasonable probability of being available to the market in those years. This included new models currently under development or expected to be developed, as well as updated versions of existing models (including cost changes, efficiency improvements, etc.).

Application-Specific Requirements

The technologies that were included were chosen based on the eight applications defined for this study (see Section 2 for definitions and specifications); these applications provided the parameters of DG size, operating hours, and fuel requirements. Vendors supplied data that were specific to these applications. DG size was a concern; any DGs smaller than the application size were included under the assumption that multiple units could be aggregated to fit the application. Conversely, DGs that were more than 50% larger than the specified application size were not considered economically feasible for that application.

Fuel

Natural gas was assumed as the primary fuel for distributed generation [Ref. 12]. Exceptions were:

- oilfield gas (flare gas) applications [Ref. 1],
- landfill gas (methane) applications [Ref. 2], and
- diesel fuel for diesel engines in all applications <u>except</u> oilfield gas and landfill gas utilization [Ref. 13].

Fuel prices assumed for this study are given in Table 10.

Table 10. Fuel Prices Assumed for Distributed Generation

Fuel Type	Fuel Price ($/MMBtu), HHV		
	2002	2006	2010
Commercial Natural Gas	5.75	5.75	5.75
Industrial & Large Commercial Natural Gas	4.92	4.92	4.92
Diesel	9	9	9
Oilfield/Flare Gas	0.5	0.5	0.5
Landfill Gas	0.4	0.4	0.4

NO_X Emissions

The scenarios are differentiated by (among other factors) NO_X emission levels allowed, in lb/MWh. Cost and performance data for a DG technology are a function of the equipment required to meet a given level of NO_X. That is, as the allowable NO_X limit becomes lower, it will generally be more expensive to meet that limit, both in terms of capital cost of equipment and maintenance requirements. Where additional emission controls are added to a base technology to enable it to meet a limit, those control methods are noted in the technology tables.

Notes on the Technologies

Fuel Cells

Currently the fuel cell that is most widely available on a commercial basis is the 200 kW ONSI (now United Technologies Corp., or UTC) phosphoric-acid fuel cell. It is also the only fuel cell that has been installed to date in a combined heat and power (CHP) application, and for which realistic CHP data is available.

The Ballard proton exchange membrane (PEM) and FCEL (formerly Fuel Cell Energy) molten carbonate fuel cells are just coming on the market. These vendors all project some cost reductions over time, as production and market penetration increase and the technologies mature. The PEM fuel cell, because of its much lower operating temperature, does not lend itself to CHP applications as readily as phosphoric-acid and molten carbonate fuel cell technologies, although vendors, mindful of the importance of overall process economics, are working on systems that will make use of the waste heat.

Siemens expects to leverage the transportation sector's development efforts for the solid oxide fuel cell in order to meet their price and efficiency targets for 2006 and 2010. UTC expressed similar confidence in the industry's ability to address the key technical issues in order to bring down fuel cell capital costs by 2010.

Fuel cells are modular, i.e., units can be "stacked" to build up total capacity (a process sometimes termed "aggregation") as the application requires, assuming space is not a limitation.

Fixed O&M costs for fuel cells represent labor and materials for yearly inspections, testing and routine maintenance. Variable O&M represents costs that accrue with operating hours for replacement of the fuel cell stacks.

Because fuel cells use a chemical conversion process rather than combustion, NO_X emissions are virtually nonexistent, being well below the specified emissions limits for all scenarios. The trace amounts of NO_X that do occur are primarily attributable to the fuel reforming process.

All fuel cells are assumed to require a reformer to extract pure hydrogen from the natural gas fuel. The cost and efficiency penalty resulting from the reformer is included in the installed cost and heat rate figures in the tables.

Source: DUA obtained the data for fuel cells from Dr. Susan A. Schoenung, Longitude 122 West, Palo Alto, CA. Dr. Schoenung is a recognized expert in the field of fuel cells, and acquired the data for this report from her vendor and industry sources.

Microturbines

Currently the only microturbine vendor with commercially available and widely used units in the field is Capstone Turbine Corporation. Capstone's base models are 30 kW and 60 kW, both guaranteed to meet 9 parts per million (ppm) NO_X emissions (about 0.5 lb/MWh). Variations on the base models are configured for low or high-pressure gas, landfill gas and flare gas applications, with some slight variations in price and efficiency.

Microturbines are easily aggregated for larger application sizes (space permitting). Capstone has also partnered with vendors of CHP equipment to provide packaged CHP applications designed for its units. Also, in partnership with the U. S. Department of Energy, Capstone is developing a base 60 kW model with a commercialization target of approximately 2004 – 2005; this "research target" model is expected to emit less than 0.07 lb/MWh NO_X, at lower cost and better performance than today's models. This unit is shown for 2006 and 2010.

Source: DUA is indebted to Kevin Duggan of Capstone Turbine Corp., Chatsworth, CA, for providing the microturbine data for this report.

Combustion Turbines (CTs)

Combustion turbines (single-cycle types) are commonly available in the 1 MW to 10 MW sizes. A variety of NO_X control methods can be applied to CTs to enable them to meet various emissions limits in a variety of applications and scenarios. Combustion turbines are widely used in the larger CHP applications.

For the most part, combustion turbine technology is mature, and cost and performance parameters are not expected to change significantly in the near term. The notable exception is the Advanced Turbine System (ATS, which Solar Turbines Corp. is currently developing in partnership with the US DOE). This model, also called the Mercury 50, is expected to be on the market around 2005, to fit in the middle of the CT range (4.2 MW), and to have lower NO_X emissions, greater fuel efficiency and lower capital cost than today's base models.

Source: DUA is grateful to Ralph Ordoñez, Solar Turbines Corp., San Diego, CA, for providing the combustion turbine data for this report.

Natural Gas & Diesel Engines

Currently most commonly available from Caterpillar and Cummins, these internal combustion engines are reliable, relatively inexpensive, and can be fitted with NO_X control methods. However, it is difficult to guarantee that the combination of engine and controls will be able to meet limits in the most extreme NO_X scenarios. Caterpillar did not provide a technology specification below 0.3 lb/MWh, and Cummins did not provide data below 0.2 lb/MWh.

Internal combustion engine technologies are mature and their cost and performance parameters are not expected to change significantly in the near term.

Source: The engine data for this report was provided by Tod Wickersham of the Good Company Associates, Austin, TX, representing both diesel and natural gas engine manufacturers.

Appendix B contains all of the technology data used in this report.

4. NO_X Emissions Scenarios

Overview

For this study the economic viability of DGs is evaluated for scenarios with varying parameters of allowable NO_X emissions, DG applications, duty cycles, regions of the state, and years.

To place these criteria into an organized framework, scenarios were defined: Baseline, Scenario 1 (versions A, B, and C), Scenario 2, and Scenario 3. Criteria that define circumstances are:

1. geographically defined zone (e.g., East Texas, West Texas, etc.),
2. duty cycle (≤ 300 hours per year or > 300 hours per year of operation),
3. application (for oilfield flare gas and landfill gas fueled DGs only).

Maximum allowable DG emission levels, expressed in units of lb/MWh, associated with each scenario are shown in Table 11.

Table 11. Scenario Emission Limits (lb/MWh)

	East Texas			West Texas		
Scenario	≤300 hr/yr	>300 hr/yr	Oilfield/ Landfill Gas	≤300 hr/yr	>300 hr/yr	Oilfield/ Landfill Gas
1	1.65	0.47	1.77	21.0	3.11	3.11
2	0.47	0.14	1.77	21.0	3.11	3.11
3	0.47	0.23	1.77	21.0	3.11	3.11

Scenario 1

Scenario 1 reflects NO_X emission regulations in effect as of June 2001. There are three versions of this scenario, dubbed 1.A, 1.B, and 1.C.

Scenario 1.A applies to DGs used in the evaluation zones in the East Texas Region. Scenario 1.B applies to DGs used in the West Texas Region. Scenario 1.C applies to DGs fueled with oilfield flare gas or landfill gas, with different levels of allowable NO_X emissions in the West Texas and East Texas Regions.

Scenario 1.A

Scenario 1.A applies to DGs operating in the East Texas Region (all three Eastern zones); there are different levels of allowable NO_X emissions for DGs operating less than or equal to 300 hours per year, versus DGs operating more than 300 hours per year.

The purpose of this scenario is to estimate the amounts of NO_X that would be emitted into each of the three Eastern zones (DFW, HGA, Rest-of-the-East) by the end of years 2002, 2006, and 2010, given the following NO_X emission limits:

For DGs operating ≤ 300 hours/year ➔ 1.65 lb/MWh.

For DGs operating > 300 hours/year ➔ 0.47 lb/MWh.

Scenario 1.B

Scenario 1.B applies to DGs operating in the West Texas Region; as in the East Texas Region, there are different levels of allowable NO_X emissions for DGs operating 300 hours per year or less versus DGs operating more than 300 hours per year. Estimated are NO_X emissions into the West Texas airshed by the end of years 2002, 2006, and 2010, given the following NO_X emission limits:

For DGs operating ≤ 300 hours/year ➔ 21.0 lb/MWh.

For DGs operating > 300 hours/year ➔ 3.11 lb/MWh.

Scenario 1.C

Scenario 1.C addresses DGs operated using oilfield flare gas or landfill gas. One level of allowable emissions applies in the East Texas Region and another level applies in West Texas.

The objective for this scenario is to estimate NO_X emissions into each of the three East Texas zones (DFW, HGA, Rest-of-the-East), by cost-effective DGs using oilfield flare gas and landfill gas, for years 2002, 2006, and 2010, given the NO_X emission limit of 1.77 lb/MWh.

In addition, estimates are made of NO_X emitted into the West Texas zone by cost-effective DGs that are fueled by oilfield flare gas and landfill gas, through years 2002, 2006, and 2010, given a NO_X emission limit of 3.11 lb/MWh.

Scenario 2

Scenario 2 represents the most stringent NO_X emission limits in East Texas, especially for DGs operating more than 300 hours per year, and are scheduled to take effect on January 1, 2005. Calculations are made to estimate the number of tons of NO_X that would be emitted into each of the three East Texas evaluation zones (DFW, HGA, Rest-of-the-East) by the end of years 2002, 2006, and 2010, given the following NO_X emission limits:

For DGs operating ≤ 300 hours per year ➔ 0.47 lb/MWh.

For DGs operating > 300 hours per year ➔ 0.14 lb/MWh.

Scenario 3

Scenario 3 represents NO_X emission limits in the East Texas Region that are more stringent than those for Scenario 1, but not as stringent as those in Scenario 2, for DGs operating more than 300 hours per year. Calculations are made to estimate the number of tons of NO_X that would be emitted into each of the three East Texas evaluation zones (DFW, HGA, Rest-of-the-East) by the end of years 2002, 2006, and 2010, given the following NO_X emission limits:

For DGs operating $\leq$ 300 hours per year ➔ 0.47 lb/MWh.

For DGs operating > 300 hours per year ➔ 0.23 lb/MWh.

5. Results

Summary Results

The summary results are presented graphically in bar charts. For example, Figures 2 and 3 are taken from the Base Case. Figure 2 shows economic DG market potential in East Texas, in units of gigawatts (GW, or 1,000 MW). Each year (2002, 2006 and 2010) has results for each of the three emissions scenarios. Figure 3 shows the corresponding NO_X (ton/yr) that could be emitted by the amounts of DG shown in Figure 2.

Figures 4 and 5 show DG market potentials and potential NO_X emissions, respectively, for the Base Case for all of Texas.

Additionally, Appendix C presents the numerical data that underlie the bar charts. For example, Table 12 is taken from Appendix C and shows results for all zones and scenarios in the Base Case for 2002. The tables in Appendix C also provide a more detailed breakdown of the East Texas zone into the Dallas – Fort Worth (DFW), Houston – Galveston (HGA), and Rest-of-the-East subzones. Note that DG market potentials in Appendix C are given in megawatts (MW).

Table 12: Summary Results – Base Case, 2002

2002		West	DFW	HGA	Rest-of-East	East	**All of Texas**
Scenario 1	(MW)	2,858	2,581	2,744	3,852	9,178	**12,036**
	(NOx, ton/yr)	7,463	712	840	2,081	3,634	**11,097**
Scenario 3	(MW)	2,858	170	263	360	793	**3,651**
	(NOx, ton/yr)	7,463	375	459	1,593	2,428	**9,890**
Scenario 2	(MW)	2,858	170	263	360	793	**3,651**
	(NOx, ton/yr)	7,463	375	459	1,593	2,428	**9,890**

Each of the five sensitivity cases studied likewise has two pairs of charts presenting summary results of that case, with numerical data provided in Appendix C. The cases each use the Base Case as a starting point, and vary only one or two parameters. The six cases evaluated for this study were:

1. Base Case: assumes 0.15 fixed charge rate (FCR) for financial calculations. Summary results are presented graphically in Figures 2 – 5.
2. Low Finance Cost: assumes 0.1 FCR (Figures 6 – 9).
3. High Finance Cost: assumes 0.2 FCR (Figures 10 – 13).

Figure 2. Economic Market Potential, Base Case, East Texas

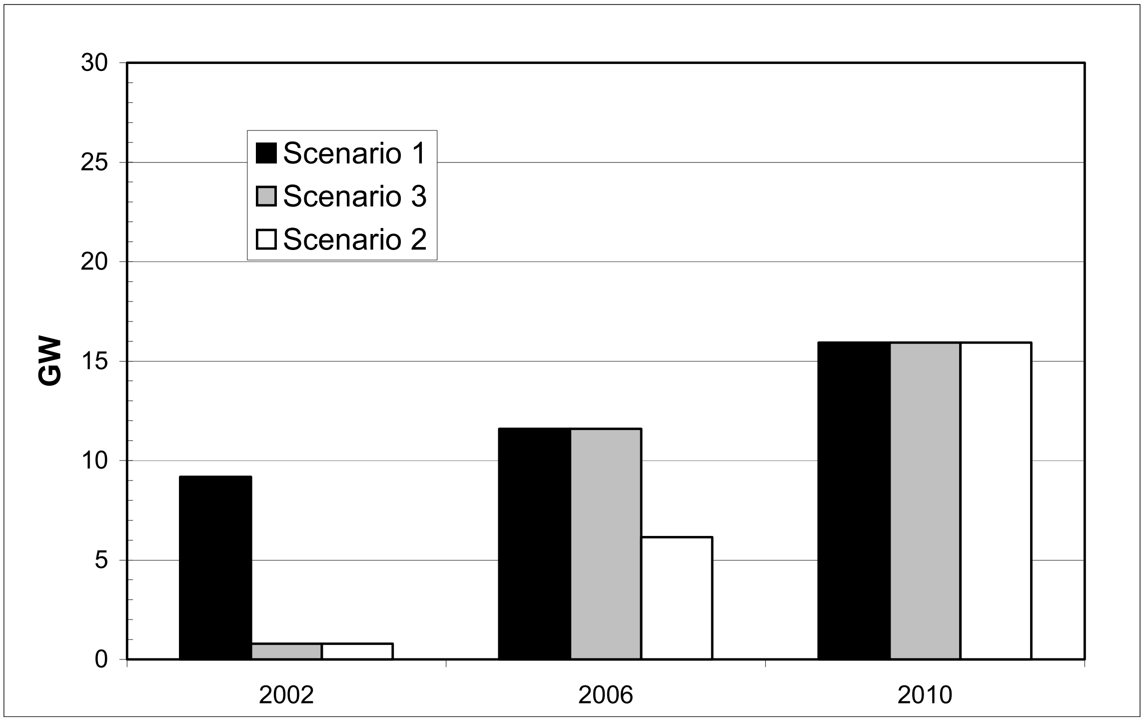


Figure 3. Potential NO_X Emissions, Base Case, East Texas

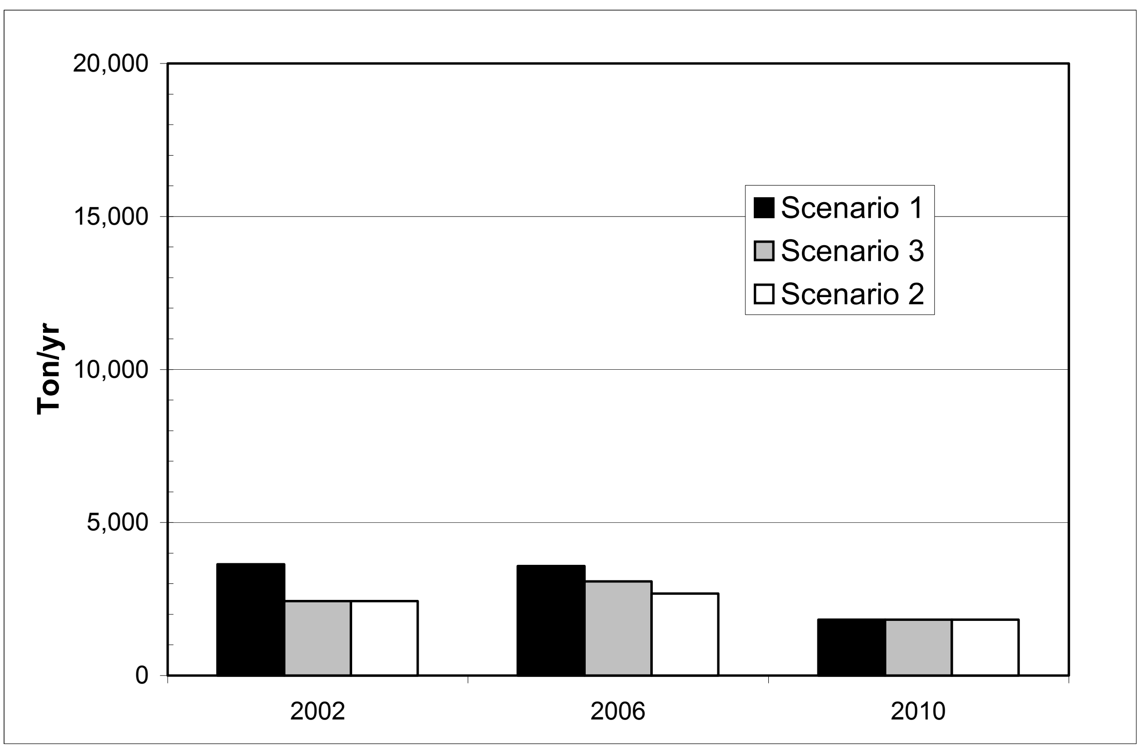


Figure 4. Economic Market Potential, Base Case, All of Texas

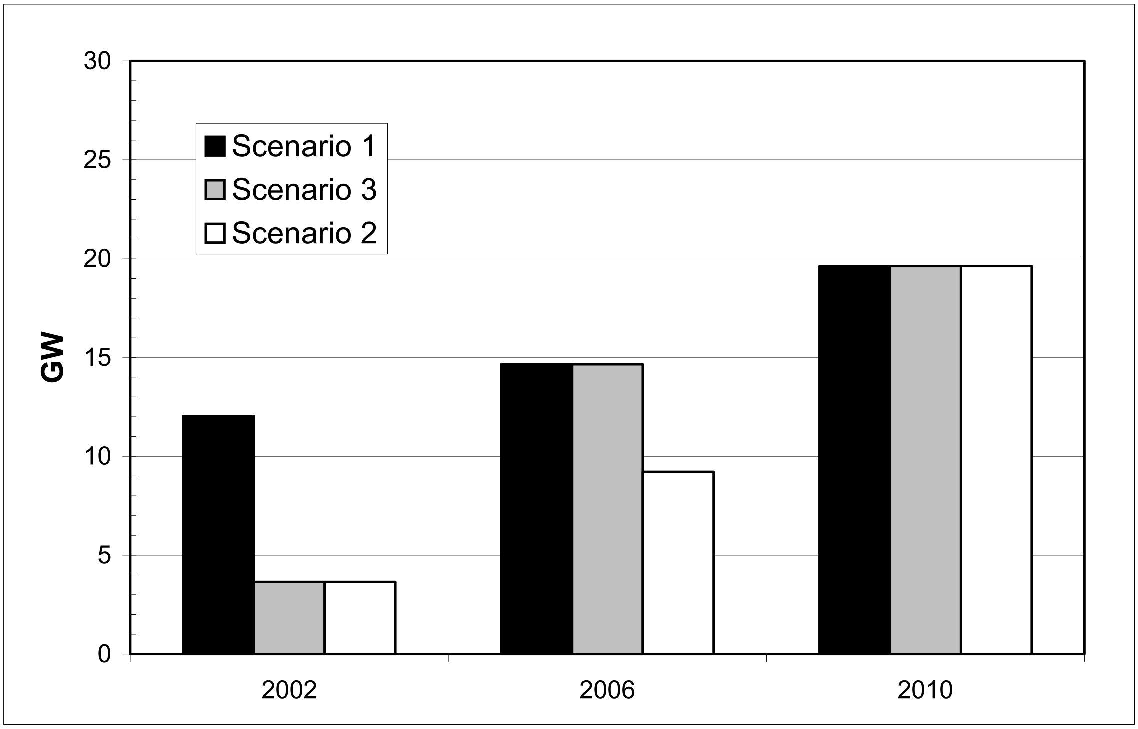
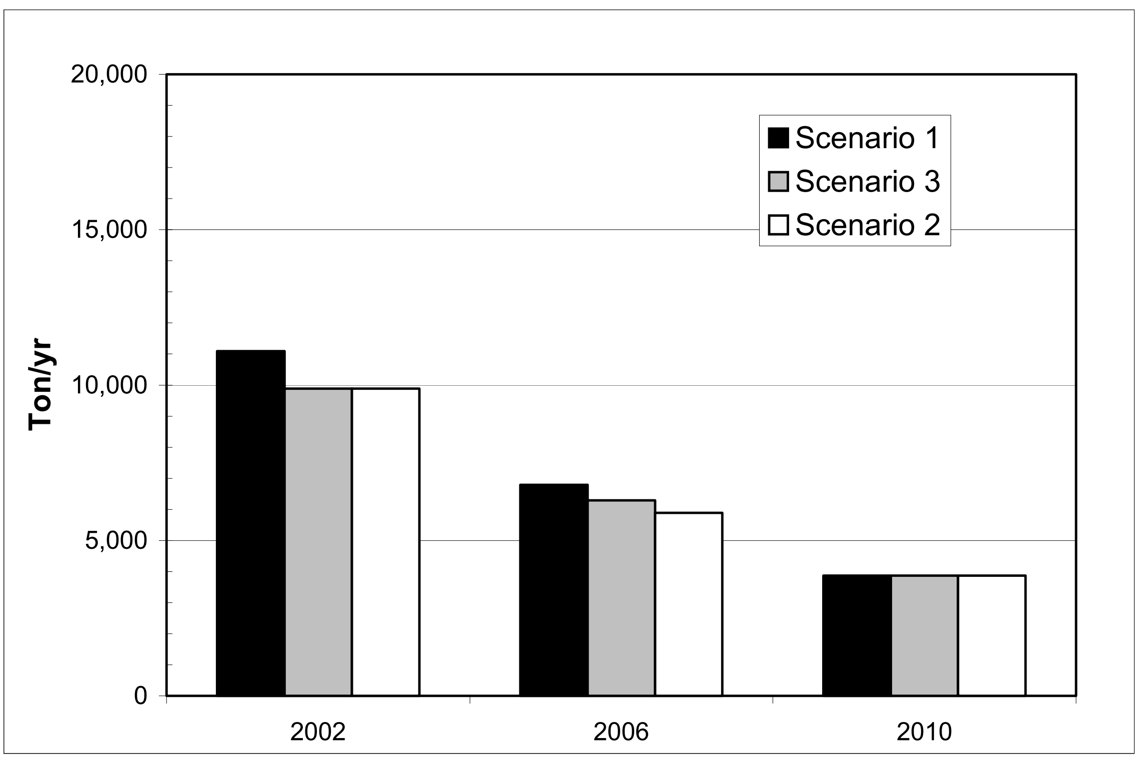


Figure 5. Potential NO_X Emissions, Base Case, All of Texas



4. No Microturbine: it is assumed that the advanced microturbine is not available (Figures 14 – 17).
5. No Microturbine, no Fuel Cell: it is assumed that both the advanced microturbine and the advanced fuel cell are not available (Figures 18 – 21).
6. High Electricity Cost in Dallas/Fort Worth zone (DFW): add 1¢/kWh to electricity cost in DFW area only, simulating the effect of transmission congestion pricing in the Dallas area (Figures 22 – 25).

Detailed Results

The second-level data that underlie the bar charts and summary results are included in the tables of Appendices D through I, corresponding to the Base Case plus five sensitivity cases as described above. Each table is for a specific, year, scenario, sensitivity case and evaluation zone (or zones).

For example, Table 13 is taken from Appendix D (Table D-2) and contains a detailed breakdown of results for the DFW (Dallas-Fort Worth) evaluation zone in the 2002 Base Case for Scenario 1. For each application, Total Market MW, Technologies, and Largest Market Share Technology Results are shown. Each Technology entry represents the most cost-effective specification available in that application that also meets the emissions limit of the given scenario and year. For example, the "Tech ID" entry for the microturbine technology in the Standby application is M-5A; this identifier designates the particular technology specification meeting the criteria of cost and emissions level for this situation. The cost and performance parameters for this model are found by looking up M-5A in Appendix B. (All other Technology IDs are likewise found in Appendix B.) Entries of zero in the "Mkt Share MW" and "NO_X ton/yr" columns for the microturbine show that it was not cost-effective for any of the 24 MW Standby market, and therefore would produce no NO_X.

Table 13. Detailed Results: Base Case, Scenario 1, 2002, DFW Zone

Application	Total Market MW	Technologies															Largest Market Share Technology Results			
		Microturbine			CT			Gas Engine			Diesel			Fuel Cell						
		Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Technology	Mkt Share	MW	NOx tons/yr
Standby	24	M-5A	0	0	CT-5C	0	0	NG-5B	0	0	D-3B	0	0	FC-4	0	0	Diesel	0.00	0	0
Reliability	2262	M-5A	0	0	CT-5C	0	0	NG-5B	0	0	D-3B	0	0	FC-4	0	0	Diesel	0.00	0	0
On-site Power	2828	M-6A	0	0	CT-6E	0	0	NG-6B	0	0	D-4B	0	0	FC-4	0	0	Gas Engine	0.00	0	0
Small CHP	665	M-6B	0	0	CT-6F	0	0	NG-6C	1	1	n/a	n/a	n/a	FC-2	0	0	Gas Engine	0.002	1	1
Large CHP	757	M-6B	30	49	CT-6B	120	95	NG-6C	58	44	n/a	n/a	n/a	FC-2	0	0	CT	0.16	120	95
Demand	2828	M-6A	0	0	CT-6E	0	0	NG-6B	846	63	D-4B	2,410	289	FC-4	0	0	Diesel	0.85	2,410	289
Oilfield Gas	0.1	M-3A	0	0	CT-3E	0.04	1	NG-3B	0.1	1	n/a	n/a	n/a	FC-4	0	0	Gas Engine	1.00	0.1	1
Landfill Gas	50	M-4A	0	0	n/a	n/a	n/a	NG-4B	50	327	n/a	n/a	n/a	FC-4	0	0	Gas Engine	1.00	50	327
																	Totals		**2,581**	**712**

Table 13 shows that for the Standby Generator Activation, Reliability Enhancement and On-Site Power applications, there were no cost-effective DGs. Therefore, under the heading "Largest Market Share Technology Results," the "Market Share," "MW," and "NO_X tons/yr" entries are zero for these three applications. Note that the diesel engine appears under the "Technology" heading here; this designates the diesel as the most cost-effective of the five competing technologies, even if it was not cost-effective enough to achieve any of the 24 MW Standby market.

Table 13 also shows that, in the Small CHP application, the natural gas engine (NG-6C) is competitive for just .002 of the market (0.2%); no other technologies are competitive. The yearly NO_X emissions from the natural gas engine in this application would be 1 ton/yr. As explained in Section 1, NO_X emissions are calculated by multiplying the MW of market potential by the NO_X emission factor of the DG and by the hours of operation specified for the application. An entry of "n/a," as shown for the diesel engine, indicates that that technology has no specification available for this application, scenario and year.

In the Large CHP application, the most cost-effective DG is the combustion turbine (CT-6B): it is cost-effective for 120 MW, or about 16% of the market, and is estimated to produce about 95 tons of NO_X per year (at 6000 hr/yr of operation). Note that the microturbine (M-6B) is cost-effective for 30 MW of the market and would produce 49 ton/yr of NO_X at that level, and the natural gas engine (NG-6C) is cost-effective for 58 MW and would produce 95 ton/yr of NO_X.

In the Demand Reduction application, the diesel engine (D-4B) is more cost-effective than the gas engine (NG-6B) with 85% market share (2,410 MW), producing 289 ton/yr of NO_X (hours of operation are 600 hr/yr for this application).

In the Oilfield/Flare Gas Utilization application, the natural gas engine (NG-3B) is slightly more cost-effective than the combustion turbine (CT-3E). In the Landfill Gas Utilization application, only the gas engine (NG-4B) is competitive.

The total of the market shares in MW and the total yearly NO_X emissions in ton/yr are shown in the bottom right of Table 13: 2,581 MW and 712 ton/yr, respectively. It can be seen that the diesel engine's 2,410 MW of market share in the Demand Reduction application is the largest part of the total market in this example. However, the 50 MW of gas engine market share in the Landfill Gas application produces the largest portion of the total NO_X (327 ton/yr), Compare this to the diesel engine's 289 ton/yr in the Demand Reduction category. Recall that in the Demand Reduction application DGs run for 600 hr/yr, and in the Landfill Gas application they run for 8760 hr/yr.

Similar details can be extracted for other years, zones, scenarios and sensitivity cases by interrogating the tables in Appendices D through I.

Description of Results

Base Case

Summary results for the Base Case are presented in Figures 2 – 5, and supported by the data in Appendices C and D.

<u>2002</u>

The total DG market potential in East Texas in Scenario 1 is 9,178 MW; this number drops to 793 MW in Scenarios 2 and 3 (numerical values are obtained from Appendix C). Scenario 1 could produce an estimated 3,634 ton/yr of NO_X, and Scenarios 2 and 3 would each produce 2,428 ton/yr of NO_X. Scenarios 2 and 3 each result in a DG market share reduction of 91%, and a corresponding NO_X reduction of 33%.

This result is primarily attributable to the elimination of DG market potential in the demand reduction application in the three East Texas zones. The diesel engine that was the economical choice under Scenario 1 cannot meet emissions limits under Scenarios 2 and 3; the natural gas engine and microturbine likewise have no models that can meet these limits, and other technologies (combustion turbines and fuel cells) are not cost-effective.

Market potentials and NO_X emissions for West Texas are the same for all three scenarios, as the emissions limits do not change in West Texas under the Standard Permit.

<u>2006</u>

DG market potential in East Texas is 11,588 MW in Scenario 1 and 6,150 MW in Scenario 2; NO_X emissions are 3,574 ton/yr in Scenario 1 and 2,675 ton/yr in Scenario 2. There is no difference in market potential between Scenarios 1 and 3; NO_X emissions for Scenario 3 are 3,071 ton/yr.

The cleaner-burning diesel engine that is now available in 2006 can be used in the demand reduction application to meet Scenario 3 NO_X requirements. However, the diesel engine cannot meet Scenario 2 emissions limits, and the higher-cost gas engine does not get as much market share; therefore, NO_X is correspondingly lower. Overall in East Texas, market share drops from 11,588 MW to 6,150 MW (a 47% reduction), while NO_X drops from 3,071 to 2,675 ton/yr (down only 13%).

DG market potentials in West Texas in 2006 are increased from 2002, and NO_X emissions are lower; as in 2002, these numbers are constant across the scenarios. This is due to the fact that the cleaner microturbine is now winning in the CHP categories, and natural gas engines with lower emissions factors have become available for the other applications.

<u>2010</u>

DG market shares and NO_X emissions are constant across all three scenarios, in all zones. Note that DG market shares are markedly increased from previous years, and NO_X emissions are significantly lower. An examination of Tables D-18 through D-21, which are representative of all three scenarios, discloses that the fuel cell and microturbine are now the predominant technologies: they capture more market share due and produce less NO_X, due to their projected lower costs and reduced emissions in 2010.

<u>General</u>

There were no cost-effective DG applications in Standby Generation in any of the years examined, and there were only a few cost-effective applications in On-site Power

Production in 2010. Also, cost-effective Reliability Enhancement applications occurred only in the West Texas zone, in all years.

Low Fixed Charge Rate

For the purpose of evaluating the effect of cheaper financing costs, a fixed charge rate (FCR) of 10% is assumed. Summary results are presented in Figures 6 – 9, and supported by the data in Appendices C and E.

2002

The general effect of a low fixed charge rate (0.10) relative to the Base Case is that DG market potentials increase across the board by substantial amounts in all years and scenarios. Also, cost-effective Reliability Enhancement applications now appear in the East zones as well as the West. Statewide NO_X emissions are somewhat higher in 2002 than in the Base Case.

2006

NO_X totals are almost the same as in the Base Case. This is primarily because the microturbine has decreased in cost over these years, capturing more of the market in the CHP applications, and it has exceptionally low NO_X levels. Note that in East Texas there is now virtually no difference in market share between Scenarios 3 and 2, as occurred in the Base Case. The natural gas engine is now cost-effective enough in the demand reduction application that it can capture essentially the same market share in Scenario 2 as the diesel engine does in Scenario 3.

2010

NO_X totals are about half the levels of the Base Case. The ultra-low-NO_X fuel cell now captures significant portions of the market.

General

From the foregoing it is possible to conclude that under favorable financing conditions, higher capital cost technologies that are more efficient and lower in NO_X will perform better in the market.

Figure 6. Economic Market Potential, Low FCR, East Texas

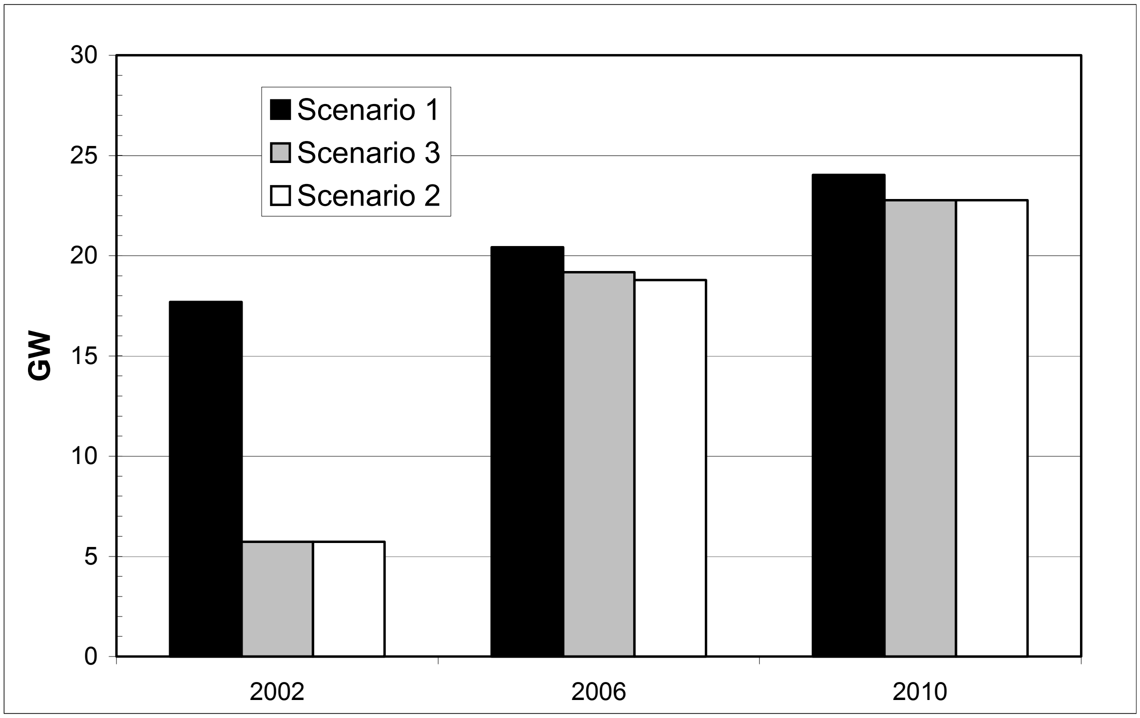


Figure 7. Potential NO_X Emissions, Low FCR, East Texas

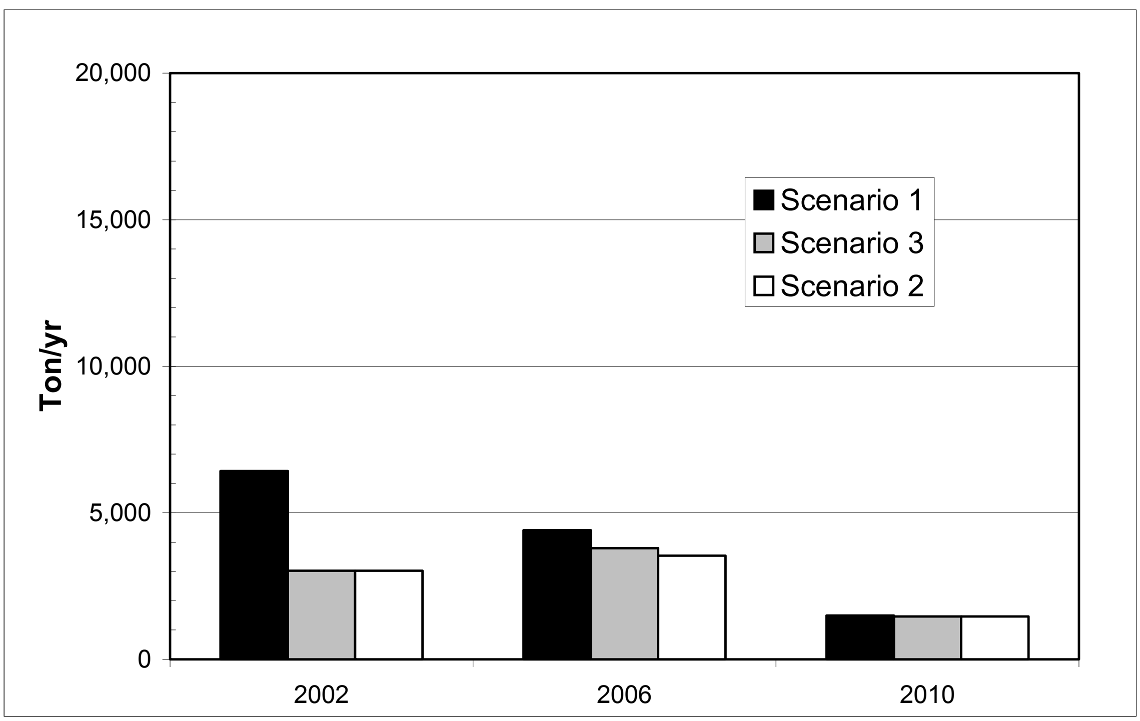


Figure 8. Economic Market Potential, Low FCR, All of Texas

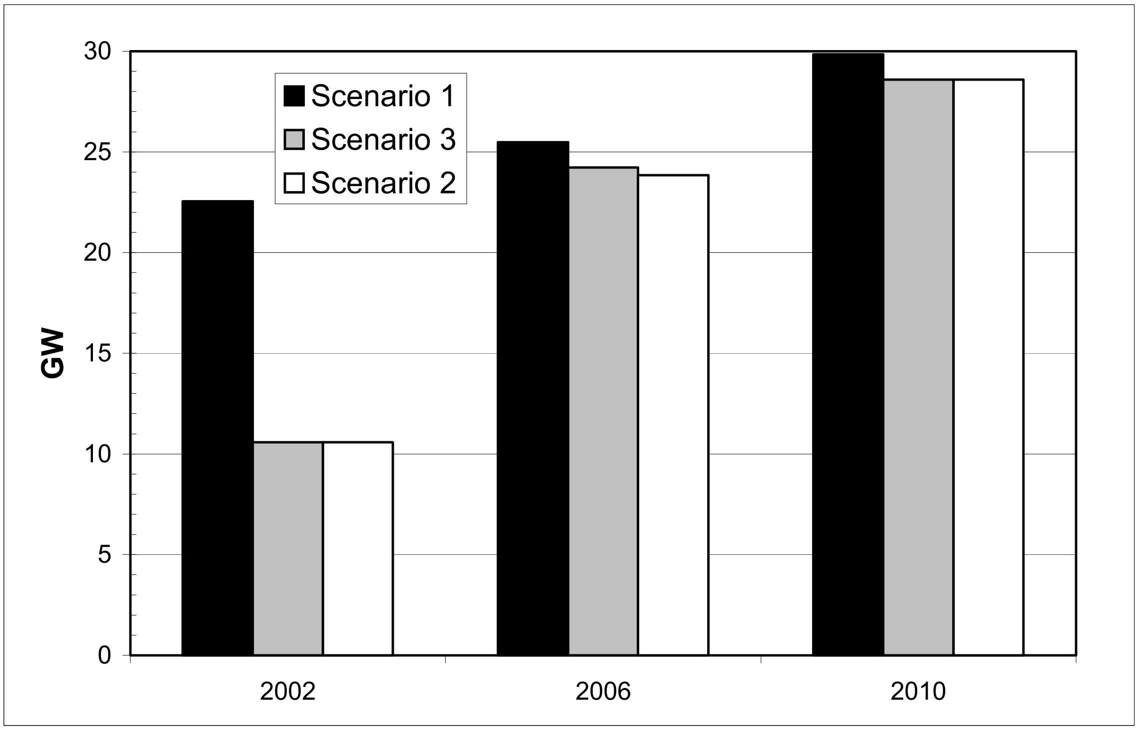
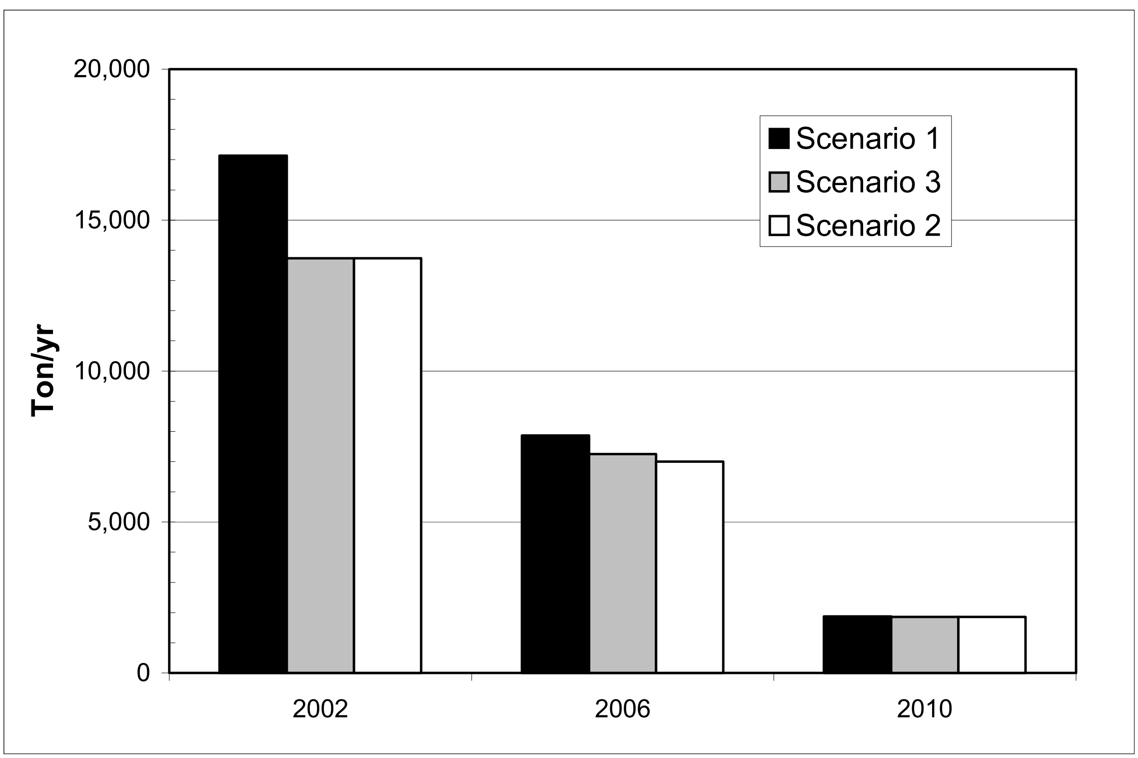


Figure 9. Potential NO_X Emissions, Low FCR, All of Texas



High Fixed Charge Rate

For the purpose of evaluating the effects of higher financing costs, a fixed charge rate (FCR) of 20% is assumed. Summary results are presented in Figures 10 – 13, and supported by the data in Appendices C and F.

General

In this case, the high fixed charge rate has the expected effect of depressing DG market potentials across the board, in all years, relative to the Base Case; NO_X emissions are correspondingly reduced.

Note that the drop in market potentials between Scenario 3 and Scenario 2 observed in the Base Case in 2006 is still present in this case, as opposed to the Low Fixed Charge Rate case. Also, high finance costs have significantly reduced the competitiveness of microturbines and fuel cells in 2006 and 2010.

Figure 10. Economic Market Potential, High FCR, East Texas

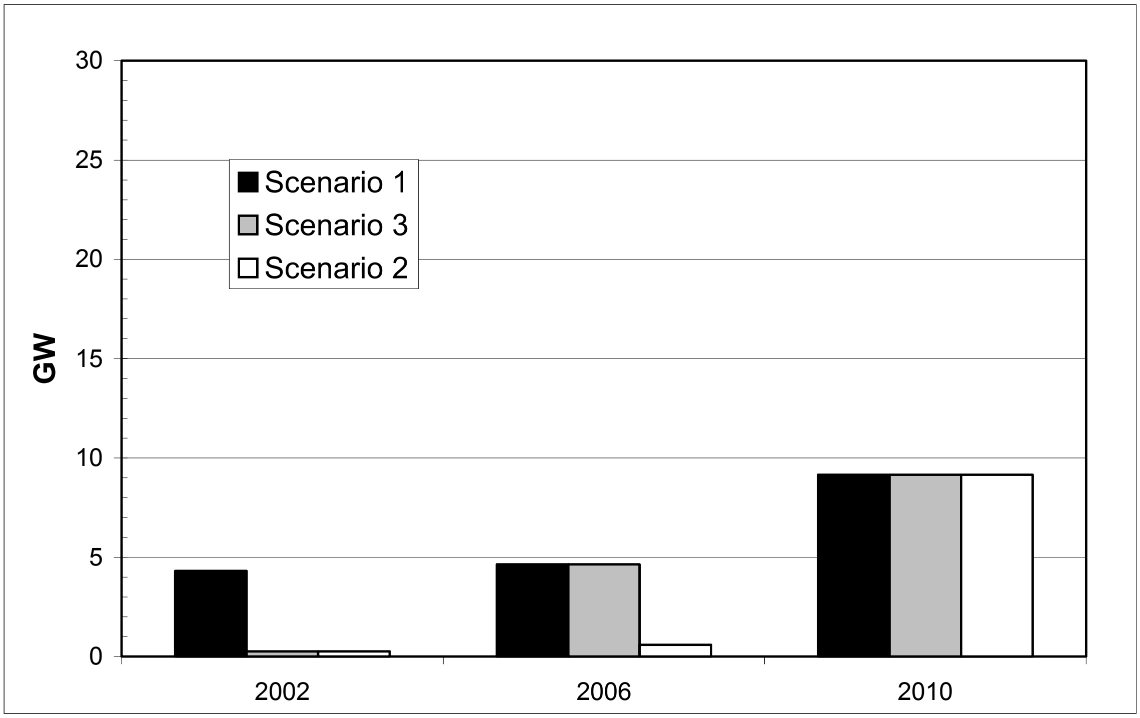


Figure 11. Potential NO_X Emissions, High FCR, East Texas

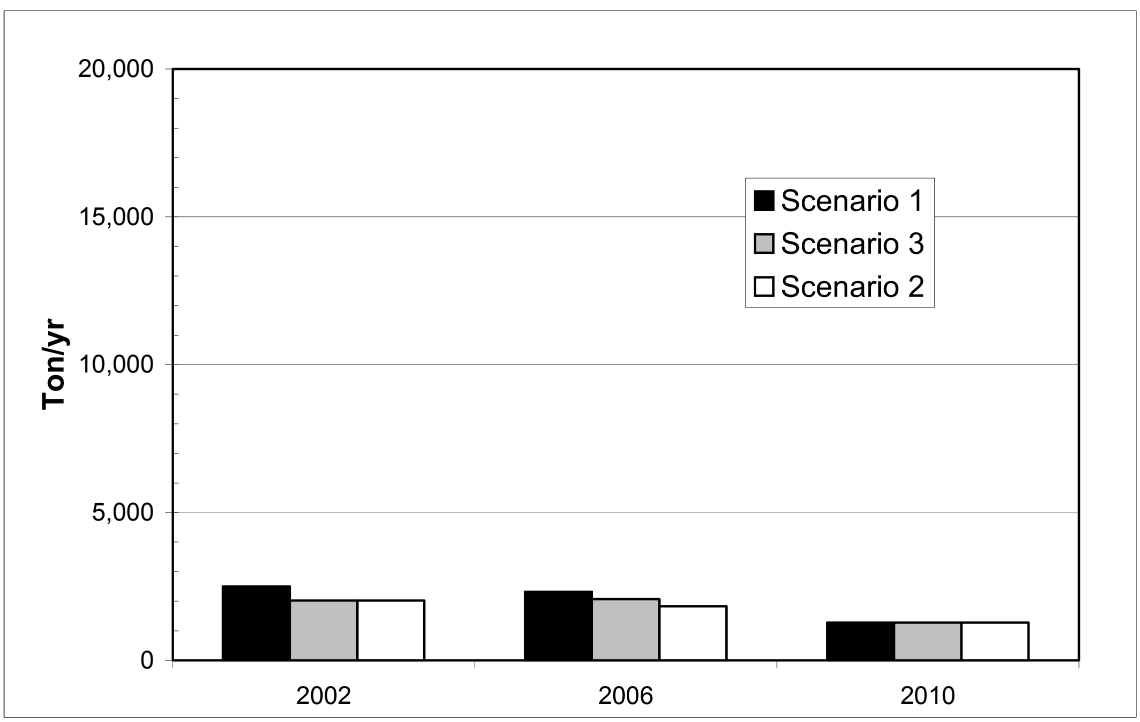


Figure 12. Economic Market Potential, High FCR, All of Texas

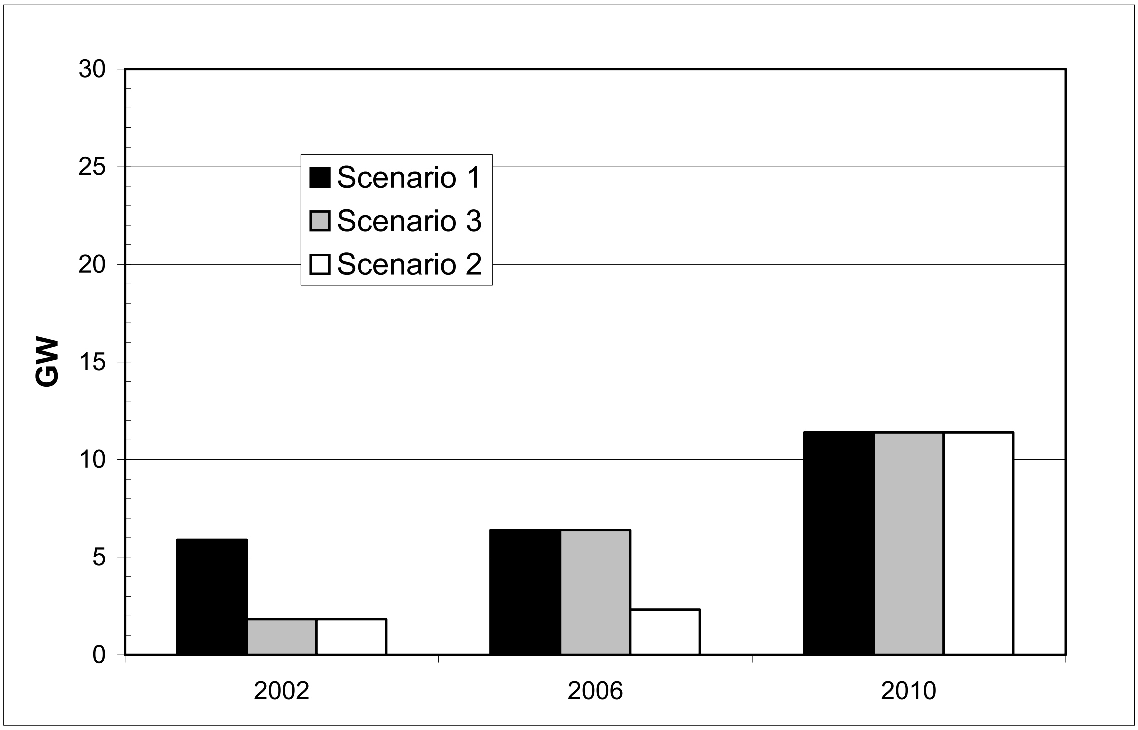
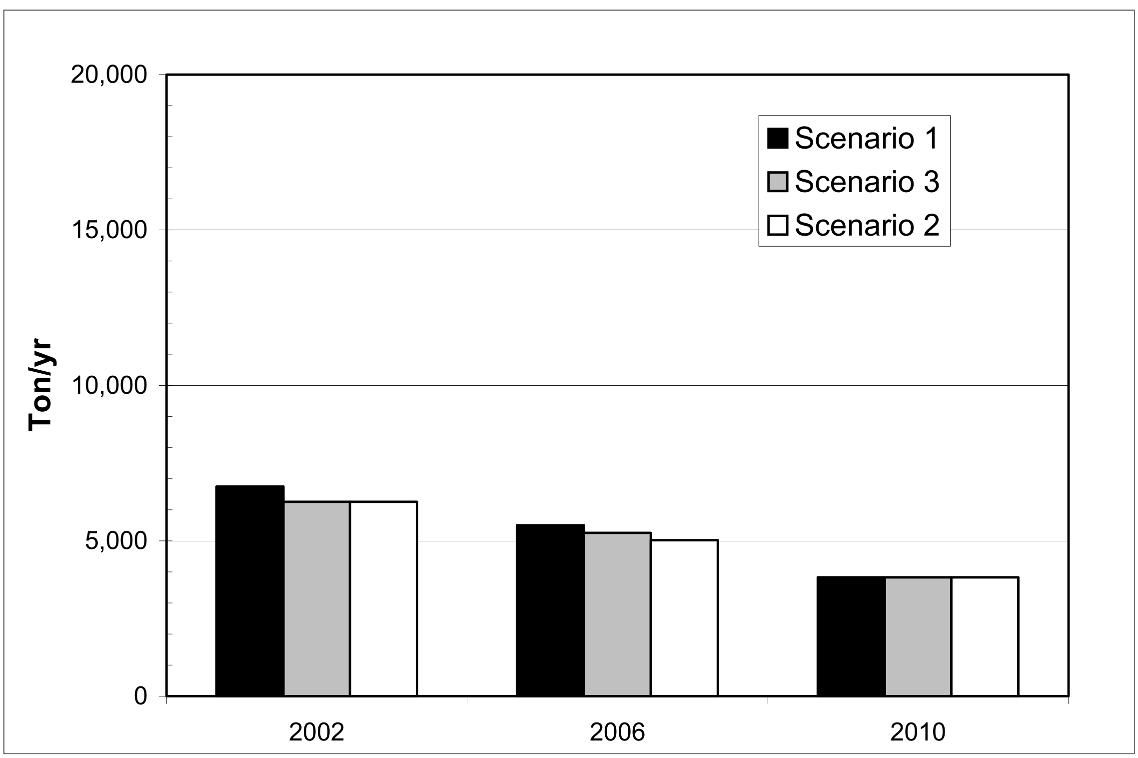


Figure 13. Potential NO_X Emissions, High FCR, All of Texas



No Microturbine

To evaluate the effect on results if the advanced microturbine is not available, the microturbine is removed from the list of candidate technologies. Summary results are presented in Figures 14 – 17, and supported by the data in Appendices C and G.

<u>2002</u>

No effect is observed in 2002 compared to the Base Case by removing the microturbine from the technology mix, since it was not cost-competitive for any applications in that year.

<u>2006</u>

In 2006 DG market potentials are reduced across the board, because the microturbine is replaced by higher-cost natural gas engines and combustion turbines in the small and large CHP applications, respectively.

However, the effects on NO_X emissions are mixed. In East Texas, NO_X goes up slightly for Scenario 1. In the Eastern zones, the combustion turbine now has significant market share in the large CHP application and is producing more NO_X than the advanced microturbine produced in the Base Case.

In Scenarios 2 and 3, NO_X is down slightly; market shares are reduced drastically in the CHP applications and little NO_X is produced. In West Texas, NO_X increases because the natural gas engine still has significant market share in both CHP applications, but produces more NO_X than the microturbine did because of its higher emissions factor.

<u>2010</u>

In 2010, as in 2006, market potentials are also reduced significantly across the board. In the East, for Scenario 1, the fuel cell now captures a small part of the small CHP market, with almost no NO_X emissions, and the CT captures some of the large CHP market. Overall, there is almost no net change in total NO_X produced in the Eastern zones. In Scenarios 2 and 3 in the East, the fuel cell is now the preferred technology in both CHP applications, with greatly reduced emissions. In the West, market potentials are down and NO_X is up for the same reasons as in 2006: the natural gas engine is more expensive than the microturbine and has a higher emissions factor.

Figure 14. Economic Market Potential, No Microturbine, East Texas

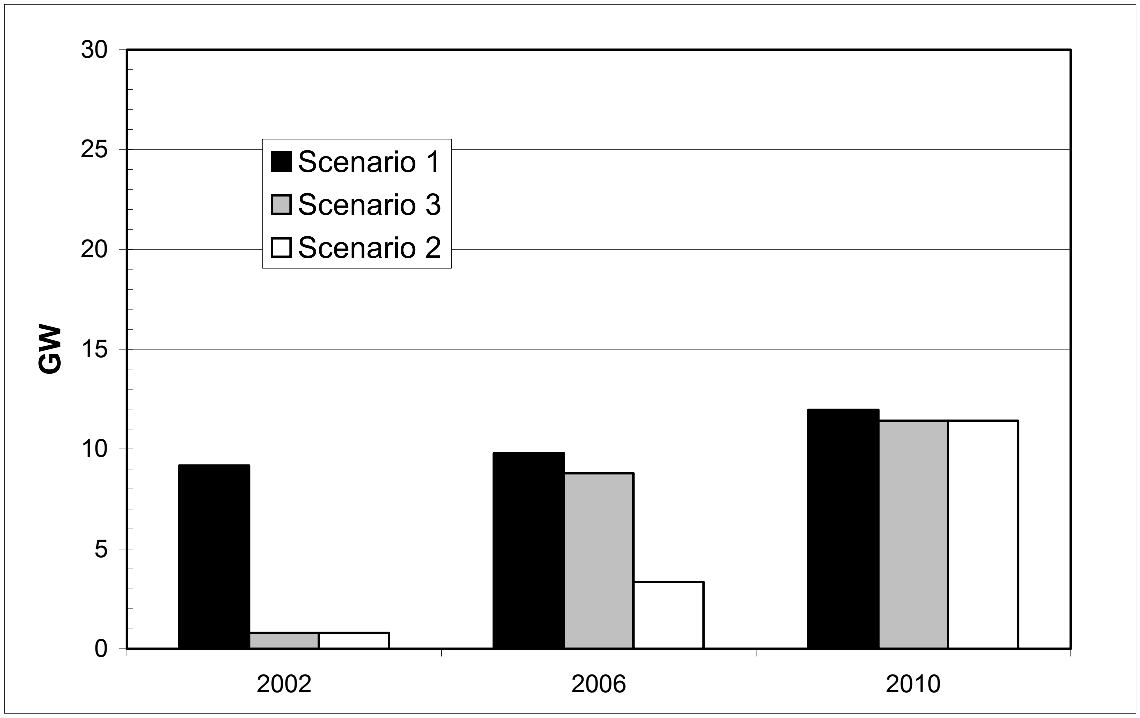


Figure 15. Potential NO_X Emissions, No Microturbine, East Texas

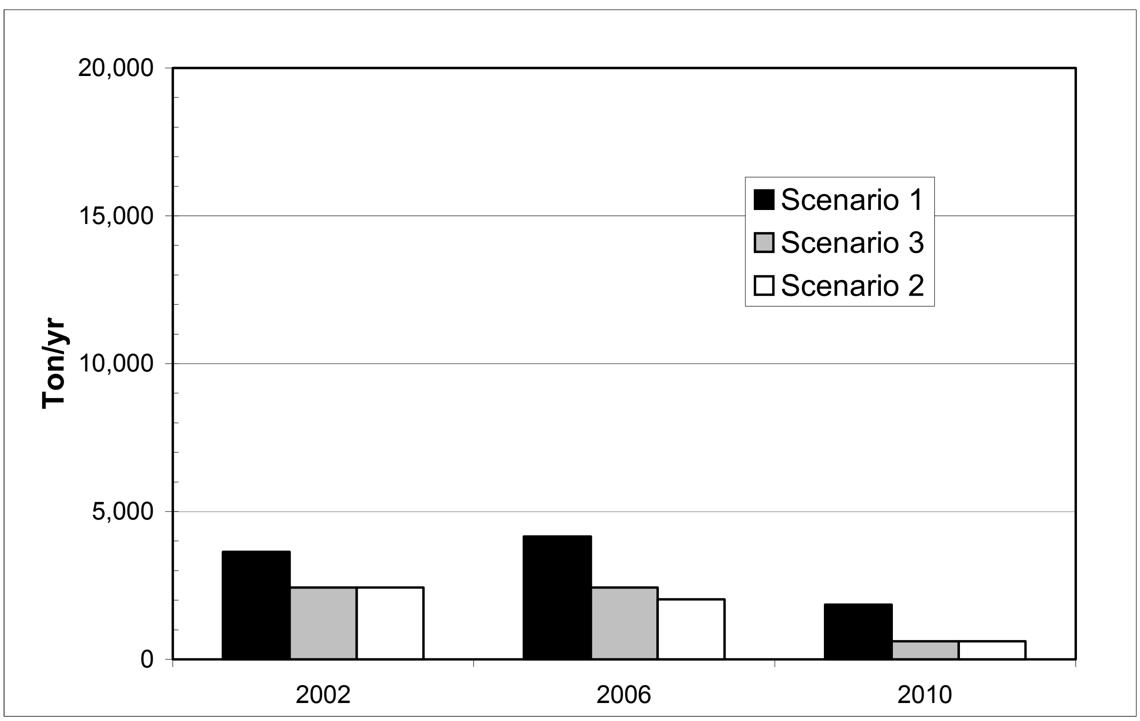


Figure 16. Economic Market Potential, No Microturbine, All of Texas

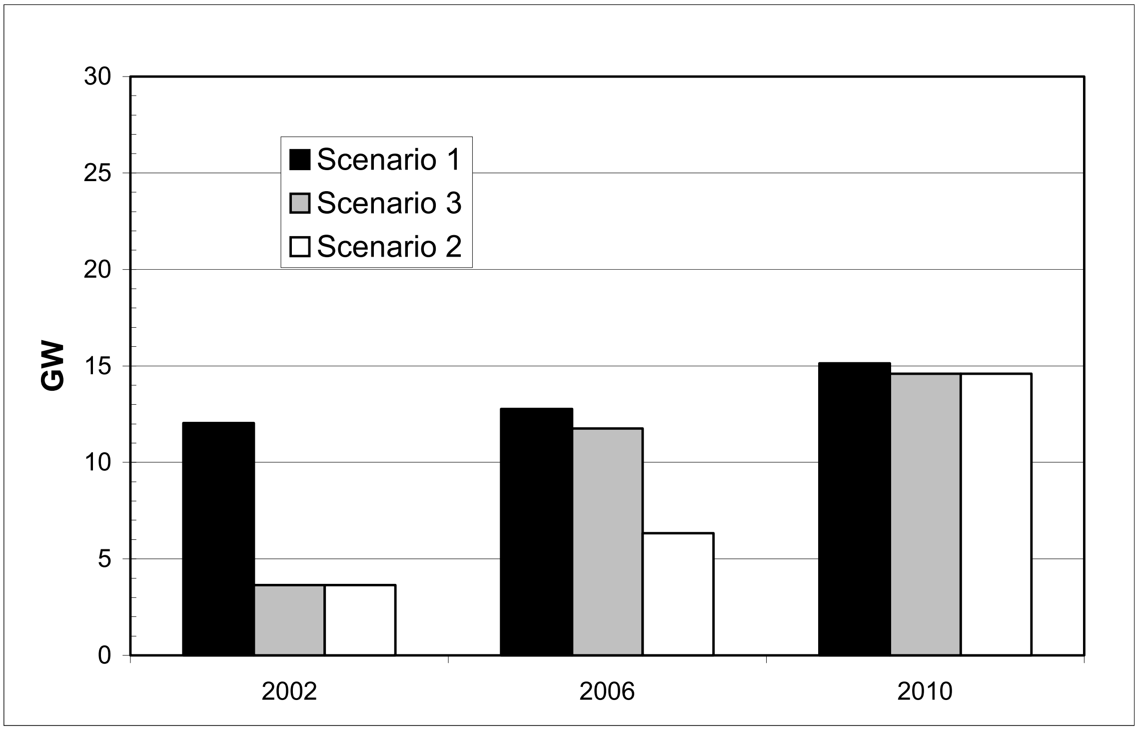
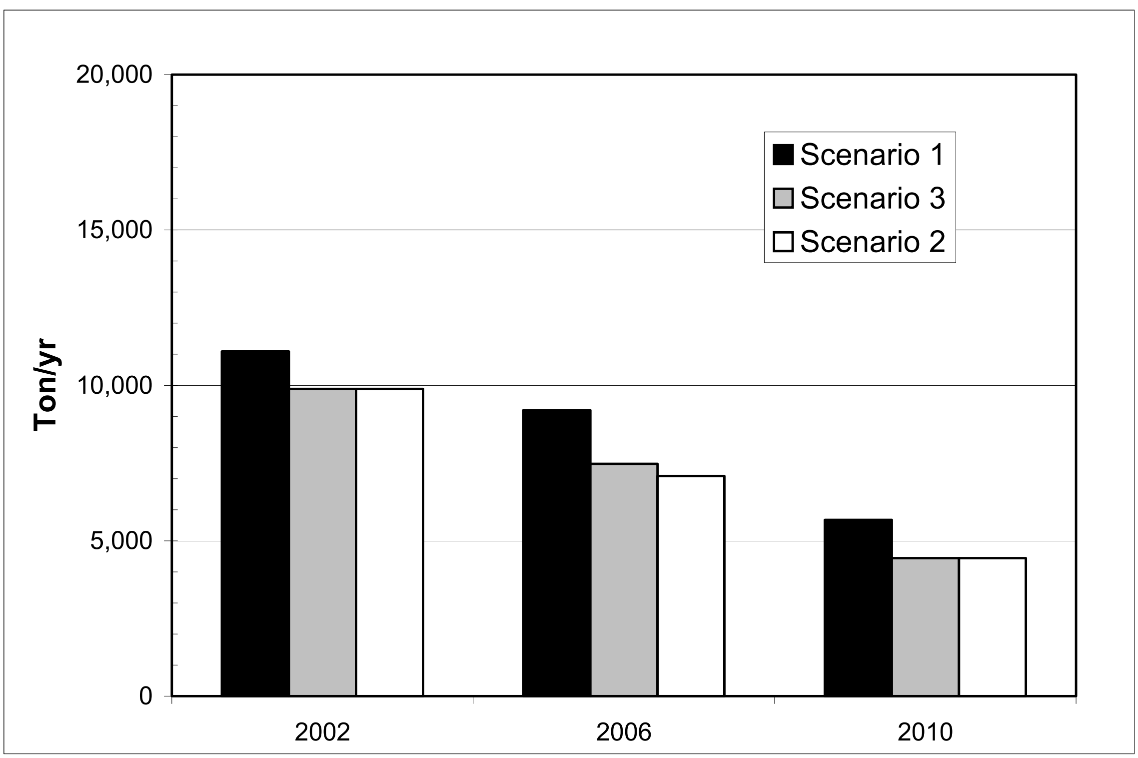


Figure 17. Potential NO_X Emissions, No Microturbine, All of Texas



No Microturbine, No Fuel Cell

To evaluate the effect on results if neither the advanced fuel cell nor the advanced microturbine is available, these technologies are removed from the list of candidate technologies. Summary results are presented in Figures 18 – 21, and supported by the data in Appendices C and H.

2002

Compared to the Base Case, no effect is observed on DG market potentials or estimated NO_X emissions in 2002 by removing the microturbine and the fuel cell from the technology mix, since neither technology was cost-effective in any applications in the Base Case that year.

2006

In 2006 the results are the same as in the No Microturbine case, since no fuel cells won market shares in any applications that year.

2010

In 2010 DG market potentials are down and NO_X emissions are up across almost all zones and scenarios. Exceptions are the Houston/Galveston zone in Scenarios 2 and 3, in which NO_X emissions are slightly lower. Without the microturbine and fuel cell in the mix, all other technologies that are cost-effective have higher emissions factors.

Figure 18. Economic Market Potential, No Microturbine or Fuel Cell, East Texas

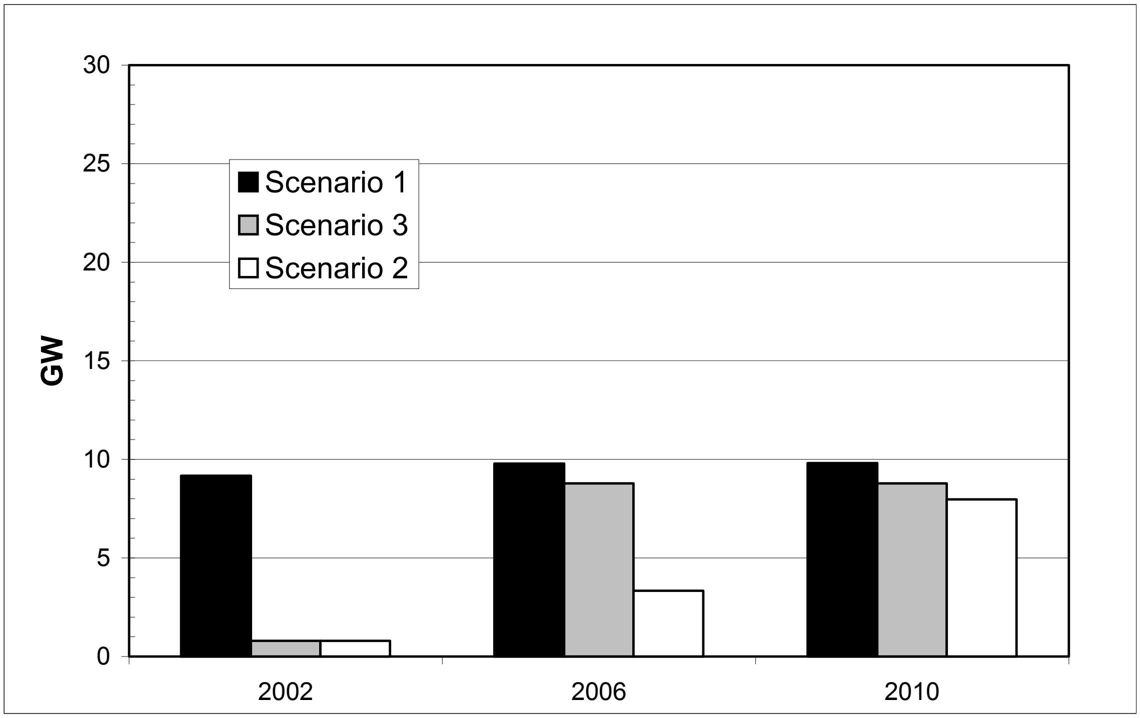


Figure 19. Potential NO_X Emissions, No Microturbine or Fuel Cell, East Texas

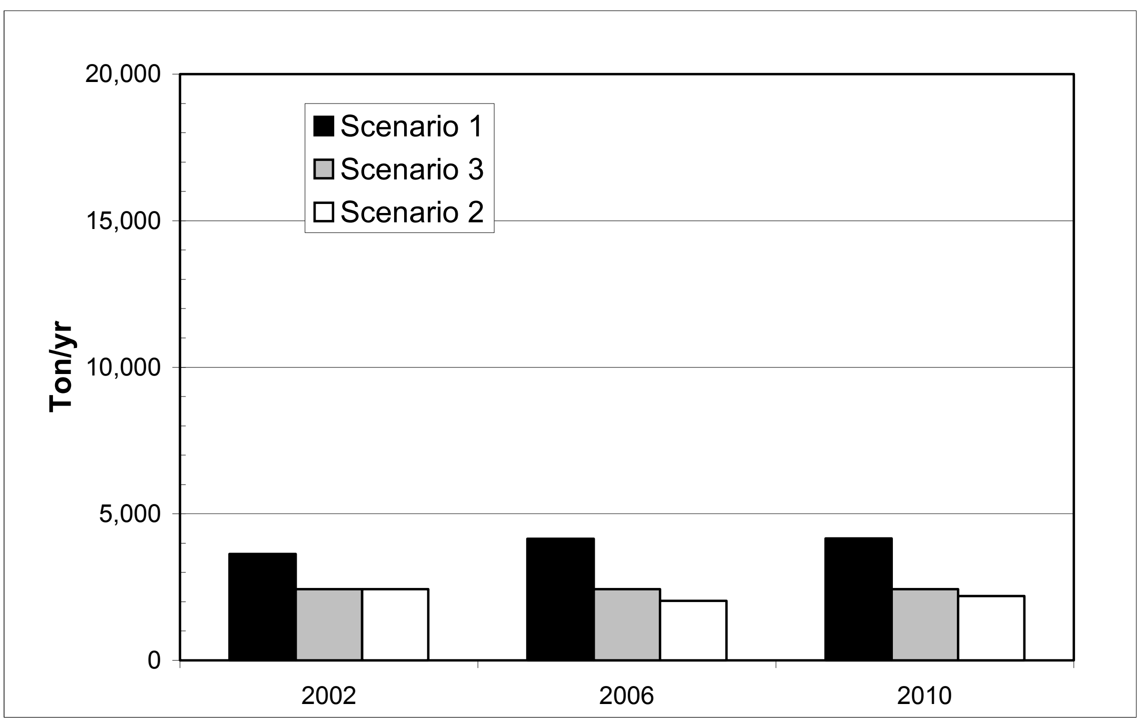


Figure 20. Economic Market Potential, No Microturbine or Fuel Cell, All of Texas

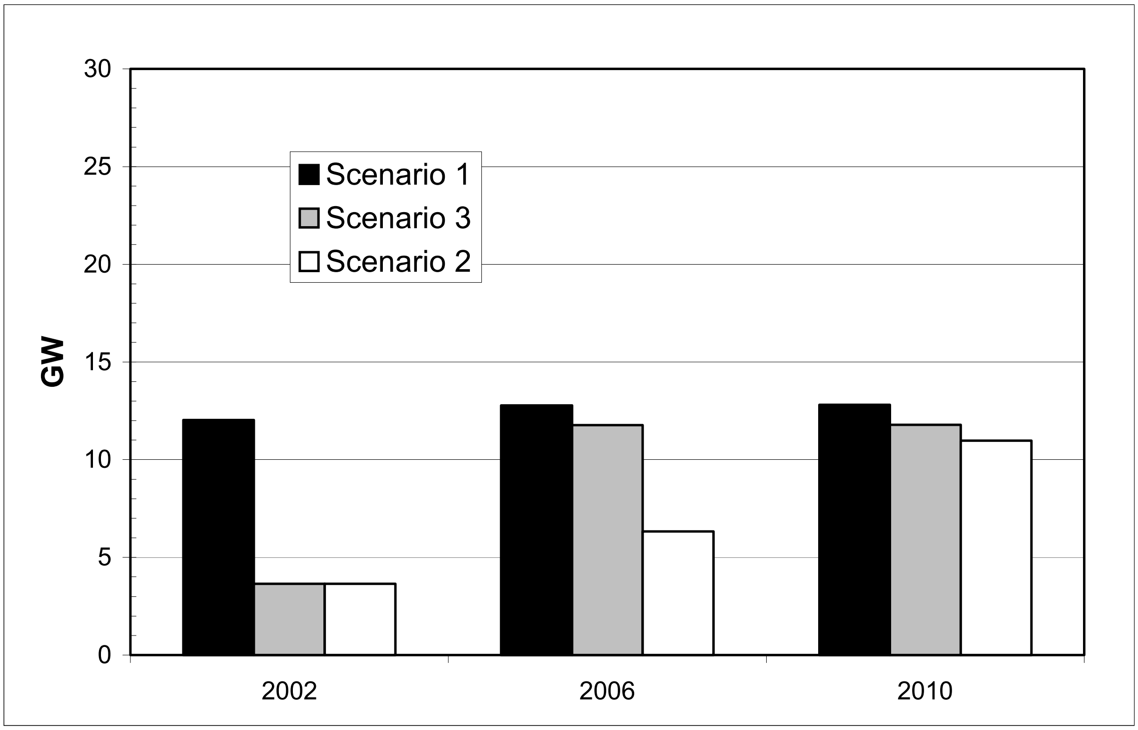
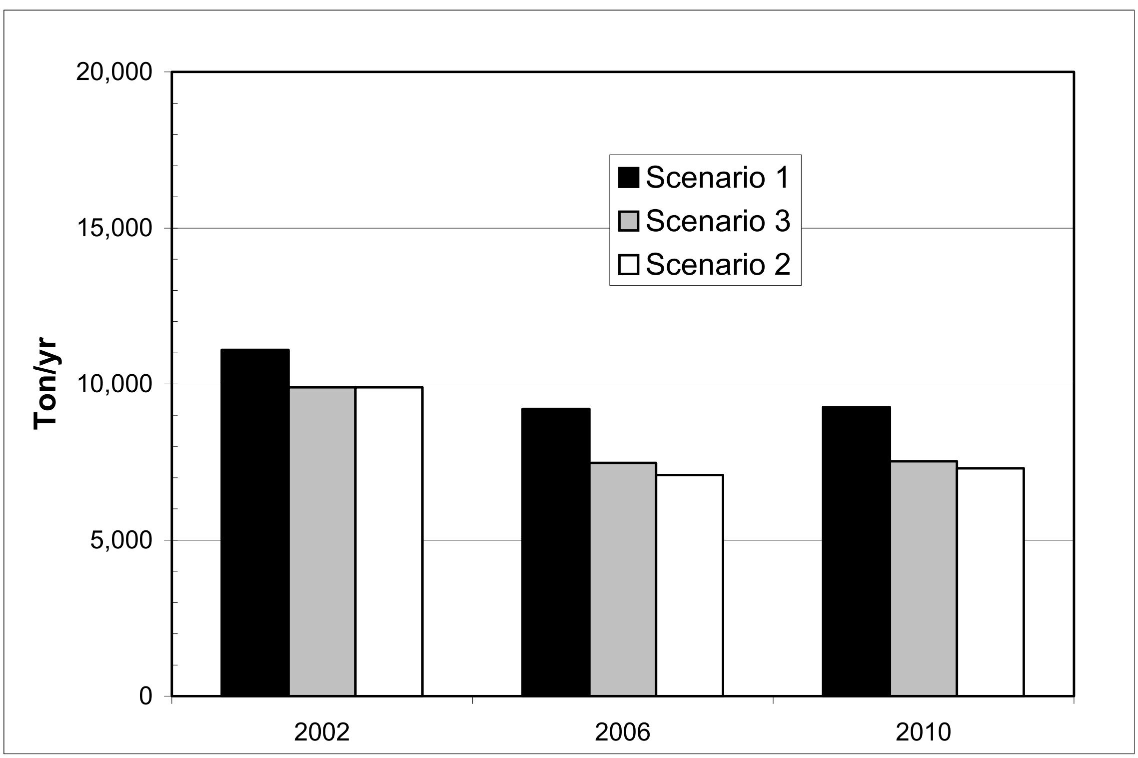


Figure 21. Potential NO_X Emissions, No Microturbine or Fuel Cell, All of Texas



High Dallas Electricity Cost

To simulate the effect of transmission congestion pricing in the Dallas area, Dallas electricity is assumed to cost 1 ¢/kWh more than the rest of the state; this figure was determined by the project team to be a representative number [Ref. 10, 11]. Summary results are presented in Figures 22 – 25, and supported by the data in Appendices C and I. Relative to the Base Case, the only changes will be seen in the results for the Dallas/Fort Worth evaluation zone.

<u>All Years</u>

In all scenarios, DG market shares in the DFW zone increase in both large and small CHP and demand reduction applications, with a corresponding increase in NO_X emissions.

Figure 22. Economic Market Potential, High Dallas Electricity Cost, East Texas

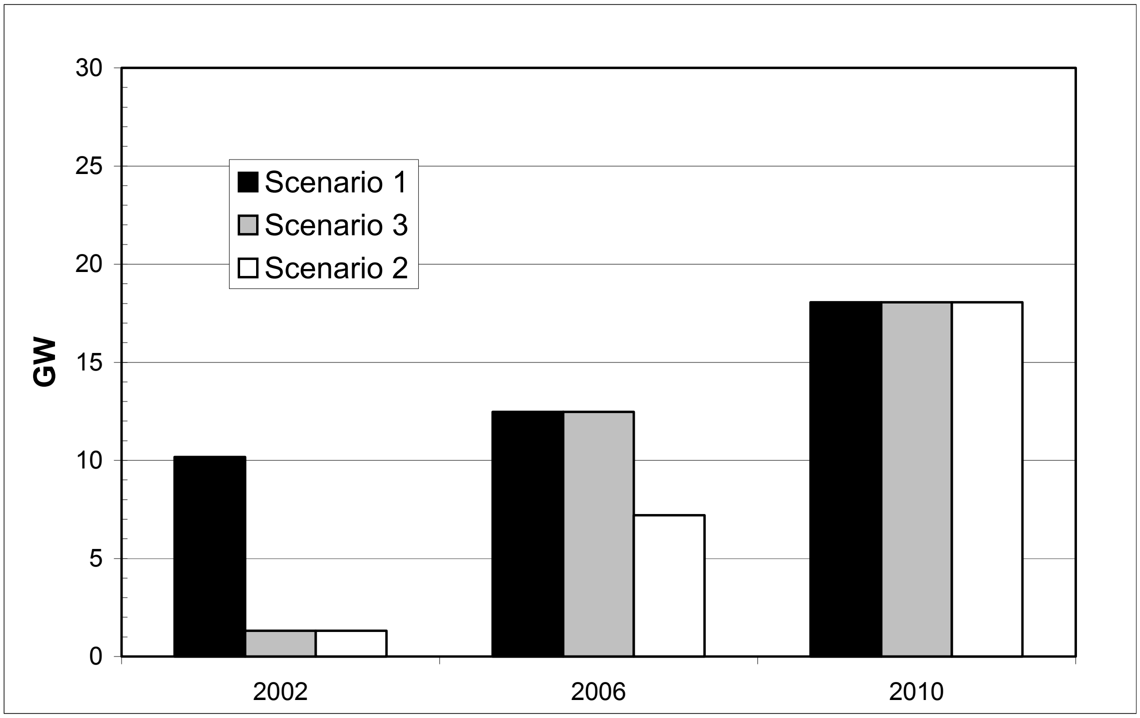


Figure 23. Potential NO_X Emissions, High Dallas Electricity Cost, East Texas

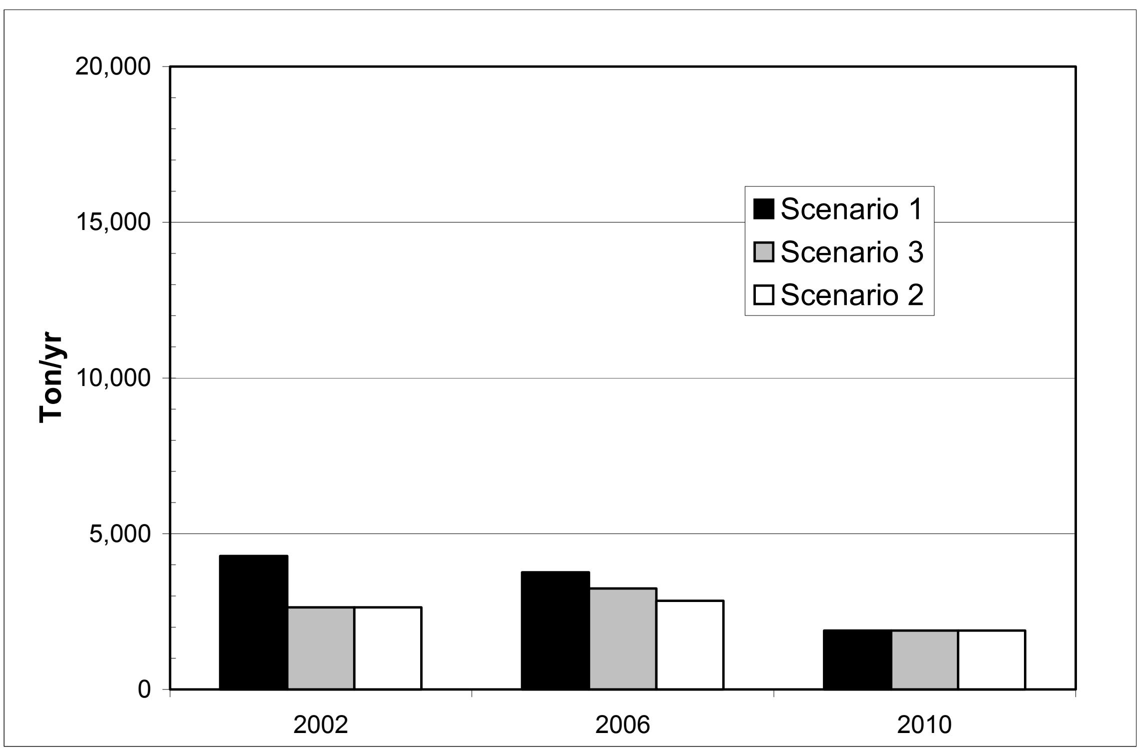


Figure 24. Economic Market Potential, High Dallas Electricity Cost, All of Texas

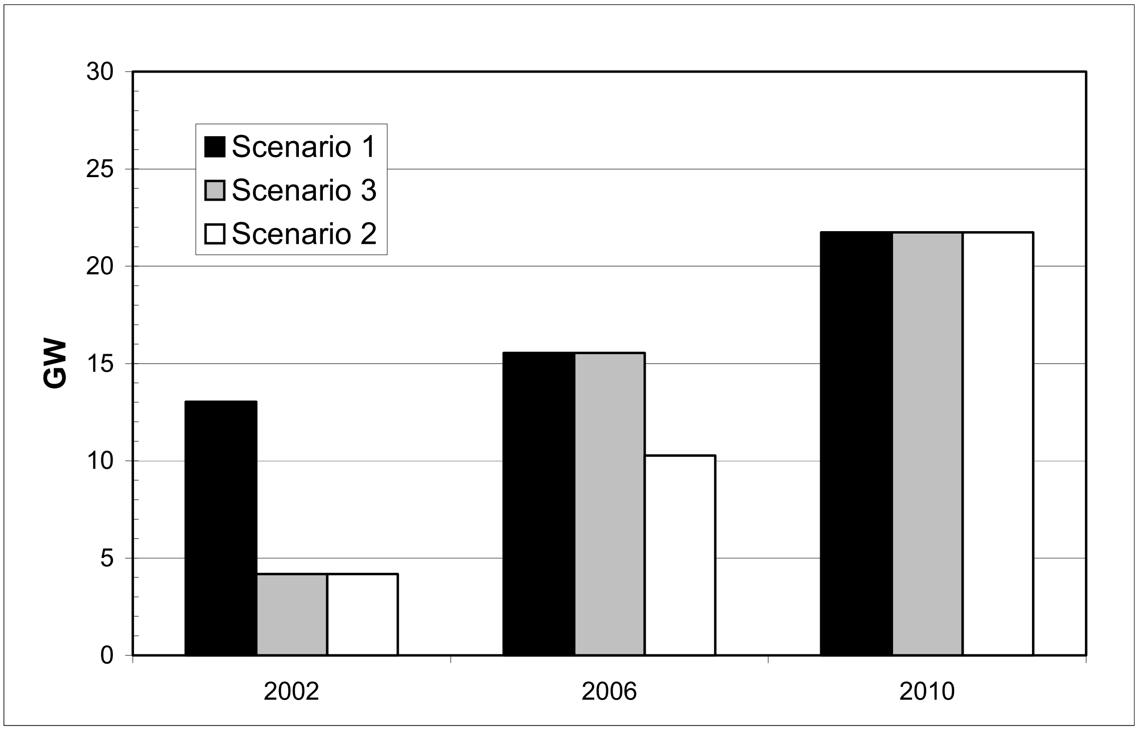
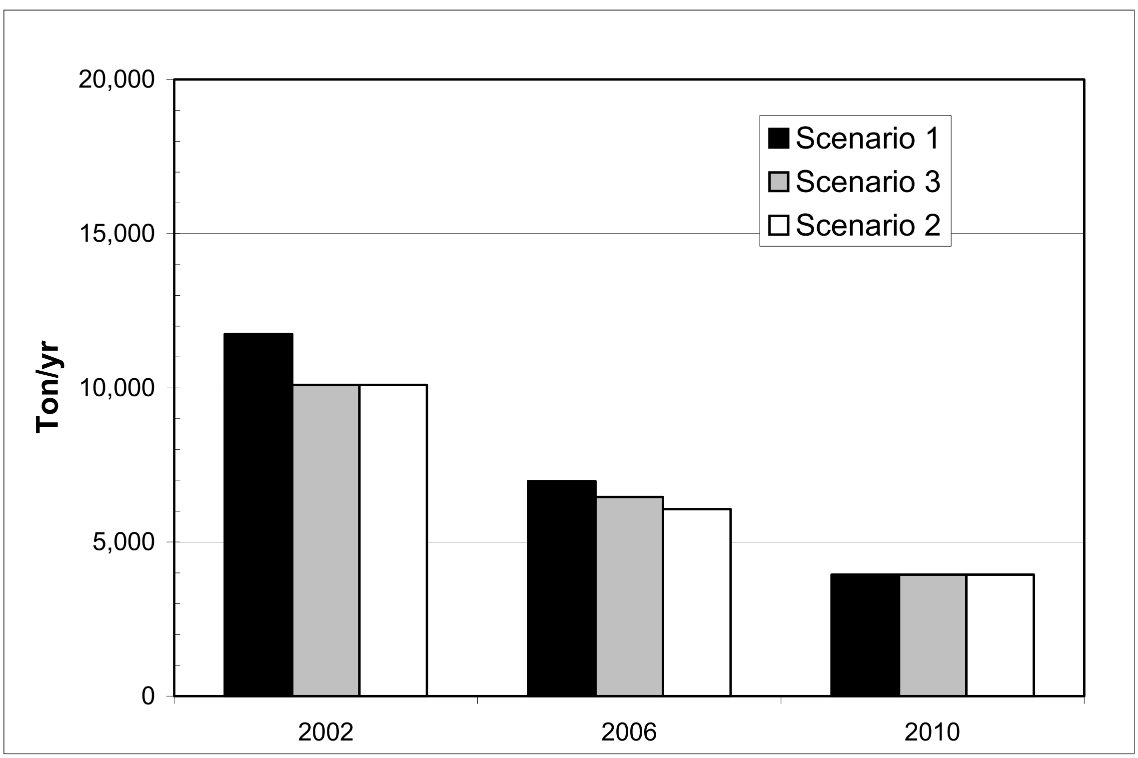


Figure 25. Potential NO_X Emissions, High Dallas Electricity Cost, All of Texas



6. Conclusions and Recommendations

Summary

In this report, Distributed Utility Associates has analyzed the potential emissions from distributed generation as it would likely unfold in Texas over the next decade. The approach was to estimate the potential markets for eight leading applications, and then estimate the NO_X emissions resulting from the distributed generation serving those applications.

The Texas Natural Resource Conservation Commission (TNRCC) supplied the specifications for the three alternative NO_X emission limit scenarios, which differed by application, time and location in the state of Texas. Scenario 1 represents NO_X emission standards contained in the Air Quality Standard Permit for Electric Generating Units (Standard Permit) effective June 1, 2001 for electric generating units installed prior to January 1, 2005. Scenario 2 represents NO_X emission standards contained in the Standard Permit for electric generating units installed on or after January 1, 2005. Scenario 3 represents alternative NO_X emission standards which are not contained in the Standard Permit.

Only technologies that could operate under the applicable emission thresholds were considered as candidates to enter the market in any given year (nearly one hundred candidate DG models and sizes were screened). For each allowable-emissions scenario, the regional and total Texas market potentials and resulting NO_X emissions were estimated for the years 2002, 2006 and 2010. This approach allowed for technology improvements, cost reductions and advanced emissions control technologies to be implemented as they become available.

The results of the study are interesting from three perspectives:
- Emission standards setting
- Market, applications, and technology insights
- Research agenda implications

Emission Standards Setting

Based on the analysis, there are certain preliminary results that bear consideration as the emissions rules in Texas are confirmed or reformulated.

For the Base Case for all of Texas in 2006, the emissions limits of Scenario 2 would appear to limit the distributed generation markets to 9,218 MW, in comparison to 14,655 MW under the emissions limits of Scenario 3. In 2002 and 2010, the DG market potentials are the same for both Scenario 2 and Scenario 3.

Statewide NO_X emissions are not significantly different between Scenarios 2 and 3, even though the allowable NO_X levels of Scenario 2 are more restrictive than for Scenario 3.

For example, in the Base Case in 2002 and 2010, estimated NO_X emissions are the same for both scenarios. In 2006, estimated NO_X emissions are 5,890 ton/yr under Scenario 2, and 6,287 ton/yr under Scenario 3.

If new, low-NO_X technologies such as advanced microturbines and fuel cells are not economically feasible or cannot cost-effectively meet the NO_X targets before 2006 and 2010, the DG markets in 2006 will be reduced from 14,655 MW to 12,774 MW in Scenario 1, from 9,218 MW to 6,323 MW in Scenario 2, and from 14,655 MW to 11,761 MW in Scenario 3. In 2010 with no advanced microturbine, DG markets drop from 19,619 MW (all scenarios) to 15,134 MW in Scenario 1 and 14,602 MW in both Scenarios 2 and 3. Assuming no advanced microturbine or fuel cell, these markets drop in 2010 to 12,815 MW in Scenario 1, 10,970 MW in Scenario 2, and 11,780 MW in Scenario 3.

Also, if advanced microturbine and fuel cell technologies do not become available, Scenario 1 NO_X emissions could increase in 2006 from 6,790 ton/yr to 9,204 ton/yr; Scenario 2 NO_X emissions could increase from 5,890 ton/yr to 7,080 ton/yr; and Scenario 3 NO_X emissions could increase from 6,287 ton/yr to 7,477 ton/yr. In 2010 with no advanced microturbine, NO_X emissions could increase from 3,866 ton/yr (all scenarios) to 5,676 ton/yr in Scenario 1 and to 4,436 ton/yr in both Scenarios 2 and 3. Assuming no advanced microturbine or fuel cell, NO_X emissions in 2010 could increase to 9,263 ton/yr in Scenario 1, 7,296 ton/yr in Scenario 2, and 7,526 ton/yr in Scenario 3.

Market, Applications and Technology Insights

The market potential for distributed generation in Texas appears substantial. Five DG market applications appear to be economically feasible in all three years studied: Small CHP, Large CHP, Demand Reduction, Oilfield Gas Utilization and Landfill Gas Utilization. The Reliability Enhancement application was cost-effective only in the West Texas zone, with a 7% market share in all years and scenarios.

The On-Site Power application was cost-effective only in 2010, with the fuel cell capturing 8% market share in all zones and scenarios. No cost-effective applications for Standby Generator Activation were identified in any years.

Diverse distributed generation technologies appear to capture the market; the particular technology in a given situation is a function of application, the applicable emissions limit, and technology maturity. Cost-effectiveness is a function of capital cost and the financing (fixed charge rate) it requires, efficiency, fuel cost and O&M costs, which are dependent upon hours of operation.

Given the cost and performance parameters assumed for microturbines, they could be big market players in 2006, contributing substantial emission reduction benefits. Likewise, given the cost and performance parameters assumed for fuel cells, they could be big market players in 2010, with even greater positive emissions impacts.

Demand charge reduction is a likely early application; its low duty cycle (600 hr/yr) results in relatively low yearly emissions totals. The details of tariff design can either encourage or discourage such markets.

Large and small CHP, demand reduction, and landfill gas and oilfield gas utilization markets account for a large proportion of the NO_X emissions in many cases.

Reliability and power quality are high-value applications and can be substantial markets, but because of the low run hours involved, they would not cause substantial NO_X emissions.

Research Agenda Implications

Improving the DG technologies (e.g., lower cost, higher efficiency and reduced NO_X emissions) would be just as effective at lowering NO_X emissions in Texas as would lowering the allowable NO_X levels through the permitting process. In other words, Texas can make the NO_X standard for distributed generation less restrictive (i.e., Scenario 3 rather than Scenario 2) if it can safely assume that microturbines will be cost-effective in 2006, and similarly for fuel cells in 2010. This assumption will depend upon the cost and performance advances expected from manufacturer R&D efforts being achieved as predicted.

If advanced microturbines are not economically viable by 2006, then under Scenario 2 (current regulation) the distributed generation market in most of Texas will be substantially reduced.

If neither advanced fuel cells nor advanced microturbines are economically viable by 2010, the distributed generation market will be cut approximately in half in most of Texas under the current regulation.

Reducing DG costs (e.g., capital and interconnection costs, heat rate, O&M, finance charges, etc.) will accelerate market entry, especially for the more expensive, lower-NO_X technologies.

Assigning proportional market shares to multiple competing technologies in a specific application, rather than assigning all market share to the most cost-effective technology, would represent an improvement in the modeling of the scenarios.

Issues That Could Affect the Accuracy of Study Results

The study results are directly dependent upon the input data and assumptions used. In addition to the uncertainty in technologies, particularly the advanced microturbines and fuel cells alluded to above, other factors could play a significant role in affecting study results, if variations were to occur in those parameters. Some of these include:

Accuracy of the technology data. While the manufacturers supplied the most accurate data available for their equipment, even a small percentage of variation in cost or performance numbers can cause shifts in the results. For example, a slight change in cost could make a technology either more or less cost-effective than alternate technologies in some cases, resulting in a completely different technology "winning" an application, with corresponding changes (plus or minus) in market share and potential NO_X emissions. This is especially true for advanced microturbines and fuel cells, whose cost-competitiveness in 2006 and 2010 depend upon the accuracy of cost and performance predictions being made for them.

Fuel and electricity prices. Cost-effectiveness of DG technologies, particularly for applications with a high number of hours of operation per year, is directly dependent upon fuel costs and how the resulting cost of energy production compares to local utility rates. Low-efficiency DGs are aided by low fuel costs and hindered by high fuel costs. Also, high prevailing electric rates make CHP more attractive; low rates make it less attractive.

Financial parameters. As can be seen from the sensitivity cases, the fixed charge rate that is used to determine the carrying charges is a critical parameter in the overall economics of a DG technology. This factor directly impacts DG market potential, and hence NO_X emissions. High capital cost technologies are much less attractive with high fixed charge rates (e.g., fuel cells in the near term).

Aggregation of multiple DG units. As stated previously, it was assumed that DGs smaller in size than the application specifies (for example, a 250 kW engine for a 1000 kW application) could be aggregated in multiples to fit the application. In reality, some additional costs would likely be incurred due to additional engineering, materials and labor costs to install multiple DG units, as opposed to a single larger unit. This would especially be the case with CHP installations. The additional ducting for heat exchangers would likely increase substantially on a per-unit basis, for multiple units.

Advanced DG technologies. Also from the sensitivity cases, it can be seen that if projected advances in technologies (e.g., fuel cells and microturbines) do not prove successful or are delayed, other technologies much different in cost and emission levels would be used instead in many cases. Given that the efforts to develop these technologies have a large R&D component, some uncertainty in their arrival to market, or even their ultimate materialization, must be expected.

NO_X control technologies. Many of the technologies modeled in this study for 2006 and 2010 assumed that technology advances, and verification of the performance of those technologies, would in fact be successful and make it to market as hoped. This is applicable to engines as well as advanced technologies such as microturbines and fuel cells. Industry experience has shown that not all hoped-for performance results are achieved in the time frame originally projected, and sometimes not at all. Again, some level of uncertainty must be factored into results that depend upon these projected performance parameters.

<u>Percentages of Load in Play.</u> The assumptions regarding how much of the technical market potential for a given application is actually achievable (the “load in play”) are to a certain extent based on experience and engineering judgment. Any variation in these numbers would translate directly into more MWh of energy production and consequent NO_X emissions.

7. References

1. Telephone conversation with John Bean of Energy Developments, Inc., Houston, TX, October 2001. Mr. Bean indicated that the cost associated with landfill gas is mostly dependent upon the cost for the gathering system. Assuming similar needs for oilfield gas, a price of 50 ¢/MMBtu was assumed for oilfield gas used for generation.

2. Telephone conversation with John Bean of Energy Developments, Inc., Houston, TX, October 2001.

3. The U.S. EPA's Landfill Methane Outreach Program (LMOP) is a voluntary assistance and partnership program that helps facilitate and promote the use of landfill gas as a renewable energy source. Their web site is http://www.epa.gov/lmop.

4. Telephone conversation with John Bean of Energy Developments, Inc., Houston, TX, October 2001.

5. Telephone discussion with Kristi Hobbs, Ed Ethridge, and Larry Reed of the Public Utility Commission of Texas (PUCT) on November 5, 2001. It was assumed that time-of-use prices would not apply, given the opportunity for "cherry picking."

6. Kristi Hobbs of the PUCT provided a spreadsheet containing an analysis titled "Comparison of Utilities' Generic T&D Rates" that breaks out T&D charges from key IOUs that are expected under deregulation in Texas.

7. Telephone conversation between Joe Iannucci and Kent Saathoff of the Electric Reliability Council of Texas (ERCOT) November 10, 2001. The subject discussed was congestion reduction benefits from DG use: whether they would exist, under what conditions, the price and how it would be determined.

8. Pupp, Roger; Woo, C.-K.: *Costs of Service Disruptions to Electricity Customers,* The Analysis Group, Inc., January 1991.

9. Personal communication with Brendan Kirby, Oak Ridge National Laboratory (ORNL).

10. Project review meeting, July 2001, Austin, TX. Attendees representing Oak Ridge National Laboratory (ORNL), the Public Utility Commission of Texas (PUCT), the Texas Natural Resource Conservation Commission (TNRCC) and Distributed Utility Associates (DUA) were present. DUA presented proposed estimates for percentages of load in play to assume for the various applications, based on its experience and with the concurrence of the project reviewers.

11. Project meeting at TNRCC, January 2002, Austin, TX. Attendees representing Oak Ridge National Laboratory (ORNL), the Public Utility Commission of Texas (PUCT), the Texas Natural Resource Conservation Commission (TNRCC) and

Distributed Utility Associates (DUA) were present. The percentages of load in play were presented, and concurrence sought from project reviewers.

12. Energy Information Administration (EIA) Natural Gas Annual 2000, available at www.eia.doe.gov/oil_gas/natural_gas/.

13. Energy Information Administration (EIA) Annual Energy Outlook 2001, available at www.eia.doe.gov/oia/aeo/.

14. "Retail Competition: The Toughest Course," Electric Perspectives, May/June 2002, p. 66.

Appendix A. Electric Demand and Evaluation Zones

To establish the technical potential for some applications it is important to know the peak demand in the state. The ERCOT (Electric Reliability Council of Texas) portion of peak load in Texas is shown in Table 14. This load is allocated by evaluation zones in Table 15

The Public Utility Commission of Texas (PUCT) provided load data for counties within ERCOT, and a source of demographic information that was used to scale known loads to estimate loads in non-ERCOT counties.

Th e PUCT also provided load growth data for the years 1994 – 2001. Between 1994 and 2001 ERCOT peak demand grew 24.55% (10,700 MW). During the same period very few capacity additions have been made to the bulk transmission system.

Table 14. ERCOT Coincident Hourly Peak Demand, 1994 - 2001

YEAR	ERCOT COINCIDENT HOURLY PEAK DEMAND, MW	ANNUAL GROWTH
1994	43,588	-
1995	46,668	7.07%
1996	47,683	2.17%
1997	50,150	5.17%
1998	53,689	7.06%
1999	54,849	2.16%
2000	57,606	5.03%
2001	54,288	-5.76%
	Average Seven-Year Compound Growth	2.18%

[Note: 1999 value would have been greater if there had been no interruptible load curtailments at the time. 2001 value is preliminary until confirmed/updated by final settlement meter readings and corrections performed by ERCOT Data Acquisition & Aggregation.]

Table 15. ERCOT Load Allocation by Evaluation Zones, %

West Texas	20
Dallas-Fort Worth (DFW)	15
Houston-Galveston (HGA)	30
Rest-of-East	35

Appendix B. Technology Cost & Performance Data

Fuel Cells

All Emissions Scenarios										
Tech-nology ID	Size Range kW	Year	Capital Cost $/kW	Installed Cost $/kW	With Cogen? Y/N	Heat Rate (HHV) Btu/kWh	Variable O&M $/kWh	Fixed O&M $/kW-yr	NOx Emissions lb/MWh	Model/ Type
FC-1	200	2002	3000	4250	N	8,420	0.01	10.0	0.0033	ONSI PC-25 / Phos Acid
FC-2	200	2002	3500	5000	Y	8,420	0.01	10.0	0.0033	ONSI PC-25 / Phos Acid
FC-3	250	2002	3000	4000	N	7,575	0.01	10.0	0.0033	Ballard Generation System / PEM
FC-4	250	2002	2800	3200	N	6,890	0.01	10.0	0.0055	FCEL / MCFC
FC-5	200	2006	2250	3125	N	8,000	0.01	7.5	0.0033	ONSI PC-25 / Phos Acid
FC-6	200	2006	2625	3750	Y	8,000	0.01	7.5	0.0033	ONSI PC-25 / Phos Acid
FC-7	250	2006	2000	2750	N	7,230	0.01	7.5	0.0033	Ballard Generation System / PEM
FC-8	250	2006	2150	2500	N	6,770	0.01	7.5	0.0055	FCEL / MCFC
FC-9	100	2006	1000	1350	N	8,420	0.01	7.5	0.0055	Siemens / SOFC
FC-10	100	2006	1350	1900	Y	8,420	0.01	7.5	0.0055	Siemens / SOFC
FC-11	300	2010	1500	2000	N	7,575	0.01	5.0	0.0033	ONSI PC-25 / Phos Acid
FC-12	300	2010	1750	2500	Y	7,575	0.01	5.0	0.0033	ONSI PC-25 / Phos Acid
FC-13	250	2010	1000	1500	N	6,890	0.01	5.0	0.0033	Ballard Generation System / PEM
FC-14	1,000	2010	1500	1800	N	6,650	0.01	5.0	0.0055	FCEL / MCFC
FC-15	500	2010	400	550	N	6,315	0.01	5.0	0.0055	Siemens / SOFC
FC-16	500	2010	650	1000	Y	6,315	0.01	5.0	0.0055	Siemens / SOFC

Microturbines

All microturbine data for 2002 is assumed to be valid for the years 2006 and 2010 as well.

Scenario 1B: West Texas, Hours ≤ 300, NOx Level = 21.0 lb/MWh*

Tech-nology ID	Size Range kW	Year	Capital Cost $/kW	Installed Cost $/kW	Co-gen? Y/N	Heat Rate (HHV) Btu/kWh	Variable O&M $/kWh	NOx Emissions ppm	NOx Emissions lb/MWh	Model/Type	NOx Reduction Method(s)
M-1A	60	2002	817	940	N	13,540	0.010	9.0	0.541	Capstone 60	Lean-premix combustion; 9 ppm NOx
M-1B	30	2002	1057	1273	N	13,985	0.010	9.0	0.558	Capstone 330 HP	Lean-premix combustion; 9 ppm NOx
M-1C	28	2002	1265	1505	N	14,430	0.010	9.0	0.576	Capstone 330 LP	Lean-premix combustion; 9 ppm NOx
M-1D	28	2002	1295	1540	N	15,095	0.010	9.0	0.603	Capstone 330 LP/RFC	Lean-premix combustion; 9 ppm NOx
M-1E	60	2006	700	825	N	10,820	0.005	1.6	0.078	Capstone 60	DOE research target
M-1F	60	2010	500	625	N	9,435	0.005	1.9	0.078	Capstone 60	DOE research target

*No CHP applications for this scenario because of low run hours.

Scenario 1B: West Texas, Hours > 300, NOx Level = 3.11 lb/MWh

Tech-nology ID	Size Range kW	Year	Capital Cost $/kW	Installed Cost $/kW	Co-gen? Y/N	Heat Rate (HHV) Btu/kWh	Variable O&M $/kWh	NOx Emissions ppm	NOx Emissions lb/MWh	Model/Type	NOx Reduction Method(s)
M-2A	60	2002	817	940	N	13,540	0.010	9.0	0.541	Capstone 60	Lean-premix combustion; 9 ppm NOx
M-2B	60	2002	950	1093	Y	13,540	0.010	9.0	0.541	Capstone 60	Lean-premix combustion; 9 ppm NOx
M-2C	30	2002	1057	1257	N	13,985	0.010	9.0	0.558	Capstone 330 HP	Lean-premix combustion; 9 ppm NOx
M-2D	30	2002	1323	1575	Y	13,985	0.010	9.0	0.558	Capstone 330 HP	Lean-premix combustion; 9 ppm NOx
M-2E	28	2002	1265	1505	N	14,430	0.010	9.0	0.576	Capstone 330 LP	Lean-premix combustion; 9 ppm NOx
M-2F	28	2002	1400	1610	Y	14,430	0.010	9.0	0.576	Capstone 330 LP	Lean-premix combustion; 9 ppm NOx
M-2G	28	2002	1415	1685	N	15,095	0.010	9.0	0.603	Capstone 330 LP/RFC	Lean-premix combustion; 9 ppm NOx
M-2H	28	2002	1550	1845	Y	15,095	0.010	9.0	0.603	Capstone 330 LP/RFC	Lean-premix combustion; 9 ppm NOx
M-2I	60	2006	700	825	N	10,820	0.005	1.6	0.078	Capstone 60	DOE research target
M-2J	60	2006	825	945	Y	10,820	0.005	1.6	0.078	Capstone 60	DOE research target
M-2K	60	2010	500	625	N	9,435	0.005	1.9	0.078	Capstone 60	DOE research target
M-2L	60	2010	625	715	Y	9,435	0.005	1.9	0.078	Capstone 60	DOE research target

Scenario 1C: West Texas, Hours > 300, NOx Level = 3.11 lb/MWh, Oilfield gas											
Tech-nology ID	Size Range kW	Year	Capital Cost $/kW	Installed Cost $/kW	Co-gen? Y/N	Heat Rate (HHV) Btu/kWh	Variable O&M $/kWh	NOx Emissions ppm	NOx Emissions lb/MWh	Model/Type	NOx Reduction Method(s)
M-3A	30	2002	980	1162	N	13,985	0.010	9.0	0.558	Capstone 330*	Lean-premix combustion; 9 ppm NOx
M-3B	30	2002	1010	1202	Y	13,985	0.010	9.0	0.558	Capstone 330*	Lean-premix combustion; 9 ppm NOx
M-3C	30	2006	980	1162	N	13,985	0.010	9.0	0.558	Capstone 330*	Lean-premix combustion; 9 ppm NOx
M-3D	30	2006	1010	1202	Y	13,985	0.010	9.0	0.558	Capstone 330*	Lean-premix combustion; 9 ppm NOx
M-3E	30	2010	980	1162	N	13,985	0.010	9.0	0.558	Capstone 330*	Lean-premix combustion; 9 ppm NOx
M-3F	30	2010	1010	1202	Y	13,985	0.010	9.0	0.558	Capstone 330*	Lean-premix combustion; 9 ppm NOx

* Provided without standard casing and packaging; assumed to be installed in industrial environment.

Scenario 1C: East Texas, Hours > 300, NOx Level = 1.77 lb/MWh, Landfill Gas											
Tech-nology ID	Size Range kW	Year	Capital Cost $/kW	Installed Cost $/kW	Co-gen? Y/N	Heat Rate (HHV) Btu/kWh	Variable O&M $/kWh	NOx Emissions ppm	NOx Emissions lb/MWh	Model/Type	NOx Reduction Method(s)
M-4A	15-30	2002	1110	1320	N	13,985	0.010	9.0	0.558	Capstone 330 LFG	Lean-premix combustion; 9 ppm NOx
M-4B	15-30	2002	1240	1475	Y*	13,985	0.010	9.0	0.558	Capstone 330 LFG	Lean-premix combustion; 9 ppm NOx
M-4C	15-30	2006	1110	1320	N	13,985	0.005	9.0	0.558	Capstone 330 LFG	Lean-premix combustion; 9 ppm NOx
M-4D	15-30	2006	1240	1475	Y*	13,985	0.005	9.0	0.558	Capstone 330 LFG	Lean-premix combustion; 9 ppm NOx
M-4E	15-30	2010	1110	1320	N	13,985	0.005	9.0	0.558	Capstone 330 LFG	Lean-premix combustion; 9 ppm NOx
M-4F	15-30	2010	1240	1475	Y*	13,985	0.005	9.0	0.558	Capstone 330 LFG	Lean-premix combustion; 9 ppm NOx

* CHP probably not available at most landfill sites; costs provided for reference, if CHP is feasible.
Capital and installed costs include the extra equipment needed for processing the landfill gas.

Scenario 1A: East Texas, Hours ≤ 300, NOx Level = 1.65 lb/MWh*											
Tech-nology ID	Size Range kW	Year	Capital Cost $/kW	Installed Cost $/kW	Co-gen? Y/N	Heat Rate (HHV) Btu/kWh	Variable O&M $/kWh	NOx Emissions		Model/Type	NOx Reduction Method(s)
								ppm	lb/MWh		
M-5A	60	2002	817	940	N	13,540	0.010	9.0	0.541	Capstone 60	Lean-premix combustion; 9 ppm NOx
M-5B	30	2002	1057	1273	N	13,985	0.010	9.0	0.558	Capstone 330 HP	Lean-premix combustion; 9 ppm NOx
M-5C	28	2002	1265	1505	N	14,430	0.010	9.0	0.576	Capstone 330 LP	Lean-premix combustion; 9 ppm NOx
M-5D	28	2002	1295	1540	N	15,095	0.010	9.0	0.603	Capstone 330 LP/RFC	Lean-premix combustion; 9 ppm NOx
M-5E	60	2006	700	825	N	10,820	0.005	1.6	0.078	Capstone 60	DOE research target
M-5F	60	2010	500	625	N	9,435	0.005	1.9	0.078	Capstone 60	DOE research target

*Note: No CHP applications for this scenario because of low run hours.

Scenario 1A: East Texas, Hours > 300, NOx Level = 0.47 lb/MWh											
Tech-nology ID	Size Range kW	Year	Capital Cost $/kW	Installed Cost $/kW	Co-gen? Y/N	Heat Rate (HHV) Btu/kWh	Variable O&M $/kWh	NOx Emissions		Model/Type	NOx Reduction Method(s)
								ppm	lb/MWh		
		2002*								N/A	
M-6A	60	2006	700	825	N	10,820	0.0047	1.6	0.078	Capstone 60	DOE research target
M-6B	60	2006	825	945	Y	10,820	0.0047	1.6	0.078	Capstone 60	DOE research target
M-6C	60	2010	500	625	N	9,435	0.0047	1.9	0.078	Capstone 60	DOE research target
M-6D	60	2010	625	715	Y	9,435	0.0047	1.9	0.078	Capstone 60	DOE research target

*No microturbine models available for 2002 meeting this NOx emissions level.

Scenarios 2 & 3: East Texas, Hours ≤ 300, after 1/1/05, NOx Level = 0.47 lb/MWh*											
Tech-nology ID	Size Range kW	Year	Capital Cost $/kW	Installed Cost $/kW	Co-gen? Y/N	Heat Rate (HHV) Btu/kWh	Variable O&M $/kWh	NOx Emissions		Model/Type	NOx Reduction Method(s)
								ppm	lb/MWh		
		2002*								N/A	
M-7A	60	2006	700	825	N	10,820	0.0047	1.6	0.078	Capstone 60	DOE research target
M-7B	60	2010	500	625	N	9,435	0.0047	1.9	0.078	Capstone 60	DOE research target

*No CHP applications for this scenario because of low run hours.
No microturbine models available for 2002 meeting this NOx emissions level.

Scenario 3: East Texas, Hours > 300, after 1/1/05, NOx Level = 0.23 lb/MWh											
Tech-nology ID	Size Range kW	Year	Capital Cost $/kW	Installed Cost $/kW	Co-gen? Y/N	Heat Rate (HHV) Btu/kWh	Variable O&M $/kWh	NOx Emissions		Model/Type	NOx Reduction Method(s)
								ppm	lb/MWh		
		2002*								N/A	
M-8A	60	2006	700	825	N	10,820	0.005	1.6	0.078	Capstone 60	DOE research target
M-8B	60	2006	825	945	Y	10,820	0.005	1.6	0.078	Capstone 60	DOE research target
M-8C	60	2010	500	625	N	9,435	0.005	1.9	0.078	Capstone 60	DOE research target
M-8D	60	2010	625	715	Y	9,435	0.005	1.9	0.078	Capstone 60	DOE research target

*No microturbine models available for 2002 meeting this NOx emissions level.

Scenario 2: East Texas, Hours > 300, after 1/1/05, NOx Level = 0.14 lb/MWh											
Tech-nology ID	Size Range kW	Year	Capital Cost $/kW	Installed Cost $/kW	Co-gen? Y/N	Heat Rate (HHV) Btu/kWh	Variable O&M $/kWh	NOx Emissions		Model/Type	NOx Reduction Method(s)
								ppm	lb/MWh		
		2002*								N/A	
M-9A	60	2006	700	825	N	10,820	0.005	1.6	0.078	Capstone 60	DOE research target
M-9B	60	2006	825	945	Y	10,820	0.005	1.6	0.078	Capstone 60	DOE research target
M-9C	60	2010	500	625	N	9,435	0.005	1.9	0.078	Capstone 60	DOE research target
M-9D	60	2010	625	715	Y	9,435	0.005	1.9	0.078	Capstone 60	DOE research target

*No microturbine models available for 2002 meeting this NOx emissions level.

Combustion Turbines

All combustion turbine data for 2002 is assumed to be valid for years 2006 and 2010 as well.

Scenario 1B: West Texas, Hours ≤ 300, NOx Level = 21.0 lb/MWh*										
Tech-nology ID	Size Range kW	Year	Capital Cost $/kW	Installed Cost $/kW	Co-gen? Y/N	Heat Rate (HHV) Btu/kWh	Variable O&M $/kWh	NOx Emissions lb/MWh	Model/Type	NOx Reduction Method(s)
CT-1A	9,450	2002	340	540	N	11,888	0.010	13.21	Solar Mars 90	Conventional combustor: 250 ppm NOx
CT-1B	5,200	2002	310	510	N	12,502	0.010	13.88	Solar Taurus 60	Conventional combustor: 250 ppm NOx
CT-1C	1,210	2002	490	920	N	15,509	0.010	17.05	Solar Saturn 20	Conventional combustor: 250 ppm NOx
CT-1D	4,200	2006	430	780	N	9,468	0.006	0.377	Solar Mercury 50	Dry Low-NOx combustion: 9 ppm NOx
CT-1E	4,200	2010	430	780	N	9,468	0.006	0.377	Solar Mercury 50	Dry Low-NOx combustion: 9 ppm NOx

*No CHP applications for this scenario because of low run hours.

Scenario 1B: West Texas, Hours > 300, NOx Level = 3.11 lb/MWh										
Tech-nology ID	Size Range kW	Year	Capital Cost $/kW	Installed Cost $/kW	Co-gen? Y/N	Heat Rate (HHV) Btu/kWh	Variable O&M $/kWh	NOx Emissions lb/MWh	Model/Type	NOx Reduction Method(s)
CT-2A	9,450	2002	390	591	N	11,888	0.010	1.321	Solar Mars 90	Dry Low-NOx combustion; 25 ppm NOx
CT-2B	9,450	2002	450	690	Y	11,888	0.013	1.321	Solar Mars 90	Dry Low-NOx combustion; 25 ppm NOx
CT-2C	5,200	2002	350	550	N	12,502	0.010	1.388	Solar Taurus 60	Dry Low-NOx combustion; 25 ppm NOx
CT-2D	5,200	2002	430	670	Y	12,502	0.013	1.388	Solar Taurus 60	Dry Low-NOx combustion; 25 ppm NOx
CT-2E	1,210	2002	670	1100	N	15,509	0.012	2.886	Solar Saturn 20	Water injection: 42 ppm NOx
CT-2F	1,210	2002	930	1500	Y	15,509	0.015	2.886	Solar Saturn 20	Water injection: 42 ppm NOx
CT-2G	4,200	2006	430	780	N	9,468	0.006	0.377	Solar Mercury 50	Dry Low-NOx combustion: 9 ppm NOx
CT-2H	4,200	2006	530	930	Y	9,468	0.009	0.377	Solar Mercury 50	Dry Low-NOx combustion: 9 ppm NOx
CT-2I	4,200	2010	430	780	N	9,468	0.006	0.377	Solar Mercury 50	Dry Low-NOx combustion: 9 ppm NOx
CT-2J	4,200	2010	530	930	Y	9,468	0.009	0.377	Solar Mercury 50	Dry Low-NOx combustion: 9 ppm NOx

Scenario 1C: West Texas, Hours > 300, NOx Level = 3.11 lb/MWh, Oilfield gas										
Tech-nology ID	Size Range kW	Year	Capital Cost $/kW	Installed Cost $/kW	Co-gen? Y/N	Heat Rate (HHV) Btu/kWh	Variable O&M $/kWh	NOx Emissions lb/MWh	Model/Type	NOx Reduction Method(s)
CT-3A	9,450	2002	390	591	N	11,888	0.010	1.321	Solar Mars 90	Dry Low-NOx combustion; 25 ppm NOx
CT-3B	9,450	2002	450	690	Y	11,888	0.013	1.321	Solar Mars 90	Dry Low-NOx combustion; 25 ppm NOx
CT-3C	5,200	2002	350	550	N	12,502	0.010	1.388	Solar Taurus 60	Dry Low-NOx combustion; 25 ppm NOx
CT-3D	5,200	2002	430	670	Y	12,502	0.013	1.388	Solar Taurus 60	Dry Low-NOx combustion; 25 ppm NOx
CT-3E	1,210	2002	670	1100	N	15,509	0.012	2.886	Solar Saturn 20	Water injection: 42 ppm NOx
CT-3F	1,210	2002	930	1500	Y	15,509	0.015	2.886	Solar Saturn 20	Water injection: 42 ppm NOx
		2006*								
		2010*								

*All 2002 models are assumed to be available in 2006 and 2010.

Scenario 1C: East Texas, Hours > 300, NOx Level = 1.77 lb/MWh, Landfill Gas*										
Tech-nology ID	Size Range kW	Year	Capital Cost $/kW	Installed Cost $/kW	Co-gen? Y/N	Heat Rate (HHV) Btu/kWh	Variable O&M $/kWh	NOx Emissions lb/MWh	Model/Type	NOx Reduction Method(s)
CT-4A	9,450	2002	440	641	N	11,888	0.010	1.587	Solar Mars 90	Conventional combustor @ 30 ppm NOx
CT-4B	9,450	2002	465	705	Y*	11,888	0.013	1.587	Solar Mars 90	Conventional combustor @ 30 ppm NOx
CT-4C	5,200	2002	400	600	N	12,502	0.010	1.665	Solar Taurus 60	Conventional combustor @ 30 ppm NOx
CT-4D	5,200	2002	480	720	Y*	12,502	0.013	1.665	Solar Taurus 60	Conventional combustor @ 30 ppm NOx
		2006**								
		2010**								

* CHP probably not available at most landfill sites; costs provided for reference, if CHP is feasible.
Capital and installed costs include the extra equipment needed for processing the landfill gas.

**All 2002 models are assumed to be available in 2006 and 2010.

Scenario 1A: East Texas, Hours < 300, NOx Level = 1.65 lb/MWh*										
Tech-nology ID	Size Range kW	Year	Capital Cost $/kW	Installed Cost $/kW	Co-gen? Y/N	Heat Rate (HHV) Btu/kWh	Variable O&M $/kWh	NOx Emissions lb/MWh	Model/Type	NOx Reduction Method(s)
CT-5A	9,450	2002	390	591	N	11,888	0.010	1.321	Solar Mars 90	Dry Low-NOx combustion; 25 ppm NOx
CT-5B	5,200	2002	350	550	N	12,502	0.010	1.388	Solar Taurus 60	Dry Low-NOx combustion; 25 NOx
CT-5C	1,210	2002	1177	1708	N	15,509	0.012	0.344	Solar Saturn 20	Water injection and SCR; 5 ppm NOx
CT-5D	4,200	2006	430	780	N	9,468	0.006	0.377	Solar Mercury 50	Dry Low-NOx combustion: 9 ppm NOx
CT-5E	4,200	2010	430	780	N	9,468	0.006	0.377	Solar Mercury 50	Dry Low-NOx combustion: 9 ppm NOx

*Note: No CHP applications for this scenario because of low run hours.

Scenario 1A: East Texas, Hours > 300, NOx Level = 0.47 lb/MWh										
Tech-nology ID	Size Range kW	Year	Capital Cost $/kW	Installed Cost $/kW	Co-gen? Y/N	Heat Rate (HHV) Btu/kWh	Variable O&M $/kWh	NOx Emissions lb/MWh	Model/Type	NOx Reduction Method(s)
CT-6A	9,450	2002	492	713	N	11,888	0.012	0.263	Solar Mars 90	Dry Low-NOx combustion, SCR: 5 ppm NOx
CT-6B	9,450	2002	532	785	Y	11,888	0.015	0.263	Solar Mars 90	Dry Low-NOx combustion, SCR: 5 ppm NOx
CT-6C	5,200	2002	498	728	N	12,502	0.012	0.278	Solar Taurus 60	Dry Low-NOx combustion, SCR: 5 ppm NOx
CT-6D	5,200	2002	580	850	Y	12,502	0.015	0.278	Solar Taurus 60	Dry Low-NOx combustion, SCR: 5 ppm NOx
CT-6E	1,210	2002	1177	1708	N	15,509	0.012	0.344	Solar Saturn 20	Water injection and SCR: 5 ppm NOx
CT-6F	1,210	2002	1540	2110	Y	15,509	0.015	0.344	Solar Saturn 20	Water injection and SCR: 5 ppm NOx
CT-6G	4,200	2006	430	780	N	9,468	0.006	0.377	Solar Mercury 50	Dry Low-emissions combustion: 9 ppm NOx
CT-6H	4,200	2006	530	930	Y	9,468	0.009	0.377	Solar Mercury 50	Dry Low-emissions combustion: 9 ppm NOx
CT-6I	4,200	2010	430	780	N	9,468	0.006	0.377	Solar Mercury 50	Dry Low-emissions combustion: 9 ppm NOx
CT-6J	4,200	2010	530	930	Y	9,468	0.009	0.377	Solar Mercury 50	Dry Low-emissions combustion: 9 ppm NOx

Scenarios 2 & 3: East Texas, Hours ≤ 300, after 1/1/05, NOx Level = 0.47 lb/MWh*										
Tech-nology ID	**Size Range kW**	**Year**	**Capital Cost $/kW**	**Installed Cost $/kW**	**Co-gen? Y/N**	**Heat Rate (HHV) Btu/kWh**	**Variable O&M $/kWh**	**NOx Emissions lb/MWh**	**Model/Type**	**NOx Reduction Method(s)**
CT-7A	9,450	2002	492	713	N	11,888	0.012	0.263	Solar Mars 90	Dry Low-NOx combustion, SCR: 5 ppm NOx
CT-7B	5,200	2002	498	728	N	12,502	0.012	0.278	Solar Taurus 60	Dry Low-NOx combustion, SCR: 5 ppm NOx
CT-7C	1,210	2002	1177	1708	N	15,509	0.012	0.344	Solar Saturn 20	Water injection and SCR: 5 ppm NOx
CT-7D	4,200	2006	430	780	N	9,468	0.006	0.377	Solar Mercury 50	Dry Low-emissions combustion: 9 ppm NOx
CT-7E	4,200	2010	430	780	N	9,468	0.006	0.377	Solar Mercury 50	Dry Low-emissions combustion: 9 ppm NOx

*Note: No CHP applications for this scenario because of low run hours.

Scenario 3: East Texas, Hours > 300, after 1/1/05, NOx Level = 0.23 lb/MWh										
Tech-nology ID	**Size Range kW**	**Year**	**Capital Cost $/kW**	**Installed Cost $/kW**	**Co-gen? Y/N**	**Heat Rate (HHV) Btu/kWh**	**Variable O&M $/kWh**	**NOx Emissions lb/MWh**	**Model/Type**	**NOx Reduction Method(s)**
CT-8A	9,450	2002	492	713	N	11,888	0.012	0.132	Solar Mars 90	Dry Low-NOx combustion, SCR: 2.5 ppm NOx
CT-8B	9,450	2002	532	785	Y	11,888	0.015	0.132	Solar Mars 90	Dry Low-NOx combustion, SCR: 2.5 ppm NOx
CT-8C	5,200	2002	498	728	N	12,502	0.012	0.139	Solar Taurus 60	Dry Low-NOx combustion, SCR: 2.5 ppm NOx
CT-8D	5,200	2002	580	850	Y	12,502	0.015	0.139	Solar Taurus 60	Dry Low-NOx combustion, SCR: 2.5 ppm NOx
CT-8E	1,210	2002	1177	1708	N	15,509	0.012	0.151	Solar Saturn 20	Water injection, SCR: 2.5 ppm NOx
CT-8F	1,210	2002	1540	2110	Y	15,509	0.015	0.151	Solar Saturn 20	Water injection, SCR: 2.5 ppm NOx
CT-8G	4,200	2006	580	960	N	9,468	0.008	0.104	Solar Mercury 50	Dry Low-NOx combustion; SCR: 2.5 ppm NOx
CT-8H	4,200	2006	680	1110	Y	9,468	0.011	0.104	Solar Mercury 50	Dry Low-NOx combustion; SCR: 2.5 ppm NOx
CT-8I	4,200	2010	580	960	N	9,468	0.008	0.104	Solar Mercury 50	Dry Low-NOx combustion; SCR: 2.5 ppm NOx
CT-8J	4,200	2010	680	1110	Y	9,468	0.011	0.104	Solar Mercury 50	Dry Low-NOx combustion; SCR: 2.5 ppm NOx

Scenario 2: East Texas, Hours > 300, after 1/1/05, NOx Level = 0.14 lb/MWh										
Tech-nology ID	**Size Range kW**	**Year**	**Capital Cost $/kW**	**Installed Cost $/kW**	**Co-gen? Y/N**	**Heat Rate (HHV) Btu/kWh**	**Variable O&M $/kWh**	**NOx Emissions lb/MWh**	**Model/Type**	**NOx Reduction Method(s)**
CT-9A	9,450	2002	492	713	N	11,888	0.012	0.132	Solar Mars 90	Dry Low-NOx combustion, SCR: 2.5 ppm NOx
CT-9B	9,450	2002	532	785	Y	11,888	0.015	0.132	Solar Mars 90	Dry Low-NOx combustion, SCR: 2.5 ppm NOx
CT-9C	5,200	2002	498	728	N	12,502	0.012	0.139	Solar Taurus 60	Dry Low-NOx combustion, SCR: 2.5 ppm NOx
CT-9D	5,200	2002	580	850	Y	12,502	0.015	0.139	Solar Taurus 60	Dry Low-NOx combustion, SCR: 2.5 ppm NOx
CT-9E	1,210	2002	1177	1708	N	15,509	0.012	0.121	Solar Saturn 20	Water injection, SCR: 2 ppm NOx
CT-9F	1,210	2002	1540	2110	Y	15,509	0.015	0.121	Solar Saturn 20	Water injection, SCR: 2 ppm NOx
CT-9G	4,200	2006	580	960	N	9,468	0.008	0.104	Solar Mercury 50	Dry Low-NOx combustion; SCR: 2.5 ppm NOx
CT-9H	4,200	2006	680	1110	Y	9,468	0.011	0.104	Solar Mercury 50	Dry Low-NOx combustion; SCR: 2.5 ppm NOx
CT-9I	4,200	2010	580	960	N	9,468	0.008	0.104	Solar Mercury 50	Dry Low-NOx combustion; SCR: 2.5 ppm NOx
CT-9J	4,200	2010	680	1110	Y	9,468	0.011	0.104	Solar Mercury 50	Dry Low-NOx combustion; SCR: 2.5 ppm NOx

Natural Gas Engines

Scenario 1B: West Texas, Hours < 300, NOx Level = 21.0 lb/MWh*											
Tech-nology ID	Size Range kW	Year	Capital Cost $/kW	Installed Cost $/kW	Co-gen? Y/N	Heat Rate (HHV) Btu/kWh	Variable O&M $/kWh	NOx Emissions g/hp-hr	NOx Emissions lb/MWh	Model/Type	NOx Reduction Method(s)
NG-1A	200-1000	2002	500	700	N	11,500	0.010	5.00	14.78	Caterpillar 14-69L	Factory air/fuel ratio system
NG-1B	50-750	2002	300	430	N	13,000	0.0092	0.84	2.49	Cummins	Single catalyst
NG-1C	200-1000	2006	500	700	N	11,500	0.010	5.00	14.78	Caterpillar 14-69L	Factory air/fuel ratio system
NG-1D	50-750	2006	300	430	N	13,000	0.0092	0.52	1.55	Cummins	Single catalyst
NG-1E	200-1000	2010	500	700	N	11,500	0.010	5.00	14.78	Caterpillar 14-69L	Factory air/fuel ratio system
NG-1F	50-750	2010	300	430	N	13,000	0.0092	0.52	1.55	Cummins	Single catalyst

*Note: No CHP applications for this scenario because of low run hours.

Scenario 1B: West Texas, Hours > 300, NOx Level = 3.11 lb/MWh											
Tech-nology ID	Size Range kW	Year	Capital Cost $/kW	Installed Cost $/kW	Co-gen? Y/N	Heat Rate (HHV) Btu/kWh	Variable O&M $/kWh	NOx Emissions g/hp-hr	NOx Emissions lb/MWh	Model/Type	NOx Reduction Method(s)
NG-2A	500-1000	2002	605-675	950	N	11,500	0.014	0.20	0.59	Caterpillar 34-69L	SCR
NG-2B	330-1750	2002	400	550	N	9,970	0.0092	0.80	2.37	Cummins QSK/QSV	Lean burn
NG-2C	330-1750	2002	500-550	670	Y	9,970	0.0097	0.80	2.37	Cummins QSK/QSV	Lean burn
NG-2D	500-1000	2006	605-675	950	N	11,500	0.014	0.20	0.59	Caterpillar 34-69L	SCR
NG-2E	330-1750	2006	375	520	N	9,970	0.0092	0.50	1.48	Cummins QSK/QSV	Lean burn
NG-2F	330-1750	2006	475-525	645	Y	9,970	0.0097	0.50	1.48	Cummins QSK/QSV	Lean burn
NG-2G	500-1000	2010	605-675	950	N	11,500	0.014	0.20	0.59	Caterpillar 34-69L	SCR
NG-2H	330-1750	2010	375	515	N	9,970	0.0092	0.50	1.48	Cummins QSK/QSV	Lean burn
NG-2I	330-1750	2010	475-525	640	Y	9,970	0.0097	0.50	1.48	Cummins QSK/QSV	Lean burn

Scenario 1C: West Texas, Hours > 300, NOx Level = 3.11 lb/MWh, Oilfield gas											
Tech-nology ID	Size Range kW	Year	Capital Cost $/kW	Installed Cost $/kW	Co-gen? Y/N	Heat Rate (HHV) Btu/kWh	Variable O&M $/kWh	NOx Emissions		Model/Type	NOx Reduction Method(s)
								g/hp-hr	lb/MWh		
NG-3A	500-1000	2002	605-675	950	N	11,500	0.014	0.20	0.59	Caterpillar 34-69L	SCR
NG-3B	330-1750	2002	400	550	N	9,970	0.0092	0.80	2.37	Cummins QSK/QSV	Lean burn
NG-3C	330-1750	2002	500-550	670	Y	9,970	0.0097	0.80	2.37	Cummins QSK/QSV	Lean burn
NG-3D	500-1000	2006	605-675	950	N	11,500	0.014	0.20	0.59	Caterpillar 34-69L	SCR
NG-3E	330-1750	2006	375	520	N	9,970	0.0092	0.50	1.48	Cummins QSK/QSV	Lean burn
NG-3F	330-1750	2006	475-525	645	Y	9,970	0.0097	0.50	1.48	Cummins QSK/QSV	Lean burn
NG-3G	500-1000	2010	605-675	950	N	11,500	0.014	0.20	0.59	Caterpillar 34-69L	SCR
NG-3H	330-1750	2010	375	515	N	9,970	0.0092	0.50	1.48	Cummins QSK/QSV	Lean burn
NG-3I	330-1750	2010	475-525	640	Y	9,970	0.0097	0.50	1.48	Cummins QSK/QSV	Lean burn

Scenario 1C: East Texas, Hours > 300, NOx Level = 1.77 lb/MWh, Landfill Gas*											
Tech-nology ID	Size Range kW	Year	Capital Cost $/kW	Installed Cost $/kW	Co-gen? Y/N	Heat Rate (HHV) Btu/kWh	Variable O&M $/kWh	NOx Emissions		Model/Type	NOx Reduction Method(s)
								g/hp-hr	lb/MWh		
NG-4A	800-1000	2002	500	700	N	11,500	0.010	0.54	1.60	Caterpillar 34-69L	Factory lean burn technology
NG-4B	330-1750	2002	450	610	N	9,970	0.0110	0.50	1.48	Cummins QSK/QSV	Lean burn; or rich burn + catalyst
NG-4C	330-1750	2002	550-600	720	Y	9,970	0.0115	0.50	1.48	Cummins QSK/QSV	Lean burn; or rich burn + catalyst
NG-4D	800-1000	2006	500	700	N	11,500	0.010	0.54	1.60	Caterpillar 34-69L	Factory lean burn technology
NG-4E	330-1750	2006	425	585	N	9,970	0.0110	0.50	1.48	Cummins QSK/QSV	Lean burn; or rich burn + catalyst
NG-4F	330-1750	2006	525-575	695	Y	9,970	0.0115	0.50	1.48	Cummins QSK/QSV	Lean burn; or rich burn + catalyst
NG-4G	800-1000	2010	500	700	N	11,500	0.010	0.54	1.60	Caterpillar 34-69L	Factory lean burn technology
NG-4H	330-1750	2010	400	560	N	9,970	0.0110	0.50	1.48	Cummins QSK/QSV	Lean burn; or rich burn + catalyst
NG-4I	330-1750	2010	500-550	670	Y	9,970	0.0115	0.50	1.48	Cummins QSK/QSV	Lean burn; or rich burn + catalyst

* CHP probably not available at most landfill sites; costs provided for reference, if CHP is feasible.
Capital and installed costs include the extra equipment needed for processing the landfill gas.

Scenario 1A: East Texas, Hours < 300, NOx Level = 1.65 lb/MWh*											
Tech-nology ID	Size Range kW	Year	Capital Cost $/kW	Installed Cost $/kW	Co-gen? Y/N	Heat Rate (HHV) Btu/kWh	Variable O&M $/kWh	NOx Emissions g/hp-hr	NOx Emissions lb/MWh	Model/Type	NOx Reduction Method(s)
NG-5A	500-1000	2002	600-675	1050	N	11,500	0.014	0.20	0.59	Caterpillar 34-69L	SCR
NG-5B	330-1750	2002	400	550	N	9,970	0.0092	0.50	1.48	Cummins QSK/QSV	Lean burn
NG-5C	500-1000	2006	600-675	1050	N	11,500	0.014	0.20	0.59	Caterpillar 34-69L	SCR
NG-5D	330-1750	2006	375	520	N	9,970	0.0092	0.50	1.48	Cummins QSK/QSV	Lean burn
NG-5E	500-1000	2010	825-1025	1050	N	11,500	0.014	0.20	0.59	Caterpillar 34-69L	SCR
NG-5F	330-1750	2010	375	515	N	9,970	0.0092	0.50	1.48	Cummins QSK/QSV	Lean burn

*Note: No CHP applications for this scenario because of low run hours.

Scenario 1A: East Texas, Hours > 300, NOx Level = 0.47 lb/MWh											
Tech-nology ID	Size Range kW	Year	Capital Cost $/kW	Installed Cost $/kW	Co-gen? Y/N	Heat Rate (HHV) Btu/kWh	Variable O&M $/kWh	NOx Emissions g/hp-hr	NOx Emissions lb/MWh	Model/Type	NOx Reduction Method(s)
NG-6A	500-1000	2002	650-750	1100	N	11,500	0.014	0.10	0.30	Caterpillar 34-69L	SCR
NG-6B	330-1750	2002	600	780	N	9,970	0.0110	0.08	0.25	Cummins QSK/QSV	90% open-loop SCR + oxidation catalyst
NG-6C	330-1750	2002	700-750	870	Y	9,970	0.0115	0.08	0.25	Cummins QSK/QSV	90% open-loop SCR + oxidation catalyst
NG-6D	500-1000	2006	650-750	1100	N	11,500	0.014	0.10	0.30	Caterpillar 34-69L	SCR
NG-6E	330-1750	2006	575	755	N	9,970	0.0110	0.05	0.16	Cummins QSK/QSV	90% open-loop SCR + oxidation catalyst
NG-6F	330-1750	2006	675-725	845	Y	9,970	0.0115	0.05	0.16	Cummins QSK/QSV	90% open-loop SCR + oxidation catalyst
NG-6G	500-1000	2010	650-750	1100	N	11,500	0.014	0.10	0.30	Caterpillar 34-69L	SCR
NG-6H	330-1750	2010	550	730	N	9,970	0.0110	0.05	0.16	Cummins QSK/QSV	90% open-loop SCR + oxidation catalyst
NG-6I	330-1750	2010	650-700	820	Y	9,970	0.0115	0.05	0.16	Cummins QSK/QSV	90% open-loop SCR + oxidation catalyst

Scenarios 2 & 3: East Texas, Hours < 300, after 1/1/05, NOx Level = 0.47 lb/MWh*											
Tech-nology ID	Size Range kW	Year	Capital Cost $/kW	Installed Cost $/kW	Co-gen? Y/N	Heat Rate (HHV) Btu/kWh	Variable O&M $/kWh	NOx Emissions		Model/Type	NOx Reduction Method(s)
								g/hp-hr	lb/MWh		
NG-7A	500-1000	2002	650-750	1100	N	11,500	0.014	0.10	0.30	Caterpillar 34-69L	SCR
NG-7B	330-1750	2002	600	780	N	9,970	0.0110	0.08	0.25	Cummins QSK/QSV	90% open-loop SCR + oxidation catalyst
NG-7C	500-1000	2006	650-750	1100	N	11,500	0.014	0.10	0.30	Caterpillar 34-69L	SCR
NG-7D	330-1750	2006	575	755	N	9,970	0.0110	0.05	0.16	Cummins QSK/QSV	90% open-loop SCR + oxidation catalyst
NG-7E	500-1000	2010	650-750	1100	N	11,500	0.014	0.10	0.30	Caterpillar 34-69L	SCR
NG-7F	330-1750	2010	550	730	N	9,970	0.0110	0.05	0.16	Cummins QSK/QSV	90% open-loop SCR + oxidation catalyst

*Note: No CHP applications for this scenario because of low run hours.

Scenario 3: East Texas, Hours > 300, after 1/1/05, NOx Level = 0.23 lb/MWh											
Tech-nology ID	Size Range kW	Year	Capital Cost $/kW	Installed Cost $/kW	Co-gen? Y/N	Heat Rate (HHV) Btu/kWh	Variable O&M $/kWh	NOx Emissions		Model/Type	NOx Reduction Method(s)
								g/hp-hr	lb/MWh		
		2002*								N/A	
NG-8A	330-1750	2006	600	780	N	9,970	0.0110	0.04	0.12	Cummins QSK/QSV	98% closed-loop SCR + oxidation catalys
NG-8B	330-1750	2006	700-750	930	Y	9,970	0.0115	0.04	0.12	Cummins QSK/QSV	98% closed-loop SCR + oxidation catalys
NG-8C	330-1750	2010	550	730	N	9,970	0.0111	0.04	0.12	Cummins QSK/QSV	98% closed-loop SCR + oxidation catalys
NG-8D	330-1750	2010	650-700	880	Y	9,970	0.0116	0.04	0.12	Cummins QSK/QSV	98% closed-loop SCR + oxidation catalys

*No engines available in 2002 meeting this level of NOx.

Scenario 2: East Texas, Hours > 300, after 1/1/05, NOx Level = 0.14 lb/MWh											
Tech-nology ID	Size Range kW	Year	Capital Cost $/kW	Installed Cost $/kW	Co-gen? Y/N	Heat Rate (HHV) Btu/kWh	Variable O&M $/kWh	NOx Emissions		Model/Type	NOx Reduction Method(s)
								g/hp-hr	lb/MWh		
		2002*								N/A	
NG-9A	330-1750	2006	600	780	N	9,970	0.0110	0.04	0.12	Cummins QSK/QSV	98% closed-loop SCR + oxidation catalys
NG-9B	330-1750	2006	700-750	930	Y	9,970	0.0115	0.04	0.12	Cummins QSK/QSV	98% closed-loop SCR + oxidation catalys
NG-9C	330-1750	2010	550	730	N	9,970	0.0111	0.04	0.12	Cummins QSK/QSV	98% closed-loop SCR + oxidation catalys
NG-9D	330-1750	2010	650-700	880	Y	9,970	0.0116	0.04	0.12	Cummins QSK/QSV	98% closed-loop SCR + oxidation catalys

*No engines available in 2002 meeting this level of NOx.

Diesel Engines

Scenario 1B: West Texas, Hours < 300, NOx Level = 21.0 lb/MWh*											
Tech-nology ID	Size Range kW	Year	Capital Cost $/kW	Installed Cost $/kW	Co-gen? Y/N	Heat Rate (HHV) Btu/kWh	Variable O&M $/kWh	NOx Emissions g/hp-hr	NOx Emissions lb/MWh	Model/Type	NOx Reduction Method(s)
D-1A	200-1000	2002	350	550	N	10,000	0.010	6.90	20.4	Caterpillar 14.6-51.8L	Factory air/fuel system
D-1B	50-2000	2002	125-230	355	N	8,980	0.015	4.74	14.0	Cummins T3 Diesel	Factory air/fuel system
D-1C	200-1000	2006	350	550	N	10,000	0.010	6.90	20.4	Caterpillar 14.6-51.8L	Factory air/fuel system
D-1D	50-2500	2006	125-230	355	N	8,980	0.015	4.74	14.0	Cummins T3 Diesel	Factory air/fuel system
D-1E	200-1000	2010	350	550	N	10,000	0.010	6.90	20.4	Caterpillar 14.6-51.8L	Factory air/fuel system
D-1F	50-2500	2010	125-230	355	N	8,980	0.015	4.74	14.0	Cummins T3 Diesel	Factory air/fuel system

*Note: No CHP applications for this scenario because of low run hours.

Scenario 1B: West Texas, Hours > 300, NOx Level =3.11 lb/MWh											
Tech-nology ID	Size Range kW	Year	Capital Cost $/kW	Installed Cost $/kW	Co-gen? Y/N	Heat Rate (HHV) Btu/kWh	Variable O&M $/kWh	NOx Emissions g/hp-hr	NOx Emissions lb/MWh	Model/Type	NOx Reduction Method(s)
D-2A	200-1000	2002	455-525	805	N	10,000	0.022	0.68	2.0	Caterpillar 14.6-51.8L	90% SCR
D-2B	50-2000	2002	210-280	425	N	8,980	0.014	0.47	1.4	Cummins T3 Diesel	90% open-loop SCR
D-2C	200-1000	2006	455-525	805	N	10,000	0.022	0.68	2.0	Caterpillar 14.6-51.8L	90% SCR
D-2D	50-2500	2006	210-280	425	N	8,980	0.014	0.47	1.4	Cummins T3 Diesel	90% open-loop SCR
D-2E	200-1000	2010	455-525	805	N	10,000	0.022	0.68	2.0	Caterpillar 14.6-51.8L	90% SCR
D-2F	50-2500	2010	210-280	425	N	8,980	0.014	0.47	1.4	Cummins T3 Diesel	90% open-loop SCR

Scenario 1A: East Texas, Hours ≤ 300, NOx Level = 1.65 lb/MWh*											
Tech-nology ID	Size Range kW	Year	Capital Cost $/kW	Installed Cost $/kW	Co-gen? Y/N	Heat Rate (HHV) Btu/kWh	Variable O&M $/kWh	NOx Emissions		Model/Type	NOx Reduction Method(s)
								g/hp-hr	lb/MWh		
D-3A	200-1000	2002	455-525	805	N	10,000	0.013	0.34	1.0	Caterpillar 14.6-51.8L	95% closed-loop SCR
D-3B	50-2000	2002	210-280	425	N	8,980	0.014	0.47	1.4	Cummins T3 Diesel	90% open-loop SCR
D-3C	200-1000	2006	455-525	805	N	10,000	0.013	0.34	1.0	Caterpillar 14.6-51.8L	95% closed-loop SCR
D-3D	50-2500	2006	210-280	425	N	8,980	0.014	0.47	1.4	Cummins T3 Diesel	90% open-loop SCR
D-3E	200-1000	2010	455-525	805	N	10,000	0.013	0.34	1.0	Caterpillar 14.6-51.8L	95% closed-loop SCR
D-3F	50-2500	2006	210-280	425	N	8,980	0.014	0.47	1.4	Cummins T3 Diesel	90% open-loop SCR

*Note: No CHP applications for this scenario because of low run hours.

Scenario 1A: East Texas, Hours > 300, NOx Level = 0.47 lb/MWh											
Tech-nology ID	Size Range kW	Year	Capital Cost $/kW	Installed Cost $/kW	Co-gen? Y/N	Heat Rate (HHV) Btu/kWh	Variable O&M $/kWh	NOx Emissions		Model/Type	NOx Reduction Method(s)
								g/hp-hr	lb/MWh		
D-4A	200-1000	2002	455-525	805	N	10,000	0.022	0.14	0.4	Caterpillar 14.6-51.8L	SCR
D-4B	50-2000	2002	225-300	450	N	8,980	0.015	0.14	0.4	Cummins T1 Diesel	98% closed-loop SCR or 3-way catalyst
D-4C	200-100	2006	455-525	805	N	10,000	0.022	0.14	0.4	Caterpillar 14.6-51.8L	SCR
D-4D	50-2500	2006	225-300	450	N	8,980	0.015	0.14	0.4	Cummins T1 Diesel	98% closed-loop SCR or 3-way catalyst
D-4E	200-100	2010	455-525	805	N	10,000	0.022	0.14	0.4	Caterpillar 14.6-51.8L	SCR
D-4F	50-2500	2010	225-300	450	N	8,980	0.015	0.14	0.4	Cummins T1 Diesel	98% closed-loop SCR or 3-way catalyst

Scenarios 2 & 3: East Texas, Hours ≤ 300, after 1/1/05, NOx Level = 0.47 lb/MWh*											
Tech-nology ID	Size Range kW	Year	Capital Cost $/kW	Installed Cost $/kW	Co-gen? Y/N	Heat Rate (HHV) Btu/kWh	Variable O&M $/kWh	NOx Emissions		Model/Type	NOx Reduction Method(s)
								g/hp-hr	lb/MWh		
D-5A	200-1000	2002	455-525	805	N	10,000	0.022	0.14	0.4	Caterpillar 14.6-51.8L	SCR
D-5B	50-2500	2002	225-300	450	N	8,980	0.015	0.14	0.4	Cummins T1 Diesel	98% closed-loop SCR or 3-way catalyst
D-5C	200-1000	2006	455-525	805	N	10,000	0.022	0.14	0.4	Caterpillar 14.6-51.8L	SCR
D-5D	50-2500	2006	225-300	450	N	8,980	0.015	0.14	0.4	Cummins T1 Diesel	98% closed-loop SCR or 3-way catalyst
D-5E	200-1000	2010	455-525	805	N	10,000	0.022	0.14	0.4	Caterpillar 14.6-51.8L	SCR
D-5F	50-2500	2010	225-300	450	N	8,980	0.015	0.14	0.4	Cummins T1 Diesel	98% closed-loop SCR or 3-way catalyst

*Note: No CHP applications for this scenario because of low run hours.

Scenario 3: East Texas, Hours > 300, after 1/1/05, NOx Level = 0.23 lb/MWh											
Tech-nology ID	Size Range kW	Year	Capital Cost $/kW	Installed Cost $/kW	Co-gen? Y/N	Heat Rate (HHV) Btu/kWh	Variable O&M $/kWh	NOx Emissions		Model/Type	NOx Reduction Method(s)
								g/hp-hr	lb/MWh		
		2002*								N/A	
D-6A	50-2000	2006	225-300	450	N	8,980	0.015	0.07	0.2	Cummins T3 Diesel	98% closed-loop SCR or 3-way catalyst
D-6B	50-2000	2010	225-300	450	N	8,980	0.015	0.07	0.2	Cummins T3 Diesel	98% closed-loop SCR or 3-way catalyst

*No engines available for 2002 meeting this level of NOx.

Scenario 2: East Texas, Hours > 300, after 1/1/05, NOx Level = 0.14 lb/MWh*											
Tech-nology ID	Size Range kW	Year	Capital Cost $/kW	Installed Cost $/kW	Co-gen? Y/N	Heat Rate (HHV) Btu/kWh	Variable O&M $/kWh	NOx Emissions		Model/Type	NOx Reduction Method(s)
								g/hp-hr	lb/MWh		
		2002								N/A	
		2006								N/A	
		2010								N/A	

*No engines are able to meet this level of NOx with current or foreseeable technology.

Appendix C. Summary Results Tables

Case #1: Base Case

Table C-1A: Summary Results – Base Case, 2002

2002		West	DFW	HGA	Rest-of-East	East	All of Texas
Scenario 1	(MW)	2,858	2,581	2,744	3,852	9,178	**12,036**
	(NOx, ton/yr)	7,463	712	840	2,081	3,634	**11,097**
Scenario 3	(MW)	2,858	170	263	360	793	**3,651**
	(NOx, ton/yr)	7,463	375	459	1,593	2,428	**9,890**
Scenario 2	(MW)	2,858	170	263	360	793	**3,651**
	(NOx, ton/yr)	7,463	375	459	1,593	2,428	**9,890**

Table C-1B: Summary Results – Base Case, 2006

2006		West	DFW	HGA	Rest-of-East	East	All of Texas
Scenario 1	(MW)	3,068	3,156	3,745	4,686	11,588	**14,655**
	(NOx, ton/yr)	3,215	779	934	1,862	3,574	**6,790**
Scenario 3	(MW)	3,068	3,156	3,745	4,686	11,588	**14,655**
	(NOx, ton/yr)	3,215	634	785	1,652	3,071	**6,287**
Scenario 2	(MW)	3,068	1,593	2,136	2,421	6,150	**9,218**
	(NOx, ton/yr)	3,215	520	667	1,487	2,675	**5,890**

Table C-1C: Summary Results – Base Case, 2010

2010		West	DFW	HGA	Rest-of-East	East	All of Texas
Scenario 1	(MW)	3,681	4,294	5,311	6,334	15,939	**19,619**
	(NOx, ton/yr)	2,043	302	556	965	1,823	**3,866**
Scenario 3	(MW)	3,681	4,294	5,311	6,334	15,939	**19,619**
	(NOx, ton/yr)	2,043	302	556	965	1,823	**3,866**
Scenario 2	(MW)	3,681	4,294	5,311	6,334	15,939	**19,619**
	(NOx, ton/yr)	2,043	302	556	965	1,823	**3,866**

Case #2: 0.1 Fixed Charge Rate

Table C-2A: Summary Results – 0.1 FCR, 2002

2002		West	DFW	HGA	Rest-of-East	East	All of Texas
Scenario 1	(MW)	4,855	4,915	5,547	7,235	17,697	**22,553**
	(NOx, ton/yr)	10,710	1,389	1,976	3,063	6,428	**17,138**
Scenario 3	(MW)	4,855	1,518	1,903	2,313	5,734	**10,589**
	(NOx, ton/yr)	10,710	518	707	1,800	3,026	**13,736**
Scenario 2	(MW)	4,855	1,518	1,903	2,313	5,734	**10,589**
	(NOx, ton/yr)	10,710	518	707	1,800	3,026	**13,736**

Table C-2B: Summary Results – 0.1 FCR, 2006

2006		West	DFW	HGA	Rest-of-East	East	All of Texas
Scenario 1	(MW)	5,050	5,567	6,680	8,180	20,426	**25,476**
	(NOx, ton/yr)	3,458	988	1,254	2,164	4,406	**7,865**
Scenario 3	(MW)	5,050	5,205	6,307	7,655	19,168	**24,218**
	(NOx, ton/yr)	3,458	810	1,072	1,908	3,790	**7,248**
Scenario 2	(MW)	5,050	5,097	6,196	7,498	18,791	**23,840**
	(NOx, ton/yr)	3,458	739	998	1,804	3,540	**6,999**

Table C-2C: Summary Results – 0.1 FCR, 2010

2010		West	DFW	HGA	Rest-of-East	East	All of Texas
Scenario 1	(MW)	5,823	6,587	7,789	9,657	24,032	**29,856**
	(NOx, ton/yr)	384	362	607	527	1,496	**1,879**
Scenario 3	(MW)	5,823	6,225	7,416	9,133	22,774	**28,597**
	(NOx, ton/yr)	384	354	599	516	1,470	**1,853**
Scenario 2	(MW)	5,823	6,225	7,416	9,133	22,774	**28,597**
	(NOx, ton/yr)	384	354	599	516	1,470	**1,853**

Case #3: 0.2 Fixed Charge Rate

Table C-3A: Summary Results – 0.2 FCR, 2002

2002	West	DFW	HGA	Rest-of-East	East	**All of Texas**
Scenario 1 (MW)	1,569	1,209	1,248	1,860	4,317	**5,886**
(NOx, ton/yr)	4,237	416	471	1,618	2,505	**6,742**
Scenario 3 (MW)	1,569	42	47	170	259	**1,828**
(NOx, ton/yr)	4,237	276	327	1,416	2,018	**6,255**
Scenario 2 (MW)	1,569	42	47	170	259	**1,828**
(NOx, ton/yr)	4,237	276	327	1,416	2,018	**6,255**

Table C-3B: Summary Results – 0.2 FCR, 2006

2006	West	DFW	HGA	Rest-of-East	East	**All of Texas**
Scenario 1 (MW)	1,744	1,287	1,381	1,975	4,643	**6,387**
(NOx, ton/yr)	3,187	451	496	1,366	2,314	**5,500**
Scenario 3 (MW)	1,744	1,287	1,381	1,975	4,643	**6,387**
(NOx, ton/yr)	3,187	381	424	1,265	2,070	**5,257**
Scenario 2 (MW)	1,744	121	180	284	585	**2,329**
(NOx, ton/yr)	3,187	311	352	1,163	1,827	**5,013**

Table C-3C: Summary Results – 0.2 FCR, 2010

2010	West	DFW	HGA	Rest-of-East	East	**All of Texas**
Scenario 1 (MW)	2,234	2,453	3,039	3,668	9,160	**11,394**
(NOx, ton/yr)	2,534	173	335	777	1,284	**3,818**
Scenario 3 (MW)	2,234	2,453	3,039	3,668	9,160	**11,394**
(NOx, ton/yr)	2,534	173	335	777	1,284	**3,818**
Scenario 2 (MW)	2,234	2,453	3,039	3,668	9,160	**11,394**
(NOx, ton/yr)	2,534	173	335	777	1,284	**3,818**

Case #4: No Microturbine

Table C-4A: Summary Results – No Microturbine, 2002

2002		West	Dallas	Houston	Rest-of-East	East	**All of Texas**
Scenario 1	(MW)	2,858	2,581	2,744	3,852	9,178	**12,036**
	(NOx, ton/yr)	7,463	712	840	2,081	3,634	**11,097**
Scenario 3	(MW)	2,858	170	263	360	793	**3,651**
	(NOx, ton/yr)	7,463	375	459	1,593	2,428	**9,890**
Scenario 2	(MW)	2,858	170	263	360	793	**3,651**
	(NOx, ton/yr)	7,463	375	459	1,593	2,428	**9,890**

Table C-4B: Summary Results – No Microturbine, 2006

2006		West	Dallas	Houston	Rest-of-East	East	**All of Texas**
Scenario 1	(MW)	2,980	2,728	3,000	4,066	9,794	**12,774**
	(tons NOx)	5,052	917	1,174	2,062	4,152	**9,204**
Scenario 3	(MW)	2,980	2,486	2,579	3,715	8,781	**11,761**
	(tons NOx)	5,052	480	517	1,429	2,426	**7,477**
Scenario 2	(MW)	2,980	923	970	1,450	3,343	**6,323**
	(tons NOx)	5,052	366	399	1,264	2,029	**7,080**

Table C-4C: Summary Results – No Microturbine, 2010

2010		West	Dallas	Houston	Rest-of-East	East	**All of Texas**
Scenario 1	(MW)	3,180	3,342	3,656	4,955	11,954	**15,134**
	(tons NOx)	3,825	309	568	974	1,852	**5,676**
Scenario 3	(MW)	3,180	3,215	3,435	4,771	11,422	**14,602**
	(tons NOx)	3,825	13	53	545	612	**4,436**
Scenario 2	(MW)	3,180	3,215	3,435	4,771	11,422	**14,602**
	(tons NOx)	3,825	13	53	545	612	**4,436**

Case #5: No Microturbine, No Fuel Cell

Table C-5A: Summary Results – No Microturbine or Fuel Cell, 2002

2002		West	Dallas	Houston	Rest-of-East	East	**All of Texas**
Scenario 1	(MW)	2,858	2,581	2,744	3,852	9,178	**12,036**
	(NOx, ton/yr)	7,463	712	840	2,081	3,634	**11,097**
Scenario 3	(MW)	2,858	170	263	360	793	**3,651**
	(NOx, ton/yr)	7,463	375	459	1,593	2,428	**9,890**
Scenario 2	(MW)	2,858	170	263	360	793	**3,651**
	(NOx, ton/yr)	7,463	375	459	1,593	2,428	**9,890**

Table C-5B: Summary Results – No Microturbine or Fuel Cell, 2006

2006		West	Dallas	Houston	Rest-of-East	East	**All of Texas**
Scenario 1	(MW)	2,980	2,728	3,000	4,066	9,794	**12,774**
	(NOx, ton/yr)	5,052	917	1,174	2,062	4,152	**9,204**
Scenario 3	(MW)	2,980	2,486	2,579	3,715	8,781	**11,761**
	(NOx, ton/yr)	5,052	480	517	1,429	2,426	**7,477**
Scenario 2	(MW)	2,980	923	970	1,450	3,343	**6,323**
	(NOx, ton/yr)	5,052	366	399	1,264	2,029	**7,080**

Table C-5C: Summary Results – No Microturbine or Fuel Cell, 2010

2010		West	Dallas	Houston	Rest-of-East	East	**All of Texas**
Scenario 1	(MW)	3,000	2,733	3,009	4,073	9,815	**12,815**
	(NOx, ton/yr)	5,100	919	1,178	2,065	4,162	**9,263**
Scenario 3	(MW)	3,000	2,486	2,579	3,715	8,781	**11,780**
	(NOx, ton/yr)	5,100	480	517	1,429	2,426	**7,526**
Scenario 2	(MW)	3,000	2,253	2,340	3,377	7,970	**10,970**
	(NOx, ton/yr)	5,100	414	449	1,333	2,195	**7,296**

Case #6: High Dallas Electricity Cost (+1¢/kWh)

Table C-6A: Summary Results – High Dallas Electricity Cost, 2002

2002		West	Dallas	Houston	Rest-of-East	East	**All of Texas**
Scenario 1	(MW)	2,858	3,577	2,744	3,852	10,174	**13,032**
	(NOx, ton/yr)	7,463	1,363	840	2,081	4,285	**11,748**
Scenario 3	(MW)	2,858	690	263	360	1,313	**4,171**
	(NOx, ton/yr)	7,463	581	459	1,593	2,633	**10,096**
Scenario 2	(MW)	2,858	690	263	360	1,313	**4,171**
	(NOx, ton/yr)	7,463	581	459	1,593	2,633	**10,096**

Table C-6B: Summary Results – High Dallas Electricity Cost, 2006

2006		West	Dallas	Houston	Rest-of-East	East	**All of Texas**
Scenario 1	(MW)	3,068	4,040	3,745	4,686	12,472	**15,539**
	(NOx, ton/yr)	3,215	964	934	1,862	3,759	**6,975**
Scenario 3	(MW)	3,068	4,040	3,745	4,686	12,472	**15,539**
	(NOx, ton/yr)	3,215	808	785	1,652	3,246	**6,461**
Scenario 2	(MW)	3,068	2,645	2,136	2,421	7,202	**10,270**
	(NOx, ton/yr)	3,215	696	667	1,487	2,850	**6,066**

Table C-6C: Summary Results – High Dallas Electricity Cost, 2010

2010		West	Dallas	Houston	Rest-of-East	East	**All of Texas**
Scenario 1	(MW)	3,681	6,404	5,311	6,334	18,049	**21,730**
	(NOx, ton/yr)	2,043	373	556	965	1,894	**3,936**
Scenario 3	(MW)	3,681	6,404	5,311	6,334	18,049	**21,730**
	(NOx, ton/yr)	2,043	373	556	965	1,894	**3,936**
Scenario 2	(MW)	3,681	6,404	5,311	6,334	18,049	**21,730**
	(NOx, ton/yr)	2,043	373	556	965	1,894	**3,936**

Appendix D. Detailed Results: Base Case

Table D-1: Detailed Results – All Scenarios, West Texas, Base Case, 2002

Application	Total Market MW	Technologies															Largest Market Share Technology Results			
		Microturbine			CT			Gas Engine			Diesel			Fuel Cell						
		Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Technology	Mkt Share	MW	NOx tons/yr
Standby	18	M-1A	0	0	CT-1C	0	0	NG-1B	0	0	D-1B	0	0	FC-4	0	0	Diesel	0.00	0	0
Reliability	1716	M-1A	0	0	CT-1C	0	0	NG-1B	0	0	D-1B	128	9	FC-4	0	0	Diesel	0.07	128	9
On-site Power	2145	M-2A	0	0	CT-2E	0	0	NG-2B	0	0	D-2B	0	0	FC-4	0	0	Gas Engine	0.00	0	0
Small CHP	505	M-2B	0	0	CT-2F	0	0	NG-2C	109	772	n/a	n/a	n/a	FC-2	0	0	Gas Engine	0.21	109	772
Large CHP	575	M-2B	23	37	CT-2B	258	1,024	NG-2C	283	2,010	n/a	n/a	n/a	FC-2	0	0	Gas Engine	0.49	283	2,010
Demand	2145	M-2A	0	0	CT-2E	0	0	NG-2B	2,006	1,426	D-2B	1,939	814	FC-4	0	0	Gas Engine	0.94	2,006	1,426
Oilfield Gas	278	M-3A	172	420	CT-3E	113	1,433	NG-3B	278	2,889	n/a	n/a	n/a	FC-4	0	0	Gas Engine	1.00	278	2,889
Landfill Gas	55	M-4A	0	0	n/a	n/a	n/a	NG-4B	55	357	n/a	n/a	n/a	FC-4	0	0	Gas Engine	1.00	55	357
																	Totals		**2,858**	**7,463**

Table D-2: Detailed Results – Scenario 1, DFW, Base Case, 2002

Application	Total Market MW	Technologies															Largest Market Share Technology Results			
		Microturbine			CT			Gas Engine			Diesel			Fuel Cell						
		Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Technology	Mkt Share	MW	NOx tons/yr
Standby	24	M-5A	0	0	CT-5C	0	0	NG-5B	0	0	D-3B	0	0	FC-4	0	0	Diesel	0.00	0	0
Reliability	2262	M-5A	0	0	CT-5C	0	0	NG-5B	0	0	D-3B	0	0	FC-4	0	0	Diesel	0.00	0	0
On-site Power	2828	M-6A	0	0	CT-6E	0	0	NG-6B	0	0	D-4B	0	0	FC-4	0	0	Gas Engine	0.00	0	0
Small CHP	665	M-6B	0	0	CT-6F	0	0	NG-6C	1	1	n/a	n/a	n/a	FC-2	0	0	Gas Engine	0.002	1	1
Large CHP	757	M-6B	30	49	CT-6B	120	95	NG-6C	58	44	n/a	n/a	n/a	FC-2	0	0	CT	0.16	120	95
Demand	2828	M-6A	0	0	CT-6E	0	0	NG-6B	846	63	D-4B	2,410	289	FC-4	0	0	Diesel	0.85	2,410	289
Oilfield Gas	0.1	M-3A	0	0	CT-3E	0.04	1	NG-3B	0.1	1	n/a	n/a	n/a	FC-4	0	0	Gas Engine	1.00	0.1	1
Landfill Gas	50	M-4A	0	0	n/a	n/a	n/a	NG-4B	50	327	n/a	n/a	n/a	FC-4	0	0	Gas Engine	1.00	50	327
																	Totals		**2,581**	**712**

Table D-3: Detailed Results – Scenario 1, HGA, Base Case, 2002

Application	Total Market MW	Microturbine Tech ID	Microturbine Mkt Share MW	Microturbine NOx ton/yr	CT Tech ID	CT Mkt Share MW	CT NOx ton/yr	Gas Engine Tech ID	Gas Engine Mkt Share MW	Gas Engine NOx ton/yr	Diesel Tech ID	Diesel Mkt Share MW	Diesel NOx ton/yr	Fuel Cell Tech ID	Fuel Cell Mkt Share MW	Fuel Cell NOx ton/yr	Largest Market Share Technology Results: Technology	Mkt Share	MW	NOx tons/yr
Standby	24	M-5A	0	0	CT-5C	0	0	NG-5B	0	0	D-3B	0	0	FC-4	0	0	Diesel	0.00	0	0
Reliability	2328	M-5A	0	0	CT-5C	0	0	NG-5B	0	0	D-3B	0	0	FC-4	0	0	Diesel	0.00	0	0
On-site Power	2910	M-6A	0	0	CT-6E	0	0	NG-6B	0	0	D-4B	0	0	FC-4	0	0	Gas Engine	0.00	0	0
Small CHP	1157	M-6B	0	0	CT-6F	0	0	NG-6C	2	1	n/a	n/a	n/a	FC-2	0	0	Gas Engine	0.002	2	1
Large CHP	1316	M-6B	52	85	CT-6B	208	164	NG-6C	101	76	n/a	n/a	n/a	FC-2	0	0	CT	0.16	208	164
Demand	2910	M-6A	0	0	CT-6E	0	0	NG-6B	871	65	D-4B	2,480	298	FC-4	0	0	Diesel	0.85	2,480	298
Oilfield Gas	6	M-3A	4	9	CT-3E	2	30	NG-3B	6	61	n/a	n/a	n/a	FC-4	0	0	Gas Engine	1.00	6	61
Landfill Gas	49	M-4A	0	0	n/a	n/a	n/a	NG-4B	49	316	n/a	n/a	n/a	FC-4	0	0	Gas Engine	1.00	49	316
																	Totals		**2,744**	**840**

Table D-4: Detailed Results – Scenario 1, Rest of East, Base Case, 2002

Application	Total Market MW	Microturbine Tech ID	Microturbine Mkt Share MW	Microturbine NOx ton/yr	CT Tech ID	CT Mkt Share MW	CT NOx ton/yr	Gas Engine Tech ID	Gas Engine Mkt Share MW	Gas Engine NOx ton/yr	Diesel Tech ID	Diesel Mkt Share MW	Diesel NOx ton/yr	Fuel Cell Tech ID	Fuel Cell Mkt Share MW	Fuel Cell NOx ton/yr	Largest Market Share Technology Results: Technology	Mkt Share	MW	NOx tons/yr
Standby	34	M-5A	0	0	CT-5C	0	0	NG-5B	0	0	D-3B	0	0	FC-4	0	0	Diesel	0.00	0	0
Reliability	3278	M-5A	0	0	CT-5C	0	0	NG-5B	0	0	D-3B	0	0	FC-4	0	0	Diesel	0.00	0	0
On-site Power	4097	M-6A	0	0	CT-6E	0	0	NG-6B	0	0	D-4B	0	0	FC-4	0	0	Gas Engine	0.00	0	0
Small CHP	964	M-6B	0	0	CT-6F	0	0	NG-6C	2	1	n/a	n/a	n/a	FC-2	0	0	Gas Engine	0.002	2	1
Large CHP	1097	M-6B	43	71	CT-6B	174	137	NG-6C	84	63	n/a	n/a	n/a	FC-2	0	0	CT	0.16	174	137
Demand	4097	M-6A	0	0	CT-6E	0	0	NG-6B	1,226	92	D-4B	3,491	419	FC-4	0	0	Diesel	0.85	3,491	419
Oilfield Gas	81	M-3A	50	123	CT-3E	33	418	NG-3B	81	843	n/a	n/a	n/a	FC-4	0	0	Gas Engine	1.00	81	843
Landfill Gas	105	M-4A	0	0	n/a	n/a	n/a	NG-4B	105	681	n/a	n/a	n/a	FC-4	0	0	Gas Engine	1.00	105	681
																	Totals		**3,852**	**2,081**

Table D-5: Detailed Results – Scenarios 2 & 3, DFW, Base Case, 2002

Application	Total Market MW	Technologies															Largest Market Share Technology Results			
		Microturbine			CT			Gas Engine			Diesel			Fuel Cell						
		Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Technology	Mkt Share	MW	NOx tons/yr
Standby	24	n/a	n/a	n/a	CT-7C	0	0	NG-7B	0	0	D-5B	0	0	FC-4	0	0	Diesel	0.00	0	0
Reliability	2262	n/a	n/a	n/a	CT-7C	0	0	NG-7B	0	0	D-5B	0	0	FC-4	0	0	Diesel	0.00	0	0
On-site Power	2828	n/a	n/a	n/a	CT-9E	0	0	n/a	n/a	n/a	n/a	n/a	n/a	FC-4	0	0	Fuel Cell	0.00	0	0
Small CHP	665	n/a	n/a	n/a	CT-9F	0	0	n/a	n/a	n/a	n/a	n/a	n/a	FC-2	0	0	CT	0.00	0	0
Large CHP	757	n/a	n/a	n/a	CT-9B	120	47	n/a	n/a	n/a	n/a	n/a	n/a	FC-2	0	0	CT	0.16	120	47
Demand	2828	n/a	n/a	n/a	CT-9E	0	0	n/a	n/a	n/a	n/a	n/a	n/a	FC-4	0	0	CT	0.00	0	0
Oilfield Gas	0.1	M-3A	0	0	CT-3E	0.04	1	NG-3B	0.1	1	n/a	n/a	n/a	FC-4	0	0	Gas Engine	1.00	0.1	1
Landfill Gas	50	M-4A	0	0	n/a	n/a	n/a	NG-4B	50	327	n/a	n/a	n/a	FC-4	0	0	Gas Engine	1.00	50	327
																	Totals		170	375

Table D-6: Detailed Results – Scenarios 2 & 3, HGA, Base Case, 2002

Application	Total Market MW	Technologies															Largest Market Share Technology Results			
		Microturbine			CT			Gas Engine			Diesel			Fuel Cell						
		Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Technology	Mkt Share	MW	NOx tons/yr
Standby	24	n/a	n/a	n/a	CT-7C	0	0	NG-7B	0	0	D-5B	0	0	FC-4	0	0	Diesel	0.00	0	0
Reliability	2328	n/a	n/a	n/a	CT-7C	0	0	NG-7B	0	0	D-5B	0	0	FC-4	0	0	Diesel	0.00	0	0
On-site Power	2910	n/a	n/a	n/a	CT-9E	0	0	n/a	n/a	n/a	n/a	n/a	n/a	FC-4	0	0	Fuel Cell	0.00	0	0
Small CHP	1157	n/a	n/a	n/a	CT-9F	0	0	n/a	n/a	n/a	n/a	n/a	n/a	FC-2	0	0	CT	0.00	0	0
Large CHP	1316	n/a	n/a	n/a	CT-9B	208	82	n/a	n/a	n/a	n/a	n/a	n/a	FC-2	0	0	CT	0.16	208	82
Demand	2910	n/a	n/a	n/a	CT-9E	0	0	n/a	n/a	n/a	n/a	n/a	n/a	FC-4	0	0	CT	0.00	0	0
Oilfield Gas	6	M-3A	4	9	CT-3E	2	30	NG-3B	6	61	n/a	n/a	n/a	FC-4	0	0	Gas Engine	1.00	6	61
Landfill Gas	49	M-4A	0	0	n/a	n/a	n/a	NG-4B	49	316	n/a	n/a	n/a	FC-4	0	0	Gas Engine	1.00	49	316
																	Totals		263	459

Table D-7: Detailed Results – Scenarios 2 & 3, Rest of East, Base Case, 2002

Application	Total Market MW	Microturbine Tech ID	Microturbine Mkt Share MW	Microturbine NOx ton/yr	CT Tech ID	CT Mkt Share MW	CT NOx ton/yr	Gas Engine Tech ID	Gas Engine Mkt Share MW	Gas Engine NOx ton/yr	Diesel Tech ID	Diesel Mkt Share MW	Diesel NOx ton/yr	Fuel Cell Tech ID	Fuel Cell Mkt Share MW	Fuel Cell NOx ton/yr	Largest Market Share Technology Results: Technology	Mkt Share	MW	NOx tons/yr
Standby	34	n/a	n/a	n/a	CT-7C	0	0	NG-7B	0	0	D-5B	0	0	FC-4	0	0	Diesel	0.00	0	0
Reliability	3278	n/a	n/a	n/a	CT-7C	0	0	NG-7B	0	0	D-5B	0	0	FC-4	0	0	Diesel	0.00	0	0
On-site Power	4097	n/a	n/a	n/a	CT-9E	0	0	n/a	n/a	n/a	n/a	n/a	n/a	FC-4	0	0	Fuel Cell	0.00	0	0
Small CHP	964	n/a	n/a	n/a	CT-9F	0	0	n/a	n/a	n/a	n/a	n/a	n/a	FC-2	0	0	CT	0.00	0	0
Large CHP	1097	n/a	n/a	n/a	CT-9B	174	69	n/a	n/a	n/a	n/a	n/a	n/a	FC-2	0	0	CT	0.16	174	69
Demand	4097	n/a	n/a	n/a	CT-9E	0	0	n/a	n/a	n/a	n/a	n/a	n/a	FC-4	0	0	CT	0.00	0	0
Oilfield Gas	81	M-3A	50	123	CT-3E	33	418	NG-3B	81	843	n/a	n/a	n/a	FC-4	0	0	Gas Engine	1.00	81	843
Landfill Gas	105	M-4A	0	0	n/a	n/a	n/a	NG-4B	105	681	n/a	n/a	n/a	FC-4	0	0	Gas Engine	1.00	105	681
																	Totals		**360**	**1,593**

Table D-8: Detailed Results – All Scenarios, West Texas, Base Case, 2006

Application	Total Market MW	Microturbine Tech ID	Microturbine Mkt Share MW	Microturbine NOx ton/yr	CT Tech ID	CT Mkt Share MW	CT NOx ton/yr	Gas Engine Tech ID	Gas Engine Mkt Share MW	Gas Engine NOx ton/yr	Diesel Tech ID	Diesel Mkt Share MW	Diesel NOx ton/yr	Fuel Cell Tech ID	Fuel Cell Mkt Share MW	Fuel Cell NOx ton/yr	Largest Market Share Technology Results: Technology	Mkt Share	MW	NOx tons/yr
Standby	18	M-1E	0	0	CT-1C	0	0	NG-1D	0	0	D-1D	0	0	FC-9	0	0	Diesel	0.00	0	0
Reliability	1716	M-1E	0	0	CT-1C	0	0	NG-1D	0	0	D-1D	128	9	FC-9	0	0	Diesel	0.07	128	9
On-site Power	2145	M-2I	0	0	CT-2E	0	0	NG-2E	0	0	D-2D	0	0	FC-9	0	0	Gas Engine	0.00	0	0
Small CHP	505	M-2J	177	41	CT-2F	0	0	NG-2F	128	566	n/a	n/a	n/a	FC-10	0	0	Microturbine	0.35	177	41
Large CHP	575	M-2J	352	82	CT-2H	200	227	NG-2F	314	1,393	n/a	n/a	n/a	FC-10	0	0	Microturbine	0.61	352	82
Demand	2145	M-2I	434	10	CT-2E	0	0	NG-2E	2,078	922	D-2D	1,939	814	FC-9	0	0	Gas Engine	0.97	2,078	922
Oilfield Gas	278	M-3C	172	420	CT-3E	113	1,433	NG-3E	278	1,804	n/a	n/a	n/a	FC-9	127	3	Gas Engine	1.00	278	1,804
Landfill Gas	55	M-4C	10	24	n/a	n/a	n/a	NG-4E	55	357	n/a	n/a	n/a	FC-9	0	0	Gas Engine	1.00	55	357
																	Totals		**3,068**	**3,215**

Table D-9: Detailed Results – Scenario 1, DFW, Base Case, 2006

Application	Total Market MW	Technologies															Largest Market Share Technology Results			
		Microturbine			CT			Gas Engine			Diesel			Fuel Cell						
		Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Technology	Mkt Share	MW	NOx tons/yr
Standby	24	M-5E	0	0	CT-5C	0	0	NG-5D	0	0	D-3D	0	0	FC-9	0	0	Diesel	0.00	0	0
Reliability	2262	M-5E	0	0	CT-5C	0	0	NG-5D	0	0	D-3D	0	0	FC-9	0	0	Diesel	0.00	0	0
On-site Power	2828	M-6A	0	0	CT-6E	0	0	NG-6E	0	0	D-4D	0	0	FC-9	0	0	Microturbine	0.00	0	0
Small CHP	665	M-6B	233	54	CT-6F	0	0	NG-6F	4	2	n/a	n/a	n/a	FC-10	0	0	Microturbine	0.35	233	54
Large CHP	757	M-6B	463	108	CT-6H	264	298	NG-6F	76	36	n/a	n/a	n/a	FC-10	0	0	Microturbine	0.61	463	108
Demand	2828	M-6A	572	13	CT-6E	0	0	NG-6E	1,058	51	D-4D	2,410	289	FC-9	0	0	Diesel	0.85	2,410	289
Oilfield Gas	0.1	M-3C	0	0	CT-3E	0.04	1	NG-3E	0.1	1	n/a	n/a	n/a	FC-9	0	0	Gas Engine	1.00	0.1	1
Landfill Gas	50	M-4C	9	22	n/a	n/a	n/a	NG-4E	50	327	n/a	n/a	n/a	FC-9	0	0	Gas Engine	1.00	50	327
																	Totals		**3,156**	**779**

Table D-10: Detailed Results – Scenario 1, HGA, Base Case, 2006

Application	Total Market MW	Technologies															Largest Market Share Technology Results			
		Microturbine			CT			Gas Engine			Diesel			Fuel Cell						
		Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Technology	Mkt Share	MW	NOx tons/yr
Standby	24	M-5E	0	0	CT-5C	0	0	NG-5D	0	0	D-3D	0	0	FC-9	0	0	Diesel	0.00	0	0
Reliability	2328	M-5E	0	0	CT-5C	0	0	NG-5D	0	0	D-3D	0	0	FC-9	0	0	Diesel	0.00	0	0
On-site Power	2910	M-6A	0	0	CT-6E	0	0	NG-6E	0	0	D-4D	0	0	FC-9	0	0	Microturbine	0.00	0	0
Small CHP	1157	M-6B	405	94	CT-6F	0	0	NG-6F	7	3	n/a	n/a	n/a	FC-10	0	0	Microturbine	0.35	405	94
Large CHP	1316	M-6B	805	188	CT-6H	459	519	NG-6F	132	63	n/a	n/a	n/a	FC-10	0	0	Microturbine	0.61	805	188
Demand	2910	M-6A	588	14	CT-6E	0	0	NG-6E	1,088	52	D-4D	2,480	298	FC-9	0	0	Diesel	0.85	2,480	298
Oilfield Gas	6	M-3C	4	9	CT-3E	2	30	NG-3E	6	38	n/a	n/a	n/a	FC-9	3	0	Gas Engine	1.00	6	38
Landfill Gas	49	M-4C	9	21	n/a	n/a	n/a	NG-4E	49	316	n/a	n/a	n/a	FC-9	0	0	Gas Engine	1.00	49	316
																	Totals		**3,745**	**934**

Table D-11: Detailed Results – Scenario 1, Rest of East, Base Case, 2006

		Technologies															Largest Market Share Technology Results			
		Microturbine			CT			Gas Engine			Diesel			Fuel Cell						
Application	Total Market MW	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Technology	Mkt Share	MW	NOx tons/yr
Standby	34	M-5E	0	0	CT-5C	0	0	NG-5D	0	0	D-3D	0	0	FC-9	0	0	Diesel	0.00	0	0
Reliability	3278	M-5E	0	0	CT-5C	0	0	NG-5D	0	0	D-3D	0	0	FC-9	0	0	Diesel	0.00	0	0
On-site Power	4097	M-6A	0	0	CT-6E	0	0	NG-6E	0	0	D-4D	0	0	FC-9	0	0	Microturbine	0.00	0	0
Small CHP	964	M-6B	338	79	CT-6F	0	0	NG-6F	6	3	n/a	n/a	n/a	FC-10	0	0	Microturbine	0.35	338	79
Large CHP	1097	M-6B	671	156	CT-6H	382	432	NG-6F	110	53	n/a	n/a	n/a	FC-10	0	0	Microturbine	0.61	671	156
Demand	4097	M-6A	828	19	CT-6E	0	0	NG-6E	1,532	74	D-4D	3,491	419	FC-9	0	0	Diesel	0.85	3,491	419
Oilfield Gas	81	M-3C	50	123	CT-3E	33	418	NG-3E	81	526	n/a	n/a	n/a	FC-9	37	1	Gas Engine	1.00	81	526
Landfill Gas	105	M-4C	19	46	n/a	n/a	n/a	NG-4E	105	681	n/a	n/a	n/a	FC-9	0	0	Gas Engine	1.00	105	681
																	Totals		4,686	1,862

Table D-12: Detailed Results – Scenario 2, DFW, Base Case, 2006

		Technologies															Largest Market Share Technology Results			
		Microturbine			CT			Gas Engine			Diesel			Fuel Cell						
Application	Total Market MW	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Technology	Mkt Share	MW	NOx tons/yr
Standby	24	M-7A	0	0	CT-7C	0	0	NG-7D	0	0	D-5D	0	0	FC-9	0	0	Diesel	0.00	0	0
Reliability	2262	M-7A	0	0	CT-7C	0	0	NG-7D	0	0	D-5D	0	0	FC-9	0	0	Diesel	0.00	0	0
On-site Power	2828	M-9A	0	0	CT-9E	0	0	NG-9A	0	0	n/a	n/a	n/a	FC-9	0	0	Microturbine	0.00	0	0
Small CHP	665	M-9B	233	54	CT-9F	0	0	NG-9B	0	0	n/a	n/a	n/a	FC-10	0	0	Microturbine	0.35	233	54
Large CHP	757	M-9B	463	108	CT-9H	26	8	NG-9B	26	9	n/a	n/a	n/a	FC-10	0	0	Microturbine	0.61	463	108
Demand	2828	M-9A	572	13	CT-9E	0	0	NG-9A	846	30	n/a	n/a	n/a	FC-9	0	0	Gas Engine	0.30	846	30
Oilfield Gas	0.1	M-3C	0	0	CT-3E	0.04	1	NG-3E	0.1	1	n/a	n/a	n/a	FC-9	0	0	Gas Engine	1.00	0.1	1
Landfill Gas	50	M-4C	9	22	n/a	n/a	n/a	NG-4E	50	327	n/a	n/a	n/a	FC-9	0	0	Gas Engine	1.00	50	327
																	Totals		1,593	520

Table D-13: Detailed Results – Scenario 2, HGA, Base Case, 2006

Application	Total Market MW	Microturbine Tech ID	Microturbine Mkt Share MW	Microturbine NOx ton/yr	CT Tech ID	CT Mkt Share MW	CT NOx ton/yr	Gas Engine Tech ID	Gas Engine Mkt Share MW	Gas Engine NOx ton/yr	Diesel Tech ID	Diesel Mkt Share MW	Diesel NOx ton/yr	Fuel Cell Tech ID	Fuel Cell Mkt Share MW	Fuel Cell NOx ton/yr	Largest Market Share Technology	Mkt Share	MW	NOx tons/yr
Standby	24	M-7A	0	0	CT-7C	0	0	NG-7D	0	0	D-5D	0	0	FC-9	0	0	Diesel	0.00	0	0
Reliability	2328	M-7A	0	0	CT-7C	0	0	NG-7D	0	0	D-5D	0	0	FC-9	0	0	Diesel	0.00	0	0
On-site Power	2910	M-9A	0	0	CT-9E	0	0	NG-9A	0	0	n/a	n/a	n/a	FC-9	0	0	Microturbine	0.00	0	0
Small CHP	1157	M-9B	405	94	CT-9F	0	0	NG-9B	0	0	n/a	n/a	n/a	FC-10	0	0	Microturbine	0.35	405	94
Large CHP	1316	M-9B	805	188	CT-9H	45	14	NG-9B	45	16	n/a	n/a	n/a	FC-10	0	0	Microturbine	0.61	805	188
Demand	2910	M-9A	588	14	CT-9E	0	0	NG-9A	871	31	n/a	n/a	n/a	FC-9	0	0	Gas Engine	0.30	871	31
Oilfield Gas	6	M-3C	4	9	CT-3E	2	30	NG-3E	6	38	n/a	n/a	n/a	FC-9	3	0	Gas Engine	1.00	6	38
Landfill Gas	49	M-4C	9	21	n/a	n/a	n/a	NG-4E	49	316	n/a	n/a	n/a	FC-9	0	0	Gas Engine	1.00	49	316
																	Totals		**2,136**	**667**

Table D-14: Detailed Results – Scenario 2, Rest of East, Base Case, 2006

Application	Total Market MW	Microturbine Tech ID	Microturbine Mkt Share MW	Microturbine NOx ton/yr	CT Tech ID	CT Mkt Share MW	CT NOx ton/yr	Gas Engine Tech ID	Gas Engine Mkt Share MW	Gas Engine NOx ton/yr	Diesel Tech ID	Diesel Mkt Share MW	Diesel NOx ton/yr	Fuel Cell Tech ID	Fuel Cell Mkt Share MW	Fuel Cell NOx ton/yr	Largest Market Share Technology	Mkt Share	MW	NOx tons/yr
Standby	34	M-7A	0	0	CT-7C	0	0	NG-7D	0	0	D-5D	0	0	FC-9	0	0	Diesel	0.00	0	0
Reliability	3278	M-7A	0	0	CT-7C	0	0	NG-7D	0	0	D-5D	0	0	FC-9	0	0	Diesel	0.00	0	0
On-site Power	4097	M-9A	0	0	CT-9E	0	0	NG-9A	0	0	n/a	n/a	n/a	FC-9	0	0	Microturbine	0.00	0	0
Small CHP	964	M-9B	338	79	CT-9F	0	0	NG-9B	0	0	n/a	n/a	n/a	FC-10	0	0	Microturbine	0.35	338	79
Large CHP	1097	M-9B	671	156	CT-9H	38	12	NG-9B	37	13	n/a	n/a	n/a	FC-10	0	0	Microturbine	0.61	671	156
Demand	4097	M-9A	828	19	CT-9E	0	0	NG-9A	1,226	44	n/a	n/a	n/a	FC-9	0	0	Gas Engine	0.30	1,226	44
Oilfield Gas	81	M-3C	50	123	CT-3E	33	418	NG-3E	81	526	n/a	n/a	n/a	FC-9	37	1	Gas Engine	1.00	81	526
Landfill Gas	105	M-4C	19	46	n/a	n/a	n/a	NG-4E	105	681	n/a	n/a	n/a	FC-9	0	0	Gas Engine	1.00	105	681
																	Totals		**2,421**	**1,487**

Table D-15: Detailed Results – Scenario 3, DFW, Base Case, 2006

Application	Total Market MW	Microturbine			CT			Gas Engine			Diesel			Fuel Cell			Largest Market Share Technology Results			
		Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Technology	Mkt Share	MW	NOx tons/yr
Standby	24	M-7A	0	0	CT-7C	0	0	NG-7D	0	0	D-5D	0	0	FC-9	0	0	Diesel	0.00	0	0
Reliability	2262	M-7A	0	0	CT-7C	0	0	NG-7D	0	0	D-5D	0	0	FC-9	0	0	Diesel	0.00	0	0
On-site Power	2828	M-8A	0	0	CT-8E	0	0	NG-8A	0	0	D-6A	0	0	FC-9	0	0	Microturbine	0.00	0	0
Small CHP	665	M-8B	233	54	CT-8F	0	0	NG-8B	0	0	n/a	n/a	n/a	FC-10	0	0	Microturbine	0.35	233	54
Large CHP	757	M-8B	463	108	CT-8H	26	8	NG-8B	26	9	n/a	n/a	n/a	FC-10	0	0	Microturbine	0.61	463	108
Demand	2828	M-8A	572	13	CT-8E	0	0	NG-8A	846	30	D-6A	2,410	145	FC-9	0	0	Diesel	0.85	2,410	145
Oilfield Gas	0.1	M-3C	0	0	CT-3E	0.04	1	NG-3E	0.1	1	n/a	n/a	n/a	FC-9	0	0	Gas Engine	1.00	0.1	1
Landfill Gas	50	M-4C	9	22	n/a	n/a	n/a	NG-4E	50	327	n/a	n/a	n/a	FC-9	0	0	Gas Engine	1.00	50	327
																	Totals		**3,156**	**634**

Table D-16: Detailed Results – Scenario 3, HGA, Base Case, 2006

Application	Total Market MW	Microturbine			CT			Gas Engine			Diesel			Fuel Cell			Largest Market Share Technology Results			
		Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Technology	Mkt Share	MW	NOx tons/yr
Standby	24	M-7A	0	0	CT-7C	0	0	NG-7D	0	0	D-5D	0	0	FC-9	0	0	Diesel	0.00	0	0
Reliability	2328	M-7A	0	0	CT-7C	0	0	NG-7D	0	0	D-5D	0	0	FC-9	0	0	Diesel	0.00	0	0
On-site Power	2910	M-8A	0	0	CT-8E	0	0	NG-8A	0	0	D-6A	0	0	FC-9	0	0	Microturbine	0.00	0	0
Small CHP	1157	M-8B	405	94	CT-8F	0	0	NG-8B	0	0	n/a	n/a	n/a	FC-10	0	0	Microturbine	0.35	405	94
Large CHP	1316	M-8B	805	188	CT-8H	45	14	NG-8B	45	16	n/a	n/a	n/a	FC-10	0	0	Microturbine	0.61	805	188
Demand	2910	M-8A	588	14	CT-8E	0	0	NG-8A	871	31	D-6A	2,480	149	FC-9	0	0	Diesel	0.85	2,480	149
Oilfield Gas	6	M-3C	4	9	CT-3E	2	30	NG-3E	6	38	n/a	n/a	n/a	FC-9	3	0.1	Gas Engine	1.00	6	38
Landfill Gas	49	M-4C	9	21	n/a	n/a	n/a	NG-4E	49	316	n/a	n/a	n/a	FC-9	0	0	Gas Engine	1.00	49	316
																	Totals		**3,745**	**785**

Table D-17: Detailed Results – Scenario 3, Rest of East, Base Case, 2006

Application	Total Market MW	Technologies															Largest Market Share Technology Results			
		Microturbine			CT			Gas Engine			Diesel			Fuel Cell						
		Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Technology	Mkt Share	MW	NOx tons/yr
Standby	34	M-7A	0	0	CT-7C	0	0	NG-7D	0	0	D-5D	0	0	FC-9	0	0	Diesel	0.00	0	0
Reliability	3278	M-7A	0	0	CT-7C	0	0	NG-7D	0	0	D-5D	0	0	FC-9	0	0	Diesel	0.00	0	0
On-site Power	4097	M-8A	0	0	CT-8E	0	0	NG-8A	0	0	D-6A	0	0	FC-9	0	0	Microturbine	0.00	0	0
Small CHP	964	M-8B	338	79	CT-8F	0	0	NG-8B	0	0	n/a	n/a	n/a	FC-10	0	0	Microturbine	0.35	338	79
Large CHP	1097	M-8B	671	156	CT-8H	38	12	NG-8B	37	13	n/a	n/a	n/a	FC-10	0	0	Microturbine	0.61	671	156
Demand	4097	M-8A	828	19	CT-8E	0	0	NG-8A	1,226	44	D-6A	3,491	209	FC-9	0	0	Diesel	0.85	3,491	209
Oilfield Gas	81	M-3C	50	123	CT-3E	33	418	NG-3E	81	526	n/a	n/a	n/a	FC-9	46	1	Gas Engine	1.00	81	526
Landfill Gas	105	M-4C	19	46	n/a	n/a	n/a	NG-4E	105	681	n/a	n/a	n/a	FC-9	0	0	Gas Engine	1.00	105	681
																	Totals		**4,686**	**1,652**

Table D-18: Detailed Results – All Scenarios, West Texas, Base Case, 2010

Application	Total Market MW	Technologies															Largest Market Share Technology Results			
		Microturbine			CT			Gas Engine			Diesel			Fuel Cell						
		Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Technology	Mkt Share	MW	NOx tons/yr
Standby	18	M-1F	0	0	CT-1C	0	0	NG-1F	0	0	D-1F	0	0	FC-15	0	0	Diesel	0.00	0	0
Reliability	1716	M-1F	0	0	CT-1C	0	0	NG-1F	0	0	D-1F	128	9	FC-15	0	0	Diesel	0.07	128	9
On-site Power	2145	M-2K	0	0	CT-2E	0	0	NG-2H	0	0	D-2F	0	0	FC-15	180	3	Fuel Cell	0.08	180	3
Small CHP	505	M-2L	410	96	CT-2F	0	0	NG-2I	132	584	n/a	n/a	n/a	FC-16	29	0.5	Microturbine	0.81	410	96
Large CHP	575	M-2L	542	126	CT-2J	200	227	NG-2I	320	1,420	n/a	n/a	n/a	FC-16	104	2	Microturbine	0.94	542	126
Demand	2145	M-2K	1,839	43	CT-2E	0	0	NG-2H	2,087	927	D-2F	1,939	814	FC-15	2,088	3	Fuel Cell	0.97	2,088	3
Oilfield Gas	278	M-3E	172	420	CT-3E	113	1,433	NG-3H	278	1,804	n/a	n/a	n/a	FC-15	278	7	Gas Engine	1.00	278	1,804
Landfill Gas	55	M-4E	10	24	n/a	n/a	n/a	NG-4H	55	357	n/a	n/a	n/a	FC-15	55	1	Fuel Cell	1.00	55	1
																	Totals		**3,681**	**2,043**

Table D-19: Detailed Results – Scenario 1, DFW, Base Case, 2010

		Technologies															Largest Market Share Technology Results			
		Microturbine			CT			Gas Engine			Diesel			Fuel Cell						
Application	Total Market MW	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Technology	Mkt Share	MW	NOx tons/yr
Standby	24	M-5F	0	0	CT-5C	0	0	NG-5F	0	0	D-3F	0	0	FC-15	0	0	Diesel	0.00	0	0
Reliability	2262	M-5F	0	0	CT-5C	0	0	NG-5F	0	0	D-3F	0	0	FC-15	0	0	Diesel	0.00	0	0
On-site Power	2828	M-6C	0	0	CT-6E	0	0	NG-6H	0	0	D-4F	0	0	FC-15	237	4	Fuel Cell	0.08	237	4
Small CHP	665	M-6D	540	126	CT-6F	0	0	NG-6I	9	4	n/a	n/a	n/a	FC-16	38	1	Microturbine	0.81	540	126
Large CHP	757	M-6D	714	166	CT-6J	264	298	NG-6I	96	46	n/a	n/a	n/a	FC-16	137	2	Microturbine	0.94	714	166
Demand	2828	M-6C	2,424	57	CT-6E	0	0	NG-6H	1,293	62	D-4F	2,410	289	FC-15	2,753	5	Fuel Cell	0.97	2,753	5
Oilfield Gas	0.1	M-3E	0	0	CT-3E	0.04	1	NG-3H	0.1	1	n/a	n/a	n/a	FC-15	0	0	Gas Engine	1.00	0.1	1
Landfill Gas	50	M-4E	9	22	n/a	n/a	n/a	NG-4H	50	327	n/a	n/a	n/a	FC-15	50	1	Fuel Cell	1.00	50	1
																	Totals		4,294	302

Table D-20: Detailed Results – Scenario 1, HGA, Base Case, 2010

		Technologies															Largest Market Share Technology Results			
		Microturbine			CT			Gas Engine			Diesel			Fuel Cell						
Application	Total Market MW	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Technology	Mkt Share	MW	NOx tons/yr
Standby	24	M-5F	0	0	CT-5C	0	0	NG-5F	0	0	D-3F	0	0	FC-15	0	0	Diesel	0.00	0	0
Reliability	2328	M-5F	0	0	CT-5C	0	0	NG-5F	0	0	D-3F	0	0	FC-15	0	0	Diesel	0.00	0	0
On-site Power	2910	M-6C	0	0	CT-6E	0	0	NG-6H	0	0	D-4F	0	0	FC-15	244	4	Fuel Cell	0.08	244	4
Small CHP	1157	M-6D	939	219	CT-6F	0	0	NG-6I	16	8	n/a	n/a	n/a	FC-16	66	1	Microturbine	0.81	939	219
Large CHP	1316	M-6D	1,241	289	CT-6J	459	519	NG-6I	166	80	n/a	n/a	n/a	FC-16	238	4	Microturbine	0.94	1,241	289
Demand	2910	M-6C	2,495	58	CT-6E	0	0	NG-6H	1,330	64	D-4F	2,480	298	FC-15	2,832	5	Fuel Cell	0.97	2,832	5
Oilfield Gas	6	M-3E	4	9	CT-3E	2	30	NG-3H	6	38	n/a	n/a	n/a	FC-15	6	0.1	Gas Engine	1.00	6	38
Landfill Gas	49	M-4E	9	21	n/a	n/a	n/a	NG-4H	49	316	n/a	n/a	n/a	FC-15	49	1	Fuel Cell	1.00	49	1
																	Totals		5,311	556

Table D-21: Detailed Results – Scenario 1, Rest of East, Base Case, 2010

Application	Total Market MW	Technologies															Largest Market Share Technology Results			
		Microturbine			CT			Gas Engine			Diesel			Fuel Cell						
		Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Technology	Mkt Share	MW	NOx tons/yr
Standby	34	M-5F	0	0	CT-5C	0	0	NG-5F	0	0	D-3F	0	0	FC-15	0	0	Diesel	0.00	0	0
Reliability	3278	M-5F	0	0	CT-5C	0	0	NG-5F	0	0	D-3F	0	0	FC-15	0	0	Diesel	0.00	0	0
On-site Power	4097	M-6C	0	0	CT-6E	0	0	NG-6H	0	0	D-4F	0	0	FC-15	344	6	Fuel Cell	0.08	344	6
Small CHP	964	M-6D	782	182	CT-6F	0	0	NG-6I	13	6	n/a	n/a	n/a	FC-16	55	1	Microturbine	0.81	782	182
Large CHP	1097	M-6D	1,034	241	CT-6J	382	432	NG-6I	139	67	n/a	n/a	n/a	FC-16	198	3	Microturbine	0.94	1,034	241
Demand	4097	M-6C	3,512	82	CT-6E	0	0	NG-6H	1,873	90	D-4F	3,491	419	FC-15	3,988	7	Fuel Cell	0.97	3,988	7
Oilfield Gas	81	M-3E	50	123	CT-3E	33	418	NG-3H	81	526	n/a	n/a	n/a	FC-15	81	2	Gas Engine	1.00	81	526
Landfill Gas	105	M-4E	19	46	n/a	n/a	n/a	NG-4H	105	681	n/a	n/a	n/a	FC-15	105	3	Fuel Cell	1.00	105	3
																	Totals		**6,334**	**965**

Table D-22: Detailed Results – Scenario 2, DFW, Base Case, 2010

Application	Total Market MW	Technologies															Largest Market Share Technology Results			
		Microturbine			CT			Gas Engine			Diesel			Fuel Cell						
		Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Technology	Mkt Share	MW	NOx tons/yr
Standby	24	M-7B	0	0	CT-7C	0	0	NG-7F	0	0	D-5F	0	0	FC-15	0	0	Diesel	0.00	0	0
Reliability	2262	M-7B	0	0	CT-7C	0	0	NG-7F	0	0	D-5F	0	0	FC-15	0	0	Diesel	0.00	0	0
On-site Power	2828	M-9C	0	0	CT-9E	0	0	NG-9C	0	0	n/a	n/a	n/a	FC-15	237	4	Fuel Cell	0.08	237	4
Small CHP	665	M-9D	540	126	CT-9F	0	0	NG-9D	0	0	n/a	n/a	n/a	FC-16	38	1	Microturbine	0.81	540	126
Large CHP	757	M-9D	714	166	CT-9J	26	8	NG-9D	0	0	n/a	n/a	n/a	FC-16	137	2	Microturbine	0.94	714	166
Demand	2828	M-9C	2,424	57	CT-9E	0	0	NG-9C	2,177	78	n/a	n/a	n/a	FC-15	2,753	5	Fuel Cell	0.97	2,753	5
Oilfield Gas	0.1	M-3E	0	0	CT-3E	0.04	1	NG-3H	0.1	1	n/a	n/a	n/a	FC-15	0	0	Gas Engine	1.00	0.1	1
Landfill Gas	50	M-4E	9	22	n/a	n/a	n/a	NG-4H	50	327	n/a	n/a	n/a	FC-15	50	1	Fuel Cell	1.00	50	1
																	Totals		**4,294**	**302**

Table D-23: Detailed Results – Scenarios 2 & 3, HGA, Base Case, 2010

Application	Total Market MW	Technologies															Largest Market Share Technology Results			
		Microturbine			CT			Gas Engine			Diesel			Fuel Cell						
		Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Technology	Mkt Share	MW	NOx tons/yr
Standby	24	M-7B	0	0	CT-7C	0	0	NG-7F	0	0	D-5F	0	0	FC-15	0	0	Diesel	0.00	0	0
Reliability	2328	M-7B	0	0	CT-7C	0	0	NG-7F	0	0	D-5F	0	0	FC-15	0	0	Diesel	0.00	0	0
On-site Power	2910	M-9C	0	0	CT-9E	0	0	NG-9C	0	0	n/a	n/a	n/a	FC-15	244	4	Fuel Cell	0.08	244	4
Small CHP	1157	M-9D	939	219	CT-9F	0	0	NG-9D	0	0	n/a	n/a	n/a	FC-16	66	1	Microturbine	0.81	939	219
Large CHP	1316	M-9D	1,241	289	CT-9J	45	14	NG-9D	0	0	n/a	n/a	n/a	FC-16	238	4	Microturbine	0.94	1,241	289
Demand	2910	M-9C	2,495	58	CT-9E	0	0	NG-9C	2,240	81	n/a	n/a	n/a	FC-15	2,832	5	Fuel Cell	0.97	2,832	5
Oilfield Gas	6	M-3E	4	9	CT-3E	2	30	NG-3H	6	38	n/a	n/a	n/a	FC-15	6	0.1	Gas Engine	1.00	6	38
Landfill Gas	49	M-4E	9	21	n/a	n/a	n/a	NG-4H	49	316	n/a	n/a	n/a	FC-15	49	1	Fuel Cell	1.00	49	1
																	Totals		5,311	556

Table D-24: Detailed Results – Scenarios 2 & 3, Rest of East, Base Case, 2010

Application	Total Market MW	Technologies															Largest Market Share Technology Results			
		Microturbine			CT			Gas Engine			Diesel			Fuel Cell						
		Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Technology	Mkt Share	MW	NOx tons/yr
Standby	34	M-7B	0	0	CT-7C	0	0	NG-7F	0	0	D-5F	0	0	FC-15	0	0	Diesel	0.00	0	0
Reliability	3278	M-7B	0	0	CT-7C	0	0	NG-7F	0	0	D-5F	0	0	FC-15	0	0	Diesel	0.00	0	0
On-site Power	4097	M-9C	0	0	CT-9E	0	0	NG-9C	0	0	n/a	n/a	n/a	FC-15	344	6	Fuel Cell	0.08	344	6
Small CHP	964	M-9D	782	182	CT-9F	0	0	NG-9D	0	0	n/a	n/a	n/a	FC-16	55	1	Microturbine	0.81	782	182
Large CHP	1097	M-9D	1,034	241	CT-9J	38	12	NG-9D	0	0	n/a	n/a	n/a	FC-16	198	3	Microturbine	0.94	1,034	241
Demand	4097	M-9C	3,512	82	CT-9E	0	0	NG-9C	3,153	114	n/a	n/a	n/a	FC-15	3,988	7	Fuel Cell	0.97	3,988	7
Oilfield Gas	81	M-3E	50	123	CT-3E	33	418	NG-3H	81	526	n/a	n/a	n/a	FC-15	81	2	Gas Engine	1.00	81	526
Landfill Gas	105	M-4E	19	46	n/a	n/a	n/a	NG-4H	105	681	n/a	n/a	n/a	FC-15	105	3	Fuel Cell	1.00	105	3
																	Totals		6,334	965

Table D-25: Detailed Results – Scenario 3, DFW, Base Case, 2010

Application	Total Market MW	Technologies: Microturbine Tech ID	Microturbine Mkt Share MW	Microturbine NOx ton/yr	CT Tech ID	CT Mkt Share MW	CT NOx ton/yr	Gas Engine Tech ID	Gas Engine Mkt Share MW	Gas Engine NOx ton/yr	Diesel Tech ID	Diesel Mkt Share MW	Diesel NOx ton/yr	Fuel Cell Tech ID	Fuel Cell Mkt Share MW	Fuel Cell NOx ton/yr	Largest Market Share Technology Results: Technology	Mkt Share	MW	NOx tons/yr
Standby	24	M-7B	0	0	CT-7C	0	0	NG-7F	0	0	D-5F	0	0	FC-15	0	0	Diesel	0.00	0	0
Reliability	2262	M-7B	0	0	CT-7C	0	0	NG-7F	0	0	D-5F	0	0	FC-15	0	0	Diesel	0.00	0	0
On-site Power	2828	M-8C	0	0	CT-8E	0	0	NG-8C	0	0	D-6B	0	0	FC-15	237	4	Fuel Cell	0.08	237	4
Small CHP	665	M-8D	540	126	CT-8F	0	0	NG-8D	0	0	n/a	n/a	n/a	FC-16	38	1	Microturbine	0.81	540	126
Large CHP	757	M-8D	714	166	CT-8J	26	8	NG-8D	0	0	n/a	n/a	n/a	FC-16	137	2	Microturbine	0.94	714	166
Demand	2828	M-8C	2,424	57	CT-8E	0	0	NG-8C	2,177	78	D-6B	2,410	145	FC-15	2,753	5	Fuel Cell	0.97	2,753	5
Oilfield Gas	0.1	M-3E	0	0	CT-3E	0.04	1	NG-3H	0.1	1	n/a	n/a	n/a	FC-15	0	0	Gas Engine	1.00	0.1	1
Landfill Gas	50	M-4E	9	22	n/a	n/a	n/a	NG-4H	50	327	n/a	n/a	n/a	FC-15	50	1	Fuel Cell	1.00	50	1
																	Totals		**4,294**	**302**

Table D-26: Detailed Results – Scenario 3, HGA, Base Case, 2010

Application	Total Market MW	Technologies: Microturbine Tech ID	Microturbine Mkt Share MW	Microturbine NOx ton/yr	CT Tech ID	CT Mkt Share MW	CT NOx ton/yr	Gas Engine Tech ID	Gas Engine Mkt Share MW	Gas Engine NOx ton/yr	Diesel Tech ID	Diesel Mkt Share MW	Diesel NOx ton/yr	Fuel Cell Tech ID	Fuel Cell Mkt Share MW	Fuel Cell NOx ton/yr	Largest Market Share Technology Results: Technology	Mkt Share	MW	NOx tons/yr
Standby	24	M-7B	0	0	CT-7C	0	0	NG-7F	0	0	D-5F	0	0	FC-15	0	0	Diesel	0.00	0	0
Reliability	2328	M-7B	0	0	CT-7C	0	0	NG-7F	0	0	D-5F	0	0	FC-15	0	0	Diesel	0.00	0	0
On-site Power	2910	M-8C	0	0	CT-8E	0	0	NG-8C	0	0	D-6B	0	0	FC-15	244	4	Fuel Cell	0.08	244	4
Small CHP	1157	M-8D	939	219	CT-8F	0	0	NG-8D	0	0	n/a	n/a	n/a	FC-16	66	1	Microturbine	0.81	939	219
Large CHP	1316	M-8D	1,241	289	CT-8J	45	14	NG-8D	0	0	n/a	n/a	n/a	FC-16	238	4	Microturbine	0.94	1,241	289
Demand	2910	M-8C	2,495	58	CT-8E	0	0	NG-8C	2,240	81	D-6B	2,480	149	FC-15	2,832	5	Fuel Cell	0.97	2,832	5
Oilfield Gas	6	M-3E	4	9	CT-3E	2	30	NG-3H	6	38	n/a	n/a	n/a	FC-15	6	0.1	Gas Engine	1.00	6	38
Landfill Gas	49	M-4E	9	21	n/a	n/a	n/a	NG-4H	49	316	n/a	n/a	n/a	FC-15	49	1	Fuel Cell	1.00	49	1
																	Totals		**5,311**	**556**

Table D-27: Detailed Results – Scenario 3, Rest of East, Base Case, 2010

Application	Total Market MW	Technologies															Largest Market Share Technology Results			
		Microturbine			CT			Gas Engine			Diesel			Fuel Cell						
		Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Technology	Mkt Share	MW	NOx tons/yr
Standby	34	M-7B	0	0	CT-7C	0	0	NG-7F	0	0	D-5F	0	0	FC-15	0	0	Diesel	0.00	0	0
Reliability	3278	M-7B	0	0	CT-7C	0	0	NG-7F	0	0	D-5F	0	0	FC-15	0	0	Diesel	0.00	0	0
On-site Power	4097	M-8C	0	0	CT-8E	0	0	NG-8C	0	0	D-6B	0	0	FC-15	344	6	Fuel Cell	0.08	344	6
Small CHP	964	M-8D	782	182	CT-8F	0	0	NG-8D	0	0	n/a	n/a	n/a	FC-16	55	1	Microturbine	0.81	782	182
Large CHP	1097	M-8D	1,034	241	CT-8J	38	12	NG-8D	0	0	n/a	n/a	n/a	FC-16	198	3	Microturbine	0.94	1,034	241
Demand	4097	M-8C	3,512	82	CT-8E	0	0	NG-8C	3,153	114	D-6B	3,491	209	FC-15	3,988	7	Fuel Cell	0.97	3,988	7
Oilfield Gas	81	M-3E	50	123	CT-3E	33	418	NG-3H	81	526	n/a	n/a	n/a	FC-15	81	2	Gas Engine	1.00	81	526
Landfill Gas	105	M-4E	19	46	n/a	n/a	n/a	NG-4H	105	681	n/a	n/a	n/a	FC-15	105	3	Fuel Cell	1.00	105	3
																	Totals		6,334	965

Appendix E. Detailed Results: 0.1 Fixed Charge Rate

Table E-1: Detailed Results – All Scenarios, West Texas, 0.1 FCR, 2002

		Technologies															Largest Market Share Technology Results			
		Microturbine			CT			Gas Engine			Diesel			Fuel Cell						
Application	Total Market MW	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Technology	Mkt Share	MW	NOx tons/yr
Standby	18	M-1A	0	0	CT-1C	0	0	NG-1B	0	0	D-1B	0	0	FC-4	0	0	Diesel	0.00	0	0
Reliability	1716	M-1A	0	0	CT-1C	0	0	NG-1B	986	12	D-1B	1,557	109	FC-4	0	0	Diesel	0.91	1,557	109
On-site Power	2145	M-2A	0	0	CT-2E	0	0	NG-2B	0	0	D-2B	0	0	FC-4	0	0	Gas Engine	0.00	0	0
Small CHP	505	M-2B	158	256	CT-2F	0	0	NG-2C	322	2,287	n/a	n/a	n/a	FC-2	0	0	Gas Engine	0.64	322	2,287
Large CHP	575	M-2B	334	542	CT-2B	490	1,940	NG-2C	498	3,544	n/a	n/a	n/a	FC-2	0	0	Gas Engine	0.87	498	3,544
Demand	2145	M-2A	1,260	204	CT-2E	303	262	NG-2B	2,145	1,525	D-2B	2,145	901	FC-4	0	0	Gas Engine	1.00	2,145	1,525
Oilfield Gas	278	M-3A	278	680	CT-3E	268	3,385	NG-3B	278	2,889	n/a	n/a	n/a	FC-4	0	0	Gas Engine	1.00	278	2,889
Landfill Gas	55	M-4A	32	79	n/a	n/a	n/a	NG-4B	55	357	n/a	n/a	n/a	FC-4	0	0	Gas Engine	1.00	55	357
																	Totals		4,855	10,710

Table E-2: Detailed Results – Scenario 1, DFW, 0.1 FCR, 2002

		Technologies															Largest Market Share Technology Results			
		Microturbine			CT			Gas Engine			Diesel			Fuel Cell						
Application	Total Market MW	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Technology	Mkt Share	MW	NOx tons/yr
Standby	24	M-5A	0	0	CT-5C	0	0	NG-5B	0	0	D-3B	0	0	FC-4	0	0	Diesel	0.00	0	0
Reliability	2262	M-5A	0	0	CT-5C	0	0	NG-5B	94	1	D-3B	1,353	9	FC-4	0	0	Diesel	0.60	1,353	9
On-site Power	2828	M-6A	0	0	CT-6E	0	0	NG-6B	0	0	D-4B	0	0	FC-4	0	0	Gas Engine	0.00	0	0
Small CHP	665	M-6B	208	337	CT-6F	0	0	NG-6C	161	121	n/a	n/a	n/a	FC-2	0	0	Microturbine	0.31	208	337
Large CHP	757	M-6B	440	714	CT-6B	476	376	NG-6C	402	301	n/a	n/a	n/a	FC-2	0	0	CT	0.63	476	376
Demand	2828	M-6A	1,661	270	CT-6E	0	0	NG-6B	2,719	204	D-4B	2,828	339	FC-4	0	0	Diesel	1.00	2,828	339
Oilfield Gas	0.1	M-3A	0	0	CT-3E	0.10	1	NG-3B	0.1	1	n/a	n/a	n/a	FC-4	0	0	Gas Engine	1.00	0.1	1
Landfill Gas	50	M-4A	30	73	n/a	n/a	n/a	NG-4B	50	327	n/a	n/a	n/a	FC-4	0	0	Gas Engine	1.00	50	327
																	Totals		4,915	1,389

Table E-3: Detailed Results – Scenario 1, HGA, 0.1 FCR, 2002

		Technologies															Largest Market Share Technology Results			
		Microturbine			CT			Gas Engine			Diesel			Fuel Cell						
Application	Total Market MW	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Technology	Mkt Share	MW	NOx tons/yr
Standby	24	M-5A	0	0	CT-5C	0	0	NG-5B	0	0	D-3B	0	0	FC-4	0	0	Diesel	0.00	0	0
Reliability	2328	M-5A	0	0	CT-5C	0	0	NG-5B	97	1	D-3B	1,392	10	FC-4	0	0	Diesel	0.60	1,392	10
On-site Power	2910	M-6A	0	0	CT-6E	0	0	NG-6B	0	0	D-4B	0	0	FC-4	0	0	Gas Engine	0.00	0	0
Small CHP	1157	M-6B	361	586	CT-6F	0	0	NG-6C	280	210	n/a	n/a	n/a	FC-2	0	0	Microturbine	0.31	361	586
Large CHP	1316	M-6B	764	1,240	CT-6B	828	654	NG-6C	699	524	n/a	n/a	n/a	FC-2	0	0	CT	0.63	828	654
Demand	2910	M-6A	1,709	277	CT-6E	0	0	NG-6B	2,798	210	D-4B	2,910	349	FC-4	0	0	Diesel	1.00	2,910	349
Oilfield Gas	6	M-3A	6	14	CT-3E	6	72	NG-3B	6	61	n/a	n/a	n/a	FC-4	0	0	Gas Engine	1.00	6	61
Landfill Gas	49	M-4A	29	70	n/a	n/a	n/a	NG-4B	49	316	n/a	n/a	n/a	FC-4	0	0	Gas Engine	1.00	49	316
																	Totals		5,547	1,976

Table E-4: Detailed Results – Scenario 1, Rest of East, 0.1 FCR, 2002

		Technologies															Largest Market Share Technology Results			
		Microturbine			CT			Gas Engine			Diesel			Fuel Cell						
Application	Total Market MW	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Technology	Mkt Share	MW	NOx tons/yr
Standby	34	M-5A	0	0	CT-5C	0	0	NG-5B	0	0	D-3B	0	0	FC-4	0	0	Diesel	0.00	0	0
Reliability	3278	M-5A	0	0	CT-5C	0	0	NG-5B	137	1	D-3B	1,961	14	FC-4	0	0	Diesel	0.60	1,961	14
On-site Power	4097	M-6A	0	0	CT-6E	0	0	NG-6B	0	0	D-4B	0	0	FC-4	0	0	Gas Engine	0.00	0	0
Small CHP	964	M-6B	301	489	CT-6F	0	0	NG-6C	233	175	n/a	n/a	n/a	FC-2	0	0	Microturbine	0.31	301	489
Large CHP	1097	M-6B	637	1,034	CT-6B	690	545	NG-6C	582	437	n/a	n/a	n/a	FC-2	0	0	CT	0.63	690	545
Demand	4097	M-6A	2,406	391	CT-6E	0	0	NG-6B	3,940	295	D-4B	4,097	492	FC-4	0	0	Diesel	1.00	4,097	492
Oilfield Gas	81	M-3A	81	198	CT-3E	78	988	NG-3B	81	843	n/a	n/a	n/a	FC-4	0	0	Gas Engine	1.00	81	843
Landfill Gas	105	M-4A	62	151	n/a	n/a	n/a	NG-4B	105	681	n/a	n/a	n/a	FC-4	0	0	Gas Engine	1.00	105	681
																	Totals		7,235	3,063

Table E-5: Detailed Results – Scenarios 2 & 3, DFW, 0.1 FCR, 2002

		Technologies															Largest Market Share Technology Results			
		Microturbine			CT			Gas Engine			Diesel			Fuel Cell						
Application	Total Market MW	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Technology	Mkt Share	MW	NOx tons/yr
Standby	24	n/a	n/a	n/a	CT-7C	0	0	NG-7B	0	0	D-5B	0	0	FC-4	0	0	Diesel	0.00	0	0
Reliability	2262	n/a	n/a	n/a	CT-7C	0	0	NG-7B	0	0	D-5B	991	2	FC-4	0	0	Diesel	0.44	991	2
On-site Power	2828	n/a	n/a	n/a	CT-9E	0	0	n/a	n/a	n/a	n/a	n/a	n/a	FC-4	0	0	Fuel Cell	0.00	0	0
Small CHP	665	n/a	n/a	n/a	CT-9F	0	0	n/a	n/a	n/a	n/a	n/a	n/a	FC-2	0	0	CT	0.00	0	0
Large CHP	757	n/a	n/a	n/a	CT-9B	476	189	n/a	n/a	n/a	n/a	n/a	n/a	FC-2	0	0	CT	0.63	476	189
Demand	2828	n/a	n/a	n/a	CT-9E	0	0	n/a	n/a	n/a	n/a	n/a	n/a	FC-4	0	0	CT	0.00	0	0
Oilfield Gas	0.1	M-3A	0	0	CT-3E	0.10	1	NG-3B	0.1	1	n/a	n/a	n/a	FC-4	0	0	Gas Engine	1.00	0.1	1
Landfill Gas	50	M-4A	30	73	n/a	n/a	n/a	NG-4B	50	327	n/a	n/a	n/a	FC-4	0	0	Gas Engine	1.00	50	327
																	Totals		**1,518**	**518**

Table E-6: Detailed Results – Scenarios 2 & 3, HGA, 0.1 FCR, 2002

		Technologies															Largest Market Share Technology Results			
		Microturbine			CT			Gas Engine			Diesel			Fuel Cell						
Application	Total Market MW	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Technology	Mkt Share	MW	NOx tons/yr
Standby	24	n/a	n/a	n/a	CT-7C	0	0	NG-7B	0	0	D-5B	0	0	FC-4	0	0	Diesel	0.00	0	0
Reliability	2328	n/a	n/a	n/a	CT-7C	0	0	NG-7B	0	0	D-5B	1,020	2	FC-4	0	0	Diesel	0.44	1,020	2
On-site Power	2910	n/a	n/a	n/a	CT-9E	0	0	n/a	n/a	n/a	n/a	n/a	n/a	FC-4	0	0	Fuel Cell	0.00	0	0
Small CHP	1157	n/a	n/a	n/a	CT-9F	0	0	n/a	n/a	n/a	n/a	n/a	n/a	FC-2	0	0	CT	0.00	0	0
Large CHP	1316	n/a	n/a	n/a	CT-9B	828	328	n/a	n/a	n/a	n/a	n/a	n/a	FC-2	0	0	CT	0.63	828	328
Demand	2910	n/a	n/a	n/a	CT-9E	0	0	n/a	n/a	n/a	n/a	n/a	n/a	FC-4	0	0	CT	0.00	0	0
Oilfield Gas	6	M-3A	6	14	CT-3E	6	72	NG-3B	6	61	n/a	n/a	n/a	FC-4	0	0	Gas Engine	1.00	6	61
Landfill Gas	49	M-4A	29	70	n/a	n/a	n/a	NG-4B	49	316	n/a	n/a	n/a	FC-4	0	0	Gas Engine	1.00	49	316
																	Totals		**1,903**	**707**

Table E-7: Detailed Results – Scenarios 2 & 3, Rest of East, 0.1 FCR, 2002

Application	Total Market MW	Technologies															Largest Market Share Technology Results			
		Microturbine			CT			Gas Engine			Diesel			Fuel Cell						
		Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Technology	Mkt Share	MW	NOx tons/yr
Standby	34	n/a	n/a	n/a	CT-7C	0	0	NG-7B	0	0	D-5B	0	0	FC-4	0	0	Diesel	0.00	0	0
Reliability	3278	n/a	n/a	n/a	CT-7C	0	0	NG-7B	0	0	D-5B	1,436	3	FC-4	0	0	Diesel	0.44	1,436	3
On-site Power	4097	n/a	n/a	n/a	CT-9E	0	0	n/a	n/a	n/a	n/a	n/a	n/a	FC-4	0	0	Fuel Cell	0.00	0	0
Small CHP	964	n/a	n/a	n/a	CT-9F	0	0	n/a	n/a	n/a	n/a	n/a	n/a	FC-2	0	0	CT	0.00	0	0
Large CHP	1097	n/a	n/a	n/a	CT-9B	690	273	n/a	n/a	n/a	n/a	n/a	n/a	FC-2	0	0	CT	0.63	690	273
Demand	4097	n/a	n/a	n/a	CT-9E	0	0	n/a	n/a	n/a	n/a	n/a	n/a	FC-4	0	0	CT	0.00	0	0
Oilfield Gas	81	M-3A	81	198	CT-3E	78	988	NG-3B	81	843	n/a	n/a	n/a	FC-4	0	0	Gas Engine	1.00	81	843
Landfill Gas	105	M-4A	62	151	n/a	n/a	n/a	NG-4B	105	681	n/a	n/a	n/a	FC-4	0	0	Gas Engine	1.00	105	681
																	Totals		**2,313**	**1,800**

Table E-8: Detailed Results – All Scenarios, West Texas, 0.1 FCR, 2006

Application	Total Market MW	Technologies															Largest Market Share Technology Results			
		Microturbine			CT			Gas Engine			Diesel			Fuel Cell						
		Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Technology	Mkt Share	MW	NOx tons/yr
Standby	18	M-1E	0	0	CT-1C	0	0	NG-1D	0	0	D-1D	0	0	FC-9	0	0	Diesel	0.00	0	0
Reliability	1716	M-1E	0	0	CT-1C	0	0	NG-1D	986	8	D-1D	1,557	109	FC-9	0	0	Diesel	0.91	1,557	109
On-site Power	2145	M-2I	0	0	CT-2E	0	0	NG-2E	0	0	D-2D	0	0	FC-9	0	0	Gas Engine	0.00	0	0
Small CHP	505	M-2J	449	105	CT-2F	0	0	NG-2F	337	1,497	n/a	n/a	n/a	FC-10	0	0	Microturbine	0.89	449	105
Large CHP	575	M-2J	565	132	CT-2H	508	575	NG-2F	509	2,260	n/a	n/a	n/a	FC-10	0	0	Microturbine	0.98	565	132
Demand	2145	M-2I	2,006	47	CT-2E	303	262	NG-2E	2,145	952	D-2D	2,145	901	FC-9	83	0	Gas Engine	1.00	2,145	952
Oilfield Gas	278	M-3C	278	680	CT-3E	268	3,385	NG-3E	278	1,804	n/a	n/a	n/a	FC-9	278	7	Gas Engine	1.00	278	1,804
Landfill Gas	55	M-4C	55	134	n/a	n/a	n/a	NG-4E	55	357	n/a	n/a	n/a	FC-9	41	1	Gas Engine	1.00	55	357
																	Totals		**5,050**	**3,458**

Table E-9: Detailed Results – Scenario 1, DFW, 0.1 FCR, 2006

		Technologies															Largest Market Share Technology Results			
		Microturbine			CT			Gas Engine			Diesel			Fuel Cell						
Application	Total Market MW	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Technology	Mkt Share	MW	NOx tons/yr
Standby	24	M-5E	0	0	CT-5C	0	0	NG-5D	0	0	D-3D	0	0	FC-9	0	0	Diesel	0.00	0	0
Reliability	2262	M-5E	0	0	CT-5C	0	0	NG-5D	270	2	D-3D	1,353	9	FC-9	0	0	Diesel	0.60	1,353	9
On-site Power	2828	M-6A	0	0	CT-6E	0	0	NG-6E	0	0	D-4D	0	0	FC-9	0	0	Microturbine	0.00	0	0
Small CHP	665	M-6B	592	138	CT-6F	0	0	NG-6F	178	86	n/a	n/a	n/a	FC-10	0	0	Microturbine	0.89	592	138
Large CHP	757	M-6B	744	173	CT-6H	669	757	NG-6F	428	206	n/a	n/a	n/a	FC-10	0	0	Microturbine	0.98	744	173
Demand	2828	M-6A	2,645	62	CT-6E	0	0	NG-6E	2,762	133	D-4D	2,828	339	FC-9	110	0	Diesel	1.00	2,828	339
Oilfield Gas	0.1	M-3C	0	0	CT-3E	0.10	1	NG-3E	0.1	1	n/a	n/a	n/a	FC-9	0	0	Gas Engine	1.00	0.1	1
Landfill Gas	50	M-4C	50	123	n/a	n/a	n/a	NG-4E	50	327	n/a	n/a	n/a	FC-9	38	1	Gas Engine	1.00	50	327
																	Totals		5,567	988

Table E-10: Detailed Results – Scenario 1, HGA, 0.1 FCR, 2006

		Technologies															Largest Market Share Technology Results			
		Microturbine			CT			Gas Engine			Diesel			Fuel Cell						
Application	Total Market MW	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Technology	Mkt Share	MW	NOx tons/yr
Standby	24	M-5E	0	0	CT-5C	0	0	NG-5D	0	0	D-3D	0	0	FC-9	0	0	Diesel	0.00	0	0
Reliability	2328	M-5E	0	0	CT-5C	0	0	NG-5D	278	2	D-3D	1,392	10	FC-9	0	0	Diesel	0.60	1,392	10
On-site Power	2910	M-6A	0	0	CT-6E	0	0	NG-6E	0	0	D-4D	0	0	FC-9	0	0	Microturbine	0.00	0	0
Small CHP	1157	M-6B	1,030	240	CT-6F	0	0	NG-6F	310	149	n/a	n/a	n/a	FC-10	0	0	Microturbine	0.89	1,030	240
Large CHP	1316	M-6B	1,293	301	CT-6H	1,163	1,315	NG-6F	745	357	n/a	n/a	n/a	FC-10	0	0	Microturbine	0.98	1,293	301
Demand	2910	M-6A	2,721	63	CT-6E	0	0	NG-6E	2,842	136	D-4D	2,910	349	FC-9	113	0	Diesel	1.00	2,910	349
Oilfield Gas	6	M-3C	6	14	CT-3E	6	72	NG-3E	6	38	n/a	n/a	n/a	FC-9	6	0	Gas Engine	1.00	6	38
Landfill Gas	49	M-4C	49	119	n/a	n/a	n/a	NG-4E	49	316	n/a	n/a	n/a	FC-9	37	1	Gas Engine	1.00	49	316
																	Totals		6,680	1,254

Table E-11: Detailed Results – Scenario 1, Rest of East, 0.1 FCR, 2006

Application	Total Market MW	Technologies: Microturbine			CT			Gas Engine			Diesel			Fuel Cell			Largest Market Share Technology Results			
		Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Technology	Mkt Share	MW	NOx tons/yr
Standby	34	M-5E	0	0	CT-5C	0	0	NG-5D	0	0	D-3D	0	0	FC-9	0	0	Diesel	0.00	0	0
Reliability	3278	M-5E	0	0	CT-5C	0	0	NG-5D	392	3	D-3D	1,961	14	FC-9	0	0	Diesel	0.60	1,961	14
On-site Power	4097	M-6A	0	0	CT-6E	0	0	NG-6E	0	0	D-4D	0	0	FC-9	0	0	Microturbine	0.00	0	0
Small CHP	964	M-6B	858	200	CT-6F	0	0	NG-6F	258	124	n/a	n/a	n/a	FC-10	0	0	Microturbine	0.89	858	200
Large CHP	1097	M-6B	1,078	251	CT-6H	969	1,096	NG-6F	621	298	n/a	n/a	n/a	FC-10	0	0	Microturbine	0.98	1,078	251
Demand	4097	M-6A	3,831	89	CT-6E	0	0	NG-6E	4,001	192	D-4D	4,097	492	FC-9	159	0	Diesel	1.00	4,097	492
Oilfield Gas	81	M-3C	81	198	CT-3E	78	988	NG-3E	81	526	n/a	n/a	n/a	FC-9	81	2	Gas Engine	1.00	81	526
Landfill Gas	105	M-4C	105	257	n/a	n/a	n/a	NG-4E	105	681	n/a	n/a	n/a	FC-9	79	2	Gas Engine	1.00	105	681
																	Totals		8,180	2,164

Table E-12: Detailed Results – Scenario 2, DFW, 0.1 FCR, 2006

Application	Total Market MW	Technologies: Microturbine			CT			Gas Engine			Diesel			Fuel Cell			Largest Market Share Technology Results			
		Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Technology	Mkt Share	MW	NOx tons/yr
Standby	24	M-7A	0	0	CT-7C	0	0	NG-7D	0	0	D-5D	0	0	FC-9	0	0	Diesel	0.00	0	0
Reliability	2262	M-7A	0	0	CT-7C	0	0	NG-7D	0	0	D-5D	991	2	FC-9	0	0	Diesel	0.44	991	2
On-site Power	2828	M-9A	0	0	CT-9E	0	0	NG-9A	0	0	n/a	n/a	n/a	FC-9	0	0	Microturbine	0.00	0	0
Small CHP	665	M-9B	592	138	CT-9F	0	0	NG-9B	123	44	n/a	n/a	n/a	FC-10	0	0	Microturbine	0.89	592	138
Large CHP	757	M-9B	744	173	CT-9H	435	136	NG-9B	337	121	n/a	n/a	n/a	FC-10	0	0	Microturbine	0.98	744	173
Demand	2828	M-9A	2,645	62	CT-9E	0	0	NG-9A	2,719	98	n/a	n/a	n/a	FC-9	110	0	Gas Engine	0.96	2,719	98
Oilfield Gas	0.1	M-3C	0	0	CT-3E	0.10	1	NG-3E	0.1	1	n/a	n/a	n/a	FC-9	0	0	Gas Engine	1.00	0.1	1
Landfill Gas	50	M-4C	50	123	n/a	n/a	n/a	NG-4E	50	327	n/a	n/a	n/a	FC-9	38	1	Gas Engine	1.00	50	327
																	Totals		5,097	739

Table E-13: Detailed Results – Scenario 2, HGA, 0.1 FCR, 2006

		Technologies															Largest Market Share Technology Results			
		Microturbine			CT			Gas Engine			Diesel			Fuel Cell						
Application	Total Market MW	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Technology	Mkt Share	MW	NOx tons/yr
Standby	24	M-7A	0	0	CT-7C	0	0	NG-7D	0	0	D-5D	0	0	FC-9	0	0	Diesel	0.00	0	0
Reliability	2328	M-7A	0	0	CT-7C	0	0	NG-7D	0	0	D-5D	1,020	2	FC-9	0	0	Diesel	0.44	1,020	2
On-site Power	2910	M-9A	0	0	CT-9E	0	0	NG-9A	0	0	n/a	n/a	n/a	FC-9	0	0	Microturbine	0.00	0	0
Small CHP	1157	M-9B	1,030	240	CT-9F	0	0	NG-9B	213	77	n/a	n/a	n/a	FC-10	0	0	Microturbine	0.89	1,030	240
Large CHP	1316	M-9B	1,293	301	CT-9H	756	236	NG-9B	585	211	n/a	n/a	n/a	FC-10	0	0	Microturbine	0.98	1,293	301
Demand	2910	M-9A	2,721	63	CT-9E	0	0	NG-9A	2,798	101	n/a	n/a	n/a	FC-9	113	0	Gas Engine	0.96	2,798	101
Oilfield Gas	6	M-3C	6	14	CT-3E	6	72	NG-3E	6	38	n/a	n/a	n/a	FC-9	6	0	Gas Engine	1.00	6	38
Landfill Gas	49	M-4C	49	119	n/a	n/a	n/a	NG-4E	49	316	n/a	n/a	n/a	FC-9	37	1	Gas Engine	1.00	49	316
																	Totals		**6,196**	**998**

Table E-14: Detailed Results – Scenario 2, Rest of East, 0.1 FCR, 2006

		Technologies															Largest Market Share Technology Results			
		Microturbine			CT			Gas Engine			Diesel			Fuel Cell						
Application	Total Market MW	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Technology	Mkt Share	MW	NOx tons/yr
Standby	34	M-7A	0	0	CT-7C	0	0	NG-7D	0	0	D-5D	0	0	FC-9	0	0	Diesel	0.00	0	0
Reliability	3278	M-7A	0	0	CT-7C	0	0	NG-7D	0	0	D-5D	1,436	3	FC-9	0	0	Diesel	0.44	1,436	3
On-site Power	4097	M-9A	0	0	CT-9E	0	0	NG-9A	0	0	n/a	n/a	n/a	FC-9	0	0	Microturbine	0.00	0	0
Small CHP	964	M-9B	858	200	CT-9F	0	0	NG-9B	178	64	n/a	n/a	n/a	FC-10	0	0	Microturbine	0.89	858	200
Large CHP	1097	M-9B	1,078	251	CT-9H	630	197	NG-9B	488	176	n/a	n/a	n/a	FC-10	0	0	Microturbine	0.98	1,078	251
Demand	4097	M-9A	3,831	89	CT-9E	0	0	NG-9A	3,940	142	n/a	n/a	n/a	FC-9	159	0	Gas Engine	0.96	3,940	142
Oilfield Gas	81	M-3C	81	198	CT-3E	78	988	NG-3E	81	526	n/a	n/a	n/a	FC-9	81	2	Gas Engine	1.00	81	526
Landfill Gas	105	M-4C	105	257	n/a	n/a	n/a	NG-4E	105	681	n/a	n/a	n/a	FC-9	79	2	Gas Engine	1.00	105	681
																	Totals		**7,498**	**1,804**

Table E-15: Detailed Results – Scenario 3, DFW, 0.1 FCR, 2006

Application	Total Market MW	Microturbine Tech ID	Microturbine Mkt Share MW	Microturbine NOx ton/yr	CT Tech ID	CT Mkt Share MW	CT NOx ton/yr	Gas Engine Tech ID	Gas Engine Mkt Share MW	Gas Engine NOx ton/yr	Diesel Tech ID	Diesel Mkt Share MW	Diesel NOx ton/yr	Fuel Cell Tech ID	Fuel Cell Mkt Share MW	Fuel Cell NOx ton/yr	Largest Market Share Technology	Mkt Share	MW	NOx tons/yr
Standby	24	M-7A	0	0	CT-7C	0	0	NG-7D	0	0	D-5D	0	0	FC-9	0	0	Diesel	0.00	0	0
Reliability	2262	M-7A	0	0	CT-7C	0	0	NG-7D	0	0	D-5D	991	2	FC-9	0	0	Diesel	0.44	991	2
On-site Power	2828	M-8A	0	0	CT-8E	0	0	NG-8A	0	0	D-6A	0	0	FC-9	0	0	Microturbine	0.00	0	0
Small CHP	665	M-8B	592	138	CT-8F	0	0	NG-8B	123	44	n/a	n/a	n/a	FC-10	0	0	Microturbine	0.89	592	138
Large CHP	757	M-8B	744	173	CT-8H	435	136	NG-8B	337	121	n/a	n/a	n/a	FC-10	0	0	Microturbine	0.98	744	173
Demand	2828	M-8A	2,645	62	CT-8E	0	0	NG-8A	2,719	98	D-6A	2,828	170	FC-9	301	0	Diesel	1.00	2,828	170
Oilfield Gas	0.1	M-3C	0	0	CT-3E	0.10	1	NG-3E	0.1	1	n/a	n/a	n/a	FC-9	0	0	Gas Engine	1.00	0.1	1
Landfill Gas	50	M-4C	50	123	n/a	n/a	n/a	NG-4E	50	327	n/a	n/a	n/a	FC-9	43	1	Gas Engine	1.00	50	327
																	Totals		**5,205**	**810**

Table E-16: Detailed Results – Scenario 3, HGA, 0.1 FCR, 2006

Application	Total Market MW	Microturbine Tech ID	Microturbine Mkt Share MW	Microturbine NOx ton/yr	CT Tech ID	CT Mkt Share MW	CT NOx ton/yr	Gas Engine Tech ID	Gas Engine Mkt Share MW	Gas Engine NOx ton/yr	Diesel Tech ID	Diesel Mkt Share MW	Diesel NOx ton/yr	Fuel Cell Tech ID	Fuel Cell Mkt Share MW	Fuel Cell NOx ton/yr	Largest Market Share Technology	Mkt Share	MW	NOx tons/yr
Standby	24	M-7A	0	0	CT-7C	0	0	NG-7D	0	0	D-5D	0	0	FC-9	0	0	Diesel	0.00	0	0
Reliability	2328	M-7A	0	0	CT-7C	0	0	NG-7D	0	0	D-5D	1,020	2	FC-9	0	0	Diesel	0.44	1,020	2
On-site Power	2910	M-8A	0	0	CT-8E	0	0	NG-8A	0	0	D-6A	0	0	FC-9	0	0	Microturbine	0.00	0	0
Small CHP	1157	M-8B	1,030	240	CT-8F	0	0	NG-8B	213	77	n/a	n/a	n/a	FC-10	0	0	Microturbine	0.89	1,030	240
Large CHP	1316	M-8B	1,293	301	CT-8H	756	236	NG-8B	585	211	n/a	n/a	n/a	FC-10	1	0	Microturbine	0.98	1,293	301
Demand	2910	M-8A	2,721	63	CT-8E	0	0	NG-8A	2,798	101	D-6A	2,910	175	FC-9	310	1	Diesel	1.00	2,910	175
Oilfield Gas	6	M-3C	6	14	CT-3E	6	72	NG-3E	6	38	n/a	n/a	n/a	FC-9	6	0.1	Gas Engine	1.00	6	38
Landfill Gas	49	M-4C	49	119	n/a	n/a	n/a	NG-4E	49	316	n/a	n/a	n/a	FC-9	42	1	Gas Engine	1.00	49	316
																	Totals		**6,307**	**1,072**

Table E-17: Detailed Results – Scenario 3, Rest of East, 0.1 FCR, 2006

		Technologies															Largest Market Share Technology Results			
		Microturbine			CT			Gas Engine			Diesel			Fuel Cell						
Application	Total Market MW	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Technology	Mkt Share	MW	NOx tons/yr
Standby	34	M-7A	0	0	CT-7C	0	0	NG-7D	0	0	D-5D	0	0	FC-9	0	0	Diesel	0.00	0	0
Reliability	3278	M-7A	0	0	CT-7C	0	0	NG-7D	0	0	D-5D	1,436	3	FC-9	0	0	Diesel	0.44	1,436	3
On-site Power	4097	M-8A	0	0	CT-8E	0	0	NG-8A	0	0	D-6A	0	0	FC-9	0	0	Microturbine	0.00	0	0
Small CHP	964	M-8B	858	200	CT-8F	0	0	NG-8B	178	64	n/a	n/a	n/a	FC-10	0	0	Microturbine	0.89	858	200
Large CHP	1097	M-8B	1,078	251	CT-8H	630	197	NG-8B	488	176	n/a	n/a	n/a	FC-10	1	0	Microturbine	0.98	1,078	251
Demand	4097	M-8A	3,831	89	CT-8E	0	0	NG-8A	3,940	142	D-6A	4,097	246	FC-9	436	1	Diesel	1.00	4,097	246
Oilfield Gas	81	M-3C	81	198	CT-3E	78	988	NG-3E	81	526	n/a	n/a	n/a	FC-9	81	2	Gas Engine	1.00	81	526
Landfill Gas	105	M-4C	105	257	n/a	n/a	n/a	NG-4E	105	681	n/a	n/a	n/a	FC-9	90	2	Gas Engine	1.00	105	681
																	Totals		**7,655**	**1,908**

Table E-18: Detailed Results – All Scenarios, West Texas, 0.1 FCR, 2010

		Technologies															Largest Market Share Technology Results			
		Microturbine			CT			Gas Engine			Diesel			Fuel Cell						
Application	Total Market MW	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Technology	Mkt Share	MW	NOx tons/yr
Standby	18	M-1F	0	0	CT-1C	0	0	NG-1F	0	0	D-1F	0	0	FC-15	0	0	Diesel	0.00	0	0
Reliability	1716	M-1F	0	0	CT-1C	0	0	NG-1F	986	8	D-1F	1,557	109	FC-15	0	0	Diesel	0.91	1,557	109
On-site Power	2145	M-2K	0	0	CT-2E	0	0	NG-2H	0	0	D-2F	0	0	FC-15	710	12	Fuel Cell	0.33	710	12
Small CHP	505	M-2L	503	117	CT-2F	0	0	NG-2I	340	1,510	n/a	n/a	n/a	FC-16	288	4.8	Microturbine	1.00	503	117
Large CHP	575	M-2L	575	134	CT-2J	508	575	NG-2I	511	2,268	n/a	n/a	n/a	FC-16	448	7	Microturbine	1.00	575	134
Demand	2145	M-2K	2,145	50	CT-2E	303	262	NG-2H	2,145	952	D-2F	2,145	901	FC-15	2,145	4	Fuel Cell	1.00	2,145	4
Oilfield Gas	278	M-3E	278	680	CT-3E	268	3,385	NG-3H	278	1,804	n/a	n/a	n/a	FC-15	278	7	Fuel Cell	1.00	278	7
Landfill Gas	55	M-4E	55	134	n/a	n/a	n/a	NG-4H	55	357	n/a	n/a	n/a	FC-15	55	1	Fuel Cell	1.00	55	1
																	Totals		**5,823**	**384**

Table E-19: Detailed Results – Scenario 1, DFW, 0.1 FCR, 2010

Application	Total Market MW	Technologies															Largest Market Share Technology Results			
		Microturbine			CT			Gas Engine			Diesel			Fuel Cell						
		Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Technology	Mkt Share	MW	NOx tons/yr
Standby	24	M-5F	0	0	CT-5C	0	0	NG-5F	0	0	D-3F	0	0	FC-15	0	0	Diesel	0.00	0	0
Reliability	2262	M-5F	0	0	CT-5C	0	0	NG-5F	309	2	D-3F	1,353	9	FC-15	0	0	Diesel	0.60	1,353	9
On-site Power	2828	M-6C	0	0	CT-6E	0	0	NG-6H	0	0	D-4F	0	0	FC-15	936	15	Fuel Cell	0.33	936	15
Small CHP	665	M-6D	662	154	CT-6F	0	0	NG-6I	197	94	n/a	n/a	n/a	FC-16	379	6	Microturbine	1.00	662	154
Large CHP	757	M-6D	757	176	CT-6J	669	757	NG-6I	454	218	n/a	n/a	n/a	FC-16	590	10	Microturbine	1.00	757	176
Demand	2828	M-6C	2,828	66	CT-6E	0	0	NG-6H	2,794	134	D-4F	2,828	339	FC-15	2,828	5	Fuel Cell	1.00	2,828	5
Oilfield Gas	0.1	M-3E	0	0	CT-3E	0.10	1	NG-3H	0.1	1	n/a	n/a	n/a	FC-15	0	0	Fuel Cell	1.00	0.1	0
Landfill Gas	50	M-4E	50	123	n/a	n/a	n/a	NG-4H	50	327	n/a	n/a	n/a	FC-15	50	1	Fuel Cell	1.00	50	1
																	Totals		**6,587**	**362**

Table E-20: Detailed Results – Scenario 1, HGA, 0.1 FCR, 2010

Application	Total Market MW	Technologies															Largest Market Share Technology Results			
		Microturbine			CT			Gas Engine			Diesel			Fuel Cell						
		Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Technology	Mkt Share	MW	NOx tons/yr
Standby	24	M-5F	0	0	CT-5C	0	0	NG-5F	0	0	D-3F	0	0	FC-15	0	0	Diesel	0.00	0	0
Reliability	2328	M-5F	0	0	CT-5C	0	0	NG-5F	318	2	D-3F	1,392	10	FC-15	0	0	Diesel	0.60	1,392	10
On-site Power	2910	M-6C	0	0	CT-6E	0	0	NG-6H	0	0	D-4F	0	0	FC-15	963	16	Fuel Cell	0.33	963	16
Small CHP	1157	M-6D	1,152	269	CT-6F	0	0	NG-6I	342	164	n/a	n/a	n/a	FC-16	660	11	Microturbine	1.00	1,152	269
Large CHP	1316	M-6D	1,316	307	CT-6J	1,163	1,315	NG-6I	789	379	n/a	n/a	n/a	FC-16	1,025	17	Microturbine	1.00	1,316	307
Demand	2910	M-6C	2,910	68	CT-6E	0	0	NG-6H	2,875	138	D-4F	2,910	349	FC-15	2,910	5	Fuel Cell	1.00	2,910	5
Oilfield Gas	6	M-3E	6	14	CT-3E	6	72	NG-3H	6	38	n/a	n/a	n/a	FC-15	6	0.1	Fuel Cell	1.00	6	0
Landfill Gas	49	M-4E	49	119	n/a	n/a	n/a	NG-4H	49	316	n/a	n/a	n/a	FC-15	49	1	Fuel Cell	1.00	49	1
																	Totals		**7,789**	**607**

Table E-21: Detailed Results – Scenario 1, Rest of East, 0.1 FCR, 2010

		Technologies															Largest Market Share Technology Results			
		Microturbine			CT			Gas Engine			Diesel			Fuel Cell						
Application	Total Market MW	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Technology	Mkt Share	MW	NOx tons/yr
Standby	34	M-5F	0	0	CT-5C	0	0	NG-5F	0	0	D-3F	0	0	FC-15	0	0	Diesel	0.00	0	0
Reliability	3278	M-5F	0	0	CT-5C	0	0	NG-5F	447	3	D-3F	1,961	14	FC-15	0	0	Diesel	0.60	1,961	14
On-site Power	4097	M-6C	0	0	CT-6E	0	0	NG-6H	0	0	D-4F	0	0	FC-15	1,356	22	Fuel Cell	0.33	1,356	22
Small CHP	964	M-6D	960	224	CT-6F	0	0	NG-6I	285	137	n/a	n/a	n/a	FC-16	550	9	Microturbine	1.00	960	224
Large CHP	1097	M-6D	1,097	256	CT-6J	969	1,096	NG-6I	657	316	n/a	n/a	n/a	FC-16	855	14	Microturbine	1.00	1,097	256
Demand	4097	M-6C	4,097	96	CT-6E	0	0	NG-6H	4,048	194	D-4F	4,097	492	FC-15	4,097	7	Fuel Cell	1.00	4,097	7
Oilfield Gas	81	M-3E	81	198	CT-3E	78	988	NG-3H	81	526	n/a	n/a	n/a	FC-15	81	2	Fuel Cell	1.00	81	2
Landfill Gas	105	M-4E	105	257	n/a	n/a	n/a	NG-4H	105	681	n/a	n/a	n/a	FC-15	105	3	Fuel Cell	1.00	105	3
																	Totals		**9,657**	**527**

Table E-22: Detailed Results – Scenario 2, DFW, 0.1 FCR, 2010

		Technologies															Largest Market Share Technology Results			
		Microturbine			CT			Gas Engine			Diesel			Fuel Cell						
Application	Total Market MW	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Technology	Mkt Share	MW	NOx tons/yr
Standby	24	M-7B	0	0	CT-7C	0	0	NG-7F	0	0	D-5F	0	0	FC-15	0	0	Diesel	0.00	0	0
Reliability	2262	M-7B	0	0	CT-7C	0	0	NG-7F	0	0	D-5F	991	2	FC-15	0	0	Diesel	0.44	991	2
On-site Power	2828	M-9C	0	0	CT-9E	0	0	NG-9C	0	0	n/a	n/a	na	FC-15	936	15	Fuel Cell	0.33	936	15
Small CHP	665	M-9D	662	154	CT-9F	0	0	NG-9D	0	0	n/a	n/a	n/a	FC-16	379	6	Microturbine	1.00	662	154
Large CHP	757	M-9D	757	176	CT-9J	435	136	NG-9D	0	0	n/a	n/a	n/a	FC-16	590	10	Microturbine	1.00	757	176
Demand	2828	M-9C	2,828	66	CT-9E	0	0	NG-9C	2,828	102	n/a	n/a	na	FC-15	2,828	5	Fuel Cell	1.00	2,828	5
Oilfield Gas	0.1	M-3E	0	0	CT-3E	0.10	1	NG-3H	0.1	1	n/a	n/a	n/a	FC-15	0	0	Fuel Cell	1.00	0.1	0
Landfill Gas	50	M-4E	50	123	n/a	n/a	n/a	NG-4H	50	327	n/a	n/a	n/a	FC-15	50	1	Fuel Cell	1.00	50	1
																	Totals		**6,225**	**354**

Table E-23: Detailed Results – Scenario 2, HGA, 0.1 FCR, 2010

Application	Total Market MW	Technologies															Largest Market Share Technology Results			
		Microturbine			CT			Gas Engine			Diesel			Fuel Cell						
		Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Technology	Mkt Share	MW	NOx tons/yr
Standby	24	M-7B	0	0	CT-7C	0	0	NG-7F	0	0	D-5F	0	0	FC-15	0	0	Diesel	0.00	0	0
Reliability	2328	M-7B	0	0	CT-7C	0	0	NG-7F	0	0	D-5F	1,020	2	FC-15	0	0	Diesel	0.44	1,020	2
On-site Power	2910	M-9C	0	0	CT-9E	0	0	NG-9C	0	0	n/a	n/a	n/a	FC-15	963	16	Fuel Cell	0.33	963	16
Small CHP	1157	M-9D	1,152	269	CT-9F	0	0	NG-9D	0	0	n/a	n/a	n/a	FC-16	660	11	Microturbine	1.00	1,152	269
Large CHP	1316	M-9D	1,316	307	CT-9J	756	236	NG-9D	0	0	n/a	n/a	n/a	FC-16	1,025	17	Microturbine	1.00	1,316	307
Demand	2910	M-9C	2,910	68	CT-9E	0	0	NG-9C	2,910	105	n/a	n/a	n/a	FC-15	2,910	5	Fuel Cell	1.00	2,910	5
Oilfield Gas	6	M-3E	6	14	CT-3E	6	72	NG-3H	6	38	n/a	n/a	n/a	FC-15	6	0.1	Fuel Cell	1.00	6	0
Landfill Gas	49	M-4E	49	119	n/a	n/a	n/a	NG-4H	49	316	n/a	n/a	n/a	FC-15	49	1	Fuel Cell	1.00	49	1
																	Totals		7,416	599

Table E-24: Detailed Results – Scenario 2, Rest of East, 0.1 FCR, 2010

Application	Total Market MW	Technologies															Largest Market Share Technology Results			
		Microturbine			CT			Gas Engine			Diesel			Fuel Cell						
		Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Technology	Mkt Share	MW	NOx tons/yr
Standby	34	M-7B	0	0	CT-7C	0	0	NG-7F	0	0	D-5F	0	0	FC-15	0	0	Diesel	0.00	0	0
Reliability	3278	M-7B	0	0	CT-7C	0	0	NG-7F	0	0	D-5F	1,436	3	FC-15	0	0	Diesel	0.44	1,436	3
On-site Power	4097	M-9C	0	0	CT-9E	0	0	NG-9C	0	0	n/a	n/a	n/a	FC-15	1,356	22	Fuel Cell	0.33	1,356	22
Small CHP	964	M-9D	960	224	CT-9F	0	0	NG-9D	0	0	n/a	n/a	n/a	FC-16	550	9	Microturbine	1.00	960	224
Large CHP	1097	M-9D	1,097	256	CT-9J	630	197	NG-9D	0	0	n/a	n/a	n/a	FC-16	855	14	Microturbine	1.00	1,097	256
Demand	4097	M-9C	4,097	96	CT-9E	0	0	NG-9C	4,097	147	n/a	n/a	n/a	FC-15	4,097	7	Fuel Cell	1.00	4,097	7
Oilfield Gas	81	M-3E	81	198	CT-3E	78	988	NG-3H	81	526	n/a	n/a	n/a	FC-15	81	2	Fuel Cell	1.00	81	2
Landfill Gas	105	M-4E	105	257	n/a	n/a	n/a	NG-4H	105	681	n/a	n/a	n/a	FC-15	105	3	Fuel Cell	1.00	105	3
																	Totals		9,133	516

Table E-25: Detailed Results – Scenario 3, DFW, 0.1 FCR, 2010

		Technologies															Largest Market Share Technology Results			
		Microturbine			CT			Gas Engine			Diesel			Fuel Cell						
Application	Total Market MW	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Technology	Mkt Share	MW	NOx tons/yr
Standby	24	M-7B	0	0	CT-7C	0	0	NG-7F	0	0	D-5F	0	0	FC-15	0	0	Diesel	0.00	0	0
Reliability	2262	M-7B	0	0	CT-7C	0	0	NG-7F	0	0	D-5F	991	2	FC-15	0	0	Diesel	0.44	991	2
On-site Power	2828	M-8C	0	0	CT-8E	0	0	NG-8C	0	0	D-6B	0	0	FC-15	936	15	Fuel Cell	0.33	936	15
Small CHP	665	M-8D	662	154	CT-8F	0	0	NG-8D	0	0	n/a	n/a	n/a	FC-16	379	6	Microturbine	1.00	662	154
Large CHP	757	M-8D	757	176	CT-8J	435	136	NG-8D	0	0	n/a	n/a	n/a	FC-16	590	10	Microturbine	1.00	757	176
Demand	2828	M-8C	2,828	66	CT-8E	0	0	NG-8C	2,828	102	D-6B	2,828	170	FC-15	2,828	5	Fuel Cell	1.00	2,828	5
Oilfield Gas	0.1	M-3E	0	0	CT-3E	0.10	1	NG-3H	0.1	1	n/a	n/a	n/a	FC-15	0	0	Fuel Cell	1.00	0.1	0
Landfill Gas	50	M-4E	50	123	n/a	n/a	n/a	NG-4H	50	327	n/a	n/a	n/a	FC-15	50	1	Fuel Cell	1.00	50	1
																	Totals		**6,225**	**354**

Table E-26: Detailed Results – Scenario 3, HGA, 0.1 FCR, 2010

		Technologies															Largest Market Share Technology Results			
		Microturbine			CT			Gas Engine			Diesel			Fuel Cell						
Application	Total Market MW	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Technology	Mkt Share	MW	NOx tons/yr
Standby	24	M-7B	0	0	CT-7C	0	0	NG-7F	0	0	D-5F	0	0	FC-15	0	0	Diesel	0.00	0	0
Reliability	2328	M-7B	0	0	CT-7C	0	0	NG-7F	0	0	D-5F	1,020	2	FC-15	0	0	Diesel	0.44	1,020	2
On-site Power	2910	M-8C	0	0	CT-8E	0	0	NG-8C	0	0	D-6B	0	0	FC-15	963	16	Fuel Cell	0.33	963	16
Small CHP	1157	M-8D	1,152	269	CT-8F	0	0	NG-8D	0	0	n/a	n/a	n/a	FC-16	660	11	Microturbine	1.00	1,152	269
Large CHP	1316	M-8D	1,316	307	CT-8J	756	236	NG-8D	0	0	n/a	n/a	n/a	FC-16	1,025	17	Microturbine	1.00	1,316	307
Demand	2910	M-8C	2,910	68	CT-8E	0	0	NG-8C	2,910	105	D-6B	2,910	175	FC-15	2,910	5	Fuel Cell	1.00	2,910	5
Oilfield Gas	6	M-3E	6	14	CT-3E	6	72	NG-3H	6	38	n/a	n/a	n/a	FC-15	6	0.1	Fuel Cell	1.00	6	0
Landfill Gas	49	M-4E	49	119	n/a	n/a	n/a	NG-4H	49	316	n/a	n/a	n/a	FC-15	49	1	Fuel Cell	1.00	49	1
																	Totals		**7,416**	**599**

Table E-27: Detailed Results – Scenario 3, Rest of East, 0.1 FCR, 2010

		Technologies															Largest Market Share Technology Results			
		Microturbine			CT			Gas Engine			Diesel			Fuel Cell						
Application	Total Market MW	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Technology	Mkt Share	MW	NOx tons/yr
Standby	34	M-7B	0	0	CT-7C	0	0	NG-7F	0	0	D-5F	0	0	FC-15	0	0	Diesel	0.00	0	0
Reliability	3278	M-7B	0	0	CT-7C	0	0	NG-7F	0	0	D-5F	1,436	3	FC-15	0	0	Diesel	0.44	1,436	3
On-site Power	4097	M-8C	0	0	CT-8E	0	0	NG-8C	0	0	D-6B	0	0	FC-15	1,356	22	Fuel Cell	0.33	1,356	22
Small CHP	964	M-8D	960	224	CT-8F	0	0	NG-8D	0	0	n/a	n/a	n/a	FC-16	550	9	Microturbine	1.00	960	224
Large CHP	1097	M-8D	1,097	256	CT-8J	630	197	NG-8D	0	0	n/a	n/a	n/a	FC-16	855	14	Microturbine	1.00	1,097	256
Demand	4097	M-8C	4,097	96	CT-8E	0	0	NG-8C	4,097	147	D-6B	4,097	246	FC-15	4,097	7	Fuel Cell	1.00	4,097	7
Oilfield Gas	81	M-3E	81	198	CT-3E	78	988	NG-3H	81	526	n/a	n/a	n/a	FC-15	81	2	Fuel Cell	1.00	81	2
Landfill Gas	105	M-4E	105	257	n/a	n/a	n/a	NG-4H	105	681	n/a	n/a	n/a	FC-15	105	3	Fuel Cell	1.00	105	3
																	Totals		9,133	516

Appendix F. Detailed Results: 0.2 Fixed Charge Rate

Table F-1: Detailed Results – All Scenarios, West Texas, 0.2 FCR, 2002

Application	Total Market MW	Technologies: Microturbine			Technologies: CT			Technologies: Gas Engine			Technologies: Diesel			Technologies: Fuel Cell			Largest Market Share Technology Results			
		Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Technology	Mkt Share	MW	NOx tons/yr
Standby	18	M-1A	0	0	CT-1C	0	0	NG-1B	0	0	D-1B	0	0	FC-4	0	0	Diesel	0.00	0	0
Reliability	1716	M-1A	0	0	CT-1C	0	0	NG-1B	0	0	D-1B	0	0	FC-4	0	0	Diesel	0.00	0	0
On-site Power	2145	M-2A	0	0	CT-2E	0	0	NG-2B	0	0	D-2B	0	0	FC-4	0	0	Gas Engine	0.00	0	0
Small CHP	505	M-2B	0	0	CT-2F	0	0	NG-2C	7	48	n/a	n/a	n/a	FC-2	0	0	Gas Engine	0.01	7	48
Large CHP	575	M-2B	0	0	CT-2B	56	222	NG-2C	72	510	n/a	n/a	n/a	FC-2	0	0	Gas Engine	0.12	72	510
Demand	2145	M-2A	0	0	CT-2E	0	0	NG-2B	1,010	718	D-2B	1,166	490	FC-4	0	0	Diesel	0.54	1,166	490
Oilfield Gas	278	M-3A	9	22	CT-3E	1	11	NG-3B	278	2,889	n/a	n/a	n/a	FC-4	0	0	Gas Engine	1.00	278	2,889
Landfill Gas	55	M-4A	0	0	n/a	n/a	n/a	NG-4B	46	300	n/a	n/a	n/a	FC-4	0	0	Gas Engine	0.84	46	300
																	Totals		1,569	4,237

Table F-2: Detailed Results – Scenario 1, DFW, 0.2 FCR, 2002

Application	Total Market MW	Technologies: Microturbine			Technologies: CT			Technologies: Gas Engine			Technologies: Diesel			Technologies: Fuel Cell			Largest Market Share Technology Results			
		Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Technology	Mkt Share	MW	NOx tons/yr
Standby	24	M-5A	0	0	CT-5C	0	0	NG-5B	0	0	D-3B	0	0	FC-4	0	0	Diesel	0.00	0	0
Reliability	2262	M-5A	0	0	CT-5C	0	0	NG-5B	0	0	D-3B	0	0	FC-4	0	0	Diesel	0.00	0	0
On-site Power	2828	M-6A	0	0	CT-6E	0	0	NG-6B	0	0	D-4B	0	0	FC-4	0	0	Gas Engine	0.00	0	0
Small CHP	665	M-6B	0	0	CT-6F	0	0	NG-6C	0	0	n/a	n/a	n/a	FC-2	0	0	Gas Engine	0.00	0	0
Large CHP	757	M-6B	0	0	CT-6B	0	0	NG-6C	0	0	n/a	n/a	n/a	FC-2	0	0	CT	0.00	0	0
Demand	2828	M-6A	0	0	CT-6E	0	0	NG-6B	0	0	D-4B	1,167	140	FC-4	0	0	Diesel	0.41	1,167	140
Oilfield Gas	0.1	M-3A	0	0	CT-3E	0.00	0	NG-3B	0.1	1	n/a	n/a	n/a	FC-4	0	0	Gas Engine	1.00	0.1	1
Landfill Gas	50	M-4A	0	0	n/a	n/a	n/a	NG-4B	42	275	n/a	n/a	n/a	FC-4	0	0	Gas Engine	0.84	42	275
																	Totals		1,209	416

Table F-3: Detailed Results – Scenario 1, HGA, 0.2 FCR, 2002

Application	Total Market MW	Technologies: Microturbine			CT			Gas Engine			Diesel			Fuel Cell			Largest Market Share Technology Results			
		Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Technology	Mkt Share	MW	NOx tons/yr
Standby	24	M-5A	0	0	CT-5C	0	0	NG-5B	0	0	D-3B	0	0	FC-4	0	0	Diesel	0.00	0	0
Reliability	2328	M-5A	0	0	CT-5C	0	0	NG-5B	0	0	D-3B	0	0	FC-4	0	0	Diesel	0.00	0	0
On-site Power	2910	M-6A	0	0	CT-6E	0	0	NG-6B	0	0	D-4B	0	0	FC-4	0	0	Gas Engine	0.00	0	0
Small CHP	1157	M-6B	0	0	CT-6F	0	0	NG-6C	0	0	n/a	n/a	n/a	FC-2	0	0	Gas Engine	0.00	0	0
Large CHP	1316	M-6B	0	0	CT-6B	0	0	NG-6C	0	0	n/a	n/a	n/a	FC-2	0	0	CT	0.00	0	0
Demand	2910	M-6A	0	0	CT-6E	0	0	NG-6B	0	0	D-4B	1,201	144	FC-4	0	0	Diesel	0.41	1,201	144
Oilfield Gas	6	M-3A	0	0	CT-3E	0	0	NG-3B	6	61	n/a	n/a	n/a	FC-4	0	0	Gas Engine	1.00	6	61
Landfill Gas	49	M-4A	0	0	n/a	n/a	n/a	NG-4B	41	265	n/a	n/a	n/a	FC-4	0	0	Gas Engine	0.84	41	265
																	Totals		**1,248**	**471**

Table F-4: Detailed Results – Scenario 1, Rest of East, 0.2 FCR, 2002

Application	Total Market MW	Technologies: Microturbine			CT			Gas Engine			Diesel			Fuel Cell			Largest Market Share Technology Results			
		Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Technology	Mkt Share	MW	NOx tons/yr
Standby	34	M-5A	0	0	CT-5C	0	0	NG-5B	0	0	D-3B	0	0	FC-4	0	0	Diesel	0.00	0	0
Reliability	3278	M-5A	0	0	CT-5C	0	0	NG-5B	0	0	D-3B	0	0	FC-4	0	0	Diesel	0.00	0	0
On-site Power	4097	M-6A	0	0	CT-6E	0	0	NG-6B	0	0	D-4B	0	0	FC-4	0	0	Gas Engine	0.00	0	0
Small CHP	964	M-6B	0	0	CT-6F	0	0	NG-6C	0	0	n/a	n/a	n/a	FC-2	0	0	Gas Engine	0.00	0	0
Large CHP	1097	M-6B	0	0	CT-6B	0	0	NG-6C	0	0	n/a	n/a	n/a	FC-2	0	0	CT	0.00	0	0
Demand	4097	M-6A	0	0	CT-6E	0	0	NG-6B	0	0	D-4B	1,690	203	FC-4	0	0	Diesel	0.41	1,690	203
Oilfield Gas	81	M-3A	3	7	CT-3E	0	3	NG-3B	81	843	n/a	n/a	n/a	FC-4	0	0	Gas Engine	1.00	81	843
Landfill Gas	105	M-4A	0	0	n/a	n/a	n/a	NG-4B	88	573	n/a	n/a	n/a	FC-4	0	0	Gas Engine	0.84	88	573
																	Totals		**1,860**	**1,618**

Table F-5: Detailed Results – Scenarios 2 & 3, DFW, 0.2 FCR, 2002

		Technologies															Largest Market Share Technology Results			
		Microturbine			CT			Gas Engine			Diesel			Fuel Cell						
Application	Total Market MW	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Technology	Mkt Share	MW	NOx tons/yr
Standby	24	n/a	n/a	n/a	CT-7C	0	0	NG-7B	0	0	D-5B	0	0	FC-4	0	0	Diesel	0.00	0	0
Reliability	2262	n/a	n/a	n/a	CT-7C	0	0	NG-7B	0	0	D-5B	0	0	FC-4	0	0	Diesel	0.00	0	0
On-site Power	2828	n/a	n/a	n/a	CT-9E	0	0	n/a	n/a	n/a	n/a	n/a	n/a	FC-4	0	0	CT	0.00	0	0
Small CHP	665	n/a	n/a	n/a	CT-9F	0	0	n/a	n/a	n/a	n/a	n/a	n/a	FC-2	0	0	CT	0.00	0	0
Large CHP	757	n/a	n/a	n/a	CT-9B	0	0	n/a	n/a	n/a	n/a	n/a	n/a	FC-2	0	0	CT	0.00	0	0
Demand	2828	n/a	n/a	n/a	CT-9E	0	0	n/a	n/a	n/a	n/a	n/a	n/a	FC-4	0	0	CT	0.00	0	0
Oilfield Gas	0.1	M-3A	0	0	CT-3E	0.00	0	NG-3B	0.1	1	n/a	n/a	n/a	FC-4	0	0	Gas Engine	1.00	0.1	1
Landfill Gas	50	M-4A	0	0	n/a	n/a	n/a	NG-4B	42	275	n/a	n/a	n/a	FC-4	0	0	Gas Engine	0.84	42	275
																	Totals		**42**	**276**

Table F-6: Detailed Results – Scenarios 2 & 3, HGA, 0.2 FCR, 2002

		Technologies															Largest Market Share Technology Results			
		Microturbine			CT			Gas Engine			Diesel			Fuel Cell						
Application	Total Market MW	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Technology	Mkt Share	MW	NOx tons/yr
Standby	24	n/a	n/a	n/a	CT-7C	0	0	NG-7B	0	0	D-5B	0	0	FC-4	0	0	Diesel	0.00	0	0
Reliability	2328	n/a	n/a	n/a	CT-7C	0	0	NG-7B	0	0	D-5B	0	0	FC-4	0	0	Diesel	0.00	0	0
On-site Power	2910	n/a	n/a	n/a	CT-9E	0	0	n/a	n/a	n/a	n/a	n/a	n/a	FC-4	0	0	CT	0.00	0	0
Small CHP	1157	n/a	n/a	n/a	CT-9F	0	0	n/a	n/a	n/a	n/a	n/a	n/a	FC-2	0	0	CT	0.00	0	0
Large CHP	1316	n/a	n/a	n/a	CT-9B	0	0	n/a	n/a	n/a	n/a	n/a	n/a	FC-2	0	0	CT	0.00	0	0
Demand	2910	n/a	n/a	n/a	CT-9E	0	0	n/a	n/a	n/a	n/a	n/a	n/a	FC-4	0	0	CT	0.00	0	0
Oilfield Gas	6	M-3A	0	0	CT-3E	0	0	NG-3B	6	61	n/a	n/a	n/a	FC-4	0	0	Gas Engine	1.00	6	61
Landfill Gas	49	M-4A	0	0	n/a	n/a	n/a	NG-4B	41	265	n/a	n/a	n/a	FC-4	0	0	Gas Engine	0.84	41	265
																	Totals		**47**	**327**

Table F-7: Detailed Results – Scenarios 2 & 3, Rest of East, 0.2 FCR, 2002

		Technologies															Largest Market Share Technology Results			
		Microturbine			CT			Gas Engine			Diesel			Fuel Cell						
Application	Total Market MW	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Technology	Mkt Share	MW	NOx tons/yr
Standby	34	n/a	n/a	n/a	CT-7C	0	0	NG-7B	0	0	D-5B	0	0	FC-4	0	0	Diesel	0.00	0	0
Reliability	3278	n/a	n/a	n/a	CT-7C	0	0	NG-7B	0	0	D-5B	0	0	FC-4	0	0	Diesel	0.00	0	0
On-site Power	4097	n/a	n/a	n/a	CT-9E	0	0	n/a	n/a	n/a	n/a	n/a	n/a	FC-4	0	0	CT	0.00	0	0
Small CHP	964	n/a	n/a	n/a	CT-9F	0	0	n/a	n/a	n/a	n/a	n/a	n/a	FC-2	0	0	CT	0.00	0	0
Large CHP	1097	n/a	n/a	n/a	CT-9B	0	0	n/a	n/a	n/a	n/a	n/a	n/a	FC-2	0	0	CT	0.00	0	0
Demand	4097	n/a	n/a	n/a	CT-9E	0	0	n/a	n/a	n/a	n/a	n/a	n/a	FC-4	0	0	CT	0.00	0	0
Oilfield Gas	81	M-3A	3	7	CT-3E	0.3	3	NG-3B	81	843	n/a	n/a	n/a	FC-4	0	0	Gas Engine	1.00	81	843
Landfill Gas	105	M-4A	0	0	n/a	n/a	n/a	NG-4B	88	573	n/a	n/a	n/a	FC-4	0	0	Gas Engine	0.84	88	573
																	Totals		**170**	**1,416**

Table F-8: Detailed Results – All Scenarios, West Texas, 0.2 FCR, 2006

		Technologies															Largest Market Share Technology Results			
		Microturbine			CT			Gas Engine			Diesel			Fuel Cell						
Application	Total Market MW	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Technology	Mkt Share	MW	NOx tons/yr
Standby	18	M-1E	0	0	CT-1C	0	0	NG-1D	0	0	D-1D	0	0	FC-9	0	0	Diesel	0.00	0	0
Reliability	1716	M-1E	0	0	CT-1C	0	0	NG-1D	0	0	D-1D	0	0	FC-9	0	0	Diesel	0.00	0	0
On-site Power	2145	M-2I	0	0	CT-2E	0	0	NG-2E	0	0	D-2D	0	0	FC-9	0	0	Gas Engine	0.00	0	0
Small CHP	505	M-2J	5	1	CT-2F	0	0	NG-2F	14	63	n/a	n/a	n/a	FC-10	0	0	Gas Engine	0.03	14	63
Large CHP	575	M-2J	52	12	CT-2H	7	7	NG-2F	94	419	n/a	n/a	n/a	FC-10	0	0	Gas Engine	0.16	94	419
Demand	2145	M-2I	0	0	CT-2E	0	0	NG-2E	1,308	581	D-2D	1,166	490	FC-9	0	0	Gas Engine	0.61	1,308	581
Oilfield Gas	278	M-3C	9	22	CT-3E	1	11	NG-3E	278	1,804	n/a	n/a	n/a	FC-9	0	0	Gas Engine	1.00	278	1,804
Landfill Gas	55	M-4C	0	0	n/a	n/a	n/a	NG-4E	49	320	n/a	n/a	n/a	FC-9	0	0	Gas Engine	0.90	49	320
																	Totals		**1,744**	**3,187**

Table F-9: Detailed Results – Scenario 1, DFW, 0.2 FCR, 2006

Application	Total Market MW	Technologies															Largest Market Share Technology Results			
		Microturbine			CT			Gas Engine			Diesel			Fuel Cell						
		Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Technology	Mkt Share	MW	NOx tons/yr
Standby	24	M-5E	0	0	CT-5C	0	0	NG-5D	0	0	D-3D	0	0	FC-9	0	0	Diesel	0.00	0	0
Reliability	2262	M-5E	0	0	CT-5C	0	0	NG-5D	0	0	D-3D	0	0	FC-9	0	0	Diesel	0.00	0	0
On-site Power	2828	M-6A	0	0	CT-6E	0	0	NG-6E	0	0	D-4D	0	0	FC-9	0	0	Gas Engine	0.00	0	0
Small CHP	665	M-6B	7	2	CT-6F	0	0	NG-6F	0	0	n/a	n/a	n/a	FC-10	0	0	Microturbine	0.01	7	2
Large CHP	757	M-6B	68	16	CT-6H	9	10	NG-6F	0	0	n/a	n/a	n/a	FC-10	0	0	Microturbine	0.09	68	16
Demand	2828	M-6A	0	0	CT-6E	0	0	NG-6E	0	0	D-4D	1,167	140	FC-9	0	0	Diesel	0.41	1,167	140
Oilfield Gas	0.1	M-3C	0	0	CT-3E	0	0	NG-3E	0.1	1	n/a	n/a	n/a	FC-9	0	0	Gas Engine	1.00	0.1	1
Landfill Gas	50	M-4C	0	0	n/a	n/a	n/a	NG-4E	45	293	n/a	n/a	n/a	FC-9	0	0	Gas Engine	0.90	45	293
																	Totals		**1,287**	**451**

Table F-10: Detailed Results – Scenario 1, HGA, 0.2 FCR, 2006

Application	Total Market MW	Technologies															Largest Market Share Technology Results			
		Microturbine			CT			Gas Engine			Diesel			Fuel Cell						
		Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Technology	Mkt Share	MW	NOx tons/yr
Standby	24	M-5E	0	0	CT-5C	0	0	NG-5D	0	0	D-3D	0	0	FC-9	0	0	Diesel	0.00	0	0
Reliability	2328	M-5E	0	0	CT-5C	0	0	NG-5D	0	0	D-3D	0	0	FC-9	0	0	Diesel	0.00	0	0
On-site Power	2910	M-6A	0	0	CT-6E	0	0	NG-6E	0	0	D-4D	0	0	FC-9	0	0	Gas Engine	0.00	0	0
Small CHP	1157	M-6B	12	3	CT-6F	0	0	NG-6F	0	0	n/a	n/a	n/a	FC-10	0	0	Microturbine	0.01	12	3
Large CHP	1316	M-6B	119	28	CT-6H	15	17	NG-6F	0	0	n/a	n/a	n/a	FC-10	0	0	Microturbine	0.09	119	28
Demand	2910	M-6A	0	0	CT-6E	0	0	NG-6E	0	0	D-4D	1,201	144	FC-9	0	0	Diesel	0.41	1,201	144
Oilfield Gas	6	M-3C	0	0	CT-3E	0	0	NG-3E	6	38	n/a	n/a	n/a	FC-9	0	0	Gas Engine	1.00	6	38
Landfill Gas	49	M-4C	0	0	n/a	n/a	n/a	NG-4E	44	283	n/a	n/a	n/a	FC-9	0	0	Gas Engine	0.90	44	283
																	Totals		**1,381**	**496**

Table F-11: Detailed Results – Scenario 1, Rest of East, 0.2 FCR, 2006

Application	Total Market MW	Microturbine Tech ID	Microturbine Mkt Share MW	Microturbine NOx ton/yr	CT Tech ID	CT Mkt Share MW	CT NOx ton/yr	Gas Engine Tech ID	Gas Engine Mkt Share MW	Gas Engine NOx ton/yr	Diesel Tech ID	Diesel Mkt Share MW	Diesel NOx ton/yr	Fuel Cell Tech ID	Fuel Cell Mkt Share MW	Fuel Cell NOx ton/yr	Technology	Mkt Share	MW	NOx tons/yr
Standby	34	M-5E	0	0	CT-5C	0	0	NG-5D	0	0	D-3D	0	0	FC-9	0	0	Diesel	0.00	0	0
Reliability	3278	M-5E	0	0	CT-5C	0	0	NG-5D	0	0	D-3D	0	0	FC-9	0	0	Diesel	0.00	0	0
On-site Power	4097	M-6A	0	0	CT-6E	0	0	NG-6E	0	0	D-4D	0	0	FC-9	0	0	Gas Engine	0.00	0	0
Small CHP	964	M-6B	10	2	CT-6F	0	0	NG-6F	0	0	n/a	n/a	n/a	FC-10	0	0	Microturbine	0.01	10	2
Large CHP	1097	M-6B	99	23	CT-6H	13	14	NG-6F	0	0	n/a	n/a	n/a	FC-10	0	0	Microturbine	0.09	99	23
Demand	4097	M-6A	0	0	CT-6E	0	0	NG-6E	0	0	D-4D	1,690	203	FC-9	0	0	Diesel	0.41	1,690	203
Oilfield Gas	81	M-3C	3	7	CT-3E	0	3	NG-3E	81	526	n/a	n/a	n/a	FC-9	0	0	Gas Engine	1.00	81	526
Landfill Gas	105	M-4C	0	0	n/a	n/a	n/a	NG-4E	94	611	n/a	n/a	n/a	FC-9	0	0	Gas Engine	0.90	94	611
																	Totals		**1,975**	**1,366**

Table F-12: Detailed Results – Scenario 2, DFW, 0.2 FCR, 2006

Application	Total Market MW	Microturbine Tech ID	Microturbine Mkt Share MW	Microturbine NOx ton/yr	CT Tech ID	CT Mkt Share MW	CT NOx ton/yr	Gas Engine Tech ID	Gas Engine Mkt Share MW	Gas Engine NOx ton/yr	Diesel Tech ID	Diesel Mkt Share MW	Diesel NOx ton/yr	Fuel Cell Tech ID	Fuel Cell Mkt Share MW	Fuel Cell NOx ton/yr	Technology	Mkt Share	MW	NOx tons/yr
Standby	24	M-7A	0	0	CT-7C	0	0	NG-7D	0	0	D-5D	0	0	FC-9	0	0	Diesel	0.00	0	0
Reliability	2262	M-7A	0	0	CT-7C	0	0	NG-7D	0	0	D-5D	0	0	FC-9	0	0	Diesel	0.00	0	0
On-site Power	2828	M-9A	0	0	CT-9E	0	0	NG-9A	0	0	n/a	n/a	n/a	FC-9	0	0	Microturbine	0.00	0	0
Small CHP	665	M-9B	7	2	CT-9F	0	0	NG-9B	0	0	n/a	n/a	n/a	FC-10	0	0	Microturbine	0.01	7	2
Large CHP	757	M-9B	68	16	CT-9H	0	0	NG-9B	0	0	n/a	n/a	n/a	FC-10	0	0	Microturbine	0.09	68	16
Demand	2828	M-9A	0	0	CT-9E	0	0	NG-9A	0	0	n/a	n/a	n/a	FC-9	0	0	Gas Engine	0.00	0	0
Oilfield Gas	0.1	M-3C	0	0	CT-3E	0	0	NG-3E	0.1	1	n/a	n/a	n/a	FC-9	0	0	Gas Engine	1.00	0.1	1
Landfill Gas	50	M-4C	0	0	n/a	n/a	n/a	NG-4E	45	293	n/a	n/a	n/a	FC-9	0	0	Gas Engine	0.90	45	293
																	Totals		**121**	**311**

Table F-13: Detailed Results – Scenario 2, HGA, 0.2 FCR, 2006

Application	Total Market MW	Technologies															Largest Market Share Technology Results			
		Microturbine			CT			Gas Engine			Diesel			Fuel Cell						
		Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Technology	Mkt Share	MW	NOx tons/yr
Standby	24	M-7A	0	0	CT-7C	0	0	NG-7D	0	0	D-5D	0	0	FC-9	0	0	Diesel	0.00	0	0
Reliability	2328	M-7A	0	0	CT-7C	0	0	NG-7D	0	0	D-5D	0	0	FC-9	0	0	Diesel	0.00	0	0
On-site Power	2910	M-9A	0	0	CT-9E	0	0	NG-9A	0	0	n/a	n/a	n/a	FC-9	0	0	Microturbine	0.00	0	0
Small CHP	1157	M-9B	12	3	CT-9F	0	0	NG-9B	0	0	n/a	n/a	n/a	FC-10	0	0	Microturbine	0.01	12	3
Large CHP	1316	M-9B	119	28	CT-9H	0	0	NG-9B	0	0	n/a	n/a	n/a	FC-10	0	0	Microturbine	0.09	119	28
Demand	2910	M-9A	0	0	CT-9E	0	0	NG-9A	0	0	n/a	n/a	n/a	FC-9	0	0	Gas Engine	0.00	0	0
Oilfield Gas	6	M-3C	0	0	CT-3E	0	0	NG-3E	6	38	n/a	n/a	n/a	FC-9	0	0	Gas Engine	1.00	6	38
Landfill Gas	49	M-4C	0	0	n/a	n/a	n/a	NG-4E	44	283	n/a	n/a	n/a	FC-9	0	0	Gas Engine	0.90	44	283
																	Totals		**180**	**352**

Table F-14: Detailed Results – Scenario 2, Rest of East, 0.1 FCR, 2006

Application	Total Market MW	Technologies															Largest Market Share Technology Results			
		Microturbine			CT			Gas Engine			Diesel			Fuel Cell						
		Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Technology	Mkt Share	MW	NOx tons/yr
Standby	34	M-7A	0	0	CT-7C	0	0	NG-7D	0	0	D-5D	0	0	FC-9	0	0	Diesel	0.00	0	0
Reliability	3278	M-7A	0	0	CT-7C	0	0	NG-7D	0	0	D-5D	0	0	FC-9	0	0	Diesel	0.00	0	0
On-site Power	4097	M-9A	0	0	CT-9E	0	0	NG-9A	0	0	n/a	n/a	n/a	FC-9	0	0	Microturbine	0.00	0	0
Small CHP	964	M-9B	10	2	CT-9F	0	0	NG-9B	0	0	n/a	n/a	n/a	FC-10	0	0	Microturbine	0.01	10	2
Large CHP	1097	M-9B	99	23	CT-9H	0	0	NG-9B	0	0	n/a	n/a	n/a	FC-10	0	0	Microturbine	0.09	99	23
Demand	4097	M-9A	0	0	CT-9E	0	0	NG-9A	0	0	n/a	n/a	n/a	FC-9	0	0	Gas Engine	0.00	0	0
Oilfield Gas	81	M-3C	3	7	CT-3E	0.3	3	NG-3E	81	526	n/a	n/a	n/a	FC-9	0	0	Gas Engine	1.00	81	526
Landfill Gas	105	M-4C	0	0	n/a	n/a	n/a	NG-4E	94	611	n/a	n/a	n/a	FC-9	0	0	Gas Engine	0.90	94	611
																	Totals		**284**	**1,163**

Table F-15: Detailed Results – Scenario 3, DFW, 0.2 FCR, 2006

Application	Total Market MW	Microturbine Tech ID	Microturbine Mkt Share MW	Microturbine NOx ton/yr	CT Tech ID	CT Mkt Share MW	CT NOx ton/yr	Gas Engine Tech ID	Gas Engine Mkt Share MW	Gas Engine NOx ton/yr	Diesel Tech ID	Diesel Mkt Share MW	Diesel NOx ton/yr	Fuel Cell Tech ID	Fuel Cell Mkt Share MW	Fuel Cell NOx ton/yr	Largest Market Share Technology	Mkt Share	MW	NOx tons/yr
Standby	24	M-7A	0	0	CT-7C	0	0	NG-7D	0	0	D-5D	0	0	FC-9	0	0	Diesel	0.00	0	0
Reliability	2262	M-7A	0	0	CT-7C	0	0	NG-7D	0	0	D-5D	0	0	FC-9	0	0	Diesel	0.00	0	0
On-site Power	2828	M-8A	0	0	CT-8E	0	0	NG-8A	0	0	D-6A	0	0	FC-9	0	0	Microturbine	0.00	0	0
Small CHP	665	M-8B	7	2	CT-8F	0	0	NG-8B	0	0	n/a	n/a	n/a	FC-10	0	0	Microturbine	0.01	7	2
Large CHP	757	M-8B	68	16	CT-8H	0	0	NG-8B	0	0	n/a	n/a	n/a	FC-10	0	0	Microturbine	0.09	68	16
Demand	2828	M-8A	0	0	CT-8E	0	0	NG-8A	0	0	D-6A	1,167	70	FC-9	0	0	Diesel	0.41	1,167	70
Oilfield Gas	0.1	M-3C	0	0	CT-3E	0.00	0	NG-3E	0.1	1	n/a	n/a	n/a	FC-9	0	0	Gas Engine	1.00	0.1	1
Landfill Gas	50	M-4C	0	0	n/a	n/a	n/a	NG-4E	45	293	n/a	n/a	n/a	FC-9	0	0	Gas Engine	0.90	45	293
																	Totals		**1,287**	**381**

Table F-16: Detailed Results – Scenario 3, HGA, 0.2 FCR, 2006

Application	Total Market MW	Microturbine Tech ID	Microturbine Mkt Share MW	Microturbine NOx ton/yr	CT Tech ID	CT Mkt Share MW	CT NOx ton/yr	Gas Engine Tech ID	Gas Engine Mkt Share MW	Gas Engine NOx ton/yr	Diesel Tech ID	Diesel Mkt Share MW	Diesel NOx ton/yr	Fuel Cell Tech ID	Fuel Cell Mkt Share MW	Fuel Cell NOx ton/yr	Largest Market Share Technology	Mkt Share	MW	NOx tons/yr
Standby	24	M-7A	0	0	CT-7C	0	0	NG-7D	0	0	D-5D	0	0	FC-9	0	0	Diesel	0.00	0	0
Reliability	2328	M-7A	0	0	CT-7C	0	0	NG-7D	0	0	D-5D	0	0	FC-9	0	0	Diesel	0.00	0	0
On-site Power	2910	M-8A	0	0	CT-8E	0	0	NG-8A	0	0	D-6A	0	0	FC-9	0	0	Microturbine	0.00	0	0
Small CHP	1157	M-8B	12	3	CT-8F	0	0	NG-8B	0	0	n/a	n/a	n/a	FC-10	0	0	Microturbine	0.01	12	3
Large CHP	1316	M-8B	119	28	CT-8H	0	0	NG-8B	0	0	n/a	n/a	n/a	FC-10	0	0	Microturbine	0.09	119	28
Demand	2910	M-8A	0	0	CT-8E	0	0	NG-8A	0	0	D-6A	1,201	72	FC-9	0	0	Diesel	0.41	1,201	72
Oilfield Gas	6	M-3C	0	0	CT-3E	0	0	NG-3E	6	38	n/a	n/a	n/a	FC-9	0	0.0	Gas Engine	1.00	6	38
Landfill Gas	49	M-4C	0	0	n/a	n/a	n/a	NG-4E	44	283	n/a	n/a	n/a	FC-9	0	0	Gas Engine	0.90	44	283
																	Totals		**1,381**	**424**

Table F-17: Detailed Results – Scenario 3, Rest of East, 0.2 FCR, 2006

Application	Total Market MW	Technologies															Largest Market Share Technology Results			
		Microturbine			CT			Gas Engine			Diesel			Fuel Cell						
		Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Technology	Mkt Share	MW	NOx tons/yr
Standby	34	M-7A	0	0	CT-7C	0	0	NG-7D	0	0	D-5D	0	0	FC-9	0	0	Diesel	0.00	0	0
Reliability	3278	M-7A	0	0	CT-7C	0	0	NG-7D	0	0	D-5D	0	0	FC-9	0	0	Diesel	0.00	0	0
On-site Power	4097	M-8A	0	0	CT-8E	0	0	NG-8A	0	0	D-6A	0	0	FC-9	0	0	Microturbine	0.00	0	0
Small CHP	964	M-8B	10	2	CT-8F	0	0	NG-8B	0	0	n/a	n/a	n/a	FC-10	0	0	Microturbine	0.01	10	2
Large CHP	1097	M-8B	99	23	CT-8H	0	0	NG-8B	0	0	n/a	n/a	n/a	FC-10	0	0	Microturbine	0.09	99	23
Demand	4097	M-8A	0	0	CT-8E	0	0	NG-8A	0	0	D-6A	1,690	101	FC-9	0	0	Diesel	0.41	1,690	101
Oilfield Gas	81	M-3C	3	7	CT-3E	0	3	NG-3E	81	526	n/a	n/a	n/a	FC-9	0	0	Gas Engine	1.00	81	526
Landfill Gas	105	M-4C	0	0	n/a	n/a	n/a	NG-4E	94	611	n/a	n/a	n/a	FC-9	0	0	Gas Engine	0.90	94	611
																	Totals		**1,975**	**1,265**

Table F-18: Detailed Results – All Scenarios, West Texas, 0.2 FCR, 2010

Application	Total Market MW	Technologies															Largest Market Share Technology Results			
		Microturbine			CT			Gas Engine			Diesel			Fuel Cell						
		Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Technology	Mkt Share	MW	NOx tons/yr
Standby	18	M-1F	0	0	CT-1C	0	0	NG-1F	0	0	D-1F	0	0	FC-15	0	0	Diesel	0.00	0	0
Reliability	1716	M-1F	0	0	CT-1C	0	0	NG-1F	0	0	D-1F	0	0	FC-15	0	0	Diesel	0.00	0	0
On-site Power	2145	M-2K	0	0	CT-2E	0	0	NG-2H	0	0	D-2F	0	0	FC-15	0	0	Fuel Cell	0.00	0	0
Small CHP	505	M-2L	187	44	CT-2F	0	0	NG-2I	16	71	n/a	n/a	n/a	FC-16	0	0.0	Microturbine	0.37	187	44
Large CHP	575	M-2L	361	84	CT-2J	7	7	NG-2I	99	441	n/a	n/a	n/a	FC-16	0	0	Microturbine	0.63	361	84
Demand	2145	M-2K	533	12	CT-2E	0	0	NG-2H	1,353	601	D-2F	1,166	490	FC-15	1,275	2	Gas Engine	0.63	1,353	601
Oilfield Gas	278	M-3E	9	22	CT-3E	1	11	NG-3H	278	1,804	n/a	n/a	n/a	FC-15	278	7	Gas Engine	1.00	278	1,804
Landfill Gas	55	M-4E	0	0	n/a	n/a	n/a	NG-4H	52	336	n/a	n/a	n/a	FC-15	55	1	Fuel Cell	1.00	55	1
																	Totals		**2,234**	**2,534**

Table F-19: Detailed Results – Scenario 1, DFW, 0.2 FCR, 2010

Application	Total Market MW	Microturbine Tech ID	Microturbine Mkt Share MW	Microturbine NOx ton/yr	CT Tech ID	CT Mkt Share MW	CT NOx ton/yr	Gas Engine Tech ID	Gas Engine Mkt Share MW	Gas Engine NOx ton/yr	Diesel Tech ID	Diesel Mkt Share MW	Diesel NOx ton/yr	Fuel Cell Tech ID	Fuel Cell Mkt Share MW	Fuel Cell NOx ton/yr	Largest Market Share Technology Results: Technology	Mkt Share	MW	NOx tons/yr
Standby	24	M-5F	0	0	CT-5C	0	0	NG-5F	0	0	D-3F	0	0	FC-15	0	0	Diesel	0.00	0	0
Reliability	2262	M-5F	0	0	CT-5C	0	0	NG-5F	0	0	D-3F	0	0	FC-15	0	0	Diesel	0.00	0	0
On-site Power	2828	M-6C	0	0	CT-6E	0	0	NG-6H	0	0	D-4F	0	0	FC-15	0	0	Fuel Cell	0.00	0	0
Small CHP	665	M-6D	246	57	CT-6F	0	0	NG-6I	0	0	n/a	n/a	n/a	FC-16	0	0	Microturbine	0.37	246	57
Large CHP	757	M-6D	475	111	CT-6J	9	10	NG-6I	0	0	n/a	n/a	n/a	FC-16	0	0	Microturbine	0.63	475	111
Demand	2828	M-6C	703	16	CT-6E	0	0	NG-6H	6	0	D-4F	1,167	140	FC-15	1,681	3	Fuel Cell	0.59	1,681	3
Oilfield Gas	0.1	M-3E	0	0	CT-3E	0.00	0	NG-3H	0.1	1	n/a	n/a	n/a	FC-15	0	0	Gas Engine	1.00	0.1	1
Landfill Gas	50	M-4E	0	0	n/a	n/a	n/a	NG-4H	47	308	n/a	n/a	n/a	FC-15	50	1	Fuel Cell	1.00	50	1
																	Totals		**2,453**	**173**

Table F-20: Detailed Results – Scenario 1, HGA, 0.2 FCR, 2010

Application	Total Market MW	Microturbine Tech ID	Microturbine Mkt Share MW	Microturbine NOx ton/yr	CT Tech ID	CT Mkt Share MW	CT NOx ton/yr	Gas Engine Tech ID	Gas Engine Mkt Share MW	Gas Engine NOx ton/yr	Diesel Tech ID	Diesel Mkt Share MW	Diesel NOx ton/yr	Fuel Cell Tech ID	Fuel Cell Mkt Share MW	Fuel Cell NOx ton/yr	Largest Market Share Technology Results: Technology	Mkt Share	MW	NOx tons/yr
Standby	24	M-5F	0	0	CT-5C	0	0	NG-5F	0	0	D-3F	0	0	FC-15	0	0	Diesel	0.00	0	0
Reliability	2328	M-5F	0	0	CT-5C	0	0	NG-5F	0	0	D-3F	0	0	FC-15	0	0	Diesel	0.00	0	0
On-site Power	2910	M-6C	0	0	CT-6E	0	0	NG-6H	0	0	D-4F	0	0	FC-15	0	0	Fuel Cell	0.00	0	0
Small CHP	1157	M-6D	429	100	CT-6F	0	0	NG-6I	0	0	n/a	n/a	n/a	FC-16	0	0	Microturbine	0.37	429	100
Large CHP	1316	M-6D	826	192	CT-6J	15	17	NG-6I	0	0	n/a	n/a	n/a	FC-16	0	0	Microturbine	0.63	826	192
Demand	2910	M-6C	723	17	CT-6E	0	0	NG-6H	7	0	D-4F	1,201	144	FC-15	1,730	3	Fuel Cell	0.59	1,730	3
Oilfield Gas	6	M-3E	0	0	CT-3E	0	0	NG-3H	6	38	n/a	n/a	n/a	FC-15	6	0.1	Gas Engine	1.00	6	38
Landfill Gas	49	M-4E	0	0	n/a	n/a	n/a	NG-4H	46	297	n/a	n/a	n/a	FC-15	49	1	Fuel Cell	1.00	49	1
																	Totals		**3,039**	**335**

Table F-21: Detailed Results – Scenario 1, Rest of East, 0.2 FCR, 2010

Application	Total Market MW	Technologies															Largest Market Share Technology Results			
		Microturbine			CT			Gas Engine			Diesel			Fuel Cell						
		Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Technology	Mkt Share	MW	NOx tons/yr
Standby	34	M-5F	0	0	CT-5C	0	0	NG-5F	0	0	D-3F	0	0	FC-15	0	0	Diesel	0.00	0	0
Reliability	3278	M-5F	0	0	CT-5C	0	0	NG-5F	0	0	D-3F	0	0	FC-15	0	0	Diesel	0.00	0	0
On-site Power	4097	M-6C	0	0	CT-6E	0	0	NG-6H	0	0	D-4F	0	0	FC-15	0	0	Fuel Cell	0.00	0	0
Small CHP	964	M-6D	357	83	CT-6F	0	0	NG-6I	0	0	n/a	n/a	n/a	FC-16	0	0	Microturbine	0.37	357	83
Large CHP	1097	M-6D	688	160	CT-6J	13	14	NG-6I	0	0	n/a	n/a	n/a	FC-16	0	0	Microturbine	0.63	688	160
Demand	4097	M-6C	1,018	24	CT-6E	0	0	NG-6H	9	0	D-4F	1,690	203	FC-15	2,436	4	Fuel Cell	0.59	2,436	4
Oilfield Gas	81	M-3E	3	7	CT-3E	0	3	NG-3H	81	526	n/a	n/a	n/a	FC-15	81	2	Gas Engine	1.00	81	526
Landfill Gas	105	M-4E	0	0	n/a	n/a	n/a	NG-4H	99	642	n/a	n/a	n/a	FC-15	105	3	Fuel Cell	1.00	105	3
																	Totals		**3,668**	**777**

Table F-22: Detailed Results – Scenario 2, DFW, 0.2 FCR, 2010

Application	Total Market MW	Technologies															Largest Market Share Technology Results			
		Microturbine			CT			Gas Engine			Diesel			Fuel Cell						
		Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Technology	Mkt Share	MW	NOx tons/yr
Standby	24	M-7B	0	0	CT-7C	0	0	NG-7F	0	0	D-5F	0	0	FC-15	0	0	Diesel	0.00	0	0
Reliability	2262	M-7B	0	0	CT-7C	0	0	NG-7F	0	0	D-5F	0	0	FC-15	0	0	Diesel	0.00	0	0
On-site Power	2828	M-9C	0	0	CT-9E	0	0	NG-9C	0	0	n/a	n/a	n/a	FC-15	0	0	Fuel Cell	0.00	0	0
Small CHP	665	M-9D	246	57	CT-9F	0	0	NG-9D	0	0	n/a	n/a	n/a	FC-16	0	0	Microturbine	0.37	246	57
Large CHP	757	M-9D	475	111	CT-9J	0	0	NG-9D	0	0	n/a	n/a	n/a	FC-16	0	0	Microturbine	0.63	475	111
Demand	2828	M-9C	703	16	CT-9E	0	0	NG-9C	435	16	n/a	n/a	n/a	FC-15	1,681	3	Fuel Cell	0.59	1,681	3
Oilfield Gas	0.1	M-3E	0	0	CT-3E	0	0	NG-3H	0.1	1	n/a	n/a	n/a	FC-15	0	0	Gas Engine	1.00	0.1	1
Landfill Gas	50	M-4E	0	0	n/a	n/a	n/a	NG-4H	47	308	n/a	n/a	n/a	FC-15	50	1	Fuel Cell	1.00	50	1
																	Totals		**2,453**	**173**

Table F-23: Detailed Results – Scenario 2, HGA, 0.2 FCR, 2010

Application	Total Market MW	Microturbine Tech ID	Microturbine Mkt Share MW	Microturbine NOx ton/yr	CT Tech ID	CT Mkt Share MW	CT NOx ton/yr	Gas Engine Tech ID	Gas Engine Mkt Share MW	Gas Engine NOx ton/yr	Diesel Tech ID	Diesel Mkt Share MW	Diesel NOx ton/yr	Fuel Cell Tech ID	Fuel Cell Mkt Share MW	Fuel Cell NOx ton/yr	Largest Market Share Technology Results: Technology	Mkt Share	MW	NOx tons/yr
Standby	24	M-7B	0	0	CT-7C	0	0	NG-7F	0	0	D-5F	0	0	FC-15	0	0	Diesel	0.00	0	0
Reliability	2328	M-7B	0	0	CT-7C	0	0	NG-7F	0	0	D-5F	0	0	FC-15	0	0	Diesel	0.00	0	0
On-site Power	2910	M-9C	0	0	CT-9E	0	0	NG-9C	0	0	n/a	n/a	n/a	FC-15	0	0	Fuel Cell	0.00	0	0
Small CHP	1157	M-9D	429	100	CT-9F	0	0	NG-9D	0	0	n/a	n/a	n/a	FC-16	0	0	Microturbine	0.37	429	100
Large CHP	1316	M-9D	826	192	CT-9J	0	0	NG-9D	0	0	n/a	n/a	n/a	FC-16	0	0	Microturbine	0.63	826	192
Demand	2910	M-9C	723	17	CT-9E	0	0	NG-9C	447	16	n/a	n/a	n/a	FC-15	1,730	3	Fuel Cell	0.59	1,730	3
Oilfield Gas	6	M-3E	0	0	CT-3E	0	0	NG-3H	6	38	n/a	n/a	n/a	FC-15	6	0.1	Gas Engine	1.00	6	38
Landfill Gas	49	M-4E	0	0	n/a	n/a	n/a	NG-4H	46	297	n/a	n/a	n/a	FC-15	49	1	Fuel Cell	1.00	49	1
																	Totals		**3,039**	**335**

Table F-24: Detailed Results – Scenario 2, Rest of East, 0.2 FCR, 2010

Application	Total Market MW	Microturbine Tech ID	Microturbine Mkt Share MW	Microturbine NOx ton/yr	CT Tech ID	CT Mkt Share MW	CT NOx ton/yr	Gas Engine Tech ID	Gas Engine Mkt Share MW	Gas Engine NOx ton/yr	Diesel Tech ID	Diesel Mkt Share MW	Diesel NOx ton/yr	Fuel Cell Tech ID	Fuel Cell Mkt Share MW	Fuel Cell NOx ton/yr	Largest Market Share Technology Results: Technology	Mkt Share	MW	NOx tons/yr
Standby	34	M-7B	0	0	CT-7C	0	0	NG-7F	0	0	D-5F	0	0	FC-15	0	0	Diesel	0.00	0	0
Reliability	3278	M-7B	0	0	CT-7C	0	0	NG-7F	0	0	D-5F	0	0	FC-15	0	0	Diesel	0.00	0	0
On-site Power	4097	M-9C	0	0	CT-9E	0	0	NG-9C	0	0	n/a	n/a	n/a	FC-15	0	0	Fuel Cell	0.00	0	0
Small CHP	964	M-9D	357	83	CT-9F	0	0	NG-9D	0	0	n/a	n/a	n/a	FC-16	0	0	Microturbine	0.37	357	83
Large CHP	1097	M-9D	688	160	CT-9J	0	0	NG-9D	0	0	n/a	n/a	n/a	FC-16	0	0	Microturbine	0.63	688	160
Demand	4097	M-9C	1,018	24	CT-9E	0	0	NG-9C	630	23	n/a	n/a	n/a	FC-15	2,436	4	Fuel Cell	0.59	2,436	4
Oilfield Gas	81	M-3E	3	7	CT-3E	0.3	3	NG-3H	81	526	n/a	n/a	n/a	FC-15	81	2	Gas Engine	1.00	81	526
Landfill Gas	105	M-4E	0	0	n/a	n/a	n/a	NG-4H	99	642	n/a	n/a	n/a	FC-15	105	3	Fuel Cell	1.00	105	3
																	Totals		**3,668**	**777**

Table F-25: Detailed Results – Scenario 3, DFW, 0.2 FCR, 2010

Application	Total Market MW	Technologies															Largest Market Share Technology Results			
		Microturbine			CT			Gas Engine			Diesel			Fuel Cell						
		Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Technology	Mkt Share	MW	NOx tons/yr
Standby	24	M-7B	0	0	CT-7C	0	0	NG-7F	0	0	D-5F	0	0	FC-15	0	0	Diesel	0.00	0	0
Reliability	2262	M-7B	0	0	CT-7C	0	0	NG-7F	0	0	D-5F	0	0	FC-15	0	0	Diesel	0.00	0	0
On-site Power	2828	M-8C	0	0	CT-8E	0	0	NG-8C	0	0	D-6B	0	0	FC-15	0	0	Fuel Cell	0.00	0	0
Small CHP	665	M-8D	246	57	CT-8F	0	0	NG-8D	0	0	n/a	n/a	n/a	FC-16	0	0	Microturbine	0.37	246	57
Large CHP	757	M-8D	475	111	CT-8J	0	0	NG-8D	0	0	n/a	n/a	n/a	FC-16	0	0	Microturbine	0.63	475	111
Demand	2828	M-8C	703	16	CT-8E	0	0	NG-8C	435	16	D-6B	1,167	70	FC-15	1,681	3	Fuel Cell	0.59	1,681	3
Oilfield Gas	0.1	M-3E	0	0	CT-3E	0	0	NG-3H	0.1	1	n/a	n/a	n/a	FC-15	0	0	Gas Engine	1.00	0.1	1
Landfill Gas	50	M-4E	0	0	n/a	n/a	n/a	NG-4H	47	308	n/a	n/a	n/a	FC-15	50	1	Fuel Cell	1.00	50	1
																	Totals		**2,453**	**173**

Table F-26: Detailed Results – Scenario 3, HGA, 0.2 FCR, 2010

Application	Total Market MW	Technologies															Largest Market Share Technology Results			
		Microturbine			CT			Gas Engine			Diesel			Fuel Cell						
		Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Technology	Mkt Share	MW	NOx tons/yr
Standby	24	M-7B	0	0	CT-7C	0	0	NG-7F	0	0	D-5F	0	0	FC-15	0	0	Diesel	0.00	0	0
Reliability	2328	M-7B	0	0	CT-7C	0	0	NG-7F	0	0	D-5F	0	0	FC-15	0	0	Diesel	0.00	0	0
On-site Power	2910	M-8C	0	0	CT-8E	0	0	NG-8C	0	0	D-6B	0	0	FC-15	0	0	Fuel Cell	0.00	0	0
Small CHP	1157	M-8D	429	100	CT-8F	0	0	NG-8D	0	0	n/a	n/a	n/a	FC-16	0	0	Microturbine	0.37	429	100
Large CHP	1316	M-8D	826	192	CT-8J	0	0	NG-8D	0	0	n/a	n/a	n/a	FC-16	0	0	Microturbine	0.63	826	192
Demand	2910	M-8C	723	17	CT-8E	0	0	NG-8C	447	16	D-6B	1,201	72	FC-15	1,730	3	Fuel Cell	0.59	1,730	3
Oilfield Gas	6	M-3E	0	0	CT-3E	0	0	NG-3H	6	38	n/a	n/a	n/a	FC-15	6	0.1	Gas Engine	1.00	6	38
Landfill Gas	49	M-4E	0	0	n/a	n/a	n/a	NG-4H	46	297	n/a	n/a	n/a	FC-15	49	1	Fuel Cell	1.00	49	1
																	Totals		**3,039**	**335**

Table F-27: Detailed Results – Scenario 3, Rest of East, 0.2 FCR, 2010

Application	Total Market MW	Microturbine Tech ID	Microturbine Mkt Share MW	Microturbine NOx ton/yr	CT Tech ID	CT Mkt Share MW	CT NOx ton/yr	Gas Engine Tech ID	Gas Engine Mkt Share MW	Gas Engine NOx ton/yr	Diesel Tech ID	Diesel Mkt Share MW	Diesel NOx ton/yr	Fuel Cell Tech ID	Fuel Cell Mkt Share MW	Fuel Cell NOx ton/yr	Largest Market Share Technology Results: Technology	Mkt Share	MW	NOx tons/yr
Standby	34	M-7B	0	0	CT-7C	0	0	NG-7F	0	0	D-5F	0	0	FC-15	0	0	Diesel	0.00	0	0
Reliability	3278	M-7B	0	0	CT-7C	0	0	NG-7F	0	0	D-5F	0	0	FC-15	0	0	Diesel	0.00	0	0
On-site Power	4097	M-8C	0	0	CT-8E	0	0	NG-8C	0	0	D-6B	0	0	FC-15	0	0	Fuel Cell	0.00	0	0
Small CHP	964	M-8D	357	83	CT-8F	0	0	NG-8D	0	0	n/a	n/a	n/a	FC-16	0	0	Microturbine	0.37	357	83
Large CHP	1097	M-8D	688	160	CT-8J	0	0	NG-8D	0	0	n/a	n/a	n/a	FC-16	0	0	Microturbine	0.63	688	160
Demand	4097	M-8C	1,018	24	CT-8E	0	0	NG-8C	630	23	D-6B	1,690	101	FC-15	2,436	4	Fuel Cell	0.59	2,436	4
Oilfield Gas	81	M-3E	3	7	CT-3E	0.3	3	NG-3H	81	526	n/a	n/a	n/a	FC-15	81	2	Gas Engine	1.00	81	526
Landfill Gas	105	M-4E	0	0	n/a	n/a	n/a	NG-4H	99	642	n/a	n/a	n/a	FC-15	105	3	Fuel Cell	1.00	105	3
																	Totals		**3,668**	**777**

Appendix G. Detailed Results: No Microturbine

[All results for 2002 are the same as the Base Case (see Tables D-1 through D-7).]
[No microturbines acquired any market shares in the 2002 Base Case. All final results for the 2002 no-microturbine case are the same as for the 2002 Base Case (see Tables D-1 through D-7).]

Table G-1: Detailed Results – All Scenarios, West Texas, No Microturbine, 2006

		Technologies															Largest Market Share Technology Results			
		Microturbine			CT			Gas Engine			Diesel			Fuel Cell						
Application	Total Market MW	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Technology	Mkt Share	MW	NOx tons/yr
Standby	18	n/a	n/a	n/a	CT-1C	0	0	NG-1D	0	0	D-1D	0	0	FC-9	0	0	Diesel	0.00	0	0
Reliability	1716	n/a	n/a	n/a	CT-1C	0	0	NG-1D	0	0	D-1D	128	9	FC-9	0	0	Diesel	0.07	128	9
On-site Power	2145	n/a	n/a	n/a	CT-2E	0	0	NG-2E	0	0	D-2D	0	0	FC-9	0	0	Gas Engine	0.00	0	0
Small CHP	505	n/a	n/a	n/a	CT-2F	0	0	NG-2F	128	566	n/a	n/a	n/a	FC-10	0	0	Gas Engine	0.25	128	566
Large CHP	575	n/a	n/a	n/a	CT-2H	200	227	NG-2F	314	1,393	n/a	n/a	n/a	FC-10	0	0	Gas Engine	0.55	314	1,393
Demand	2145	n/a	n/a	n/a	CT-2E	0	0	NG-2E	2,078	922	D-2D	1,939	814	FC-9	0	0	Gas Engine	0.97	2,078	922
Oilfield Gas	278	n/a	n/a	n/a	CT-3E	113	1,433	NG-3E	278	1,804	n/a	n/a	n/a	FC-9	127	3	Gas Engine	1.00	278	1,804
Landfill Gas	55	n/a	n/a	n/a	n/a	n/a	n/a	NG-4E	55	357	n/a	n/a	n/a	FC-9	0	0	Gas Engine	1.00	55	357
																	Totals		**2,980**	**5,052**

Table G-2: Detailed Results – Scenario 1, DFW, No Microturbine, 2006

		Technologies															Largest Market Share Technology Results			
		Microturbine			CT			Gas Engine			Diesel			Fuel Cell						
Application	Total Market MW	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Technology	Mkt Share	MW	NOx tons/yr
Standby	24	n/a	n/a	n/a	CT-5C	0	0	NG-5D	0	0	D-3D	0	0	FC-9	0	0	Diesel	0.00	0	0
Reliability	2262	n/a	n/a	n/a	CT-5C	0	0	NG-5D	0	0	D-3D	0	0	FC-9	0	0	Diesel	0.00	0	0
On-site Power	2828	n/a	n/a	n/a	CT-6E	0	0	NG-6E	0	0	D-4D	0	0	FC-9	0	0	Gas Engine	0.00	0	0
Small CHP	665	n/a	n/a	n/a	CT-6F	0	0	NG-6F	4	2	n/a	n/a	n/a	FC-10	0	0	Gas Engine	0.01	4	2
Large CHP	757	n/a	n/a	n/a	CT-6H	264	298	NG-6F	76	36	n/a	n/a	n/a	FC-10	0	0	CT	0.35	264	298
Demand	2828	n/a	n/a	n/a	CT-6E	0	0	NG-6E	1,058	51	D-4D	2,410	289	FC-9	0	0	Diesel	0.85	2,410	289
Oilfield Gas	0.1	n/a	n/a	n/a	CT-3E	0.04	1	NG-3E	0.1	1	n/a	n/a	n/a	FC-9	0	0	Gas Engine	1.00	0.1	1
Landfill Gas	50	n/a	n/a	n/a	n/a	n/a	n/a	NG-4E	50	327	n/a	n/a	n/a	FC-9	0	0	Gas Engine	1.00	50	327
																	Totals		**2,728**	**917**

Table G-3: Detailed Results – Scenario 1, HGA, No Microturbine, 2006

Application	Total Market MW	Technologies: Microturbine			CT			Gas Engine			Diesel			Fuel Cell			Largest Market Share Technology Results			
		Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Technology	Mkt Share	MW	NOx tons/yr
Standby	24	n/a	n/a	n/a	CT-5C	0	0	NG-5D	0	0	D-3D	0	0	FC-9	0	0	Diesel	0.00	0	0
Reliability	2328	n/a	n/a	n/a	CT-5C	0	0	NG-5D	0	0	D-3D	0	0	FC-9	0	0	Diesel	0.00	0	0
On-site Power	2910	n/a	n/a	n/a	CT-6E	0	0	NG-6E	0	0	D-4D	0	0	FC-9	0	0	Gas Engine	0.00	0	0
Small CHP	1157	n/a	n/a	n/a	CT-6F	0	0	NG-6F	7	3	n/a	n/a	n/a	FC-10	0	0	Gas Engine	0.01	7	3
Large CHP	1316	n/a	n/a	n/a	CT-6H	459	519	NG-6F	132	63	n/a	n/a	n/a	FC-10	0	0	CT	0.35	459	519
Demand	2910	n/a	n/a	n/a	CT-6E	0	0	NG-6E	1,088	52	D-4D	2,480	298	FC-9	0	0	Diesel	0.85	2,480	298
Oilfield Gas	6	n/a	n/a	n/a	CT-3E	2	30	NG-3E	6	38	n/a	n/a	n/a	FC-9	3	0	Gas Engine	1.00	6	38
Landfill Gas	49	n/a	n/a	n/a	n/a	n/a	n/a	NG-4E	49	316	n/a	n/a	n/a	FC-9	0	0	Gas Engine	1.00	49	316
																	Totals		**3,000**	**1,174**

Table G-4: Detailed Results – Scenario 1, Rest of East, No Microturbine, 2006

Application	Total Market MW	Technologies: Microturbine			CT			Gas Engine			Diesel			Fuel Cell			Largest Market Share Technology Results			
		Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Technology	Mkt Share	MW	NOx tons/yr
Standby	34	n/a	n/a	n/a	CT-5C	0	0	NG-5D	0	0	D-3D	0	0	FC-9	0	0	Diesel	0.00	0	0
Reliability	3278	n/a	n/a	n/a	CT-5C	0	0	NG-5D	0	0	D-3D	0	0	FC-9	0	0	Diesel	0.00	0	0
On-site Power	4097	n/a	n/a	n/a	CT-6E	0	0	NG-6E	0	0	D-4D	0	0	FC-9	0	0	Gas Engine	0.00	0	0
Small CHP	964	n/a	n/a	n/a	CT-6F	0	0	NG-6F	6	3	n/a	n/a	n/a	FC-10	0	0	Gas Engine	0.01	6	3
Large CHP	1097	n/a	n/a	n/a	CT-6H	382	432	NG-6F	110	53	n/a	n/a	n/a	FC-10	0	0	CT	0.35	382	432
Demand	4097	n/a	n/a	n/a	CT-6E	0	0	NG-6E	1,532	74	D-4D	3,491	419	FC-9	0	0	Diesel	0.85	3,491	419
Oilfield Gas	81	n/a	n/a	n/a	CT-3E	33	418	NG-3E	81	526	n/a	n/a	n/a	FC-9	37	1	Gas Engine	1.00	81	526
Landfill Gas	105	n/a	n/a	n/a	n/a	n/a	n/a	NG-4E	105	681	n/a	n/a	n/a	FC-9	0	0	Gas Engine	1.00	105	681
																	Totals		**4,066**	**2,062**

Table G-5: Detailed Results – Scenario 2, DFW, No Microturbine, 2006

Application	Total Market MW	Microturbine Tech ID	Microturbine Mkt Share MW	Microturbine NOx ton/yr	CT Tech ID	CT Mkt Share MW	CT NOx ton/yr	Gas Engine Tech ID	Gas Engine Mkt Share MW	Gas Engine NOx ton/yr	Diesel Tech ID	Diesel Mkt Share MW	Diesel NOx ton/yr	Fuel Cell Tech ID	Fuel Cell Mkt Share MW	Fuel Cell NOx ton/yr	Largest Market Share Technology Results: Technology	Mkt Share	MW	NOx tons/yr
Standby	24	n/a	n/a	n/a	CT-7C	0	0	NG-7D	0	0	D-5D	0	0	FC-9	0	0	Diesel	0.00	0	0
Reliability	2262	n/a	n/a	n/a	CT-7C	0	0	NG-7D	0	0	D-5D	0	0	FC-9	0	0	Diesel	0.00	0	0
On-site Power	2828	n/a	n/a	n/a	CT-9E	0	0	NG-9A	0	0	n/a	n/a	n/a	FC-9	0	0	Gas Engine	0.00	0	0
Small CHP	665	n/a	n/a	n/a	CT-9F	0	0	NG-9B	0	0	n/a	n/a	n/a	FC-10	0	0	Gas Engine	0.00	0	0
Large CHP	757	n/a	n/a	n/a	CT-9H	26	8	NG-9B	26	9	n/a	n/a	n/a	FC-10	0	0	CT	0.03	26	8
Demand	2828	n/a	n/a	n/a	CT-9E	0	0	NG-9A	846	30	n/a	n/a	n/a	FC-9	0	0	Gas Engine	0.30	846	30
Oilfield Gas	0.1	n/a	n/a	n/a	CT-3E	0.04	1	NG-3E	0.1	1	n/a	n/a	n/a	FC-9	0	0	Gas Engine	1.00	0.1	1
Landfill Gas	50	n/a	n/a	n/a	n/a	n/a	n/a	NG-4E	50	327	n/a	n/a	n/a	FC-9	0	0	Gas Engine	1.00	50	327
																	Totals		**923**	**366**

Table G-6: Detailed Results – Scenario 2, HGA, No Microturbine, 2006

Application	Total Market MW	Microturbine Tech ID	Microturbine Mkt Share MW	Microturbine NOx ton/yr	CT Tech ID	CT Mkt Share MW	CT NOx ton/yr	Gas Engine Tech ID	Gas Engine Mkt Share MW	Gas Engine NOx ton/yr	Diesel Tech ID	Diesel Mkt Share MW	Diesel NOx ton/yr	Fuel Cell Tech ID	Fuel Cell Mkt Share MW	Fuel Cell NOx ton/yr	Largest Market Share Technology Results: Technology	Mkt Share	MW	NOx tons/yr
Standby	24	n/a	n/a	n/a	CT-7C	0	0	NG-7D	0	0	D-5D	0	0	FC-9	0	0	Diesel	0.00	0	0
Reliability	2328	n/a	n/a	n/a	CT-7C	0	0	NG-7D	0	0	D-5D	0	0	FC-9	0	0	Diesel	0.00	0	0
On-site Power	2910	n/a	n/a	n/a	CT-9E	0	0	NG-9A	0	0	n/a	n/a	n/a	FC-9	0	0	Gas Engine	0.00	0	0
Small CHP	1157	n/a	n/a	n/a	CT-9F	0	0	NG-9B	0	0	n/a	n/a	n/a	FC-10	0	0	Gas Engine	0.00	0	0
Large CHP	1316	n/a	n/a	n/a	CT-9H	45	14	NG-9B	45	16	n/a	n/a	n/a	FC-10	0	0	CT	0.03	45	14
Demand	2910	n/a	n/a	n/a	CT-9E	0	0	NG-9A	871	31	n/a	n/a	n/a	FC-9	0	0	Gas Engine	0.30	871	31
Oilfield Gas	6	n/a	n/a	n/a	CT-3E	2	30	NG-3E	6	38	n/a	n/a	n/a	FC-9	3	0	Gas Engine	1.00	6	38
Landfill Gas	49	n/a	n/a	n/a	n/a	n/a	n/a	NG-4E	49	316	n/a	n/a	n/a	FC-9	0	0	Gas Engine	1.00	49	316
																	Totals		**970**	**399**

Table G-7: Detailed Results – Scenario 2, Rest of East, No Microturbine, 2006

Application	Total Market MW	Technologies															Largest Market Share Technology Results			
		Microturbine			CT			Gas Engine			Diesel			Fuel Cell						
		Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Technology	Mkt Share	MW	NOx tons/yr
Standby	34	n/a	n/a	n/a	CT-7C	0	0	NG-7D	0	0	D-5D	0	0	FC-9	0	0	Diesel	0.00	0	0
Reliability	3278	n/a	n/a	n/a	CT-7C	0	0	NG-7D	0	0	D-5D	0	0	FC-9	0	0	Diesel	0.00	0	0
On-site Power	4097	n/a	n/a	n/a	CT-9E	0	0	NG-9A	0	0	n/a	n/a	n/a	FC-9	0	0	Gas Engine	0.00	0	0
Small CHP	964	n/a	n/a	n/a	CT-9F	0	0	NG-9B	0	0	n/a	n/a	n/a	FC-10	0	0	Gas Engine	0.00	0	0
Large CHP	1097	n/a	n/a	n/a	CT-9H	38	12	NG-9B	37	13	n/a	n/a	n/a	FC-10	0	0	CT	0.03	38	12
Demand	4097	n/a	n/a	n/a	CT-9E	0	0	NG-9A	1,226	44	n/a	n/a	n/a	FC-9	0	0	Gas Engine	0.30	1,226	44
Oilfield Gas	81	n/a	n/a	n/a	CT-3E	33	418	NG-3E	81	526	n/a	n/a	n/a	FC-9	37	1	Gas Engine	1.00	81	526
Landfill Gas	105	n/a	n/a	n/a	n/a	n/a	n/a	NG-4E	105	681	n/a	n/a	n/a	FC-9	0	0	Gas Engine	1.00	105	681
																	Totals		**1,450**	**1,264**

Table G-8: Detailed Results – Scenario 3, DFW, No Microturbine, 2006

Application	Total Market MW	Technologies															Largest Market Share Technology Results			
		Microturbine			CT			Gas Engine			Diesel			Fuel Cell						
		Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Technology	Mkt Share	MW	NOx tons/yr
Standby	24	n/a	n/a	n/a	CT-7C	0	0	NG-7D	0	0	D-5D	0	0	FC-9	0	0	Diesel	0.00	0	0
Reliability	2262	n/a	n/a	n/a	CT-7C	0	0	NG-7D	0	0	D-5D	0	0	FC-9	0	0	Diesel	0.00	0	0
On-site Power	2828	n/a	n/a	n/a	CT-8E	0	0	NG-8A	0	0	D-6A	0	0	FC-9	0	0	Gas Engine	0.00	0	0
Small CHP	665	n/a	n/a	n/a	CT-8F	0	0	NG-8B	0	0	n/a	n/a	n/a	FC-10	0	0	Gas Engine	0.00	0	0
Large CHP	757	n/a	n/a	n/a	CT-8H	26	8	NG-8B	26	9	n/a	n/a	n/a	FC-10	0	0	CT	0.03	26	8
Demand	2828	n/a	n/a	n/a	CT-8E	0	0	NG-8A	846	30	D-6A	2,410	145	FC-9	0	0	Diesel	0.85	2,410	145
Oilfield Gas	0.1	n/a	n/a	n/a	CT-3E	0.04	1	NG-3E	0.1	1	n/a	n/a	n/a	FC-9	0	0	Gas Engine	1.00	0.1	1
Landfill Gas	50	n/a	n/a	n/a	n/a	n/a	n/a	NG-4E	50	327	n/a	n/a	n/a	FC-9	0	0	Gas Engine	1.00	50	327
																	Totals		**2,486**	**480**

Table G-9: Detailed Results – Scenario 3, HGA, No Microturbine, 2006

Application	Total Market MW	Microturbine Tech ID	Microturbine Mkt Share MW	Microturbine NOx ton/yr	CT Tech ID	CT Mkt Share MW	CT NOx ton/yr	Gas Engine Tech ID	Gas Engine Mkt Share MW	Gas Engine NOx ton/yr	Diesel Tech ID	Diesel Mkt Share MW	Diesel NOx ton/yr	Fuel Cell Tech ID	Fuel Cell Mkt Share MW	Fuel Cell NOx ton/yr	Largest Market Share Technology Results: Technology	Mkt Share	MW	NOx tons/yr
Standby	24	n/a	n/a	n/a	CT-7C	0	0	NG-7D	0	0	D-5D	0	0	FC-9	0	0	Diesel	0.00	0	0
Reliability	2328	n/a	n/a	n/a	CT-7C	0	0	NG-7D	0	0	D-5D	0	0	FC-9	0	0	Diesel	0.00	0	0
On-site Power	2910	n/a	n/a	n/a	CT-8E	0	0	NG-8A	0	0	D-6A	0	0	FC-9	0	0	Gas Engine	0.00	0	0
Small CHP	1157	n/a	n/a	n/a	CT-8F	0	0	NG-8B	0	0	n/a	n/a	n/a	FC-10	0	0	Gas Engine	0.00	0	0
Large CHP	1316	n/a	n/a	n/a	CT-8H	45	14	NG-8B	45	16	n/a	n/a	n/a	FC-10	0	0	CT	0.03	45	14
Demand	2910	n/a	n/a	n/a	CT-8E	0	0	NG-8A	871	31	D-6A	2,480	149	FC-9	0	0	Diesel	0.85	2,480	149
Oilfield Gas	6	n/a	n/a	n/a	CT-3E	2	30	NG-3E	6	38	n/a	n/a	n/a	FC-9	3	0.1	Gas Engine	1.00	6	38
Landfill Gas	49	n/a	n/a	n/a	n/a	n/a	n/a	NG-4E	49	316	n/a	n/a	n/a	FC-9	0	0	Gas Engine	1.00	49	316
																	Totals		**2,579**	**517**

Table G-10: Detailed Results – Scenario 3, Rest of East, No Microturbine, 2006

Application	Total Market MW	Microturbine Tech ID	Microturbine Mkt Share MW	Microturbine NOx ton/yr	CT Tech ID	CT Mkt Share MW	CT NOx ton/yr	Gas Engine Tech ID	Gas Engine Mkt Share MW	Gas Engine NOx ton/yr	Diesel Tech ID	Diesel Mkt Share MW	Diesel NOx ton/yr	Fuel Cell Tech ID	Fuel Cell Mkt Share MW	Fuel Cell NOx ton/yr	Largest Market Share Technology Results: Technology	Mkt Share	MW	NOx tons/yr
Standby	34	n/a	n/a	n/a	CT-7C	0	0	NG-7D	0	0	D-5D	0	0	FC-9	0	0	Diesel	0.00	0	0
Reliability	3278	n/a	n/a	n/a	CT-7C	0	0	NG-7D	0	0	D-5D	0	0	FC-9	0	0	Diesel	0.00	0	0
On-site Power	4097	n/a	n/a	n/a	CT-8E	0	0	NG-8A	0	0	D-6A	0	0	FC-9	0	0	Gas Engine	0.00	0	0
Small CHP	964	n/a	n/a	n/a	CT-8F	0	0	NG-8B	0	0	n/a	n/a	n/a	FC-10	0	0	Gas Engine	0.00	0	0
Large CHP	1097	n/a	n/a	n/a	CT-8H	38	12	NG-8B	37	13	n/a	n/a	n/a	FC-10	0	0	CT	0.03	38	12
Demand	4097	n/a	n/a	n/a	CT-8E	0	0	NG-8A	1,226	44	D-6A	3,491	209	FC-9	0	0	Diesel	0.85	3,491	209
Oilfield Gas	81	n/a	n/a	n/a	CT-3E	33	418	NG-3E	81	526	n/a	n/a	n/a	FC-9	46	1	Gas Engine	1.00	81	526
Landfill Gas	105	n/a	n/a	n/a	n/a	n/a	n/a	NG-4E	105	681	n/a	n/a	n/a	FC-9	0	0	Gas Engine	1.00	105	681
																	Totals		**3,715**	**1,429**

Table G-11: Detailed Results – All Scenarios, West Texas, No Microturbine, 2010

Application	Total Market MW	Technologies: Microturbine			CT			Gas Engine			Diesel			Fuel Cell			Largest Market Share Technology Results			
		Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Technology	Mkt Share	MW	NOx tons/yr
Standby	18	n/a	n/a	n/a	CT-1C	0	0	NG-1F	0	0	D-1F	0	0	FC-15	0	0	Diesel	0.00	0	0
Reliability	1716	n/a	n/a	n/a	CT-1C	0	0	NG-1F	0	0	D-1F	128	9	FC-15	0	0	Diesel	0.07	128	9
On-site Power	2145	n/a	n/a	n/a	CT-2E	0	0	NG-2H	0	0	D-2F	0	0	FC-15	180	3	Fuel Cell	0.08	180	3
Small CHP	505	n/a	n/a	n/a	CT-2F	0	0	NG-2I	132	584	n/a	n/a	n/a	FC-16	29	0.5	Gas Engine	0.26	132	584
Large CHP	575	n/a	n/a	n/a	CT-2J	200	227	NG-2I	320	1,420	n/a	n/a	n/a	FC-16	104	2	Gas Engine	0.56	320	1,420
Demand	2145	n/a	n/a	n/a	CT-2E	0	0	NG-2H	2,087	927	D-2F	1,939	814	FC-15	2,088	3	Fuel Cell	0.97	2,088	3
Oilfield Gas	278	n/a	n/a	n/a	CT-3E	113	1,433	NG-3H	278	1,804	n/a	n/a	n/a	FC-15	278	7	Gas Engine	1.00	278	1,804
Landfill Gas	55	n/a	n/a	n/a	n/a	n/a	n/a	NG-4H	55	357	n/a	n/a	n/a	FC-15	55	1	Fuel Cell	1.00	55	1
																	Totals		**3,180**	**3,825**

Table G-12: Detailed Results – Scenario 1, DFW, No Microturbine, 2010

Application	Total Market MW	Technologies: Microturbine			CT			Gas Engine			Diesel			Fuel Cell			Largest Market Share Technology Results			
		Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Technology	Mkt Share	MW	NOx tons/yr
Standby	24	n/a	n/a	n/a	CT-5C	0	0	NG-5F	0	0	D-3F	0	0	FC-15	0	0	Diesel	0.00	0	0
Reliability	2262	n/a	n/a	n/a	CT-5C	0	0	NG-5F	0	0	D-3F	0	0	FC-15	0	0	Diesel	0.00	0	0
On-site Power	2828	n/a	n/a	n/a	CT-6E	0	0	NG-6H	0	0	D-4F	0	0	FC-15	237	4	Fuel Cell	0.08	237	4
Small CHP	665	n/a	n/a	n/a	CT-6F	0	0	NG-6I	9	4	n/a	n/a	n/a	FC-16	38	1	Fuel Cell	0.06	38	1
Large CHP	757	n/a	n/a	n/a	CT-6J	264	298	NG-6I	96	46	n/a	n/a	n/a	FC-16	137	2	CT	0.35	264	298
Demand	2828	n/a	n/a	n/a	CT-6E	0	0	NG-6H	1,293	62	D-4F	2,410	289	FC-15	2,753	5	Fuel Cell	0.97	2,753	5
Oilfield Gas	0.1	n/a	n/a	n/a	CT-3E	0.04	1	NG-3H	0.1	1	n/a	n/a	n/a	FC-15	0	0	Gas Engine	1.00	0.1	1
Landfill Gas	50	n/a	n/a	n/a	n/a	n/a	n/a	NG-4H	50	327	n/a	n/a	n/a	FC-15	50	1	Fuel Cell	1.00	50	1
																	Totals		**3,342**	**309**

Table G-13: Detailed Results – Scenario 1, HGA, No Microturbine, 2010

Application	Total Market MW	Technologies															Largest Market Share Technology Results			
		Microturbine			CT			Gas Engine			Diesel			Fuel Cell						
		Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Technology	Mkt Share	MW	NOx tons/yr
Standby	24	n/a	n/a	n/a	CT-5C	0	0	NG-5F	0	0	D-3F	0	0	FC-15	0	0	Diesel	0.00	0	0
Reliability	2328	n/a	n/a	n/a	CT-5C	0	0	NG-5F	0	0	D-3F	0	0	FC-15	0	0	Diesel	0.00	0	0
On-site Power	2910	n/a	n/a	n/a	CT-6E	0	0	NG-6H	0	0	D-4F	0	0	FC-15	244	4	Fuel Cell	0.08	244	4
Small CHP	1157	n/a	n/a	n/a	CT-6F	0	0	NG-6I	16	8	n/a	n/a	n/a	FC-16	66	1	Fuel Cell	0.06	66	1
Large CHP	1316	n/a	n/a	n/a	CT-6J	459	519	NG-6I	166	80	n/a	n/a	n/a	FC-16	238	4	CT	0.35	459	519
Demand	2910	n/a	n/a	n/a	CT-6E	0	0	NG-6H	1,330	64	D-4F	2,480	298	FC-15	2,832	5	Fuel Cell	0.97	2,832	5
Oilfield Gas	6	n/a	n/a	n/a	CT-3E	2	30	NG-3H	6	38	n/a	n/a	n/a	FC-15	6	0.1	Gas Engine	1.00	6	38
Landfill Gas	49	n/a	n/a	n/a	n/a	n/a	n/a	NG-4H	49	316	n/a	n/a	n/a	FC-15	49	1	Fuel Cell	1.00	49	1
																	Totals		**3,656**	**568**

Table G-14: Detailed Results – Scenario 1, Rest of East, No Microturbine, 2010

Application	Total Market MW	Technologies															Largest Market Share Technology Results			
		Microturbine			CT			Gas Engine			Diesel			Fuel Cell						
		Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Technology	Mkt Share	MW	NOx tons/yr
Standby	34	n/a	n/a	n/a	CT-5C	0	0	NG-5F	0	0	D-3F	0	0	FC-15	0	0	Diesel	0.00	0	0
Reliability	3278	n/a	n/a	n/a	CT-5C	0	0	NG-5F	0	0	D-3F	0	0	FC-15	0	0	Diesel	0.00	0	0
On-site Power	4097	n/a	n/a	n/a	CT-6E	0	0	NG-6H	0	0	D-4F	0	0	FC-15	344	6	Fuel Cell	0.08	344	6
Small CHP	964	n/a	n/a	n/a	CT-6F	0	0	NG-6I	13	6	n/a	n/a	n/a	FC-16	55	1	Fuel Cell	0.06	55	1
Large CHP	1097	n/a	n/a	n/a	CT-6J	382	432	NG-6I	139	67	n/a	n/a	n/a	FC-16	198	3	CT	0.35	382	432
Demand	4097	n/a	n/a	n/a	CT-6E	0	0	NG-6H	1,873	90	D-4F	3,491	419	FC-15	3,988	7	Fuel Cell	0.97	3,988	7
Oilfield Gas	81	n/a	n/a	n/a	CT-3E	33	418	NG-3H	81	526	n/a	n/a	n/a	FC-15	81	2	Gas Engine	1.00	81	526
Landfill Gas	105	n/a	n/a	n/a	n/a	n/a	n/a	NG-4H	105	681	n/a	n/a	n/a	FC-15	105	3	Fuel Cell	1.00	105	3
																	Totals		**4,955**	**974**

Table G-15: Detailed Results – Scenario 2, DFW, No Microturbine, 2010

		Technologies															Largest Market Share Technology Results			
		Microturbine			CT			Gas Engine			Diesel			Fuel Cell						
Application	Total Market MW	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Technology	Mkt Share	MW	NOx tons/yr
Standby	24	n/a	n/a	n/a	CT-7C	0	0	NG-7F	0	0	D-5F	0	0	FC-15	0	0	Diesel	0.00	0	0
Reliability	2262	n/a	n/a	n/a	CT-7C	0	0	NG-7F	0	0	D-5F	0	0	FC-15	0	0	Diesel	0.00	0	0
On-site Power	2828	n/a	n/a	n/a	CT-9E	0	0	NG-9C	0	0	n/a	n/a	n/a	FC-15	237	4	Fuel Cell	0.08	237	4
Small CHP	665	n/a	n/a	n/a	CT-9F	0	0	NG-9D	0	0	n/a	n/a	n/a	FC-16	38	1	Fuel Cell	0.06	38	1
Large CHP	757	n/a	n/a	n/a	CT-9J	26	8	NG-9D	0	0	n/a	n/a	n/a	FC-16	137	2	Fuel Cell	0.18	137	2
Demand	2828	n/a	n/a	n/a	CT-9E	0	0	NG-9C	2,177	78	n/a	n/a	n/a	FC-15	2,753	5	Fuel Cell	0.97	2,753	5
Oilfield Gas	0.1	n/a	n/a	n/a	CT-3E	0.04	1	NG-3H	0.1	1	n/a	n/a	n/a	FC-15	0	0	Gas Engine	1.00	0.1	1
Landfill Gas	50	n/a	n/a	n/a	n/a	n/a	n/a	NG-4H	50	327	n/a	n/a	n/a	FC-15	50	1	Fuel Cell	1.00	50	1
																	Totals		**3,215**	**13**

Table G-16: Detailed Results – Scenario 2, HGA, No Microturbine, 2010

		Technologies															Largest Market Share Technology Results			
		Microturbine			CT			Gas Engine			Diesel			Fuel Cell						
Application	Total Market MW	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Technology	Mkt Share	MW	NOx tons/yr
Standby	24	n/a	n/a	n/a	CT-7C	0	0	NG-7F	0	0	D-5F	0	0	FC-15	0	0	Diesel	0.00	0	0
Reliability	2328	n/a	n/a	n/a	CT-7C	0	0	NG-7F	0	0	D-5F	0	0	FC-15	0	0	Diesel	0.00	0	0
On-site Power	2910	n/a	n/a	n/a	CT-9E	0	0	NG-9C	0	0	n/a	n/a	n/a	FC-15	244	4	Fuel Cell	0.08	244	4
Small CHP	1157	n/a	n/a	n/a	CT-9F	0	0	NG-9D	0	0	n/a	n/a	n/a	FC-16	66	1	Fuel Cell	0.06	66	1
Large CHP	1316	n/a	n/a	n/a	CT-9J	45	14	NG-9D	0	0	n/a	n/a	n/a	FC-16	238	4	Fuel Cell	0.18	238	4
Demand	2910	n/a	n/a	n/a	CT-9E	0	0	NG-9C	2,240	81	n/a	n/a	n/a	FC-15	2,832	5	Fuel Cell	0.97	2,832	5
Oilfield Gas	6	n/a	n/a	n/a	CT-3E	2	30	NG-3H	6	38	n/a	n/a	n/a	FC-15	6	0.1	Gas Engine	1.00	6	38
Landfill Gas	49	n/a	n/a	n/a	n/a	n/a	n/a	NG-4H	49	316	n/a	n/a	n/a	FC-15	49	1	Fuel Cell	1.00	49	1
																	Totals		**3,435**	**53**

Table G-17: Detailed Results – Scenario 2, Rest of East, No Microturbine, 2010

Application	Total Market MW	Technologies															Largest Market Share Technology Results			
		Microturbine			CT			Gas Engine			Diesel			Fuel Cell						
		Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Technology	Mkt Share	MW	NOx tons/yr
Standby	34	n/a	n/a	n/a	CT-7C	0	0	NG-7F	0	0	D-5F	0	0	FC-15	0	0	Diesel	0.00	0	0
Reliability	3278	n/a	n/a	n/a	CT-7C	0	0	NG-7F	0	0	D-5F	0	0	FC-15	0	0	Diesel	0.00	0	0
On-site Power	4097	n/a	n/a	n/a	CT-9E	0	0	NG-9C	0	0	n/a	n/a	n/a	FC-15	344	6	Fuel Cell	0.08	344	6
Small CHP	964	n/a	n/a	n/a	CT-9F	0	0	NG-9D	0	0	n/a	n/a	n/a	FC-16	55	1	Fuel Cell	0.06	55	1
Large CHP	1097	n/a	n/a	n/a	CT-9J	38	12	NG-9D	0	0	n/a	n/a	n/a	FC-16	198	3	Fuel Cell	0.18	198	3
Demand	4097	n/a	n/a	n/a	CT-9E	0	0	NG-9C	3,153	114	n/a	n/a	n/a	FC-15	3,988	7	Fuel Cell	0.97	3,988	7
Oilfield Gas	81	n/a	n/a	n/a	CT-3E	33	418	NG-3H	81	526	n/a	n/a	n/a	FC-15	81	2	Gas Engine	1.00	81	526
Landfill Gas	105	n/a	n/a	n/a	n/a	n/a	n/a	NG-4H	105	681	n/a	n/a	n/a	FC-15	105	3	Fuel Cell	1.00	105	3
																	Totals		**4,771**	**545**

Table G-18: Detailed Results – Scenario 3, DFW, No Microturbine, 2010

Application	Total Market MW	Technologies															Largest Market Share Technology Results			
		Microturbine			CT			Gas Engine			Diesel			Fuel Cell						
		Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Technology	Mkt Share	MW	NOx tons/yr
Standby	24	n/a	n/a	n/a	CT-7C	0	0	NG-7F	0	0	D-5F	0	0	FC-15	0	0	Diesel	0.00	0	0
Reliability	2262	n/a	n/a	n/a	CT-7C	0	0	NG-7F	0	0	D-5F	0	0	FC-15	0	0	Diesel	0.00	0	0
On-site Power	2828	n/a	n/a	n/a	CT-8E	0	0	NG-8C	0	0	D-6B	0	0	FC-15	237	4	Fuel Cell	0.08	237	4
Small CHP	665	n/a	n/a	n/a	CT-8F	0	0	NG-8D	0	0	n/a	n/a	n/a	FC-16	38	1	Fuel Cell	0.06	38	1
Large CHP	757	n/a	n/a	n/a	CT-8J	26	8	NG-8D	0	0	n/a	n/a	n/a	FC-16	137	2	Fuel Cell	0.18	137	2
Demand	2828	n/a	n/a	n/a	CT-8E	0	0	NG-8C	2,177	78	D-6B	2,410	145	FC-15	2,753	5	Fuel Cell	0.97	2,753	5
Oilfield Gas	0.1	n/a	n/a	n/a	CT-3E	0.04	1	NG-3H	0.1	1	n/a	n/a	n/a	FC-15	0	0	Gas Engine	1.00	0.1	1
Landfill Gas	50	n/a	n/a	n/a	n/a	n/a	n/a	NG-4H	50	327	n/a	n/a	n/a	FC-15	50	1	Fuel Cell	1.00	50	1
																	Totals		**3,215**	**13**

Table G-19: Detailed Results – Scenario 3, HGA, No Microturbine, 2010

Application	Total Market MW	Technologies															Largest Market Share Technology Results			
		Microturbine			CT			Gas Engine			Diesel			Fuel Cell						
		Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Technology	Mkt Share	MW	NOx tons/yr
Standby	24	n/a	n/a	n/a	CT-7C	0	0	NG-7F	0	0	D-5F	0	0	FC-15	0	0	Diesel	0.00	0	0
Reliability	2328	n/a	n/a	n/a	CT-7C	0	0	NG-7F	0	0	D-5F	0	0	FC-15	0	0	Diesel	0.00	0	0
On-site Power	2910	n/a	n/a	n/a	CT-8E	0	0	NG-8C	0	0	D-6B	0	0	FC-15	244	4	Fuel Cell	0.08	244	4
Small CHP	1157	n/a	n/a	n/a	CT-8F	0	0	NG-8D	0	0	n/a	n/a	n/a	FC-16	66	1	Fuel Cell	0.06	66	1
Large CHP	1316	n/a	n/a	n/a	CT-8J	45	14	NG-8D	0	0	n/a	n/a	n/a	FC-16	238	4	Fuel Cell	0.18	238	4
Demand	2910	n/a	n/a	n/a	CT-8E	0	0	NG-8C	2,240	81	D-6B	2,480	149	FC-15	2,832	5	Fuel Cell	0.97	2,832	5
Oilfield Gas	6	n/a	n/a	n/a	CT-3E	2	30	NG-3H	6	38	n/a	n/a	n/a	FC-15	6	0.1	Gas Engine	1.00	6	38
Landfill Gas	49	n/a	n/a	n/a	n/a	n/a	n/a	NG-4H	49	316	n/a	n/a	n/a	FC-15	49	1	Fuel Cell	1.00	49	1
																	Totals		**3,435**	**53**

Table G-20: Detailed Results – Scenario 3, Rest of East, No Microturbine, 2010

Application	Total Market MW	Technologies															Largest Market Share Technology Results			
		Microturbine			CT			Gas Engine			Diesel			Fuel Cell						
		Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Technology	Mkt Share	MW	NOx tons/yr
Standby	34	n/a	n/a	n/a	CT-7C	0	0	NG-7F	0	0	D-5F	0	0	FC-15	0	0	Diesel	0.00	0	0
Reliability	3278	n/a	n/a	n/a	CT-7C	0	0	NG-7F	0	0	D-5F	0	0	FC-15	0	0	Diesel	0.00	0	0
On-site Power	4097	n/a	n/a	n/a	CT-8E	0	0	NG-8C	0	0	D-6B	0	0	FC-15	344	6	Fuel Cell	0.08	344	6
Small CHP	964	n/a	n/a	n/a	CT-8F	0	0	NG-8D	0	0	n/a	n/a	n/a	FC-16	55	1	Fuel Cell	0.06	55	1
Large CHP	1097	n/a	n/a	n/a	CT-8J	38	12	NG-8D	0	0	n/a	n/a	n/a	FC-16	198	3	Fuel Cell	0.18	198	3
Demand	4097	n/a	n/a	n/a	CT-8E	0	0	NG-8C	3,153	114	D-6B	3,491	209	FC-15	3,988	7	Fuel Cell	0.97	3,988	7
Oilfield Gas	81	n/a	n/a	n/a	CT-3E	33	418	NG-3H	81	526	n/a	n/a	n/a	FC-15	81	2	Gas Engine	1.00	81	526
Landfill Gas	105	n/a	n/a	n/a	n/a	n/a	n/a	NG-4H	105	681	n/a	n/a	n/a	FC-15	105	3	Fuel Cell	1.00	105	3
																	Totals		**4,771**	**545**

Appendix H. Detailed Results: No Microturbine, No Fuel Cell

[All final results for the 2002 no-microturbine no-fuel-cell case are the same as for the 2002 Base Case (see Tables D-1 through D-7). All final results for the 2006 no-microturbine, no-fuel-cell case are the same as for the 2006 no-microturbine case (see Tables G-1 through G-10).]

Table H-1: Detailed Results – All Scenarios, West Texas, No Microturbine or Fuel Cell, 2010

		Technologies															Largest Market Share Technology Results			
		Microturbine			CT			Gas Engine			Diesel			Fuel Cell						
Application	Total Market MW	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Technology	Mkt Share	MW	NOx tons/yr
Standby	18	n/a	n/a	n/a	CT-1C	0	0	NG-1F	0	0	D-1F	0	0	n/a	n/a	n/a	Diesel	0.00	0	0
Reliability	1716	n/a	n/a	n/a	CT-1C	0	0	NG-1F	0	0	D-1F	128	9	n/a	n/a	n/a	Diesel	0.07	128	9
On-site Power	2145	n/a	n/a	n/a	CT-2E	0	0	NG-2H	0	0	D-2F	0	0	n/a	n/a	n/a	Gas Engine	0.00	0	0
Small CHP	505	n/a	n/a	n/a	CT-2F	0	0	NG-2I	132	584	n/a	n/a	n/a	n/a	n/a	n/a	Gas Engine	0.26	132	584
Large CHP	575	n/a	n/a	n/a	CT-2J	200	227	NG-2I	320	1,420	n/a	n/a	n/a	n/a	n/a	n/a	Gas Engine	0.56	320	1,420
Demand	2145	n/a	n/a	n/a	CT-2E	0	0	NG-2H	2,087	927	D-2F	1,939	814	n/a	n/a	n/a	Gas Engine	0.97	2,087	927
Oilfield Gas	278	n/a	n/a	n/a	CT-3E	113	1,433	NG-3H	278	1,804	n/a	n/a	n/a	n/a	n/a	n/a	Gas Engine	1.00	278	1,804
Landfill Gas	55	n/a	n/a	n/a	n/a	n/a	n/a	NG-4H	55	357	n/a	n/a	n/a	n/a	n/a	n/a	Gas Engine	1.00	55	357
																	Totals		**3,000**	**5,100**

Table H-2: Detailed Results – Scenario 1, DFW, No Microturbine or Fuel Cell, 2010

		Technologies															Largest Market Share Technology Results			
		Microturbine			CT			Gas Engine			Diesel			Fuel Cell						
Application	Total Market MW	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Technology	Mkt Share	MW	NOx tons/yr
Standby	24	n/a	n/a	n/a	CT-5C	0	0	NG-5F	0	0	D-3F	0	0	n/a	n/a	n/a	Diesel	0.00	0	0
Reliability	2262	n/a	n/a	n/a	CT-5C	0	0	NG-5F	0	0	D-3F	0	0	n/a	n/a	n/a	Diesel	0.00	0	0
On-site Power	2828	n/a	n/a	n/a	CT-6E	0	0	NG-6H	0	0	D-4F	0	0	n/a	n/a	n/a	Gas Engine	0.00	0	0
Small CHP	665	n/a	n/a	n/a	CT-6F	0	0	NG-6I	9	4	n/a	n/a	n/a	n/a	n/a	n/a	Gas Engine	0.01	9	4
Large CHP	757	n/a	n/a	n/a	CT-6J	264	298	NG-6I	96	46	n/a	n/a	n/a	n/a	n/a	n/a	CT	0.35	264	298
Demand	2828	n/a	n/a	n/a	CT-6E	0	0	NG-6H	1,293	62	D-4F	2,410	289	n/a	n/a	n/a	Diesel	0.85	2,410	289
Oilfield Gas	0.1	n/a	n/a	n/a	CT-3E	0.04	1	NG-3H	0.1	1	n/a	n/a	n/a	n/a	n/a	n/a	Gas Engine	1.00	0.1	1
Landfill Gas	50	n/a	n/a	n/a	n/a	n/a	n/a	NG-4H	50	327	n/a	n/a	n/a	n/a	n/a	n/a	Gas Engine	1.00	50	327
																	Totals		**2,733**	**919**

Table H-3: Detailed Results – Scenario 1, HGA, No Microturbine or Fuel Cell, 2010

Application	Total Market MW	Technologies															Largest Market Share Technology Results			
		Microturbine			CT			Gas Engine			Diesel			Fuel Cell						
		Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Technology	Mkt Share	MW	NOx tons/yr
Standby	24	n/a	n/a	n/a	CT-5C	0	0	NG-5F	0	0	D-3F	0	0	n/a	n/a	n/a	Diesel	0.00	0	0
Reliability	2328	n/a	n/a	n/a	CT-5C	0	0	NG-5F	0	0	D-3F	0	0	n/a	n/a	n/a	Diesel	0.00	0	0
On-site Power	2910	n/a	n/a	n/a	CT-6E	0	0	NG-6H	0	0	D-4F	0	0	n/a	n/a	n/a	Gas Engine	0.00	0	0
Small CHP	1157	n/a	n/a	n/a	CT-6F	0	0	NG-6I	16	8	n/a	n/a	n/a	n/a	n/a	n/a	Gas Engine	0.01	16	8
Large CHP	1316	n/a	n/a	n/a	CT-6J	459	519	NG-6I	166	80	n/a	n/a	n/a	n/a	n/a	n/a	CT	0.35	459	519
Demand	2910	n/a	n/a	n/a	CT-6E	0	0	NG-6H	1,330	64	D-4F	2,480	298	n/a	n/a	n/a	Diesel	0.85	2,480	298
Oilfield Gas	6	n/a	n/a	n/a	CT-3E	2	30	NG-3H	6	38	n/a	n/a	n/a	n/a	n/a	n/a	Gas Engine	1.00	6	38
Landfill Gas	49	n/a	n/a	n/a	n/a	n/a	n/a	NG-4H	49	316	n/a	n/a	n/a	n/a	n/a	n/a	Gas Engine	1.00	49	316
																	Totals		3,009	1,178

Table H-4: Detailed Results – Scenario 1, Rest of East, No Microturbine or Fuel Cell, 2010

Application	Total Market MW	Technologies															Largest Market Share Technology Results			
		Microturbine			CT			Gas Engine			Diesel			Fuel Cell						
		Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Technology	Mkt Share	MW	NOx tons/yr
Standby	34	n/a	n/a	n/a	CT-5C	0	0	NG-5F	0	0	D-3F	0	0	n/a	n/a	n/a	Diesel	0.00	0	0
Reliability	3278	n/a	n/a	n/a	CT-5C	0	0	NG-5F	0	0	D-3F	0	0	n/a	n/a	n/a	Diesel	0.00	0	0
On-site Power	4097	n/a	n/a	n/a	CT-6E	0	0	NG-6H	0	0	D-4F	0	0	n/a	n/a	n/a	Gas Engine	0.00	0	0
Small CHP	964	n/a	n/a	n/a	CT-6F	0	0	NG-6I	13	6	n/a	n/a	n/a	n/a	n/a	n/a	Gas Engine	0.01	13	6
Large CHP	1097	n/a	n/a	n/a	CT-6J	382	432	NG-6I	139	67	n/a	n/a	n/a	n/a	n/a	n/a	CT	0.35	382	432
Demand	4097	n/a	n/a	n/a	CT-6E	0	0	NG-6H	1,873	90	D-4F	3,491	419	n/a	n/a	n/a	Diesel	0.85	3,491	419
Oilfield Gas	81	n/a	n/a	n/a	CT-3E	33	418	NG-3H	81	526	n/a	n/a	n/a	n/a	n/a	n/a	Gas Engine	1.00	81	526
Landfill Gas	105	n/a	n/a	n/a	n/a	n/a	n/a	NG-4H	105	681	n/a	n/a	n/a	n/a	n/a	n/a	Gas Engine	1.00	105	681
																	Totals		4,073	2,065

Table H-5: Detailed Results – Scenario 2, DFW, No Microturbine or Fuel Cell, 2010

		Technologies: Microturbine			CT			Gas Engine			Diesel			Fuel Cell			Largest Market Share Technology Results			
Application	Total Market MW	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Technology	Mkt Share	MW	NOx tons/yr
Standby	24	n/a	n/a	na	CT-7C	0	0	NG-7F	0	0	D-5F	0	0	n/a	n/a	n/a	Diesel	0.00	0	0
Reliability	2262	n/a	n/a	na	CT-7C	0	0	NG-7F	0	0	D-5F	0	0	n/a	n/a	n/a	Diesel	0.00	0	0
On-site Power	2828	n/a	n/a	na	CT-9E	0	0	NG-9C	0	0	n/a	n/a	n/a	n/a	n/a	n/a	Gas Engine	0.00	0	0
Small CHP	665	n/a	n/a	na	CT-9F	0	0	NG-9D	0	0	n/a	n/a	n/a	n/a	n/a	n/a	Gas Engine	0.00	0	0
Large CHP	757	n/a	n/a	na	CT-9J	26	8	NG-9D	0	0	n/a	n/a	n/a	n/a	n/a	n/a	CT	0.03	26	8
Demand	2828	n/a	n/a	na	CT-9E	0	0	NG-9C	2,177	78	n/a	n/a	n/a	n/a	n/a	n/a	Gas Engine	0.77	2,177	78
Oilfield Gas	0.1	n/a	n/a	na	CT-3E	0.04	1	NG-3H	0.1	1	n/a	n/a	n/a	n/a	n/a	n/a	Gas Engine	1.00	0.1	1
Landfill Gas	50	n/a	n/a	na	n/a	n/a	n/a	NG-4H	50	327	n/a	n/a	n/a	n/a	n/a	n/a	Gas Engine	1.00	50	327
																	Totals		2,253	414

Table H-6: Detailed Results – Scenario 2, HGA, No Microturbine or Fuel Cell, 2010

		Technologies: Microturbine			CT			Gas Engine			Diesel			Fuel Cell			Largest Market Share Technology Results			
Application	Total Market MW	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Technology	Mkt Share	MW	NOx tons/yr
Standby	24	n/a	n/a	n/a	CT-7C	0	0	NG-7F	0	0	D-5F	0	0	n/a	n/a	n/a	Diesel	0.00	0	0
Reliability	2328	n/a	n/a	n/a	CT-7C	0	0	NG-7F	0	0	D-5F	0	0	n/a	n/a	n/a	Diesel	0.00	0	0
On-site Power	2910	n/a	n/a	n/a	CT-9E	0	0	NG-9C	0	0	n/a	n/a	n/a	n/a	n/a	n/a	Gas Engine	0.00	0	0
Small CHP	1157	n/a	n/a	n/a	CT-9F	0	0	NG-9D	0	0	n/a	n/a	n/a	n/a	n/a	n/a	Gas Engine	0.00	0	0
Large CHP	1316	n/a	n/a	n/a	CT-9J	45	14	NG-9D	0	0	n/a	n/a	n/a	n/a	n/a	n/a	CT	0.03	45	14
Demand	2910	n/a	n/a	n/a	CT-9E	0	0	NG-9C	2,240	81	n/a	n/a	n/a	n/a	n/a	n/a	Gas Engine	0.77	2,240	81
Oilfield Gas	6	n/a	n/a	n/a	CT-3E	2	30	NG-3H	6	38	n/a	n/a	n/a	n/a	n/a	n/a	Gas Engine	1.00	6	38
Landfill Gas	49	n/a	n/a	n/a	n/a	n/a	n/a	NG-4H	49	316	n/a	n/a	n/a	n/a	n/a	n/a	Gas Engine	1.00	49	316
																	Totals		2,340	449

Table H-7: Detailed Results – Scenario 2, Rest of East, No Microturbine or Fuel Cell, 2010

Application	Total Market MW	Technologies															Largest Market Share Technology Results			
		Microturbine			CT			Gas Engine			Diesel			Fuel Cell						
		Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Technology	Mkt Share	MW	NOx tons/yr
Standby	34	n/a	n/a	n/a	CT-7C	0	0	NG-7F	0	0	D-5F	0	0	n/a	n/a	n/a	Diesel	0.00	0	0
Reliability	3278	n/a	n/a	n/a	CT-7C	0	0	NG-7F	0	0	D-5F	0	0	n/a	n/a	n/a	Diesel	0.00	0	0
On-site Power	4097	n/a	n/a	n/a	CT-9E	0	0	NG-9C	0	0	n/a	n/a	n/a	n/a	n/a	n/a	Gas Engine	0.00	0	0
Small CHP	964	n/a	n/a	n/a	CT-9F	0	0	NG-9D	0	0	n/a	n/a	n/a	n/a	n/a	n/a	Gas Engine	0.00	0	0
Large CHP	1097	n/a	n/a	n/a	CT-9J	38	12	NG-9D	0	0	n/a	n/a	n/a	n/a	n/a	n/a	CT	0.03	38	12
Demand	4097	n/a	n/a	n/a	CT-9E	0	0	NG-9C	3,153	114	n/a	n/a	n/a	n/a	n/a	n/a	Gas Engine	0.77	3,153	114
Oilfield Gas	81	n/a	n/a	n/a	CT-3E	33	418	NG-3H	81	526	n/a	n/a	n/a	n/a	n/a	n/a	Gas Engine	1.00	81	526
Landfill Gas	105	n/a	n/a	n/a	n/a	n/a	n/a	NG-4H	105	681	n/a	n/a	n/a	n/a	n/a	n/a	Gas Engine	1.00	105	681
																	Totals		3,377	1,333

Table H-8: Detailed Results – Scenario 3, DFW , No Microturbine or Fuel Cell, 2010

Application	Total Market MW	Technologies															Largest Market Share Technology Results			
		Microturbine			CT			Gas Engine			Diesel			Fuel Cell						
		Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Technology	Mkt Share	MW	NOx tons/yr
Standby	24	n/a	n/a	n/a	CT-7C	0	0	NG-7F	0	0	D-5F	0	0	n/a	n/a	n/a	Diesel	0.00	0	0
Reliability	2262	n/a	n/a	n/a	CT-7C	0	0	NG-7F	0	0	D-5F	0	0	n/a	n/a	n/a	Diesel	0.00	0	0
On-site Power	2828	n/a	n/a	n/a	CT-8E	0	0	NG-8C	0	0	D-6B	0	0	n/a	n/a	n/a	Gas Engine	0.00	0	0
Small CHP	665	n/a	n/a	n/a	CT-8F	0	0	NG-8D	0	0	n/a	n/a	n/a	n/a	n/a	n/a	Gas Engine	0.00	0	0
Large CHP	757	n/a	n/a	n/a	CT-8J	26	8	NG-8D	0	0	n/a	n/a	n/a	n/a	n/a	n/a	CT	0.03	26	8
Demand	2828	n/a	n/a	n/a	CT-8E	0	0	NG-8C	2,177	78	D-6B	2,410	145	n/a	n/a	n/a	Diesel	0.85	2,410	145
Oilfield Gas	0.1	n/a	n/a	n/a	CT-3E	0.04	1	NG-3H	0.1	1	n/a	n/a	n/a	n/a	n/a	n/a	Gas Engine	1.00	0.1	1
Landfill Gas	50	n/a	n/a	n/a	n/a	n/a	n/a	NG-4H	50	327	n/a	n/a	n/a	n/a	n/a	n/a	Gas Engine	1.00	50	327
																	Totals		2,486	480

Table H-9: Detailed Results – Scenario 3, HGA, No Microturbine or Fuel Cell, 2010

		Technologies: Microturbine			CT			Gas Engine			Diesel			Fuel Cell			Largest Market Share Technology Results			
Application	Total Market MW	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Technology	Mkt Share	MW	NOx tons/yr
Standby	24	n/a	n/a	n/a	CT-7C	0	0	NG-7F	0	0	D-5F	0	0	n/a	n/a	n/a	Diesel	0.00	0	0
Reliability	2328	n/a	n/a	n/a	CT-7C	0	0	NG-7F	0	0	D-5F	0	0	n/a	n/a	n/a	Diesel	0.00	0	0
On-site Power	2910	n/a	n/a	n/a	CT-8E	0	0	NG-8C	0	0	D-6B	0	0	n/a	n/a	n/a	Gas Engine	0.00	0	0
Small CHP	1157	n/a	n/a	n/a	CT-8F	0	0	NG-8D	0	0	n/a	n/a	n/a	n/a	n/a	n/a	Gas Engine	0.00	0	0
Large CHP	1316	n/a	n/a	n/a	CT-8J	45	14	NG-8D	0	0	n/a	n/a	n/a	n/a	n/a	n/a	CT	0.03	45	14
Demand	2910	n/a	n/a	n/a	CT-8E	0	0	NG-8C	2,240	81	D-6B	2,480	149	n/a	n/a	n/a	Diesel	0.85	2,480	149
Oilfield Gas	6	n/a	n/a	n/a	CT-3E	2	30	NG-3H	6	38	n/a	n/a	n/a	n/a	n/a	n/a	Gas Engine	1.00	6	38
Landfill Gas	49	n/a	n/a	n/a	n/a	n/a	n/a	NG-4H	49	316	n/a	n/a	n/a	n/a	n/a	n/a	Gas Engine	1.00	49	316
																	Totals		**2,579**	**517**

Table H-10: Detailed Results – Scenario 3, Rest of East, No Microturbine or Fuel Cell, 2010

		Technologies: Microturbine			CT			Gas Engine			Diesel			Fuel Cell			Largest Market Share Technology Results			
Application	Total Market MW	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Technology	Mkt Share	MW	NOx tons/yr
Standby	34	n/a	n/a	n/a	CT-7C	0	0	NG-7F	0	0	D-5F	0	0	n/a	n/a	n/a	Diesel	0.00	0	0
Reliability	3278	n/a	n/a	n/a	CT-7C	0	0	NG-7F	0	0	D-5F	0	0	n/a	n/a	n/a	Diesel	0.00	0	0
On-site Power	4097	n/a	n/a	n/a	CT-8E	0	0	NG-8C	0	0	D-6B	0	0	n/a	n/a	n/a	Gas Engine	0.00	0	0
Small CHP	964	n/a	n/a	n/a	CT-8F	0	0	NG-8D	0	0	n/a	n/a	n/a	n/a	n/a	n/a	Gas Engine	0.00	0	0
Large CHP	1097	n/a	n/a	n/a	CT-8J	38	12	NG-8D	0	0	n/a	n/a	n/a	n/a	n/a	n/a	CT	0.03	38	12
Demand	4097	n/a	n/a	n/a	CT-8E	0	0	NG-8C	3,153	114	D-6B	3,491	209	n/a	n/a	n/a	Diesel	0.85	3,491	209
Oilfield Gas	81	n/a	n/a	n/a	CT-3E	33	418	NG-3H	81	526	n/a	n/a	n/a	n/a	n/a	n/a	Gas Engine	1.00	81	526
Landfill Gas	105	n/a	n/a	n/a	n/a	n/a	n/a	NG-4H	105	681	n/a	n/a	n/a	n/a	n/a	n/a	Gas Engine	1.00	105	681
																	Totals		**3,715**	**1,429**

Appendix I. Detailed Results: High Dallas Electricity Cost

[All results for non-Dallas zones are the same as the Base Case.]

Table I-1: Detailed Results – Scenario 1, DFW, High Electricity Cost, 2002

		Technologies															Largest Market Share Technology Results			
		Microturbine			CT			Gas Engine			Diesel			Fuel Cell						
Application	Total Market MW	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Technology	Mkt Share	MW	NOx tons/yr
Standby	24	M-5A	0	0	CT-5C	0	0	NG-5B	0	0	D-3B	0	0	FC-4	0	0	Diesel	0.00	0	0
Reliability	2262	M-5A	0	0	CT-5C	0	0	NG-5B	0	0	D-3B	0	0	FC-4	0	0	Diesel	0.00	0	0
On-site Power	2828	M-6A	0	0	CT-6E	0	0	NG-6B	0	0	D-4B	0	0	FC-4	0	0	Gas Engine	0.00	0	0
Small CHP	665	M-6B	251	407	CT-6F	0	0	NG-6C	292	219	n/a	n/a	n/a	FC-2	0	0	Gas Engine	0.44	292	219
Large CHP	757	M-6B	492	798	CT-6B	640	505	NG-6C	557	418	n/a	n/a	n/a	FC-2	0	0	CT	0.85	640	505
Demand	2828	M-6A	16	3	CT-6E	0	0	NG-6B	1,199	90	D-4B	2,594	311	FC-4	0	0	Diesel	0.92	2,594	311
Oilfield Gas	0.1	M-3A	0	0	CT-3E	0.10	1	NG-3B	0.1	1	n/a	n/a	n/a	FC-4	0	0	Gas Engine	1.00	0.1	1
Landfill Gas	50	M-4A	46	112	n/a	n/a	n/a	NG-4B	50	327	n/a	n/a	n/a	FC-4	0	0	Gas Engine	1.00	50	327
																	Totals		**3,577**	**1,363**

Table I-2: Detailed Results – Scenario 2, DFW, High Electricity Cost, 2002

		Technologies															Largest Market Share Technology Results			
		Microturbine			CT			Gas Engine			Diesel			Fuel Cell						
Application	Total Market MW	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Technology	Mkt Share	MW	NOx tons/yr
Standby	24	n/a	n/a	n/a	CT-7C	0	0	NG-7B	0	0	D-5B	0	0	FC-4	0	0	Diesel	0.00	0	0
Reliability	2262	n/a	n/a	n/a	CT-7C	0	0	NG-7B	0	0	D-5B	0	0	FC-4	0	0	Diesel	0.00	0	0
On-site Power	2828	n/a	n/a	n/a	CT-9E	0	0	n/a	n/a	n/a	n/a	n/a	n/a	FC-4	0	0	Fuel Cell	0.00	0	0
Small CHP	665	n/a	n/a	n/a	CT-9F	0	0	n/a	n/a	n/a	n/a	n/a	n/a	FC-2	0	0	CT	0.00	0	0
Large CHP	757	n/a	n/a	n/a	CT-9B	640	253	n/a	n/a	n/a	n/a	n/a	n/a	FC-2	0	0	CT	0.85	640	253
Demand	2828	n/a	n/a	n/a	CT-9E	0	0	n/a	n/a	n/a	n/a	n/a	n/a	FC-4	0	0	CT	0.00	0	0
Oilfield Gas	0.1	M-3A	0	0	CT-3E	0.10	1	NG-3B	0.1	1	n/a	n/a	n/a	FC-4	0	0	Gas Engine	1.00	0.1	1
Landfill Gas	50	M-4A	46	112	n/a	n/a	n/a	NG-4B	50	327	n/a	n/a	n/a	FC-4	0	0	Gas Engine	1.00	50	327
																	Totals		**690**	**581**

Table I-3: Detailed Results – Scenario 3, DFW, High Electricity Cost, 2002

Application	Total Market MW	Technologies															Largest Market Share Technology Results			
		Microturbine			CT			Gas Engine			Diesel			Fuel Cell						
		Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Technology	Mkt Share	MW	NOx tons/yr
Standby	24	n/a	n/a	n/a	CT-7C	0	0	NG-7B	0	0	D-5B	0	0	FC-4	0	0	Diesel	0.00	0	0
Reliability	2262	n/a	n/a	n/a	CT-7C	0	0	NG-7B	0	0	D-5B	0	0	FC-4	0	0	Diesel	0.00	0	0
On-site Power	2828	n/a	n/a	n/a	CT-8E	0	0	n/a	n/a	n/a	n/a	n/a	n/a	FC-4	0	0	Fuel Cell	0.00	0	0
Small CHP	665	n/a	n/a	n/a	CT-8F	0	0	n/a	n/a	n/a	n/a	n/a	n/a	FC-2	0	0	CT	0.00	0	0
Large CHP	757	n/a	n/a	n/a	CT-8B	640	253	n/a	n/a	n/a	n/a	n/a	n/a	FC-2	0	0	CT	0.85	640	253
Demand	2828	n/a	n/a	n/a	CT-8E	0	0	n/a	n/a	n/a	n/a	n/a	n/a	FC-4	0	0	CT	0.00	0	0
Oilfield Gas	0.1	M-3A	0	0	CT-3E	0.10	1	NG-3B	0.1	1	n/a	n/a	n/a	FC-4	0	0	Gas Engine	1.00	0.1	1
Landfill Gas	50	M-4A	46	112	n/a	n/a	n/a	NG-4B	50	327	n/a	n/a	n/a	FC-4	0	0	Gas Engine	1.00	50	327
																	Totals		**690**	**581**

Table I-4: Detailed Results – Scenario 1, DFW, High Electricity Cost, 2006

Application	Total Market MW	Technologies															Largest Market Share Technology Results			
		Microturbine			CT			Gas Engine			Diesel			Fuel Cell						
		Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Technology	Mkt Share	MW	NOx tons/yr
Standby	24	M-5E	0	0	CT-5C	0	0	NG-5D	0	0	D-3D	0	0	FC-9	0	0	Diesel	0.00	0	0
Reliability	2262	M-5E	0	0	CT-5C	0	0	NG-5D	0	0	D-3D	0	0	FC-9	0	0	Diesel	0.00	0	0
On-site Power	2828	M-6A	0	0	CT-6E	0	0	NG-6E	0	0	D-4D	0	0	FC-9	0	0	Microturbine	0.00	0	0
Small CHP	665	M-6B	639	149	CT-6F	0	0	NG-6F	328	157	n/a	n/a	n/a	FC-10	0	0	Microturbine	0.96	639	149
Large CHP	757	M-6B	757	176	CT-6H	726	822	NG-6F	586	282	n/a	n/a	n/a	FC-10	0	0	Microturbine	1.00	757	176
Demand	2828	M-6A	871	20	CT-6E	0	0	NG-6E	1,444	69	D-4D	2,594	311	FC-9	0	0	Diesel	0.92	2,594	311
Oilfield Gas	0.1	M-3C	0	0	CT-3E	0.10	1	NG-3E	0.1	1	n/a	n/a	n/a	FC-9	0	0	Gas Engine	1.00	0.1	1
Landfill Gas	50	M-4C	50	123	n/a	n/a	n/a	NG-4E	50	327	n/a	n/a	n/a	FC-9	49	1	Gas Engine	1.00	50	327
																	Totals		**4,040**	**964**

Table I-5: Detailed Results – Scenario 2, DFW, High Electricity Cost, 2006

Application	Total Market MW	Technologies															Largest Market Share Technology Results			
		Microturbine			CT			Gas Engine			Diesel			Fuel Cell						
		Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Technology	Mkt Share	MW	NOx tons/yr
Standby	24	M-7A	0	0	CT-7C	0	0	NG-7D	0	0	D-5D	0	0	FC-9	0	0	Diesel	0.00	0	0
Reliability	2262	M-7A	0	0	CT-7C	0	0	NG-7D	0	0	D-5D	0	0	FC-9	0	0	Diesel	0.00	0	0
On-site Power	2828	M-9A	0	0	CT-9E	0	0	NG-9A	0	0	n/a	n/a	n/a	FC-9	0	0	Microturbine	0.00	0	0
Small CHP	665	M-9B	639	149	CT-9F	0	0	NG-9B	216	78	n/a	n/a	n/a	FC-10	0	0	Microturbine	0.96	639	149
Large CHP	757	M-9B	757	176	CT-9H	479	150	NG-9B	478	172	n/a	n/a	n/a	FC-10	0	0	Microturbine	1.00	757	176
Demand	2828	M-9A	871	20	CT-9E	0	0	NG-9A	1,199	43	n/a	n/a	n/a	FC-9	0	0	Gas Engine	0.42	1,199	43
Oilfield Gas	0.1	M-3C	0	0	CT-3E	0.10	1	NG-3E	0.1	1	n/a	n/a	n/a	FC-9	0	0	Gas Engine	1.00	0.1	1
Landfill Gas	50	M-4C	50	123	n/a	n/a	n/a	NG-4E	50	327	n/a	n/a	n/a	FC-9	49	1	Gas Engine	1.00	50	327
																	Totals		**2,645**	**696**

Table I-6: Detailed Results – Scenario 3, DFW, High Electricity Cost, 2006

Application	Total Market MW	Technologies															Largest Market Share Technology Results			
		Microturbine			CT			Gas Engine			Diesel			Fuel Cell						
		Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Technology	Mkt Share	MW	NOx tons/yr
Standby	24	M-7A	0	0	CT-7C	0	0	NG-7D	0	0	D-5D	0	0	FC-9	0	0	Diesel	0.00	0	0
Reliability	2262	M-7A	0	0	CT-7C	0	0	NG-7D	0	0	D-5D	0	0	FC-9	0	0	Diesel	0.00	0	0
On-site Power	2828	M-8A	0	0	CT-8E	0	0	NG-8A	0	0	D-6A	0	0	FC-9	0	0	Microturbine	0.00	0	0
Small CHP	665	M-8B	639	149	CT-8F	0	0	NG-8B	216	78	n/a	n/a	n/a	FC-10	0	0	Microturbine	0.96	639	149
Large CHP	757	M-8B	757	176	CT-8H	479	150	NG-8B	478	172	n/a	n/a	n/a	FC-10	0	0	Microturbine	1.00	757	176
Demand	2828	M-8A	871	20	CT-8E	0	0	NG-8A	1,199	43	D-6A	2,594	156	FC-9	0	0	Diesel	0.92	2,594	156
Oilfield Gas	0.1	M-3C	0	0	CT-3E	0.10	1	NG-3E	0.1	1	n/a	n/a	n/a	FC-9	0	0	Gas Engine	1.00	0.1	1
Landfill Gas	50	M-4C	50	123	n/a	n/a	n/a	NG-4E	50	327	n/a	n/a	n/a	FC-9	50	1	Gas Engine	1.00	50	327
																	Totals		**4,040**	**808**

Table I-7: Detailed Results – Scenario 1, DFW, High Electricity Cost, 2010

		Technologies															Largest Market Share Technology Results			
		Microturbine			CT			Gas Engine			Diesel			Fuel Cell						
Application	Total Market MW	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Technology	Mkt Share	MW	NOx tons/yr
Standby	24	M-5F	0	0	CT-5C	0	0	NG-5F	0	0	D-3F	0	0	FC-15	0	0	Diesel	0.00	0	0
Reliability	2262	M-5F	0	0	CT-5C	0	0	NG-5F	0	0	D-3F	0	0	FC-15	0	0	Diesel	0.00	0	0
On-site Power	2828	M-6C	116	27	CT-6E	0	0	NG-6H	0	0	D-4F	0	0	FC-15	2,117	35	Fuel Cell	0.75	2,117	35
Small CHP	665	M-6D	665	155	CT-6F	0	0	NG-6I	364	175	n/a	n/a	n/a	FC-16	463	8	Microturbine	1.00	665	155
Large CHP	757	M-6D	757	176	CT-6J	726	822	NG-6I	613	294	n/a	n/a	n/a	FC-16	656	11	Microturbine	1.00	757	176
Demand	2828	M-6C	2,605	61	CT-6E	0	0	NG-6H	1,685	81	D-4F	2,594	311	FC-15	2,814	5	Fuel Cell	1.00	2,814	5
Oilfield Gas	0.1	M-3E	0	0	CT-3E	0.10	1	NG-3H	0.1	1	n/a	n/a	n/a	FC-15	0	0	Gas Engine	1.00	0.1	1
Landfill Gas	50	M-4E	50	123	n/a	n/a	n/a	NG-4H	50	327	n/a	n/a	n/a	FC-15	50	1	Fuel Cell	1.00	50	1
																	Totals		**6,404**	**373**

Table I-8: Detailed Results – Scenario 2, DFW, High Electricity Cost, 2010

		Technologies															Largest Market Share Technology Results			
		Microturbine			CT			Gas Engine			Diesel			Fuel Cell						
Application	Total Market MW	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Tech ID	Mkt Share MW	NOx ton/yr	Technology	Mkt Share	MW	NOx tons/yr
Standby	24	M-7B	0	0	CT-7C	0	0	NG-7F	0	0	D-5F	0	0	FC-15	0	0	Diesel	0.00	0	0
Reliability	2262	M-7B	0	0	CT-7C	0	0	NG-7F	0	0	D-5F	0	0	FC-15	0	0	Diesel	0.00	0	0
On-site Power	2828	M-9C	116	27	CT-9E	0	0	NG-9C	0	0	n/a	n/a	n/a	FC-15	2,117	35	Fuel Cell	0.75	2,117	35
Small CHP	665	M-9D	665	155	CT-9F	0	0	NG-9D	0	0	n/a	n/a	n/a	FC-16	463	8	Microturbine	1.00	665	155
Large CHP	757	M-9D	757	176	CT-9J	479	150	NG-9D	0	0	n/a	n/a	n/a	FC-16	656	11	Microturbine	1.00	757	176
Demand	2828	M-9C	2,605	61	CT-9E	0	0	NG-9C	2,417	87	n/a	n/a	n/a	FC-15	2,814	5	Fuel Cell	1.00	2,814	5
Oilfield Gas	0.1	M-3E	0	0	CT-3E	0.10	1	NG-3H	0.1	1	n/a	n/a	n/a	FC-15	0	0	Gas Engine	1.00	0.1	1
Landfill Gas	50	M-4E	50	123	n/a	n/a	n/a	NG-4H	50	327	n/a	n/a	n/a	FC-15	50	1	Fuel Cell	1.00	50	1
																	Totals		**6,404**	**373**

Table I-9: Detailed Results – Scenario 3, DFW, High Electricity Cost, 2010

Application	Total Market MW	Microturbine Tech ID	Microturbine Mkt Share MW	Microturbine NOx ton/yr	CT Tech ID	CT Mkt Share MW	CT NOx ton/yr	Gas Engine Tech ID	Gas Engine Mkt Share MW	Gas Engine NOx ton/yr	Diesel Tech ID	Diesel Mkt Share MW	Diesel NOx ton/yr	Fuel Cell Tech ID	Fuel Cell Mkt Share MW	Fuel Cell NOx ton/yr	Largest Market Share Technology Results: Technology	Mkt Share	MW	NOx tons/yr
Standby	24	M-7B	0	0	CT-7C	0	0	NG-7F	0	0	D-5F	0	0	FC-15	0	0	Diesel	0.00	0	0
Reliability	2262	M-7B	0	0	CT-7C	0	0	NG-7F	0	0	D-5F	0	0	FC-15	0	0	Diesel	0.00	0	0
On-site Power	2828	M-8C	116	27	CT-8E	0	0	NG-8C	0	0	D-6B	0	0	FC-15	2,117	35	Fuel Cell	0.75	2,117	35
Small CHP	665	M-8D	665	155	CT-8F	0	0	NG-8D	0	0	n/a	n/a	n/a	FC-16	463	8	Microturbine	1.00	665	155
Large CHP	757	M-8D	757	176	CT-8J	479	150	NG-8D	0	0	n/a	n/a	n/a	FC-16	656	11	Microturbine	1.00	757	176
Demand	2828	M-8C	2,605	61	CT-8E	0	0	NG-8C	2,417	87	D-6B	2,594	156	FC-15	2,814	5	Fuel Cell	1.00	2,814	5
Oilfield Gas	0.1	M-3E	0	0	CT-3E	0.10	1	NG-3H	0.1	1	n/a	n/a	n/a	FC-15	0	0	Gas Engine	1.00	0.1	1
Landfill Gas	50	M-4E	50	123	n/a	n/a	n/a	NG-4H	50	327	n/a	n/a	n/a	FC-15	50	1	Fuel Cell	1.00	50	1
																	Totals		**6,404**	**373**