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ENERGY EFFICIENCY/RENEWABLE ENERGY IMPACT IN THE TEXAS EMISSIONS REDUCTION PLAN (TERP)

VOLUME II—TECHNICAL REPORT

Annual Report to the
Texas Commission on Environmental Quality
January 2011-December 2011

TCEQ

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December 2012

ENERGY SYSTEMS LABORATORY

Texas Engineering Experiment Station
The Texas A&M University System

ENERGY SYSTEMS LABORATORY
Texas Engineering Experiment Station
The Texas A&M University System
405 Harvey Mitchell Parkway, South
College Station, Texas 77843-3581

December 31, 2012

Chairman Bryan W. Shaw
Texas Commission on Environmental Quality
P. O. Box 13087
Austin, TX 78711-3087

Dear Chairman Shaw:

The Energy Systems Laboratory (Laboratory) at the Texas Engineering Experiment Station of The Texas A&M University System is pleased to provide its ninth annual report, "Energy Efficiency/Renewable Energy Impact in the Texas Emissions Reduction Plan (TERP)," as required under Texas Health and Safety Code Ann. § 388.003 (e), Vernon Supp. 2002 (Senate Bill 5, 77R as amended 78 R & 78S).

The Laboratory is required to annually report the energy savings from statewide adoption of the Texas Building Energy Performance Standards in Senate Bill 5 (SB 5), as amended, and the relative impact of proposed local energy code amendments in the Texas non-attainment and near-non-attainment counties as part of the Texas Emissions Reduction Plan (TERP).

Please contact me at (979) 845-1280 should you or any of the TCEQ staff have any questions concerning this report or any of the work presently being done to quantify emissions reduction from energy efficiency and renewable energy measures as a result of the TERP implementation.

Sincerely,

David E. Claridge

David E. Claridge, Ph.D., P.E.
Director

Enclosure

cc: Commissioner Toby Baker
Commissioner Carlos Rubinstein
Executive Director Zak Covar

Disclaimer

VOLUME II – TECHNICAL REPORT

Energy Efficiency/Renewable Energy Impact
In The Texas Emissions Reduction Plan

Executive Summary

The Energy Systems Laboratory (Laboratory), at the Texas Engineering Experiment Station of The Texas A&M University System, in fulfillment of its responsibilities under Texas Health and Safety Code Ann. § 388.003 (e), Vernon Supp. 2002, submits its ninth annual report, Energy Efficiency/Renewable Energy (EE/RE) Impact in the Texas Emissions Reduction Plan (TERP) to the Texas Commission on Environmental Quality.

The report is organized in three volumes.

- Volume I – Summary Report – provides an executive summary and overview;
- Volume II – Technical Report – provides a detailed report of activities, methodologies and findings;
- Volume III – Technical Appendix – contains detailed data from simulations for each of the counties included in the analysis.

The ESL worked with the EPA and TCEQ regarding a new version of eGRID for all ERCOT counties in Texas. A new version of eGRID was developed and presented in this report, which is based on the ERCOT congestion management zones. As the TCEQ moved the base year to more recent years, this updated version of eGRID, representing the current Texas market, has been used to estimate the emissions reduction from wind power in the next year's report.

Accomplishments:

a. Energy Code Amendments

The Laboratory was requested by several Councils of Governments (COGs) and municipalities to analyze the stringency of several proposed residential and commercial energy code amendments, including: the 2003 and 2006 IECC and the ASHRAE Standards 90.1-2001 and 90.1-2004. Results of the analysis are included in this Volume II-Technical Report.

b. Technical Assistance

The Laboratory provided technical assistance to the TCEQ, PUCT, SECO, ERCOT, and several political subdivisions, as well as stakeholders participating in improving the compliance of the Texas Building Energy Performance Standards (TBEPS). The Laboratory also worked closely with the TCEQ to refine the integrated NOx emissions reduction calculation procedures that provide the TCEQ with a standardized, creditable NOx emissions reduction from energy efficiency and renewable energy (EE/RE) programs, which are acceptable to the US EPA. These activities have improved the accuracy of the creditable NOx emissions reduction from EE/RE initiatives contained in the TERP and have assisted the TCEQ, local governments, and the building industry with effective, standardized implementation and reporting.

c. NOx Emissions Reduction

Under the TERP legislation, the Laboratory must determine the energy savings from energy code adoption and, when applicable, from more stringent local codes or above-code performance ratings, and must report these reductions annually to the TCEQ.

Figure 1 shows the integrated NOx emissions reduction through 2020 for the electricity and natural gas savings from the various EE/RE programs.

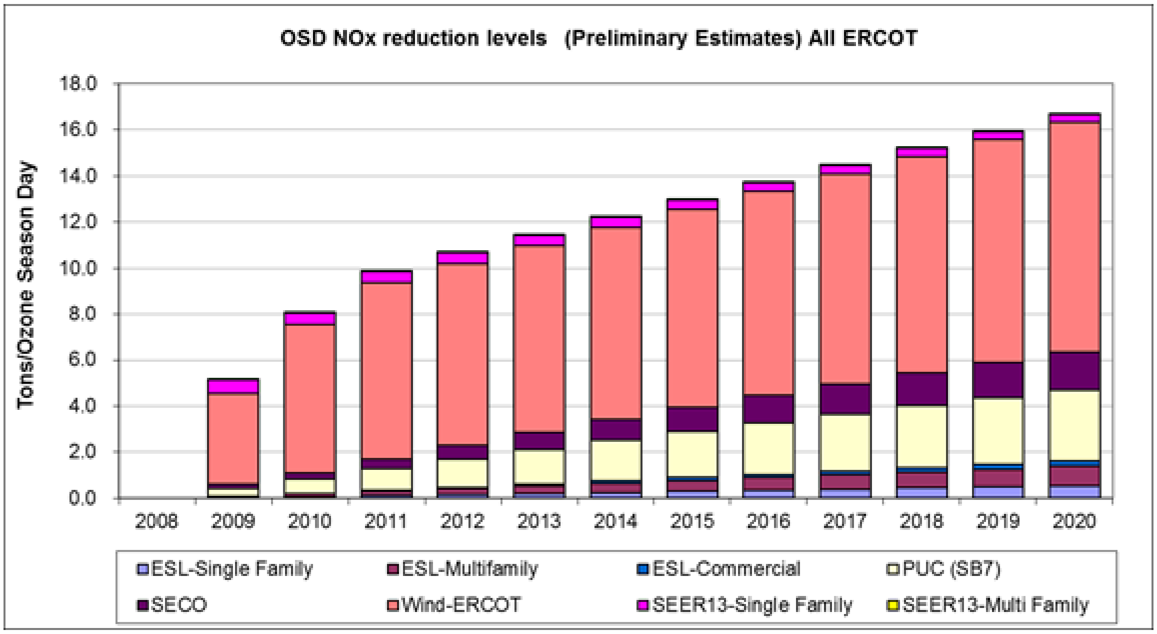

Figure 1: OSD NOx Emissions Reduction Projections through 2020 (Base Year 2008)

In 2011 (Table 1), the total integrated annual savings from all programs is 13,354,918 MWh/year. The integrated annual electricity savings from all the different programs is:

- Savings from code-compliant residential and commercial construction is 315,876 MWh/year (2.4% of the total electricity savings),
- Savings from the PUC's Senate Bill 7 program is 1,197,953 MWh/year 9.0%),
- Savings from SECO's Senate Bill 5 program is 509,616 MWh/year (3.8%), and
- Electricity savings from green power purchases (wind) is 10,995,427MWh/year (82.3%).
- Savings from residential air conditioner retrofits[1] is 336,046 MWh/year (2.5%)

By 2013, the total integrated annual savings from all programs will be 15,391,293 MWh/year. The integrated annual electricity savings from all the different programs is:

- Savings from code-compliant residential and commercial construction will be 597,699 MWh/year (3.9% of the total electricity savings),
- Savings from the PUC's Senate Bill 7 programs will be 1,908,944 MWh/year (12.4%),
- Savings from SECO's Senate Bill 5 program will be 909,903 MWh/year (5.9%), and
- Electricity savings from green power purchases (wind) will be 11,671,466 MWh/year (75.8%) and
- Savings from residential air conditioner retrofits is 303,281 MWh/year (2.0%).

In 2011 (Table 2), the total integrated annual NOx emissions reduction from all programs is 3,723 tons-NOx/year. The integrated annual NOx emissions reduction[2] from all the different programs is:

- NOx emissions reduction from code-compliant residential and commercial construction is 80tons-NOx/year (2.1% of the total NOx savings),
- NOx emissions reduction from the PUC's Senate Bill 7 programs is 340 tons-NOx/year (9.1%),

[1] This assumes air conditioners in existing homes are replaced with the more efficient SEER 13 units, versus an average of SEER 11, which is slightly more efficient than the previous minimum standard of SEER 10.
[2] These NOx emissions reductions were calculated with the US EPA's 2010 eGRID for annual (25% capacity factor).

- NOx emissions reduction from SECO's Senate Bill 5 program is 162 tons-NOx/year (4.4%), and
- NOx emissions reduction from green power purchases (wind) is 3,062 tons-NOx/year (82.2%) andNOx emissions reduction from residential air conditioner retrofits is 79 tons-NOx/year (2.1%).

By 2013, the total integrated annual NOx emissions reduction from all programs will be 4,296 tons-NOx/year. The integrated annual NOx emissions reduction from all the different programs is:

- NOx emissions reduction from code-compliant residential and commercial construction will be 150 tons-NOx/year (3.5% of the total NOx savings),
- NOx emissions reduction from the PUC's Senate Bill 7 programs will be 547 tons-NOx/years (12.7%),
- NOx emissions reduction from SECO's Senate Bill 5 program will be 277 tons-NOx/year (6.4%), and
- NOx emissions reduction from green power purchases (wind) will be 3,250 tons-NOx/years (75.7%) and
- NOx emissions reduction from residential air conditioner retrofits will be 72 tons-NOx/year (1.7%).

Table 1: Annual and OSD Electricity Savings for the Different Programs (Base Year 2008)

PROGRAM	ANNUAL												
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
ESL-Single Family (MWh)	0	21,748	55,268	93,760	132,768	172,325	212,462	253,214	294,613	336,694	379,492	423,044	467,388
ESL-Multifamily (MWh)	0	50,218	94,867	167,566	239,960	312,072	383,927	455,547	526,957	598,177	669,233	740,146	810,939
ESL-Commercial (MWh)	0	0	25,750	54,550	83,726	113,302	143,303	173,752	204,674	236,097	268,045	300,545	333,627
PUC (SB7) (MWh)	0	449,034	814,153	1,197,953	1,562,564	1,908,944	2,238,004	2,550,612	2,847,590	3,129,718	3,397,740	3,652,361	3,894,251
SECO (MWh)	0	235,216	293,537	509,616	714,891	909,903	1,095,163	1,271,161	1,438,359	1,597,197	1,748,093	1,891,444	2,027,628
Wind-ERCOT (MWh)	0	3,273,150	8,135,429	10,995,427	11,328,405	11,671,466	12,024,917	12,389,071	12,764,253	13,150,797	13,549,046	13,959,356	14,382,092
SEER13-Single Family (MWh)	0	343,330	326,163	309,855	294,362	279,644	265,662	252,379	239,760	227,772	216,383	205,564	195,286
SEER13-Multifamily (MWh)	0	29,021	27,569	26,191	24,881	23,637	22,456	21,333	20,266	19,253	18,290	17,376	16,507
Total Annual (MWh)	0	4,401,717	9,772,736	13,354,918	14,381,557	15,391,293	16,385,894	17,367,069	18,336,472	19,295,705	20,246,322	21,189,836	22,127,718

PROGRAM	OZONE SEASON DAY - OSD												
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
ESL-Single Family (MWh)	0	124	283	468	655	844	1,037	1,232	1,431	1,633	1,838	2,047	2,259
ESL-Multifamily (MWh)	0	233	460	744	1,027	1,308	1,589	1,869	2,148	2,426	2,704	2,981	3,258
ESL-Commercial (MWh)	0	0	71	149	229	310	393	476	561	647	734	823	914
PUC (SB7) (MWh)	0	1,230	2,231	3,282	4,281	5,230	6,132	6,988	7,802	8,575	9,309	10,006	10,669
SECO (MWh)	0	644	804	1,396	1,959	2,493	3,000	3,483	3,941	4,376	4,789	5,182	5,555
Wind-ERCOT (MWh)	0	14,246	23,054	27,654	28,492	29,355	30,244	31,160	32,103	33,075	34,077	35,109	36,172
SEER13-Single Family (MWh)	0	2,445	2,323	2,207	2,097	1,992	1,892	1,798	1,708	1,622	1,541	1,464	1,391
SEER13-Multifamily (MWh)	0	195	186	176	167	159	151	144	136	130	123	117	111
Total OSD (MWh)	0	19,117	29,412	36,076	38,907	41,691	44,438	47,150	49,830	52,484	55,115	57,729	60,329

Table 2: Annual and OSD NOx Emissions Reduction Values for the Different Programs (Base Year 2008)

PROGRAM	ANNUAL (in tons NOx)												
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
ESL-Single Family	0	5	14	23	33	42	52	62	72	83	93	104	115
ESL-Multifamily	0	13	24	43	61	80	98	117	135	153	171	190	208
ESL-Commercial	0	0	6	14	21	28	36	43	51	59	67	75	83
PUC (SB7)	0	126	229	340	447	547	643	734	821	903	981	1,055	1,125
SECO	0	67	99	162	221	277	330	381	429	475	518	559	599
Wind-ERCOT	0	893	2,268	3,062	3,154	3,250	3,348	3,450	3,554	3,662	3,773	3,887	4,005
SEER13-Single Family	0	81	77	73	69	66	62	59	56	53	51	48	46
SEER13-Multifamily	0	7	6	6	6	6	5	5	5	5	4	4	4
Total Annual (Tons NOx)	0	1,192	2,723	3,723	4,012	4,296	4,574	4,851	5,123	5,393	5,658	5,922	6,185

PROGRAM	OZONE SEASON DAY - OSD (in tons NOx/day)												
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
ESL-Single Family	0.00	0.03	0.07	0.11	0.16	0.21	0.25	0.30	0.35	0.40	0.45	0.50	0.55
ESL-Multifamily	0.00	0.06	0.12	0.19	0.26	0.33	0.41	0.48	0.55	0.62	0.69	0.76	0.83
ESL-Commercial	0.00	0.00	0.02	0.04	0.06	0.08	0.10	0.12	0.14	0.16	0.18	0.20	0.23
PUC (SB7)	0.00	0.35	0.63	0.93	1.22	1.50	1.76	2.01	2.25	2.47	2.69	2.89	3.08
SECO	0.00	0.18	0.27	0.44	0.60	0.76	0.90	1.04	1.18	1.30	1.42	1.53	1.64
Wind-ERCOT	0.00	3.94	6.42	7.63	7.87	8.10	8.35	8.60	8.86	9.13	9.41	9.69	9.99
SEER13-Single Family	0.00	0.57	0.54	0.51	0.49	0.46	0.44	0.42	0.40	0.38	0.36	0.34	0.32
SEER13-Multifamily	0.00	0.05	0.04	0.04	0.04	0.04	0.04	0.03	0.03	0.03	0.03	0.03	0.03
Total OSD (Tons NOx)	0.00	5.18	8.11	9.89	10.70	11.48	12.25	13.00	13.76	14.49	15.23	15.94	16.67

4. Technology Transfer

The Laboratory, along with the TCEQ, hosts the annual Clean Air Through Energy Efficiency (CATEE) conference, which is attended by top experts and policy makers in Texas and from around the country. At the conference, the latest educational programs and technology is presented and discussed, including efforts by the Laboratory, and others, to reduce air pollution in Texas through energy efficiency and renewable energy. These efforts have produced significant success in bringing EE/RE closer to US EPA acceptance in the Texas SIP. The Laboratory will continue to provide superior technology to the State of Texas through such efforts with the TCEQ and the US EPA.

To accelerate the transfer of technology developed as part of the TERP, the Laboratory has also made presentations at national, state and local meetings and conferences, which includes the publication of peer-reviewed papers. The Laboratory will continue to provide technical assistance to the TCEQ, counties and communities working toward obtaining full SIP credit for the energy efficiency and renewable energy projects that are lowering emissions and improving the air quality for all Texans.

These efforts have been recognized nationally by the US EPA. In 2007, the Laboratory was awarded a National Center of Excellence on Displaced Emissions Reduction (CEDER) by the US EPA so that these accomplishments could be rapidly disseminated to other states for their use. The benefits of CEDER include:

- Reducing the financial, technical, and administrative costs of determining the emissions reduction from EE/RE measures;
- Continuing to accelerate implementation of EE/RE strategies as a viable clean air effort in Texas and other states;
- Helping other states better identify and prioritize cost-effective clean air strategies from EE/RE; and
- Communicating the results of quantification efforts through case-studies and a clearinghouse of information.

The Energy Systems Laboratory provides the annual report, Energy Efficiency/Renewable Energy (EE/RE) Impact in the Texas Emissions Reduction Plan (TERP), to the Texas Commission on Environmental Quality (TCEQ) in fulfillment of its responsibilities under Texas Health and Safety Code Ann. § 388.003 (e), Vernon Supp. 2002. If any questions arise, please contact us by phone at 979-862-2804, or by email at terpinfo@tees.tamus.edu.

Acknowledgements

This work has been completed as a fulfillment of the requirements in Texas Health Code, Senate Bill 5, Section 388.003, and through Senate Bill 20, House Bill 2481 and House Bill 2129, which requires the Laboratory to assist

TCEQ in quantifying emissions reductions credits from energy efficiency and renewable energy programs, through a contract with the Texas Environmental Research Consortium (TERC). Similarly, selected Code training workshops were funded by the US DOE through the Texas State Energy Conservation Office (SECO). Partial funding on the Texas Climate Vision project, a joint project with the City of Austin was also provided by the US DOE through SECO.

The authors are also grateful for the timely input provided by the following individuals, and agencies: Mr. Art Diem, US EPA, for providing the eGRID database and Vincent Meiller and Robert Gifford, TCEQ.

Numerous additional individuals at the Laboratory contributed significantly to this report, including, Sung Lok Do, Kee Han Kim, , Stephen O'Neal, Rose Sauser and Ivonne Macouzet.

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1. Overview

The Energy Systems Laboratory (Laboratory), at the Texas Engineering Experiment Station of the Texas A&M University System, is pleased to provide our ninth annual report, Energy Efficiency/Renewable Energy Impact in the Texas Emissions Reduction Plan (TERP), to the Texas Commission on Environmental Quality (TCEQ) in fulfillment of its responsibilities under Texas Health and Safety Code Ann. § 388.003 (e), Vernon Supp. 2002. This annual report:

- Provides an estimate of the energy savings and NOx reductions from energy code compliance in new residential construction in all ERCOT counties;
- Provides an estimate of the standardized, cumulative, integrated energy savings and NOx reductions from the TERP programs implemented by the Laboratory, SECO, the PUC and ERCOT in all ERCOT Texas;
- Describes the technology developed to enable the TCEQ to substantiate energy and emissions reduction credits from energy efficiency and renewable energy initiatives (EE/RE) to the U.S. Environmental Protection Agency (US EPA), including the development of a web-based emissions reduction calculator; and
- Outlines progress in advancing EE/RE strategies for credit in the Texas State Implementation Plan (SIP).

The report is organized in three volumes.

Volume I – Summary Report – provides an executive summary and overview;
Volume II – Technical Report – provides a detailed report of activities, methodologies and findings; and
Volume III – Technical Appendix – contains detailed data from code-compliant energy simulations for all ERCOT counties in Texas included in the analysis.

1.1 Legislative Background

The TERP was established in 2001 by the 77th Legislature through the enactment of Senate Bill 5 to:

- Ensure that Texas air meets the Federal Clean Air Act requirements (Section 707, Title 42, United States Code); and
- Reduce NOx emissions in non-attainment and near-non-attainment counties through mandatory and voluntary programs, including the implementation of energy efficiency and renewable energy programs (EE/RE).

To achieve the clean air and emissions reduction goals of the TERP, Senate Bill 5 created a number of EE/RE programs for credit in the SIP:

- The Texas Building Energy Performance Standards (TBEPS) as the building energy code for all new residential and commercial buildings;
- A municipality or county may request the Laboratory to determine the energy impact of proposed energy code changes;
- An annual evaluation by the Public Utility Commission of Texas (PUCT), in cooperation with the Laboratory, of the emissions reduction of energy demand, peak electric loads and the associated air contaminant reductions from utility-sponsored programs established under Senate Bill 5, and utility-sponsored programs established under the electric utility restructuring act (Section 39.905 Utilities Code);
- A 5% electricity reduction goal each year for facilities of political subdivisions in non-attainment and near-non-attainment counties from 2002 through 2009; and
- Annual report to TCEQ to be provided by the Laboratory on the energy savings and resultant emissions reduction from implementation of building energy codes and which identifies the municipalities and counties whose codes are more or less stringent than the un-amended code.

Passed during the 78th Legislature (2003), HB 1365 and HB 3235 amended TERP to enhance its effectiveness with these additional energy efficiency initiatives:

- TCEQ is required to conduct outreach to non-attainment and near-non-attainment counties on the benefits of implementing energy efficiency measures as a way to meet the air quality goals under the federal Clean Air Act;
- TCEQ is required develop a methodology for computing emissions reduction from energy efficiency initiatives;
- A voluntary Energy-Efficient Building Program at the General Land Office (GLO), in consultation with the Laboratory, for the accreditation of buildings that exceed the state energy code requirements by 15% or more;

- Municipalities are allowed to adopt an optional, alternate energy code compliance mechanism through the use of accredited energy efficiency programs determined to be code-compliant by the Laboratory, as well as the US EPA's Energy Star New Homes program; and
- The Laboratory is required to develop and administer a statewide training program for municipal building inspectors seeking to become code-certified inspectors for enforcement of energy codes.

Senate Bill 5 was again amended during the 79th Legislature (2005) through SB 20, HB 2481 and HB 2129. These enhanced the effectiveness of Senate Bill 5 by adding the following energy efficiency initiatives:

- 5,880 MW of generating capacity is required from renewable energy technologies by 2015;
- 500 MW from non-wind renewables;
- The PUCT is required to establish a target of 10,000 megawatts of installed renewable capacity by 2025;
- The TCEQ is required to develop methodology for computing emissions reduction from renewable energy initiatives and the associated credits;
- The Laboratory is required to assist the TCEQ in quantifying emissions reduction credits from energy efficiency and renewable energy programs;
- The Texas Environmental Research Consortium (TERC) is required to contract with the Laboratory to develop and annually calculate creditable emissions reduction from wind and other renewable energy resources for the state's SIP; and
- The Laboratory is required to develop at least three alternative methods for achieving a 15 % greater potential energy savings in residential, commercial and industrial construction.

The 80th Legislature (2007), through SB 12, and HB 3693 further amended Senate Bill 5 to enhance its effectiveness by adding the following energy efficiency initiatives:

- The Laboratory is required to provide written recommendations to the State Energy Conservation Office (SECO) about whether or not the energy efficiency provisions of latest published edition of the International Residential Code (IRC) or the International Energy Conservation Code (IECC) are equivalent to or better than the energy efficiency and air quality achievable under the editions adopted under the 2001 IRC/IECC. The Laboratory shall make its recommendations no later than six months after publication of new editions at the end of each three-year code development cycle of the International Residential Code and the International Energy Conservation Code.
- The Laboratory is required to consider comments made by persons who have an interest in the adoption of the energy codes in the recommendations made to SECO.
- The Laboratory is required to develop a standardized report format to be used by providers of home energy ratings, including different report formats for rating newly constructed residences from those for existing residences. The form must be designed to give potential buyers information on a structure's energy performance, including: insulation; types of windows; heating and cooling equipment; water heating equipment; additional energy conserving features, if any; results of performance measurements of building tightness and forced air distribution; and an overall rating of probable energy efficiency relative to the minimum requirements of the International Energy Conservation Code or the energy efficiency chapter of the International Residential Code, as appropriate.
- The Laboratory is encouraged to cooperate with an industry organization or trade association to: develop guidelines for home energy ratings; provide training for individuals performing home energy ratings and providers of home energy ratings; and provide a registry of completed ratings for newly constructed residences and residential improvement projects for the purpose of computing the energy savings and emissions reduction benefits of the home energy ratings program.
- The Laboratory is required to include information on the benefits attained from this program in an annual report to the commission.

The 81st Legislature (2009) extended the date of the TERP to 2019 and required the TCEQ to contract with Laboratory to compute emissions reduction from wind and other renewable energy resources for the SIP.

The 82nd Legislature (2011) has cut 50% of the Laboratory's funding under TERP (to take into effect in FY 2012), while the Laboratory's responsibilities under TERP increased, as new energy efficiency initiatives were introduced:

- Each political subdivision, institution of higher education or state agency shall establish a goal to reduce the electric consumption by the entity by at least 5% each state fiscal year for 10 years, beginning

September 1, 2011. Each entity annually shall report to SECO, on forms provided by SECO, regarding the entity's goal, the entity's efforts to meet the goal, and progress the entity has made. The Laboratory is required to calculate energy savings and emissions reduction for each political subdivision, institution of higher education or state agency, based on the information collected by SECO.

- Beginning April 1, 2012, all electric cooperatives that had retail sales of more than 500,000 MWh in 2005 and all municipally owned utilities must report each year to SECO, on a standardized form developed by SECO, information regarding the combined effects of the energy efficiency activities of the electric cooperative/utility from the previous calendar year, including the annual goals, programs enacted to achieve those goals, and any achieved energy demand or savings goals. The Laboratory is required to calculate energy savings and emissions reduction for municipally owned utilities and for electric cooperatives, based on the information collected by SECO.
- SECO is required to appoint a new advisory committee for selecting high-performance building design evaluation systems. The Laboratory will send a representative to participate at the new advisory committee.
- The Legislature is allowed to conduct outreach to the real estate industry on the value of energy code compliance and above code construction.

1.2 Laboratory Funding for the TERP

The Laboratory expended $181,855 in FY 2002; $372,226 in FY 2003; $635,683.84 in FY 2004; $1,107,366.13 in FY 2005; $952,012.70 in 2006; $947,114.62 in FY 2007; $908,512.65 in FY 2008; $949,927.94 in FY 2009; $902,843.35 in FY2010. In FY 2011 the Laboratory expended $853,421.69. The Laboratory has also supplemented these funds with competitively awarded Federal and State grants to provide the needed statewide training for the new mandatory energy codes and to provide technical assistance to cities and counties in helping them implement adoption of the legislated energy efficiency codes. In addition, the ESL received an award from the US EPA in the spring of 2007 to establish a Center of Excellence for the Determination of Emissions Reduction (CEDER) which has helped to enhance the EE/RE emissions calculations.

1.3 Accomplishments since January 2011

Since January 2011, the Laboratory has accomplished the following:

- Calculated energy and resultant NOx reductions from implementation of the Texas Building Energy Performance Standards (IECC/IRC codes) to new residential and commercial construction for all non-attainment and near-non-attainment counties;
- Enhanced the Laboratory's IECC/IRC Code-Traceable Test Suite for determining emissions reduction due to code and above-code programs;
- Enhanced the IC3 calculator, which is energy code compliance software based on the Texas Building Energy Performance Standards by resolving minor defects found in the model, introducing new capability to add slab and floor insulation to IC3 interface, and updating manual and illustrations;
- Continued development and testing of key procedures for validating simulations of building energy performance;
- Provided energy code training workshops, including: residential, commercial IECC/IRC energy code training sessions, code-compliant software sessions throughout the State of Texas;
- Maintained and updated the Laboratory's Texas Emissions Reduction Plan (TERP) website;
- Maintained a builder's residential energy code Self-Certification Form (Ver.1.3) for use by builders outside municipalities;

- Analyzed the stringency of several residential and commercial energy codes, including the 2009 IECC, 2009 IRC and ASHRAE Standard 90.1 2007;
- Reviewed several local code proposed amendments and analyzed their stringency. For: the City of Houston and the City of Austin.
- Hosted the Clean Air Through Energy Efficiency (CATEE) Conference in November 2011 in Dallas, Texas. Conference sessions included key talks by the TCEQ, EPA, DOE and the Laboratory about quantifying emissions reduction from EE/RE opportunities and guidance on key energy efficiency and renewable energy topics;
- Provided technical assistance to the TCEQ regarding specific issues, including:
  - Enhancement of the standardized, integrated NOx emissions reduction reporting procedures to the TCEQ for EE/RE projects;
  - Enhancement of the procedures for weather normalizing NOx emissions reduction from renewable projects;
- Enhanced the web-based emissions reduction calculator, including:
  - Continued the enhancement of the new computer architecture to allow for synchronous calculations, user accounts, and code-compliance;
- Developed 15% above code recommendations for residential buildings;
- Participated as exhibitors at several conferences, including the Clean Air Through Energy Efficiency Conference in Dallas, Texas and the Texas Green Home Summit in Los Colinas, Texas.
- Performed a study for the City of Arlington on the economic and environmental impacts of potential energy code enhancements for the city. The project identified up to 16 Energy Efficiency Measures (EEMs) for various building energy components (e.g., windows, doors, insulation; lighting; HVAC; and domestic water heating). Combinations of EEMs were used to deliver 15% above the energy code stringency. The study and recommendations included both residential and commercial new development and existing building inventory (as an option).
- Continued the development of verification procedures, including:
  - Worked toward the code compliance tools for commercial buildings, retail and school buildings.

1.4 Technology Transfer

To accelerate the transfer of technology developed as part of the TERP program, the Laboratory:

- Delivered "Statewide Air Emissions Calculations from Wind and Other Renewables," to the Texas Commission on Environmental Quality in December 2011.
- Updated previously developed degradation analysis to determine if degradation could be observed in the measured power from Texas wind farms.
- Updated previously developed database of other renewable projects in Texas, including: solar photovoltaic, geothermal, hydroelectric, and Landfill Gas-fired Power Plants.
- Applied previously developed estimation techniques for hourly solar radiation from limited data sets.
- Worked with the EPA and TCEQ and developed a new version of eGRID for all ERCOT counties in Texas.
- Along with the TCEQ and the US EPA, is host to the annual Clean Air Through Energy Efficiency (CATEE) Conference attended by top Texas experts and policy makers and national experts.
- Continued the National Center of Excellence on Displaced Emissions Reduction (CEDER) by the US EPA. The benefits of CEDER include:
  - Reducing the financial, technical, and administrative costs of determining the emissions reduction from EE/RE measures;
  - Continuing to accelerate implementation of EE/RE strategies as a viable clean air effort in Texas and other states;
  - Helping other states identify and prioritize cost-effective clean air strategies from EE/RE, and;
  - Communicating the results of quantification efforts through case-studies and a clearinghouse of information.

In addition to the tasks listed above, the Laboratory delivered presentations regarding the TERP related work, including:

- Presentation to the North Texas Chapter, May 2011 and June 2011
- Presentations to the Building Official Association of Texas, August 2011Presentations to the City of Arlington, August 2011 and October 2011
- Presentations to the Sierra Club, Houston and El Paso, Texas, October 2011
- Presentations to the International Conference for Enhanced Building Operations, New York City, New York, October 2011
- Presentations to the Clean Air Through Energy Efficiency Conference, Dallas, Texas, November 2011
- Presentation to the Texas Green Home Summit, Irving, Texas, 2011
- Presentation to the Central Texas Council of Governments, 2011

Four presentations to the City of Arlington

- Mukhopadhyay, J.; Kim, H.; Do, SL.; Kim, KH; Baltazar, J-C; Haberl, J.; Lewis, C. 2011 "Cost-Effective Energy Efficiency Measures for Above Code (ASHRAE 90.1-2001 and 2007) Restaurant Buildings in the City of Arlington," City of Arlington and Stakeholders, August and October 2011
- Kim, H.; Do, SL.; Baltazar, J-C; Haberl, J.; Lewis, C. 2011 "Cost-Effective Energy Efficiency Measures for Above Code (2003 and 2009 IECC) Residential Buildings in the City of Arlington," City of Arlington and Stakeholders, August and October 2011
- Kim, H.; Do, SL; Kim, KH; Baltazar, J-C; Haberl, J.; Lewis, C. 2011 "Cost-Effective Energy Efficiency Measures for Above Code(ASHRAE 90.1-2001 and 2007) Small Retail Buildings in the City of Arlington," City of Arlington and Stakeholders, August and October 2011
- Mukhopadhyay, J.; Kim, H.; Do, SL.; Kim, KH; Baltazar, J-C; Haberl, J.; Lewis, C. 2011 "Cost-Effective Energy Efficiency Measures for Above Code (ASHRAE 90.1-2001 and 2007) Small Restaurant Buildings in the City of Arlington," City of Arlington and Stakeholders, August and October 2011

Presentation of four papers at the 11th International Conference for Enhanced Building Operations, held in New York City, New York, October 2011.

- Kim, H.; Baltazar, J.C.; Haberl, J.; Lewis, C.; Yazdani, B. 2011 "Statewide Electricity and Demand Capacity Savings from the Implementation of IECC Code in Texas: Analysis for Single-Family Residences," *Proceedings of the 11th International Conference for Enhanced Building Operations,* New York City, New York
- Mukhopadhyay, J.; Baltazar, J.C., Jim, H.; Haberl, J. 2011 "Comparison of ASHRAE Standard 90.1, 189.1 and IECC Codes for Large Office Buildings in Texas", *Proceedings of the Eleventh International Conference for Enhanced Building Operations,* New York City, New York
- Kim, H.; Baltazar, J.C.; Haberl, J.; Lewis, C.; Yazdani, B. 2011 "Energy Savings and Persistence From an Energy Services Performance Contract at an Army Base," *Proceedings of the 11th International Conference for Enhanced Building Operations,* New York City, New York
- Kim, H.; Baltazar, J.C.; Haberl, J.; Lewis, C.; Yazdani, B. 2011 "Cost-Effective Energy Efficiency Measures for 15% Above 2009 IECC Code-Compliant House for Residential Buildings in TX," *Proceedings of the 11th International Conference for Enhanced Building Operations,* New York City, New York

Two presentations to the Clean Air Through Energy Efficiency Conference held in Dallas, Texas, November 2011.

- Kim, H.; Haberl, J.; Baltazar, J-C.; Mukhopadhyay, J.; Do, SL.; Kim, KH.; Lewis, C.; Yazdani, B.; 2011 "Energy Efficiency/Renewable Energy (EE/RE) Measures for K-12 Schools in Texas," *Clean Air Through Energy Efficiency Conference,* Dallas, Texas, November 2012
- Haberl, J.; Yazdani, B.; Culp, 2011 "Texas Emissions Reductions Program (TERP) Energy Efficiency/Renewable Energy (EE/RE) Update," *Clean Air Through Energy Efficiency Conference,* Dallas, Texas, November 2012

One presentation to the *Lowering School Energy Bills* Workshop at the Clean Air Through Energy Efficiency Conference held in Dallas, Texas November 2011

The Laboratory has and will continue to provide leading-edge technical assistance to the TCEQ, counties and communities working toward obtaining full SIP credit for the energy efficiency and renewable energy projects that are lowering emissions and improving the air quality for all Texans. The Laboratory will continue to provide superior technology to the State of Texas through efforts with the TCEQ and US EPA. The efforts taken by the Laboratory have produced significant success in bringing EE/RE closer to US EPA acceptance in the SIP. These activities were designed to more accurately calculate the creditable NOx emissions reduction from EE/RE initiatives contained in the TERP and to assist the TCEQ, local governments, and the building industry with standardized, effective implementation and reporting.

1.5 Energy and NOx Reductions from New Residential and Commercial Construction, Including Furnace Pilot Light Savings and Residential Air Conditioner Retrofits

State adoption of the energy efficiency provisions of the International Residential Code (IRC) and International Energy Conservation Code (IECC) became effective September 1, 2001. The Laboratory has developed and delivered training to assist municipal inspectors to become certified energy inspectors. The Laboratory also supported code officials with guidance on interpretations as needed. This effort, based on a requirement of HB 3235, 78^{th} Texas Legislature, supports a more uniform interpretation and application of energy codes throughout the state. In general, the State is experiencing a true market transformation from low energy efficiency products to high energy efficiency products. These include: low solar heat gain windows, higher efficiency appliances, high efficiency air conditioners and heat pumps, increased insulation, lower thermal loss ducts and in-builder participation in "above-code" code programs such as Energy Star New Homes, which previously had no state baseline and almost no participation.

In 2011, the following savings were calculated:

- In 2011, the annual electricity savings from code-compliant residential and commercial construction is calculated to be 315,876 MWh/year (2.4% of the total electricity savings),
- Savings from residential air conditioner retrofits[3] is 336,046 MWh/year (2.5%).

- In 2011, the OSD electricity savings from code-compliant residential and commercial construction is calculated to be 1,361 MWh/day (3.8%),
- Savings from residential air conditioner retrofits are 2,383 MWh/day (6.6%).

- By 2013, the annual electricity savings from code-compliant residential and commercial construction is calculated to be 597,699 MWh/year (3.9% of the total electricity savings),
- Savings from residential air conditioner retrofits will be 303,281 MWh/year (2.0%).

- By 2013, the OSD electricity savings from code-compliant residential and commercial construction is calculated to be 2,462 MWh/day (5.9%),

[3] This assumes air conditioners in existing homes are replaced with the more efficient SEER 13 units, versus an average of SEER 11, which is slightly more efficient than the previous minimum standard of SEER 10.

- Savings from residential air conditioner retrofits will be 5,230 MWh/day (12.5%).

- In 2011, the annual NOx emissions reduction from code-compliant residential and commercial construction is calculated to be 80 tons-NOx/year (2.1% of the total NOx savings),
- Savings from residential air conditioner retrofits is 72 tons-NOx/year (2.1%).

- In 2011, the OSD NOx emissions reduction from code-compliant residential and commercial construction is calculated to be 0.34 tons-NOx/day (3.4%),
- Savings from residential air conditioner retrofits are 0.55 tons-NOx/day (5.6%).

- By 2013, the NOx emissions reduction from code-compliant residential and commercial construction is calculated to be 150 tons-NOx/year (3.5% of the total NOx savings),
- Savings from residential air conditioner retrofits will be 72 tons-NOx/year (1.7%).

- By 2013, the OSD NOx emissions reduction from code-compliant residential and commercial construction is calculated to be 0.62 tons-NOx/day (5.4%),
- Savings from residential air conditioner retrofits will be 0.50 tons-NOx/day (4.4%).

1.6 Integrated NOx Emissions Reductions Reporting Across State Agencies

In 2005, the Laboratory began to work with the TCEQ to develop a standardized, integrated NOx emissions reduction across state agencies implementing EE/RE programs so that the results can be evaluated consistently. As required by the legislation, the TCEQ receives the following reports:

- From the Laboratory – savings from code compliance and renewables;
- From the Laboratory, in cooperation with the Electric Reliability Council of Texas (ERCOT), the savings from electricity generated from wind power;
- From the Public Utilities Commission of Texas (PUCT) on the impacts of the utility-administered programs designed to meet the mandated energy efficiency goals of SB7 and SB5; and
- From the State Energy Conservation Office (SECO) on the impacts of energy conservation in state agencies and political subdivisions.

The total integrated annual electricity savings for all the different programs in the integrated format was calculated using the adjustment factors shown in Table 36 for 2009 through 2020 as shown in Table 1. NOx emissions reduction from the electricity savings for the annual for all the programs in the integrated format is shown in Table 2. In Table 1 and Table 2 annual integrated values are shown for 2009 through 2020.

In 2011 (Table 1),
the total integrated annual savings from all programs is 13,354,918 MWh/year. The integrated annual electricity savings from all the different programs is:

- Savings from code-compliant residential and commercial construction is 315,876 MWh/year (2.4% of the total electricity savings),
- Savings from the PUC's Senate Bill 7 program is 1,197,953MWh/year (9.0%),
- Savings from SECO's Senate Bill 5 program is 509,616 MWh/year (3.8%),
- Electricity savings from green power purchases (wind) is 10,995,427 MWh/year (82.3%), and
- Savings from residential air conditioner retrofits is 336,046 MWh/year (2.5%).

By 2013, the total integrated annual savings from all programs will be 15,391,293 MWh/year. The integrated annual electricity savings from all the different programs is:

- Savings from code-compliant residential and commercial construction will be 597,699 MWh/year (3.9% of the total electricity savings),

- Savings from the PUC's Senate Bill 7 programs will be 1,908,944 MWh/year (12.4%),
- Savings from SECO's Senate Bill 5 program will be 909,903 MWh/year (5.9%),
- Electricity savings from green power purchases (wind) will be 11,671,466 MWh/year (75.8%), and
- Savings from residential air conditioner retrofits is 303,281 MWh/year (2.0%).

In 2011 (Table 2), the total integrated annual NOx emissions reduction from all programs is 3,723 tons-NOx/year. The integrated annual NOx emissions reduction[4] from all the different programs is:

- NOx emissions reduction from code-compliant residential and commercial construction is 80 tons-NOx/year (2.1% of the total NOx savings),
- NOx emissions reduction from the PUC's Senate Bill 7 programs is 340 tons-NOx/year (9.1%),
- NOx emissions reduction from SECO's Senate Bill 5 program is 162 tons-NOx/year (4.4%),
- NOx emissions reduction from green power purchases (wind) is 3,062 tons-NOx/year (82.2%), and
- NOx emissions reduction from residential air conditioner retrofits is 79 tons-NOx/year (2.1%).

By 2013, the total integrated annual NOx emissions reduction from all programs will be 4,296 tons-NOx/year. The integrated annual NOx emissions reduction from all the different programs is:

- NOx emissions reduction from code-compliant residential and commercial construction will be 150 tons-NOx/year (3.5% of the total NOx savings),
- NOx emissions reduction from the PUC's Senate Bill 7 programs will be 547 tons-NOx/years (12.7%),
- NOx emissions reduction from SECO's Senate Bill 5 program will be 277 tons-NOx/year (6.4%),
- NOx emissions reduction from green power purchases (wind) will be 3,250 tons-NOx/years (75.7%), and
- NOx emissions reduction from residential air conditioner retrofits will be 72 tons-NOx/year (1.7%).

Figure 2 shows the NOx emissions reduction through 2020 for the electricity and natural gas savings from all TERP programs reporting to the TCEQ. Table 3 provides the details regarding the annual degradation, transmission and distribution losses, discount factors and growth factors that were used in the analysis[5]. Additional details of the analysis are reported in Volume III of this report.

Table 3: Adjustment Factors used for the Calculation of the Annual and OSD NOx Savings for the Different Programs

	ESL- Single Family	ESL- Multi Family	ESL- Commercial	PUC (SB7)	SECO	Wind-ERCOT	SEER13 Single Family	SEER13 Multi Family
Annual Degradation Factor	2.00%	2.00%	2.00%	5.00%	5.00%	0.00%	5.00%	5.00%
T&D Loss	7.00%	7.00%	7.00%	7.00%	7.00%	0.00%	7.00%	7.00%
Initial Discount Factor	20.00%	20.00%	20.00%	25.00%	60.00%	10.00%	20.00%	20.00%
Growth Factor	3.25%	1.54%	3.25%	0.00%	0.00%	Actual Rates	N.A.	N.A.
Weather Normalized	Yes	Yes	Yes	No	No	See note 7	Yes	Yes

[4] These NOx emissions reductions were calculated with the US EPA's 2010 eGRID for annual (25% capacity factor).
[5] These factors were determined by TCEQ.

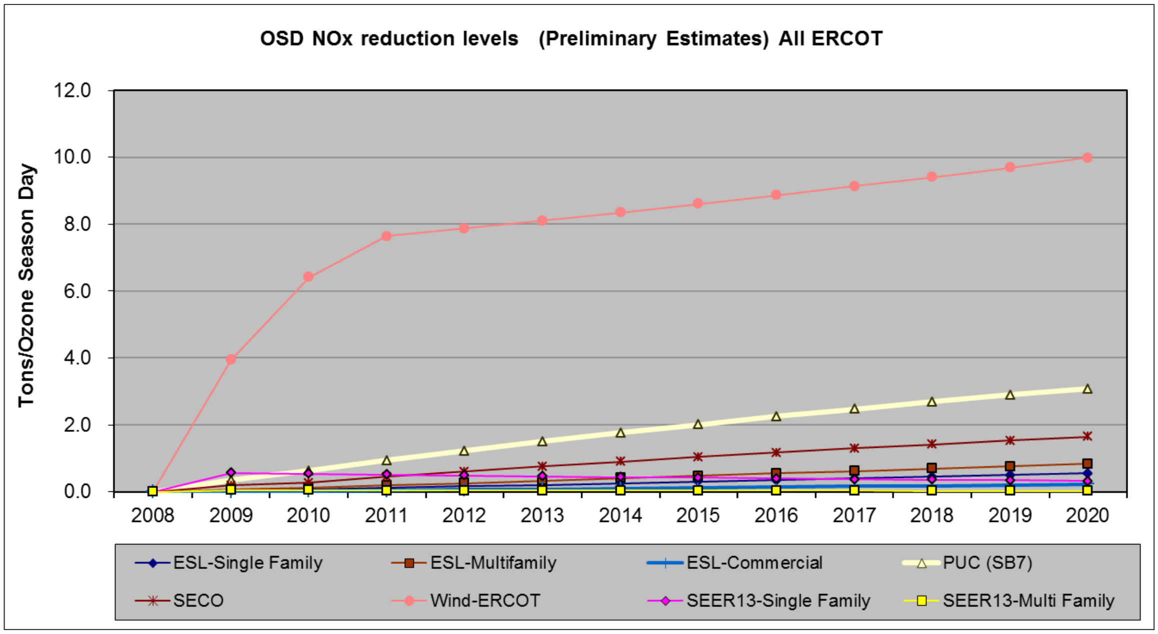

Figure 2: Integrated OSD NOx Emissions Reduction Projections through 2020 (Base Year 2008)

1.7 Technology for Calculating and Verifying Emissions Reduction from Energy Used in Buildings

In 2004 and 2005, the Laboratory developed a web-based Emissions Reduction Calculator, known as "*eCalc*," which contains the underlying technology for determining NOx emissions reduction from power plants that generate the electricity for the user[6]. The emissions reduction calculator is being used to calculate emissions reduction for consideration for SIP credits from energy efficiency and renewable energy programs in the TERP.

In 2007, the Laboratory enhanced the calculator to provide additional functions and usability, including:

- Renaming the product IC3 v2.0
- Enhanced the Laboratory's IECC/IRC Code-Traceable Test Suite for determining emissions reduction due to code and above-code programs;
- Enhanced web-based emissions calculator, including:
  - Use of the calculator to determine 15% above code residential and commercial options.
  - Gathered, cleaned and posted weather data archive for 17 NOAA stations;
  - Performed comparative testing of the calculator vs. other, non-web-based simulation programs;
  - Developed and tested radiant barrier simulation;
  - Using the web-based emissions calculator, started development of the derivative version Texas Climate Vision calculator for the City of Austin;
- Continued the development of verification procedures, including:
  - Completed the calibrated simulation of a high-efficiency office building in Austin, Texas;
  - Continued work to develop a calibrated simulation of an office building in College Station; and
  - Continued work to develop a calibrated simulation of a K-12 school in College Station;

In 2008, work on both web based calculators continued;

- Deployed IC3 v3.2 to handle a wider selection of single family building configurations (http://ic3.tamu.edu);
- Delivered TCV v1.0 to the City of Austin for their testing;
- Continued to operate the original eCalc;
- Supported modeling efforts by building enhanced tools for batch simulation;
- Provided training on both IC3 and TCV.

[6] eCalc reports NOx, SOx and CO2 emissions reduction from the US EPA eGRID database for power providers in the ERCOT region.

In 2009, IC3 developments included:

- A sister product, AIM was created for the State Comptroller's office.
- Usage statistics continue to climb.
- Updated to v3.6 which included 3 story houses, external cladding, more sophisticated ceiling/roof models, enhanced foundation modeling and the ability to copy projects

In 2010 there were several software updates including:

- IC3
    - 3.9.0 – Slab Insulation Support
    - 3.7.0 – 3.8.0 First Version of Multifamily Released along with numerous tweaks and fixes
    - 3.6.2 – New Building Model Integrated, Updated Artwork and Illustrations
- DDP
    - 1.7.05 – Added Heat Reject Recording for Electric and Gas
- Web Reports and Texas Building Registry
    - Registry 0.x – First versions of the Web Reports on TCV, eCalc, and IC3
    - Registry 1.0 – City and County Reports
    - Registry 1.1 – Cross-linked Reports for City and County
    - IC3 Reports 1.0 – Updated Certificate Reports which replace Registry 1.1 and evolve into the Texas Building Registry

The 2011 software updates include:

- IC3
    - 3.9.4 – Added approval workflow to start a new 2009 IECC job as further refinements were needed to the BDL
    - 3.9.5 – Various IECC 2009 fixes and refinements implemented
    - 3.9.6 – Updated BDL to 4.01.08, SHGC max does not apply to Climate Zone 4, 0.35 ACH minimum to all projects, Ventilation Fans added to % Air Conditioning Calculation
    - 3.9.7 - Corrected Certificate and Status screens to reflect insulation and floor construction.
    - 3.9.8- Set minimum R-value for insulated sheathing to R-2;
    - 3.10.0 - Updated and corrected problems with several text and value fields; Corrected and printed MF and SF Certificates;
    - 3.10.3 - Changed Certificate to Energy Audit Report; Added a new Certificate to be printed out; Added Inspector's list for a project; Added Pagination in projects page
    - 3.11.0 12/22/2011-Added Austin Energy 2009 IECC Energy Code Support
- Web Reports and Texas Building Registry
    - TBR Reports 1.0.5 – Added 4 new reports
    - TBR Reports 1.0.6 – Added 9 new reports
    - Registry 2.0 – Included 7 new Parameterized reports

1.8 IC3 Texas Building Registry (TBR)

1.8.1 Background

In 2008, the 81st Texas Legislature amended the Texas Administrative Code (TAC .§388.008, 2009) to develop a Registry of Above-Code homes. The Laboratory built the first version of the Registry in 2009. This preliminary version allowed The Laboratory to provide basic metrics on usage of the Laboratory's above code calculators, *IC3*[7]

[7] International Code Compliance Calculator, a web based, above code calculator for single family, detached, new construction in Texas.

and *TCV*[8]. By running reports against the calculator's databases, The Laboratory could determine calculator usage by month for Texas' Cities and Counties. These reports allowed a better understanding of how builders were adopting the calculators across the State so the Laboratory could improve the calculators.

Figure 3 shows the Projects and Certificates issued each month since January 2011. A Project is a house plan, while Certificates are printed reports given to the building official - assuming that the house is at or above code. In 2011, some users entered a basic floor plan and re-cycled it to generate more certificates. Figure 4 shows that more projects were entered (and presumably did not pass) than certificates created.

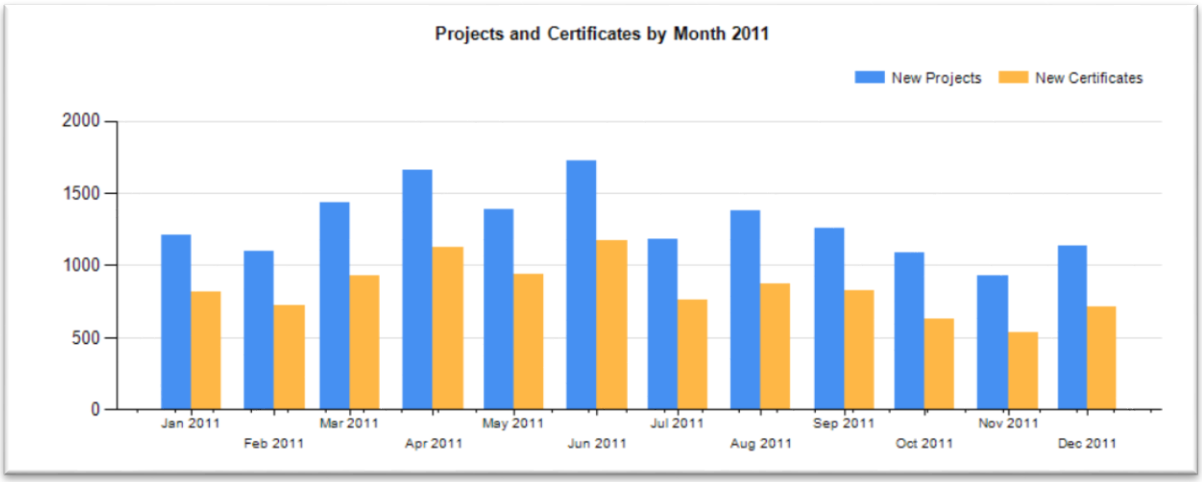

Figure 3: *IC3* 2011 Certificates and Projects

Figure 4: *IC3* 2011 Users vs. Certificates shows the cumulative Users and Certificates for 2011. The divergence between the two lines emphasizes the difference between the projects completed and certificates issued.

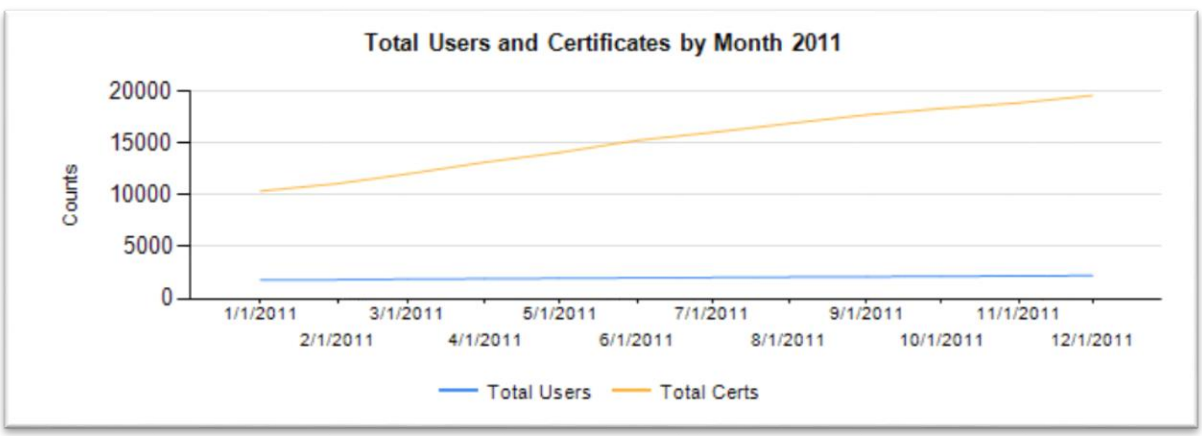

Figure 4: *IC3* 2011 Users vs. Certificates

Figure 5 shows that the largest adopter of the *IC3* software was the North Central Texas Council of Governments (NCTCOG) area, specifically, users building in Dallas, Collin, Denton, and Tarrant Counties.

[8] Texas Climate Vision, a web based, above code calculator for single family, detached, new construction in Austin Energy's service area.

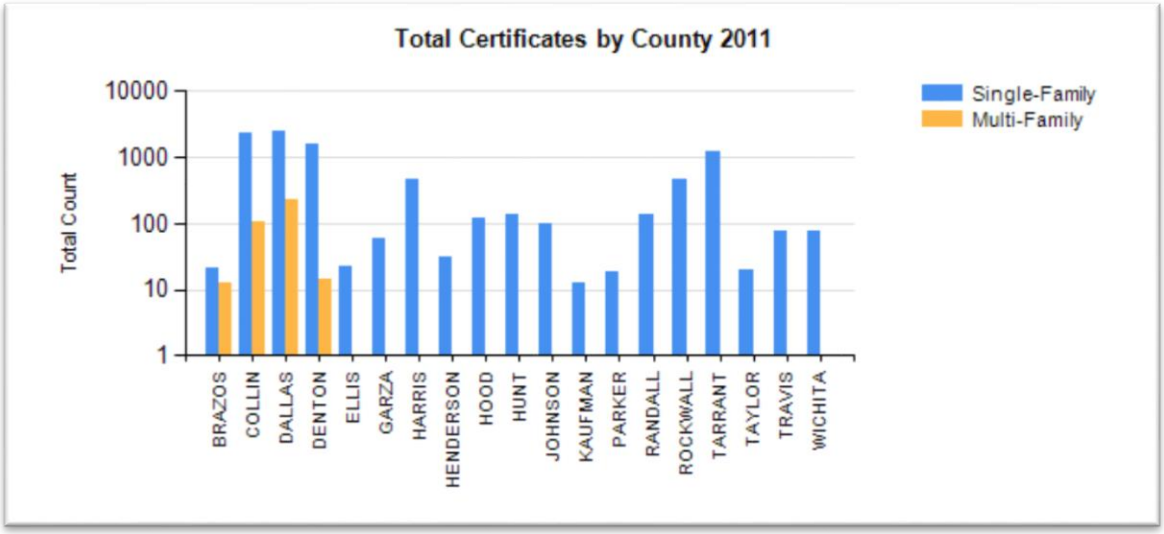

Figure 5: *IC3* 2011 Certificates – Counties with at least 10 Certificates

Figure 6 shows the certifications issued by city.

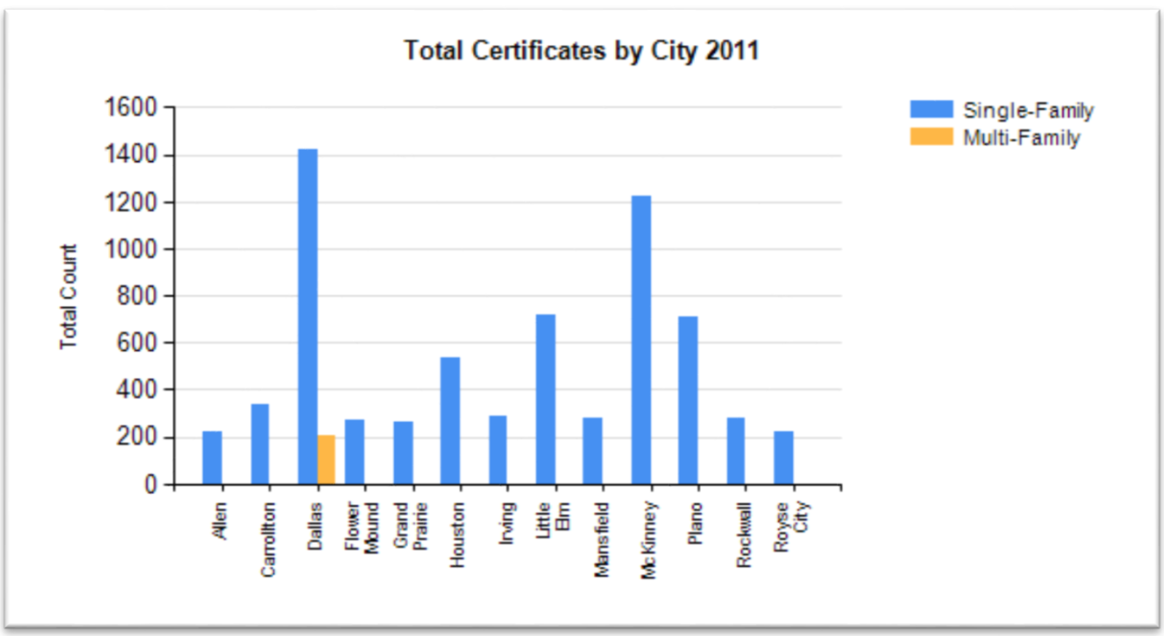

Figure 6: *IC3* 2011 Certificates – Cities with at least 200 Certificates

1.8.2 TBR Current Version

As illustrated below and a "*Report on the Development of the Format for a Texas Residential Registry* (Gilman, et al., 2008), the underlying database was optimized for supporting the *IC3* and *TCV* calculators and therefore needed a transformation to allow for seamless reporting. Consequently, The Laboratory has been steadily adding reporting capability and has been making software changes to reflect the new reporting requirements and analysis capabilities. The underlying technology of the *IC3* and *TCV* calculators is *Microsoft SQL Server 2008*. This product offers reporting capabilities through various tools.

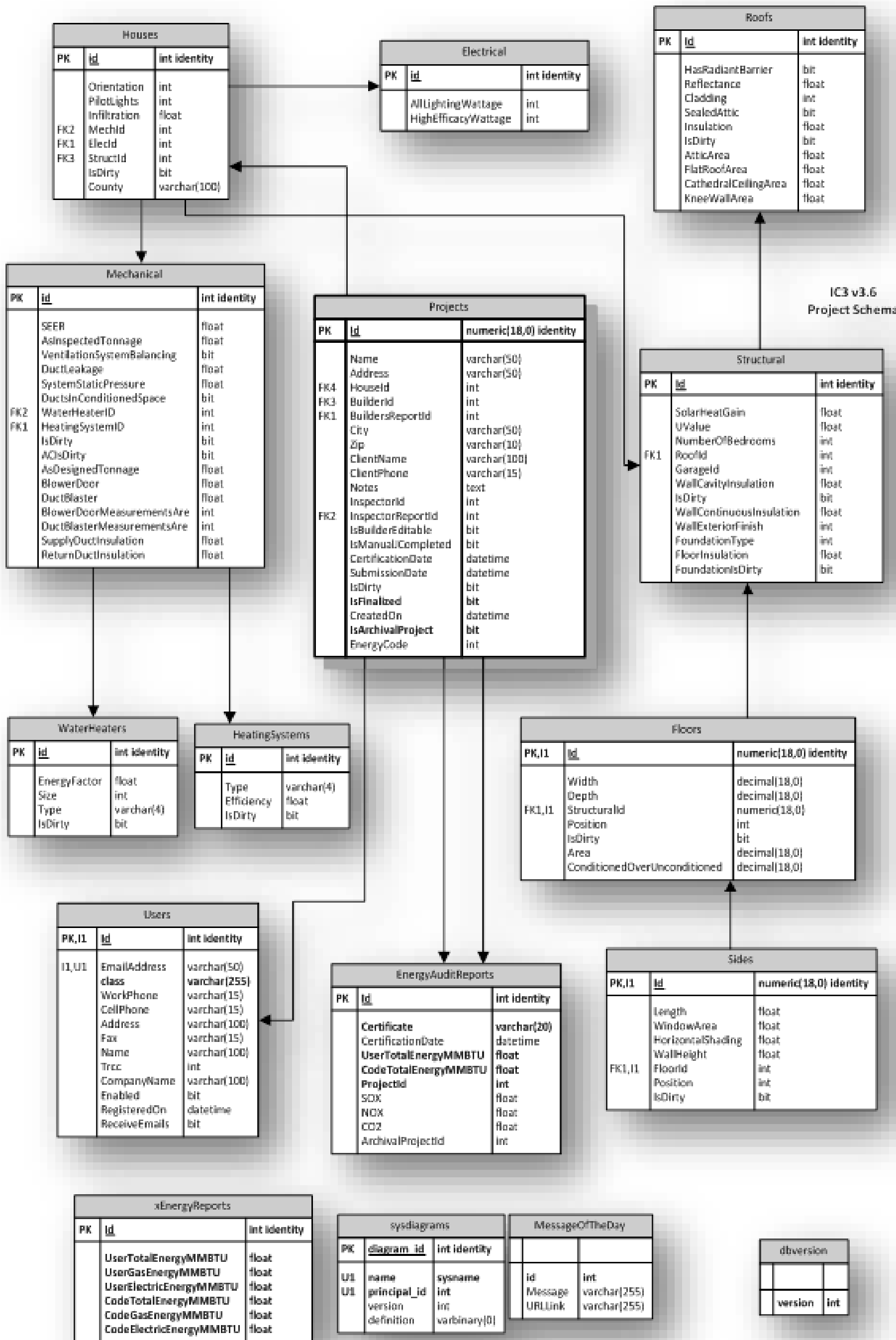

Figure 7 Database Schema

Figure 7 Database Schema shows the "layout" of the IC3 (v3.x) and TCV[9] (v1.1) databases. It gives a rough overview of the different tables (called "entities") found in the *IC3* database. The center entity is the Project, which is the center of the *IC3* software's abstraction of a house. The other tables include floors, walls, electrical, and systems.

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[9] The *TCV* v1.1 database has different fields due to the built-in inspection module and the fact it was completed two years earlier than the described *IC3* v3.6.

1.8.3 Usage Reports

Figure 8 shows a steady growth from the start of record keeping (July 2009) until the end of 2011. During this year, ESL conducted several workshops and was able to detect a correlation between workshops and IC3 usage.

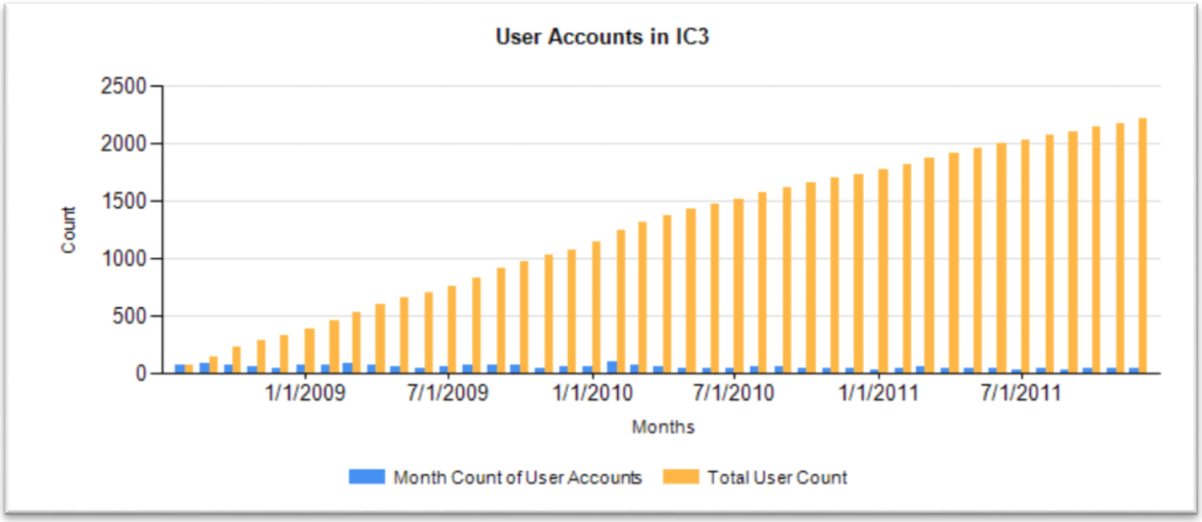


Figure 8: IC3 Usage Growth in 2011

Figure 9 shows the correlation between users and their successful projects (i.e. those that generate certificates). The graph shows that users were generating more certificates, and were doing so at a much faster rate than the rate of adding new users.

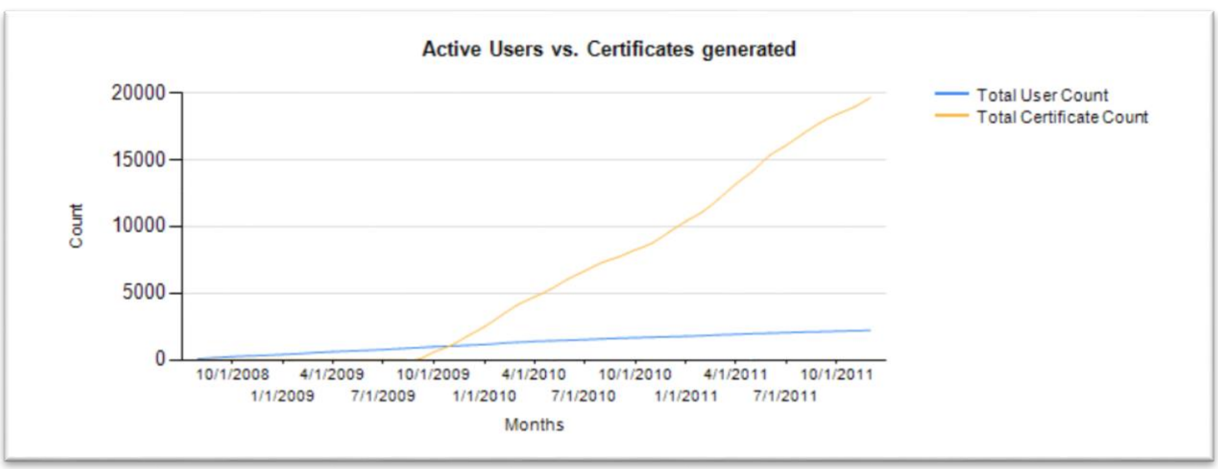


Figure 9 Users and Certificates 2011

Figure 10 through Figure 14 show where the usage was using Counties and Cities as the grouping entity. The North Central Texas Council of Governments (NCTCOG) led the way in usage during 2011.

Counties Generating Single Family IC3 Certificates in 2011

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
ANGELINA	0	1	1	0	0	0	0	0	0	0	0	0	2
ARCHER	0	0	0	0	1	0	0	0	0	0	0	0	1
BEXAR	0	0	0	2	0	0	0	0	0	0	0	0	2
BRAZOS	0	0	0	0	2	3	1	14	0	0	0	1	21
COLLIN	218	235	206	346	187	245	174	204	131	144	103	178	2371
COOKE	0	1	0	0	0	0	0	0	0	0	0	0	1
DALLAS	179	113	239	245	206	317	192	264	256	142	130	182	2465
DENTON	131	93	133	188	191	214	100	146	131	86	96	94	1603
ELLIS	3	2	0	3	2	1	3	3	0	5	0	1	23
ERATH	0	0	0	0	1	0	1	2	0	0	0	0	4
FORT BEND	0	0	0	0	0	0	0	0	0	0	0	1	1
GALVESTON	0	1	0	0	0	0	0	0	0	0	0	0	1
GARZA	0	0	0	0	0	0	1	6	0	1	1	51	60
GRAYSON	0	0	0	0	0	0	0	0	0	0	1	1	2
HARRIS	50	51	43	48	45	40	53	37	42	31	9	28	477
HARTLEY	0	0	0	0	0	0	0	0	0	1	0	0	1
HENDERSON	4	0	3	3	2	12	1	4	0	0	1	2	32
HOOD	4	13	1	17	22	17	17	6	8	13	1	0	119
HOPKINS	0	0	0	0	0	0	0	0	0	1	0	0	1
HOUSTON	0	0	0	0	0	0	0	0	0	0	0	8	8
HUNT	8	4	25	35	42	0	1	2	1	2	4	12	136
JOHNSON	8	5	13	12	17	8	8	4	17	1	3	3	99
KAUFMAN	1	1	6	1	0	2	0	0	0	2	0	0	13
KIMBLE	0	0	0	0	0	0	1	0	0	0	0	0	1
LAMAR	0	0	0	0	2	0	0	0	0	0	0	0	2
LUBBOCK	0	0	0	0	0	0	0	0	0	0	1	0	1
MATAGORDA	0	1	0	0	0	0	0	0	0	0	0	0	1
MONTGOMERY	0	0	6	0	0	0	0	0	0	0	0	0	6
PARKER	0	0	3	6	1	2	4	1	0	0	1	0	18
POTTER	0	0	0	1	0	1	0	0	0	1	2	5	10
RANDALL	8	14	9	20	9	15	8	15	11	10	12	5	136
RED RIVER	0	0	0	0	0	1	0	0	0	0	0	0	1
ROCKWALL	59	25	36	32	46	90	34	21	33	30	20	33	459
SHERMAN	0	0	0	0	2	0	0	0	0	0	0	0	2
TARRANT	122	98	97	104	76	110	117	85	83	110	111	80	1193
TAYLOR	0	0	0	20	0	0	0	0	0	0	0	0	20
TRAVIS	1	1	15	7	17	9	1	14	2	3	2	6	78
VICTORIA	0	0	0	0	0	2	0	0	0	0	0	0	2
WICHITA	3	4	1	6	22	10	0	3	3	11	10	2	75
WISE	0	1	0	0	0	0	0	0	0	0	0	0	1
ZAPATA	0	0	0	0	0	0	0	0	0	0	1	0	1

Figure 10 Counties Generating Single Family ICS Certificates in 2011

Counties Generating Multi-Family IC3 Certificates in 2011

	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
BRAZORIA	0	0	0	0	0	0	1	0	0	0	0	1
BRAZOS	0	1	0	2	1	4	0	2	0	0	3	13
COLLIN	2	17	9	6	30	26	2	3	0	5	7	107
DALLAS	47	34	0	4	18	7	16	91	5	5	0	227
DENTON	0	10	0	0	0	0	1	0	0	3	0	14
RANDALL	0	0	0	4	0	0	0	0	0	0	1	5
TARRANT	0	0	0	2	2	0	0	0	0	0	4	8
TRAVIS	0	2	0	0	0	0	0	0	0	0	0	2

Figure 11 Counties Generating Multi-Family IC3 Certificates in 2011

Cities Generating Single-Family IC3 Certificates in 2011

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Burleson	0	1	0	0	0	0	0	0	0	0	0	0	1
Dallas	0	0	0	0	2	0	0	0	0	0	0	0	2
Desoto	0	1	1	0	0	0	0	0	0	0	0	0	2
Grand Prairie	0	0	1	0	0	0	0	1	0	2	0	0	4
Irving	0	0	0	20	4	3	0	0	0	8	1	2	38
Irving	0	3	9	0	0	0	0	0	24	0	0	0	36
McKinney	2	0	0	0	0	0	0	0	0	0	0	0	2
Rockwall	0	0	0	0	3	0	0	0	0	0	0	0	3
ABILENE	0	0	0	20	0	0	0	0	0	0	0	0	20
Addison	0	0	0	0	0	0	0	0	2	0	0	0	2
Allen	1	4	0	32	13	16	26	54	26	4	19	25	220
Amarello	0	0	0	0	0	0	0	0	0	0	0	5	5
Amarillo	4	4	2	18	2	8	7	0	8	4	8	5	70
Anna	0	0	0	0	0	0	6	0	0	0	0	0	6
Anytown	0	0	0	0	0	0	0	0	0	0	0	1	1
Argyle	0	0	0	4	0	0	0	0	0	0	0	0	4
Arlington	4	12	5	9	2	6	1	4	6	9	4	5	67
Art	0	0	0	0	0	0	0	2	0	0	0	0	2
Athens	0	0	0	0	0	0	0	4	0	0	0	2	6
Austin	1	0	12	5	6	7	0	11	1	1	2	1	47
Azle	0	0	0	0	0	0	11	0	0	0	0	5	16
Bellaire	0	0	0	0	0	0	0	0	0	0	0	1	1
Benbrook	14	8	2	17	10	1	7	10	4	7	4	4	88
Bryan	0	0	0	0	2	0	0	0	0	0	0	0	2
Burleson	14	8	23	23	23	12	9	9	19	22	6	8	176
Canyon	4	10	7	3	7	8	1	15	3	7	6	0	71
Carrollton	53	18	25	31	8	0	21	14	54	17	17	23	281
Carrollton	0	0	0	0	0	60	0	0	0	0	0	0	60
Carrolton	0	0	0	0	2	5	0	0	7	0	0	0	14
Cedar Hill	0	0	0	0	2	3	1	4	1	1	0	4	16
Cedar Hill	0	0	1	0	0	0	0	0	0	0	0	0	1
Celina	0	0	1	0	0	0	0	0	0	0	0	0	1
College Station	0	0	0	2	1	3	2	14	0	0	0	1	23
Colleyville	3	7	3	5	2	0	2	0	4	5	10	6	47
Colony	0	0	0	2	0	0	0	0	0	0	0	0	2
Coppell	0	0	8	8	0	3	0	1	4	3	0	1	28
Corinth	2	0	0	0	2	0	1	0	0	2	4	0	11
Crowley	0	0	0	0	0	0	0	0	0	3	0	0	3
cs	0	0	0	0	10	0	0	0	0	0	0	0	10
Dalhart	0	0	0	0	0	0	0	0	0	1	0	0	1
Dallas	100	63	99	159	133	131	150	142	139	89	102	119	1426
Denison	0	0	0	0	0	0	0	0	0	0	1	0	1
Denton	13	22	0	21	17	34	7	24	12	4	10	7	171
Denton	0	0	20	0	0	0	0	0	0	0	0	0	20
DeSoto	28	1	19	3	9	10	7	3	0	0	0	5	85
Duncanville	0	0	0	0	0	0	0	0	0	0	0	8	8
Edgecliff	0	0	0	0	0	1	0	0	0	0	0	0	1
EULESS	0	0	0	0	0	0	0	0	0	0	0	2	2
Euless	6	0	0	0	0	0	0	0	0	0	0	0	6
Fairview	0	0	0	0	0	2	1	2	4	0	0	0	9
Farmers Branch	1	0	0	0	0	0	0	0	0	0	0	0	1
Farmersville	0	0	0	0	0	0	1	1	0	0	0	0	2
Fate	0	0	0	0	0	0	0	0	2	0	1	6	9
Flower Mound	7	11	15	40	35	54	26	17	19	18	21	7	270
Flower Mound, TX	0	0	0	0	2	0	0	0	0	0	0	0	2
Flowermound	0	0	0	0	0	0	1	0	0	0	0	0	1
flowermound	0	0	0	13	1	0	0	0	0	0	0	0	14
Forest Hill	0	0	0	2	0	0	0	0	0	0	0	0	2
Fort Worth	0	1	3	1	1	5	13	2	6	12	10	7	61
Frisco	0	1	0	0	5	1	1	3	0	1	0	2	14
Frisco	0	0	1	0	0	0	0	0	0	0	0	0	1

Figure 12: Cities Generating Single Family IC3 Certificates in 2011

FT. WORTH	0	0	1	0	0	0	0	0	0	0	0	0	1
Gainseville	0	1	0	0	0	0	0	0	0	0	0	0	1
Galveston	0	1	0	0	0	0	0	0	0	0	0	0	1
GARLAND	0	0	0	0	0	1	0	1	0	0	0	1	3
Glen Heights	0	1	0	0	0	0	0	0	0	0	0	0	1
Glenn Heights	0	1	0	0	0	1	0	14	0	0	0	0	16
GP	0	0	0	0	0	0	1	0	0	0	0	0	1
Granbury	4	10	1	17	22	17	17	6	8	14	1	0	117
Granbury TX	0	3	0	0	0	0	0	0	0	0	0	0	3
Grand Prairie	0	1	38	0	34	63	30	0	0	4	8	17	195
Grand Prairie	10	0	0	35	0	0	0	10	10	0	0	0	65
Grand Prarie	0	0	2	0	0	0	0	0	0	0	0	0	2
Grapevine	1	0	0	0	0	6	2	4	9	2	3	0	27
Greenville	0	0	0	0	9	0	0	0	0	2	0	0	11
Gun Barrel City	3	0	3	3	2	12	1	0	0	0	1	0	25
Haltom City	0	0	0	0	0	0	0	0	0	0	1	1	2
Haslet	0	0	0	2	0	0	0	0	0	0	0	0	2
Heath	6	2	3	3	9	3	2	11	7	9	1	5	61
Highland Park	4	0	1	1	5	16	1	6	5	8	2	2	51
Highland Village	2	0	0	0	0	0	0	0	0	0	0	0	2
HOSUTON	0	0	2	0	0	0	0	0	0	0	0	0	2
Houston	51	51	42	47	47	39	58	45	42	25	10	79	536
IOWA PARK	0	0	1	0	0	0	0	0	0	0	0	0	1
Irving	31	25	47	25	27	32	10	0	45	0	9	0	251
Irving	0	0	0	0	0	0	0	22	0	8	0	5	35
Italy	0	0	0	0	0	1	0	0	0	0	0	0	1
Jersey Village	0	0	0	1	0	0	0	0	0	0	0	0	1
Josephine	0	0	0	0	0	0	0	0	0	0	0	7	7
Keller	37	10	3	6	2	12	4	11	4	7	0	5	101
Kennedale	0	0	0	0	0	0	0	0	0	1	0	0	1
Kingwood	0	0	0	0	0	0	0	0	0	0	0	5	5
Lake Dallas	0	0	2	0	0	0	0	0	0	0	0	0	2
LAKEWOOD VILLAGE	0	0	0	1	0	1	0	0	0	0	0	0	2
Lavon	1	0	0	0	0	0	0	0	0	0	0	1	2
Lewisville	3	5	20	26	11	27	0	8	2	9	0	4	115
Lexington	0	0	0	0	0	0	1	0	0	0	0	0	1
Little Elm	49	35	55	73	105	66	43	95	63	44	48	44	720
Little Elm, Texas	4	0	0	0	0	0	0	0	0	0	0	0	4
Lubbock	0	0	0	0	0	0	0	0	0	0	1	0	1
Lucas	0	0	8	12	0	0	0	1	0	2	0	1	24
Lufkin	0	1	1	0	0	0	0	0	0	0	0	0	2
Mainsfield	0	5	0	0	0	1	1	0	0	0	1	0	8
Mansfield	30	34	31	18	21	25	24	23	11	12	44	10	283
Mansfield, Texas	0	1	0	0	0	0	0	0	0	0	0	0	1
MASTER	0	0	0	0	0	0	0	0	0	0	0	5	5
McKinney	138	143	128	211	118	138	94	61	33	77	37	49	1227
Melissa	0	0	0	0	0	4	0	5	6	1	2	8	26
Melissa, Texas	0	1	0	0	1	0	3	0	0	0	1	0	6
Mesquite	0	0	0	0	0	0	0	18	0	0	0	1	19
Midlothian	3	0	0	3	2	0	3	2	0	5	0	1	19
Murphy	0	0	2	0	0	1	3	1	0	0	3	2	12
Nashville	0	1	0	0	0	0	0	0	0	0	0	0	1
New City	0	0	0	0	0	0	0	1	0	0	0	0	1
North Richland Hills	5	9	8	5	0	13	9	7	15	7	5	8	91
Northlake	0	0	0	0	0	0	1	0	0	0	0	1	2
Nottingham	0	0	0	0	0	2	0	0	0	0	0	0	2
Oak Point	0	0	0	2	2	0	0	0	0	0	0	0	4
Pantego	0	0	1	0	0	0	0	0	0	0	0	0	1
Paris	0	0	0	0	2	0	0	0	0	0	0	0	2
Payne Springs	1	0	0	0	0	0	0	0	0	0	0	0	1
Pilot Point	1	0	0	0	0	0	0	0	0	0	0	0	1
Plano	64	73	75	67	46	77	34	63	51	58	35	67	710
Portland	0	0	0	0	0	1	0	0	0	0	0	0	1

Figure 12: Cities Generating Single Family IC3 Certificates in 2011 (continued)

Princeton	0	7	0	0	0	0	0	0	0	0	0	10	17
Prosper	2	3	0	0	2	0	1	0	0	0	0	0	8
Providence	0	0	0	0	0	0	0	0	0	0	0	3	3
Richardson	6	15	6	1	5	16	5	32	10	10	6	5	117
Roanoke	0	1	0	0	0	0	0	0	2	0	2	2	7
Rockwall	44	22	30	21	20	36	29	5	21	20	18	15	281
Rowlett	0	0	0	1	0	0	0	0	0	0	0	0	1
Royce City	4	0	0	0	1	0	1	1	0	1	0	5	13
Royse City	12	5	28	43	46	51	5	6	2	0	4	18	220
Runaway Bay	0	1	0	0	0	0	0	0	0	0	0	0	1
Sachse, Texas	0	0	0	0	0	0	0	0	0	0	1	0	1
Saginaw	0	0	0	0	0	1	0	3	0	0	0	1	5
Sanger	0	0	0	0	0	0	0	0	0	0	2	0	2
Seagoville	1	3	7	3	0	2	0	0	0	2	0	0	18
Shenandoah	0	0	0	0	0	0	2	0	0	0	0	0	2
Shendandoah	0	0	6	0	0	0	0	0	0	0	0	0	6
Sherman	0	0	0	0	2	0	0	0	0	0	0	1	3
South Lake	0	0	0	0	0	0	0	0	0	0	2	0	2
Southlake	8	8	17	15	12	24	15	9	17	13	13	13	164
Southlake Tx	0	0	0	1	0	0	0	0	0	0	0	0	1
Southlake, Tx	0	0	0	0	1	0	0	0	0	6	4	0	11
Spring	0	0	0	0	0	1	0	0	0	0	0	0	1
Spring Valley	0	0	0	0	0	0	0	0	0	8	0	0	8
St. Paul	0	0	0	0	0	2	0	0	0	0	0	0	2
Stephenville	0	0	0	0	1	0	1	2	0	0	0	0	4
Sugar Land	0	0	0	0	0	0	0	0	0	1	0	0	1
Sugarland	0	0	2	0	0	0	0	0	0	0	0	0	2
Sunnyvale	0	0	0	0	0	0	0	1	0	0	0	0	1
TERRELL	0	0	0	1	0	0	0	0	0	0	0	0	1
test	0	0	0	0	0	1	0	0	0	0	0	5	6
THE COLONY	5	3	0	1	0	0	0	0	4	0	0	0	13
The Colony	0	0	0	0	0	5	0	1	0	0	0	1	7
The Preserve	1	0	0	0	0	0	0	0	0	0	0	0	1
Trophy Club	0	0	1	0	4	0	0	0	0	0	0	0	5
University Park	0	3	6	0	2	16	4	4	0	5	4	12	56
Universly Park	0	0	0	1	0	0	0	0	0	0	0	0	1
Way	0	0	0	0	0	0	0	0	0	0	1	0	1
West	0	0	0	0	0	0	0	0	1	0	0	0	1
West University	0	0	0	0	0	0	0	0	0	0	0	2	2
Westlake	3	0	0	0	0	1	2	3	0	2	1	2	14
Westworth Village	0	0	0	0	0	0	0	0	0	0	1	0	1
White Settlement	0	0	0	1	2	0	0	0	0	0	0	0	3
WICHITA FALLS	3	4	0	5	23	10	0	3	3	10	7	2	70
WICHITA FALLS TX	0	0	0	1	0	0	0	0	0	0	1	0	2
Wichita Falls, Texas	0	0	0	0	0	0	0	0	0	1	0	0	1
Wichita Falls, TX	0	0	0	0	0	0	0	0	0	0	1	0	1
Wichita Falls, Tx.	0	0	0	0	0	0	0	0	0	0	1	0	1
Wylie	5	0	2	5	3	1	8	9	2	0	0	4	39
x	0	0	0	0	0	0	0	0	0	0	0	1	1
Zug	0	0	0	0	0	0	0	0	0	0	1	0	1

Figure 12: Cities Generating Single Family IC3 Certificates in 2011 (continued)

Cities Generating Multi-Family IC3 Certificates in 2011

	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
	0	0	0	0	0	0	0	2	0	0	0	2
Bedford	0	0	0	0	2	0	0	0	0	0	0	2
Bryan	0	1	0	2	0	1	0	0	0	0	1	5
Canyon	0	0	0	4	0	0	0	0	0	0	1	5
College STation	0	0	0	0	1	3	0	2	0	0	2	8
Dallas	47	34	0	4	16	2	14	79	5	5	0	206
Dallas, TX	0	0	0	0	0	0	1	12	0	0	0	13
duncanville	0	0	0	0	2	0	0	0	0	0	0	2
houston	0	0	0	0	0	0	1	0	0	0	0	1
Irving	0	2	0	0	0	5	0	0	0	0	0	7
Keller	0	0	0	2	0	0	0	0	0	0	0	2
Las Colinas	0	0	0	0	0	0	1	0	0	0	0	1
Lewisville	0	0	0	0	0	0	0	0	0	3	0	3
Little Elm	0	10	0	0	0	0	0	0	0	0	0	10
McKinney	2	0	0	0	2	2	2	1	0	0	7	16
McKinney, Texas	0	0	0	0	0	0	0	0	0	5	0	5
Plano	0	17	9	6	28	24	0	0	0	0	0	84
Southlake	0	0	0	0	0	0	0	0	0	0	4	4
The Colony	0	0	0	0	0	0	1	0	0	0	0	1

Figure 13: Cities Generating Multi-Family IC3 Certificates in 2011

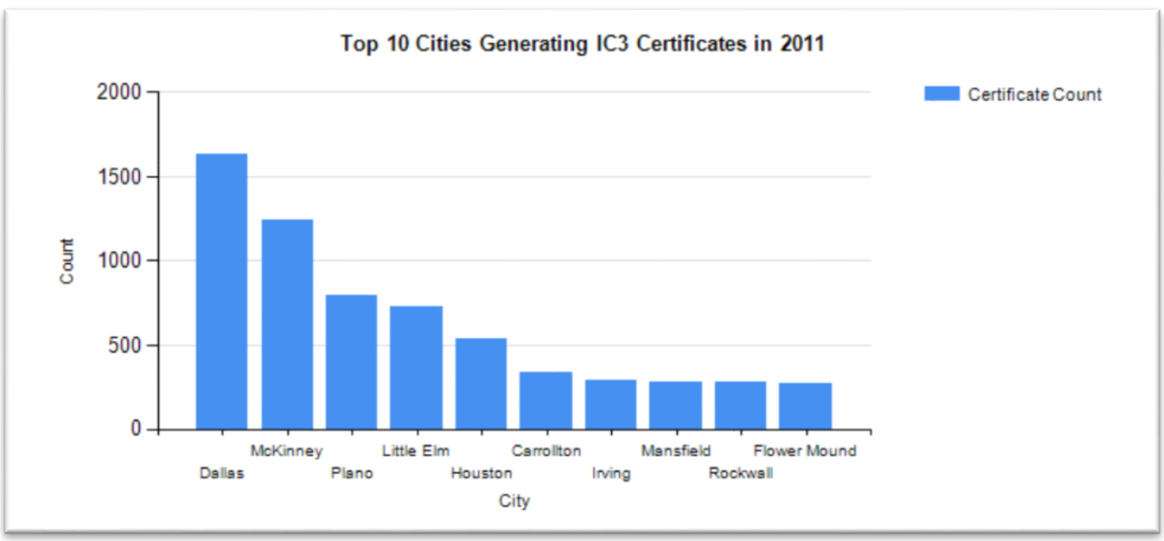


Figure 14: Top 10 Cities Generating Certificates in 2011

1.8.4 Parameter Reports

A unique and valuable use of the Registry is to look at building trends across the state.

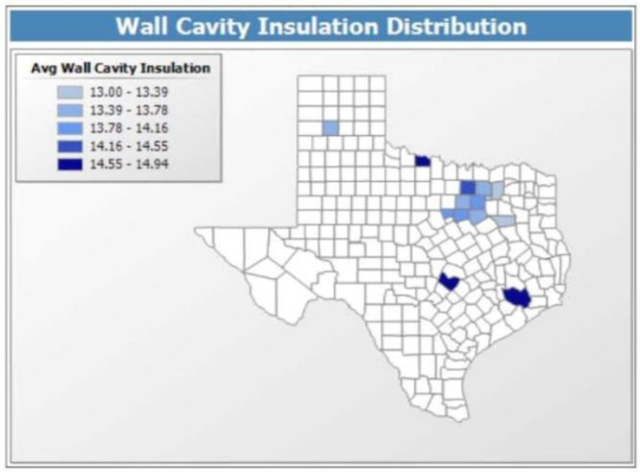
Yearly Average Wall Cavity Insulation Distribution for 2011

Overall data Statistics derived from a subset of Counties having house count > 10

	Total Count	Average Wall Cavity	Standard Deviation
Single Family	4799	13.84	1.98
Multi Family	585	17.27	2.7

Single Family

County	Avg Wall Cavity	House Count
Travis	14.94	32
Wichita	14.73	48
Harris	14.62	201
Denton	14.25	870
Hood	14.16	64
Dallas	13.97	1243
Johnson	13.78	72
Tarrant	13.59	633
Collin	13.55	1227
Randall	13.43	88
Ellis	13.43	14
Rockwall	13.09	238
Henderson	13	18
Hunt	13	51



Multi Family

County	Avg Wall Cavity	House Count
Dallas	17.92	508
Collin	13	77

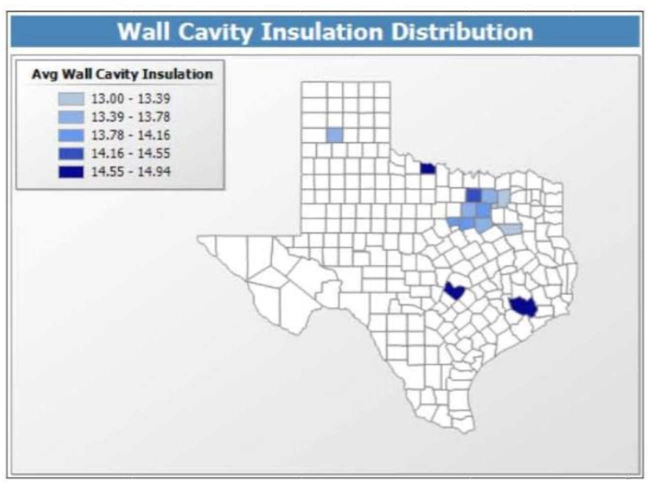


Figure 15: Average Wall Cavity Insulation by County 2011

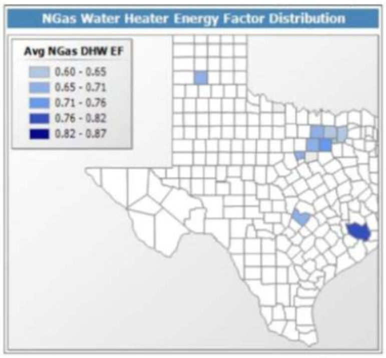
Yearly Average Wall Heater Energy Factor Distribution for 2011

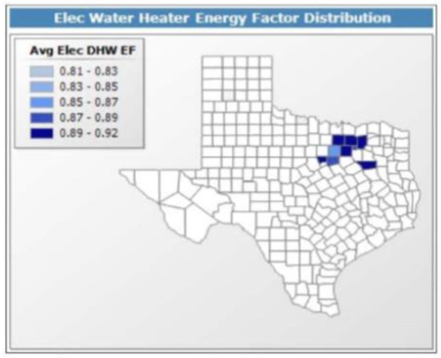
Overall Data Statistics derived from a subset of Counties having house count > 10

	Total Count	Average NGas EF	Standard Deviation
Single Family	1138	0.89	0.05
Multi Family	69	0.72	0.11

	Total Count	Average Elec EF	Standard Deviation
Single Family	3685	0.68	0.13
Multi Family	208	0.91	0.01

Single Family

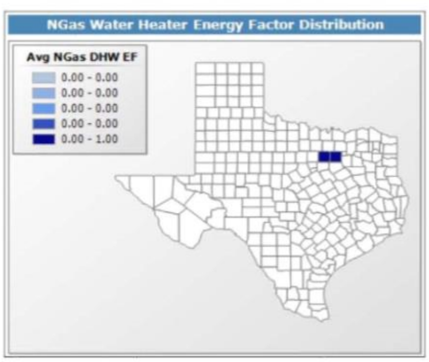


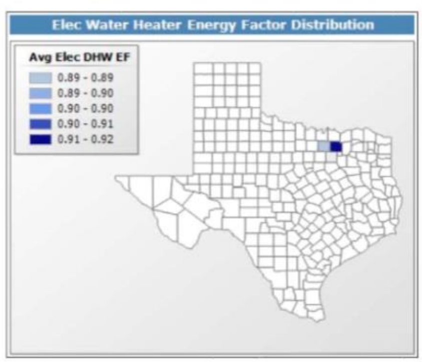


County	Avg NGas WH EF	House Count
Wichita	0.87	29
Harris	0.81	195
Dallas	0.72	906
Travis	0.7	31
Randall	0.68	30
Denton	0.68	687
Hood	0.67	36
Tarrant	0.67	454
Collin	0.64	1011
Rockwall	0.61	215
Hunt	0.6	22
Johnson	0.6	38

County	Avg Elec WH EF	House Count
Wichita	0.92	19
Hood	0.91	28
Denton	0.91	183
Hunt	0.91	29
Dallas	0.91	337
Collin	0.9	216
Henderson	0.9	17
Rockwall	0.89	23
Johnson	0.88	34
Tarrant	0.87	179
Randall	0.81	58

Multi Family





County	Avg NGas WH EF	Unit Count
Dallas	0.71	43
Tarrant	0.69	13

County	Avg Elec WH EF	Unit Count
Dallas	0.92	465
Collin	0.91	71
Denton	0.89	14

Figure 16: Average Water heater Efficiencies 2011

This report shows both natural gas and electric water heater efficiencies across Texas in 2011.

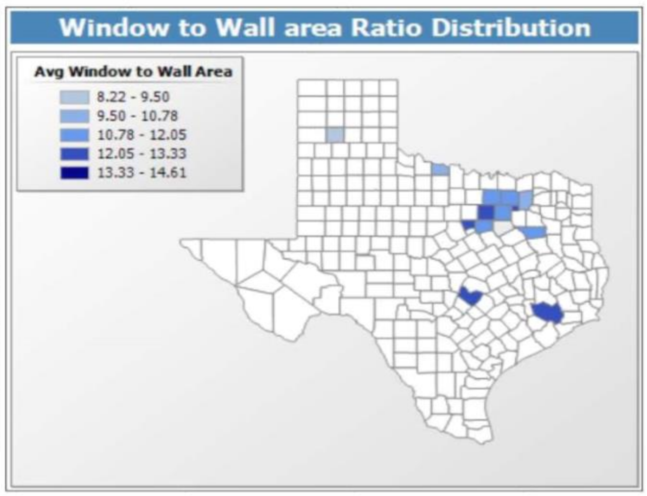
Average Window to Wall Area Ratio across Counties for 2011

Overall data Statistics derived from a subset of Counties having house count > 10

	Total Count	Average Wall Cavity
Single Family	11.65	4.28
Multi Family	8.49	9.34

Single Family

County	Avg Window To Wall Area	House Count
Ellis	14.61	14
Travis	12.79	32
Harris	12.65	201
Hood	12.43	64
Rockwall	12.1	238
Tarrant	12.08	633
Dallas	12	1243
Henderson	11.97	18
Denton	11.45	870
Johnson	11.27	72
Collin	11.25	1227
Hunt	10.1	51
Wichita	9.64	48
Randall	8.22	88



Multi Family

County	Avg Window To Wall Area	Unit Count
Dallas	10.87	27
Collin	7.53	67

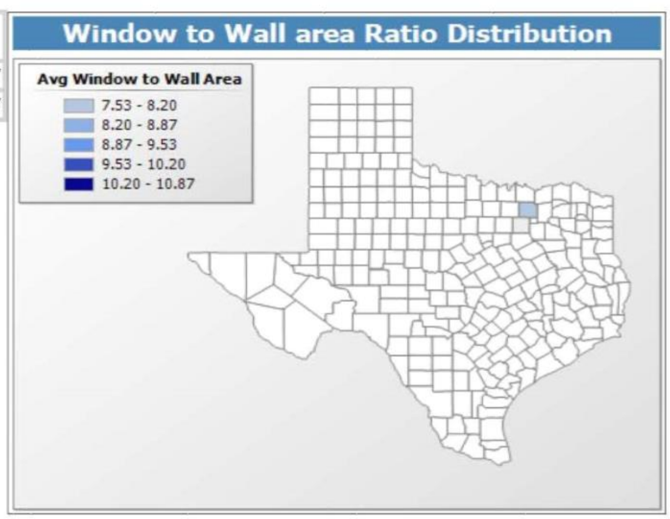


Figure 17: Average Window to Wall Ratio 2011

Here is an analysis of the window to wall ratio across Texas in 2011.
The formula used is: 100 * <total window area sq. ft.> / <total wall area sq. ft.>

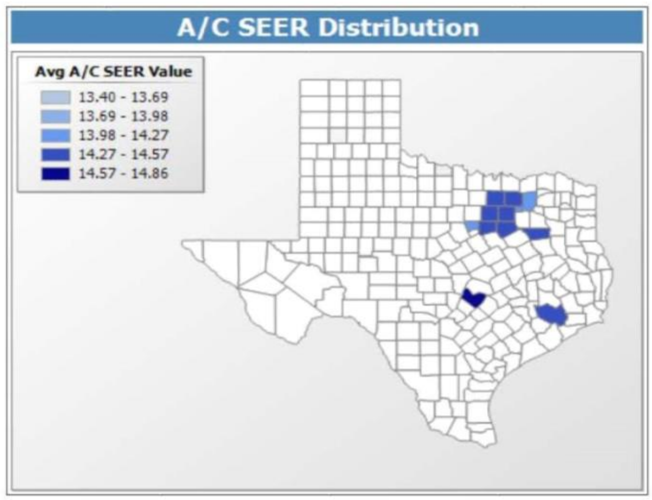
Average A/C SEER across Counties for 2011

Overall data Statistics derived from a subset of Counties having house count > 10

	Average	Standard Deviation
Single Family	14.33	1.03
Multi Family	13.87	0.38

Single Family

County	Avg SEER Value	House Count
Wichita	14.86	48
Travis	14.78	32
Tarrant	14.47	633
Ellis	14.46	14
Johnson	14.44	72
Harris	14.41	201
Henderson	14.39	18
Denton	14.35	870
Dallas	14.34	1243
Collin	14.33	1227
Hood	14.16	64
Hunt	14.07	51
Rockwall	13.99	238
Randall	13.4	88



Multi Family

County	Avg SEER Value	House Count
Collin	13.96	77
Dallas	13.86	508

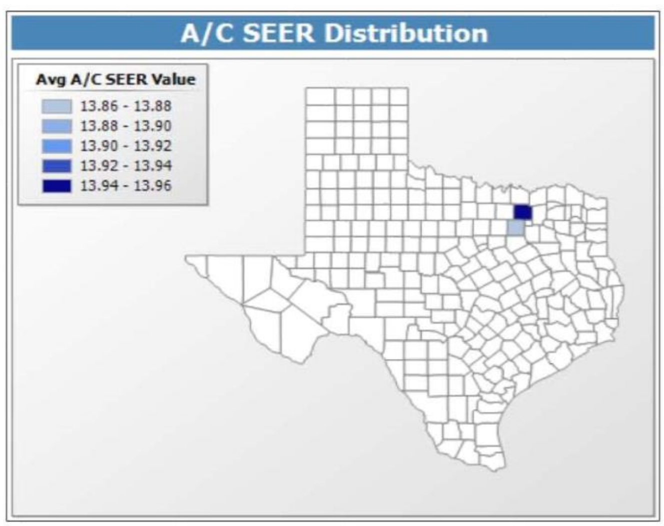


Figure 18: Average SEER 2011

The efficiency (and sizing) of air conditioning is a vital component of energy efficiency in Texas.

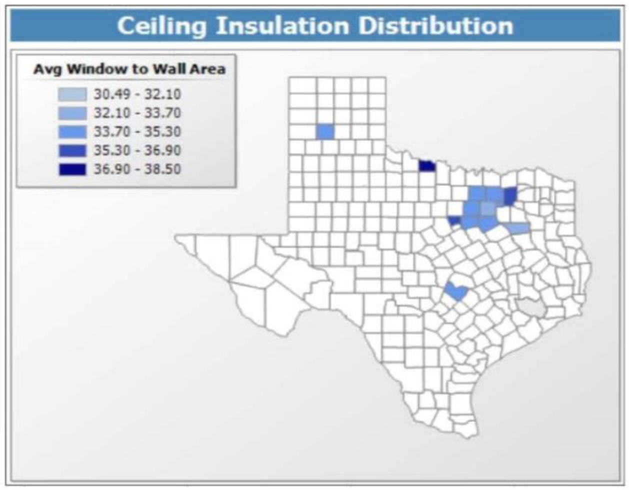
Average Ceiling Insulation across Counties for 2011

Overall data Statistics derived from a subset of Counties having house count > 10

	Average	Standard Deviation
Single Family	33.97	5.42
Multi Family	31.77	4.07

Single Family

County	Avg Ceiling Insulation	House Count
Wichita	38.5	48
Hood	36.15	64
Hunt	35.8	51
Rockwall	35.22	238
Collin	35.16	1227
Ellis	35.14	14
Randall	34.74	88
Travis	34.34	32
Denton	34.09	870
Tarrant	34.01	633
Johnson	33.76	72
Dallas	32.62	1243
Henderson	32.33	18
Harris	30.49	201



Multi Family

County	Avg Ceiling Insulation	House Count
Collin	37.22	77
Dallas	30.22	508

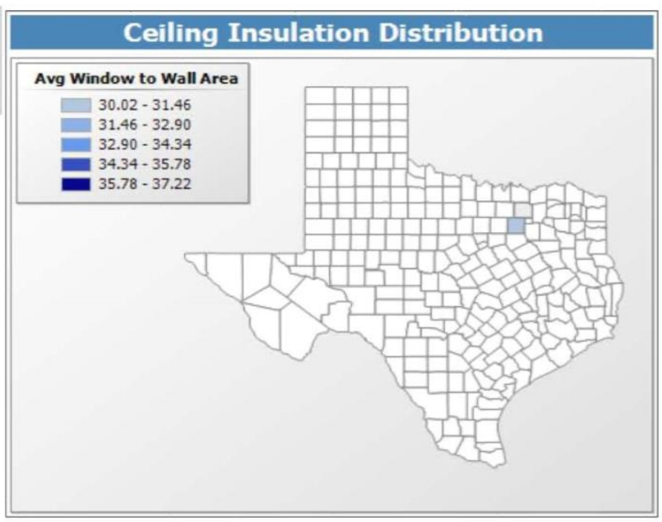


Figure 19: Average Ceiling Insulation 2011

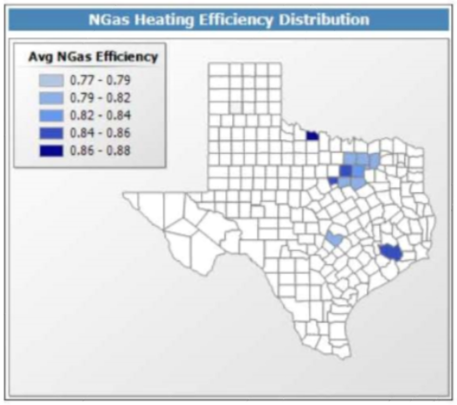
Average Heating Efficiency across Counties for 2011

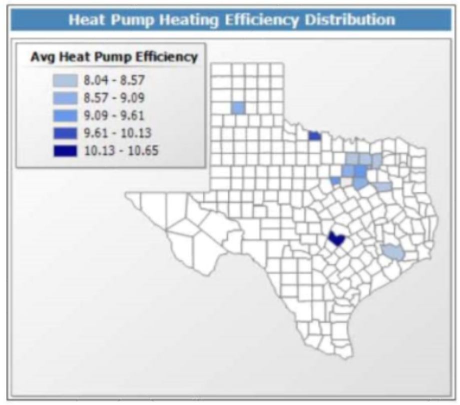
Overall Data Statistics derived from a subset of Counties having house count > 10

	Total Count	Average NGas EF	Standard Deviation
Single Family	3604	0.81	0.19
Multi Family	84	0.8	0.04

	Total Count	Average Elec EF	Standard Deviation
Single Family	1121	8.81	1.26
Multi Family	492	8.27	0.58

Single Family



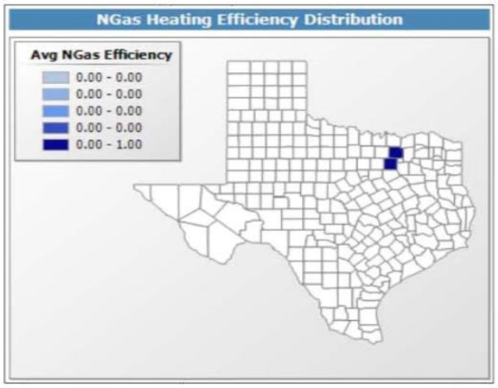


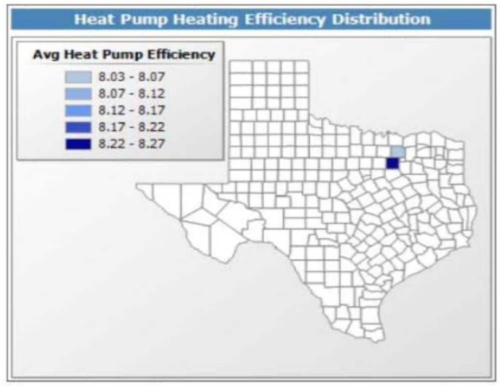
County	Avg NGas Heating Efficiency	House Count
Wichita	0.88	28
Hood	0.85	14
Harris	0.84	187
Tarrant	0.84	438
Dallas	0.82	870
Travis	0.81	27
Ellis	0.81	10
Denton	0.81	689
Collin	0.81	1056
Rockwall	0.8	213
Hunt	0.8	22
Johnson	0.8	20
Randall	0.77	30

County	Avg Heat Pump Heating Efficiency	House Count
Travis	10.65	4
Wichita	10.08	19
Hood	9.28	50
Dallas	9.12	337
Ellis	9.08	4
Tarrant	9.04	185
Rockwall	8.61	22
Randall	8.59	56
Harris	8.52	9
Denton	8.52	169
Hunt	8.39	29
Collin	8.38	168
Henderson	8.16	17
Johnson	8.04	52

Figure 20: Average Heating Efficiency 2011

Multi Family





County	Avg NGas Heating Efficiency	Unit Count
Dallas	0.82	19
Collin	0.8	65

County	Avg Heat Pump Heating Efficiency	Unit Count
Dallas	8.27	480
Collin	8.03	12

Figure 20: Average Heating Efficiency 2011 (continued)

Here we examine space heating efficiency in 2011 using both natural gas and heap pump heating.

Average SHGC across Counties for 2011

Overall data Statistics derived from a subset of Counties having house count > 10

	Average	Standard Deviation
Single Family	0.3	0.06
Multi Family	0.31	0.04

Single Family

County	Avg SHGC Value	House Count
Hunt	0.35	51
Rockwall	0.35	238
Ellis	0.34	14
Henderson	0.34	18
Travis	0.33	32
Harris	0.32	201
Randall	0.31	88
Johnson	0.31	72
Hood	0.31	64
Collin	0.31	1227
Tarrant	0.3	633
Denton	0.3	870
Wichita	0.29	48
Dallas	0.29	1243

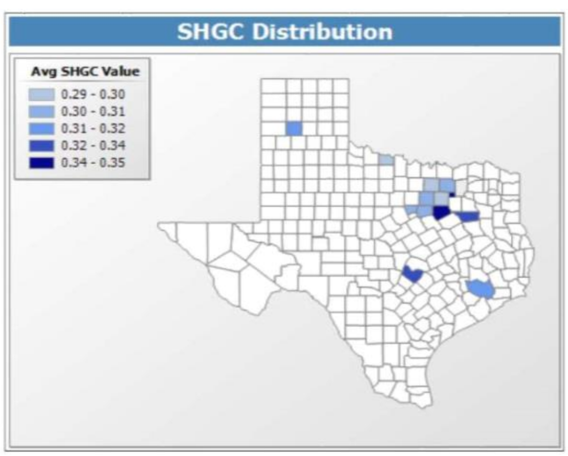
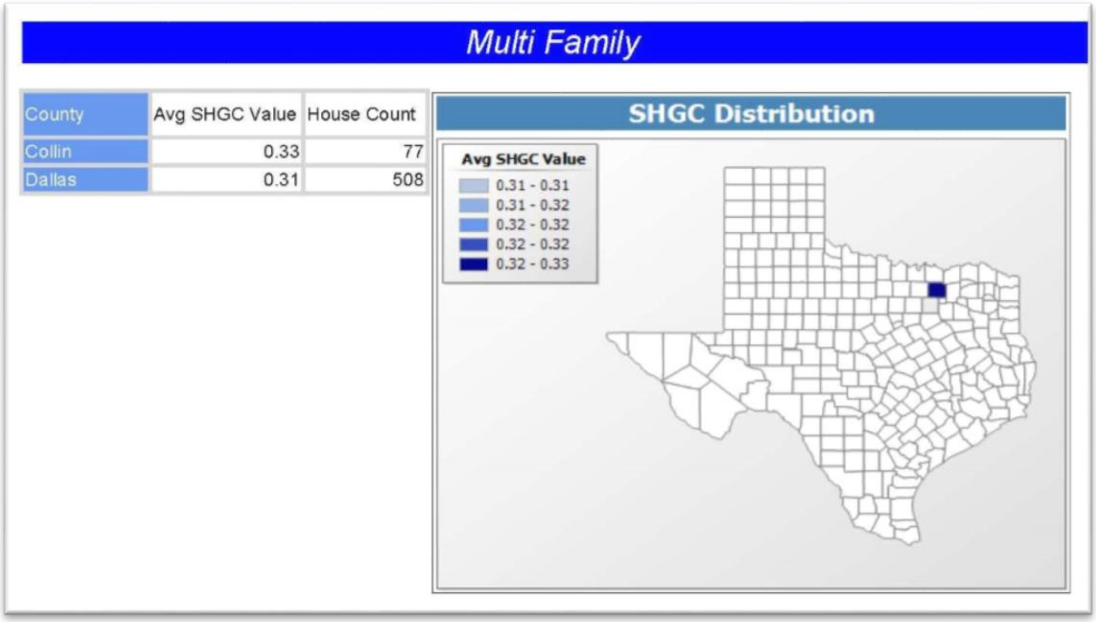
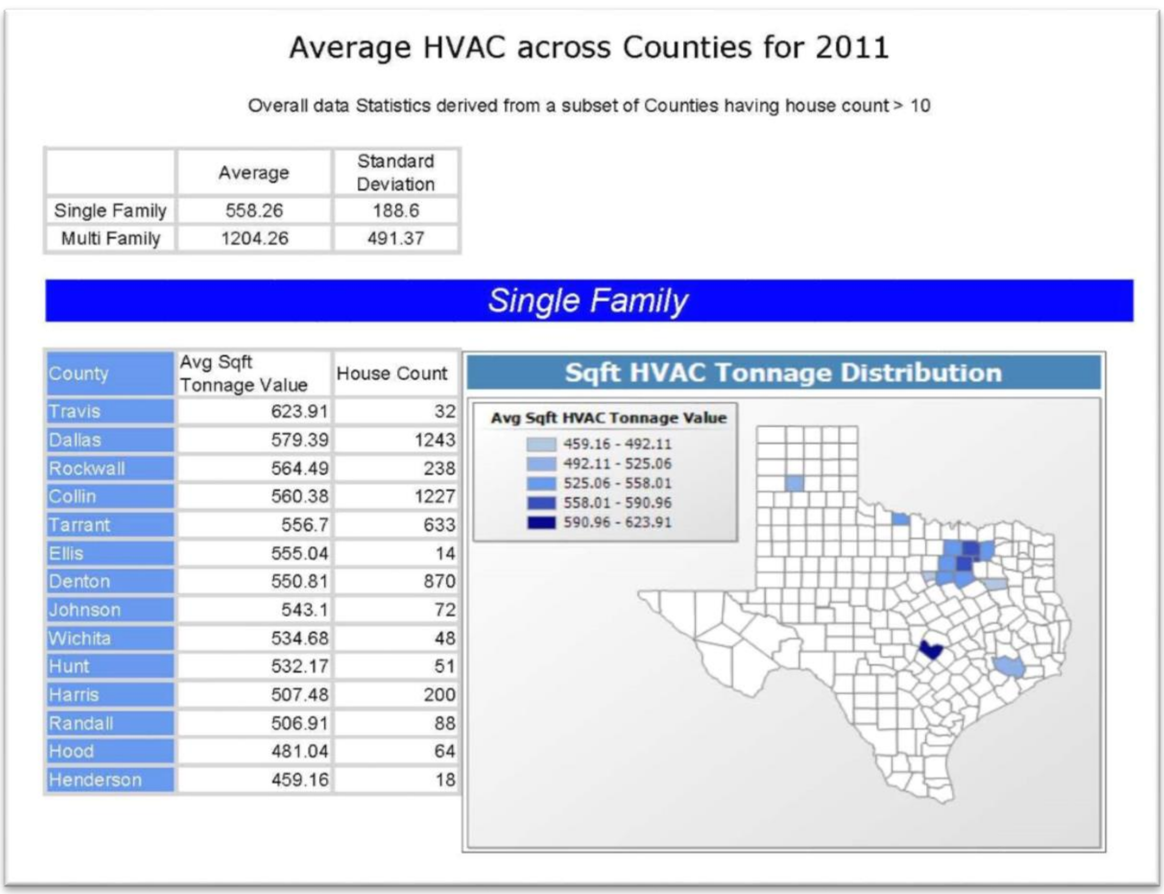


Figure 21: Average SHGC 2011



County	Avg SHGC Value	House Count
Collin	0.33	77
Dallas	0.31	508

Figure 21: Average SHGC 2011 (continued)



	Average	Standard Deviation
Single Family	558.26	188.6
Multi Family	1204.26	491.37

County	Avg Sqft Tonnage Value	House Count
Travis	623.91	32
Dallas	579.39	1243
Rockwall	564.49	238
Collin	560.38	1227
Tarrant	556.7	633
Ellis	555.04	14
Denton	550.81	870
Johnson	543.1	72
Wichita	534.68	48
Hunt	532.17	51
Harris	507.48	200
Randall	506.91	88
Hood	481.04	64
Henderson	459.16	18

Figure 22: Average HVAC Tonnage to Sq Ft 2011

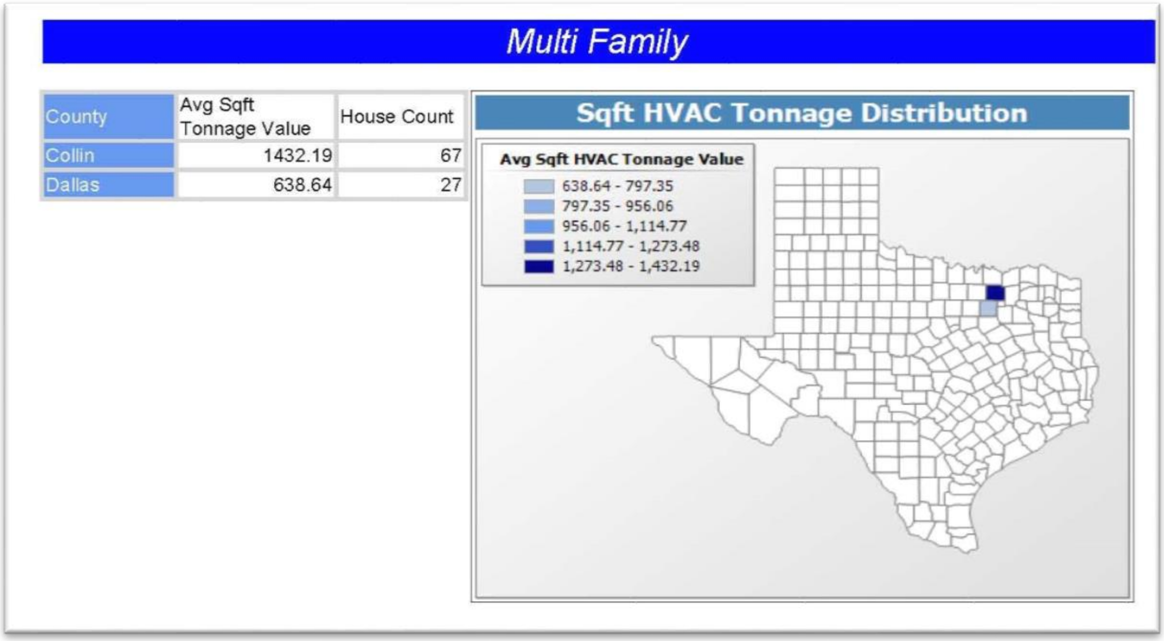


Figure 22: Average HVAC Tonnage to Sq Ft 2011 (continued)

Another way to evaluate high performing houses is how much air conditioning they have per sq. ft. of house. Here we see ranges, for single family homes, of 458 to 623 sq ft per ton with an average of 558 sq. ft. per ton. Last year's average was 538 sq. ft. per ton. Thus, Texas is becoming more efficient.

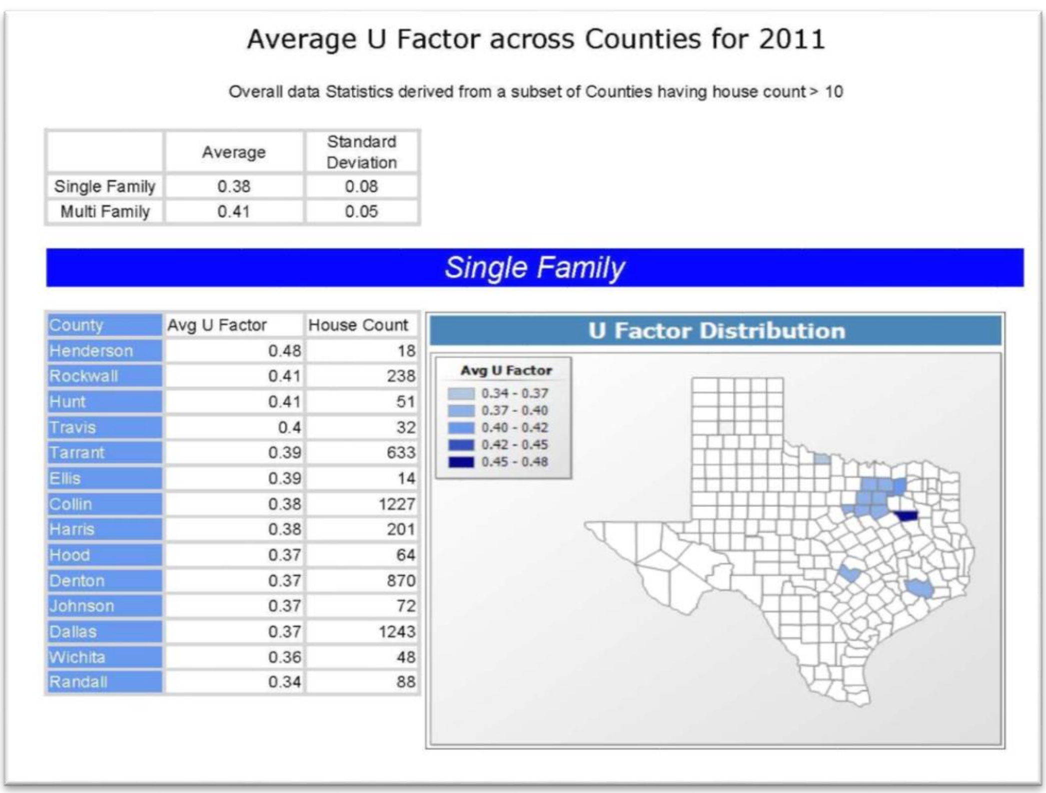


Figure 23: Average U Factor 2011

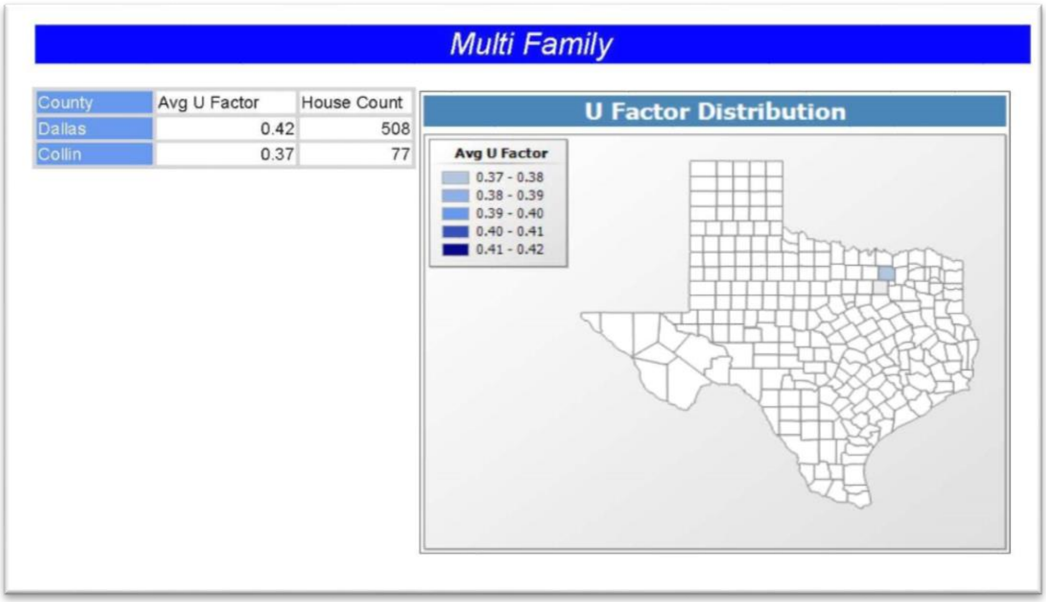


Figure: 23 Average U Factor 2011 (continued)

The U Factor applies to the heat transfer of a window caused by temperature, no direct solar radiation.

1.9 Code Adoption

During the 77th Legislature, Senate Bill 5 (SB 5) adopted the 2000 International Residential Code (IRC) as the energy code for single-family residential construction and the 2000 International Energy Conservation Code (IECC), with the 2001 Supplement for all other residential, commercial and industrial construction in the state. This bill became law in 2001 and marked the first mandatory energy code requirements for the State of Texas and established the Texas Building Energy Performance Standards (TBEPS). Both codes require that municipalities establish procedures for administration and enforcement, and ensure that code-certified inspectors perform inspections.

State adoption of the 2000 Residential Code energy provisions and 2000 International Energy Conservation Code became effective September 1, 2001. During 2000 and 2010, the State Energy Conservation Office SECO) received input into the adoption of the 2009 IRC and IECC, through Stakeholder meetings and public comment periods. In June 2010 the final rule was published, which established effective dates for the 2009 IRC and IECC. The 2012 IECC for use in commercial, industrial and all other residential construction that is not single-family residential as defined in the Health and Safety Code, 388.002(12) became effective on April 1, 2011. The 2009 IRC and IECC for single-family residential construction will become effective on January 1, 2012.

Review of the 2012 IRC and IECC began in 2011. A review of the published codes and public comments were completed and a recommendation provided to SECO.

Table 4: Code adoptions

CITY NAME	Commercial Building Code (IBC)	Residential Building Code (IRC)	Energy Code (IECC)	Electrical Code (NEC)	Mechanical Code (IMC)	Plumbing Code (IPC)	Green Building Code	Existing Building Code (IEBC)	Other Codes
Abilene	2003	2003	2000	2008	2003	2003	N/A	2003	2003 IFGC
Addison									
Allen									
Amarillo	2006	2006	2006	2008	2006	2006	N/A	2006	2006 IFC, 2006 IFGC
Angleton									
Arlington	2003	2003	2003	2002	2003	2003	N/A	N/A	2003 IFC, 2003 IFGC
Austin									
Baytown	2006	2006	2006	2008	2006	2006	N/A	2006	N/A
Beaumont									
Bedford									
Big Spring	2006	2006	2006	2005	2006	2006	N/A	2006	N/A
Borger									
Brownsville	2006	2006	2006	2008	2006	2006	N/A	N/A	2006 IFGC
Bryan	2003	2003	2003	2002	2003	2003	N/A	2003	2003 IFGC
Burleson	2006	2006	2006	2005	2006	2006	N/A	N/A	North Central Texas Council of Government Amendment
Carrollton *	2006	2006	2006	2008	2006	2006	N/A	N/A	NCTCOG Recommended Regional Amendments
Cedar Hill	2006	2006	2006	2008	2006	2006	N/A	N/A	2006 IFGC
Cedar Park	2009	2009	2009	2008	2009	2009	N/A	2009	2006 IFC with Ammendments, 2009 IPMC
Cleburne	2003	2003	2003	2002	2003	2003	N/A	N/A	N/A
College Station	2009	2009	2009	2008	2009	2009	N/A	N/A	N/A
Conroe	2003	N/A	N/A	2008	2000	2000	N/A	N/A	2003 IFC
Coppell	N/A	2006	2006	2005	2006	2006	N/A	2006	2006 IFC, 2006 IFGC, 2006 IPMC
Copperas Cove									
Corpus Christi	2003	2003	2003	2002	2003	2003	N/A	N/A	N/A
Corsicana	2009	2009	N/A	2008	2009	2009	N/A	N/A	N/A
Dallas	2006	2006	2006	2008	2006	2006	City of Dallas Ordinance #081070	2003	2006 IFC, 2006 IFGC
Deer Park									
Del Rio									
Denton									
Desoto	2003	2003	2003	2002	2003	2003	N/A	N/A	N/A
Devine									
Duncanville	2008	2008	2008	2008	2008	2008	N/A	N/A	2006 IFGC, 2006 IPMC
Eagle Pass	2009	2009	2009	2008	2006	2009	N/A	2006	N/A
Edinburg									
El Paso									
Euless	2003	2003	2003	2002	2003	2003	N/A	N/A	2003 IFC, 2003 IFGC, 2003 IPMC
Farmers Branch									
Flower Mound									
Fort Worth	2003	2003	2003	2008	2003	2003	N/A	N/A	2003 IFGC
Friendswood	2009	2009	2009	2008	2009	2009	N/A	N/A	N/A
Frisco									
Galveston	2009	2009	2009	2008	2009	2009	N/A	N/A	2009 IFC, 2009 IPMC
Garland	2003	2003	2003	2005	2003	2003	N/A	N/A	N/A
Georgetown	2003	2000	2000	2002	2003	2003	N/A	2003	N/A
Grand Prairie	2003	2003	2003	2005	2003	2003	N/A	N/A	2003 IFC, 2003 IFGC
Grapevine	2006	2006	eferenc	2005	2006	2006	N/A	2006	N/A
Greenville	2006	2006	2006	2005	2006	2006	N/A	2006	N/A
Haltom City	2003	2003	2003	2002	2003	2003	N/A	N/A	N/A
Harker Heights	2009	2009	2008	2008	2009	2009	N/A	2006	2009 IFC, 2009 IFGC
Harlingen									
Houston									
Huntsville	2003	2003	2003	2005	2003	2003	N/A	N/A	2003 IFC, 2003 IFGC, 2003 IPMC
Hurst	2003	2003	2003	2005	2003	2003	N/A	N/A	2003 IPMC
Irving	2006	2006	2006	2008	2006	2006	N/A	N/A	2006 IFC, 2006 IFGC
Keller	2006	2006	2006	2008	2006	2006	N/A	N/A	2006 IFGC
Killeen									
Kingsville									
Kyle	2000	2000	2000	1999	2000	2000	N/A	N/A	2000 IPMC
La Porte									
Lake Jackson									
Lancaster	2003	2003	2003	2002	2003	2003	N/A	N/A	2003 IPMC

Table 4: Code adoptions (continued)

CITY NAME	Commercial Building Code (IBC)	Residential Building Code (IRC)	Energy Code (IECC)	Electrical Code (NEC)	Mechanical Code (IMC)	Plumbing Code (IPC)	Green Building Code	Existing Building Code (IEBC)	Other Codes
Desoto	2003	2003	2003	2002	2003	2003	N/A	N/A	N/A
Devine									
Duncanville	2008	2008	2008	2008	2008	2008	N/A	N/A	2006 IFGC, 2006 IPMC
Eagle Pass	2009	2009	2009	2008	2006	2009	N/A	2006	N/A
Edinburg									
El Paso									
Euless	2003	2003	2003	2002	2003	2003	N/A	N/A	2003 IFC, 2003 IFGC, 2003 IPMC
Farmers Branch									
Flower Mound									
Fort Worth	2003	2003	2003	2008	2003	2003	N/A	N/A	2003 IFGC
Friendswood	2009	2009	2009	2008	2009	2009	N/A	N/A	N/A
Frisco									
Galveston	2009	2009	2009	2008	2009	2009	N/A	N/A	2009 IFC, 2009 IPMC
Garland	2003	2003	2003	2005	2003	2003	N/A	N/A	N/A
Georgetown	2003	2000	2000	2002	2003	2003	N/A	2003	N/A
Grand Prairie	2003	2003	2003	2005	2003	2003	N/A	N/A	2003 IFC, 2003 IFGC
Grapevine	2006	2006	eferenc	2005	2006	2006	N/A	2006	N/A
Greenville	2006	2006	2006	2005	2006	2006	N/A	2006	N/A
Haltom City	2003	2003	2003	2002	2003	2003	N/A	N/A	N/A
Harker Heights	2009	2009	2008	2008	2009	2009	N/A	2006	2009 IFC, 2009 IFGC
Harlingen									
Houston									
Huntsville	2003	2003	2003	2005	2003	2003	N/A	N/A	2003 IFC, 2003 IFGC, 2003 IPMC
Hurst	2003	2003	2003	2005	2003	2003	N/A	N/A	2003 IPMC
Irving	2006	2006	2006	2008	2006	2006	N/A	N/A	2006 IFC, 2006 IFGC
Keller	2006	2006	2006	2008	2006	2006	N/A	N/A	2006 IFGC
Killeen									
Kingsville									
Kyle	2000	2000	2000	1999	2000	2000	N/A	N/A	2000 IPMC
La Porte									
Lake Jackson									
Lancaster	2003	2003	2003	2002	2003	2003	N/A	N/A	2003 IPMC
San Antonio									
San Benito	2009	2009	2009	N/A	2009	2009	N/A	N/A	2009 IFGC, 2009 IPMC, 2009 IWUIC
San Juan	2006	2006	2006	2008	2006	2006	N/A	2006	2006 IFC/Hurricane Resistant Residential Construction
San Marcos									
Schertz									
Seguin	2006	2006	2006	2005	2006	2006	N/A	2006	N/A
Sherman	2006	2006	2006	2005	2006	2006	N/A	N/A	N/A
Socorro	2003	2003	2003	2003	2003	2003	2003	2003	N/A
Southlake	2006	2006	2006	2008	2006	2006	N/A	N/A	N/A
Sugar Land	2003	2003	2003	2005	2003	2003	N/A	2003	2003 IFC, 2003 IFGC, 2003 IPMC
Temple	2006	2006	2006	2008	2006	2006	N/A	N/A	2006 IFGC, 2006 IPMC
Texarkana									
Texas City	2006	2006	2006	2006	2006	2006	2006	2006	N/A
The Colony	2006	2006	2006	2008	2006	2006	N/A	N/A	N/A
Tyler									
Victoria									
Waco *	2009	2009	2009	2008	2009	2009	N/A	2009	2009 IFC, 2009 IFGC, 2009 IPMC
Waxahachie									
Weatherford									
Weslaco									
Wichita Falls	2006	2006	2006	2008	2006	2006	N/A	2006	N/A

Section 388.009 of HB 3235 requires the Laboratory to develop and administer a state-wide training program for municipal building inspectors who seek to become code-certified inspectors. To accomplish this, the Laboratory originally developed the Energy Code Workshops which were based on the 2006 International Energy Conservation Code (IECC) as published by the International Code Council (ICC) for residential and commercial buildings, with amendments. Since then, the Laboratory has updated the workshops to the 2009 IECC. During 2011, the Laboratory provided various energy-code-related trainings through projects funded by the State Energy Conservation Office, which began in previous years. These included:

- 2009 IECC Commercial Provisions Training;
- 2009 IECC Residential Provisions Training;

- 2009 IECC Fundamentals for Commercial Provisions Training; and
- 2009 IECC Fundamentals for Residential Provisions Training.

In October 2009 the Laboratory was awarded a grant from the State Energy Conservation Office to conduct a new training series, **"**Green is Mainstream: Energy Codes, Energy Efficiency and Best Practices in Green Building" Workshops to educate builders, city building officials, architects, engineers, apprentices, building trades' instructors, students and homeowners on ways to reduce construction costs, lower homeowner's energy bills, and minimize environmental impacts. Twenty-seven workshops were provided at Texas home builders associations around Texas from 2009-2011. In 2011, the 8 last workshops of this project were held in January. These 8 workshops included 261 participants.

From April 2010-June 2011, the Laboratory lead the "EE/RE Training Program", which was ARRA funded through the Texas Workforce Commission and involved 6 sub-recipients. The project included: (a) Development of 5 curricula related to the 2009 IECC and EE/RE topics (curricula is available on ESL website); (b) Development and delivery of 3 levels of 2009 IECC overview courses, and 3 hands-on technical skills training. Overall, the project exceeded the original goal of 650 eligible trainees by over 35% and reached 881 trainees through a series of 45 workshops and online trainings. In 2011 alone, the project included 27 workshops with 493 participants, and provided online training to 124 participants.

In addition, in July 2011, the Laboratory was awarded a grant from the State Energy Conservation Office to conduct ASHRAE Standard 90.1-2010 Workshops across the State of Texas. By the end of 2011, seven workshops from this grant were held, with a total of 265 participants. In 2011also saw three online

The total number of workshops held by the Energy Systems Laboratory for the year 2011 was 67 with 1250 participants.

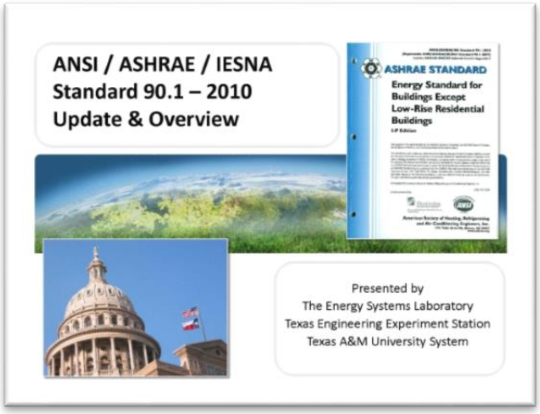
Table 5: List of all short courses/workshops conducted in 2011

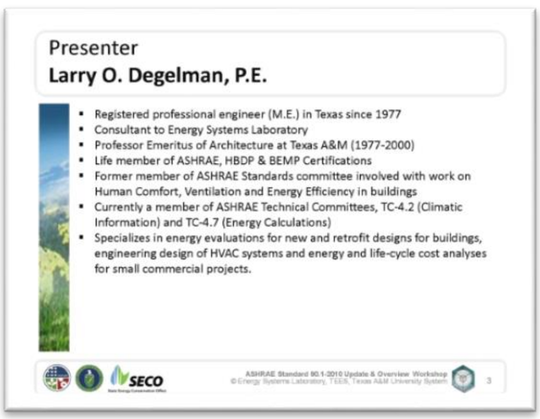
Course Title	Date	Location	Attendance
Green is Mainstream	1/18/2011	Dallas, TX	15
Green is Mainstream	1/18/2011	Dallas, TX	23
Green is Mainstream	1/20/2011	Houston, TX	78
Green is Mainstream	1/24/2011	College Station, TX	13
Green is Mainstream	1/24/2011	College Station , TX	32
Green is Mainstream	1/25/2011	Prairie View A&M , TX	57
Green is Mainstream	1/25/2011	Prairie View A&M , TX	12
Special Topic Hands-on: Performance Testing Requirements in the Code	1/26/2011	Frisco, TX	19
Green is Mainstream	1/27/2011	Addison, TX	31
Special Topic Hands-on: Duct Total Leakage Testing at Rough-in	1/27/2011	Frisco, TX	20
Special Topic Hands-on: Air Infiltration Testing & Duct Leakage to Outside	1/27/2011	Frisco, TX	18
Special Topic Hands-on: Performance Testing Requirements in the Code	2/22/2011	Lufkin, TX	13
2009 IECC Overview Basic	2/22/2011	Lufkin, TX	2
2009 IECC Overview Intermediate	2/22/2011	Lufkin, TX	3
Special Topic Hands-on: Duct Total Leakage Testing at Rough-in	2/23/2011	Lufkin, TX	13
Special Topic Hands-on: Air Infiltration Testing & Duct Leakage to Outside	2/23/2011	Lufkin, TX	13
2009 IECC Overview Advanced	2/23/2011	Lufkin, TX	3
2009 IECC Overview Basic	3/7/2011	Tyler, TX	29
2009 IECC Overview Intermediate	3/7/2011	Tyler, TX	45
Special Topic Hands-on: Performance Testing Requirements in the Code	3/7/2011	Tyler, TX	17
Introductory Presentation on Proposed Certification Endorsements	3/8/2011	Tyler, TX	12
2009 IECC Overview Advanced	3/8/2011	Tyler, TX	32
Special Topic Hands-on: Duct Total Leakage Testing at Rough-in	3/8/2011	Tyler, TX	15
Special Topic Hands-on: Air Infiltration Testing & Duct Leakage to Outside	3/8/2011	Tyler, TX	15
2009 IECC Commercial Provisions	3/17/2011	Arlington, TX	34
Introductory Presentation on Proposed Certification Endorsements	3/29/2011	College Station, TX	9
Special Topic Hands-on: Performance Testing Requirements in the Code	3/29/2011	College Station, TX	16
2009 IECC Overview Basic	3/29/2011	College Station, TX	9
2009 IECC Overview Intermediate	3/29/2011	College Station, TX	12
Introductory Presentation on Proposed Certification Endorsements	3/30/2011	College Station, TX	4

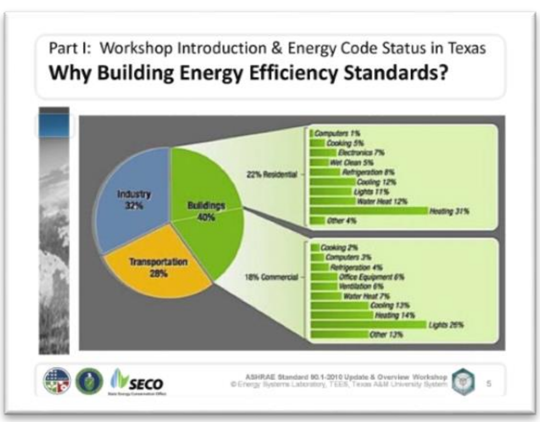
Table 5: List of all short courses/workshops conducted in 2011(continued)

Special Topic Hands-on: Duct Total Leakage Testing at Rough-in	3/30/2011	College Station, TX	16
Special Topic Hands-on: Air Infiltration Testing & Duct Leakage to Outside	3/30/2011	College Station, TX	16
2009 IECC Overview Advanced	3/30/2011	College Station, TX	10
2009 IECC Overview Basic	6/7/2011	Grapevine, TX	45
2009 IECC Overview Intermediate	6/7/2011	Grapevine, TX	27
Special Topic Hands-on: Performance Testing Requirements in the Code	6/7/2011	Grapevine, TX	22
Special Topic Hands-on: Duct Total Leakage Testing at Rough-in	6/8/2011	Grapevine, TX	21
Special Topic Hands-on: Air Infiltration Testing & Duct Leakage to Outside	6/8/2011	Grapevine, TX	20
2009 IECC Overview Advanced	6/8/2011	Grapevine, TX	22
2009 IECC Residential Provisions	7/21/2011	Mansfield, TX	32
ASHRAE Standard 90.0-2010	7/29/2011	Houston, TX	26
2009 IECC Fundamentals for Commercial Provisions	8/16/2011	Rosenberg, TX	8
2009 IECC Fundamentals for Residential Provisions	8/17/2011	Rosenberg, TX	8
ASHRAE Standard 90.0-2010	8/25/2011	Austin, TX	58
ASHRAE Standard 90.0-2010	9/21/2011	Dallas, TX	55
ASHRAE Standard 90.0-2010	10/3/ 2011	Lubbock, TX	46
ASHRAE Standard 90.0-2010	11/7/2011	Dallas, TX	19
ASHRAE Standard 90.0-2010	11/18/2011	El Paso, TX	33
ASHRAE Standard 90.0-2010	11/29/2011	Edinburgh, TX	28
Total of 64 workshops			**1,126**
2009 IECC Overview Basic	1/25/11-5/31/11	TX	44
2009 IECC Overview Intermediate	1/25/11-5/31/11	TX	39
2009 IECC Overview Advanced	1/25/11-5/31/11	TX	38
Total online training (3 available courses)			**124**
Total Trainees			**1,250**

Slides from the ASHRAE 90.1 Standard Update Workshops which were presented all in six different locations in the State of Texas in 2011.







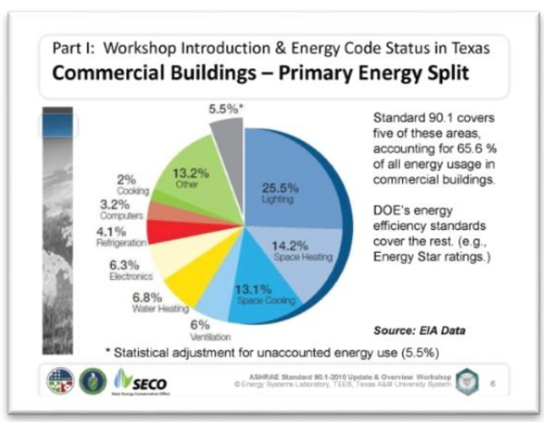
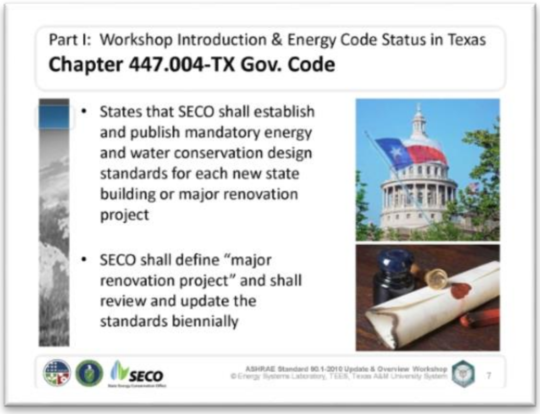
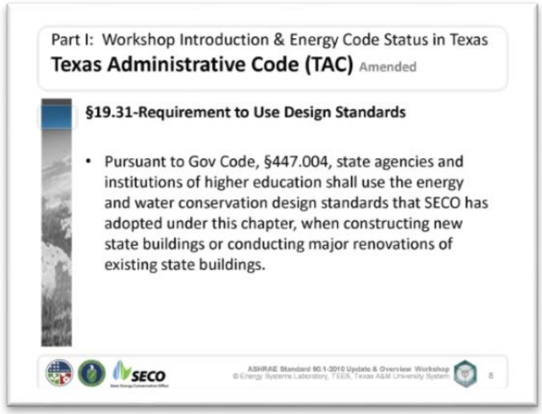
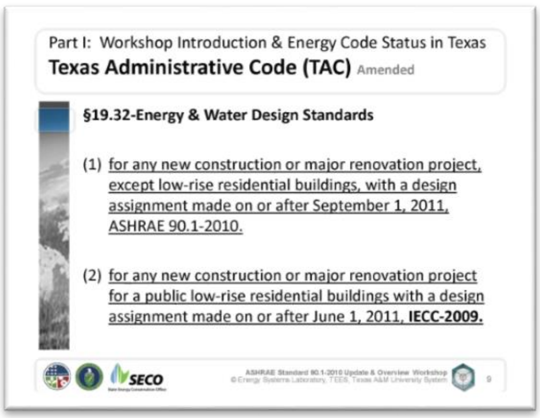
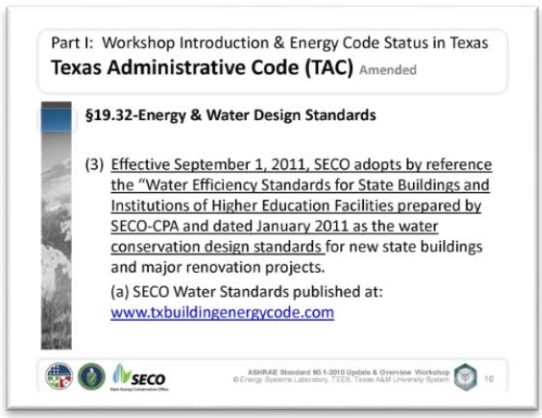


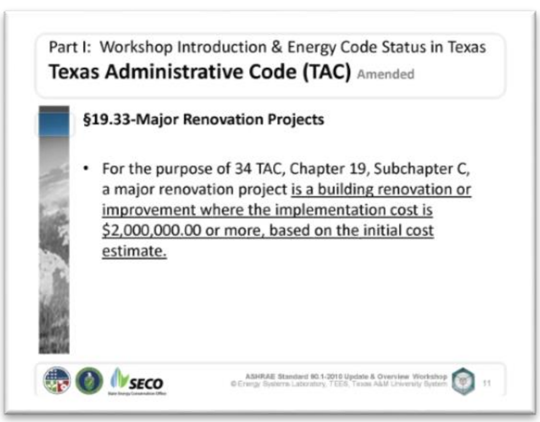
Figure 24: ASHRAE 90.1 Standard Update Workshop











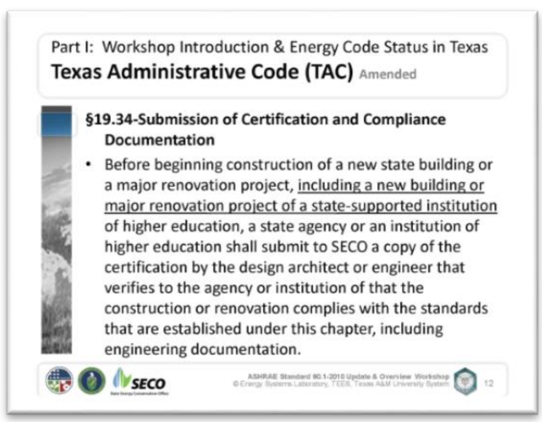
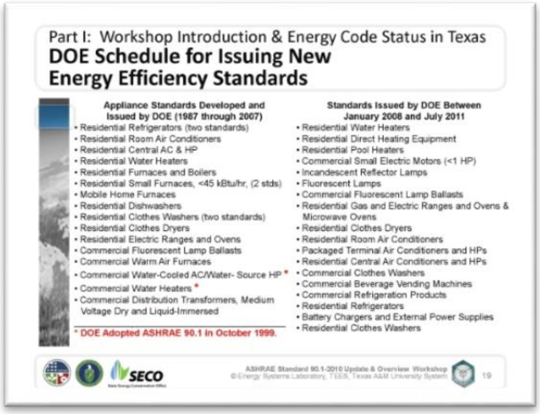
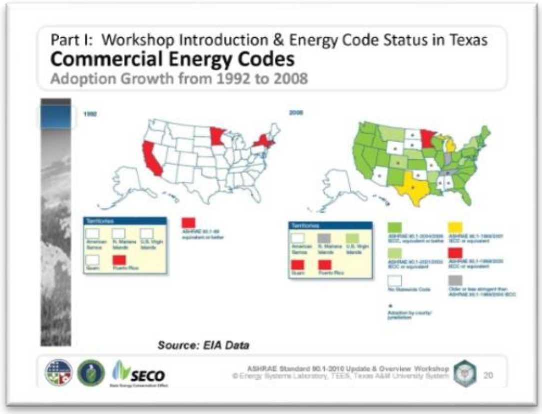
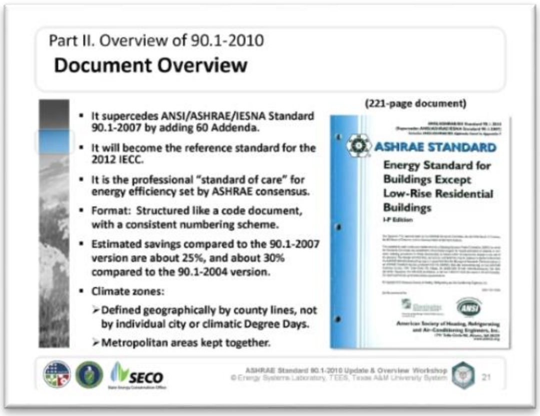


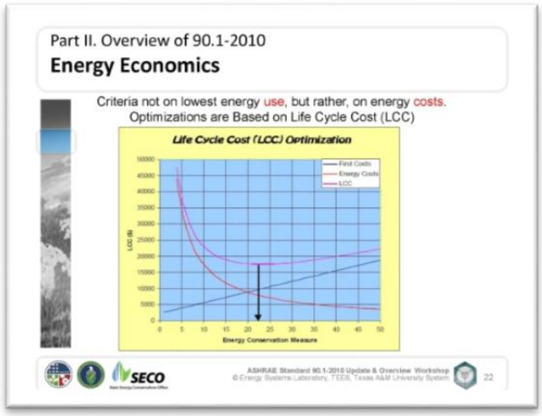
Figure 24: ASHRAE 90.1 Standard Update Workshop (continued)

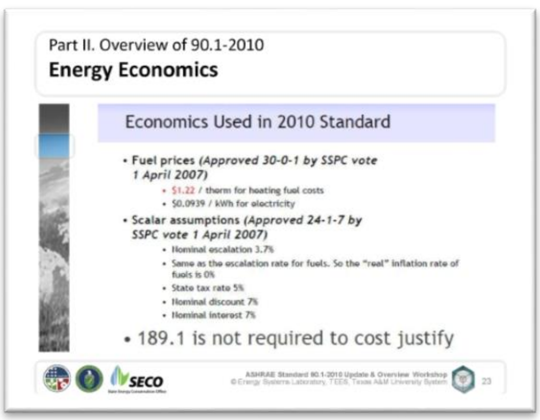
Figure 24: ASHRAE 90.1 Standard Update Workshop (continued)











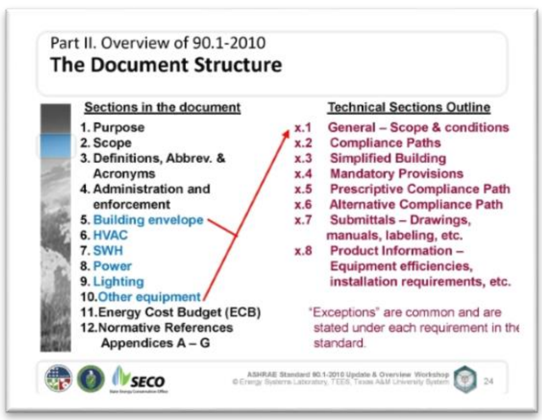
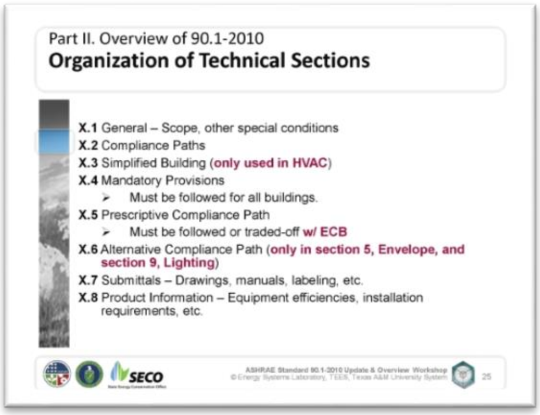
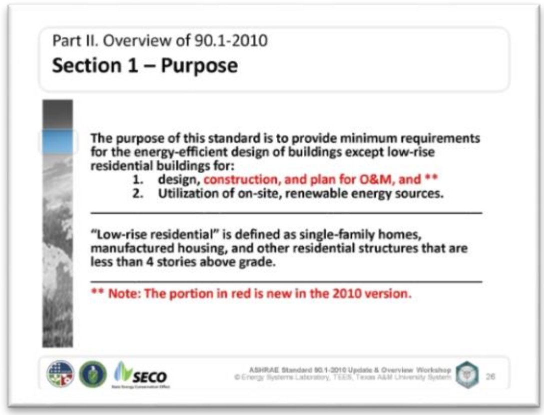
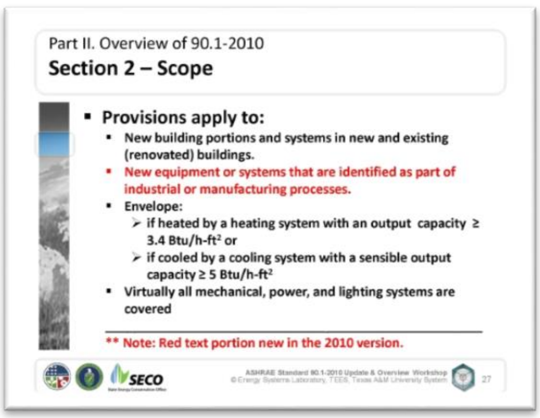
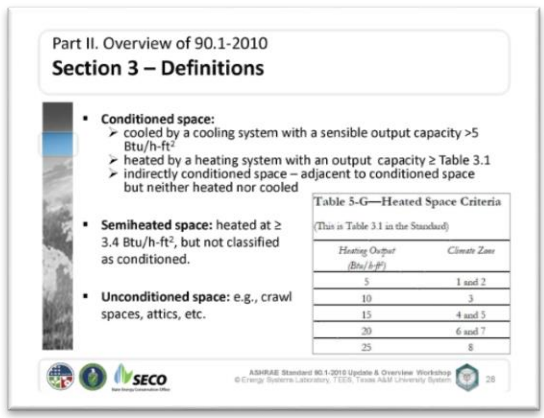


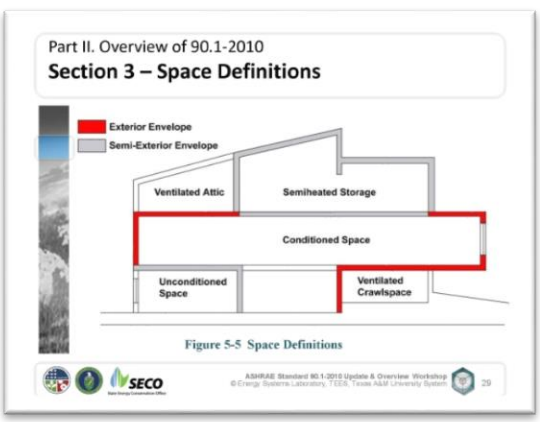
Figure 24: ASHRAE 90.1 Standard Update Workshop (continued)











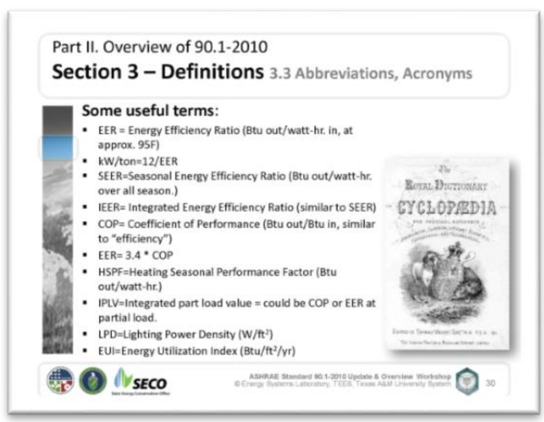
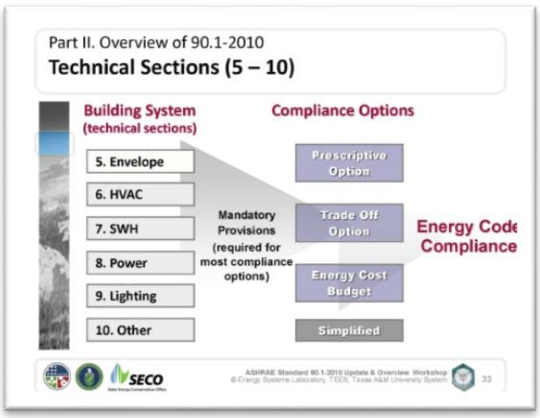
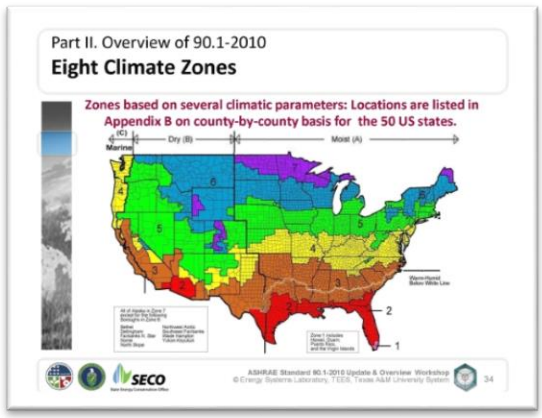
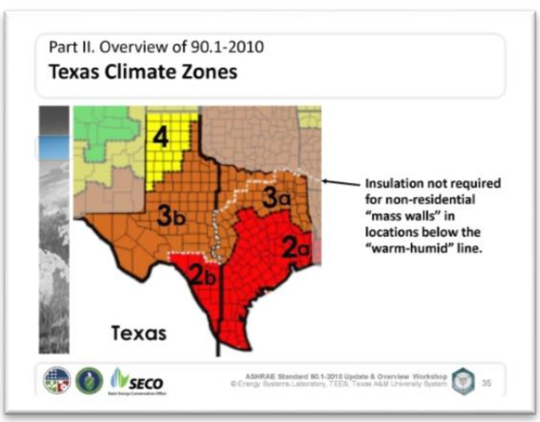


Figure 24: ASHRAE 90.1 Standard Update Workshop (continued)







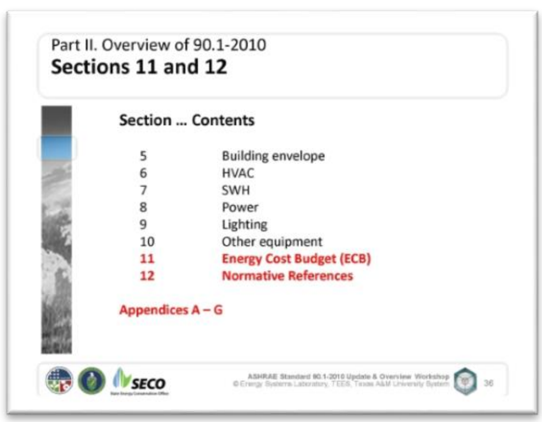
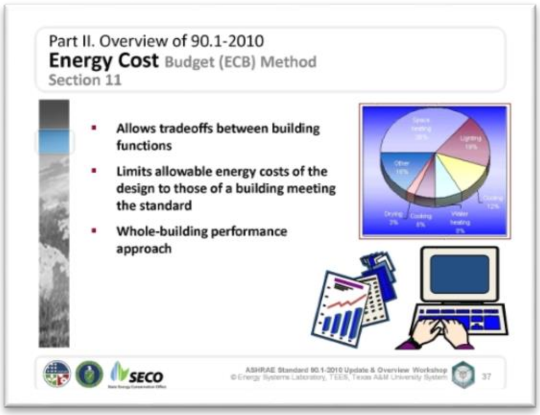
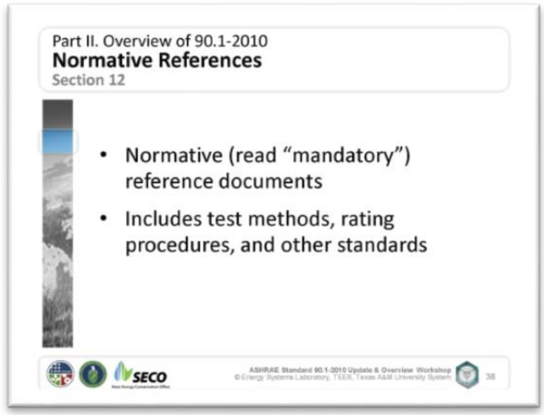
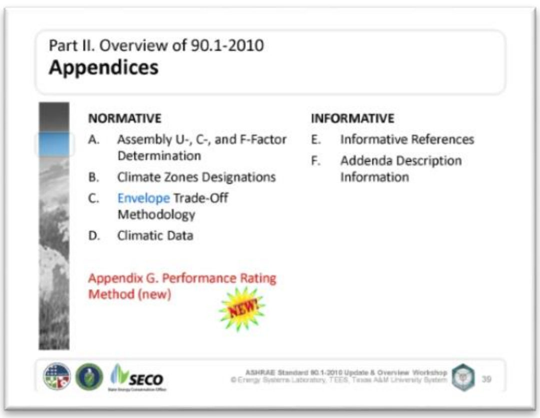
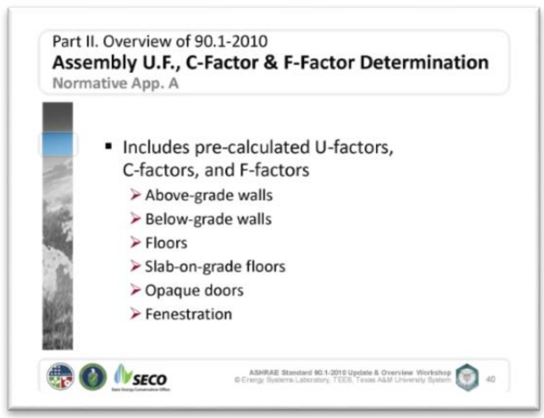


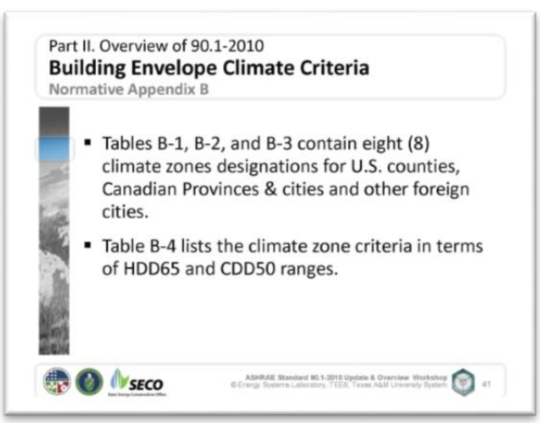
Figure 24: ASHRAE 90.1 Standard Update Workshop (continued)











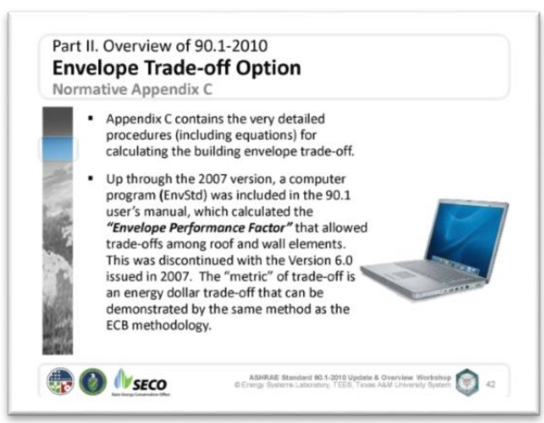
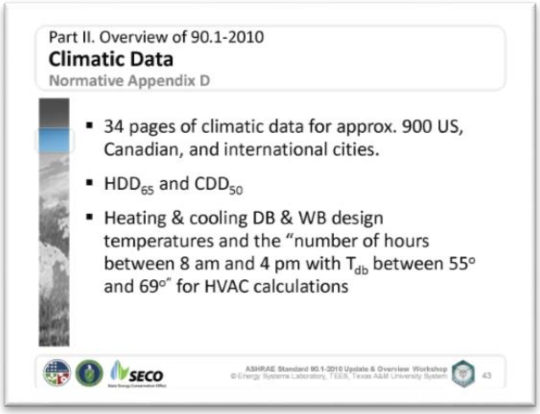
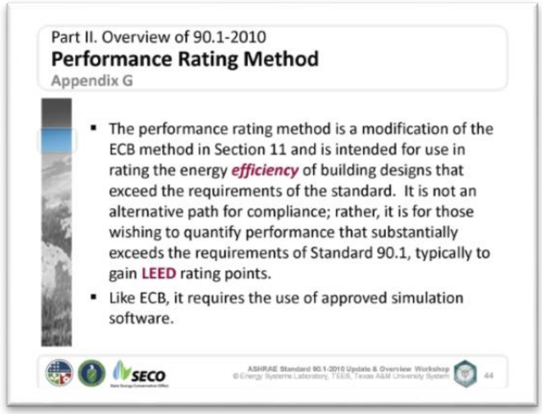
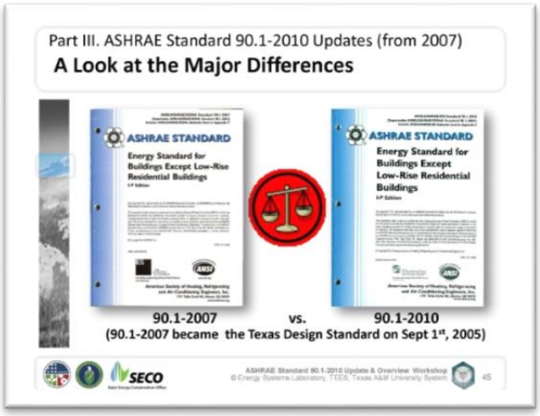
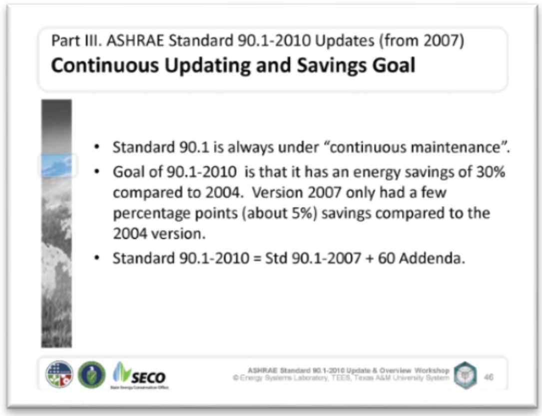


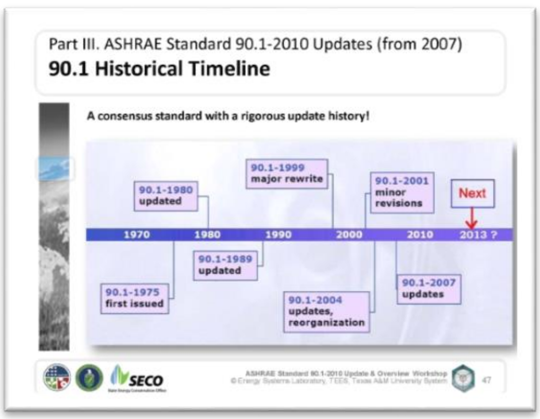
Figure 24: ASHRAE 90.1 Standard Update Workshop (continued)











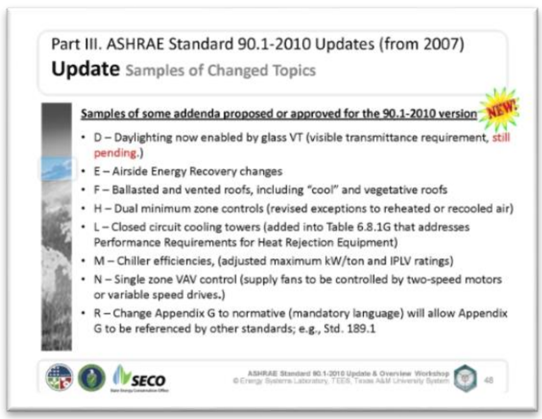
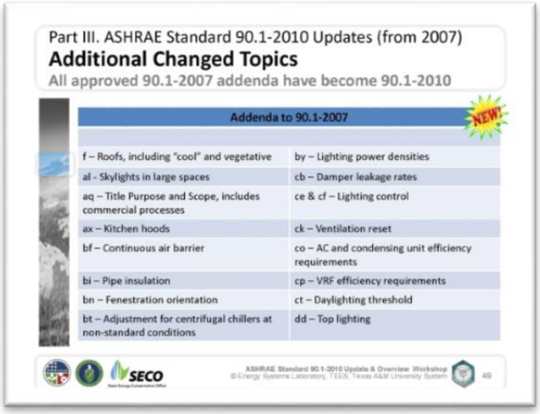
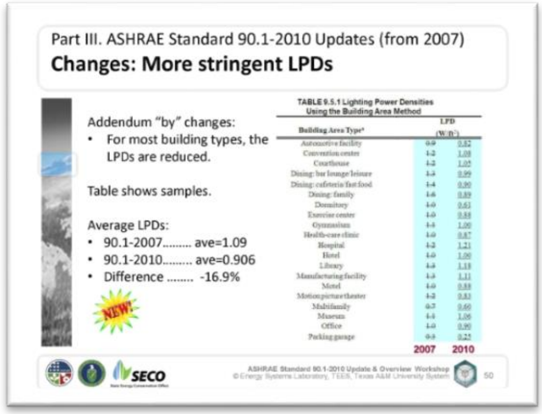
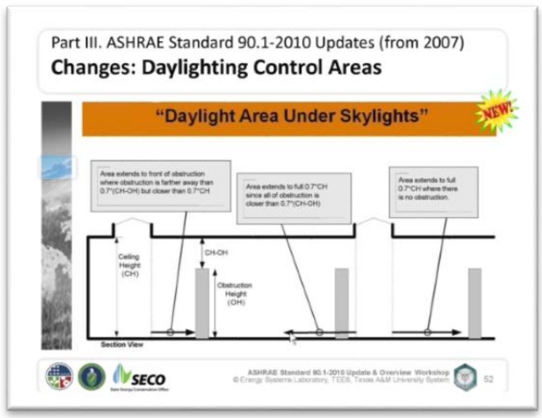
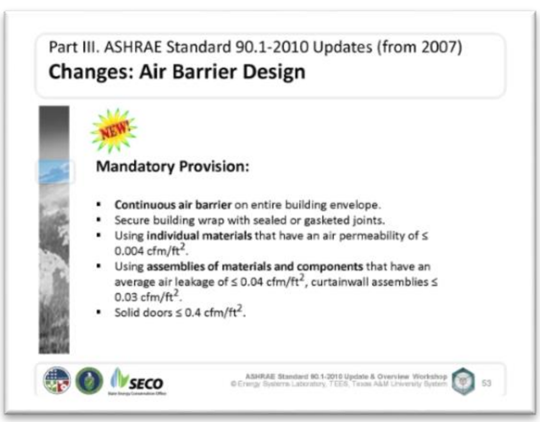


Figure 24: ASHRAE 90.1 Standard Update Workshop (continued)









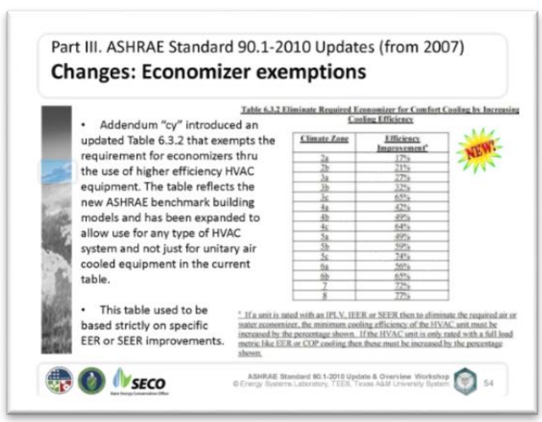
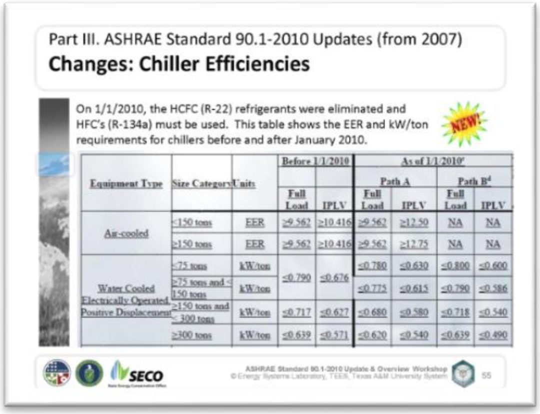
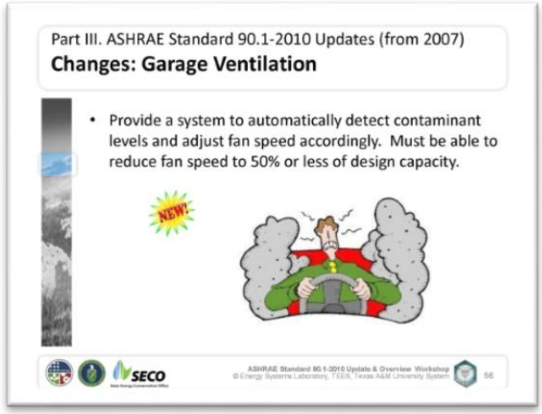
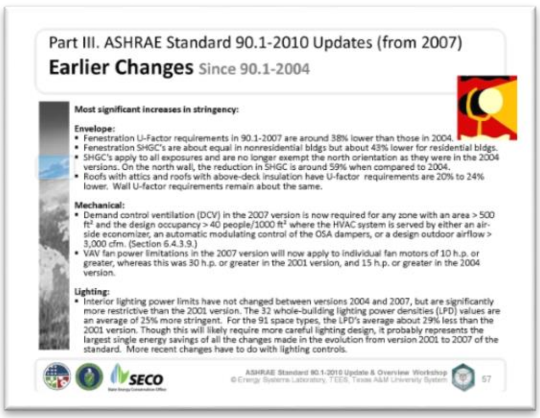
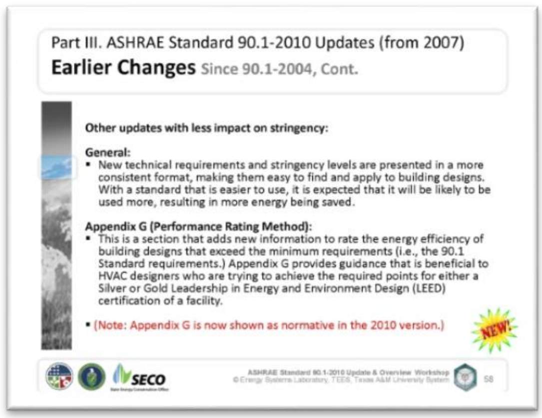


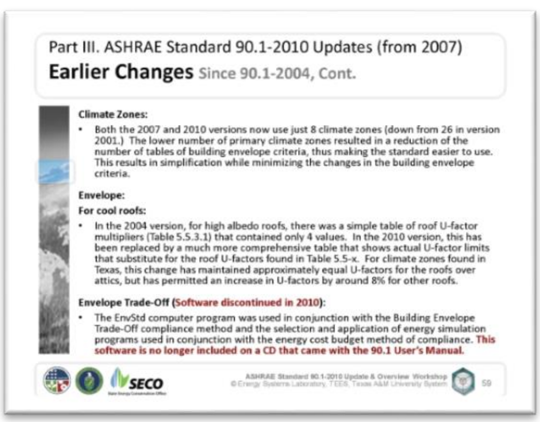
Figure 24: ASHRAE 90.1 Standard Update Workshop (continued)











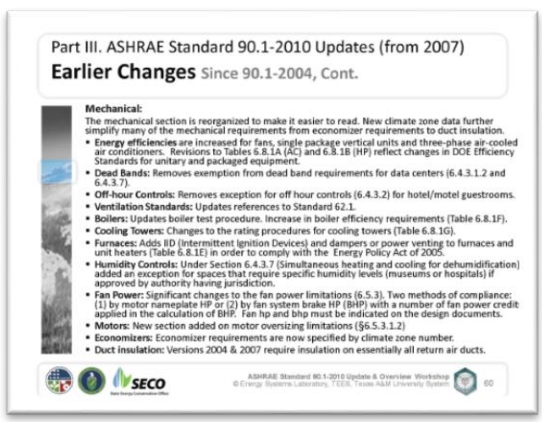
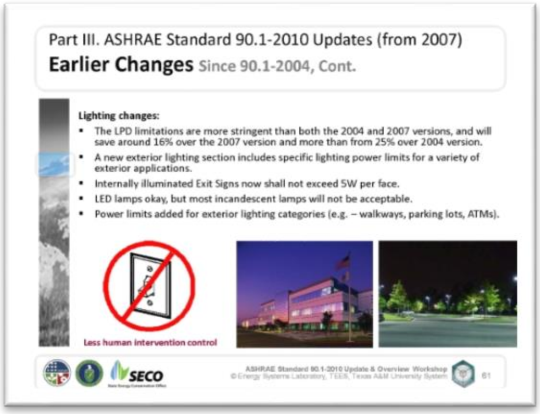
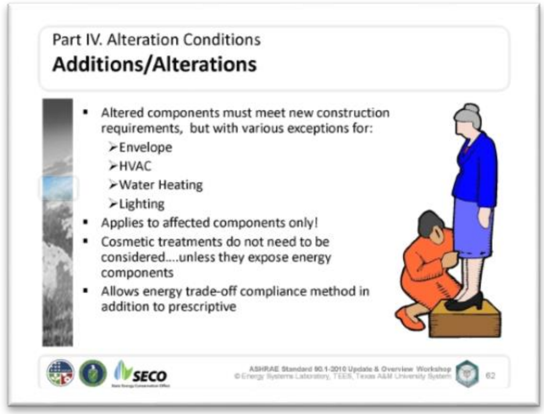
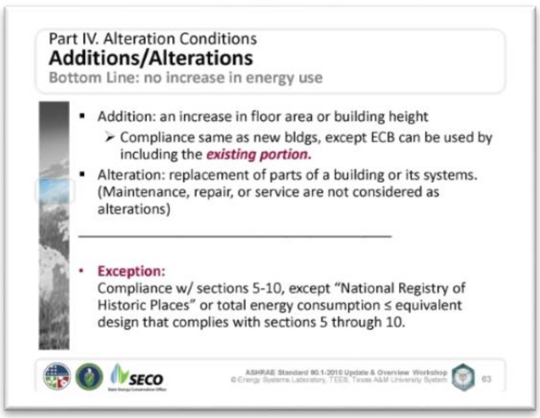
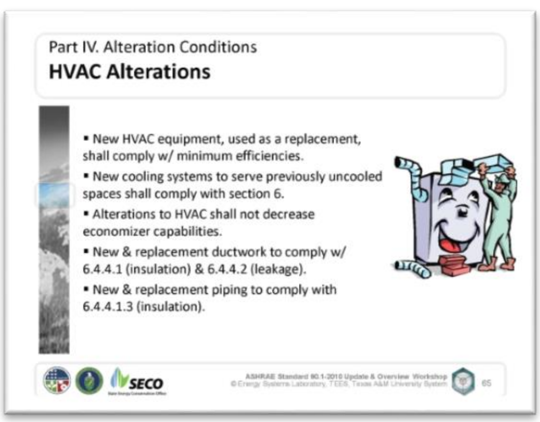


Figure 24: ASHRAE 90.1 Standard Update Workshop (continued)









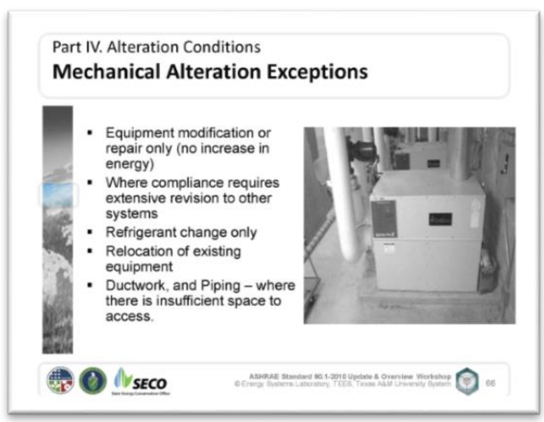
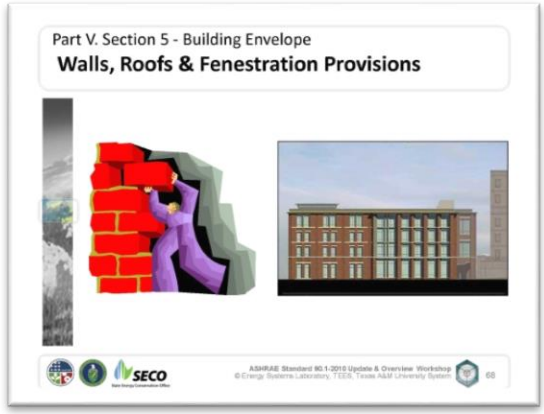
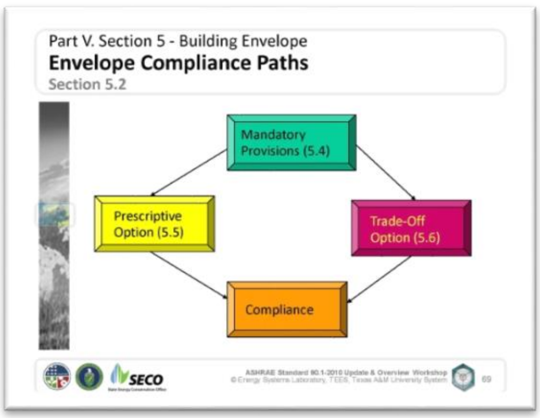
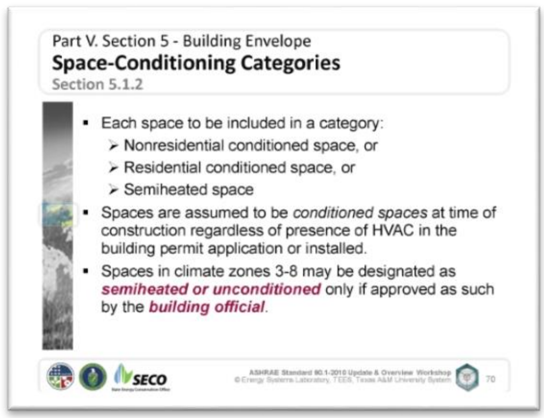
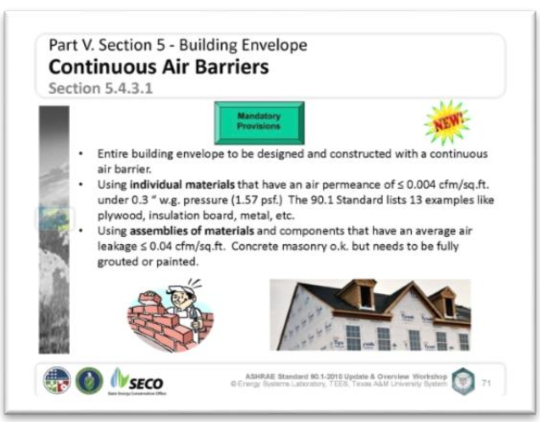


Figure 24: ASHRAE 90.1 Standard Update Workshop (continued)









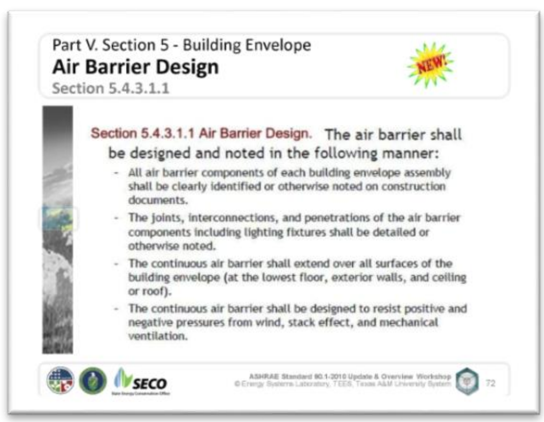
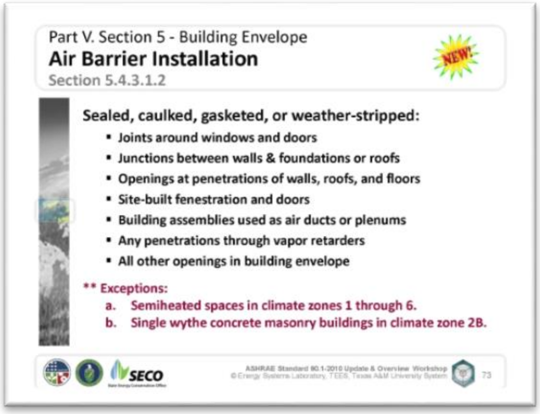
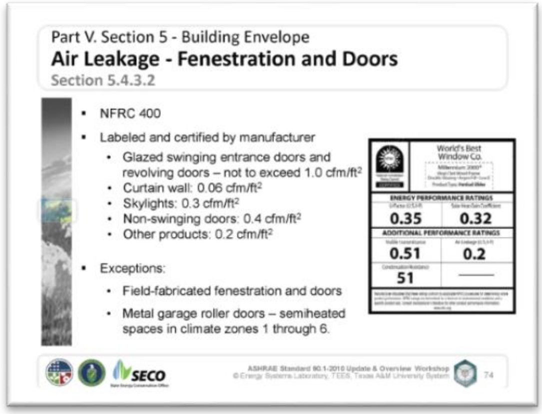
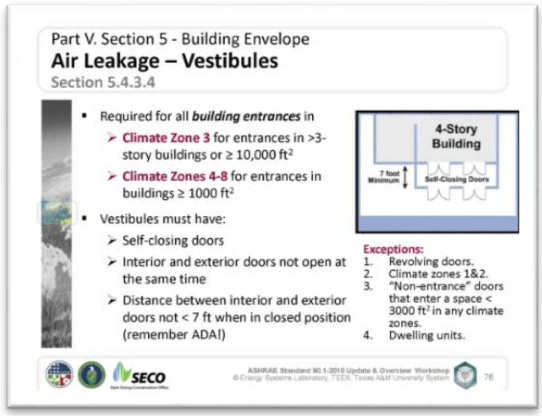
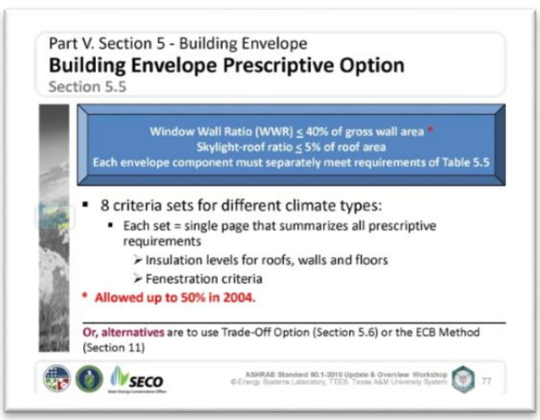


Figure 24: ASHRAE 90.1 Standard Update Workshop (continued)









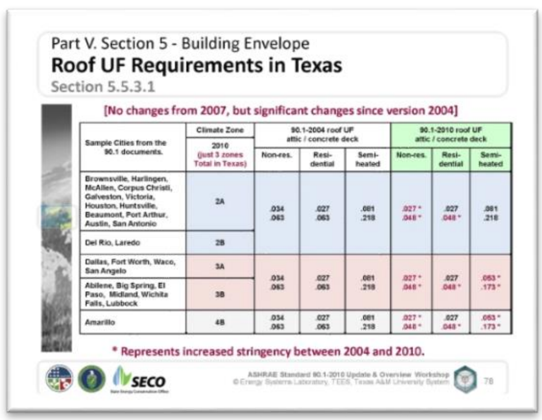
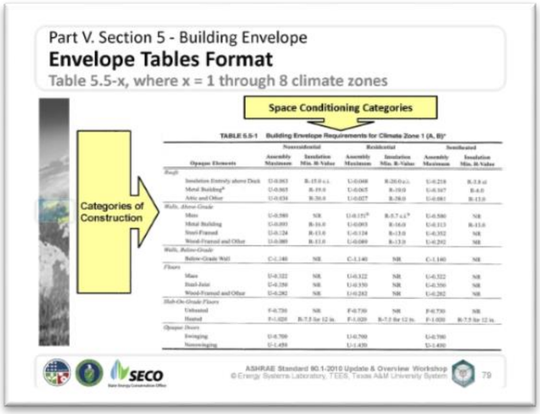
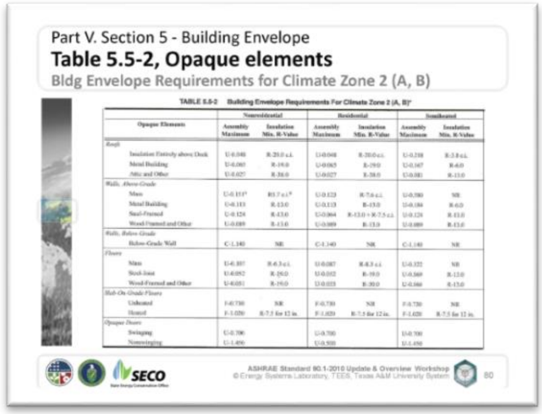
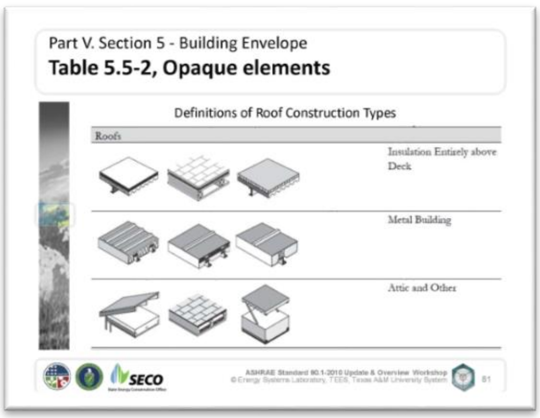
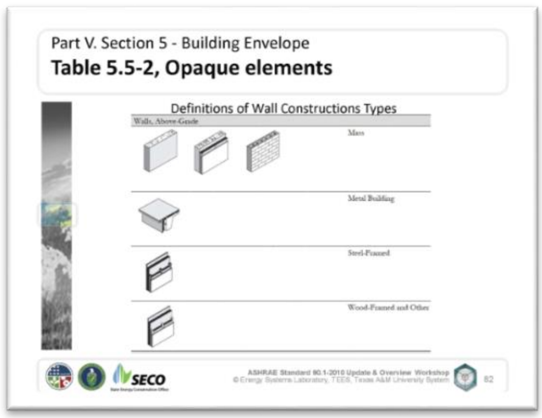


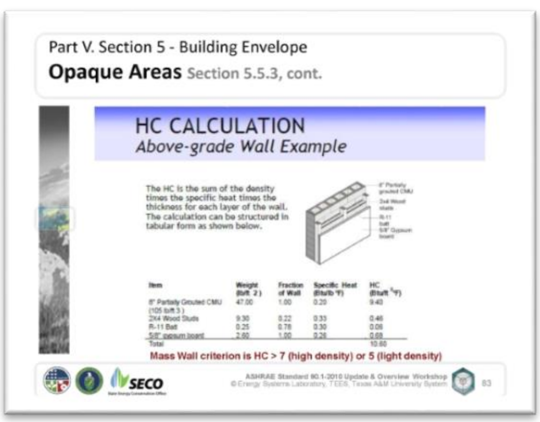
Figure 24: ASHRAE 90.1 Standard Update Workshop (continued)











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8" Partially Grouted CMU (105 lb/ft 3)	47.00	1.00	0.20	9.40
2X4 Wood Studs	9.30	0.22	0.33	0.46
R-11 Batt	0.25	0.78	0.30	0.06
5/8" gypsum board	2.60	1.00	0.26	0.68
Total				10.60

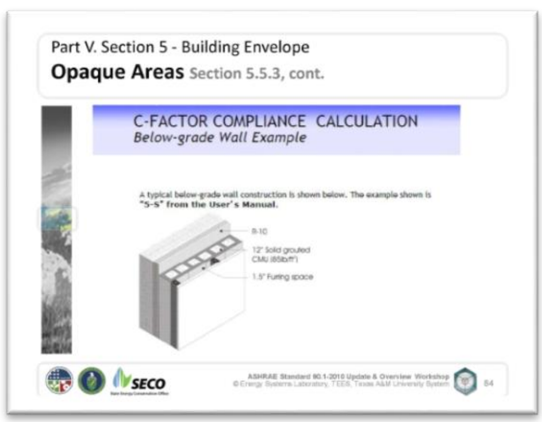
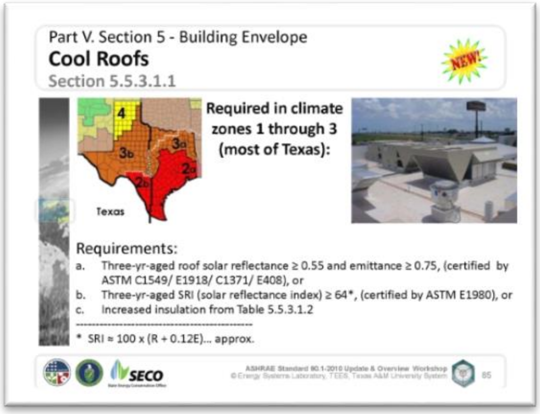
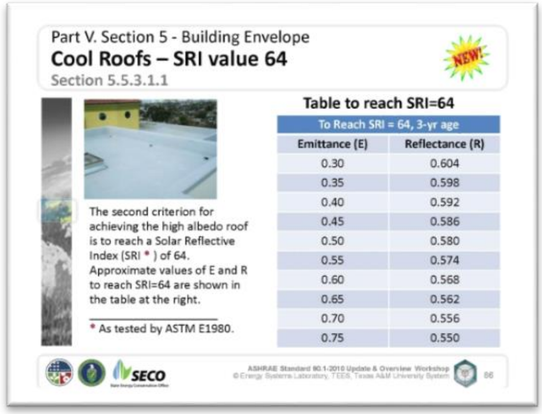
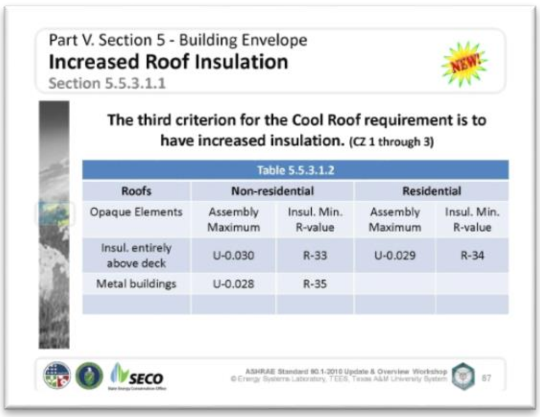
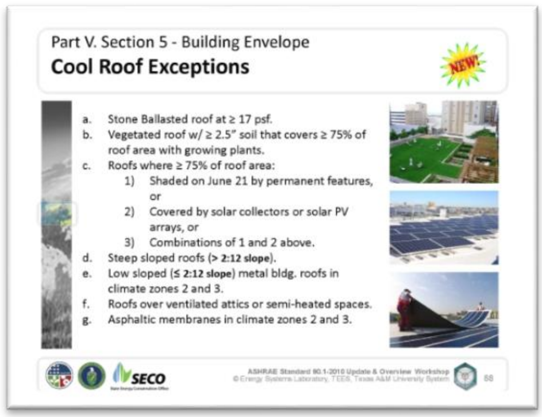


Figure 24: ASHRAE 90.1 Standard Update Workshop (continued)









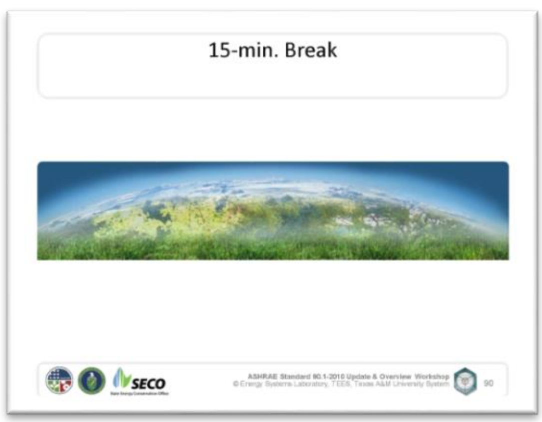


Figure 24: ASHRAE 90.1 Standard Update Workshop (continued)

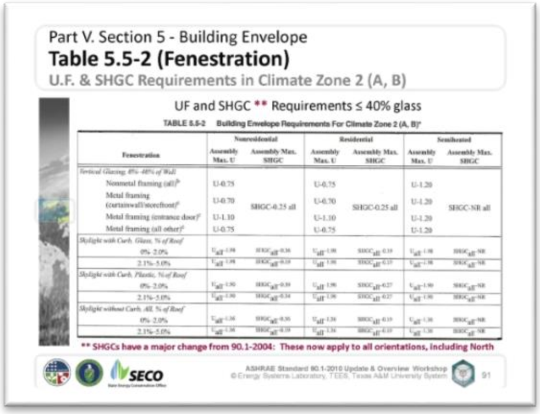
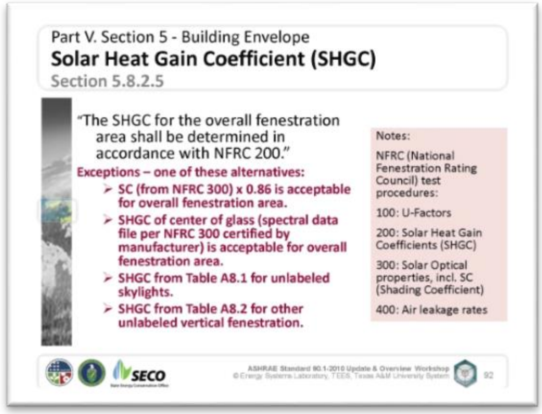
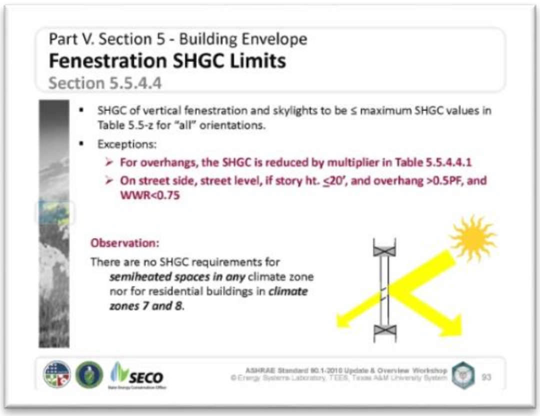


TABLE 5.5-2 Building Envelope Requirements For Climate Zone 2 (A, B)*

Fenestration	Nonresidential Assembly Max. U	Nonresidential Assembly Max. SHGC	Residential Assembly Max. U	Residential Assembly Max. SHGC	Semiheated Assembly Max. U	Semiheated Assembly Max. SHGC
Vertical Glazing, 0%–40% of Wall						
Nonmetal framing (all)[b]	U-0.75	SHGC-0.25 all	U-0.75	SHGC-0.25 all	U-1.20	SHGC-NR all
Metal framing (curtainwall/storefront)[c]	U-0.70		U-0.70		U-1.20	
Metal framing (entrance door)[c]	U-1.10		U-1.10		U-1.20	
Metal framing (all other)[c]	U-0.75		U-0.75		U-1.20	
Skylight with Curb, Glass, % of Roof						
0%–2.0%	U_{all}-1.98	$SHGC_{all}$-0.36	U_{all}-1.98	$SHGC_{all}$-0.19	U_{all}-1.98	$SHGC_{all}$-NR
2.1%–5.0%	U_{all}-1.98	$SHGC_{all}$-0.19	U_{all}-1.98	$SHGC_{all}$-0.19	U_{all}-1.98	$SHGC_{all}$-NR
Skylight with Curb, Plastic, % of Roof						
0%–2.0%	U_{all}-1.90	$SHGC_{all}$-0.39	U_{all}-1.90	$SHGC_{all}$-0.27	U_{all}-1.90	$SHGC_{all}$-NR
2.1%–5.0%	U_{all}-1.90	$SHGC_{all}$-0.34	U_{all}-1.90	$SHGC_{all}$-0.27	U_{all}-1.90	$SHGC_{all}$-NR
Skylight without Curb, All, % of Roof						
0%–2.0%	U_{all}-1.36	$SHGC_{all}$-0.36	U_{all}-1.36	$SHGC_{all}$-0.19	U_{all}-1.36	$SHGC_{all}$-NR
2.1%–5.0%	U_{all}-1.36	$SHGC_{all}$-0.19	U_{all}-1.36	$SHGC_{all}$-0.19	U_{all}-1.36	$SHGC_{all}$-NR





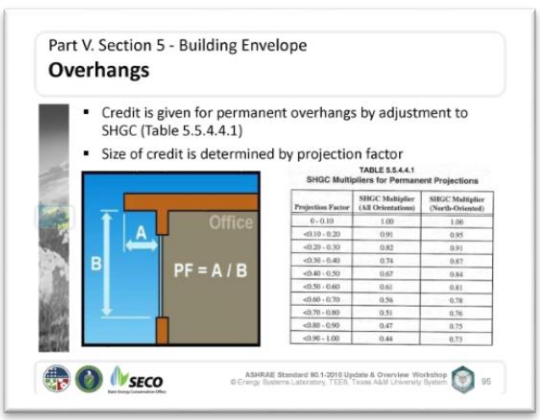


TABLE 5.5.4.4.1
SHGC Multipliers for Permanent Projections

Projection Factor	SHGC Multiplier (All Orientations)	SHGC Multiplier (North-Oriented)
0 - 0.10	1.00	1.00
<0.10 - 0.20	0.91	0.95
<0.20 - 0.30	0.82	0.91
<0.30 - 0.40	0.74	0.87
<0.40 - 0.50	0.67	0.84
<0.50 - 0.60	0.61	0.81
<0.60 - 0.70	0.56	0.78
<0.70 - 0.80	0.51	0.76
<0.80 - 0.90	0.47	0.75
<0.90 - 1.00	0.44	0.73

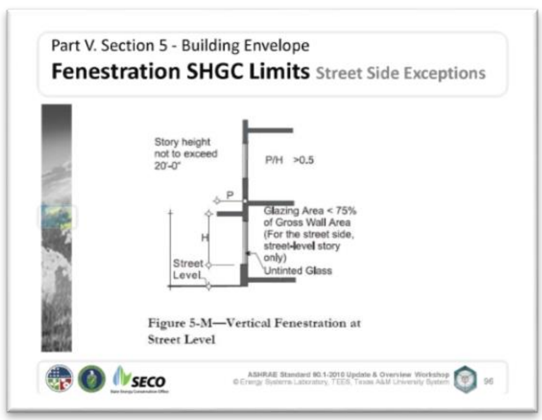
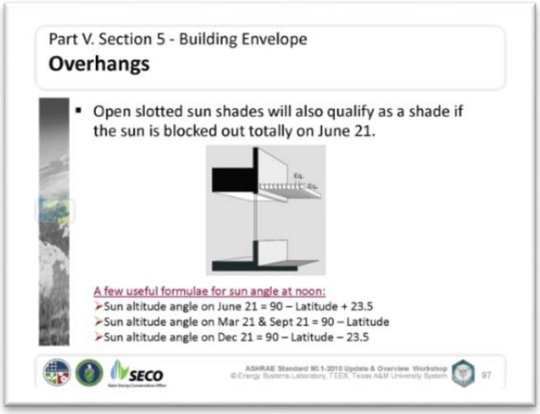
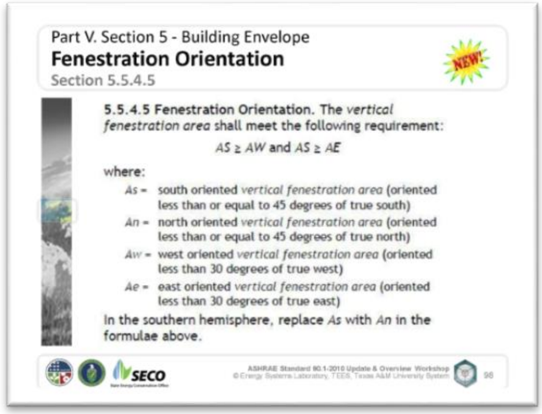
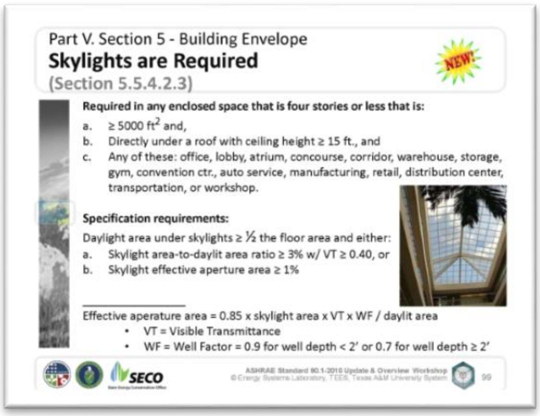
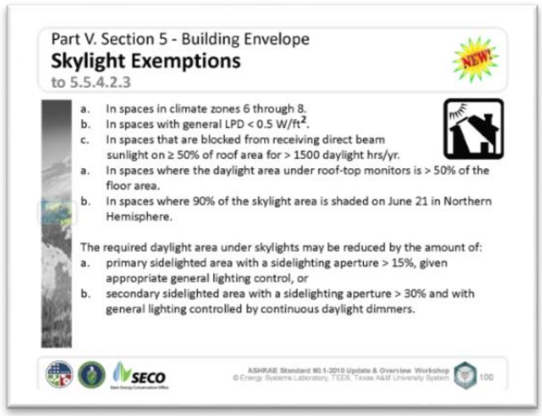


Figure 24: ASHRAE 90.1 Standard Update Workshop (continued)









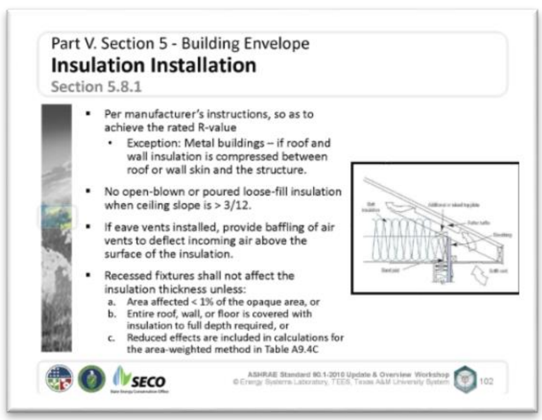
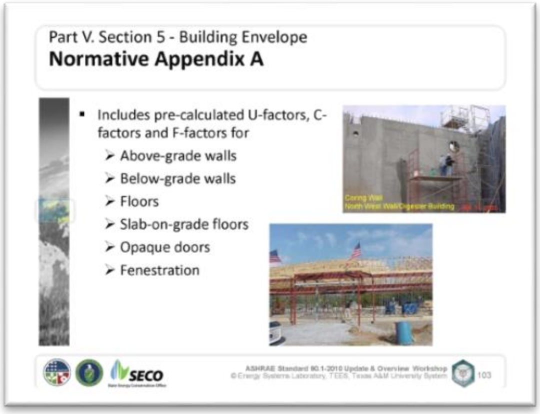
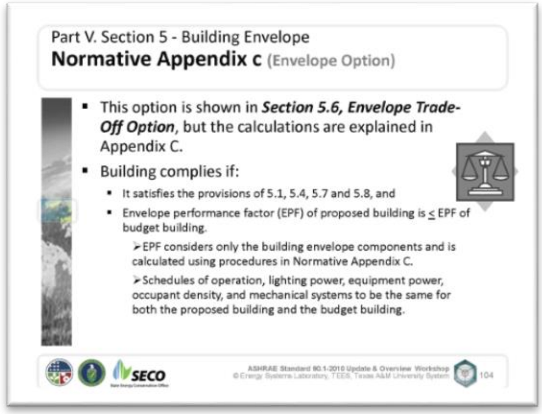
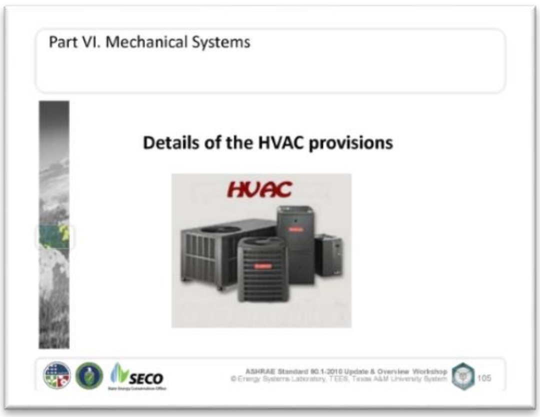
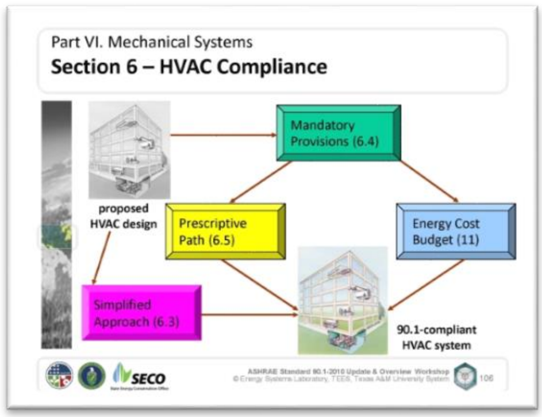


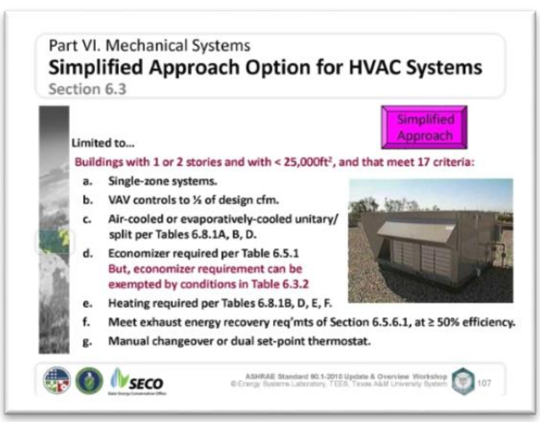
Figure 24: ASHRAE 90.1 Standard Update Workshop (continued)











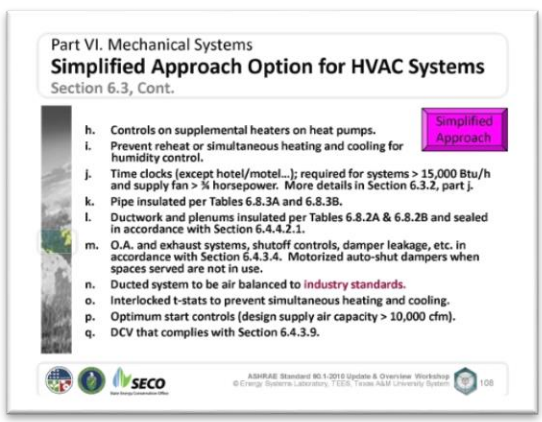
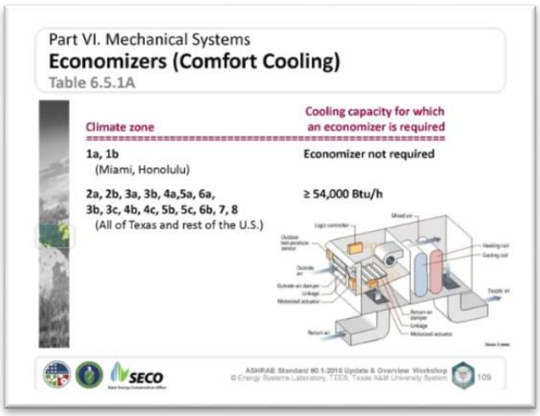
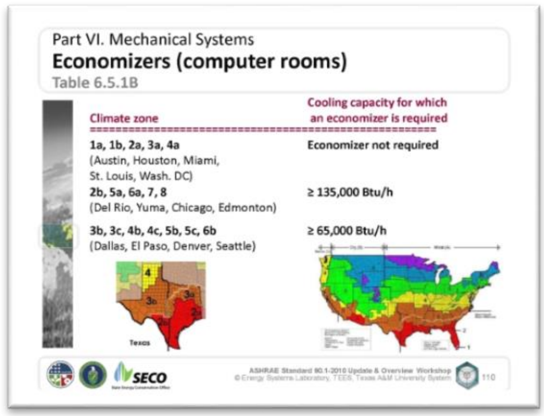
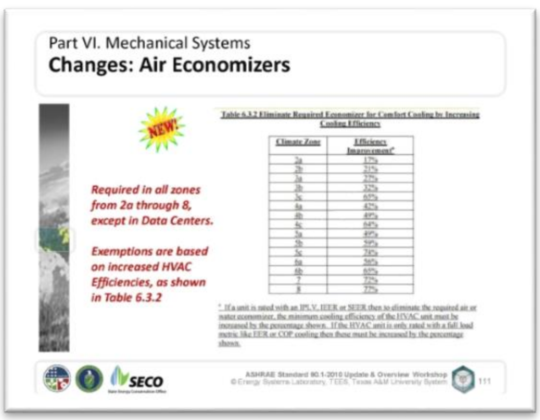
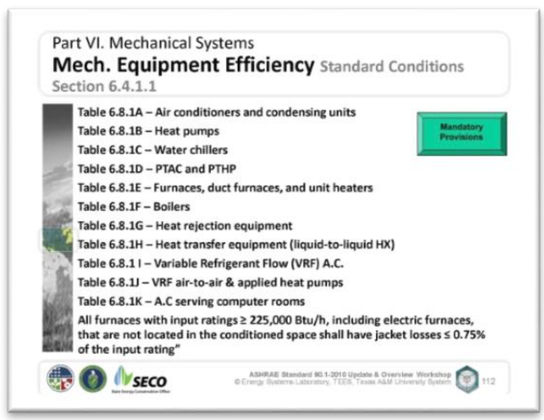


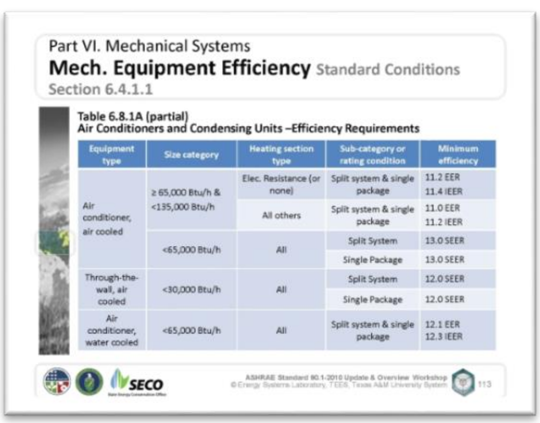
Figure 24: ASHRAE 90.1 Standard Update Workshop (continued)











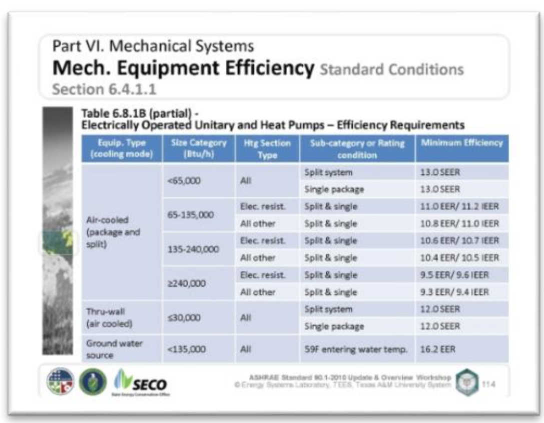
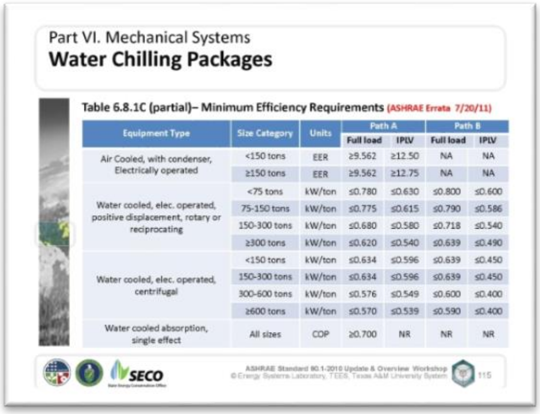


Figure 24: ASHRAE 90.1 Standard Update Workshop (continued)



Part VI. Mechanical Systems

Water Chilling Packages

Table 6.8.1C (partial)– Minimum Efficiency Requirements (ASHRAE Errata 7/20/11)

Equipment Type	Size Category	Units	Path A		Path B	
			Full load	IPLV	Full load	IPLV
Air Cooled, with condenser, Electrically operated	<150 tons	EER	≥9.562	≥12.50	NA	NA
	≥150 tons	EER	≥9.562	≥12.75	NA	NA
Water cooled, elec. operated, positive displacement, rotary or reciprocating	<75 tons	kW/ton	≤0.780	≤0.630	≤0.800	≤0.600
	75-150 tons	kW/ton	≤0.775	≤0.615	≤0.790	≤0.586
	150-300 tons	kW/ton	≤0.680	≤0.580	≤0.718	≤0.540
	≥300 tons	kW/ton	≤0.620	≤0.540	≤0.639	≤0.490
Water cooled, elec. operated, centrifugal	<150 tons	kW/ton	≤0.634	≤0.596	≤0.639	≤0.450
	150-300 tons	kW/ton	≤0.634	≤0.596	≤0.639	≤0.450
	300-600 tons	kW/ton	≤0.576	≤0.549	≤0.600	≤0.400
	≥600 tons	kW/ton	≤0.570	≤0.539	≤0.590	≤0.400
Water cooled absorption, single effect	All sizes	COP	≥0.700	NR	NR	NR

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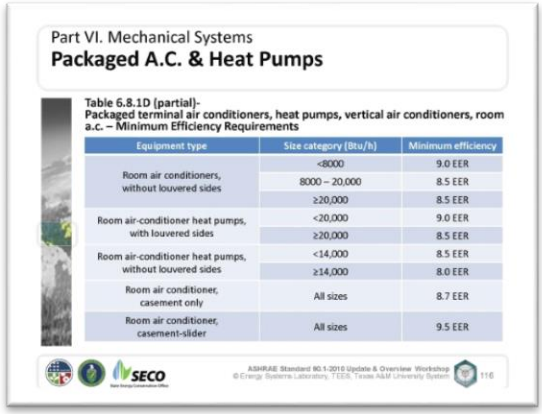

Part VI. Mechanical Systems

Packaged A.C. & Heat Pumps

Table 6.8.1D (partial)-
Packaged terminal air conditioners, heat pumps, vertical air conditioners, room a.c. – Minimum Efficiency Requirements

Equipment type	Size category (Btu/h)	Minimum efficiency
Room air conditioners, without louvered sides	<8000	9.0 EER
	8000 – 20,000	8.5 EER
	≥20,000	8.5 EER
Room air-conditioner heat pumps, with louvered sides	<20,000	9.0 EER
	≥20,000	8.5 EER
Room air-conditioner heat pumps, without louvered sides	<14,000	8.5 EER
	≥14,000	8.0 EER
Room air conditioner, casement only	All sizes	8.7 EER
Room air conditioner, casement-slider	All sizes	9.5 EER

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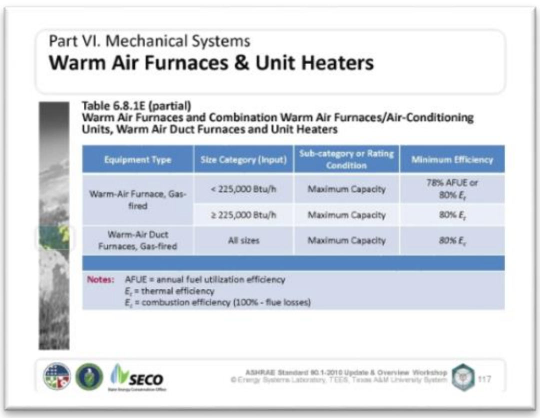

Part VI. Mechanical Systems

Warm Air Furnaces & Unit Heaters

Table 6.8.1E (partial)
Warm Air Furnaces and Combination Warm Air Furnaces/Air-Conditioning Units, Warm Air Duct Furnaces and Unit Heaters

Equipment Type	Size Category (Input)	Sub-category or Rating Condition	Minimum Efficiency
Warm-Air Furnace, Gas-fired	< 225,000 Btu/h	Maximum Capacity	78% AFUE or 80% E_t
	≥ 225,000 Btu/h	Maximum Capacity	80% E_t
Warm-Air Duct Furnaces, Gas-fired	All sizes	Maximum Capacity	80% E_c

Notes: AFUE = annual fuel utilization efficiency
E_t = thermal efficiency
E_c = combustion efficiency (100% - flue losses)

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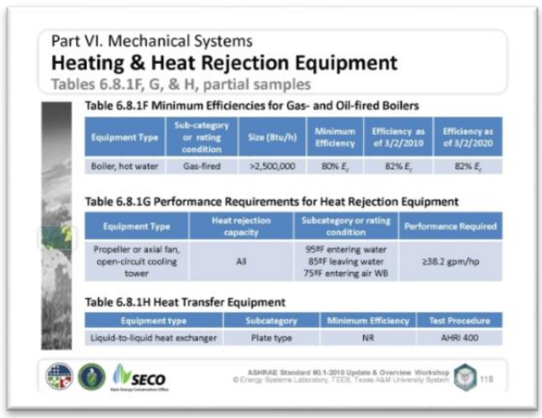

Part VI. Mechanical Systems

Heating & Heat Rejection Equipment

Tables 6.8.1F, G, & H, partial samples

Table 6.8.1F Minimum Efficiencies for Gas- and Oil-fired Boilers

Equipment Type	Sub-category or rating condition	Size (Btu/h)	Minimum Efficiency	Efficiency as of 3/2/2010	Efficiency as of 3/2/2020
Boiler, hot water	Gas-fired	>2,500,000	80% E_c	82% E_c	82% E_c

Table 6.8.1G Performance Requirements for Heat Rejection Equipment

Equipment Type	Heat rejection capacity	Subcategory or rating condition	Performance Required
Propeller or axial fan, open-circuit cooling tower	All	95ºF entering water 85ºF leaving water 75ºF entering air WB	≥38.2 gpm/hp

Table 6.8.1H Heat Transfer Equipment

Equipment type	Subcategory	Minimum Efficiency	Test Procedure
Liquid-to-liquid heat exchanger	Plate type	NR	AHRI 400

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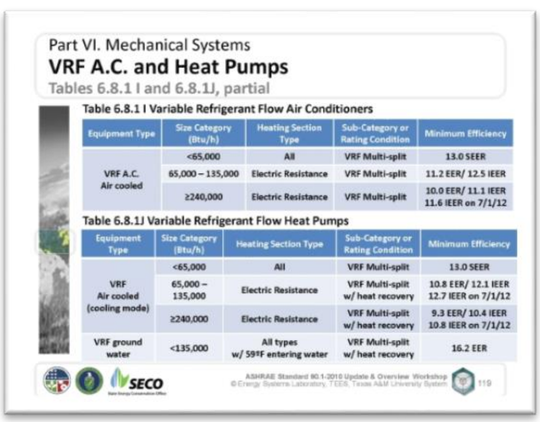

Part VI. Mechanical Systems

VRF A.C. and Heat Pumps

Tables 6.8.1 I and 6.8.1J, partial

Table 6.8.1 I Variable Refrigerant Flow Air Conditioners

Equipment Type	Size Category (Btu/h)	Heating Section Type	Sub-Category or Rating Condition	Minimum Efficiency
VRF A.C. Air cooled	<65,000	All	VRF Multi-split	13.0 SEER
	65,000 – 135,000	Electric Resistance	VRF Multi-split	11.2 EER/ 12.5 IEER
	≥240,000	Electric Resistance	VRF Multi-split	10.0 EER/ 11.1 IEER 11.6 IEER on 7/1/12

Table 6.8.1J Variable Refrigerant Flow Heat Pumps

Equipment Type	Size Category (Btu/h)	Heating Section Type	Sub-Category or Rating Condition	Minimum Efficiency
VRF Air cooled (cooling mode)	<65,000	All	VRF Multi-split	13.0 SEER
	65,000 – 135,000	Electric Resistance	VRF Multi-split w/ heat recovery	10.8 EER/ 12.1 IEER 12.7 IEER on 7/1/12
	≥240,000	Electric Resistance	VRF Multi-split w/ heat recovery	9.3 EER/ 10.4 IEER 10.8 IEER on 7/1/12
VRF ground water	<135,000	All types w/ 59ºF entering water	VRF Multi-split w/ heat recovery	16.2 EER

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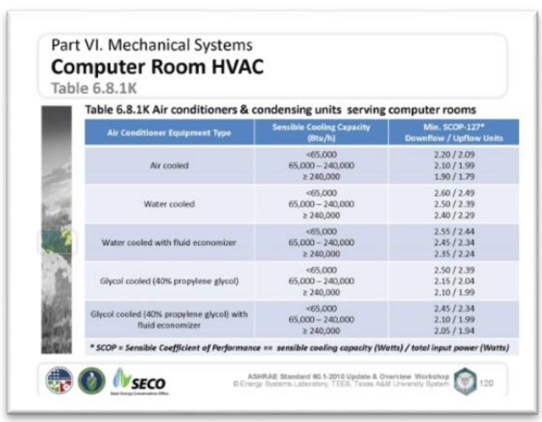

Part VI. Mechanical Systems

Computer Room HVAC

Table 6.8.1K

Table 6.8.1K Air conditioners & condensing units serving computer rooms

Air Conditioner Equipment Type	Sensible Cooling Capacity (Btu/h)	Min. SCOP-127* Downflow / Upflow Units
Air cooled	<65,000 65,000 – 240,000 ≥ 240,000	2.20 / 2.09 2.10 / 1.99 1.90 / 1.79
Water cooled	<65,000 65,000 – 240,000 ≥ 240,000	2.60 / 2.49 2.50 / 2.39 2.40 / 2.29
Water cooled with fluid economizer	<65,000 65,000 – 240,000 ≥ 240,000	2.55 / 2.44 2.45 / 2.34 2.35 / 2.24
Glycol cooled (40% propylene glycol)	<65,000 65,000 – 240,000 ≥ 240,000	2.50 / 2.39 2.15 / 2.04 2.10 / 1.99
Glycol cooled (40% propylene glycol) with fluid economizer	<65,000 65,000 – 240,000 ≥ 240,000	2.45 / 2.34 2.10 / 1.99 2.05 / 1.94

* SCOP = Sensible Coefficient of Performance == sensible cooling capacity (Watts) / total input power (Watts)

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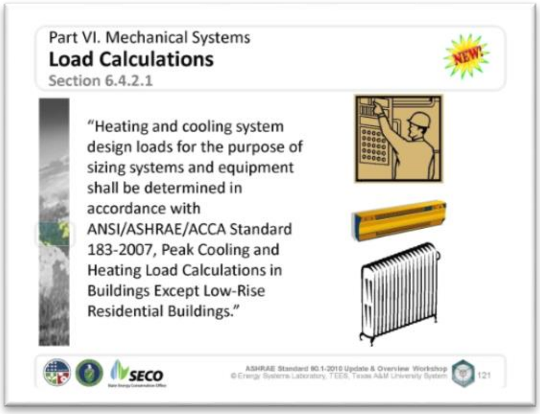
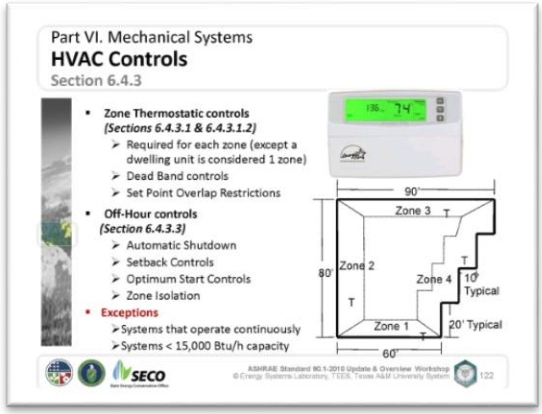
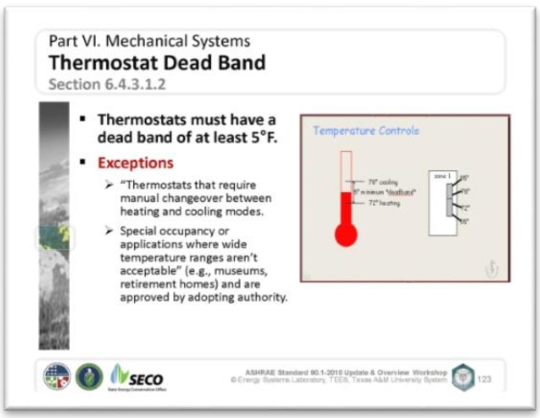
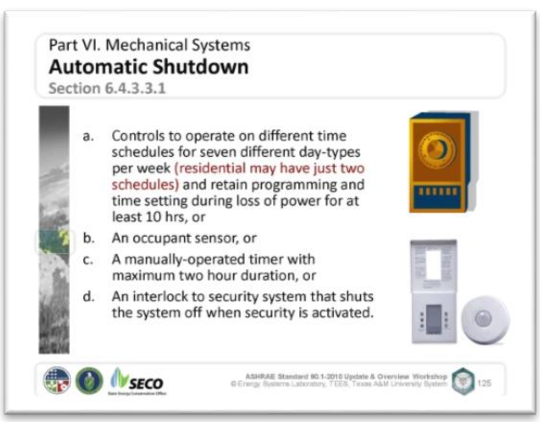
Figure 24: ASHRAE 90.1 Standard Update Workshop (continued)









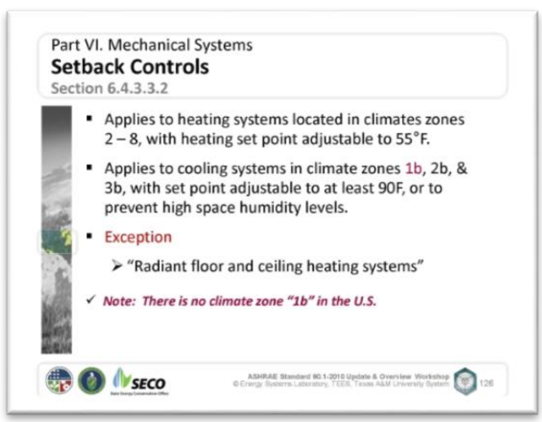
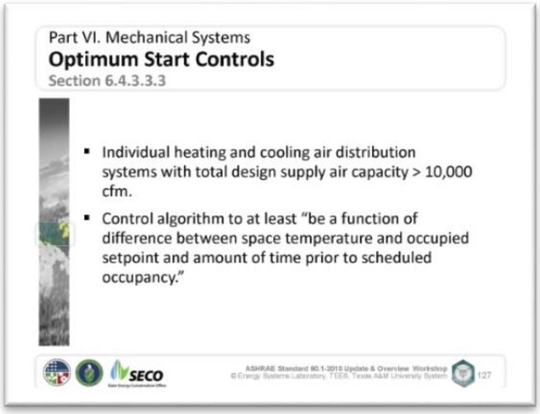
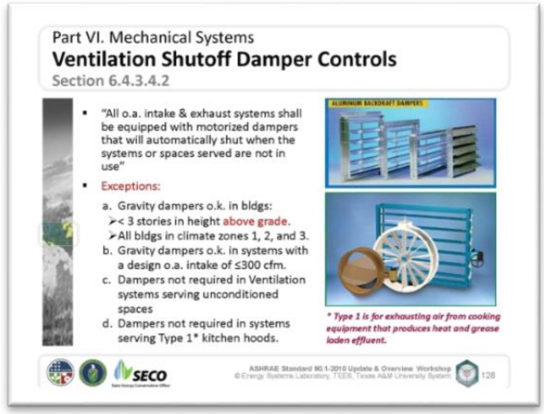
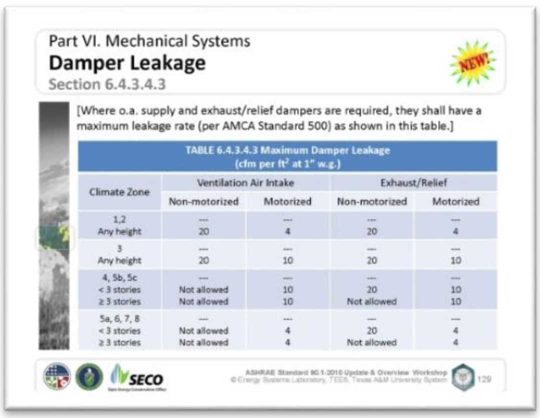
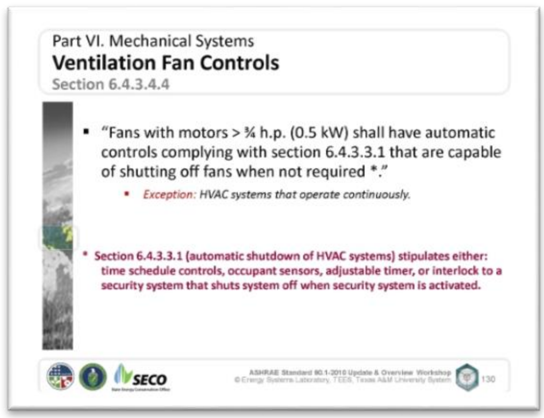


Figure 24: ASHRAE 90.1 Standard Update Workshop (continued)









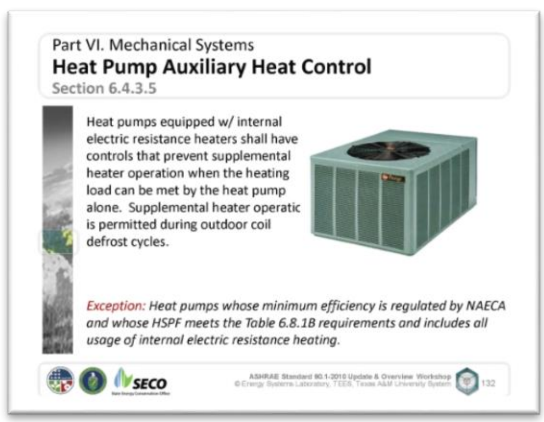
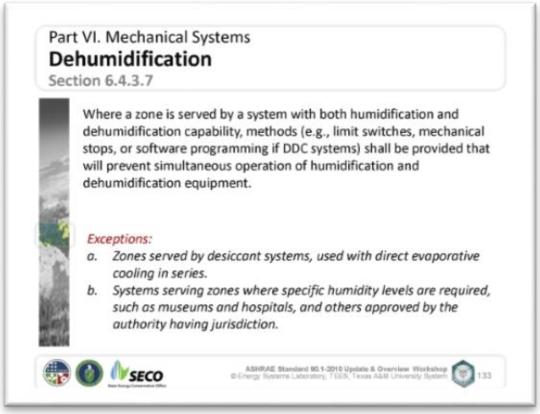
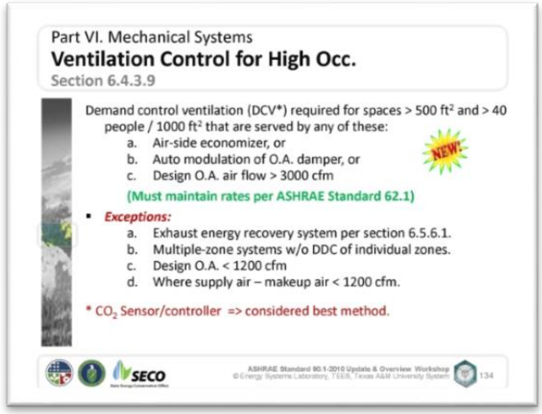
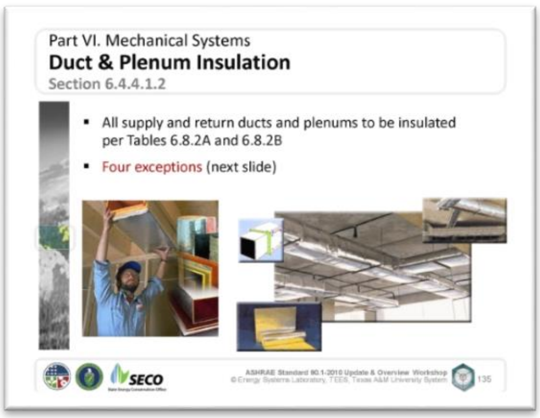
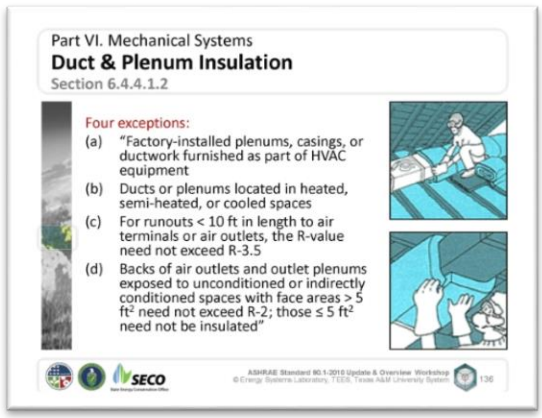


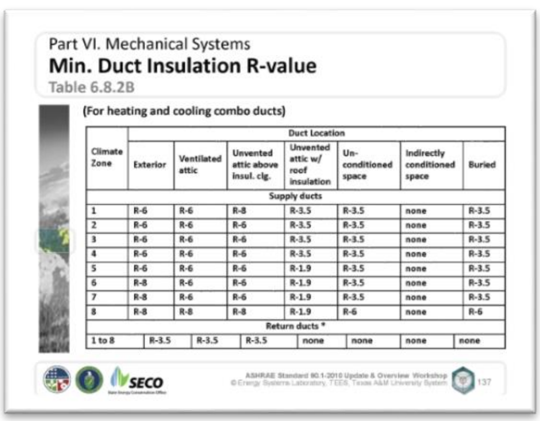
Figure 24: ASHRAE 90.1 Standard Update Workshop (continued)











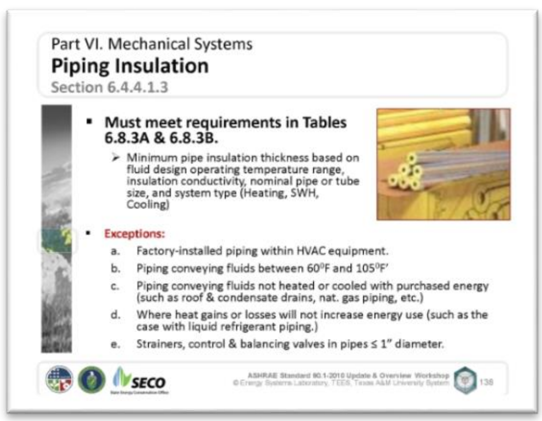
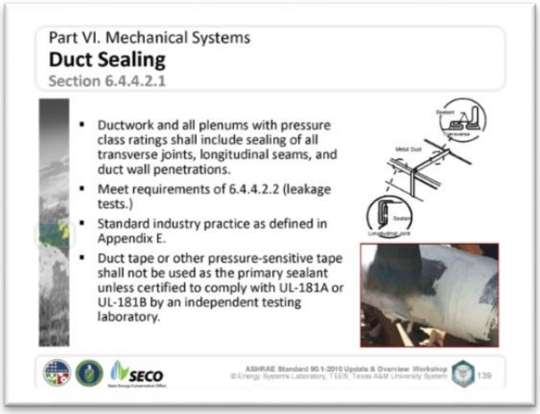
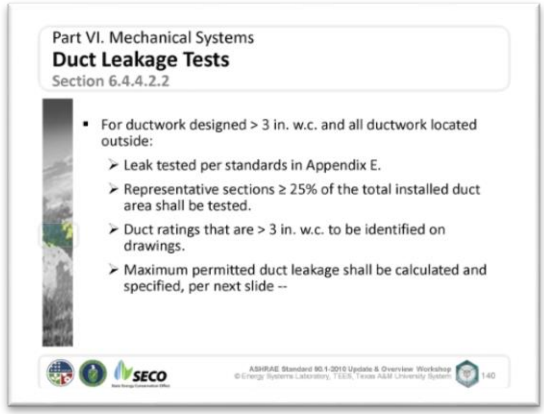
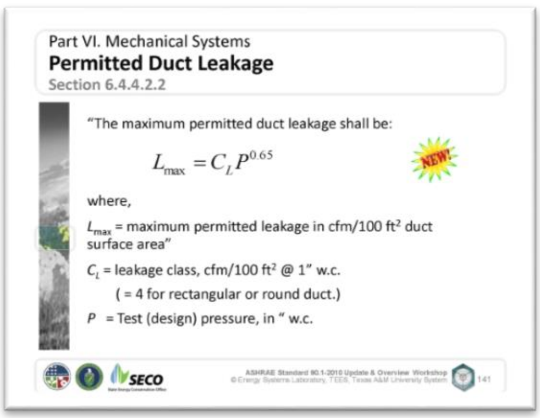
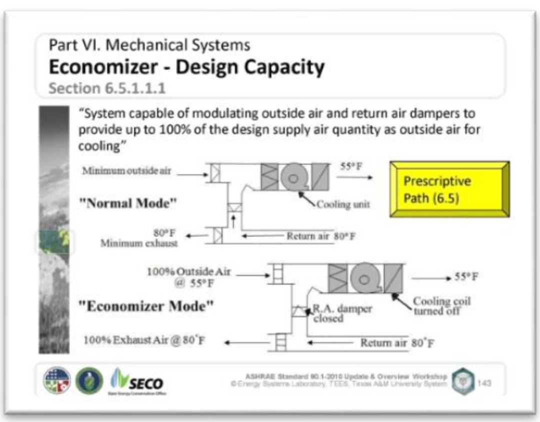


Figure 24: ASHRAE 90.1 Standard Update Workshop (continued)









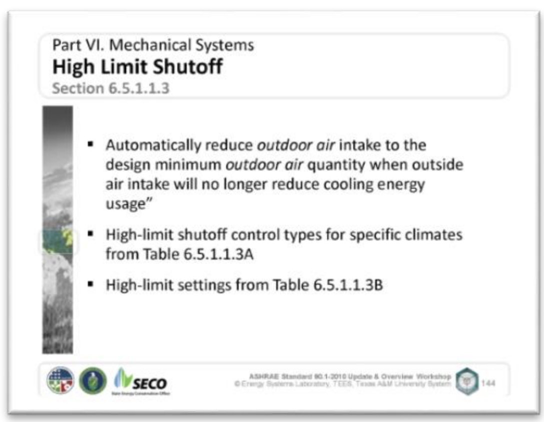
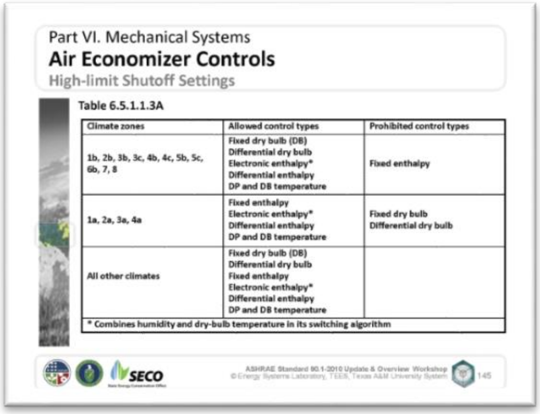
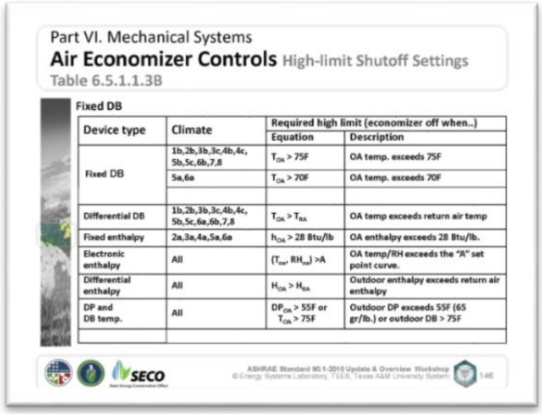
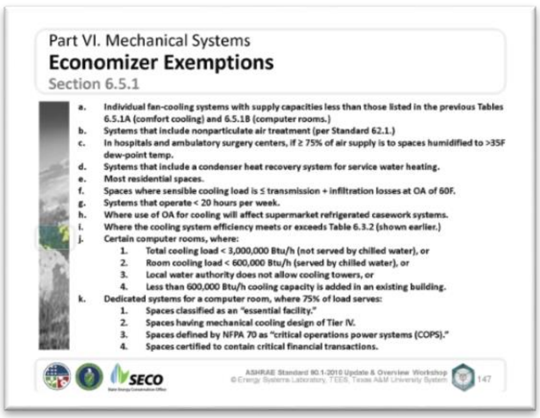
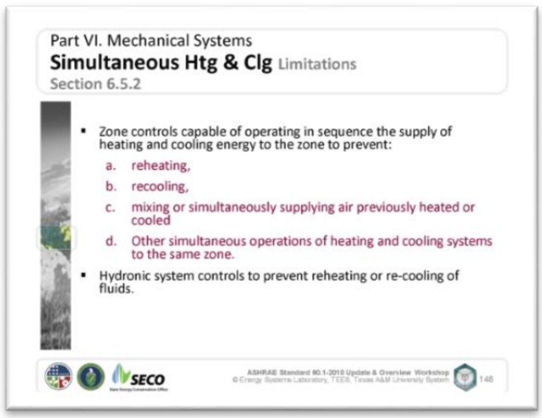


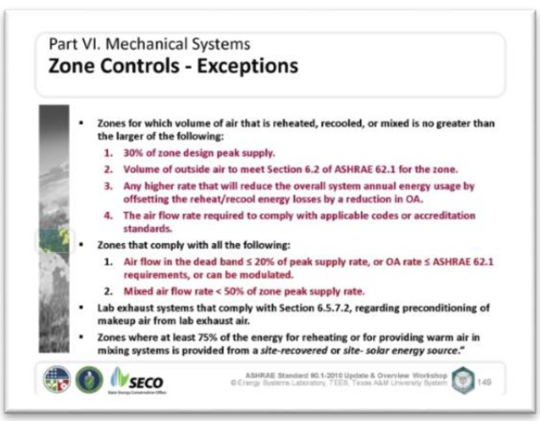
Figure 24: ASHRAE 90.1 Standard Update Workshop (continued)











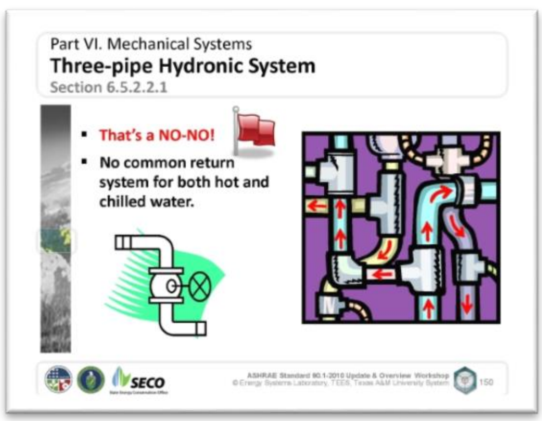
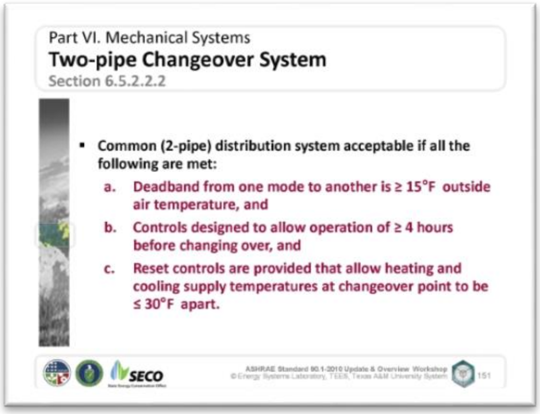
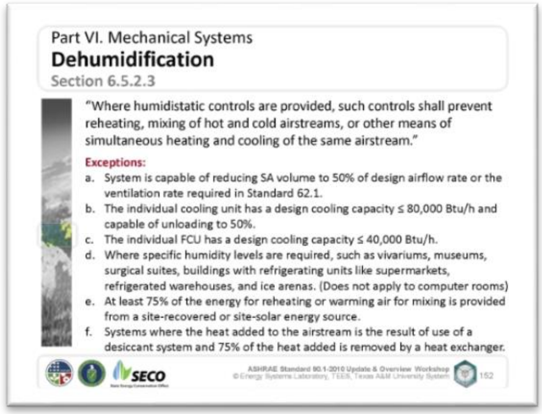
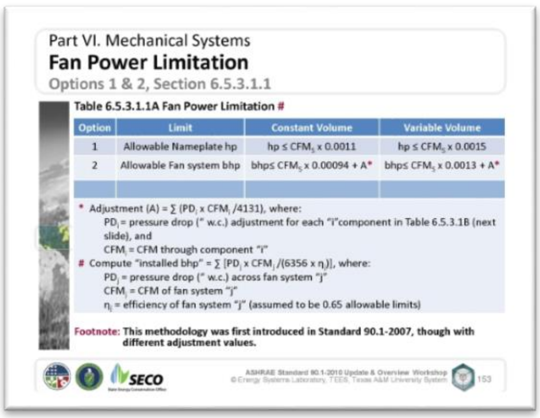
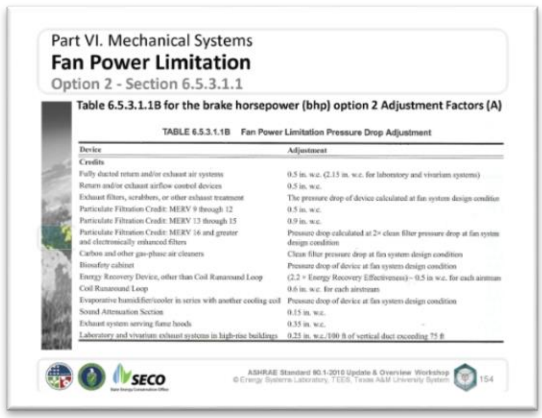


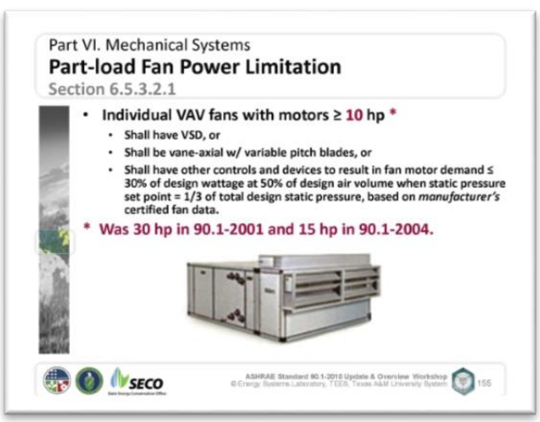
Figure 24: SHRAE 90.1 Standard Update Workshop (continued)











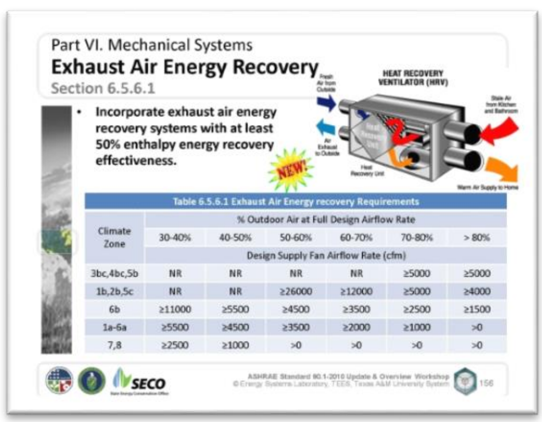
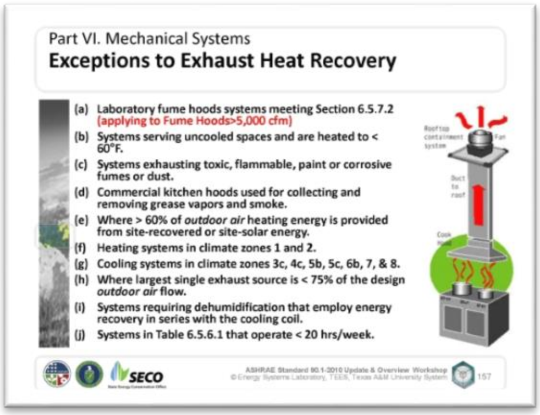
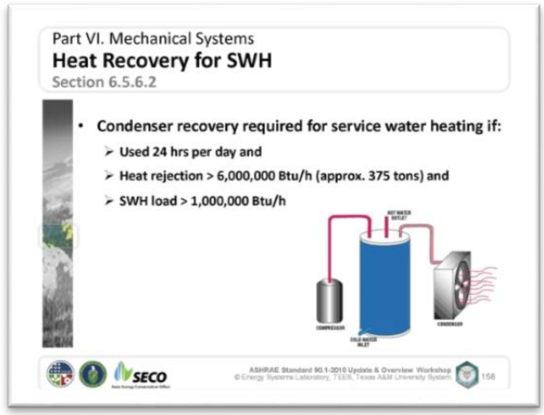
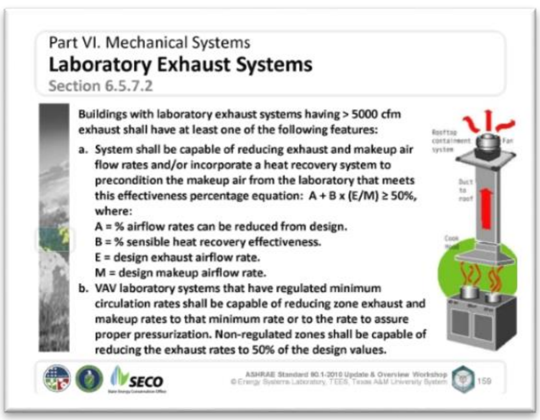
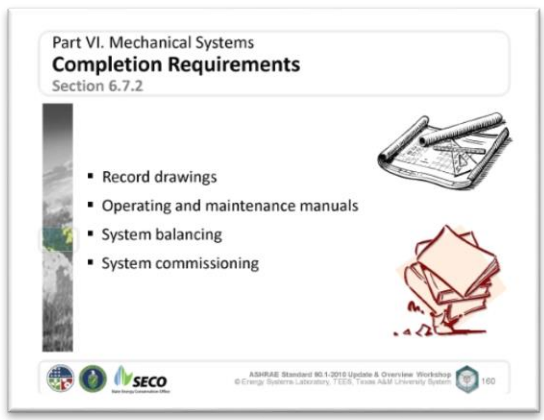


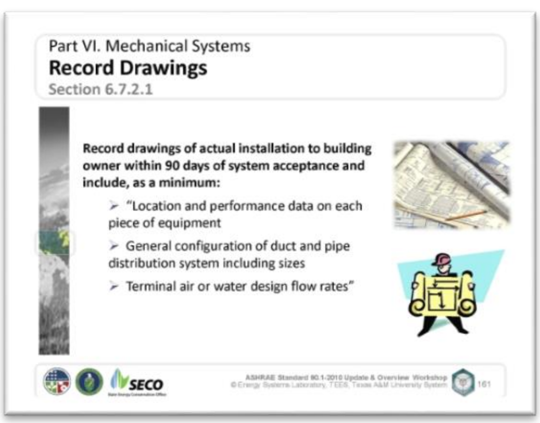
Figure 24: ASHRAE 90.1 Standard Update Workshop (continued)











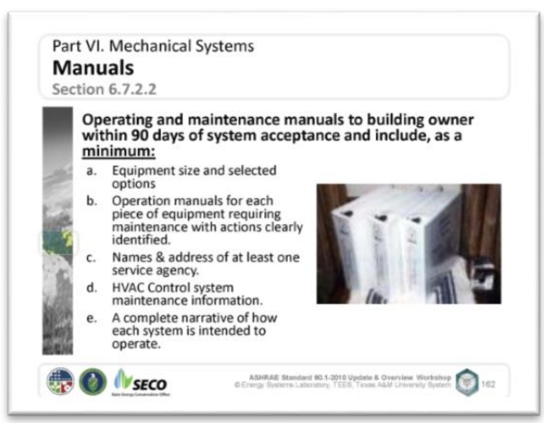
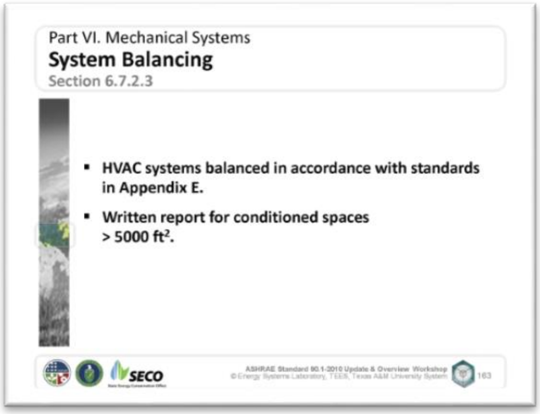
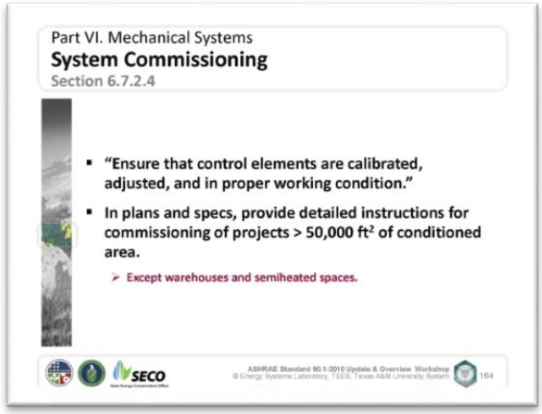
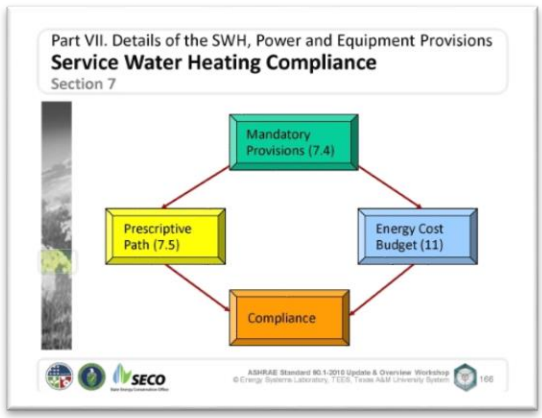


Figure 24: ASHRAE 90.1 Standard Update Workshop (continued)







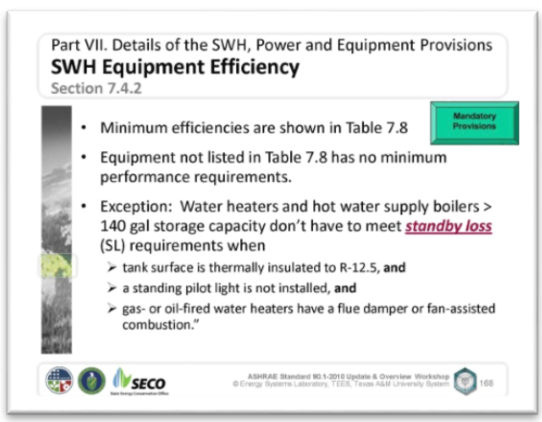
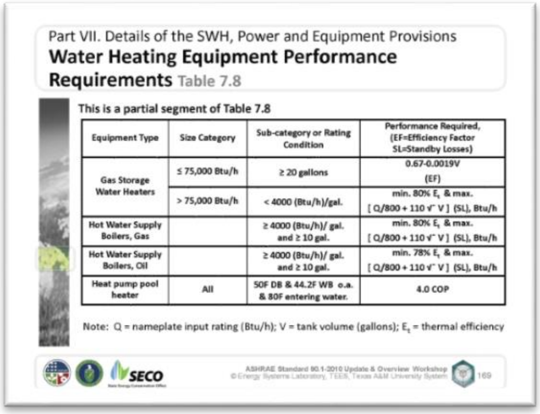
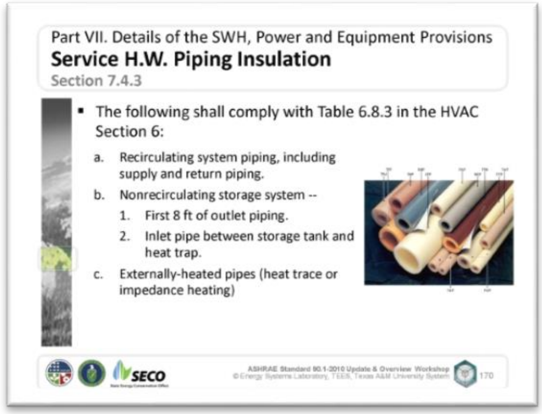
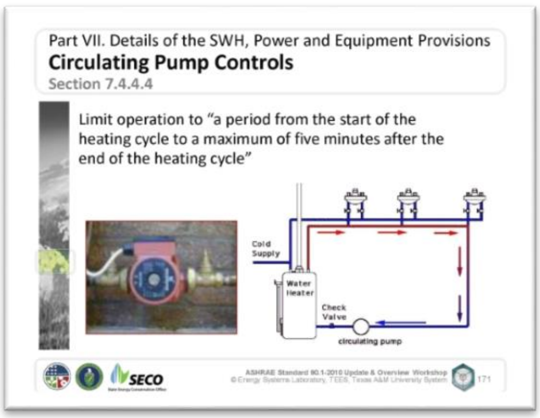


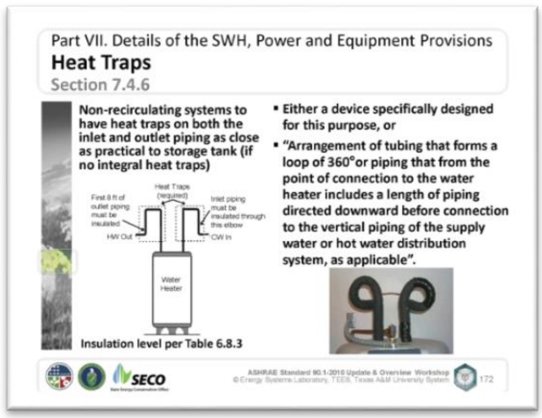
Figure 24: ASHRAE 90.1 Standard Update Workshop (continued)

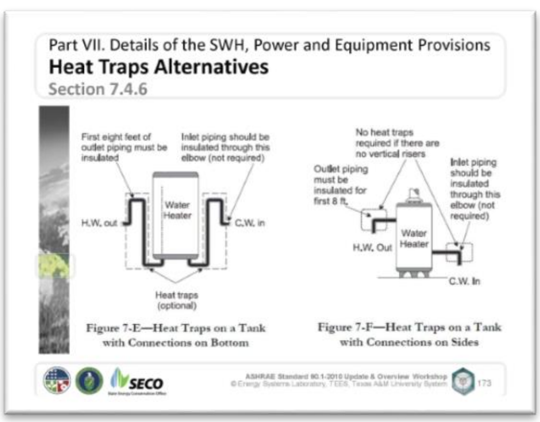


Equipment Type	Size Category	Sub-category or Rating Condition	Performance Required, (EF=Efficiency Factor SL=Standby Losses)
Gas Storage Water Heaters	≤ 75,000 Btu/h	≥ 20 gallons	0.67-0.0019V (EF)
	> 75,000 Btu/h	< 4000 (Btu/h)/gal.	min. 80% E_t & max. [Q/800 + 110 √ V] (SL), Btu/h
Hot Water Supply Boilers, Gas		≥ 4000 (Btu/h)/ gal. and ≥ 10 gal.	min. 80% E_t & max. [Q/800 + 110 √ V] (SL), Btu/h
Hot Water Supply Boilers, Oil		≥ 4000 (Btu/h)/ gal. and ≥ 10 gal.	min. 78% E_t & max. [Q/800 + 110 √ V] (SL), Btu/h
Heat pump pool heater	All	50F DB & 44.2F WB o.a. & 80F entering water.	4.0 COP









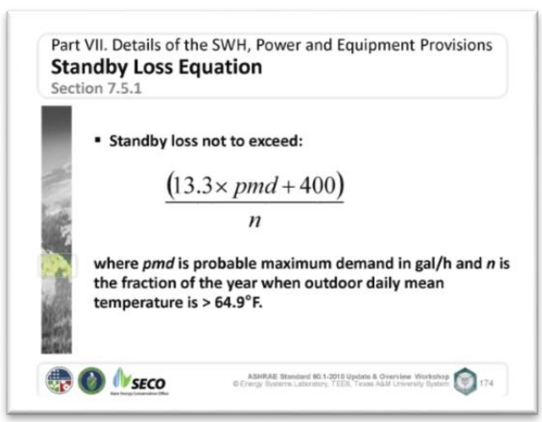
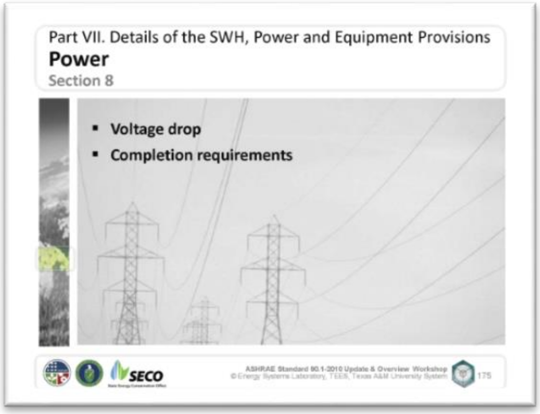
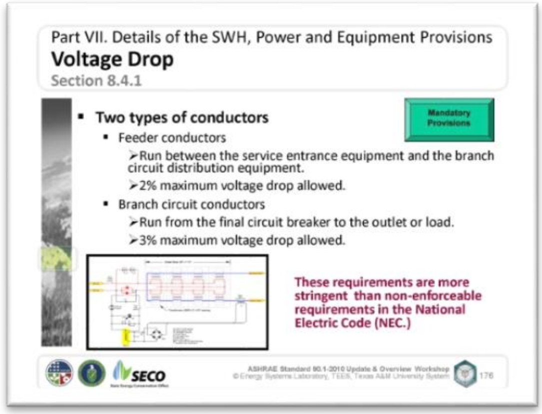
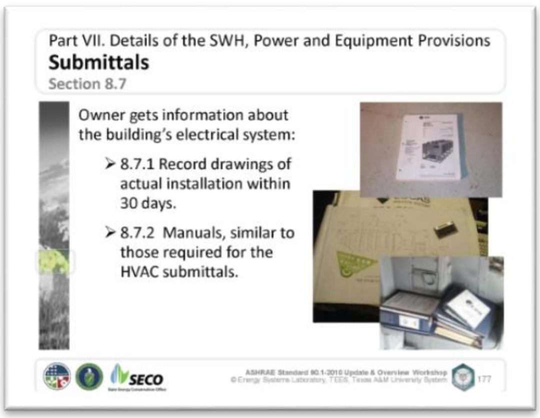
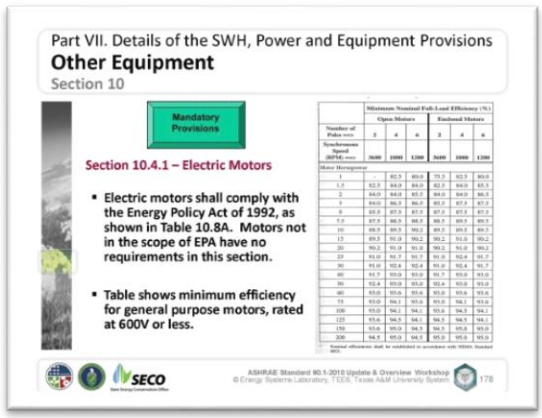


Figure 24: ASHRAE 90.1 Standard Update Workshop (continued)









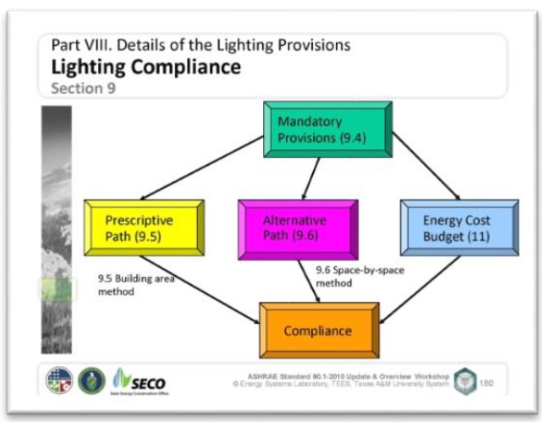
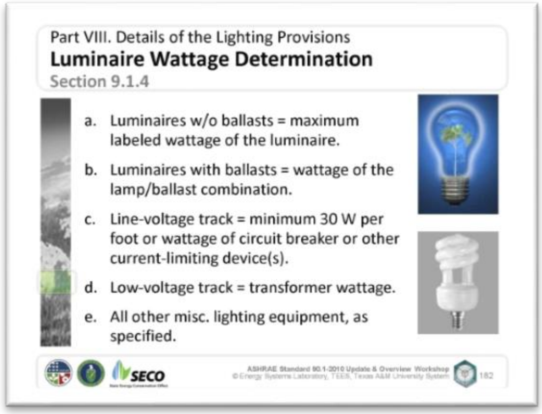
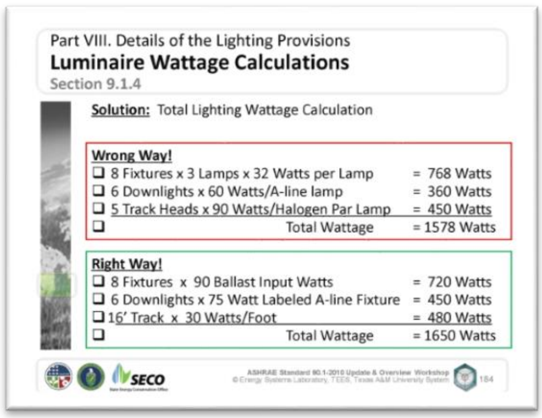
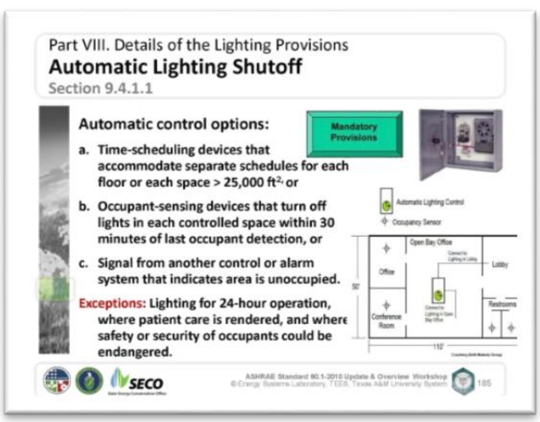


Figure 24: ASHRAE 90.1 Standard Update Workshop (continued)







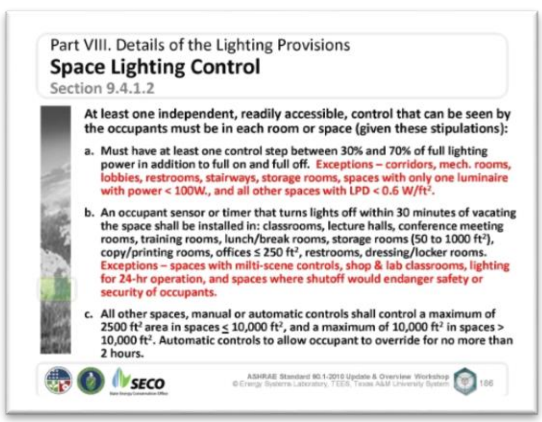
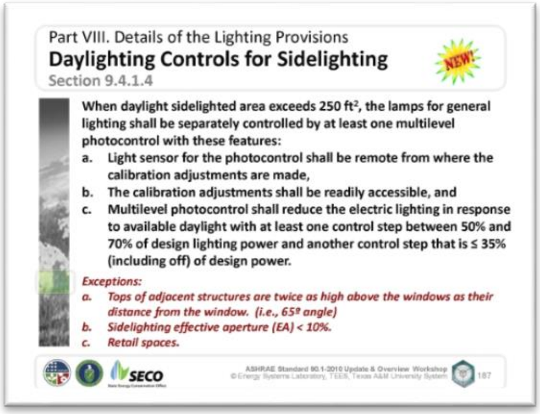
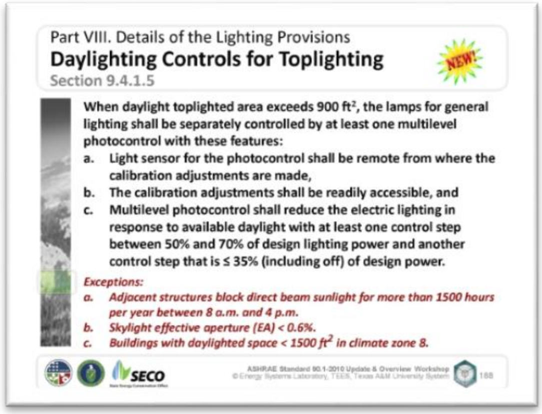
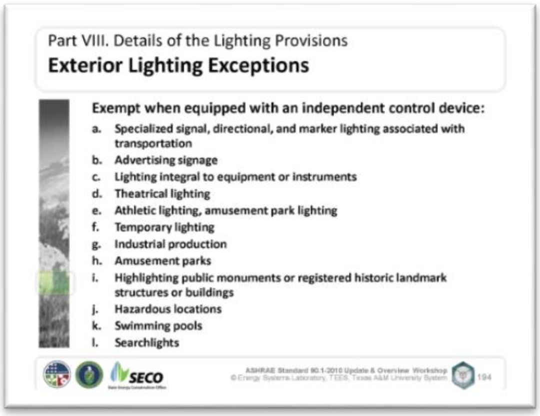
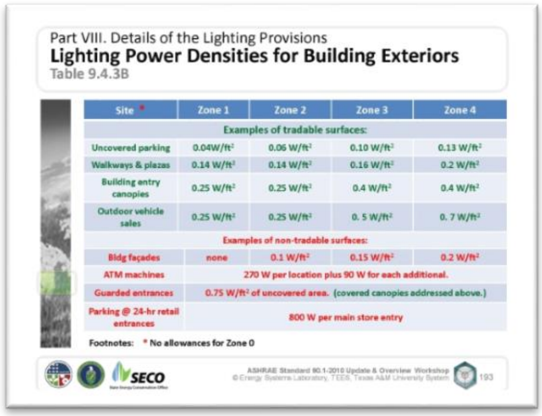


Figure 24: ASHRAE 90.1 Standard Update Workshop (continued)









Site *	Zone 1	Zone 2	Zone 3	Zone 4
Examples of tradable surfaces:				
Uncovered parking	0.04W/ft²	0.06 W/ft²	0.10 W/ft²	0.13 W/ft²
Walkways & plazas	0.14 W/ft²	0.14 W/ft²	0.16 W/ft²	0.2 W/ft²
Building entry canopies	0.25 W/ft²	0.25 W/ft²	0.4 W/ft²	0.4 W/ft²
Outdoor vehicle sales	0.25 W/ft²	0.25 W/ft²	0. 5 W/ft²	0. 7 W/ft²
Examples of non-tradable surfaces:				
Bldg façades	none	0.1 W/ft²	0.15 W/ft²	0.2 W/ft²
ATM machines	270 W per location plus 90 W for each additional.			
Guarded entrances	0.75 W/ft² of uncovered area. (covered canopies addressed above.)			
Parking @ 24-hr retail entrances	800 W per main store entry			

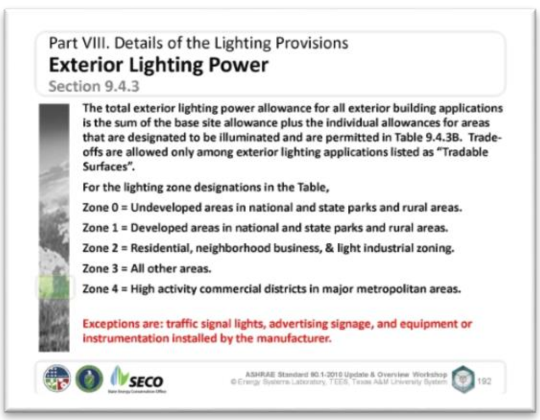
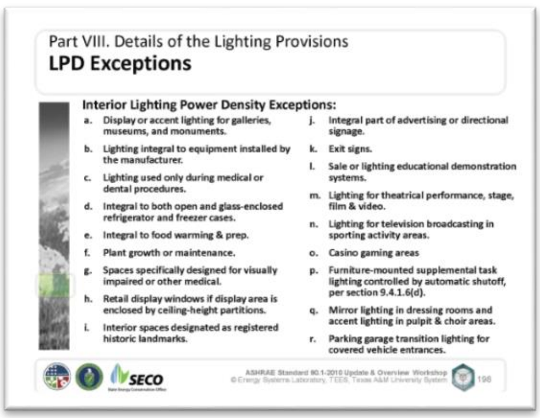
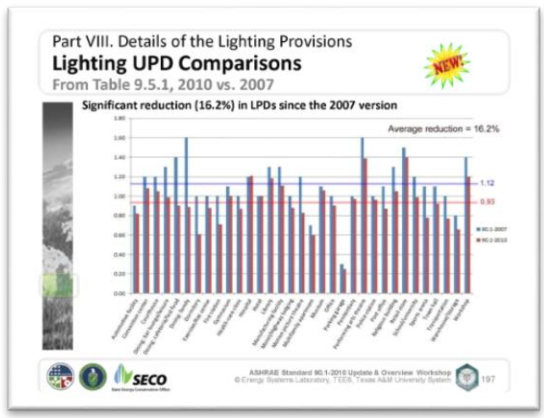


Figure 24: ASHRAE 90.1 Standard Update Workshop (continued)





Bldg Type	2007	2010	Diff.	Bldg Type	2007	2010	Diff.
Automotive facility	0.9	0.82	9 %	Multifamily	0.7	0.60	14 %
Convention center	1.2	1.08	10 %	Museum	1.1	1.06	4 %
Courthouse	1.2	1.05	13 %	Office	1.0	0.90	10 %
Dining: bar/lounge	1.3	0.99	24 %	Parking garage	0.3	0.25	17 %
Dining: cafeteria	1.4	0.90	36 %	Penitentiary	1.0	0.97	3 %
Dining: family	1.6	0.89	44 %	Performing arts theater	1.6	1.39	13 %
Dormitory	1.0	0.61	39 %	Police station	1.0	0.96	4 %
Exercise center	1.0	0.88	12 %	Post office	1.1	0.87	21 %
Fire station	1.0	0.71	29 %	Religious building	1.3	1.05	19 %
Gymnasium	1.1	1 %	9 %	Retail	1.5	1.40	7 %
Health-care clinic	1.0	0.87	13 %	School / University	1.2	0.99	18 %
Hospital	1.2	1.21	-1 %	Sports arena	1.1	0.78	29 %
Hotel	1.0	1.00	0 %	Town hall	1.1	0.92	16 %
Library	1.3	1.18	9 %	Transportation	1.0	0.77	23 %
Manufacturing facility	1.3	1.11	15 %	Warehouse	0.8	0.66	18 %
Motel	1.0	0.88	12 %	Workshop	1.4	1.20	14 %
Motion picture theatre	1.2	0.83	31 %	Overall Average	1.12	0.93	16.2 %

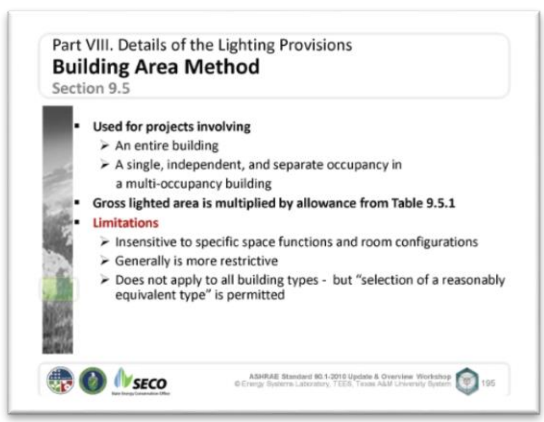
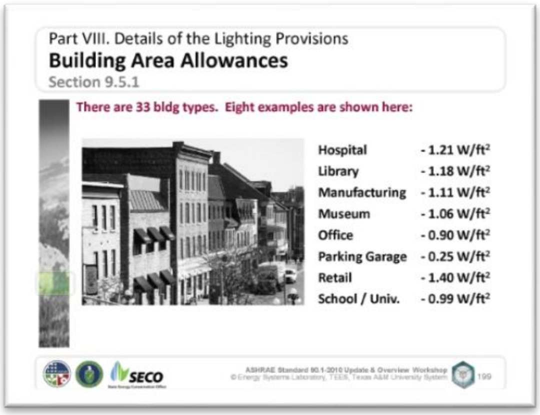
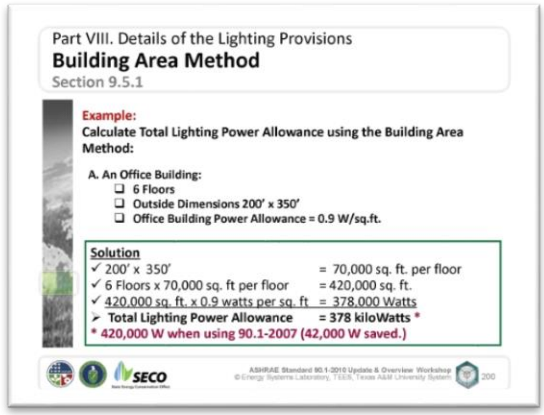
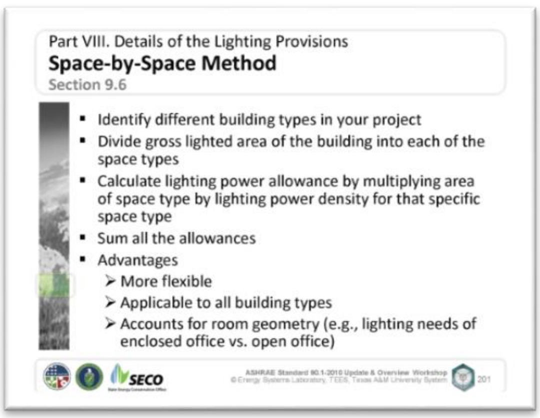


Figure 24: ASHRAE 90.1 Standard Update Workshop (continued)







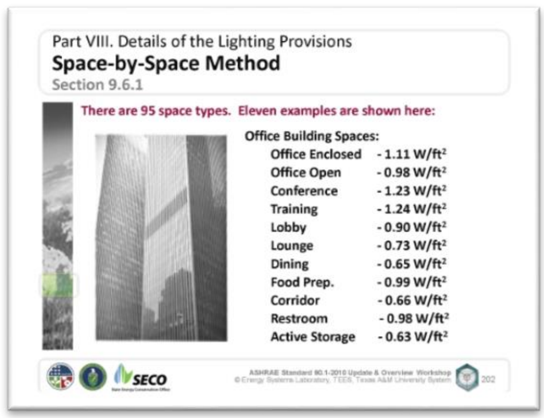
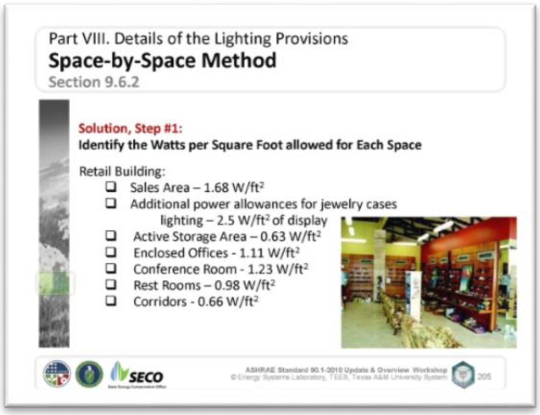
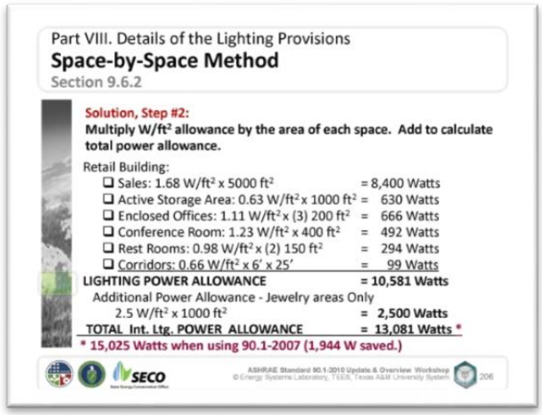
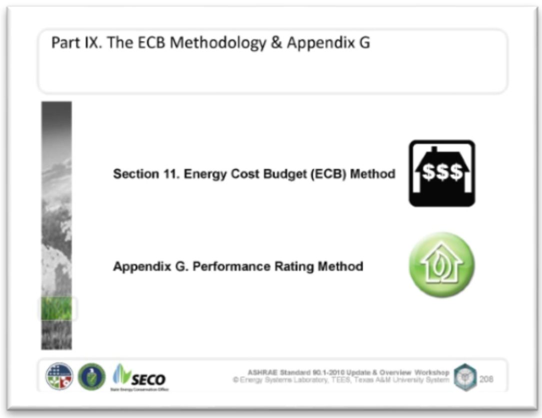
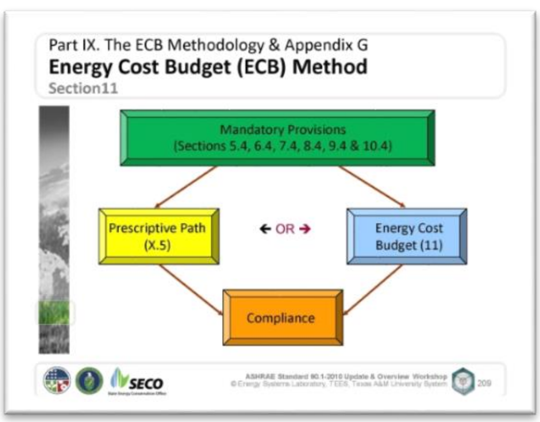


Figure 24: ASHRAE 90.1 Standard Update Workshop (continued)









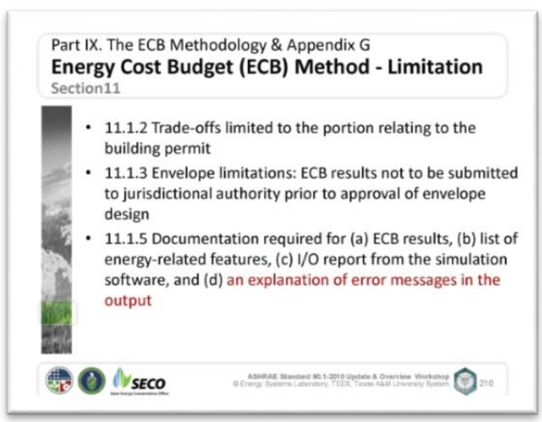
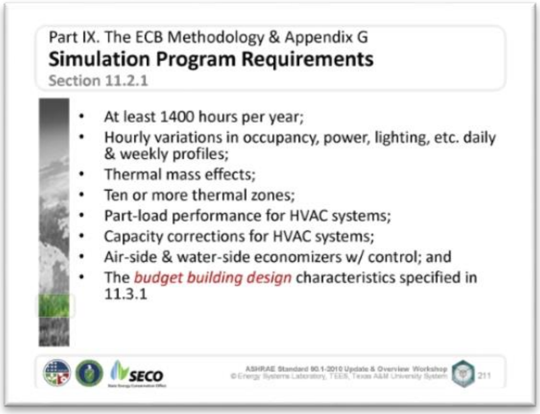
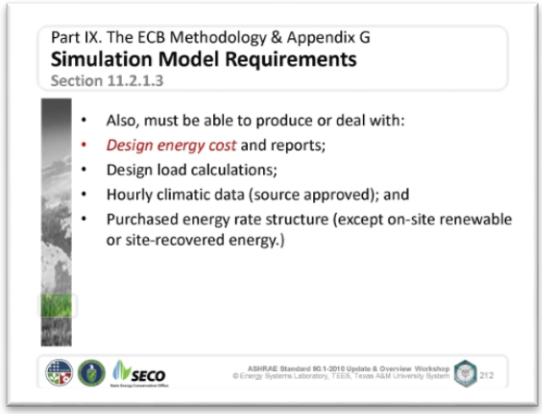
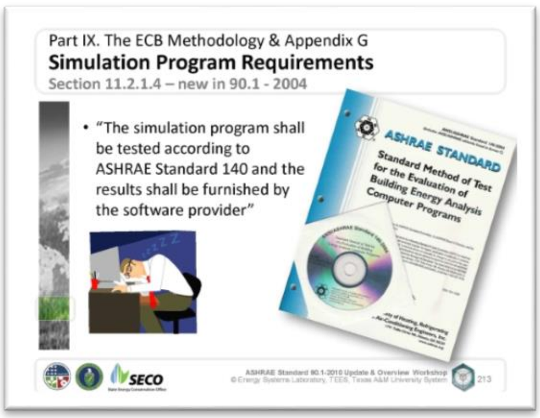
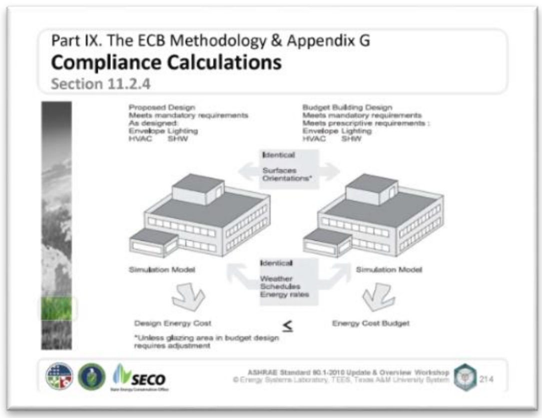


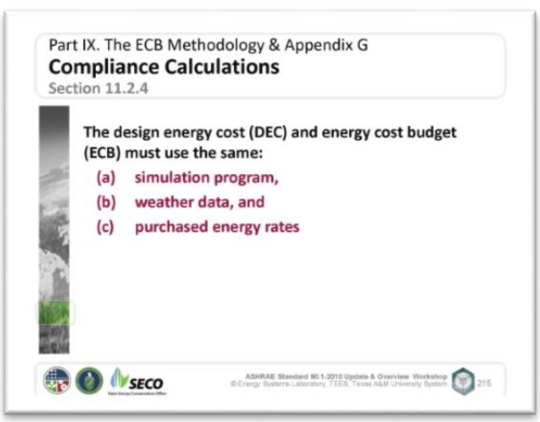
Figure 24: ASHRAE 90.1 Standard Update Workshop (continued)











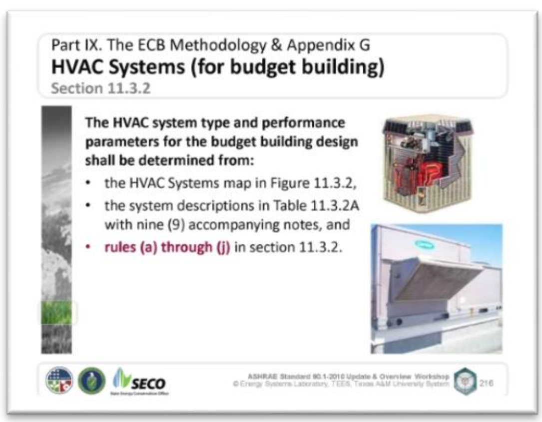
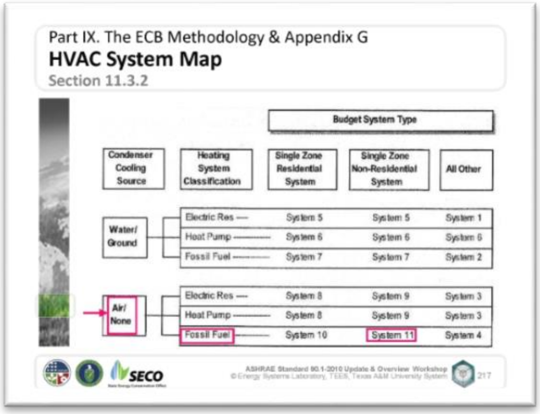
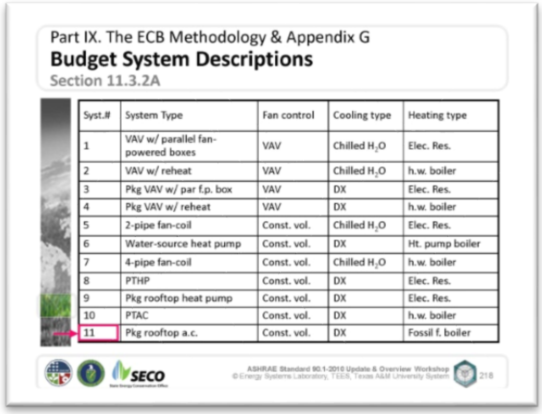
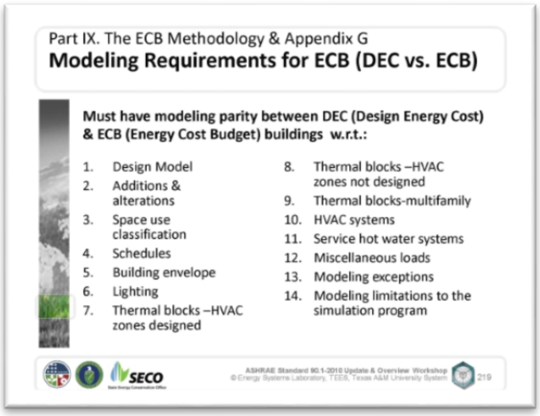


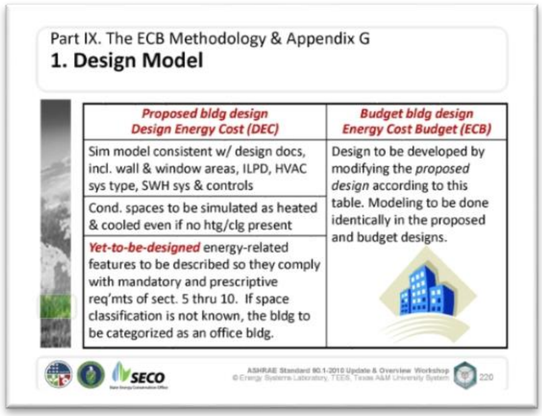
Figure 24: ASHRAE 90.1 Standard Update Workshop (continued)

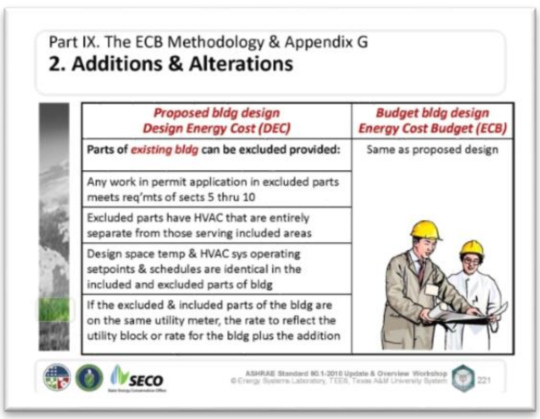




Syst.#	System Type	Fan control	Cooling type	Heating type
1	VAV w/ parallel fan-powered boxes	VAV	Chilled H_2O	Elec. Res.
2	VAV w/ reheat	VAV	Chilled H_2O	h.w. boiler
3	Pkg VAV w/ par f.p. box	VAV	DX	Elec. Res.
4	Pkg VAV w/ reheat	VAV	DX	h.w. boiler
5	2-pipe fan-coil	Const. vol.	Chilled H_2O	Elec. Res.
6	Water-source heat pump	Const. vol.	DX	Ht. pump boiler
7	4-pipe fan-coil	Const. vol.	Chilled H_2O	h.w. boiler
8	PTHP	Const. vol.	DX	Elec. Res.
9	Pkg rooftop heat pump	Const. vol.	DX	Elec. Res.
10	PTAC	Const. vol.	DX	h.w. boiler
11	Pkg rooftop a.c.	Const. vol.	DX	Fossil f. boiler







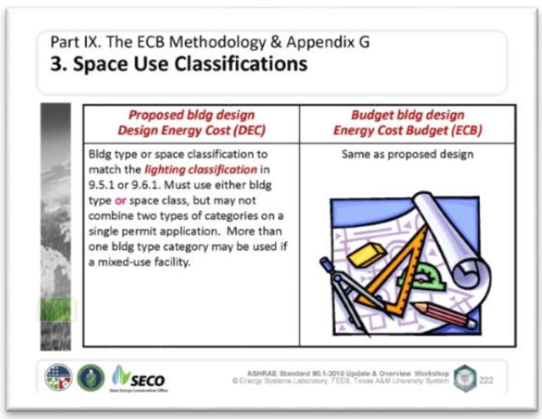
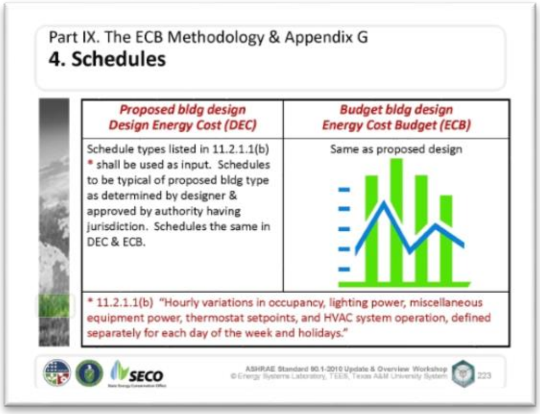
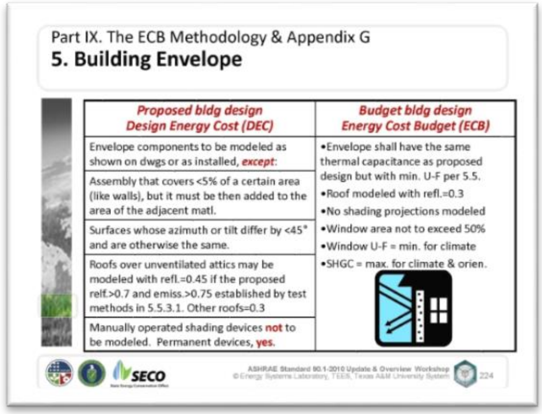
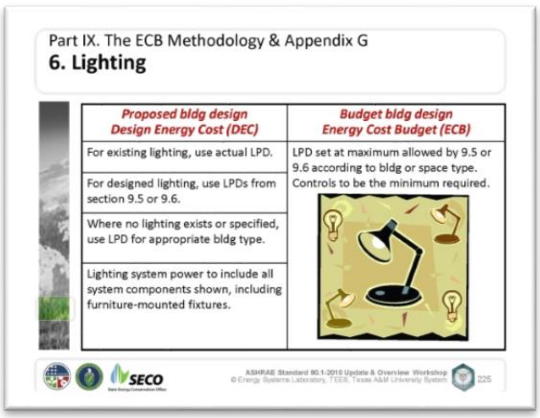
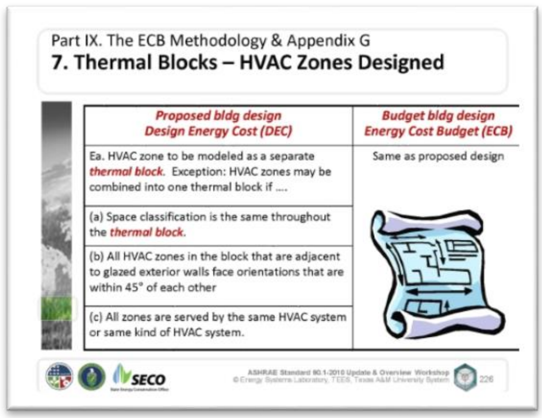


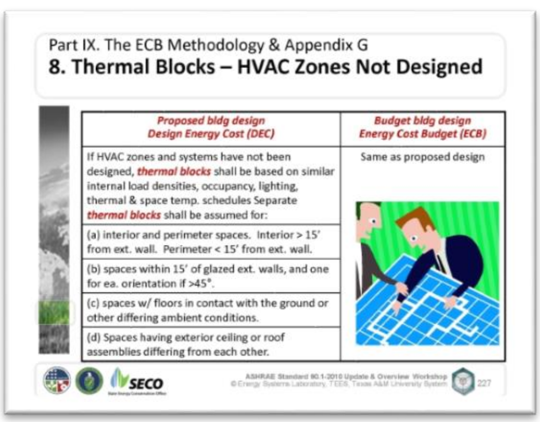
Figure 24: ASHRAE 90.1 Standard Update Workshop (continued)











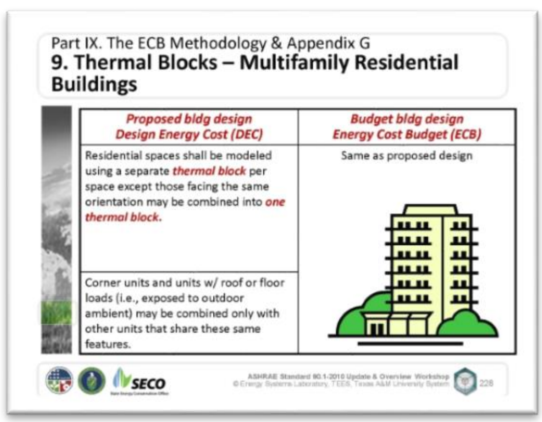
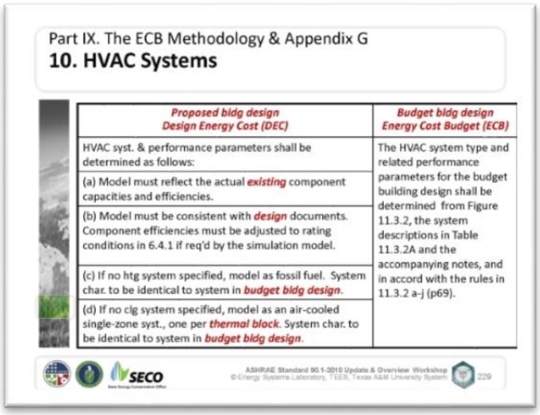
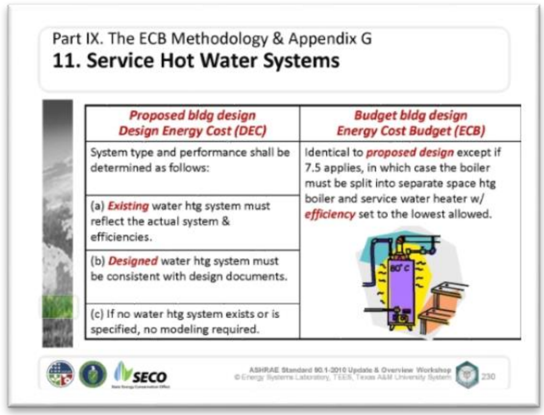
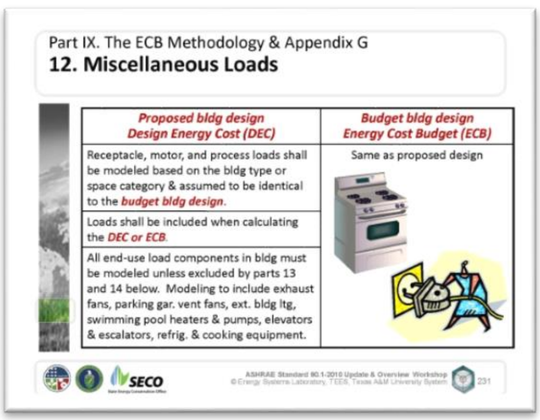
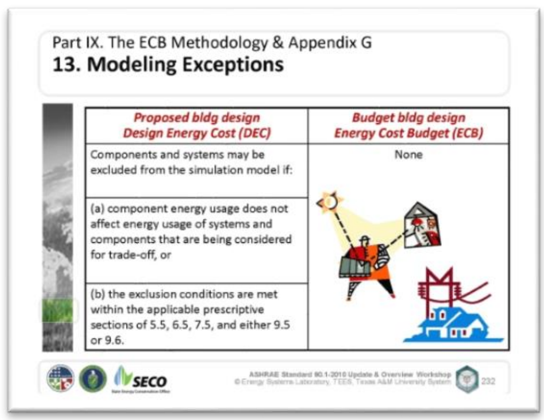


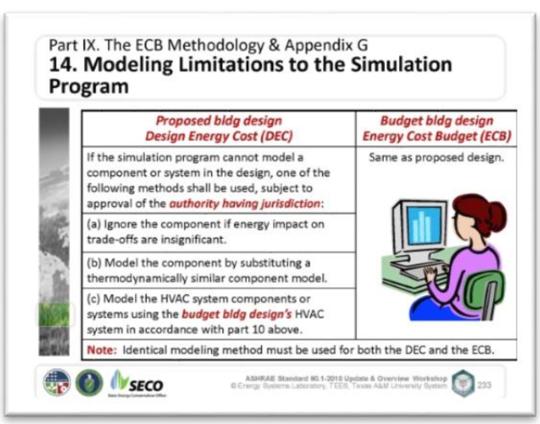
Figure 24: ASHRAE 90.1 Standard Update Workshop (continued)











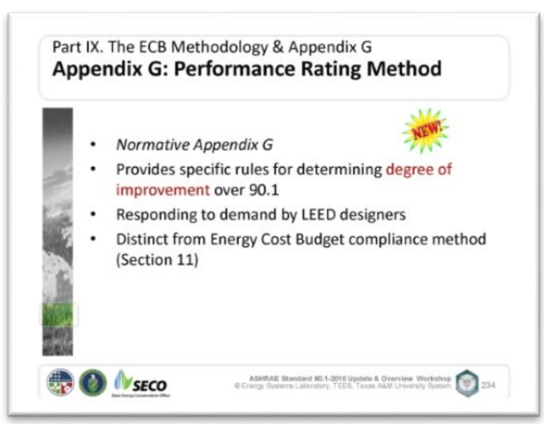
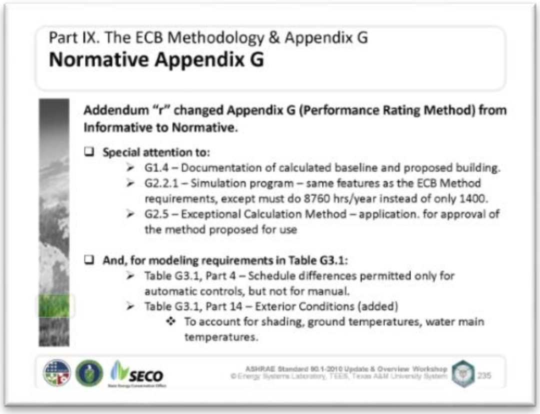
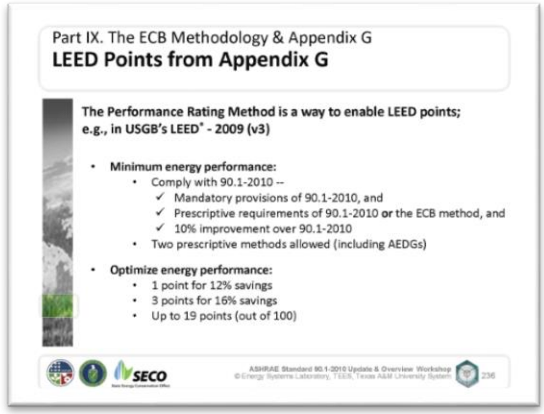
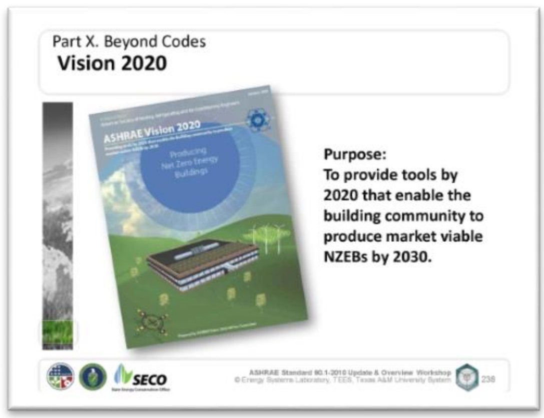
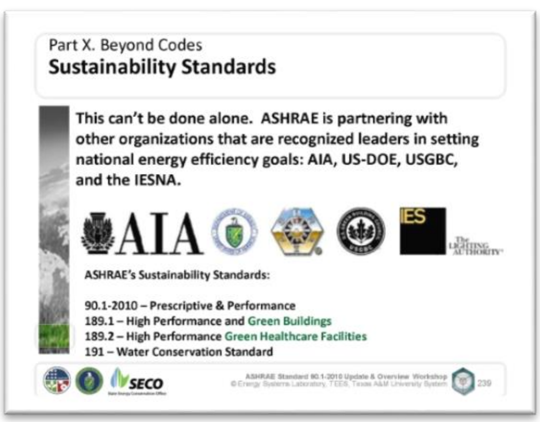


Figure 24: ASHRAE 90.1 Standard Update Workshop (continued)









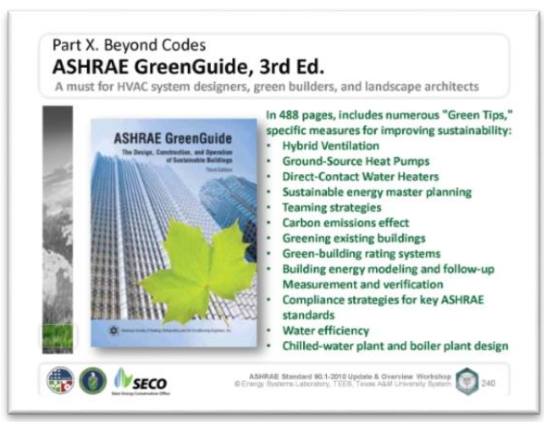
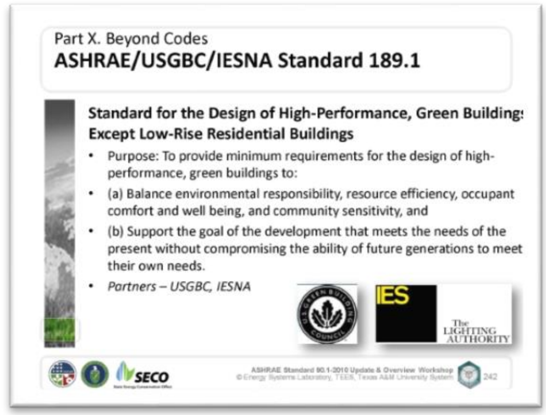
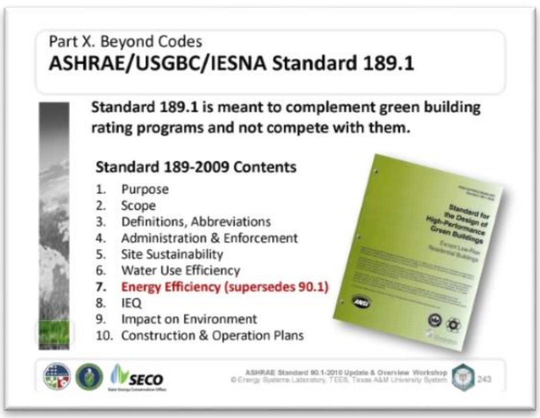
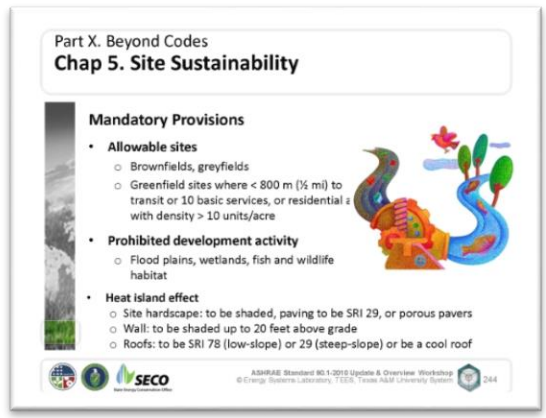


Figure 24: ASHRAE 90.1 Standard Update Workshop (continued)







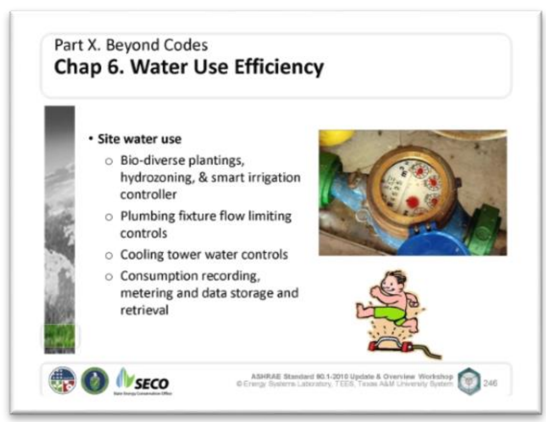
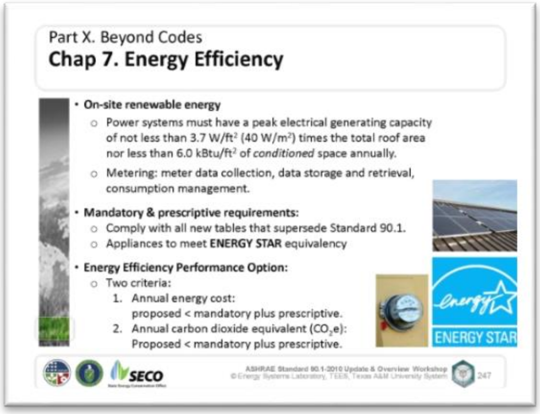
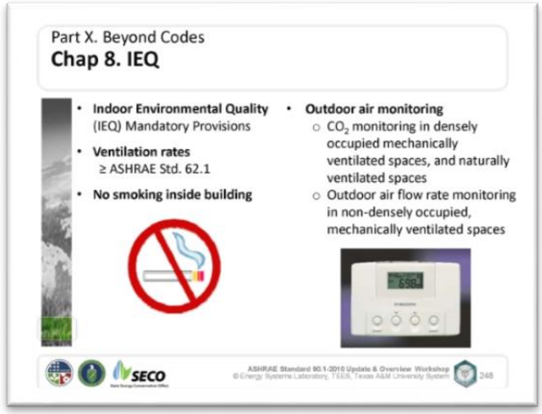
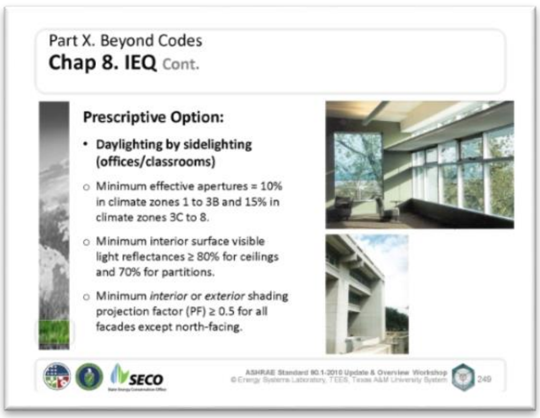
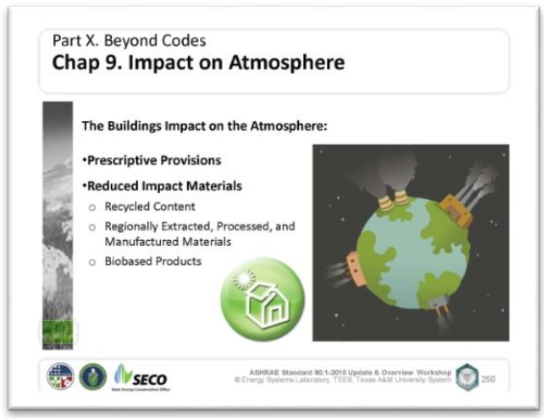


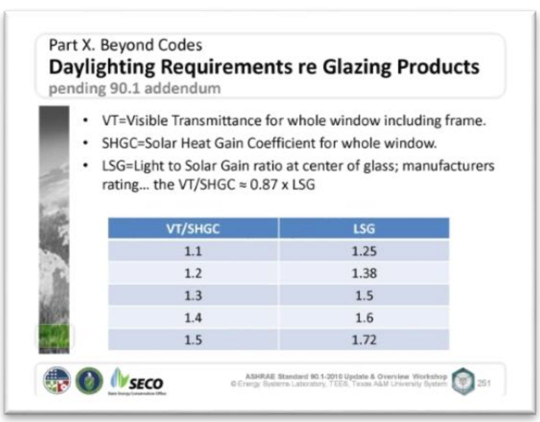
Figure 24: ASHRAE 90.1 Standard Update Workshop (continued)











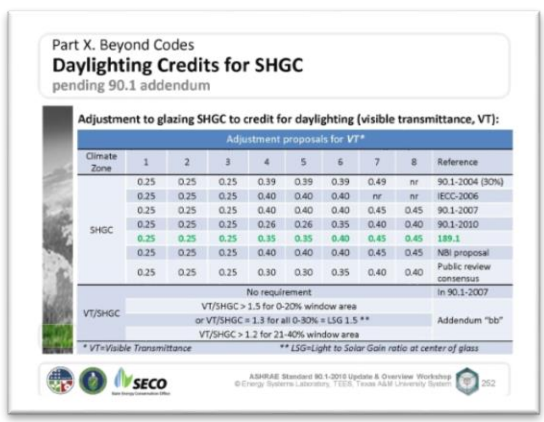
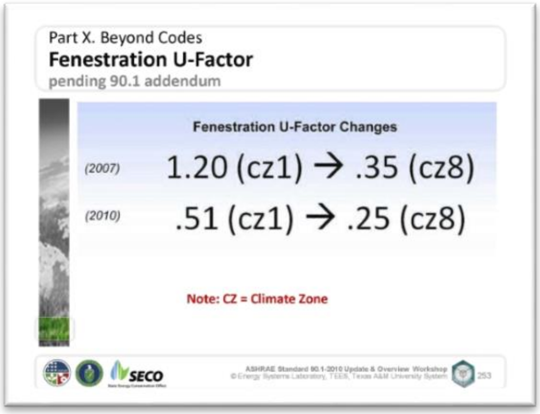
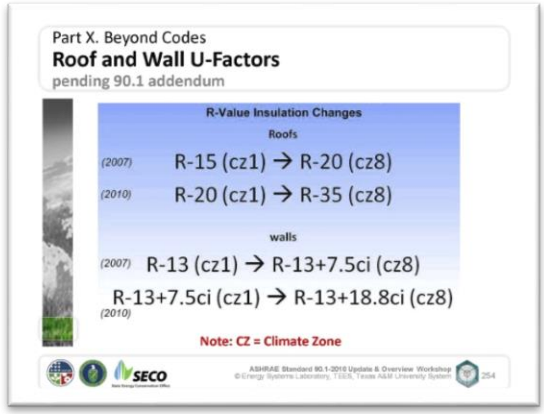
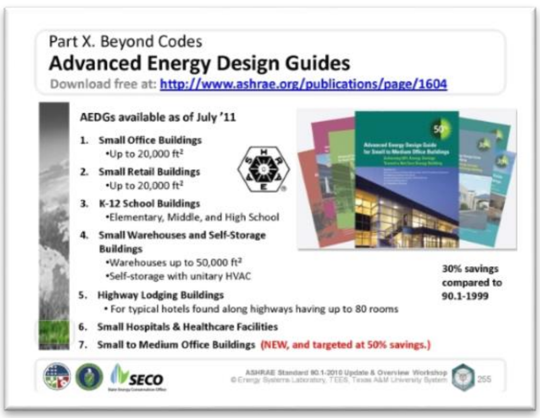
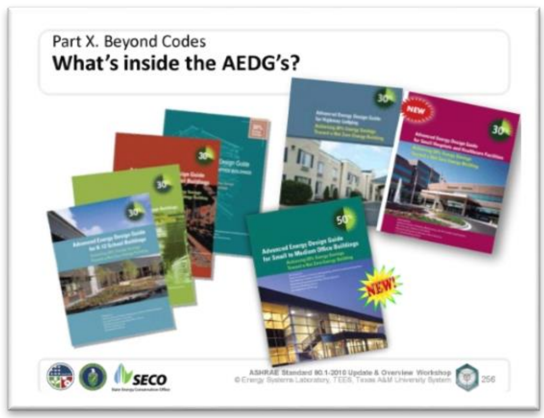


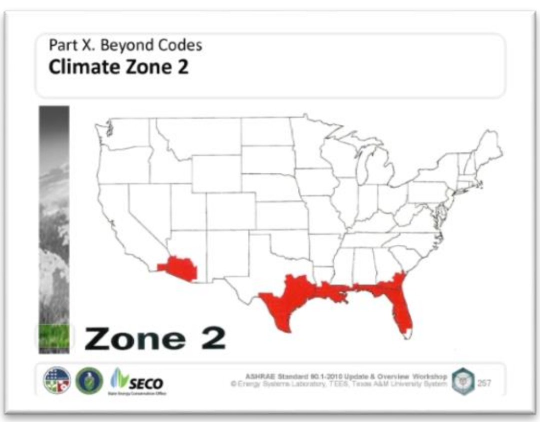
Figure 24: ASHRAE 90.1 Standard Update Workshop (continued)











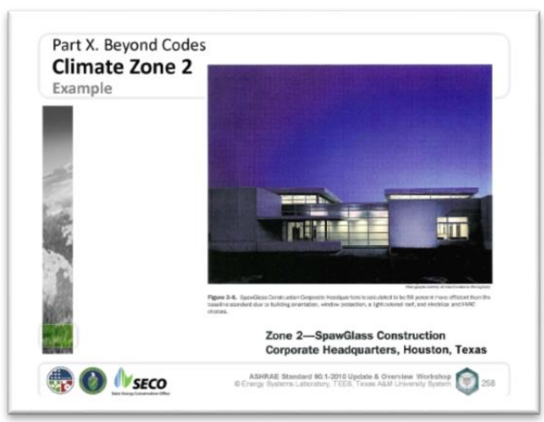
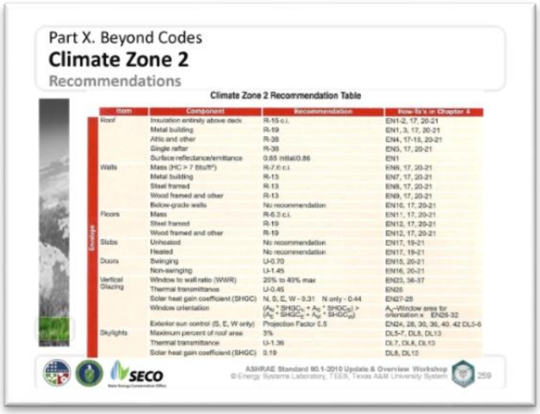
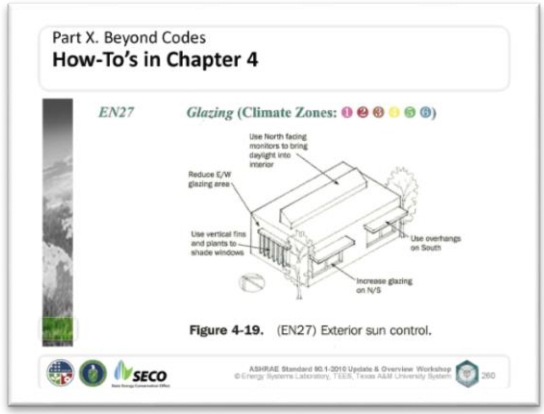
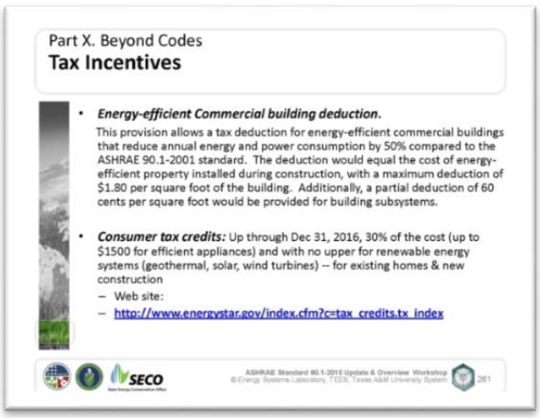
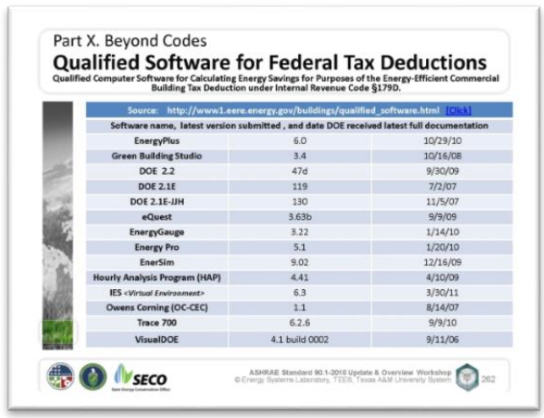


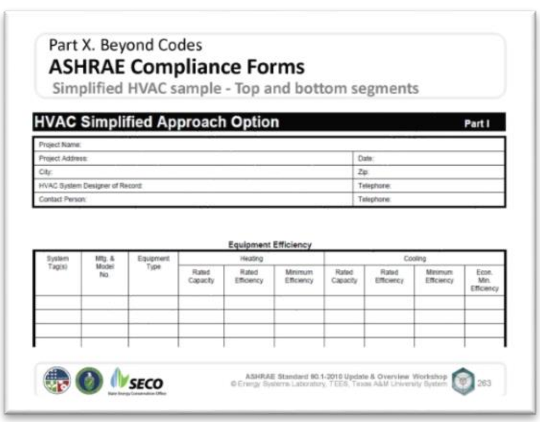
Figure 24: ASHRAE 90.1 Standard Update Workshop (continued)











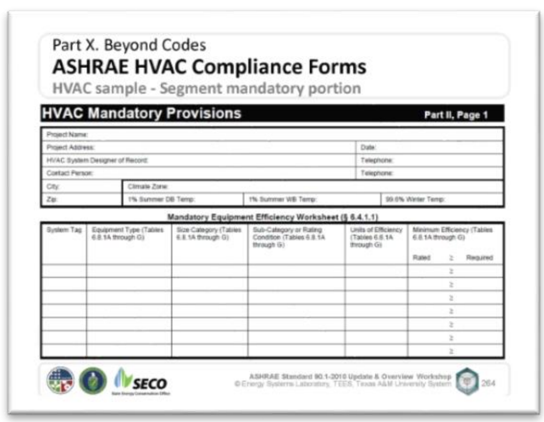
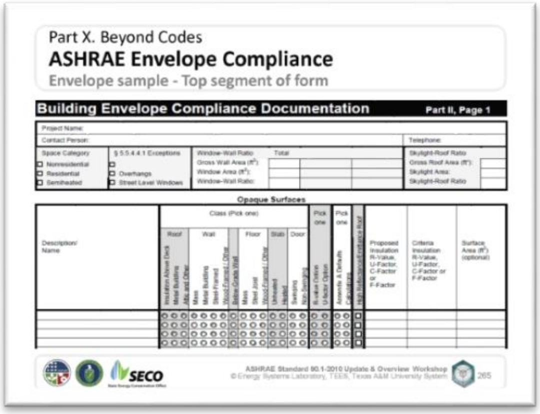
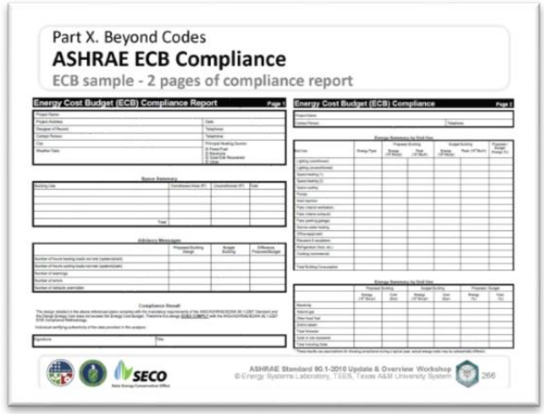
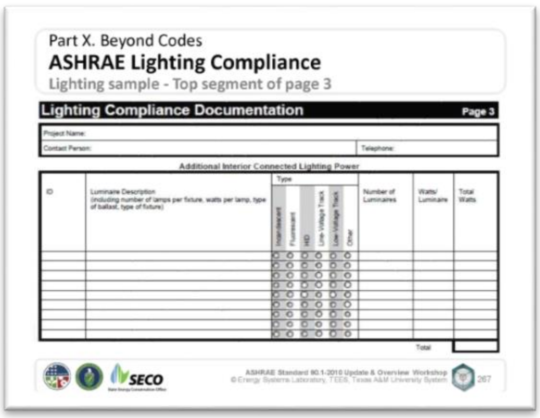
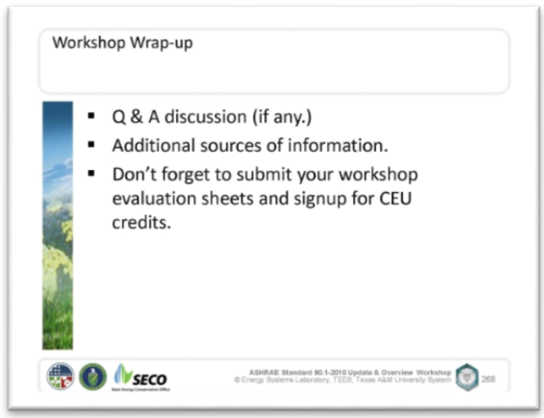


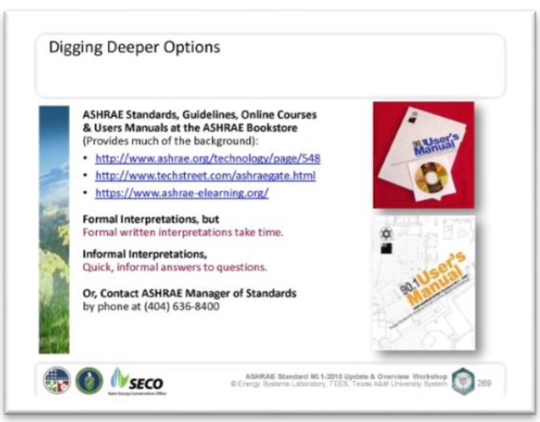
Figure 24: ASHRAE 90.1 Standard Update Workshop (continued)











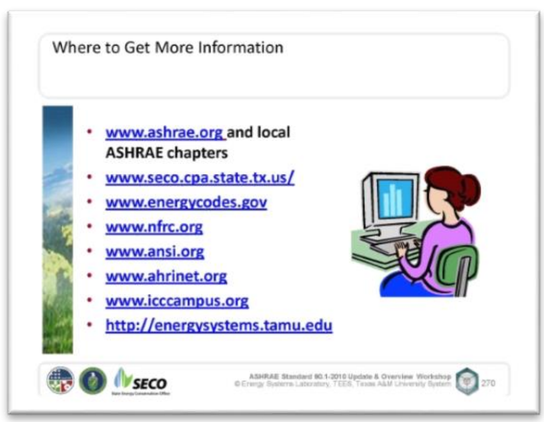


Figure 24: ASHRAE 90.1 Standard Update Workshop (continued)

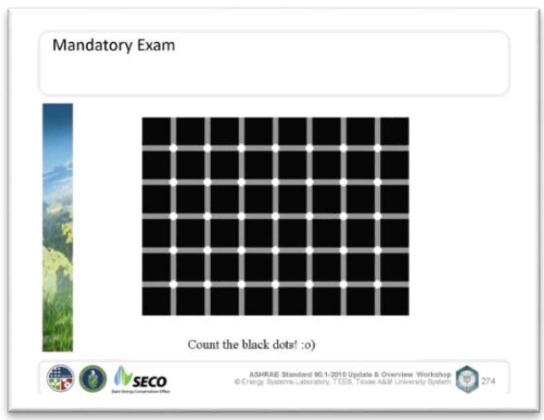


Figure 24: ASHRAE 90.1 Standard Update Workshop (continued)

1.10 Evaluation of Additional Technologies for Reducing Energy Use in Existing Buildings

The Laboratory provided technical assistance to the TCEQ, the PUCT, SECO and ERCOT, as well as Stakeholders participating in the Energy Code and Renewables programs.

- In 2008, the Laboratory continued to work with the TCEQ to develop an integrated NOx emissions reductions calculation that provided the TCEQ with a creditable NOx emissions reductions from energy efficiency and renewable energy (EE/RE) programs reported to the TCEQ in 2008 by the Laboratory, PUCT, SECO, and ERCOT (i.e., wind).
- At the request of the TCEQ, the Laboratory has continued the development of procedures for quantifying NOx emissions reductions from wind turbines that includes weather normalization and the quantification of NOx emissions reductions from the new Federal regulations for SEER 13 air conditioners.

1.11 Planned Focus for 2012

In FY 2011, the Energy Systems Laboratory will continue in its cooperative efforts with the TCEQ, PUCT, SECO, US EPA and others to evaluate the energy savings resulted from the EE/RE measures and programs of the TERP and their impact on air quality, and continue with the energy code state-wide implementation assistance under the Texas Building Energy Performance Standards program of the TERP. The Laboratory team will:

- Assist the TCEQ to obtain SIP credits from energy efficiency and renewable energy using the Laboratory's Emissions Reduction Calculator technology;
- Verify, document and report energy efficiency and renewable energy savings in all TERP EE/RE programs for the SIP in each non-attainment and affected county using the TCEQ/US EPA approved technology;
- Assist the PUCT with determining emissions reductions credits from energy efficiency programs funded by SB 7 and SB 5;
- Assist political subdivisions and Councils of Governments with calculating emissions reductions from local code changes and voluntary EE/RE programs for SIP inclusion;
- Continue to refine the cost-effective techniques to implement 15% above code (2009 IECC) energy efficiency in low-priced and moderately-priced residential housing;
- Continue to refine the cost-effective methods and techniques to implement 15% above code energy efficiency in low-priced and moderately-priced commercial buildings;
- Continue to develop creditable procedures for calculating NOx emissions reductions from green renewable technologies, including wind power, solar energy and geothermal energy systems;
- Continue development of well-documented, integrated NOx emissions reductions methodologies for calculating and reporting NOx reductions, including a unified database framework for required reporting to TCEQ of potentially creditable measures from the ESL, PUCT, and SECO SB 5 initiatives;
- Upon request, provide written recommendations to the State Energy Conservation Office (SECO) about whether or not the energy efficiency provisions of latest published edition of the International Residential Code (IRC), or the International Energy Conservation Code (IECC), are equivalent to, or better than, the energy efficiency and air quality achievable under the editions adopted under the 2001 IRC/IECC. This will consider comments made by persons who have an interest in the adoption of the energy codes in the recommendations made to SECO.
- Develop a standardized report format to be used by providers of home energy ratings, including different report formats for rating newly constructed residences from those for existing residences.
- Continue to cooperate with an industry organization or trade association to: develop guidelines for home energy ratings; provide training for individuals performing home energy ratings and providers of home energy ratings; and provide a registry of completed ratings for newly constructed residences and residential improvement projects for the purpose of computing the energy savings and emissions reductions benefits of the home energy ratings program.

- Include all benefits attained from this program in an annual report to the commission.
- Enhance IC3 to support multifamily residences, and add other features to enhance adoption.
- Engage production builders and municipalities in overcoming obstacles to their using IC3 for their new home construction.
- Seek funding to enhance TCV (Austin's version of IC3).Assist SECO in refining the form on which political subdivisions need to report annually their electric consumption.
- Assist SECO in developing a new standardized reporting form for all municipally owned utilities and electric cooperatives, which had retail sales of more than 500,000 MWh in 2005, to report the combined effects of their energy efficiency activities from the previous calendar year.
- Send a representative to SECO's new advisory committee for selecting high-performance building design evaluation systems.

The Laboratory has and will continue to provide leading-edge technical assistance to counties and communities working toward obtaining full SIP credit for the energy efficiency and renewable energy projects that are lowering emissions and improving the air for all Texans. The Laboratory will continue to provide superior technology to the State of Texas through efforts with the TCEQ and US EPA. The efforts taken by the Laboratory have produced significant success in bringing EE/RE closer to US EPA acceptance in the SIP.

If any questions arise, please contact us by phone at 979-845-1280, or by email at terpinfo@tees.tamus.edu.

2 Introduction

2.1 Background

In 2001, the Texas Legislature adopted the Texas Emissions Reduction Plan, identifying thirty-eight counties in Texas where a focus on air quality improvements was deemed critical to public health and economic growth. These areas are shown on the map in **Error! Reference source not found.** as non-attainment and near nonattainment. In 008, the twenty counties designated as nonattainment counties include: Brazoria, Chambers, Collin, Dallas, Denton, Ellis, Fort Bend, Hardin, Harris, Jefferson, Galveston, Johnson, Kaufman, Liberty, Montgomery, Orange, Parker, Rockwall, Tarrant, and Waller Counties. The fourteen counties designated as Ozone Early Action Compact counties include: Bastrop, Bexar, Caldwell, Comal, Gregg, Guadalupe, Harrison, Hays, Rusk, Smith, Travis, Upshur, Williamson, and Wilson County.

These counties represent several geographic areas of the state, which have been assigned to different climate zones by the 2001 IECC[10] as shown in Figure 26, based primarily on Heating Degree Days (HDD). These include climate zone 5 or 6 (i.e., 2,000 to 2,999 HDD_{65}) for the Dallas-Ft. Worth and El Paso areas, and climate zones 3 and 4 (i.e., 1,000 to 1,999 HDD_{65}) for the Houston-Galveston-Beaumont-Port Arthur-Brazoria areas. Also shown in Figure 26 are the locations of the various weather data sources, including the Typical Meteorological Year (TMY2) (NREL 1995) stations, the Weather Year for Energy Calculations (WYEC2) (Stoffel 1995) weather stations, the National Weather Service weather stations, (NWS) (NOAA 1993) weather stations, the ASHRAE 90.1 1989 weather locations[11], the ASHRAE 90.1 1999 weather locations, the solar stations measured by the National Renewable Energy Laboratory (NREL)[12], the solar stations measured by the TCEQ[13], and F-CHART and PV F-CHART weather locations[14].

[10] The "2000 IECC" notation is used to signify the 2000 International Residential Code (IRC), which includes the International Energy Conservation Code (IECC) as modified by the 2001 Supplement (IECC 2001), published by the ICC in March of 2001, as required by Senate Bill 5.

[11] The ASHRAE 90.1-1989 and 90.1-1999 weather stations are used in the emissions calculator for determining the building characteristics.

[12] The NREL stations were the primary source of the 1999 global horizontal, direct normal and diffuse solar radiation used to determine the 1999 peak-day and annual emissions for the DOE-2 simulations for code-compliant housing and commercial buildings.

[13] The TCEQ stations were used as the secondary source for global horizontal solar radiation when the NREL sites were missing data or no NREL site was nearby.

[14] The F-Chart and PV F-Chart weather locations are used to determine the solar thermal or electricity produced by the systems specified by the use in the emissions calculation. The monthly energy or electricity production from F-Chart or PV F-Chart is then weather-normalized using

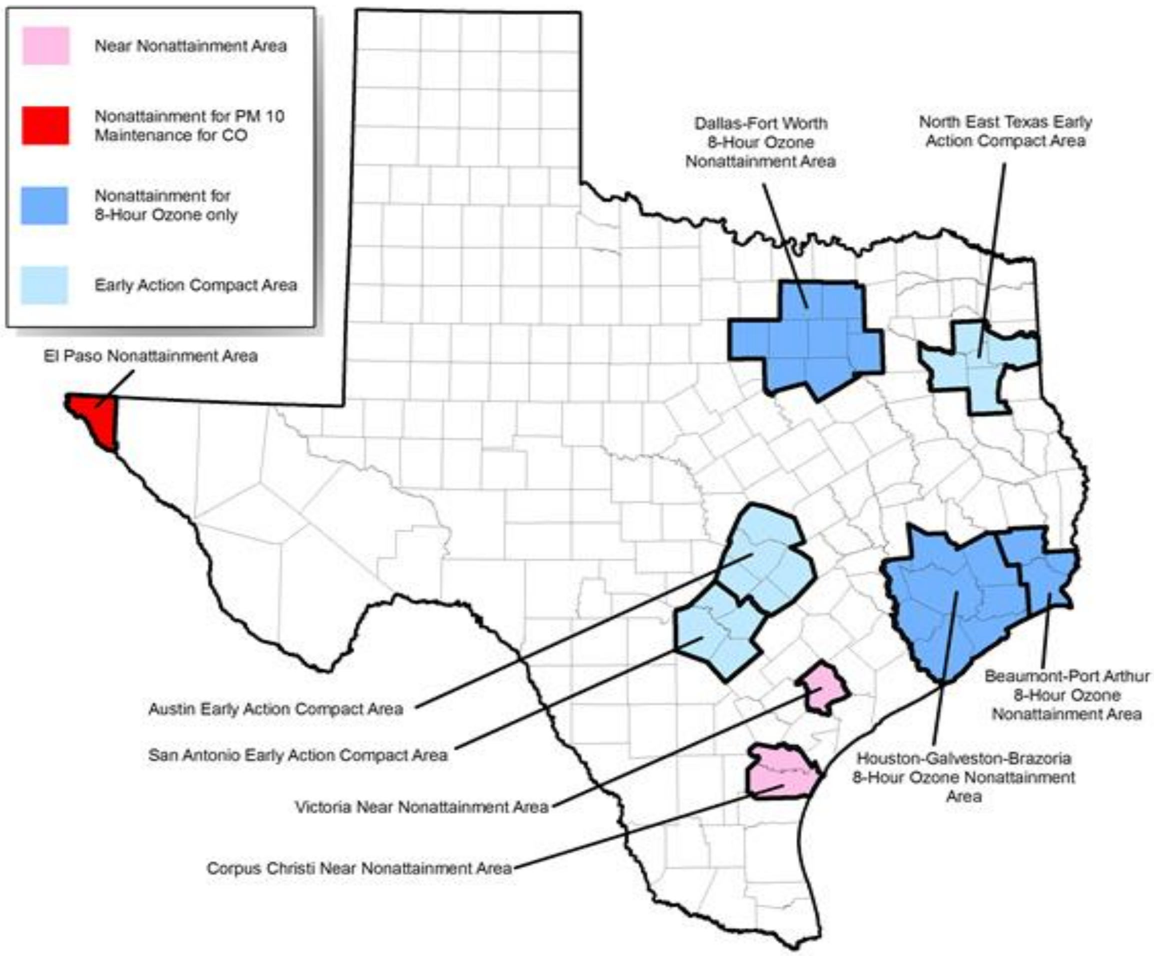


Figure 25: US EPA Nonattainment and Near Nonattainment

2.2 Energy Systems Laboratory's Responsibilities in the TERP

In 2001, Texas Senate Bill 5 outlined the following responsibilities for the Energy Systems Laboratory (ESL) within the TERP:

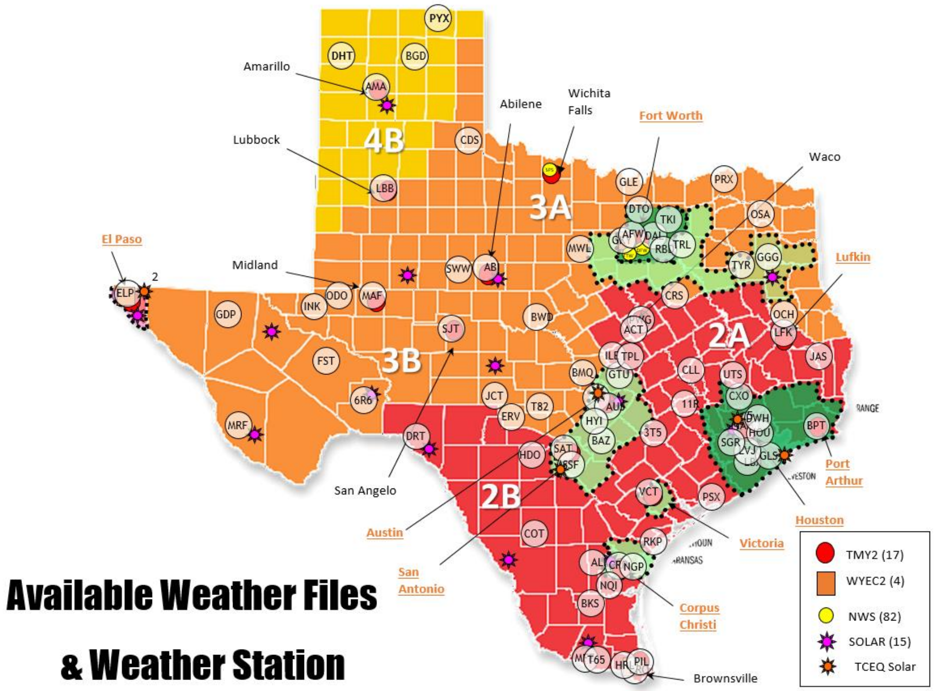
- Sec. 386.205. Evaluation of State Energy Efficiency Programs.
- Sec. 388.003. Adoption of Building Energy Efficiency Performance Standards.
- Sec. 388.004. Enforcement of Energy Standards Outside of Municipality.
- Sec. 388.007. Distribution of Information and Technical Assistance.
- Sec. 388.008. Development of Home Energy Ratings.

In 2003 these responsibilities were modified by the following:

- House Bill 1365, including modifications to:
  - Sec. 388.004. Enforcement of Energy Standards Outside of Municipality
  - Sec. 388.009. Energy-Efficient Building Program
- House Bill 3235 which includes modifications to

ASHRAE's Inverse Model Toolkit to develop coefficients that are then used to determine the 1999 annual and peak day energy or electricity production for emissions calculations.

- Sec. 388.009. Certification of Municipal Building Inspectors.



List of Available Weather Files and Weather Stations of Texas

Texas Weather Stations (NOAA)

1 Abilene Regional Airport (ABI)
2 Alice International Airport (ALI)
3 Amarillo International Airport (AMA)
4 Angleton / Lake Jackson Brazori (LBX)
5 Arlington Municipal Airport (GKY)
6 Austin - Bergstrom International (AUS)
7 Austin Camp Mabry (ATT)
8 Borger Hutchinson County Airport (BGD)
9 BRENHAM: BRENHAM MUNICIPAL AIRPORT (11R)
10 Brownsville S Padre Isl International (BRO)
11 BROWNWOOD: BROWNWOOD REGIONAL AIRPORT (BWD)
12 Burnet Municipal Airport (BMQ)
13 Childress Municipal Airport (CDS)
14 College Station (CLL)
15 Conroe Montgomery County Airport (CXO)
16 Corpus Christi International Airport (CRP)
17 CORPUS CHRISTI: CORPUS CHRISTI NAS/TRUAX FIELD ARPT (NGP)
18 Corsicana Campbell Field (CRS)
19 Cotulla La Salle Co Airport (COT)
20 Dalhart Municipal Airport (DHT)
21 Dallas - Fort Worth International Airport (DFW)
22 Dallas Love Field (DAL)
23 Dallas Redbird Airport (RBD)
24 Del Rio International Airport (DRT)
25 Denton Municipal Airport (DTO)
26 Dryden Terrell County Airport (6R6)
27 El Paso International Airport (ELP)
28 FALFURRIAS: BROOKS COUNTY AIRPORT (BKS)
29 Fort Stockton Pecos County Airport (FST)
30 Fort Worth Alliance Airport (AFW)
31 Fort Worth Meacham (FTW)
32 FREDERICKSBURG: GILLESPIE COUNTY AIRPORT (T82)
33 GAINESVILLE: GAINESVILLE MUNICIPAL AIRPORT (GLE)
34 Galveston Scholes Field (GLS)
35 GEORGETOWN: GEORGETOWN MUNICIPAL AIRPORT (GTU)
36 Harlingen Rio Grande Valley I (HRL)
37 Hondo Municipal Airport (HDO)
38 Houston Bush Intercontinental (IAH)
39 Houston Clover Field (LVJ)
40 Houston Hooks Memorial Airport (DWH)
41 Houston Sugarland Mem (SGR)
42 Houston William P Hobby Airport (HOU)
43 Huntsville Municipal Airport (UTS)
44 JASPER: JASPER COUNTY-BELL FIELD AIRPORT (JAS)
45 Junction Kimble County Airport (JCT)
46 KERRVILLE: KERRVILLE MUNI/LOUIS SCHREINER FLD AIRPORT (ERV)
47 KILLEEN: KILLEEN MUNICIPAL AIRPORT (ILE)
48 KINGSVILLE: KINGSVILLE NAS AIRPORT (NQI)
49 LA GRANGE: FAYETTE REGIONAL AIR CENTER AIRPORT (3T5)
50 Longview E Tx Rgnl Airport (GGG)
51 Lubbock International Airport (LBB)
52 Lufkin Angelina Cty Airport (LFK)
53 MARFA: MARFA MUNICIPAL AIRPORT (MRF)
54 McAllen Miller International Airport (MFE)
55 McKinney Municipal Airport (TKI)
56 Midland International Airport (MAF)
57 Mineral Wells Airport (MWL)
58 MOUNT PLEASANT: MOUNT PLEASANT REGIONAL AIRPORT (OSA)
59 NACOGDOCHES: A L MANGHAM JR REGIONAL AIRPORT (OCH)
60 New Braunfels Municipal Airport (BAZ)
61 Odessa Schlemeyer Field (ODO)
62 Palacios Municipal Airport (PSX)
63 PARIS: COX FIELD AIRPORT (PRX)
64 PERRYTON: PERRYTON OCHILTREE COUNTY AIRPORT (PYX)
65 Pine Springs Guadalupe Mounta (GDP)
66 Port Arthur Se Tx Rgnl Airport (BPT)
67 Port Isabel Cameron County Airport (PIL)
68 Rockport Aransas Co Airport (RKP)
69 San Angelo Mathis Field (SJT)
70 San Antonio International Airport (SAT)
71 San Antonio Stinson Municipal Airport (SSF)
72 SAN MARCOS: SAN MARCOS MUNICIPAL AIRPORT (HYI)
73 SWEETWATER: AVENGER FIELD AIRPORT (SWW)
74 TEMPLE: DRAUGHON-MILLER CNTRL TEXAS REGIONAL ARPT (TPL)
75 Terrell Municipal Airport (TRL)
76 Tyler Pounds Field (TYR)
77 Victoria Regional Airport (VCT)
78 WACO: MC GREGOR EXECUTIVE AIRPORT (PWG)
79 Waco Regional Airport (ACT)
80 WESLACO: MID VALLEY AIRPORT (T65)
81 Wichita Falls Municipal Airport (SPS)
82 Wink Winkler Co Airport (INK)

Texas TMY2 Weather Files

1 Abilene
2 Amarillo
3 Austin
4 Brownsville
5 Corpus Christi
6 El Paso
7 Fort Worth
8 Houston
9 Lubbock
10 Lufkin
11 Midland
12 Port Arthur
13 San Angelo
14 San Antonio
15 Victoria
16 Waco
17 Wichita Falls

Texas WYEC2 Weather Files

1 El Paso
2 Brownsville
3 Fort Worth
4 San Antonio

NREL Solar Stations

1 Abilene
2 Austin
3 Big Spring
4 Canyon
5 Clear Lake
6 Corpus Christi
7 Del Rio
8 Edinburg
9 El Paso
10 Laredo
11 Menard
12 Overton
13 Pecos
14 Presidio
15 Sanderson

TCEQ Solar Stations

1 Bexar
2 Travis
3 El Paso (2)
4 Galveston
5 Harris (5)

FCHART and PV FCHART (New Weather File)

1 ABILENE
2 AMARILLO
3 AUSTIN
4 BROWNSVILLE
5 CORPUS CHRISTI
6 EL PASO
7 FORT WORTH
8 HOUSTON
9 LUBBOCK
10 LUFKIN
11 MIDLAND-ODESSA
12 PORT ARTHUR
13 SAN ANGELO
14 SAN ANTONIO
15 SHERMAN
16 VICTORIA
17 WACO
18 WICHITA FALLS

Figure 26: Available NWS, TMY2 and WYEC2 weather files compared to IECC/IRC weather zones for Texas

In 2005 these same responsibilities were further updated:

- with Senate Bill 20, House Bill 2481, and 2129.

These responsibilities were further updated in 2007:

- with Senate Bill 12 and House Bill 3693.

These responsibilities were further updated in 2009:

- with House Bill 1796.

These responsibilities were further updated in 2011:

- with Senate Bills 898 and 924, and House Bill 51.

In the following sections each of these tasks is further described.

2.2.1 (SB 5) Section 386.205. Evaluation of State Energy Efficiency Programs (w/PUCT)

The Laboratory is instructed to assist the Public Utility Commission of Texas (PUCT) and provide an annual report that quantifies by county the reductions of energy demand, peak loads, and associated emissions of air contaminants achieved from the programs implemented under this subchapter and from those implemented under Section 39.905, Utilities Code (i.e., Senate Bill 7).

2.2.2 (SB 5) Sec. 388.003. Adoption of Building Energy Efficiency Performance Standards.

TERP adopts the energy efficiency chapter of the 2001 International Residential Code (2001 IRC) as an energy code for single-family residential construction, and the 2001 International Energy Conservation Code (2001 IECC) for all other residential, commercial and industrial construction in the state. It requires that municipalities establish procedures for administration and enforcement, and ensure that code-certified inspectors perform inspections.

TERP provides that local amendments, in non-attainment areas and affected counties, may not result in less stringent energy efficiency requirements. The Laboratory is to review local amendments, if requested, and submit an annual report of savings impacts to the TCEQ. The Laboratory is also authorized to collect fees for certain of its tasks in Sections 388.004, 388.007 and 388.008.

2.2.3 (SB 5) Sec. 388.004. Enforcement of Energy Standards Outside of Municipality

For construction outside of the local jurisdiction of a municipality, TERP provides for a building to comply if:

a) a building certified by a national, state, or local accredited energy efficiency program shall be considered in compliance;
b) a building with inspections from private code-certified inspectors using the energy efficiency chapter of the International Residential Code or International Energy Conservation Code shall be considered in compliance; and
c) a builder who does not have access to either of the above methods for a building shall certify compliance using a form provided by the Laboratory, enumerating the code-compliance features of the building.

2.2.4 (SB 5) Sec. 388.007. Distribution of Information and Technical Assistance

The Laboratory is required to make available to builders, designers, engineers, and architects code implementation materials that explain the requirements of the International Energy Conservation Code and the energy efficiency chapter of the International Residential Code. TERP authorizes the Laboratory to develop simplified materials to be designed for projects in which a design professional is not involved. It also authorizes the Laboratory to provide local jurisdictions with technical assistance concerning implementation and enforcement of the International Energy Conservation Code and the energy efficiency chapter of the International Residential Code.

2.2.5 (SB 5) Sec. 388.008. Development of Home Energy Ratings.

TERP requires the Laboratory to develop a standardized report format to be used by providers of home energy ratings (HERs). The form must be designed to give potential buyers information on a structure's energy performance, including certain equipment. TERP requires the Laboratory to establish a public information program to inform homeowners, sellers, buyers, and others regarding home energy ratings.

2.2.6 (HB 1365) Sec. 388.004. Enforcement of Energy Standards Outside of Municipality

At the 78th Legislature (2003), House Bill 1365 modified Section 388.004 of The TERP to include the following new requirements:

- That builders shall retain for three years documentation which shows their building is in compliance with the Texas Building Energy Performance Standards, and that builders shall provide a copy of the compliance documentation to homeowners.
- That single-family residences built in unincorporated areas of counties, which were completed on or after September 1, 2001, but not later than August 31, 2003, are considered in compliance with the Texas Building Energy Performance Standards.

To help builders comply with these requirements, the Laboratory will enhance the current form, which is posted on the Laboratory's The TERP website.

2.2.7 (HB 1365) Sec. 388.009. Energy-Efficient Building Program

In 2003, House Bill 1365 modified the TERP, adding a new Section 388.009. In this section the General Land Office, the TCEQ and the Laboratory, working with an advisory committee, may develop an energy-efficient building accreditation program for buildings that exceed the building energy performance standards under Section 388.003 by 15% or more. This program shall be updated annually to include best available energy-efficient building practices. This program shall use a checklist system to produce an energy-efficient building scorecard to help: (1) home buyers compare potential homes and, by providing a copy of the completed scorecard to a mortgage lender, qualify for energy-efficient mortgages under the National Housing Act; and (2) communities qualify for emissions reduction credits by adopting codes that meet or exceed the energy-efficient building or energy performance standards established under this chapter. This effort may include a public information program to inform homeowners, sellers, buyers, and others regarding energy-efficient building ratings. The Laboratory shall establish a system to measure the reduction in energy and emissions produced under the energy-efficient building program and report those savings to the commission.

2.2.8 (HB 3235) Sec. 388.009. Certification of Municipal Inspectors

Also in 2003, House Bill 3235 modified the TERP to add the new Section 388.009. In this section the Laboratory is required to develop and administer a state-wide training program for municipal building inspectors who seek to become code-certified inspectors. To accomplish this, the Laboratory will work with national code organizations to assist participants in the certification program and is allowed to collect a reasonable fee from participants in the program to pay for the costs of administering the program. This program is required to be developed no later than January 1, 2004, with state-wide training sessions starting no later than March 1, 2004.

2.2.9 (SB 20, HB 2481, HB 2129). Additional Energy-Efficiency Initiatives

The 79th Legislature (2005), through SB 20, HB 2481 and HB 2129, amended SB 5 to enhance its effectiveness by adding the following additional energy-efficiency initiatives, including requiring 5,880 MW of generating capacity from renewable energy technologies by 2015, and 500 MW from non-wind renewables.

This legislation also requires PUCT to establish a target of 10,000 MW of installed renewable capacity by 2025, and requires TCEQ to develop a methodology for computing emissions reductions from renewable energy initiatives and the associated credits. The Laboratory is to assist TCEQ in quantifying emissions reductions credits from energy-efficiency and renewable-energy programs, through a contract with the Texas Environmental Research Consortium (TERC) to develop and annually calculate creditable emissions reductions from wind and other renewable energy resources for the state's SIP.

Finally, this legislation requires the Laboratory to develop at least 3 alternative methods for achieving a 15% greater potential energy savings in residential, commercial and industrial construction. To accomplish this, the Laboratory will be using the code-compliance calculator to ascertain which measures are best suited for reducing energy use without requiring substantial investments.

2.2.10 (SB 12, HB 3693). Additional Energy-Efficiency Initiatives

The 80th Legislature (2007), through SB 12, and HB 3693 amended SB 5 to enhance its effectiveness by adding several new energy efficiency initiatives. First, it requires the Laboratory to provide written recommendations to the State Energy Conservation Office (SECO) about whether or not the energy efficiency provisions of latest published edition of the International Residential Code (IRC), or the International Energy Conservation Code (IECC), are equivalent to or better than the energy efficiency and air quality achievable under the editions adopted under the 2001 IRC/IECC. The laboratory shall make its recommendations not later than six months after publication of new editions at the end of each three-year code development cycle of the International Residential Code and the International Energy Conservation Code. As part of this work with SECO, the Laboratory is required to consider comments made by persons who have an interest in the adoption of the energy codes in the recommendations made to SECO.

In addition, it requires the Laboratory to develop a standardized report format to be used by providers of home energy ratings, including different report formats for rating newly constructed residences from those for existing residences. The form must be designed to give potential buyers information on a structure's energy performance, including: insulation; types of windows; heating and cooling equipment; water heating equipment; additional energy conserving features, if any; results of performance measurements of building tightness and forced air distribution; and an overall rating of probable energy efficiency relative to the minimum requirements of the International Energy Conservation Code or the energy efficiency chapter of the International Residential Code, as appropriate.

It also encourages the Laboratory to cooperate with an industry organization or trade association to: develop guidelines for home energy ratings; provide training for individuals performing home energy ratings and providers of home energy ratings; and provide a registry of completed ratings for newly constructed residences and residential improvement projects for the purpose of computing the energy savings and emissions reductions benefits of the home energy ratings program. Finally, it requires the Laboratory shall to include information on the benefits attained from this program in an annual report to the commission.

2.2.11 (HB 1796). TERP Term & Additional Energy- Efficiency Initiatives

The 81st Legislature (2009), through HB 1796, amended sections Sec. 386.252 (a) and (b), to extend the date of the TERP to 2019 and require the TCEQ to contract with Laboratory to compute emissions reduction from wind and other renewable energy resources for the SIP.

2.2.12 (HB 51, SB 898, SB 924). Additional Energy-Efficiency Initiatives & Refinement of Ongoing Initiatives

The 82nd Legislature (2011) through HB-1, had an overall appropriation/budget reduction for TERP by %50, (to take into effect in FY 2012). The Laboratory's funding under TERP were cut by %50 accordingly, while the Laboratory's responsibilities under TERP increased:

The 82nd Legislature (2011), through SB 898, amended Sec 388.005 (c), (d) and (e), which per the amendment, requires each political subdivision, institution of higher education or state agency to establish a goal to reduce the electric consumption by the entity by at least 5% each fiscal year for 10 years, beginning September 1, 2011. SB 898 further elaborated and enhanced the annual reporting requirements for those entities, and required SECO to develop a standardized form for reporting. SB 898 adds the Laboratory as the entity in charge of calculating energy savings and estimated emissions reduction for each political subdivision, institution of higher education or state agency, based on the information collected by SECO. The Laboratory shall share the analysis with the TCEQ, EPA and ERCOT.

The 82nd Legislature (2011), through SB 924, amended Sec 39.9051, Utilities Code, (f), (g) and (h), to enhance the reporting requirements by all municipally owned utilities and electric cooperatives that had retail sales of more than 500,000 MWh in 2005, regarding combined effects of their energy efficiency activities. Per the amended sections, beginning April 1, 2012, these entities must report each year to SECO, on a standardized form developed by SECO. The report of information regarding the combined effects of the energy efficiency activities of the electric cooperative/utility from the previous calendar year should include the annual goals, programs enacted to achieve those goals, and any achieved energy demand or savings goals. SB 924 adds the Laboratory as the entity in charge of calculating energy savings and estimated emissions reduction for municipally owned utilities and for electric cooperatives, based on the information collected by SECO. The Laboratory shall share the analysis with the PUCT, ERCOT, EPA and TCEQ.

The 82nd Legislature, through HB 51, required SECO to appoint a new advisory committee for selecting high-performance building design evaluation systems. The committee includes a representative from the Laboratory and meets at least once every two years.

The 82nd Legislature, through HB 51, modified Sec 388.003 (e) on the Laboratory's review of proposed local code amendments, which should be compared to the unamended code (instead of the "base" code), and added to Sec 388.007 (c) the fact that Laboratory is allowed to provide technical assistance concerning the implementation of local code amendments.

In addition, HB 51 added Sec 388.007 (d), which allows The Laboratory to conduct outreach to the real estate industry on the value of energy code compliance and above code construction.

3 Progress: January 2011 through December 2011

3.1 (SB 5) Section 386.205. Evaluation of State Energy-Efficiency Programs (w/PUCT)

3.1.1 Implemented Procedures for Evaluating State Energy-Efficiency Programs

In 2004 the Laboratory held several meetings with the Public Utility Commission of Texas to discuss the development of a framework for reporting emissions reduction from the State Energy Efficiency Programs administered by the PUCT. The State Energy-Efficiency Programs administered by the PUCT include programs under Senate Bill 7 (i.e., Section 39.905 Utilities Code) and Senate Bill 5.

In 2003 and 2004, the Laboratory worked with the TCEQ to identify a method to help the PUCT more accurately report their deemed savings as peak-day savings in 1999, using the Laboratory's new emissions reductions calculator. In 2005, this method was implemented in the TCEQ's Integrated Emissions Calculations, which was reported in the 2005, 2006, 2007, 2008, 2009 and 2010 annual report.

3.2 (SB 5) Sec. 388.003. Adoption of Building Energy-Efficiency Performance Standards

3.2.1 Provide Code Training Sessions

During the 77th Legislature, Senate Bill 5 (SB 5) adopted the 2000 International Residential Code (IRC) as the energy code for single-family residential construction and the 2000 edition of the International Energy Conservation Code (IECC), with the 2001 Supplement for all other residential, commercial and industrial construction in the state. It requires that municipalities establish procedures for administration and enforcement, and ensure that code-certified inspectors perform inspections.

These codes are published by the International Code Council (ICC), which publishes a new edition every three years and a supplement in the intervening years. The 2003 Codes have been reviewed and determined to be no less stringent than the editions currently adopted by SB 5. Transition to the 2003 IRC and IECC can be easily accomplished. The 2006 Codes were reviewed and the residential provisions were determined to be less stringent than the editions adopted by SB 5 while the commercial provisions were determined to be as stringent as those in SB 5. Energy System Laboratory has assisted the local legislative bodies with amendments to the residential portions of the 2006 International Energy Conservation Code to insure it remains in compliance with the State Regulations concerning stringency.

Section 388.009 requires the Laboratory to develop and administer a state-wide training program for municipal building inspectors who seek to become code-certified inspectors. To accomplish this, the Laboratory developed the Energy Code Workshops which are based on the 2003 and 2006 International Energy Conservation Code (IECC) as published by the International Code Council (ICC) for residential and commercial buildings, with amendments. In addition, three more workshops were developed that offered software training, ASHRAE Standard 62.1 and ASHRAE Standard 90.1.

The Residential Energy Code Training Workshop and Commercial Requirements of the International Energy Conservation Workshop both include an overview of the TERP program and extensive instruction on all chapters of the IECC, which include the general requirements, definitions, and design conditions. The 2003 and 2006 Residential Workshops also includes detailed instruction on Chapter(s) which contain specific regulations relating to residential construction, in addition to a comparison of the IECC and the energy provisions of the International Residential Code (IRC). The 2003 and 2006 Commercial Workshops includes detailed instruction on Chapter(s), which relate to commercial regulations and a summary of the relationship between ASHRAE 90.1 and the commercial provisions of the IECC.

In 2011, the TERP group prepared new/revised materials for the following trainings:

- The 2009 IECC training materials created for the TWC workshops in 2010/2011, were updated and consolidated into two full length workshops, one for Residential and one for Commercial.

- ASHRAE Standard 90.0-2010 full-day workshops training materials, including PPT presentation and hard copy handouts
- The materials that were developed for the ASHRAE Standard 90.0-2010 full-day workshops (seven workshops delivered in 2011 and two in 2012) were also adapted for a series of five 45-minute online sessions that were filmed during the first quarter of 2012.

3.2.2 Summary of ASHRAE Standard 90.1 Standards Committee Activities during 2011, and Ongoing Subcommittee Actions

The following paragraphs track the changes and discussion in the ASHRAE 90.1 Standard at the ASHRAE winter conference in Las Vegas, Nevada and ASHRAE summer conference in Montreal, Canada. Both the conferences took place in 2011.

Work Plan is focused mainly on CM work targeted at developing the ASHRAE Standard 90.1- 2013. The working group set the goal of saving (compared to 90.1-2004) 40% by 2013 and 50% by 2016. A suggestion was provided that possibly a 50% goal should be in place for the 2013 version of the ASHRAE Standard 90.1, in order to be compatible with the goals of the US DOE targets. Much discussion ensued on the validity and logic of these savings targets. It was alleged that the methodology for computing the savings is different between ASHRAE and DOE. Following much discussion, the committee passed a motion to send the plan back to the Working Group with the request to clarify the savings goal and that the reporting of results would have to include energy savings both with and not with unregulated (plug) loads.

The SSPC also debated the questions: When reporting industry average energy consumption (e.g., Btu/sq.ft.), should “U.S.” be placed before “industry average?” And, should targets be specified in terms of “the 17 climate zones in the U.S.?”

The committee recommended that ASHRAE clarify the differences between the IECC and the 90.1 Standard.The committee also agreed to blended fuel rates for the 2010 Standard as $1.22/therm for gas and $0.0939/kWh for electricity. For the 2013 version, the committee agreed to review these rates for a possible revision. The intent of the committee was to regard the standard to be “cost effective”, so possibly there will be differences in fuel cost based on “regional” energy rates. Additional cost items were to be considered, such as water rates TBD and demand charges TBD (resulting in revised kWh charges.)

The committee discussed the introduction of Appendix H. For Appendix H, working groups will re-visit basic parameters: Escalation = 3.7%, fed tax rate = 34%, state tax rate = 5%, nominal discount rate = 7%, nominal interest = 7%. Finally the committee discussed addenda bb and ci to the ASHRAE Standard 90.1 – 2010.

Several addenda to ASHRAE Standard 90.1 – 2010 were discussed and put out for public review. The addenda are presented in the section below. Some of these addenda are discussed in the 2010 annual report and will not be included in the discussion below.

A progress indicator report prepared by PNNL was presented. The findings of this report are presented in the section below.

3.2.2.1 Progress Indicator Report

The overall objective of this report was to have 30% savings with the ASHRAE Standard 90.1- 2010, when compared to the ASHARE Standard 90.1-2004. Bing Liu presented PNNL’s final report on the 30% energy savings objective compared to 90.1-2004 as the baseline.

From the progress report, it was indicated that overall there have been 153 approved addenda since ASHRAE Standard 90.1-2004. 118 of these addenda were made to the mandatory and prescriptive sections of the code. 72 of the addenda had an impact on energy savings. The latest addenda are described in the section on reported and discussed addenda.

The report includes approach and methodology showing 16 building types in 17 different climate zones. The work incorporates 108 addenda issued since the publication of the 2004 version. Results show that the average site line energy savings across all building types resulted in about 25.5% with receptacle loads and about 32.6% without receptacle loads. Energy cost savings were 24% and 30.1% respectively.

3.2.2.2 Reported and discussed Addenda

Several addenda to ASHRAE Standard 90.1-2010 were put up for public review. The addenda are briefly described below.

Addendum a
This addendum updates the test procedure references for product information in the Tables in Section 10.8 (product information), and also adds a normative reference in Chapter 12. This will make the table references more consistent with other equipment tables (and other test procedure references) in the Standard.

Addendum b
2010 edition of the ASME Safety Code for Elevators and Escalators added allowances to permit varying the speed of escalators and moving walks to conserve energy. It does not yet permit automatically stopping and starting of escalators or moving walks. Variable-speed technology is common for this application in other countries.

Addendum c
The treatment of laboratory exhaust fans is currently not specified. Laboratory exhaust design requires sufficient momentum of exhaust volume to exit the building wake in order to prevent re-entrainment of exhaust air. The standard design approach to accomplish this for VAV supply systems utilizes an outside air bypass damper that ensures a constant volume stack discharge (brings in OA air to supplement any decrease in exhaust volume from the building). Clarifying this as the baseline approach in Appendix G (Performance Rating Method) will make it clear to design teams that other approaches consider to be energy reduction strategies will be acknowledged as such and appropriately credited.

Addendum g
With the approval of Addendum aq to Standard 90.1-2010, this standard can now add requirements for some of the process and plug loads within a building. The Department of
Energy has defined minimum efficiency requirements for some Commercial Refrigerator and Freezers that went into effect as of 1/1/2010. Additional requirements for commercial refrigeration equipment have also been defined and approved per 10CFR Part 431 and will go into effect on 1/1/2012. This addendum adds these requirements to Standard 90.1-2010.

As part of the DOE evaluation, they have calculated that the standard changes will result in 1.035 quads of energy savings over a 30 year period from 2012-2042. The economic analysis shows a scalar (payback) of 1.3 to 3.9. This addendum adds two additional tables, Table 6.8.1L and 6.8.1M, which define the minimum efficiency requirements for commercial refrigerators and freezers. Also a reference to AHRI Standard 1200 and AHAM Standard HRF-1 is added in Section 12.

Addendum h
This addendum amends the minimum energy efficiency standards for water-to-air heat pumps (water loop, ground water, and ground loop) listed in Table 6.8.1B of Standard 90.1-2010.These new minimum efficiencies meet or exceed the Energy Star Tier 1 levels for Ground Water and Ground Source heat pumps that were in effect until January 1, 2011. Proposed cooling EERs and heating COPs are on average 3% to 11% more stringent than values currently listed in the standard. These new minimums are proposed to become effective immediately upon publication of the addendum. Finally, the proposal corrects the minimum efficiencies for through-thewall products and removes the small-duct, high-velocity product class from Table 6.8.1B.

Addendum i
Single package vertical AC units.

Addendum j
In Table 6.8.1A, three issues need to be corrected.

- In the preparation of Table 6.8.1, as a result of addendum CO, a mistake was found for the efficiency requirements for the new category of evaporatively cooled units with a capacity from 240,000 Btu/h to 760,000 Btu/h in the category of other heat. The EER as of 6/1/2011 is shown as 12.2 EER, whereas the EER for the same unit with electric heat is 11.9 EER. The EER for other size units is 0.2 EER lower for other heat to account for the increased pressure drop. The current value for this product results in a 0.3 increase, which is an error. The values of 12.2 EER should be 11.7 EER, which is 0.2 below the 11.9 listed for the electric heat unit.
- In addition, the small duct high velocity requirements have been dropped by DOE and they are only allowing such systems under a waiver clause so the addendum has also made a change to remove the small duct high velocity systems from Tables 6.8.1A and 6.8.1B.
- Note a states that the "IPLV and part load rating conditions are only applicable to equipment with capacity modulation". The IPLV term is no longer used and has been replaced by the IEER which applies to all units including those that do not have capacity modulation.

Addendum k
This will make the transformer test procedure references consistent with other references in Chapter 6.

Addendum l
This addendum fixes a mistake in Section 6.5.3.1.2 for fan brake horsepower methodology.

Addendum m
This proposal adds power density and control requirements to capture additional savings, adds a needed exemption for practical application, includes submittal requirements, and changes control credits to apply only to lamps in multi-lamp fixtures that are controlled.

Addendum n
The intent of this addendum is to clarify that the total lumens/Watt for the entire elevator cab is being required to meet the efficiency requirement, but that it is not required that each individual light source must comply.

Addendum o
This addendum updates the fenestration air leakage provisions to clarify the requirements for glazed sectional garage doors. A new definition for sectional garage doors is also added.

Addendum q
This language updates the ASHRAE dynamic glazing definition to match the National Fenestration Rating Council dynamic glazing definition.

Addendum r
This addendum clarifies the intent of the committee and relocates all wording related to thermostat and humidity schedules to the Schedules section of Table G3.1 for greater ease of use.

Addendum s
Large amounts of fan energy can be wasted when zones report incorrect information to the control system, which causes the supply fan speed to increase, often to maximum speed. This addendum requires additional safeguards to prevent this, and for non-DDC systems requires location of sensors in locations that do not require high setpoints.

Addendum t
This addendum makes corrections 6.5.1.1.4 (Dampers) to correct the reference to the proper section for damper leakage. In addition this addendum also clarifies that the damper leakage requirements in 6.4.3.4.3 (Damper Leakage) and as defined in Table 6.4.3.4.3 (Maximum damper leakage) applies to the return air dampers used in economizers

Addendum u
This addendum proposes to add a reference to AMCA Standard 205-10 to require fan efficiency requirements to be classified based on fan efficiency grades.

Addendum v
This proposal requires that the controlled receptacles be appropriately identified so that users can clearly distinguish between controlled and non-controlled receptacles.

Addendum w
This addendum clarifies the credits for renewable energy and purchased energy in Section 11 (Energy Cost Budget Method) and Appendix G (Performance Rating Method)

Addendum x
This addendum puts limits on air leakage through the casing and through the damper for terminal air boxes in Section 6.4.4.2. This requirement only applies to single duct and dual duct units.

Addendum y
These tables will update the standard to include the new federal energy efficiency standards in Section 10.8 for motors used in HVAC equipment that will be in effect starting in 2015.

Addendum z
This proposal relocates the existing water economizer requirements in 6.5.2.4 the general economizer requirements in 6.5.1.5

Addendum aa
This proposed change eliminates references to the type of DDC control system, and just specifies how the system must perform in Section 6.5.3.2.3

Addendum ab
This addendum adds a Filled Cavity metal building roof assembly to Appendix A.

Addendum ac
This allows the inclusion of the R-value of an air space in enclosed cavities with or without insulation when calculating the total R-value of assemblies in Appendix A. This is consistent with what is allowed in Chapter 26 of the 2009 Handbook of Fundamentals.

Addendum ci
Since the ECB method and Addendum G were initially adopted into Standard 90.1, the cooling tower market has moved to variable-speed fan controls rather than two-speed fan motors on cooling towers. The change to variable-speed drives on the cooling tower fan(s) reflects current practice and will serve as a truer baseline for comparisons between the baseline system (Systems 7 and 8) and the proposed building system by users of Appendix G as well as the Energy Cost Budget Method.

In addition, an exception has been added for climates with extremely high design wet-bulb temperatures such that the baseline system will not require an unreasonably large cooling tower. In such climate zones, the current requirement is not a realistic baseline and unfairly penalizes the proposed design. The changes in this Addendum correct this condition by providing a more realistic baseline.

Finally, the use of “open circuit” as opposed to “closed circuit” cooling towers has been clarified in the text (reference Addendum ad to Standard 90.1-2007).

Addendum cj
This addendum modifies Appendix G (Performance Rating Method) to change the requirements for economizers and how they are modeled in computer rooms.

3.2.2.3 Brief Summary of work by each sub-committee

From the Lighting sub-committee:
No new proposals were discussed in the lighting sub-committee in the Las Vegas meeting.

From the Mechanical sub-committee:
The committee proposed additions to Table 6.8.1L&M, of federally regulated package equipment efficiencies. The committee also discussed updating efficiencies (COP) of water-to-air electrically operated heat pumps.

A presentation explaining the equipment types, timelines and triggers to start a rule making process was presented to the sub-committee. This ruling has a potential for a significant impact on the certification of packaged HVAC products due to the increased in basic model groups. The proposal has been officially delayed for 18 months and it was noted that a ruling will be released in the fall with a new interpretation of the basic model group definitions. Also, in the current proposal DOE has extended the federal coverage to Computer Room units, but this is currently being evaluated.

A presentation was made comparing the Standard's insulation thicknesses relative to other standards. A recommendation was made to check with CEC Title 24 on analysis that has been done. A discussion occurred regarding potential industrial processes and whether they were covered by the new standard with the change in the Title, Purpose and Scope in the 2010 Standard.

From the Envelope sub-committee:
The envelope committee discussed Addendum bb on Table 5.5-1 of the ASHRAE Standard 90.1-2010 code, which describes the U-values and R-values. The sub-committee also discussed rewriting Appendix C of the ASHRAE 90.1-2010, which describes the trade-off option for the building envelope described in subsection 5.8. In addition, a proposal was presented to the sub-committee to recognize insulated metal panels as a continuous insulation. Other items on the agenda included a presentation by PNNL regarding savings from the installation of cool roofs and a discussion on the findings from the ASHRAE research project 1365, which describes abd catalogs the thermal performance of building envelope details for mid- and high-rise buildings. The sub-committee discussed the potential use of this information in the ASHRAE 90.1 standard.

From the ECB sub-committee:
The ECB sub-committee discussed the change in the specification of baseline HVAC system for publication and public review. The sub-committee also discussed the proposal to eliminate two rotation exceptions related to simulating four orientations on the baseline building that no longer seemed appropriate in light of some changes made by the envelope sub-committee.

In addition, the sub-committee discussed the amendment to Appendix G regarding vertical fenestration areas baseline modeling on existing buildings. Also, the committee proposed a motion to approve changes in vertical fenestration Tables G.3.3 – sets requirements for the baseline building. Fenestration percentages for above grade walls are shown by building type. The idea behind this motion was to help people get LEED points for good fenestration design.

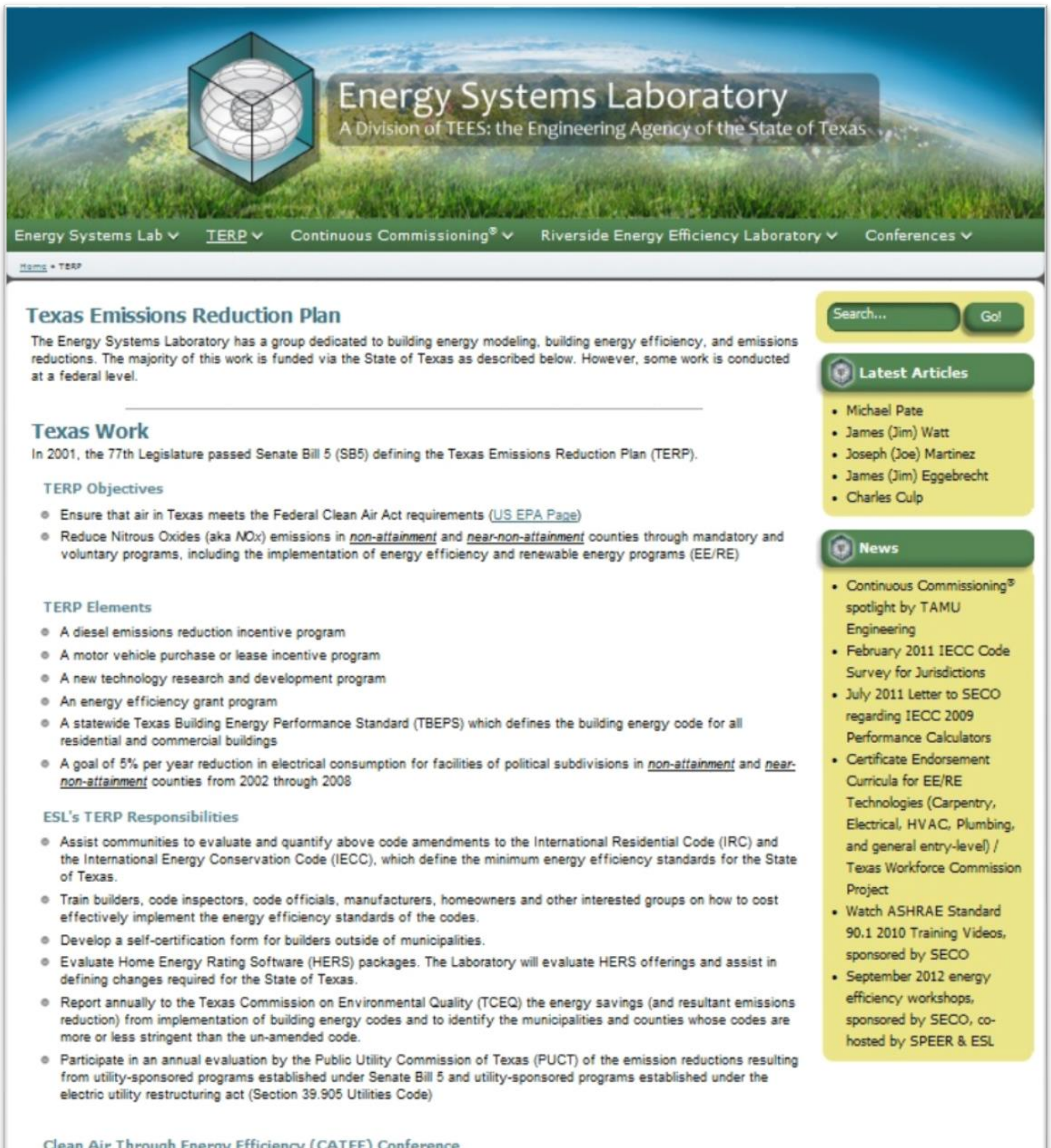
3.3 Laboratory's TERP Web Site "esl.tamu.edu/terp"

Since the fall of 2001, the Laboratory has maintained a TERP webpage, where information is provided to builders, code officials, the design community and homeowners about TERP. In 2010, the Laboratory redesigned its website to make navigation easier. On the navigation bar is a tab that links to the TERP homepage (Figure 28). The homepage contains the following items:

- Definition of the Texas Emissions Reduction Plan
- Texas Work
    - TERP Objectives
    - TERP Elements

  - ESL's TERP Responsibilities
  - The CATEE Conference
  - Links to
    - Texas Legislative Testimony by the ESL
    - TERP Legislative History
- National Work
  - National Center of Excellence on Displaced Emission Reductions (CEDER)
  - Links to
    - CEDER Program
    - EPA Recognizes ESL and Dallas Partners

In addition, the TERP homepage also includes a sidebar on the left with links to the latest articles and news.


Energy Systems Laboratory
A Division of TEES: the Engineering Agency of the State of Texas

Energy Systems Lab | TERP | Continuous Commissioning® | Riverside Energy Efficiency Laboratory | Conferences

Home » TERP

Texas Emissions Reduction Plan

The Energy Systems Laboratory has a group dedicated to building energy modeling, building energy efficiency, and emissions reductions. The majority of this work is funded via the State of Texas as described below. However, some work is conducted at a federal level.

Texas Work

In 2001, the 77th Legislature passed Senate Bill 5 (SB5) defining the Texas Emissions Reduction Plan (TERP).

TERP Objectives

- Ensure that air in Texas meets the Federal Clean Air Act requirements (US EPA Page)
- Reduce Nitrous Oxides (aka NOx) emissions in *non-attainment* and *near-non-attainment* counties through mandatory and voluntary programs, including the implementation of energy efficiency and renewable energy programs (EE/RE)

TERP Elements

- A diesel emissions reduction incentive program
- A motor vehicle purchase or lease incentive program
- A new technology research and development program
- An energy efficiency grant program
- A statewide Texas Building Energy Performance Standard (TBEPS) which defines the building energy code for all residential and commercial buildings
- A goal of 5% per year reduction in electrical consumption for facilities of political subdivisions in *non-attainment* and *near-non-attainment* counties from 2002 through 2008

ESL's TERP Responsibilities

- Assist communities to evaluate and quantify above code amendments to the International Residential Code (IRC) and the International Energy Conservation Code (IECC), which define the minimum energy efficiency standards for the State of Texas.
- Train builders, code inspectors, code officials, manufacturers, homeowners and other interested groups on how to cost effectively implement the energy efficiency standards of the codes.
- Develop a self-certification form for builders outside of municipalities.
- Evaluate Home Energy Rating Software (HERS) packages. The Laboratory will evaluate HERS offerings and assist in defining changes required for the State of Texas.
- Report annually to the Texas Commission on Environmental Quality (TCEQ) the energy savings (and resultant emissions reduction) from implementation of building energy codes and to identify the municipalities and counties whose codes are more or less stringent than the un-amended code.
- Participate in an annual evaluation by the Public Utility Commission of Texas (PUCT) of the emission reductions resulting from utility-sponsored programs established under Senate Bill 5 and utility-sponsored programs established under the electric utility restructuring act (Section 39.905 Utilities Code)

Clean Air Through Energy Efficiency (CATEE) Conference

Search... Go!

Latest Articles

- Michael Pate
- James (Jim) Watt
- Joseph (Joe) Martinez
- James (Jim) Eggebrecht
- Charles Culp

News

- Continuous Commissioning® spotlight by TAMU Engineering
- February 2011 IECC Code Survey for Jurisdictions
- July 2011 Letter to SECO regarding IECC 2009 Performance Calculators
- Certificate Endorsement Curricula for EE/RE Technologies (Carpentry, Electrical, HVAC, Plumbing, and general entry-level) / Texas Workforce Commission Project
- Watch ASHRAE Standard 90.1 2010 Training Videos, sponsored by SECO
- September 2012 energy efficiency workshops, sponsored by SECO, co-hosted by SPEER & ESL

Figure 27. TERP Home Page

The TERP tab also contains a dropdown menu which provides links to the following sections

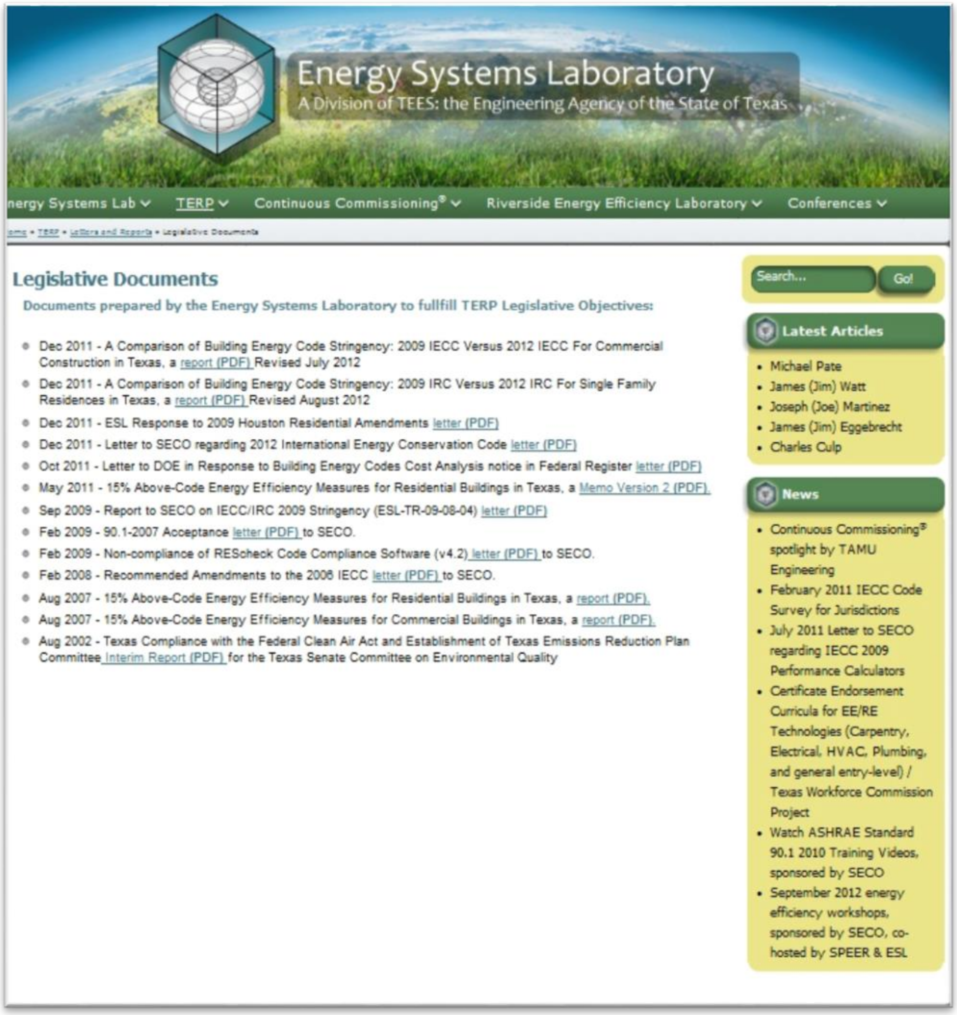


Figure 28: TERP –Letters and Reports

- Code Compliance Calculator
    - IC3
        - Help and Support – contains IC3 Help Resources including
            - Supplemental Release Notes
            - What's New in this Version?
            - Manual
            - Detailed Release Notes for current release of IC3
            - Aggregate Reports from IC3 – Location, parameters and maps.
            - Contact information
            - RESNET Certification Resources
        - News – includes information about improvements and fixes to IC3
        - Workshops – description of IC3 Workshops, including contact information

        - FAQs
        - IC3 Reports – contains data from ESL's research and software projects
            - IC3 – Registry House Parameters (updated monthly)
                - Envelope
                - Systems
                - Mixed
            - Texas Building Registry Demographics
                - Texas
                - Counties
                - Cities
                - TCV (Travis County & Austin)
            - Weather Data
    - TCV
        - Help & Support – contains TCV Help & Support and contact information
        - News – includes TCV News including
            - What's New in Version 1.1
            - What is the Difference between TCV v1.1 and IC3 v3.x?
        - FAQs
    - Other Legacy calculators
        - AIM Calculator
        - eCalc 1.x Calculator
    - Credits

- Letters and Reports
    - Legislative Documents
    - Builders Information
    - EPA/CEDER Work
        - Background
        - Reports provided to US EPA as part of CEDER Program
    - Reports – listed by year from 2002-2011

- About
    - Legislative Testimony
    - Legislative Documents
    - Legislative History

- TERP Data Sets
    - Weather Data
    - Texas Building Registry
        - IC3/TCV Usage Reports
        - IC3 House Construction Trends

- TERP Links
    - eCalc Emissions & Energy Calculator
    - International Code Compliance Calculator (ICCC)
    - Public Utility Commission of Texas (PUC)
    - U.S. Department of Energy (DOE)
    - Texas State Conservation Office (SECO)
    - U.S. Environmental Protection Agency (EPA)
    - International Code Council (ICC)

    - American Society of Heating, Refrigeration and Air-Conditioning Engineers (ASHRAE)
    - North Central Texas Council of Governments (NCTCOG)
    - Alamo Area Council of Governments (AACOG)
    - Circle of Ten
    - Texas Home Energy Rating Organization (TxHERO)

- Other Publications
    - Builders Information
    - Digital Library
    - Presentations
    - Proceedings
        - Air Quality (CATEE)
        - Hot & Humid
        - IBPSA
        - ICEBO
        - IETC

- Workshops
    - IC3
    - IECC Residential
    - IECC Commercial
    - ASHRAE

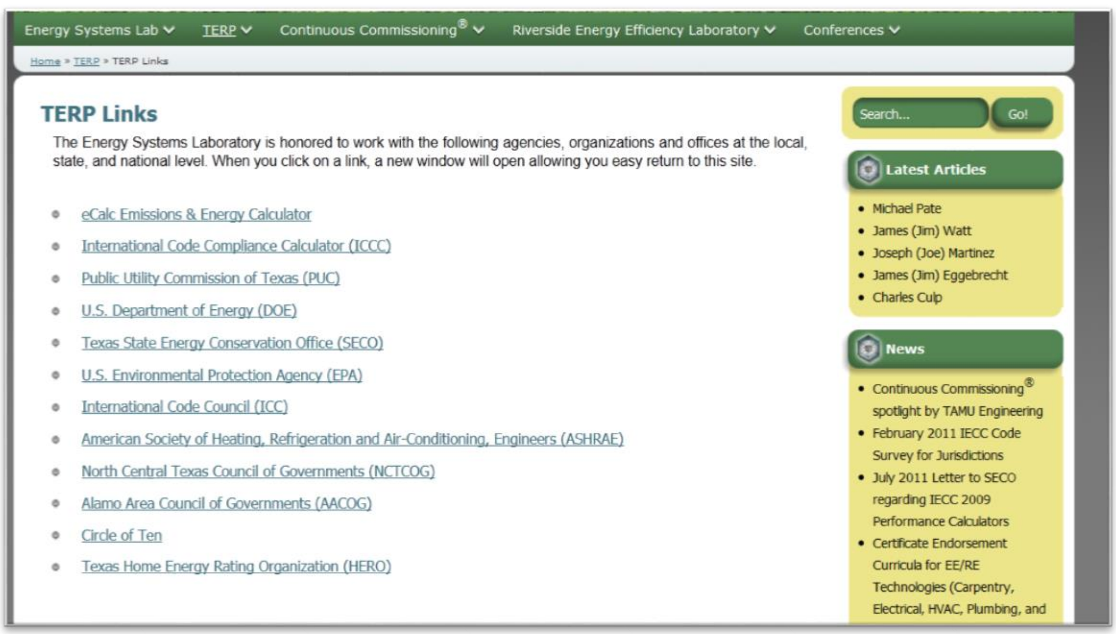


Figure 29: TERP Links

3.3.1 Provide Technical Assistance to the TCEQ

The Laboratory received dozens of calls per week from code officials, builders, home owners and municipal officials regarding the building code and emissions calculations. A complete file of these transactions is maintained at the Laboratory.

3.4 Delivered "Statewide Air Emissions Calculations from Wind and Other Renewables: Summary Report September 2011 – July 2012," to the Texas Commission on Environmental Quality in July 2012, revised November 2012

The Energy Systems Laboratory, in fulfillment of its responsibilities under this Legislation, submits its annual report, "Statewide Air Emissions Calculations from Wind and Other Renewables," to the Texas Commission on Environmental Quality.

The report is organized in several deliverables:

- a summary report, which details the key areas of work
- supporting documentation
- supporting data files, including weather data, and wind production data, which have been assembled as part of the year's effort

The executive summary provides summaries of the key areas of accomplishment this year, including:

- continuation of stakeholder's meetings
- analysis of power generation from wind farms using improved method and 2010 data
- analysis of emissions reduction from wind farms
- updates on degradation analysis
- analysis of other renewables, including PV, solar thermal, hydroelectric, geothermal and landfill gas
- review of electricity generation by renewable sources and transmission planning study reported by ERCOT

3.4.1 Analysis of wind farms using improved method and 2011 data

In this report, the weather normalization procedures, developed together with the Stakeholders, were presented and applied to all the wind farms that reported their data to ERCOT during the 2010 measurement period, together with wind data from the nearby NOAA weather stations. In the 2011 Wind and Renewables report to the TCEQ (Haberl et al. 2011), weather normalization analysis methods were reviewed.

The wind farm (Sweetwater III) was used as an example in this report to present the same weather normalization procedure, including the processing of weather and power generation data, modeling of daily power generation versus daily wind speed using the ASHRAE Inverse Model Toolkit (IMT) for two separate periods, i.e., Ozone Season Days period (OSP), from July 15 to September 15, and Non-Ozone
Season days period (Non-OSP); prediction of 2008 wind power generation using developed coefficients from 2010 daily OSP and Non-OSP models; summarizing the measured 2008 and 2010 wind power generation for those wind farms having 2008 measured data and the analysis on monthly capacity factors generated using the models.

Then, a summary of total predicted wind power production in the base year (2008) for all of the wind farms in the ERCOT region using the developed procedure was presented and the new wind farms which started operation in 2010 were added. The total measured wind power generation in 2010 was 23,962,433 MWh/yr, which is 5 % less than what the same wind farms would have produced in 2008. The measured wind power generation in the OSP of 2010 was 53,189MWh/day, which is 16.93% higher than the 2008 OSD Baseline wind production.

This report also includes an uncertainty analysis that was performed on all the daily regression models for the entire year and Ozone Season Period.

3.4.1.1 Analysis of emissions reductions from wind farms

In this report, the procedure for calculating annual and peak-day, county-wide NOx reductions from electricity savings from wind projects implemented in the CM zones in ERCOT was presented and, calculating the NOx emission reductions based on the special version of 2010 eGRID, developed by the EPA for the TCEQ. According to the 2008 baseline, the total MWh savings for the wind farms within the ERCOT region are 25,224,413 MWh and 45,487 MWh/day in the Ozone Season Period. The total NOx emissions reductions across all the counties amount to 6,873.92 tons/yr. and 12.46 tons/day for the Ozone Season Period. Compared to the 1999 baseline reported last year, the total NOx emissions reductions decreased by 4985.08 tons/year and 14.54 tons/year for the Ozone Season Period. This is because the baseline was shifted from 1999 to 2008; the new 2010 egrid has been used instead of 2007 egrid as well.

The ESL worked with the EPA and TCEQ regarding a new version of eGRID for all ERCOT counties in Texas. A new version of eGRID was developed and presented in this report, which is based on the ERCOT congestion management zones. As the TCEQ moved the base year to more recent years, this updated version of eGRID, representing the current Texas market, has been used to estimate the emissions reduction from wind power in the next year's report.

3.4.1.2 Development of a degradation analysis

This report contains an updated analysis to determine what amount of degradation could be observed in the measured power from Texas wind farms. Currently, the TCEQ uses a very conservative 5% degradation per year for the power output from a wind farm when making future projections from existing wind farms. Accordingly, the TCEQ asked the ESL to evaluate any observed degradation from the measured data for Texas wind farms. To accomplish this, nine wind farms (12 sites) from 2002 to 2011, two wind farms from 2004 to 2011, and five wind farms from 2006 to 2011, were evaluated with a total capacity of 1889.6 MW. This year, no new wind farms were added for the analysis because the qualified wind farms needed at least four- year measured data.

In this analysis, a sliding statistical index was established for each site that uses 10th, 25th, 50th, 75th, 90th, and 99th percentiles of the hourly power generation over a 12-month sliding period, as well as mean, minimum and maximum hourly power generation of the same 12-month period. These indices are then displayed using one data symbol for each 12-month slide, beginning from the first 12-month period until the last 12-month period for each of the wind farms.

Of the 19 sites analyzed, 12 sites showed an increase when one compares the 90th percentile of whole period to the 90th percentile of the first 12-month period, ranging from 3.5% to 30.6% The remaining seven sites showed a decrease from -2.3% to -30.1%. The weighted average of this increase across all wind farms studied is 7.8% (positive), which indicates that no degradation was observed from the aggregate energy production from these wind farms over the studied operation period.

3.4.1.3 Analysis of other renewable sources

Other renewable energy projects throughout the state of Texas were located to determine NOx emissions reduction and are included in this section. Searches were conducted on five specific categories which include solar photovoltaic, solar thermal, geothermal, hydroelectric, and Landfill Gas-Fired Power Plants. Many newly located renewable energy projects are assembled for inclusion in this report.

3.4.1.4 Review of electricity savings and transmission planning study reported by ERCOT

In this report, the information posted on ERCOT's Renewable Energy Credit Program site www.texasrenewables.com is reviewed. In particular, information posted under the "Public Reports" tab was downloaded and assembled into an appropriate format for review. This includes ERCOT's 2001 through 2011 reports to the Legislature and information from ERCOT's listing of REC generators.

Technical Assistance

The Laboratory provides technical assistance to the TCEQ, the PUC, SECO and ERCOT, as well as Stakeholders participating in a number of conferences and presentations. In 2011, the Laboratory continued to work closely with the TCEQ to develop an integrated emissions calculation, which provided the TCEQ with a creditable NOx emissions reduction from energy efficiency and renewable energy (EE/RE) programs reported to the TCEQ in 2005, 2006, 2007, 2008, 2009, 2010 and 2011 by the Laboratory, PUC, SECO, and Wind-ERCOT.

The Laboratory has also enhanced the previously developed emissions calculator by: expanding the capabilities to include all counties in ERCOT, including the collection and assembly of weather from 1999 to the present from 17 NOAA weather stations, and enhancing the underlying computer platform for the calculator.

The Laboratory has and will continue to provide leading edge technical assistance to counties and communities working toward obtaining full SIP credit for the energy efficiency and renewable energy projects that are lowering the emissions and improving the air for all Texans. The Laboratory will continue to provide superior technology to the State of Texas through efforts with the TCEQ and US EPA. The efforts taken by the Laboratory have produced significant success in bringing EE/RE closer to US EPA acceptance in the SIP.

Table 1: 2000/2001 IECC Performance Path vs. 2009 IECC Performance Path

County	IECC 2009 Weather Zones	Energy Type**	Total Annual Savings of the IECC 2009 Performance Path compared to the IECC 2000/2001 (%)*	
			Gas Heating, DHW	Heat Pump Heating, Electric DHW
Houston (HAR)	2A	Site	10.9 %	10.9 %
		Source	11.9 %	10.9 %
Brownsville (CAM)	2B	Site	16.4 %	13.6 %
		Source	15.1 %	13.6 %
Dallas (TAR)	3A	Site	12.8 %	10.8 %
		Source	12.3 %	10.8 %
El Paso (ELP)	3B	Site	10.2 %	10.0 %
		Source	11.2 %	10.0 %
Amarillo (ARM)	4B	Site	16.0 %	14.6 %
		Source	16.7 %	14.6 %

**Base-case Simulation Assumptions:* Analysis used single-family house, 2,500 ft^2, single story, four bedrooms, slab-on-grade, ducts in the unconditioned, ventilated attic, window-to-floor ratio: 18% for 2000/2001, 15% for 2009, windows equally distributed (N,E,S,W), and no exterior shading. HVAC Distribution efficiency: 0.8 for 2000/2001, 0.88 for 2009. All other roof, wall and window parameters as per 2000/2001 and 2009 IECC for county shown (IC3 ver. 3.03.02).
***Source Energy Consumption*: A factor of 3.16 was used to calculate the source electricity consumption. A factor of 1.1 was used to calculate source gas energy consumption.

Table 2: 2000/2001 IECC Performance Path vs. 2009 IECC Prescriptive Path

County	IECC 2009 Weather Zones	Energy Type**	Total Annual Savings of the IECC 2009 Prescriptive Path compared to the IECC 2000/2001 (%)*	
			Gas Heating, DHW	Heat Pump Heating, Electric DHW
Houston (HAR)	2A	Site	7.8 %	8.7 %
		Source	9.1 %	8.7 %
Brownsville (CAM)	2B	Site	14.3 %	11.6 %
		Source	13.0 %	11.6 %
Dallas (TAR)	3A	Site	9.6 %	8.6 %
		Source	9.6 %	8.6 %
El Paso (ELP)	3B	Site	7.0 %	8.3 %
		Source	8.9 %	8.3 %
Amarillo (ARM)	4B	Site	10.7 %	11.9 %
		Source	13.1 %	11.9 %

**Base-case Simulation Assumptions:* Analysis used single-family house, 2,500 ft^2, single story, four bedrooms, slab-on-grade, ducts in the unconditioned, ventilated attic, window-to-floor ratio: 18% for 2000/2001, 15% for 2009, windows equally distributed (N,E,S,W), and no exterior shading. HVAC Distribution efficiency: 0.8 for 2000/2001; for 2009 IECC, HVAC distribution efficiency simulated using R8 insulation for supply, R6 for return ducts and total duct leakage of 11% to outdoor. All other roof, wall and window parameters as per 2000/2001 and 2009 IECC for county shown (IC3 ver. 3.03.02).
***Source Energy Consumption*: A factor of 3.16 was used to calculate the source electricity consumption. A factor of 1.1 was used to calculate source gas energy consumption.

Table 3: 2000/2001 IECC Performance Path vs. Chapter 11 of the 2009 IRC Prescriptive Path

County	IECC 2009 Weather Zones	Energy Type**	Total Annual Savings of the IRC 2009 compared to the IECC 2000/2001 (%)*	
			Gas Heating, DHW	Heat Pump Heating, Electric DHW
Houston (HAR)	2A	Site	7.7 %	7.7 %
		Source	8.3 %	7.7 %
Brownsville (CAM)	2B	Site	13.7 %	10.4 %
		Source	11.8 %	10.4 %
Dallas (TAR)	3A	Site	9.9 %	7.8 %
		Source	9.0 %	7.8 %
El Paso (ELP)	3B	Site	7.1 %	7.1 %
		Source	7.9 %	7.1 %
Amarillo (ARM)	4B	Site	10.7 %	11.9 %
		Source	13.1 %	11.9 %

**Base-case Simulation Assumptions:* Analysis used single-family house, 2,500 ft^2, single story, four bedrooms, slab-on-grade, ducts in the unconditioned, ventilated attic, window-to-floor ratio: 18% for 2000/2001, 15% for 2009 IRC, windows equally distributed (N,E,S,W), and no exterior shading. HVAC Distribution efficiency: 0.8 for 2000/2001; for 2009 IRC, HVAC distribution efficiency simulated using R8 insulation for supply, R6 for return ducts and total duct leakage of 11% to outdoor. All other roof, wall and window parameters as per 2000/2001 and 2009 IRC for county shown (IC3 ver. 3.03.02).
***Source Energy Consumption*: A factor of 3.16 was used to calculate the source electricity consumption. A factor of 1.1 was used to calculate source gas energy consumption.

3.5 Presentations to various entities and conferences.

The Energy Systems Laboratory made presentations at several conferences, to the City of Arlington and to two chapters of the Sierra Club about ways to save energy.

Presentation to Clean Air Through Energy Efficiency Conference, November 2011, Dallas, Texas

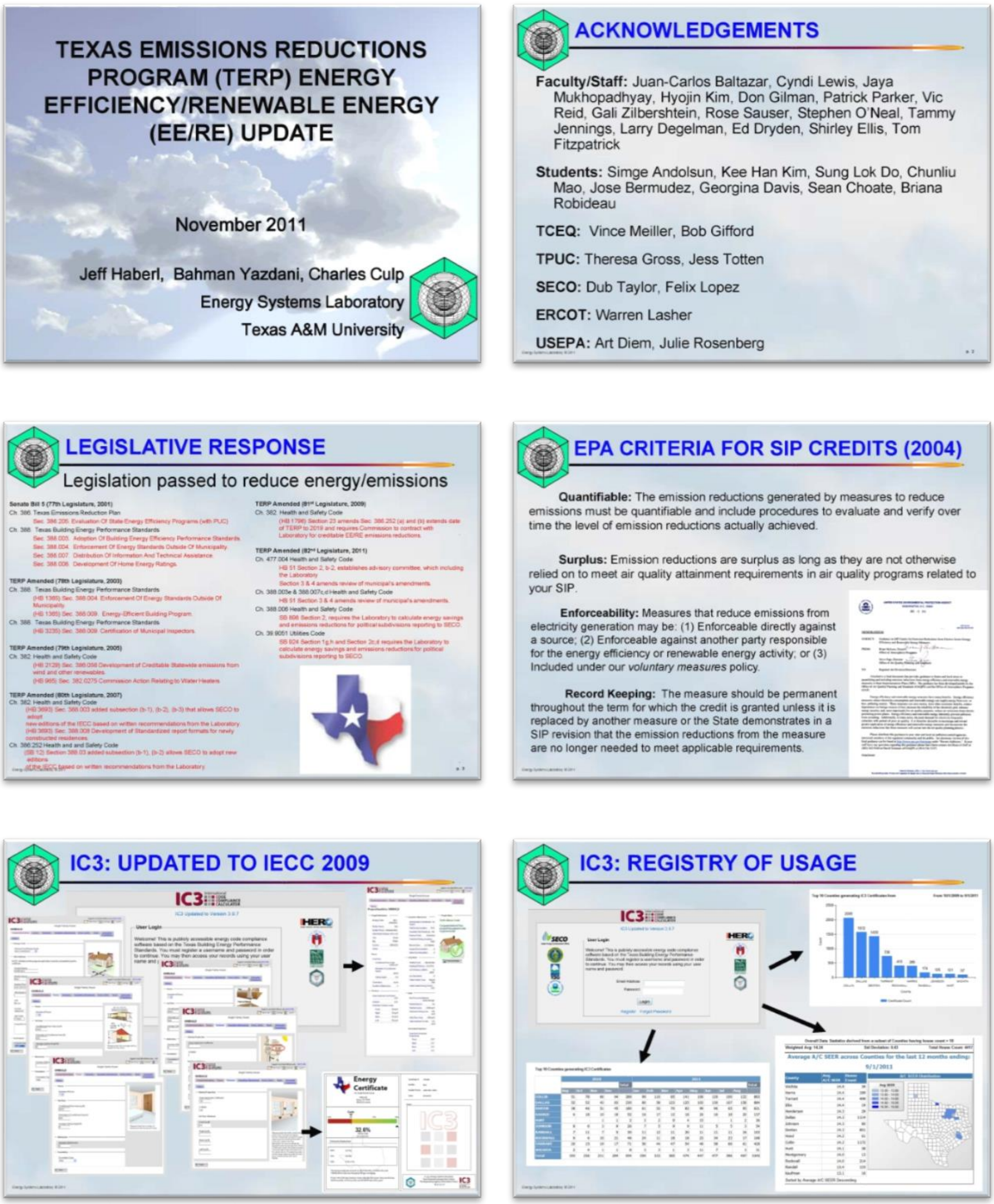
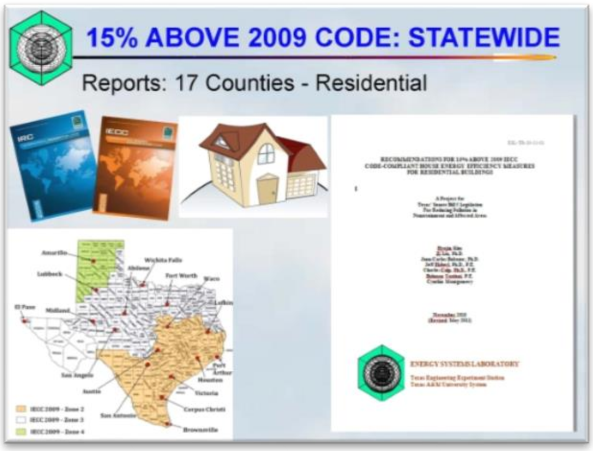
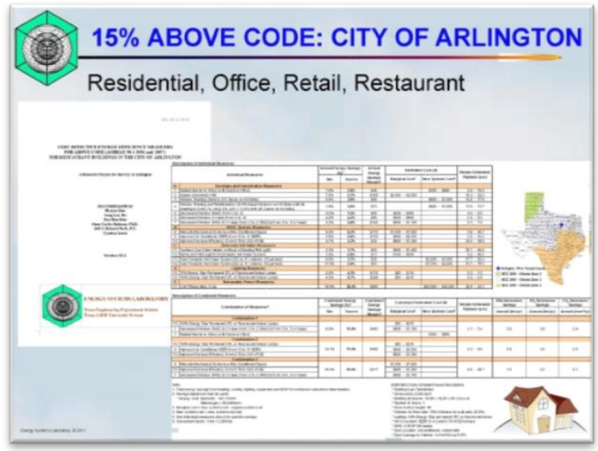
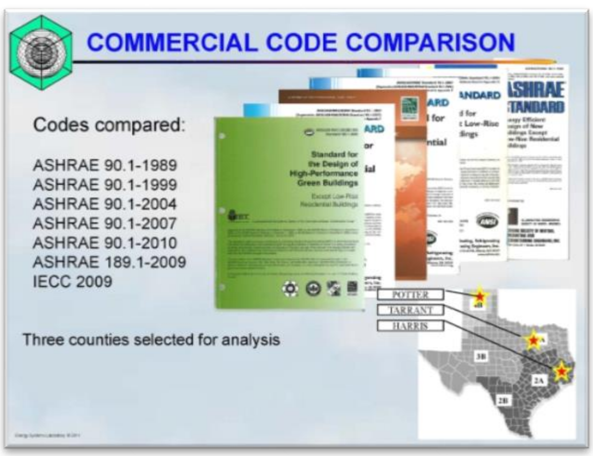
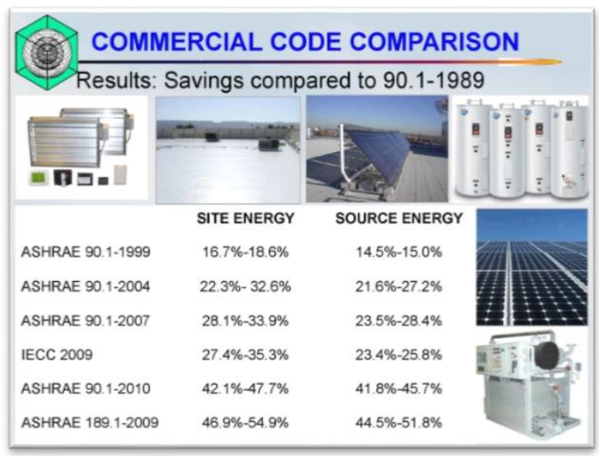


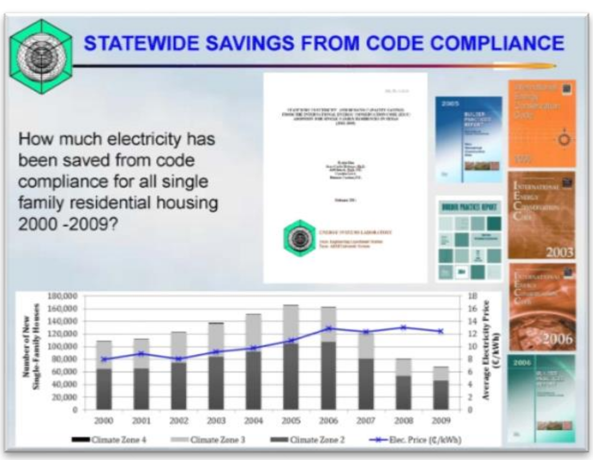
Figure 30: Presentation to the Clean Air Through Energy Efficiency Conference











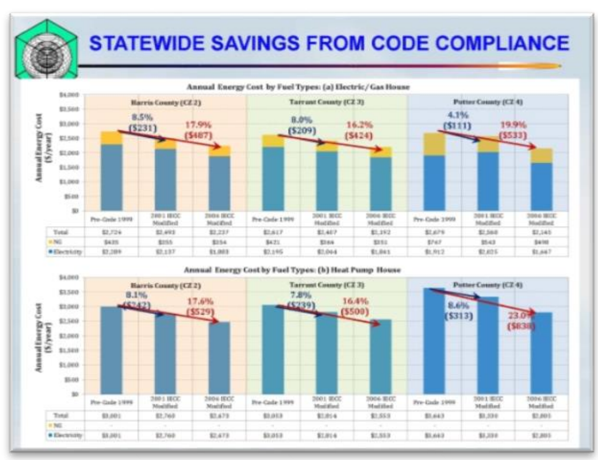
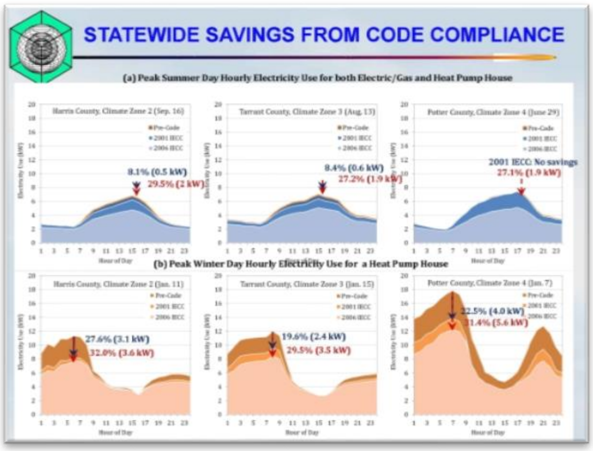
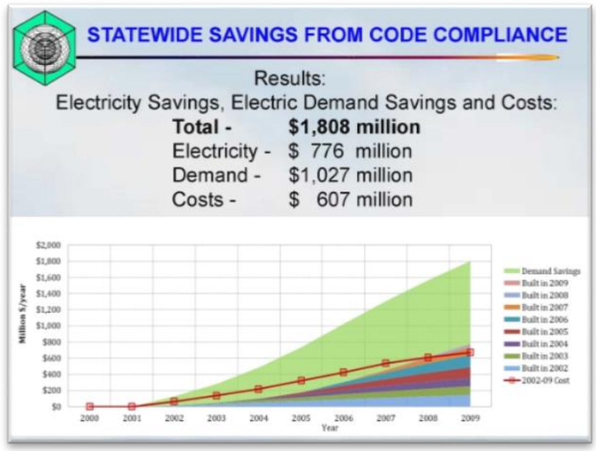
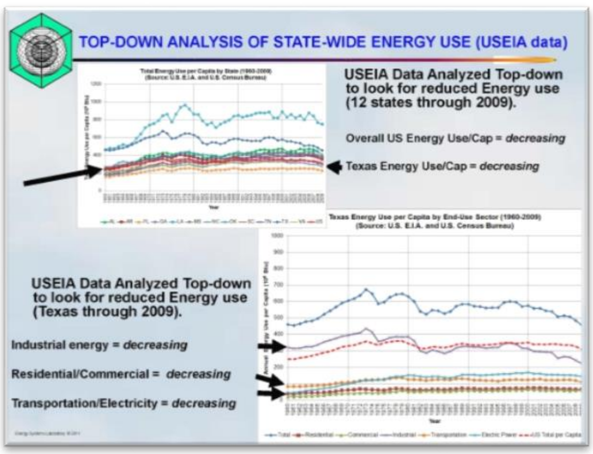
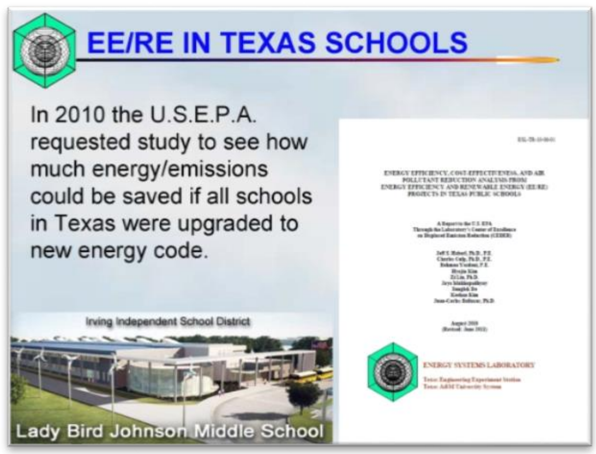


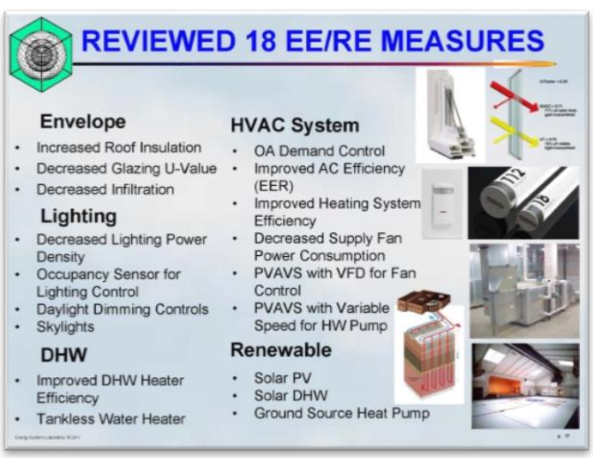
Figure 30: Presentation to the Clean Air Through Energy Efficiency Conference (Continued)











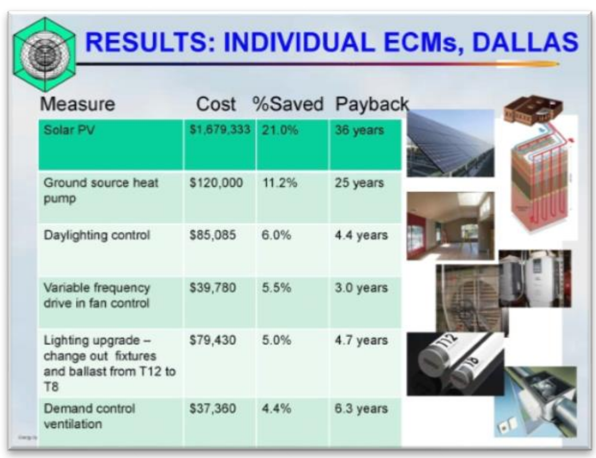
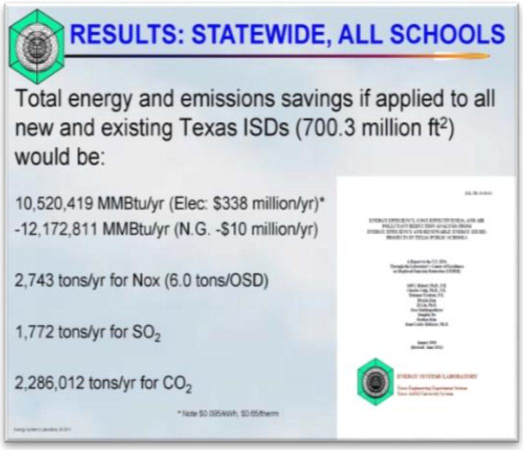
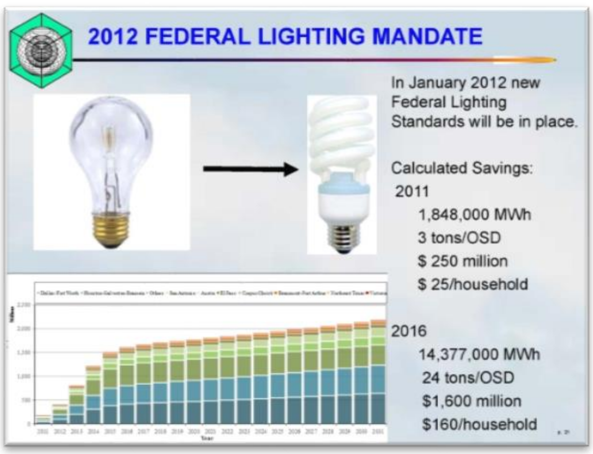
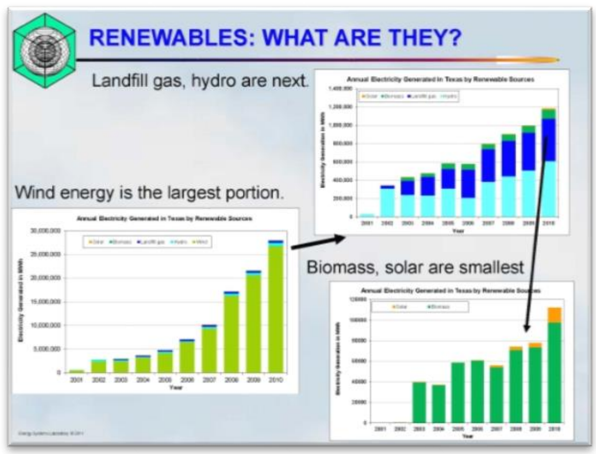
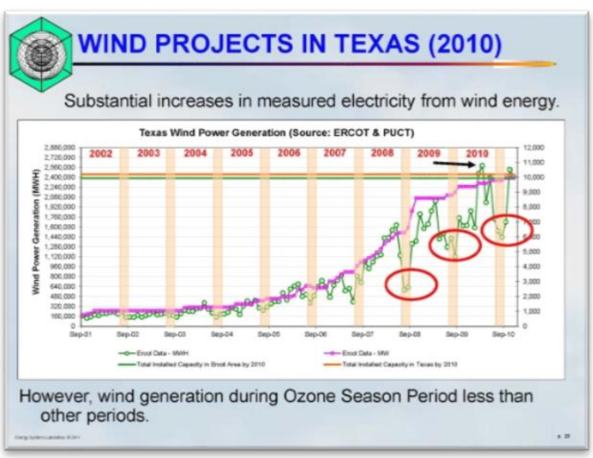


Figure 30: Presentation to the Clean Air Through Energy Efficiency Conference (Continued)









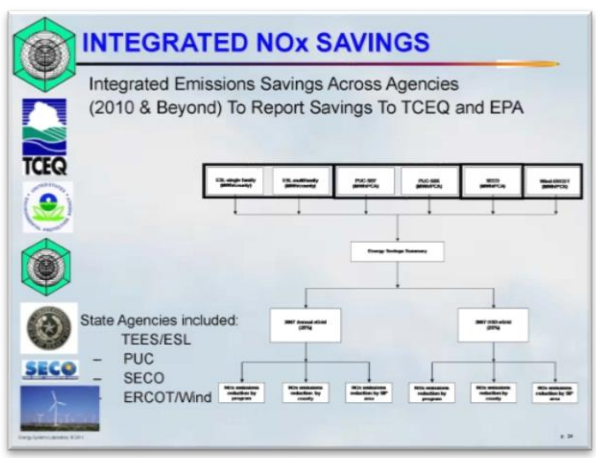


Figure 30: Presentation to the Clean Air Through Energy Efficiency Conference (Continued)

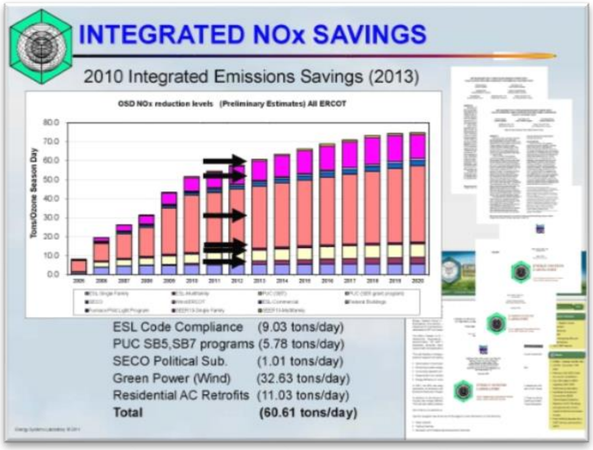
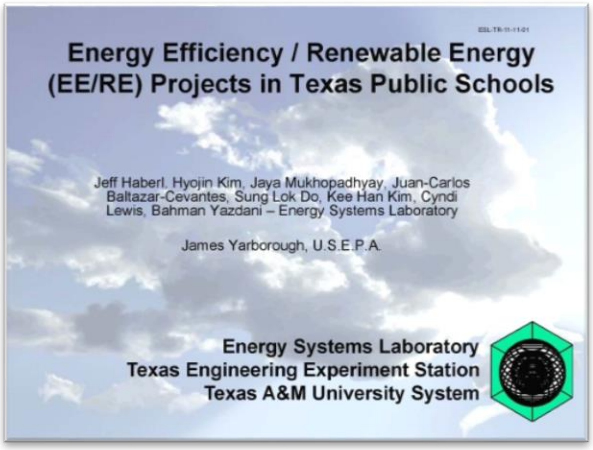
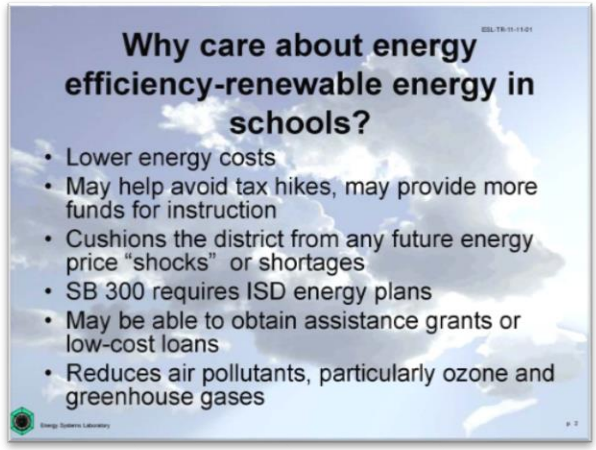
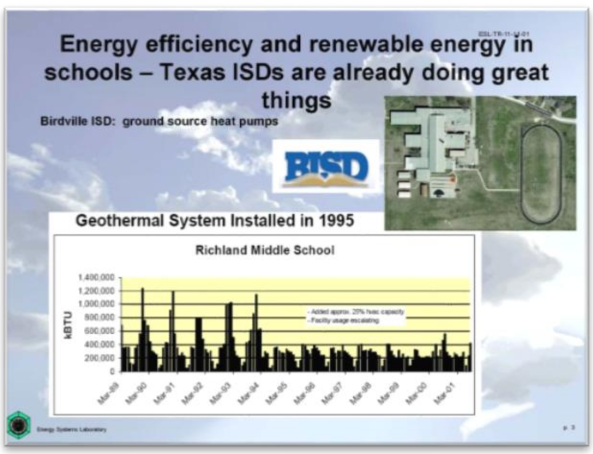


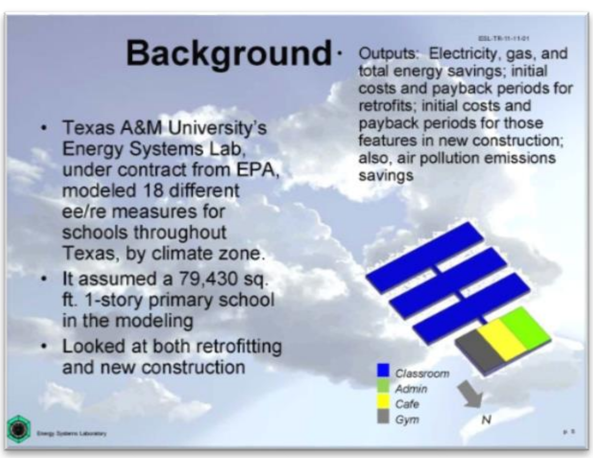
Figure 30: Presentation to the Clean Air Through Energy Efficiency Conference (Continued)

Presentation at *Lowering Energy Bills for Schools Workshop* at the Clean Air Through Energy Efficiency Conference, November 2011 in Dallas Texas.









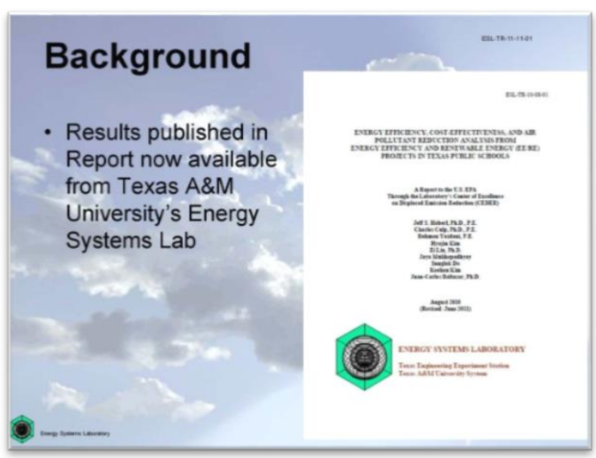
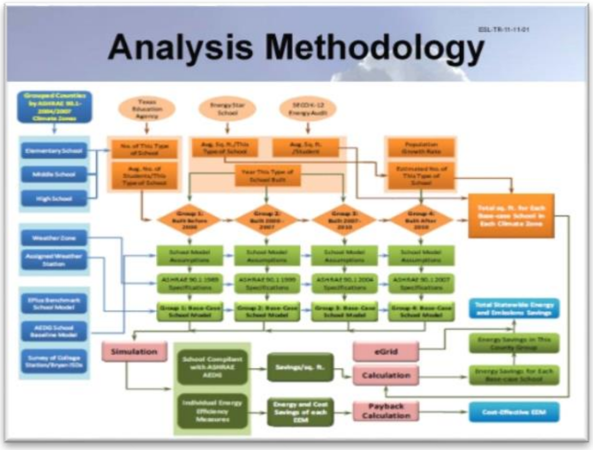
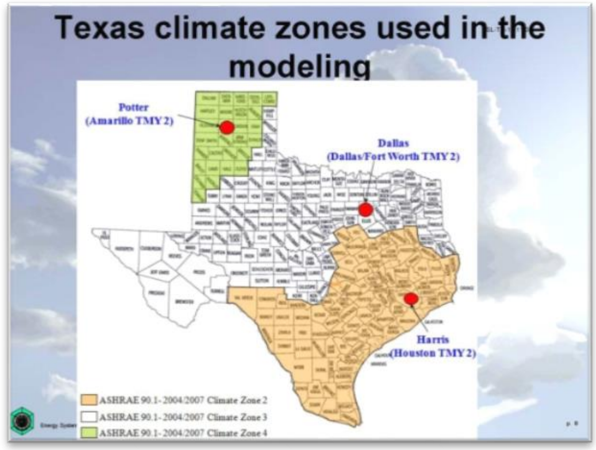
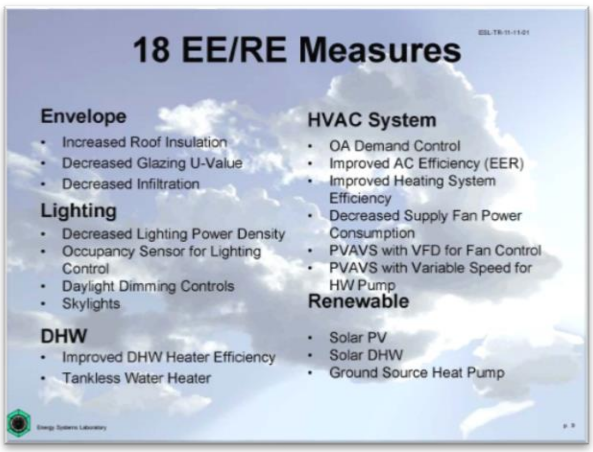
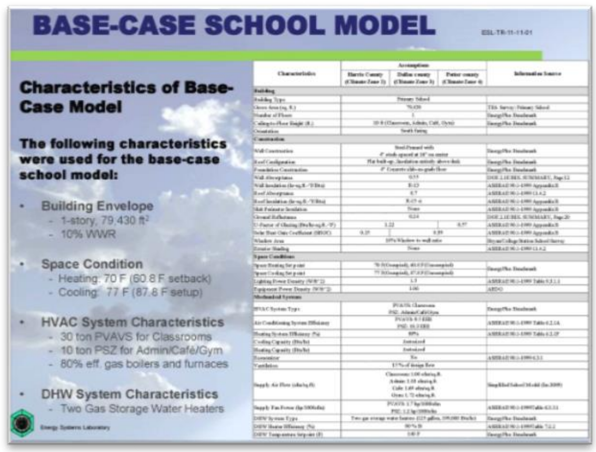


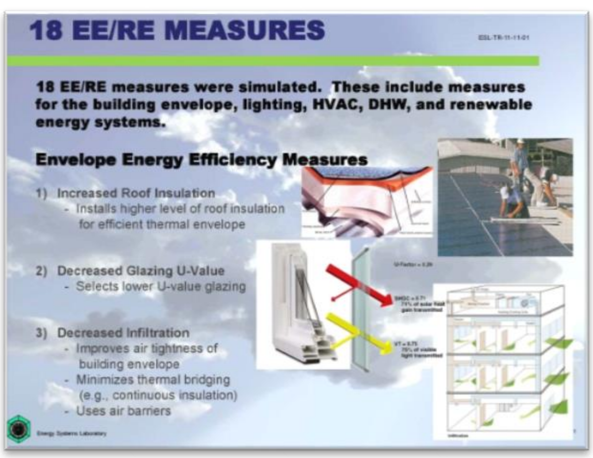
Figure 31: Presentation to the Clean Air Through Energy Efficiency Conference











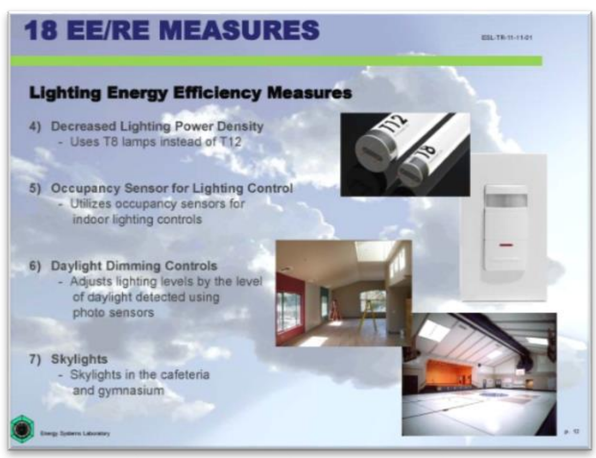
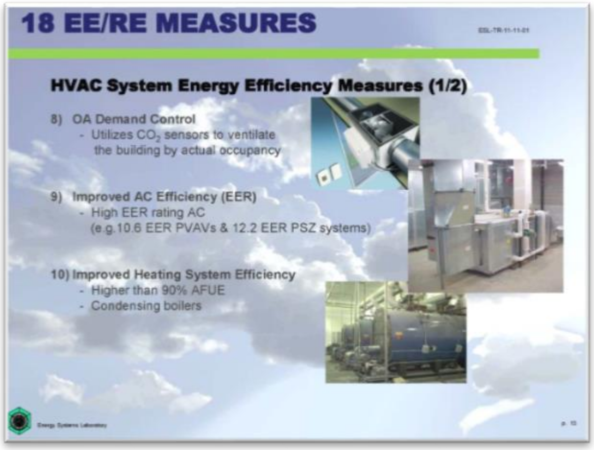
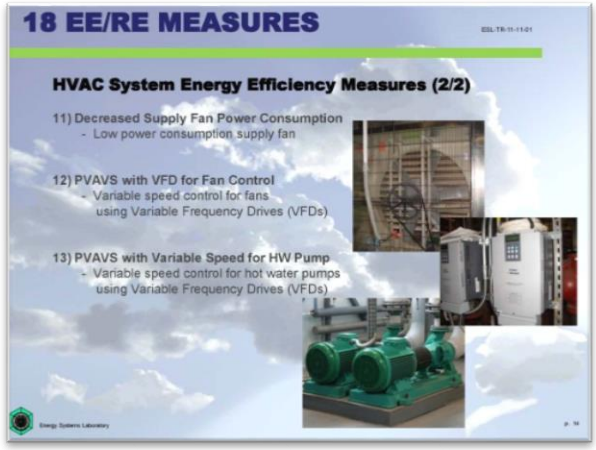
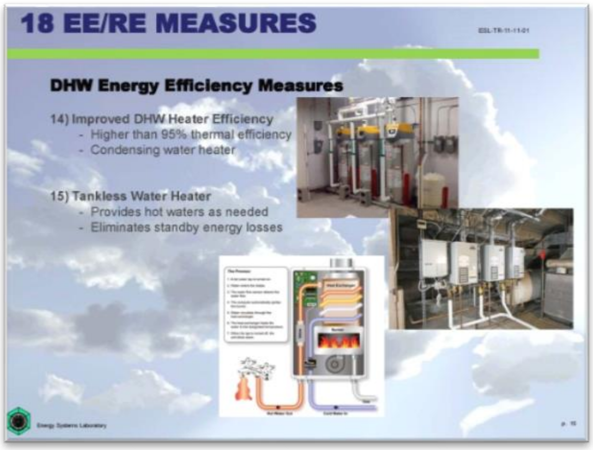
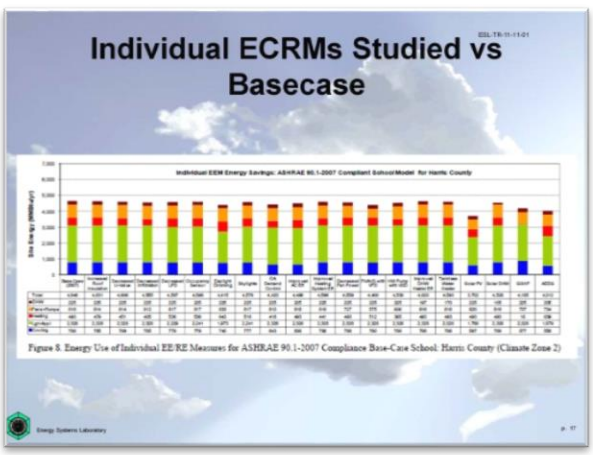


Figure 31: Presentation to the Clean Air Through Energy Efficiency Conference (Continued)









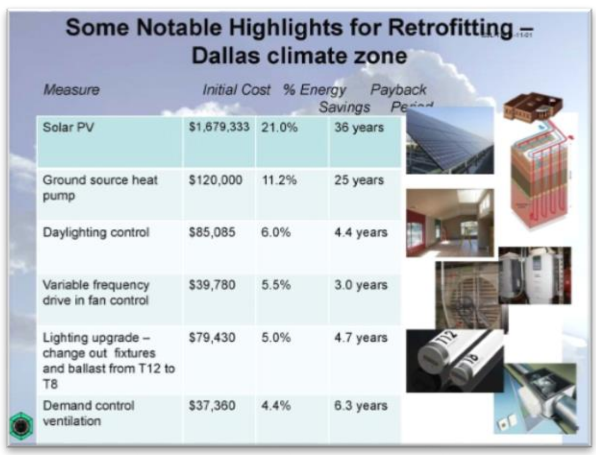
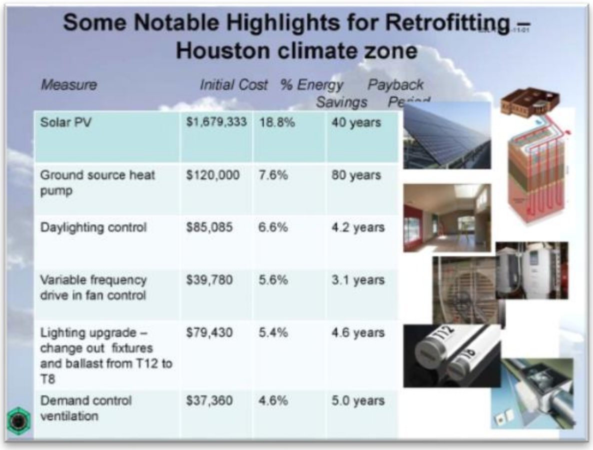
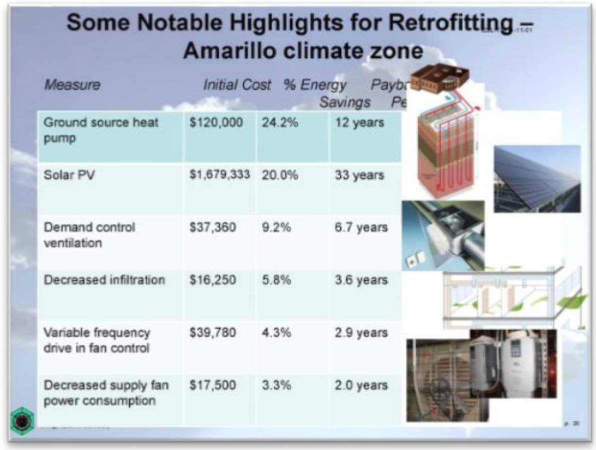


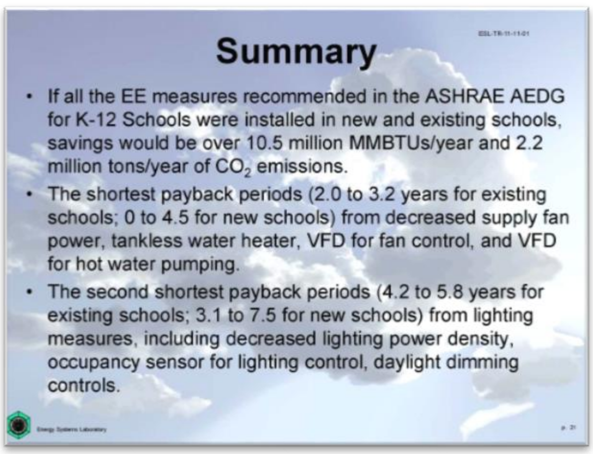
Figure 31: Presentation to the Clean Air Through Energy Efficiency Conference (Continued)

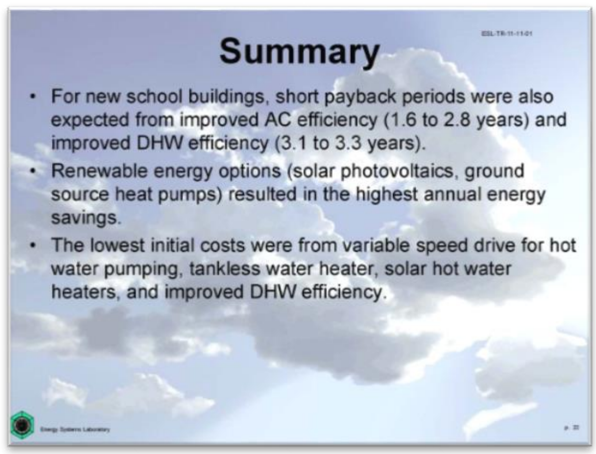


Measure	Initial Cost	% Energy Savings	Payback Period
Solar PV	$1,679,333	18.8%	40 years
Ground source heat pump	$120,000	7.6%	80 years
Daylighting control	$85,085	6.6%	4.2 years
Variable frequency drive in fan control	$39,780	5.6%	3.1 years
Lighting upgrade – change out fixtures and ballast from T12 to T8	$79,430	5.4%	4.6 years
Demand control ventilation	$37,360	4.6%	5.0 years



Measure	Initial Cost	% Energy Savings	Payback Period
Ground source heat pump	$120,000	24.2%	12 years
Solar PV	$1,679,333	20.0%	33 years
Demand control ventilation	$37,360	9.2%	6.7 years
Decreased infiltration	$16,250	5.8%	3.6 years
Variable frequency drive in fan control	$39,780	4.3%	2.9 years
Decreased supply fan power consumption	$17,500	3.3%	2.0 years





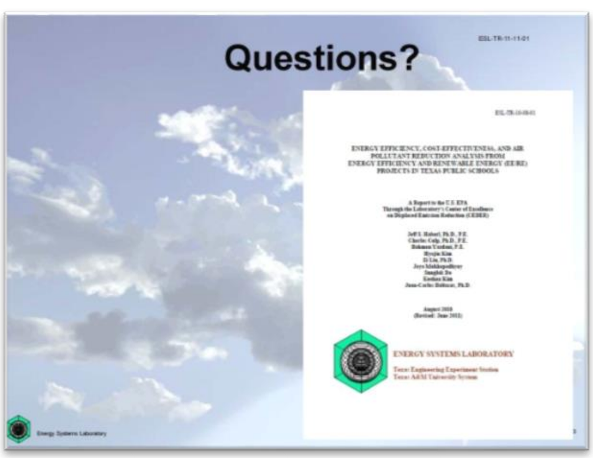
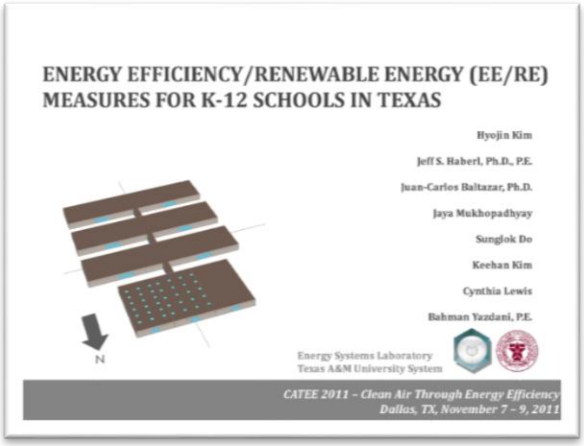
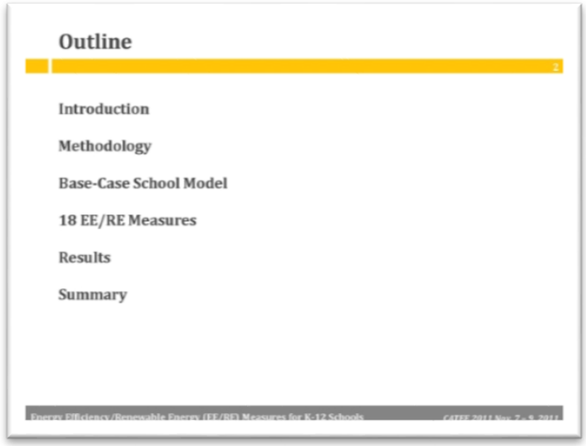
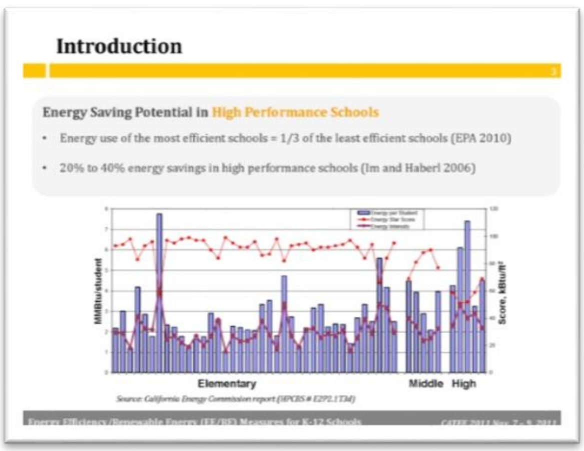


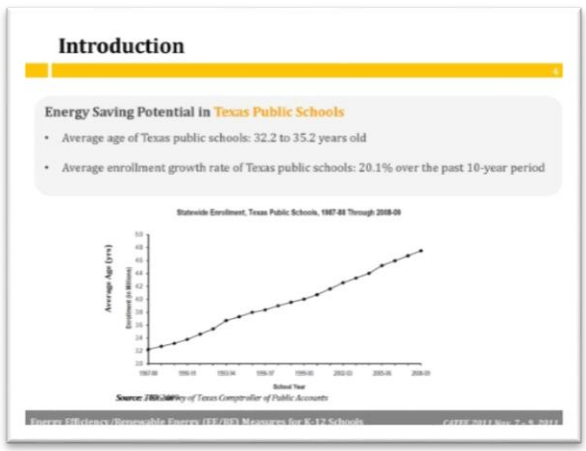
Figure 31: Presentation to the Clean Air Through Energy Efficiency Conference (Continued)

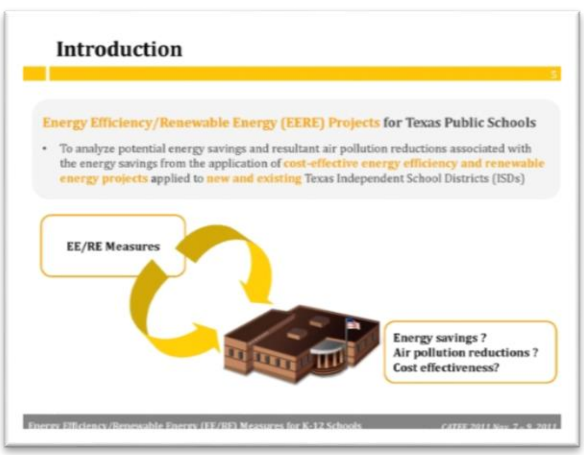
Presentation at the 2011 Clean Air Through Energy Efficiency Conference, Dallas, Texas November 2011











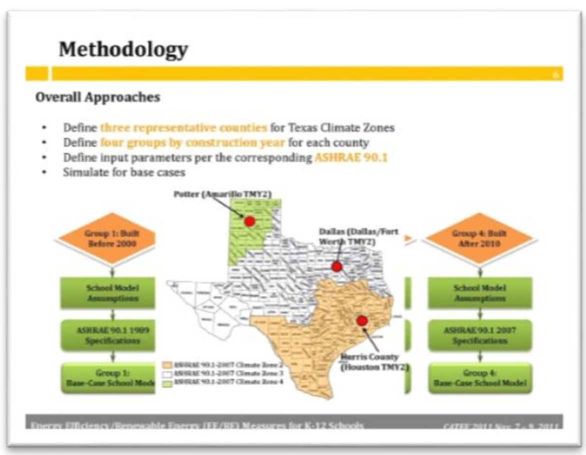
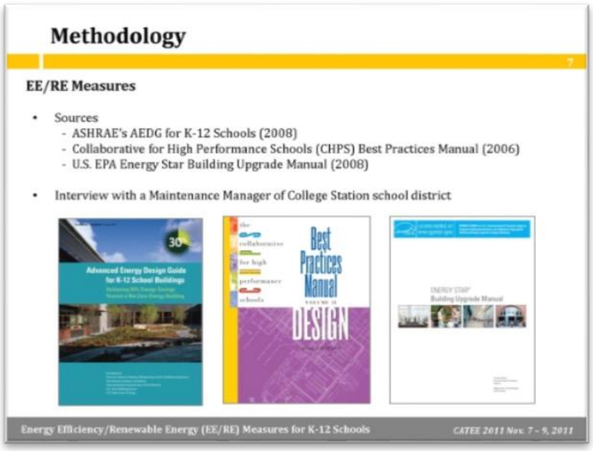
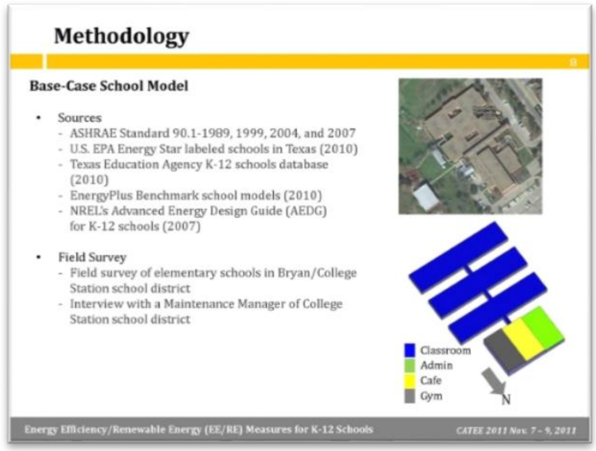
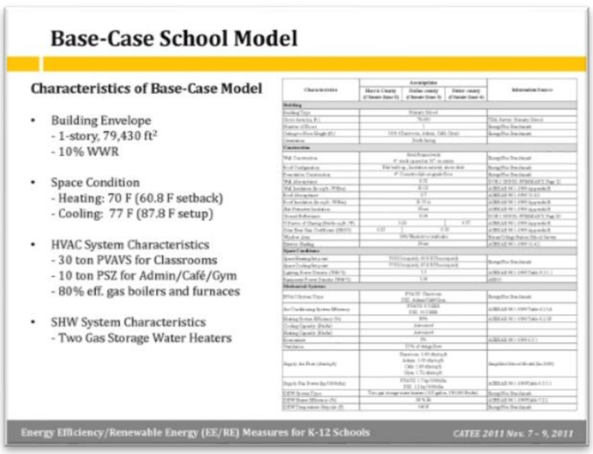
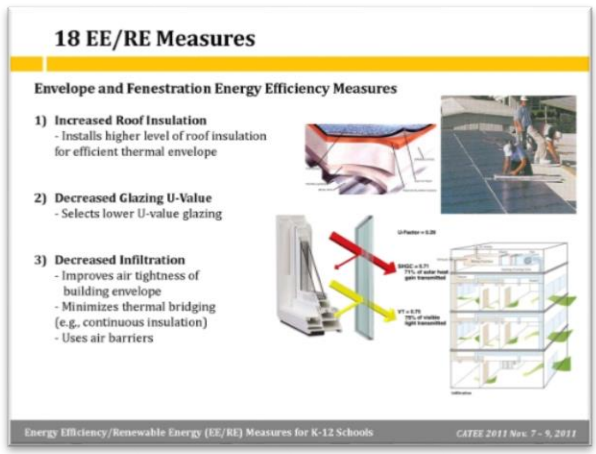


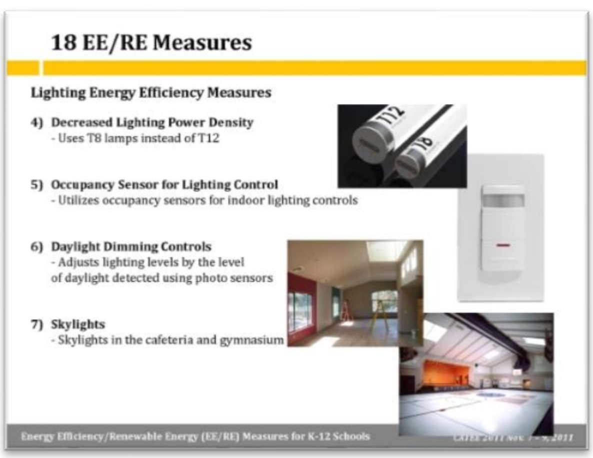
Figure 31: Presentation to the Clean Air Through Energy Efficiency Conference (Continued)











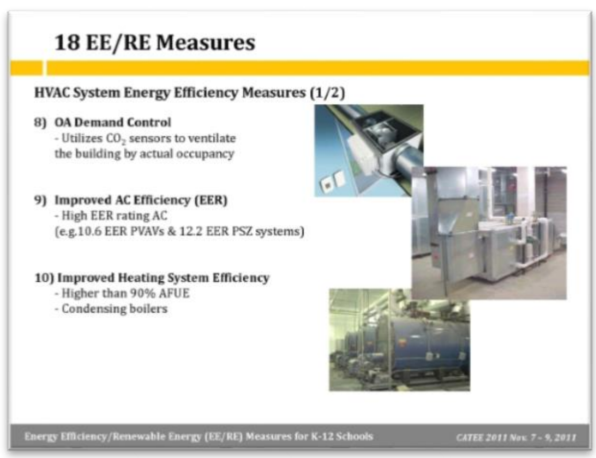
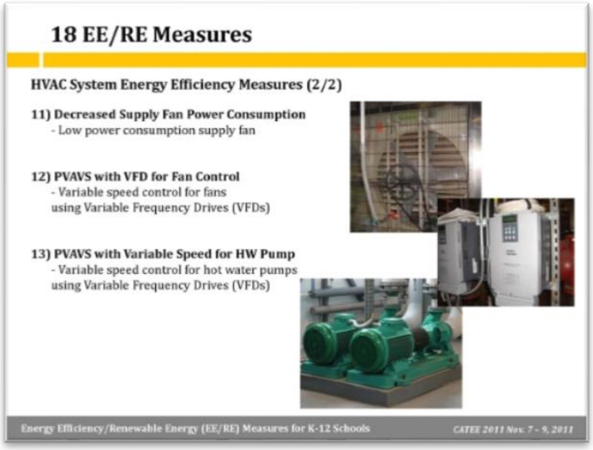
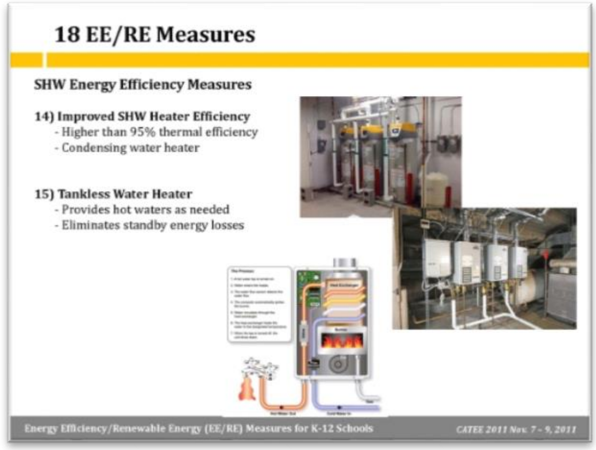
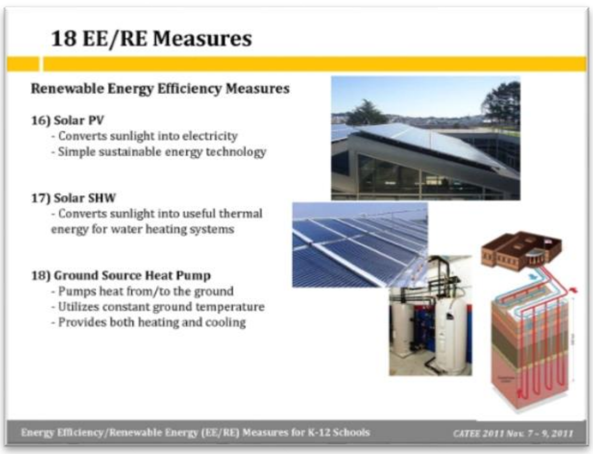
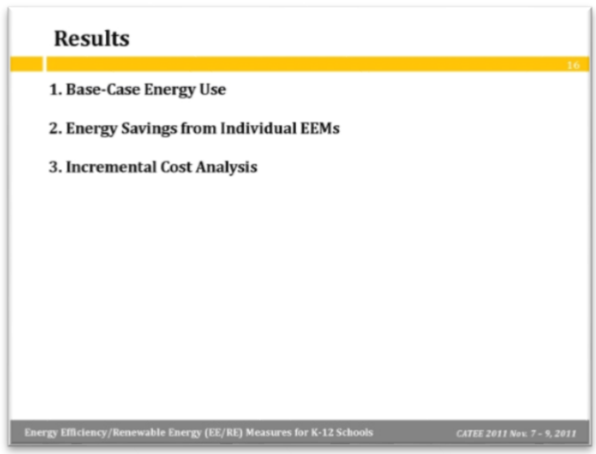


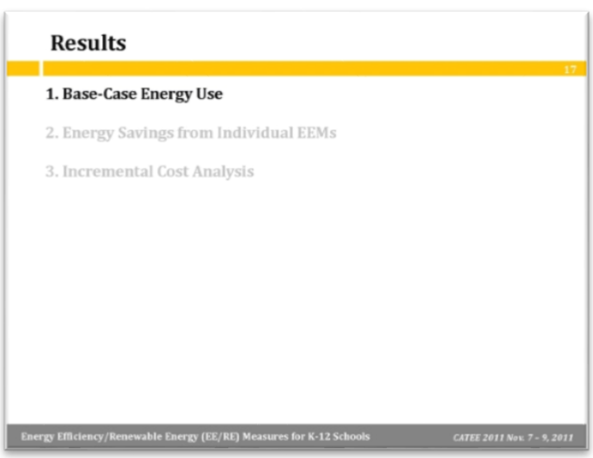
Figure 31: Presentation to the Clean Air Through Energy Efficiency Conference (Continued)











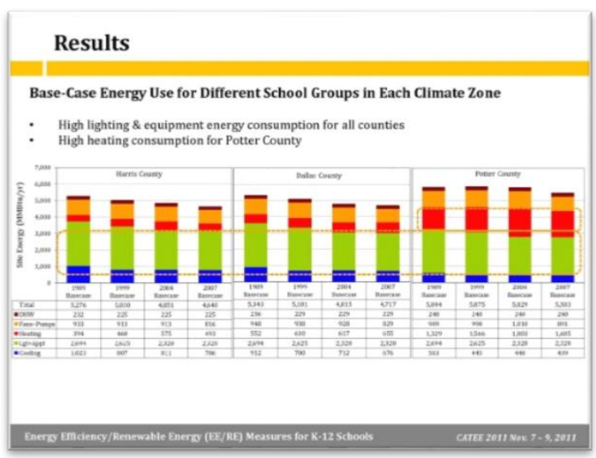
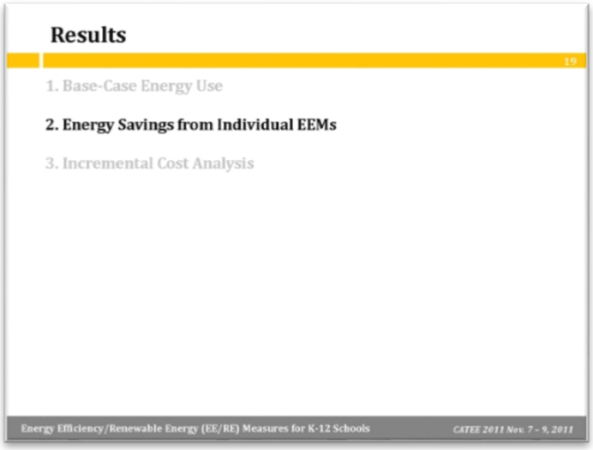
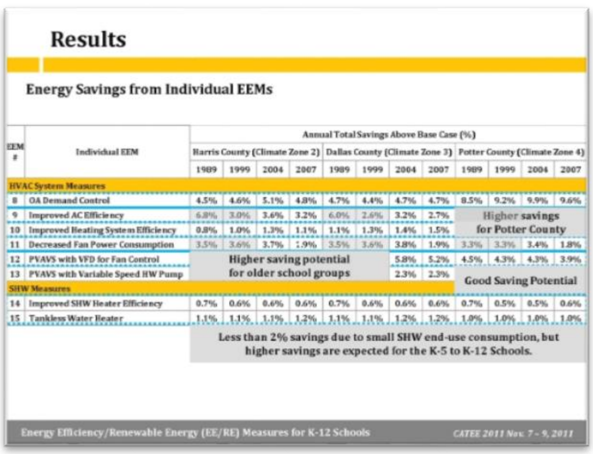


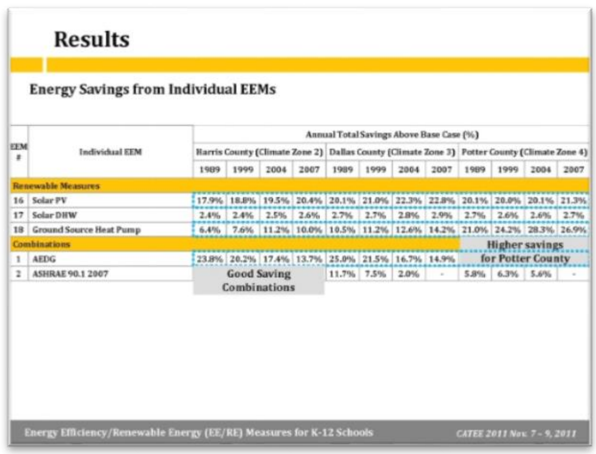
Figure 31: Presentation to the Clean Air Through Energy Efficiency Conference (Continued)



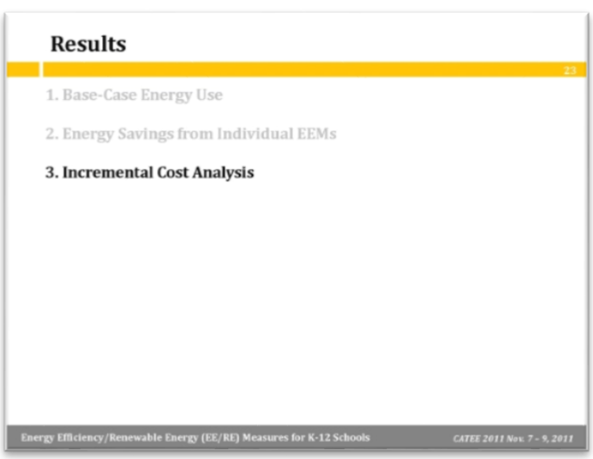
EEM #	Individual EEM	Annual Total Savings Above Base Case (%)											
		Harris County (Climate Zone 2)				Dallas County (Climate Zone 3)				Potter County (Climate Zone 4)			
		1989	1999	2004	2007	1989	1999	2004	2007	1989	1999	2004	2007
Envelope Measures													
1	Increased Roof Insulation	0.5%	0.9%	1.0%	0.4%	1.0%	1.2%	1.4%	0.6%	2.4%	2.8%	2.8%	1.2%
2	Decreased Glazing U-Value	1.4%	2.4%	2.9%	0.9%	2.2%	2.5%	0.5%	1.0%	3.3%	1.2%	1.2%	-
3	Decreased Infiltration	1.6%	1.8%	2.1%	2.0%	2.3%	2.4%	2.7%	2.8%	5.6%	5.8%	6.1%	6.4%
Lighting Measures													
4	Decreased LPD	7.1%	5.4%	1.3%	1.3%	6.1%	5.0%	1.3%	1.2%				
5	Occupancy Sensor for Lighting Control	1.7%	1.5%	1.1%	1.1%	1.4%	1.3%	1.1%	1.0%	0.6%	0.4%	0.2%	0.2%
6	Daylight Dimming Controls	9.6%	6.6%	4.9%	5.0%	11.2%	6.0%	3.9%	3.5%	3.5%	2.5%	1.4%	1.6%
7	Skylights	1.9%	1.9%	1.4%	1.6%	1.6%	1.1%	0.8%	0.9%	-0.8%	-0.9%	-1.3%	-1.2%

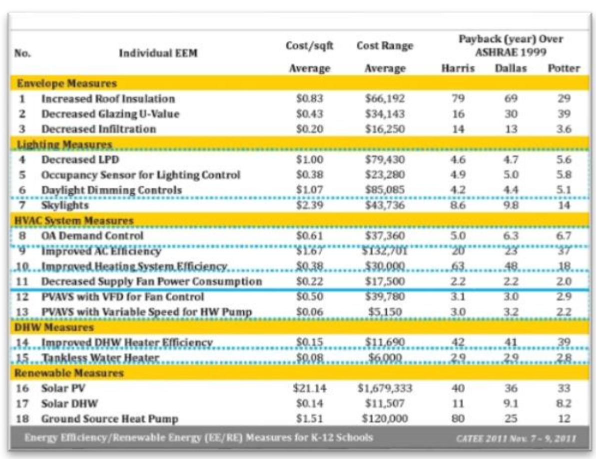


EEM #	Individual EEM	Annual Total Savings Above Base Case (%)											
		Harris County (Climate Zone 2)				Dallas County (Climate Zone 3)				Potter County (Climate Zone 4)			
		1989	1999	2004	2007	1989	1999	2004	2007	1989	1999	2004	2007
HVAC System Measures													
8	OA Demand Control	4.5%	4.6%	5.1%	4.8%	4.7%	4.4%	4.7%	4.7%	8.5%	9.2%	9.9%	9.6%
9	Improved AC Efficiency	6.8%	3.0%	3.6%	3.2%	6.0%	2.6%	3.2%	2.7%				
10	Improved Heating System Efficiency	0.8%	1.0%	1.3%	1.1%	1.1%	1.3%	1.4%	1.5%				
11	Decreased Fan Power Consumption	3.5%	3.6%	3.7%	1.9%	3.5%	3.6%	3.8%	1.9%	3.3%	3.3%	3.4%	1.8%
12	PVAVS with VFD for Fan Control							5.8%	5.2%	4.5%	4.3%	4.3%	3.9%
13	PVAVS with Variable Speed HW Pump							2.3%	2.3%				
SHW Measures													
14	Improved SHW Heater Efficiency	0.7%	0.6%	0.6%	0.6%	0.7%	0.6%	0.6%	0.6%	0.7%	0.5%	0.5%	0.6%
15	Tankless Water Heater	1.1%	1.1%	1.1%	1.2%	1.1%	1.1%	1.2%	1.2%	1.0%	1.0%	1.0%	1.0%



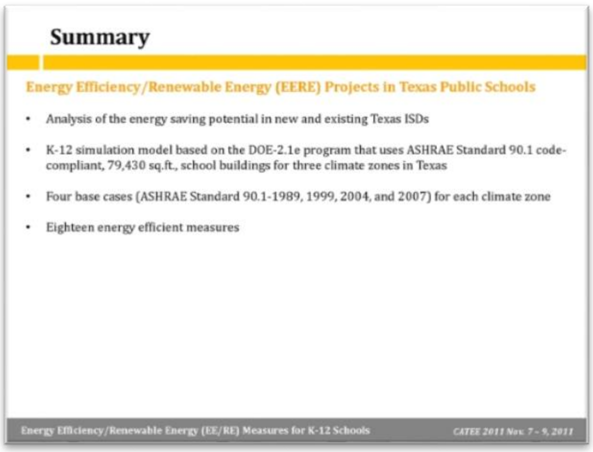
EEM #	Individual EEM	Annual Total Savings Above Base Case (%)											
		Harris County (Climate Zone 2)				Dallas County (Climate Zone 3)				Potter County (Climate Zone 4)			
		1989	1999	2004	2007	1989	1999	2004	2007	1989	1999	2004	2007
Renewable Measures													
16	Solar PV	17.9%	18.8%	19.5%	20.4%	20.1%	21.0%	22.3%	22.8%	20.1%	20.0%	20.1%	21.3%
17	Solar DHW	2.4%	2.4%	2.5%	2.6%	2.7%	2.7%	2.8%	2.9%	2.7%	2.6%	2.6%	2.7%
18	Ground Source Heat Pump	6.4%	7.6%	11.2%	10.0%	10.5%	11.2%	12.6%	14.2%	21.0%	24.2%	28.3%	26.9%
Combinations													
1	AEDG	23.8%	20.2%	17.4%	13.7%	25.0%	21.5%	16.7%	14.9%				
2	ASHRAE 90.1 2007					11.7%	7.5%	2.0%	-	5.8%	6.3%	5.6%	-

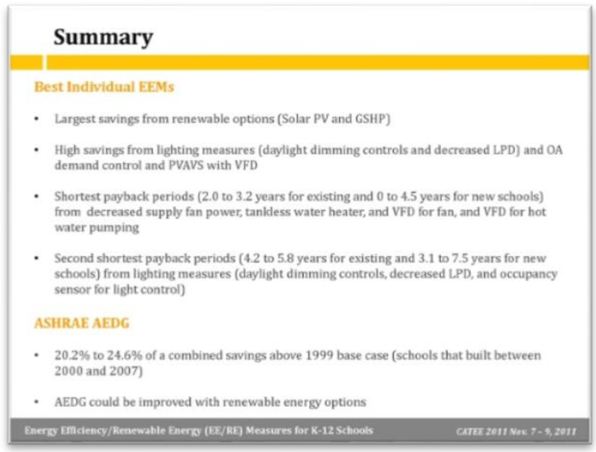


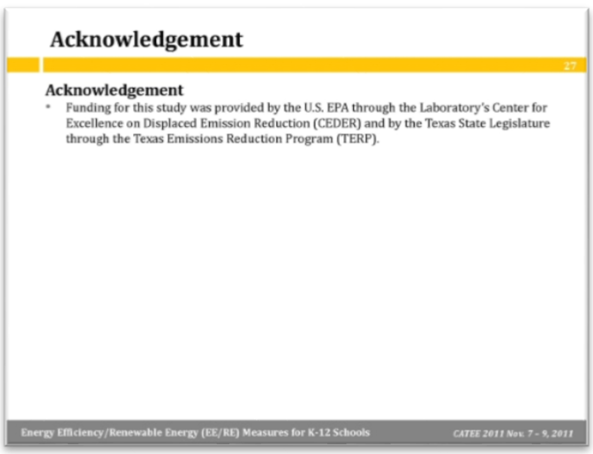


No.	Individual EEM	Cost/sqft	Cost Range	Payback (year) Over ASHRAE 1999		
		Average	Average	Harris	Dallas	Potter
Envelope Measures						
1	Increased Roof Insulation	$0.83	$66,192	79	69	29
2	Decreased Glazing U-Value	$0.43	$34,143	16	30	39
3	Decreased Infiltration	$0.20	$16,250	14	13	3.6
Lighting Measures						
4	Decreased LPD	$1.00	$79,430	4.6	4.7	5.6
5	Occupancy Sensor for Lighting Control	$0.38	$23,280	4.9	5.0	5.8
6	Daylight Dimming Controls	$1.07	$85,085	4.2	4.4	5.1
7	Skylights	$2.39	$43,736	8.6	9.8	14
HVAC System Measures						
8	OA Demand Control	$0.61	$37,360	5.0	6.3	6.7
9	Improved AC Efficiency	$1.67	$132,701	20	23	37
10	Improved Heating System Efficiency	$0.38	$30,000	63	48	18
11	Decreased Supply Fan Power Consumption	$0.22	$17,500	2.2	2.2	2.0
12	PVAVS with VFD for Fan Control	$0.50	$39,780	3.1	3.0	2.9
13	PVAVS with Variable Speed for HW Pump	$0.06	$5,150	3.0	3.2	2.2
DHW Measures						
14	Improved DHW Heater Efficiency	$0.15	$11,690	42	41	39
15	Tankless Water Heater	$0.08	$6,000	2.9	2.9	2.8
Renewable Measures						
16	Solar PV	$21.14	$1,679,333	40	36	33
17	Solar DHW	$0.14	$11,507	11	9.1	8.2
18	Ground Source Heat Pump	$1.51	$120,000	80	25	12

Figure 31: Presentation to the Clean Air Through Energy Efficiency Conference (Continued)







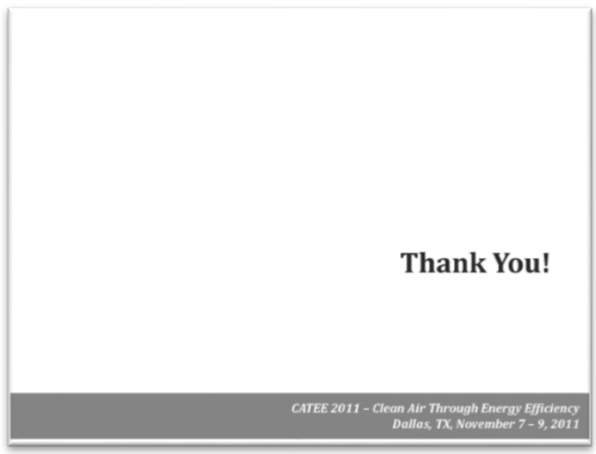


Figure 31: Presentation to the Clean Air Through Energy Efficiency Conference (Continued)

Presentation at the 2011 Building Officials Association of Texas, Mid-Year Meeting

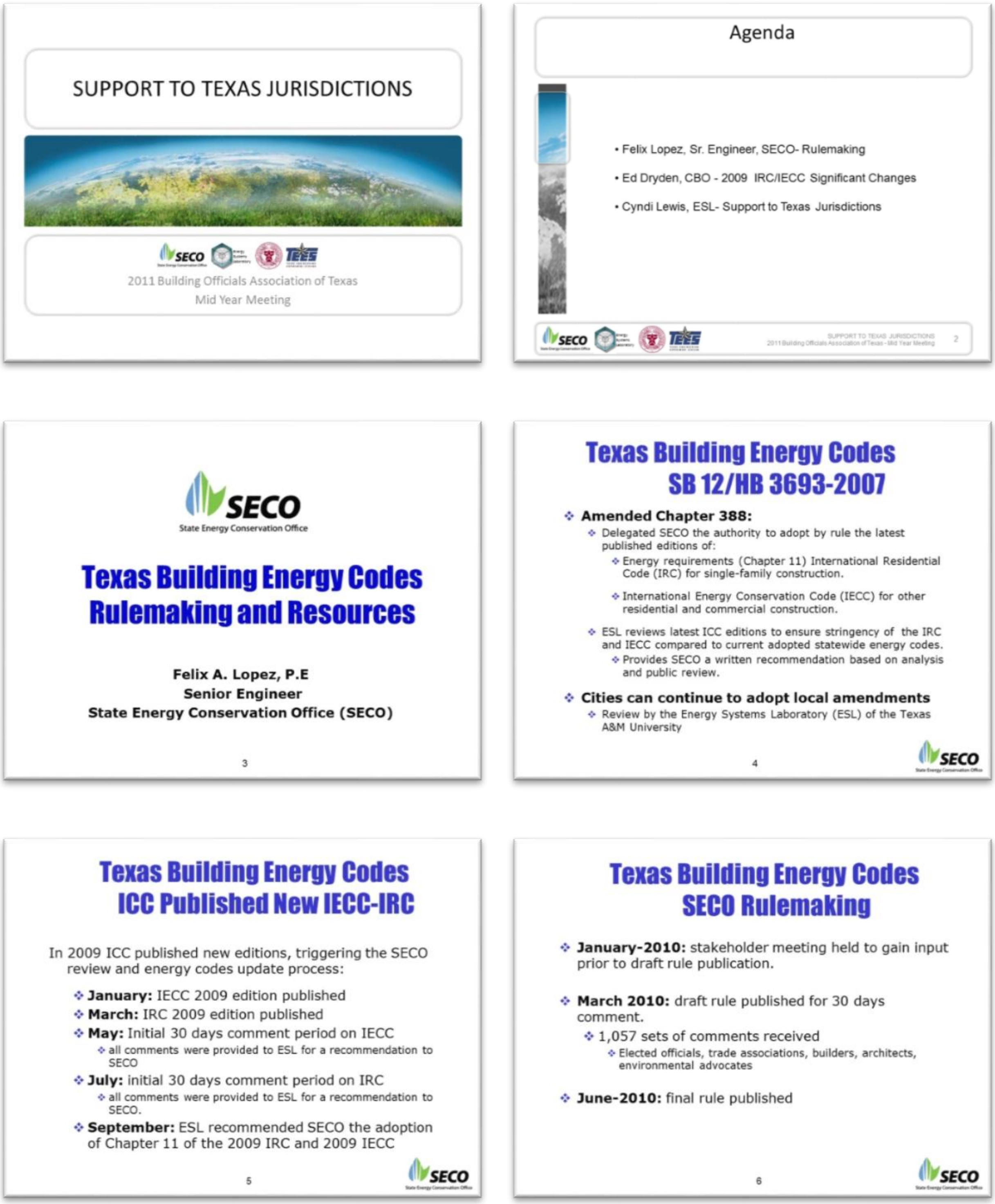


Figure 32: Presentation to the Building Official Association of Texas

Texas Building Energy Codes

Final Rule: *§19.53.Building Energy Efficiency Performance Standards*

(a) **Single-family residential construction. Effective January 1, 2012**, the **energy efficiency provisions** (Chapter 11) of the **International Residential Code** as they existed on May 1, 2009, are adopted as the energy code in this state for single-family residential construction as it is defined in Health and Safety Code, §388.002(12).

(b) **All other residential, commercial, and industrial construction. Effective April 1, 2011**, the **International Energy Conservation Code** as it existed on May 1, 2009, is adopted as the energy code for use in this state for all residential, commercial, and industrial construction that is not single-family residential construction under subsection (a) of this section.

7

SECO

Texas Building Energy Codes Outreach, Training & Support

Enhanced Building Energy Code Website
- Streaming and downloadable training videos, in English and Spanish
- Calendar of training events
- Materials request center

Collateral Material
- IRC and IECC code books provided to local code officials
- "Best Practice" Guidelines
- Newsletter with workshop dates, highlighted codes, case studies, etc.

Training
- Individual workshops in each district/member area, to include
  - 24 regional councils of governments
  - 34 local home builder associations
  - 17 local chapters of the American Institute of Architects

Technical Support
- Code compliance tools for city bulding officials
- Building stock benchmarking

8

SECO

Texas Building Energy Codes Resources- (ARRA)

Video Training on IECC-2009
- **Single Family Residential (Chapter 4)**
- **Commercial (Chapter 5)**
- **Final Draft Ready/Voice Over by February 2011**
- **Will be available in March 2011**

9

SECO

Texas Building Energy Codes Resources- (ARRA)

Energy Diagnostic Loan Program
- **Blower Door System**
- **Duct Leakage System**
- **Infrared Cameras**
- **Public Sector**
  - **Local Government**
  - **COGs**
- **RFP to Select Vendor/Contractor-March 2011**

10

SECO

Texas Building Energy Codes Resources- (ARRA Funds)

Training on IECC-2009/IRC-2009
- **Residential (Except Single Family)-Chapter 4**
- **Commercial-Chapter 5**
- **Single Family Residential-Chapter 11/IRC-2009**
- **RFP to Select Vendor/Contractor-March 2011**
- **Start Statewide Training Sessions-April 2011**

11

SECO

Texas Building Energy Codes Resources-Compliance

User Friendly Tools & Compliance Training
- **Competitive DOE-PNNL Solicitation Aug 2010**
- **$300,415 Award Contract-6/30/1 Due Date**
- **SECO-BMI Contract**
- **i-Comply Software Training**
- **Austin & San Antonio Pilots**

Compliance Data Gathering and Analysis
- **BCAP-Texas Gap Analysis**
  - **Local Jurisdictions**
  - **Region**
  - **Reporting**

12

SECO

Figure 32: Presentation to the Building Official Association of Texas (Continued)

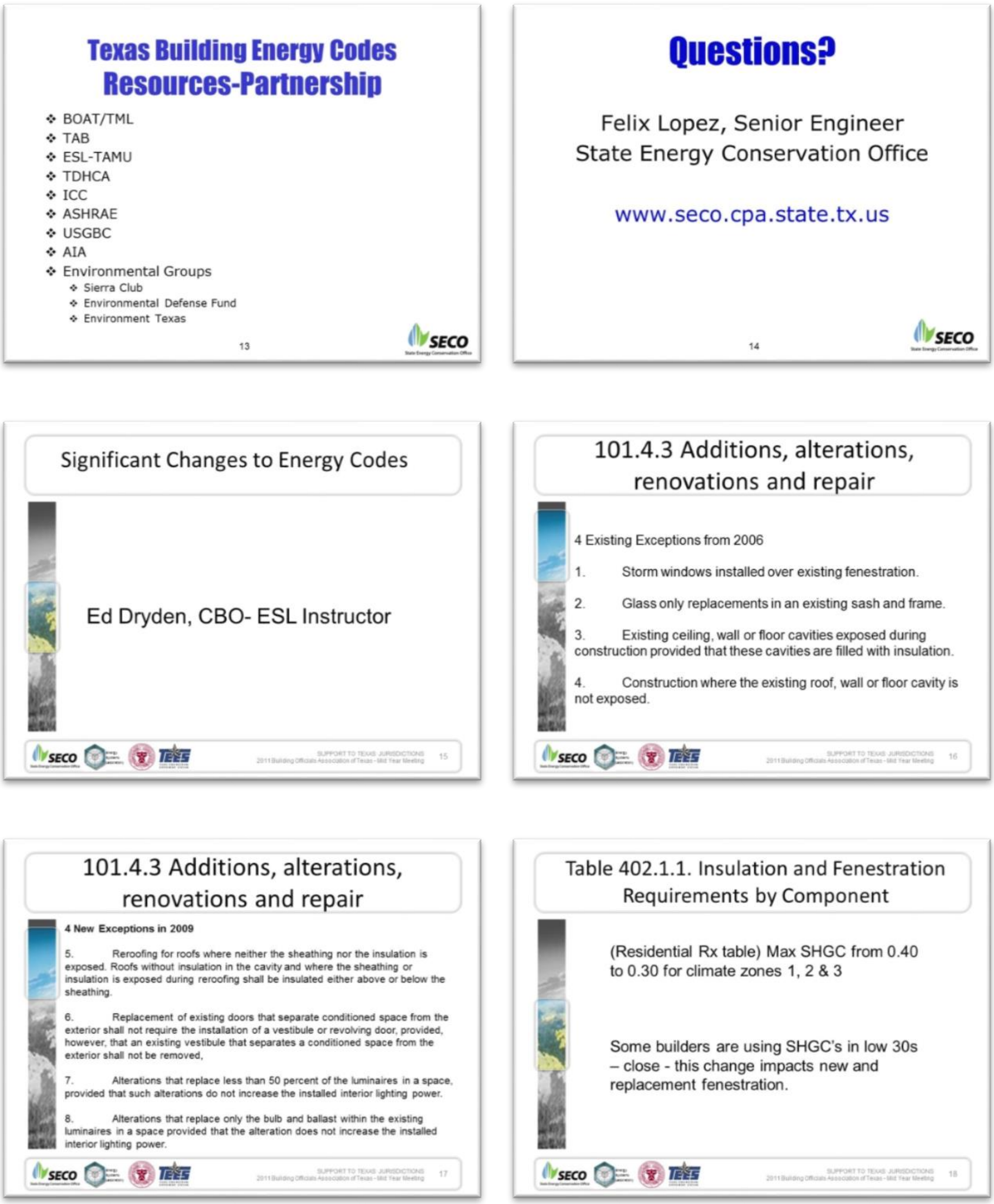
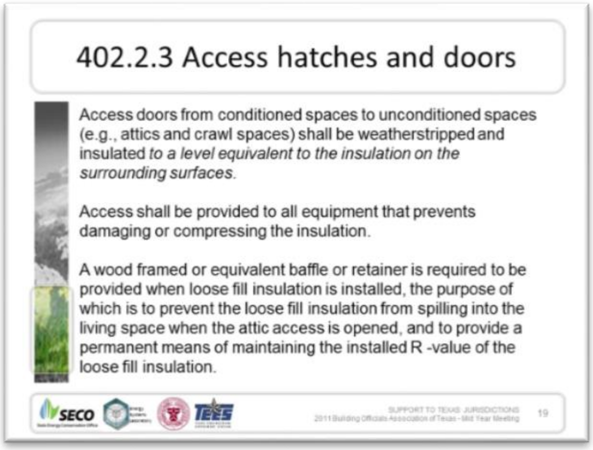
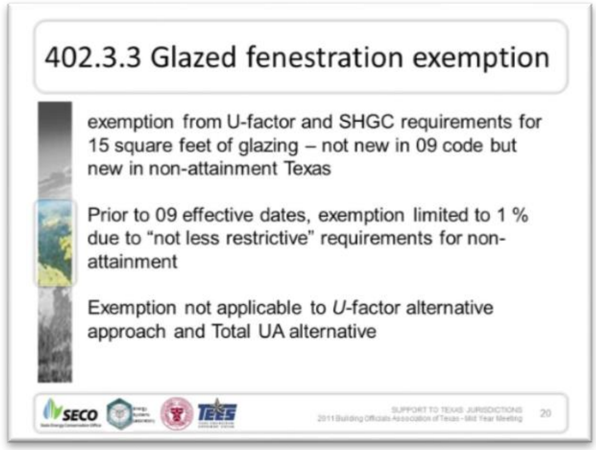
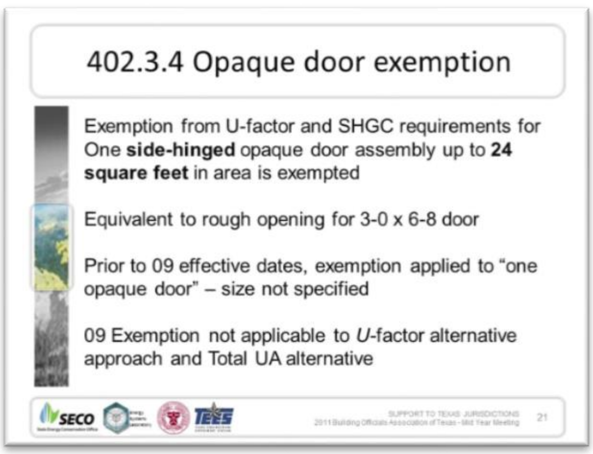
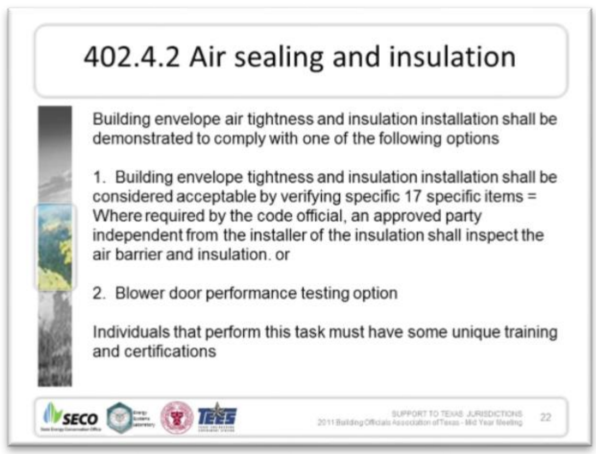


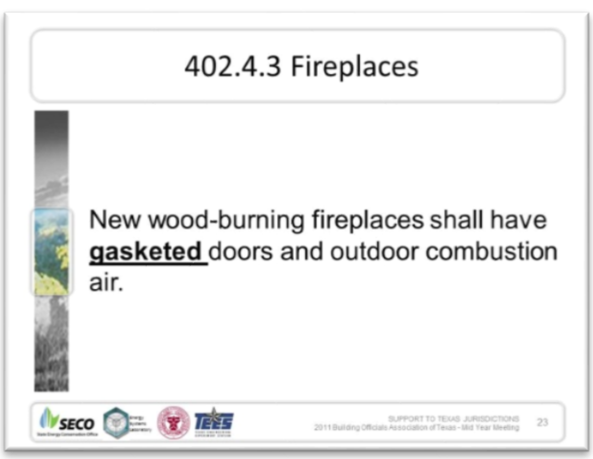
Figure 32: Presentation to the Building Official Association of Texas (Continued)











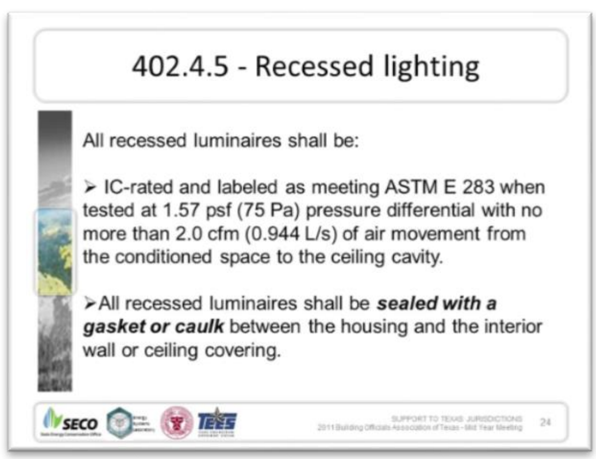
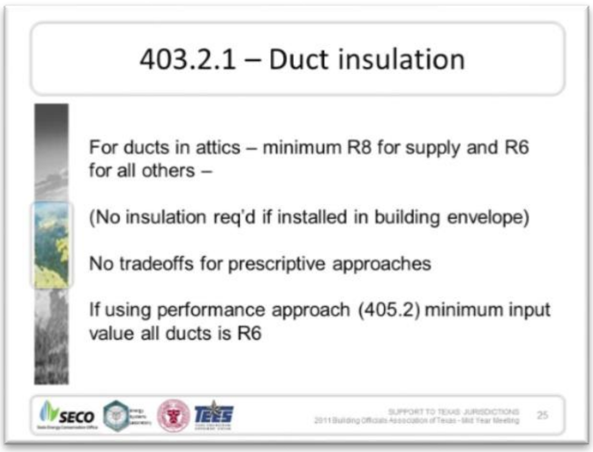
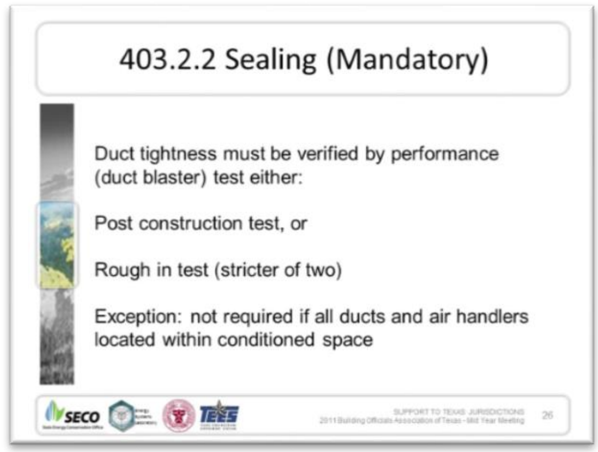
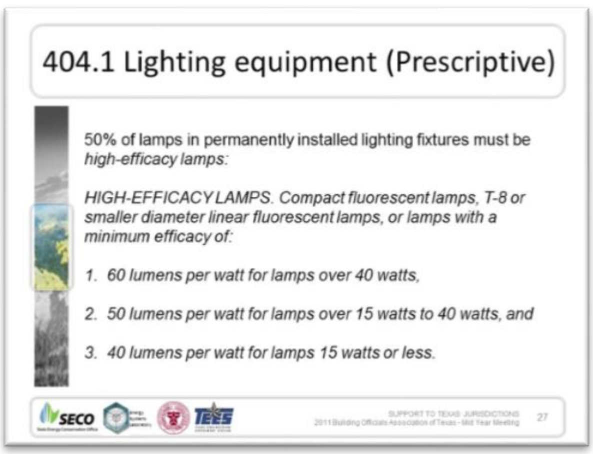
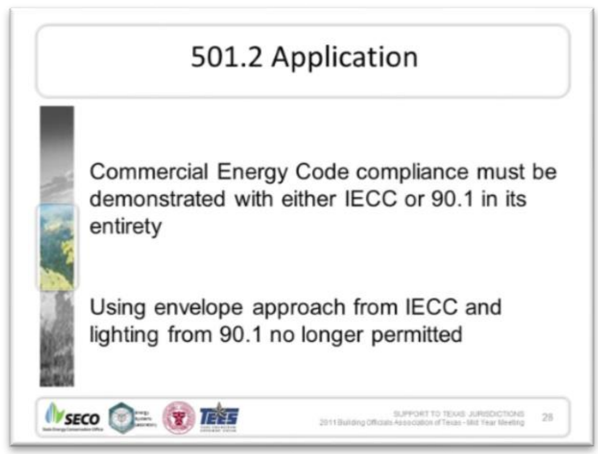


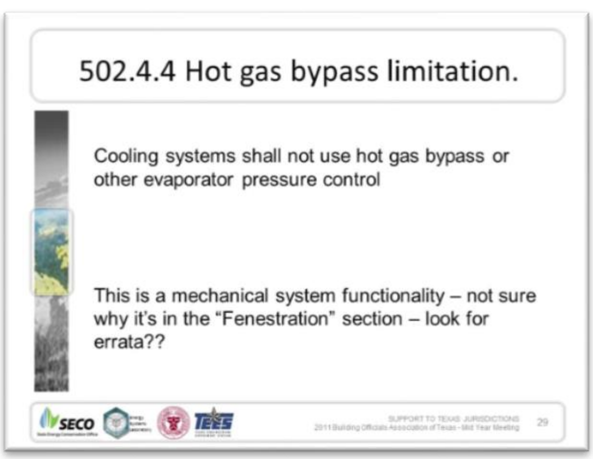
Figure 32: Presentation to the Building Official Association of Texas (Continued)











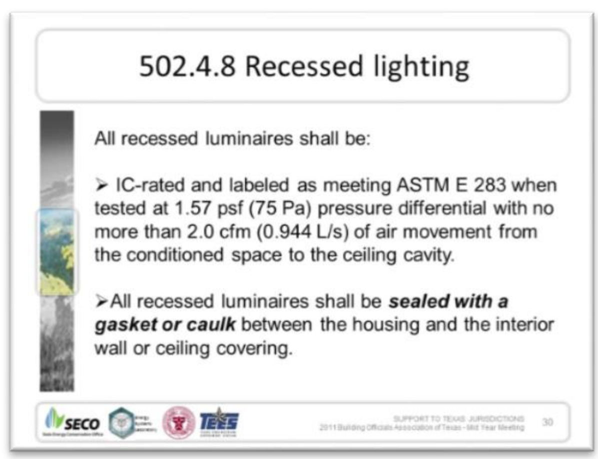
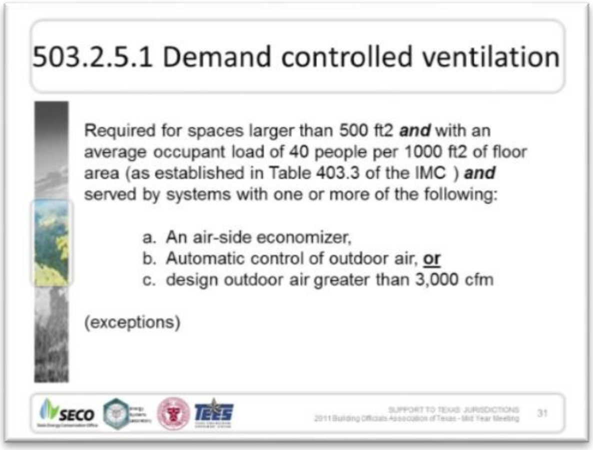
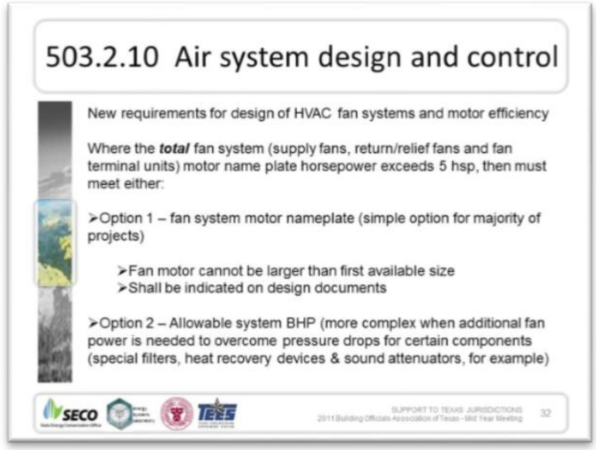
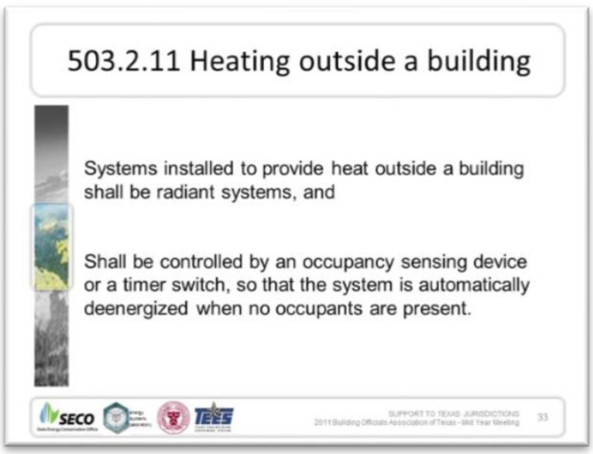
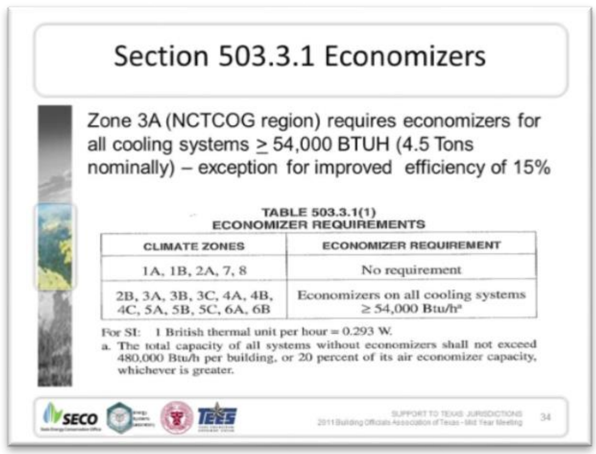


Figure 32: Presentation to the Building Official Association of Texas (Continued)

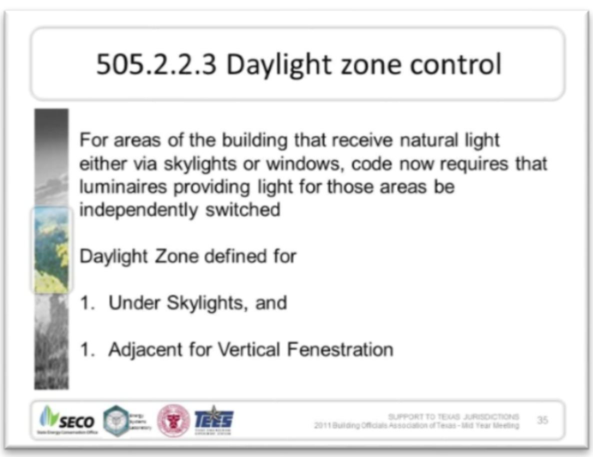








CLIMATE ZONES	ECONOMIZER REQUIREMENT
1A, 1B, 2A, 7, 8	No requirement
2B, 3A, 3B, 3C, 4A, 4B, 4C, 5A, 5B, 5C, 6A, 6B	Economizers on all cooling systems ≥ 54,000 Btu/h[a]



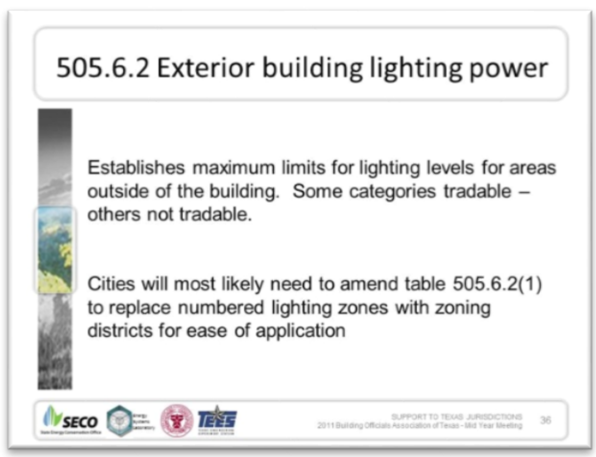
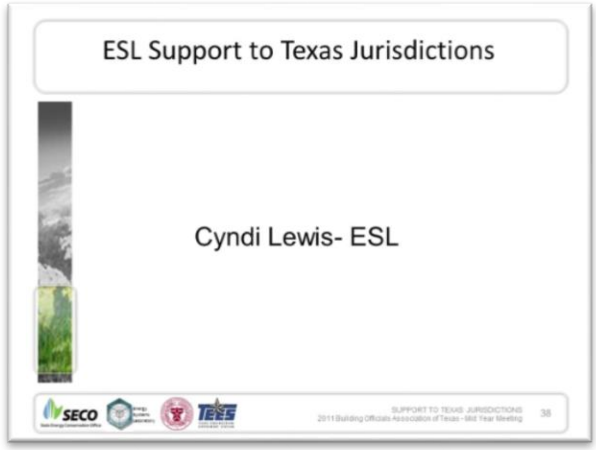
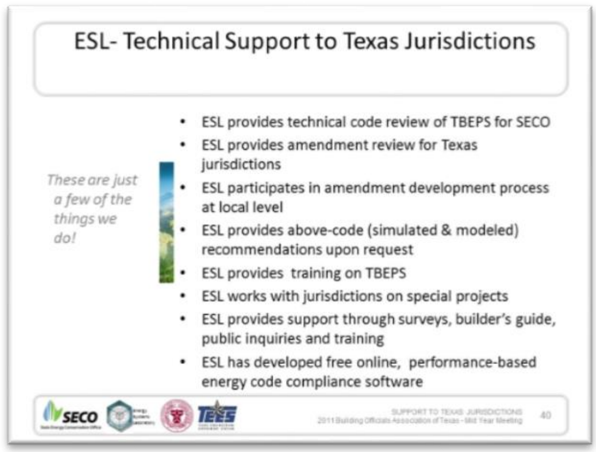


Figure 32: Presentation to the Building Official Association of Texas (Continued)





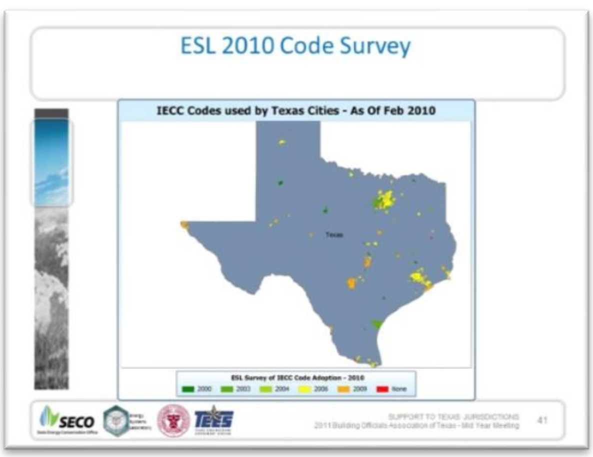
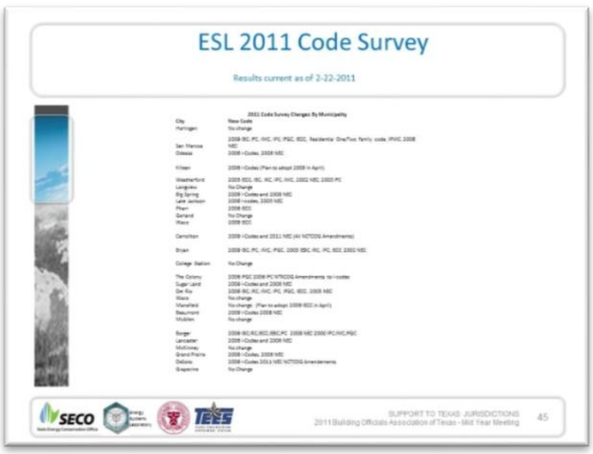
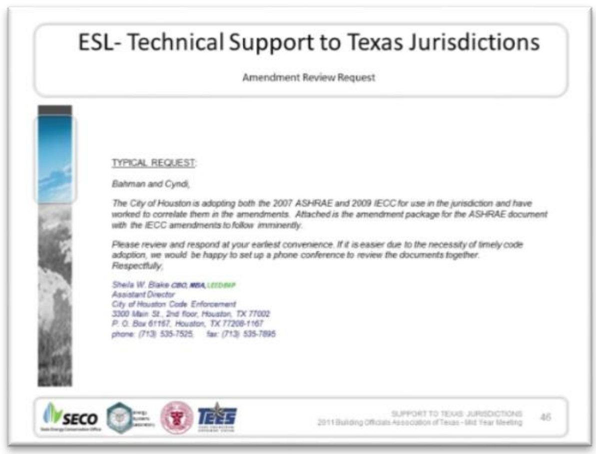
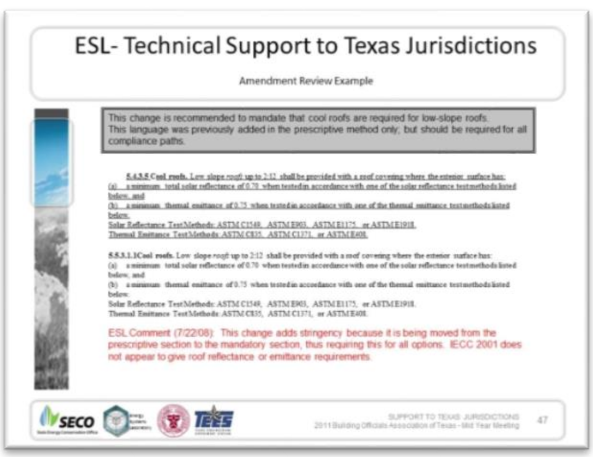


Figure 32: Presentation to the Building Official Association of Texas (Continued)







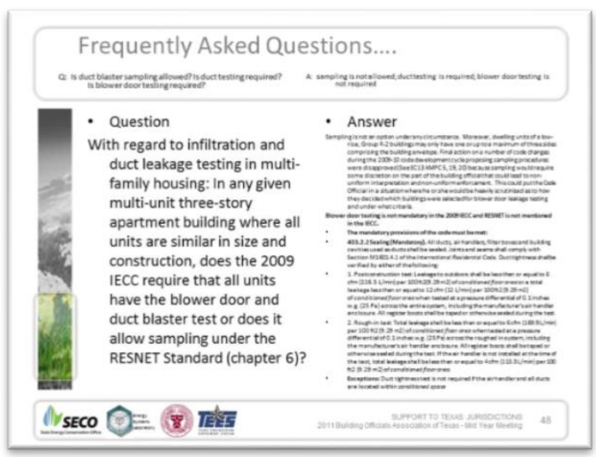


Figure 32: Presentation to the Building Official Association of Texas (Continued)

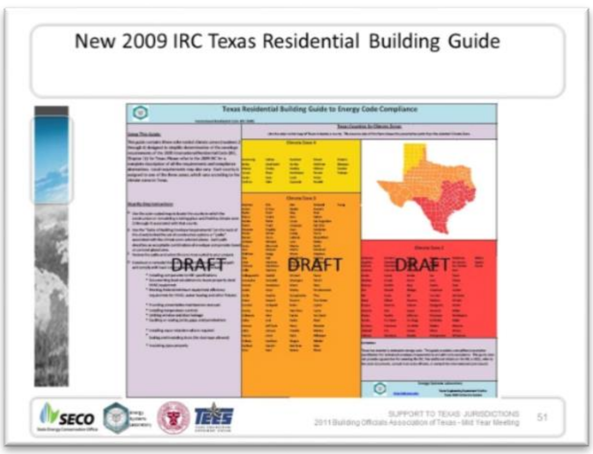
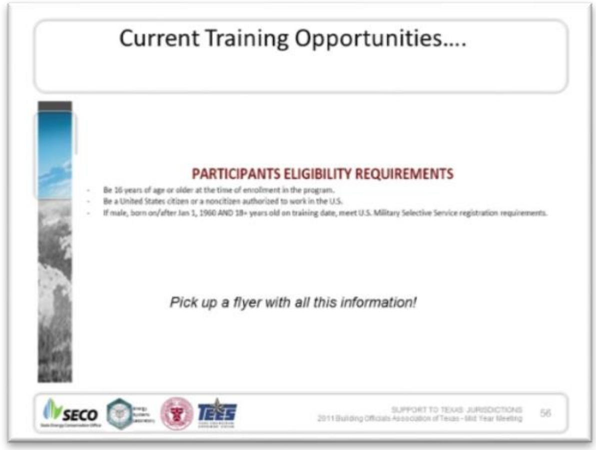
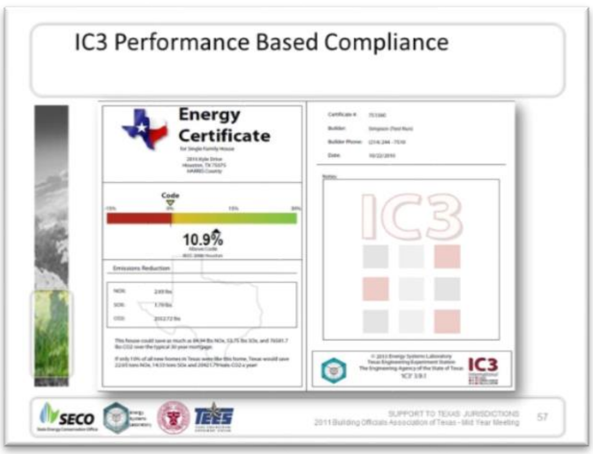


Figure 32: Presentation to the Building Official Association of Texas (Continued)





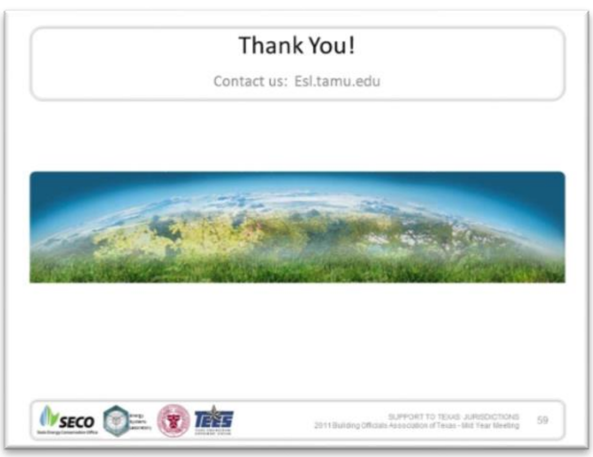
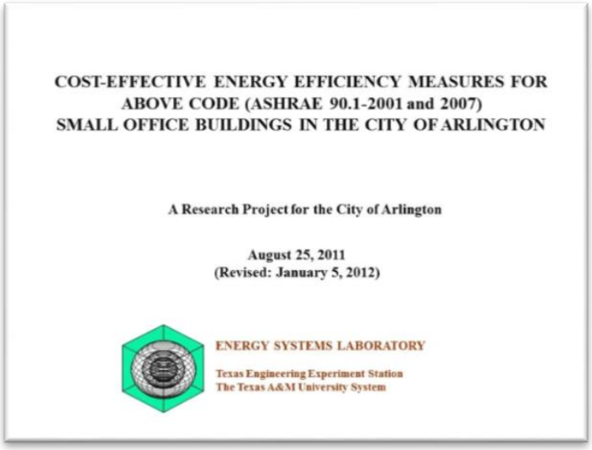
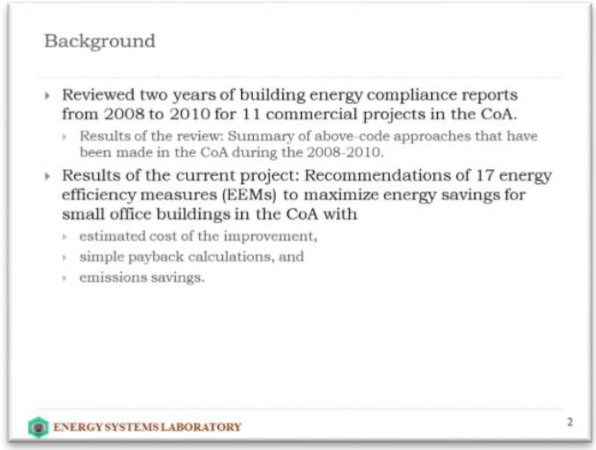
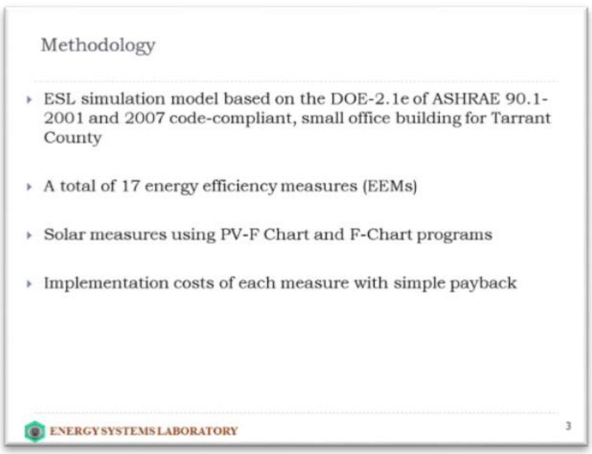


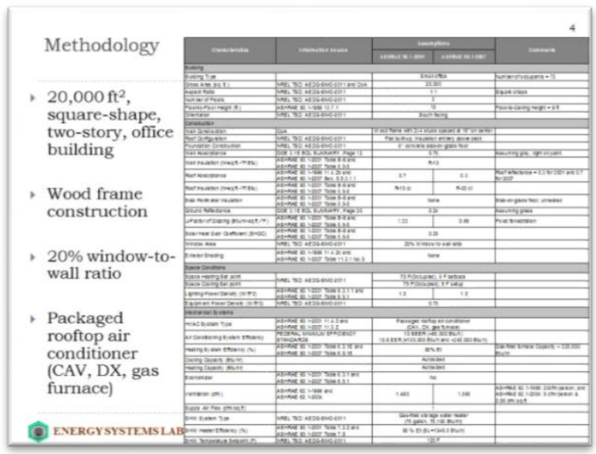
Figure 32: Presentation to the Building Official Association of Texas (Continued)

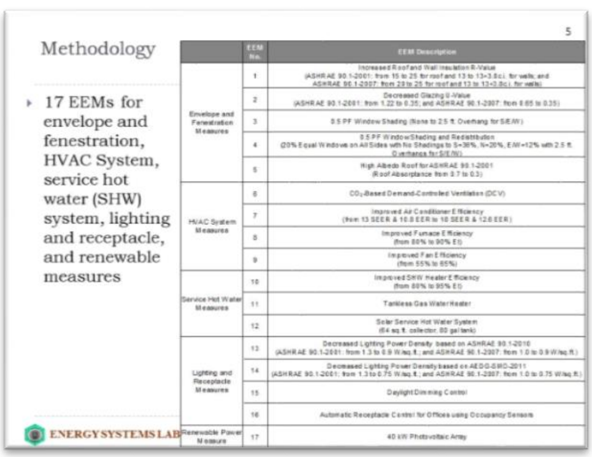
Presentation to the City of Arlington, August 25, 2011











	EEM No.	EEM Description
Envelope and Fenestration Measures	1	Increased Roof and Wall Insulation R-Value (ASHRAE 90.1-2001: from 15 to 25 for roof and 13 to 13+3.8c.i. for walls; and ASHRAE 90.1-2007: from 20 to 25 for roof and 13 to 13+3.8c.i. for walls)
	2	Decreased Glazing U-Value (ASHRAE 90.1-2001: from 1.22 to 0.35; and ASHRAE 90.1-2007: from 0.65 to 0.35)
	3	0.5 PF Window Shading (None to 2.5 ft. Overhang for S/E/W)
	4	0.5 PF Window Shading and Redistribution (20% Equal Windows on All Sides with No Shadings to S=38%, N=20%, E/W=12% with 2.5 ft. Overhangs for S/E/W)
	5	High Albedo Roof for ASHRAE 90.1-2001 (Roof Absorptance from 0.7 to 0.3)
HVAC System Measures	6	CO_2-Based Demand-Controlled Ventilation (DCV)
	7	Improved Air Conditioner Efficiency (from 13 SEER & 10.8 EER to 18 SEER & 12.6 EER)
	8	Improved Furnace Efficiency (from 80% to 90% Et)
	9	Improved Fan Efficiency (from 55% to 65%)
Service Hot Water Measures	10	Improved SHW Heater Efficiency (from 80% to 95% Et)
	11	Tankless Gas Water Heater
	12	Solar Service Hot Water System (64 sq.ft. collector, 80 gal tank)
Lighting and Receptacle Measures	13	Decreased Lighting Power Density based on ASHRAE 90.1-2010 (ASHRAE 90.1-2001: from 1.3 to 0.9 W/sq.ft.; and ASHRAE 90.1-2007: from 1.0 to 0.9 W/sq.ft.)
	14	Decreased Lighting Power Density based on AEDG-SMO-2011 (ASHRAE 90.1-2001: from 1.3 to 0.75 W/sq.ft.; and ASHRAE 90.1-2007: from 1.0 to 0.75 W/sq.ft.)
	15	Daylight Dimming Control
	16	Automatic Receptacle Control for Offices using Occupancy Sensors
Renewable Power Measure	17	40 kW Photovoltaic Array

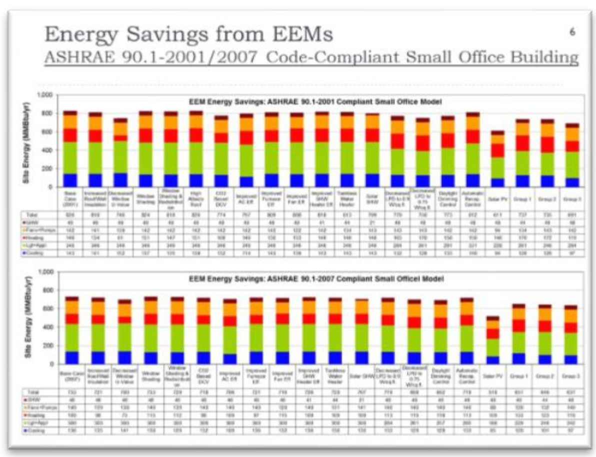
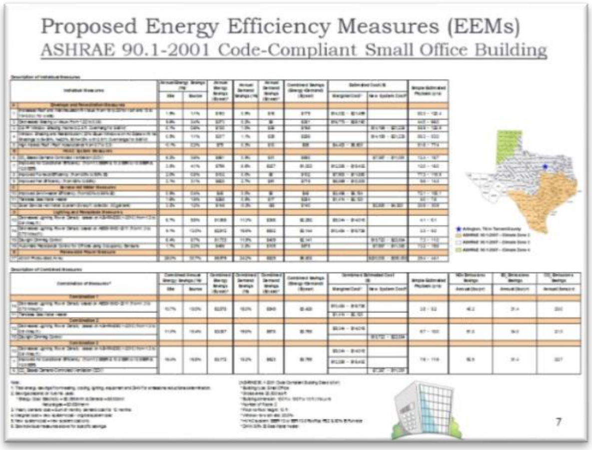
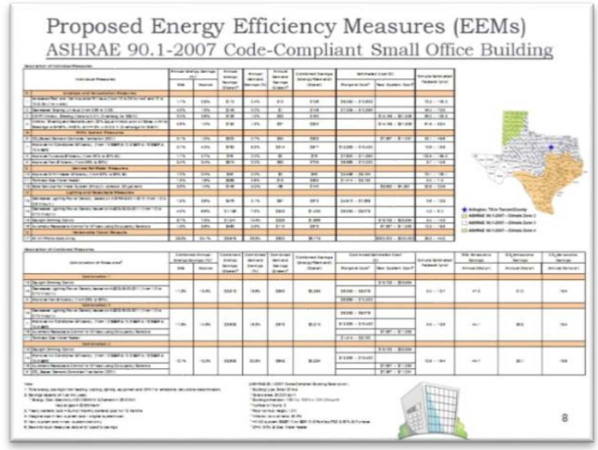
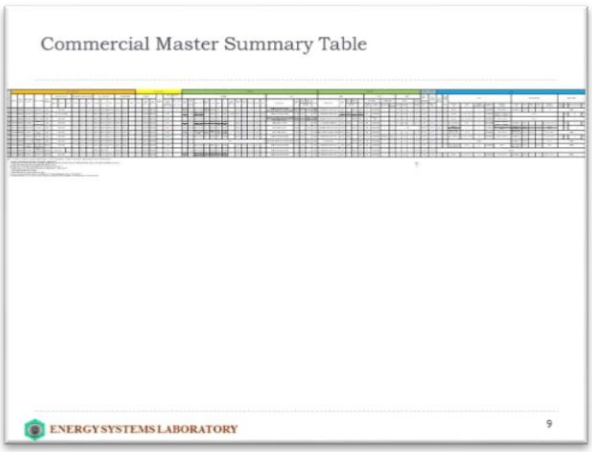


Figure 33: Presentation to the city of Arlington







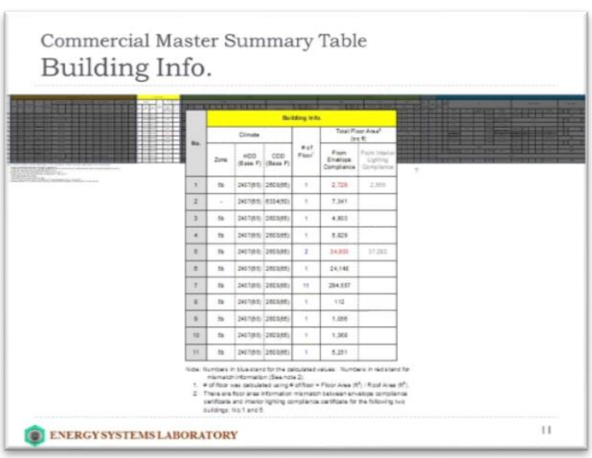
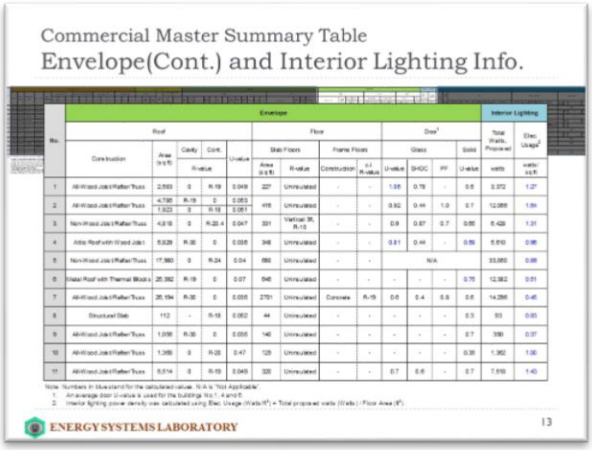
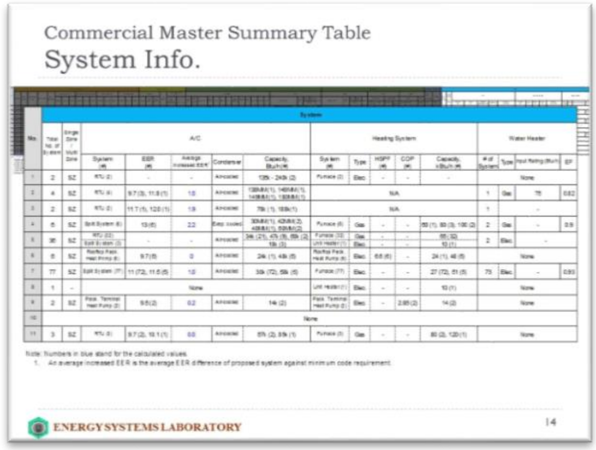
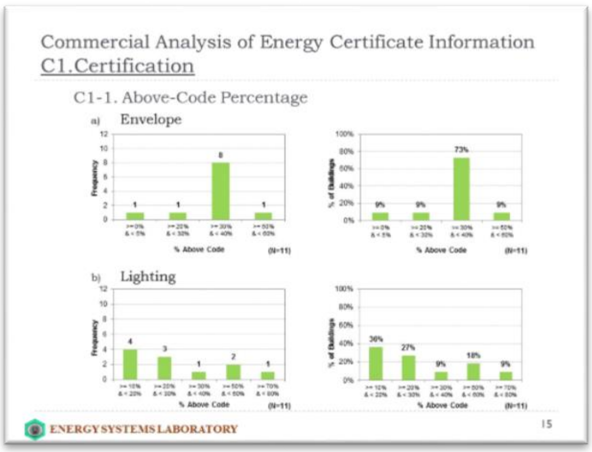
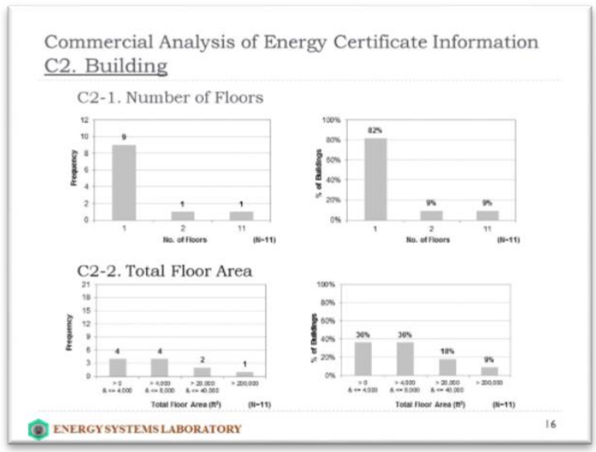


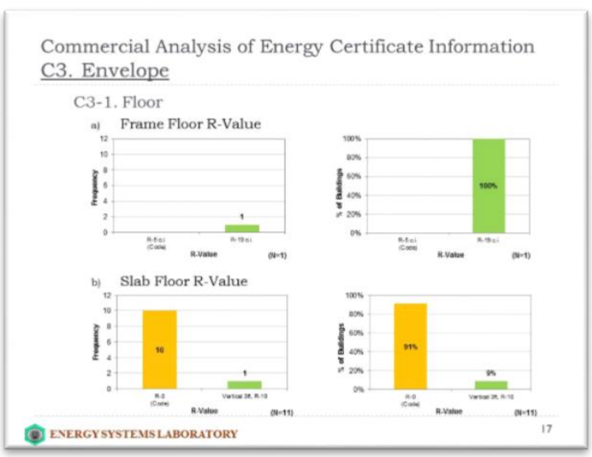
Figure 33: Presentation to the city of Arlington (Continued)











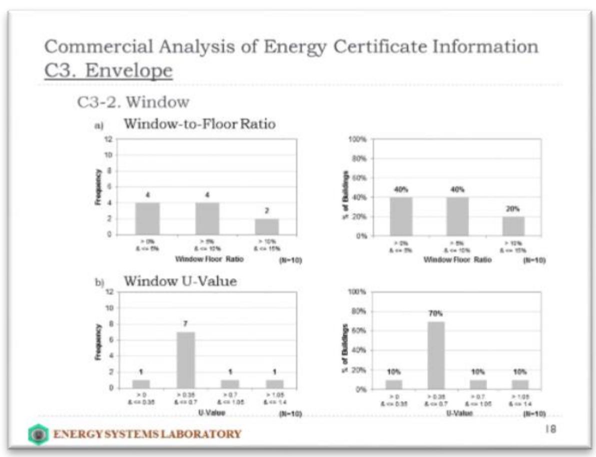
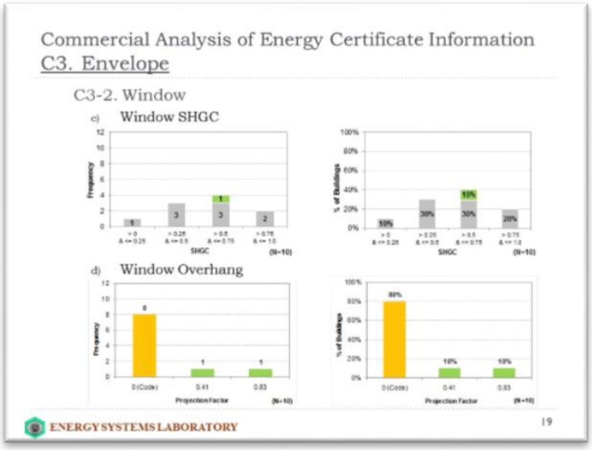
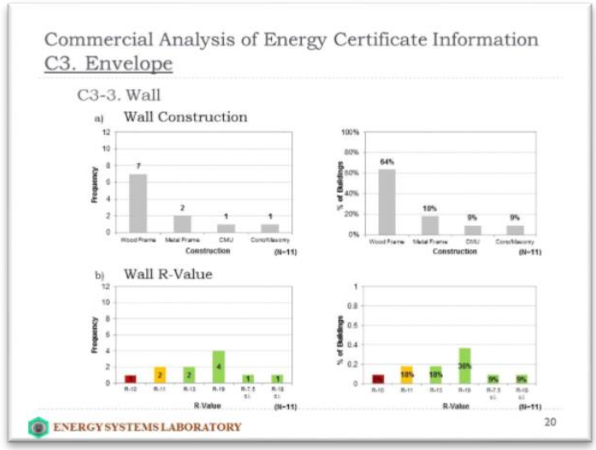
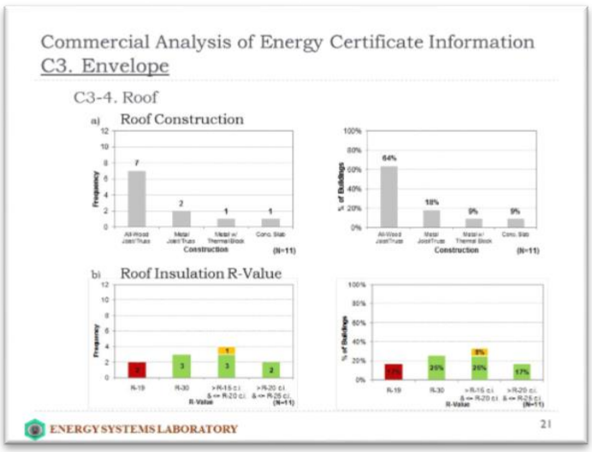
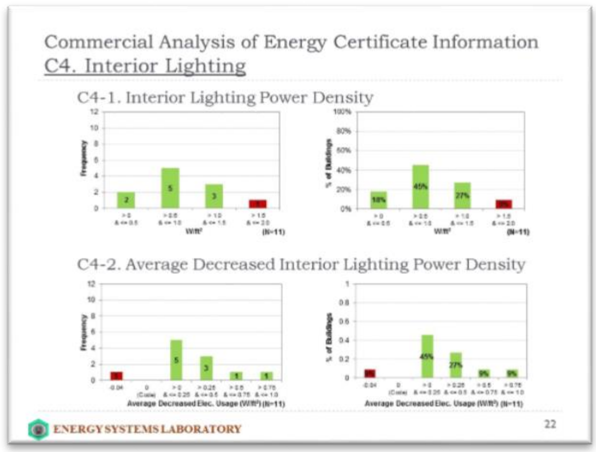


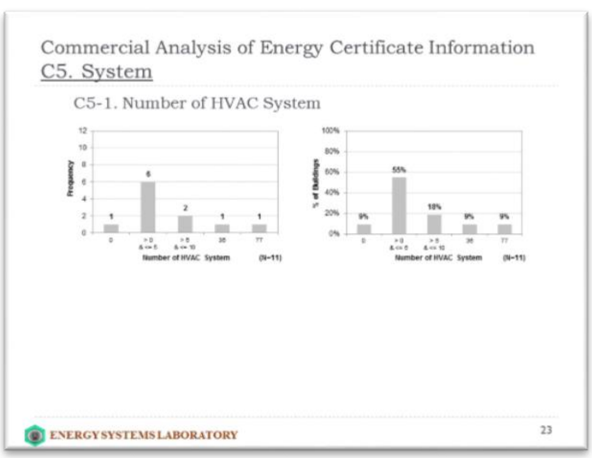
Figure 33: Presentation to the city of Arlington (Continued)











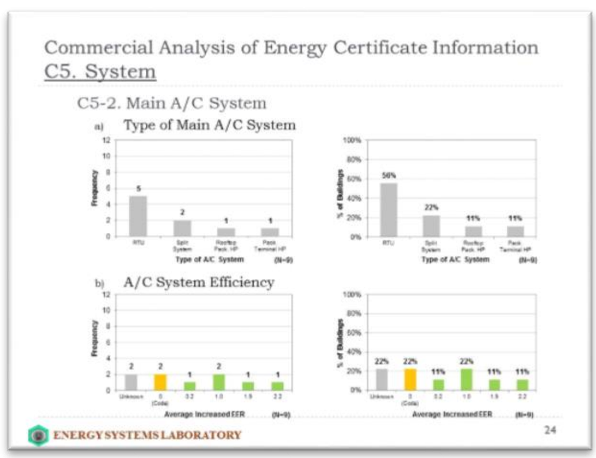
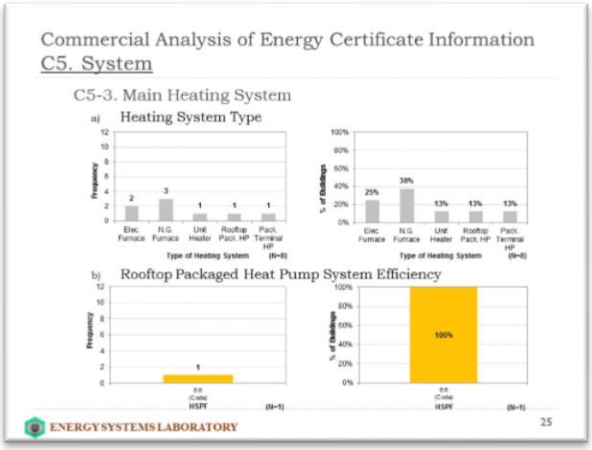
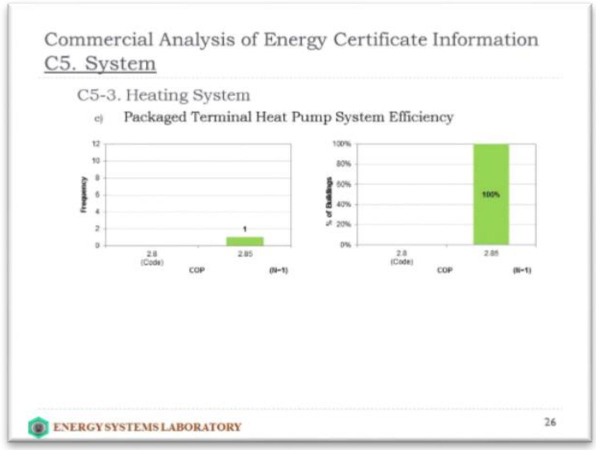
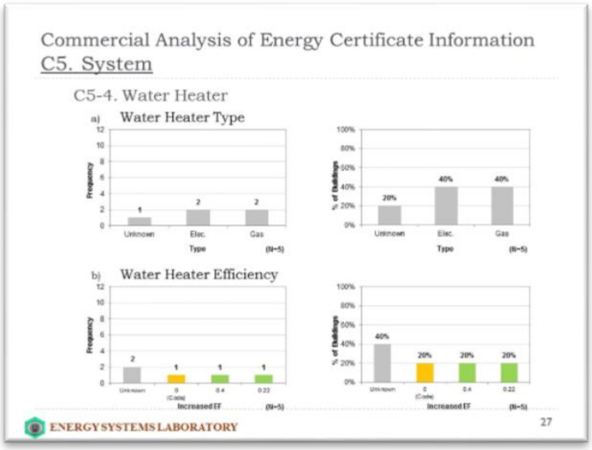
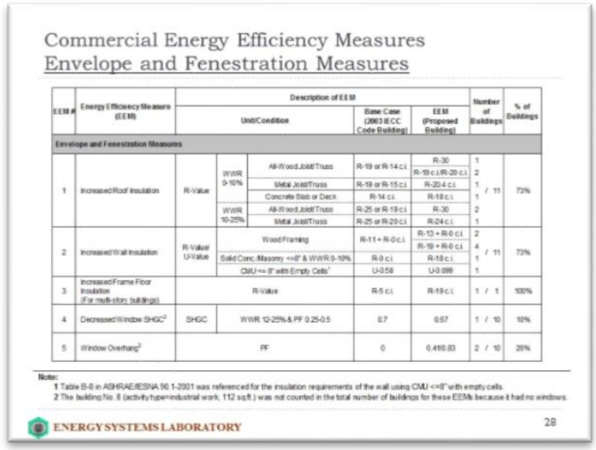


Figure 33: Presentation to the city of Arlington (Continued)





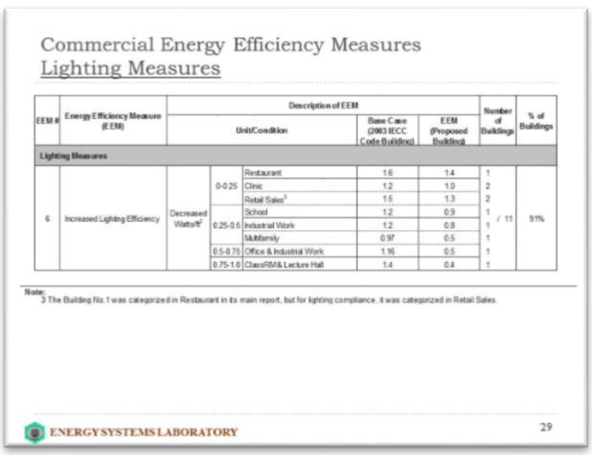



Commercial Energy Efficiency Measures
Envelope and Fenestration Measures

EEM #	Energy Efficiency Measure (EEM)	Description of EEM: Unit/Condition			Base Case (2003 IECC Code Building)	EEM (Proposed Building)	Number of Buildings	% of Buildings
Envelope and Fenestration Measures								
1	Increased Roof Insulation	R-Value	WWR 0-10%	All-Wood Joist/Truss	R-19 or R-14 c.i.	R-30	1	/ 11	73%
						R-19 c.i./R-20 c.i.	2	
				Metal Joist/Truss	R-19 or R-15 c.i.	R-20.4 c.i.	1	
				Concrete Slab or Deck	R-14 c.i.	R-18 c.i.	1	
			WWR 10-25%	All-Wood Joist/Truss	R-25 or R-19 c.i.	R-30	2	
				Metal Joist/Truss	R-25 or R-20 c.i.	R-24 c.i.	1	
2	Increased Wall Insulation	R-Value/ U-Value	Wood Framing		R-11 + R-0 c.i.	R-13 + R-0 c.i.	2	/ 11	73%
						R-19 + R-0 c.i.	4	
			Solid Conc./Masonry <=8" & WWR 0-10%		R-0 c.i.	R-18 c.i.	1	
			CMU <= 8" with Empty Cells[1]		U-0.58	U-0.099	1	
3	Increased Frame Floor Insulation (For multi-story buildings)	R-Value			R-5 c.i.	R-19 c.i.	1 / 1	100%
4	Decreased Window SHGC[2]	SHGC	WWR 12-25% & PF 0.25-0.5		0.7	0.57	1 / 10	10%
5	Window Overhang[2]	PF			0	0.41/0.83	2 / 10	20%

Note:
1 Table B-6 in ASHRAE/IESNA 90.1-2001 was referenced for the insulation requirements of the wall using CMU <=8" with empty cells.
2 The building No. 8 (activity type=industrial work, 112 sq.ft.) was not counted in the total number of buildings for these EEMs because it had no windows.

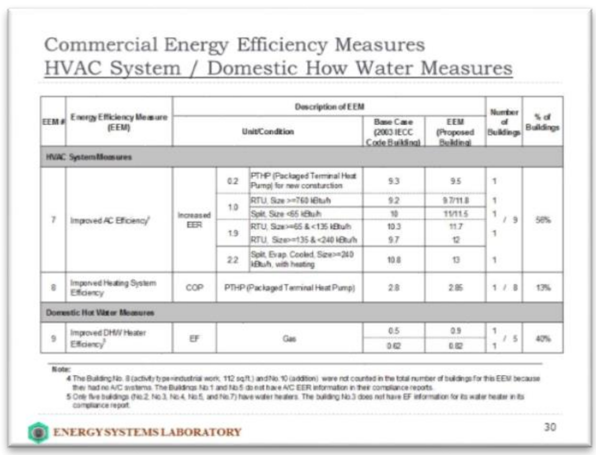
ENERGY SYSTEMS LABORATORY 28


Commercial Energy Efficiency Measures
Lighting Measures

EEM #	Energy Efficiency Measure (EEM)	Description of EEM: Unit/Condition			Base Case (2003 IECC Code Building)	EEM (Proposed Building)	Number of Buildings	% of Buildings
Lighting Measures								
6	Increased Lighting Efficiency	Decreased Watts/ft²	0-0.25	Restaurant	1.6	1.4	1 / 11	91%
				Clinic	1.2	1.0	2	
				Retail Sales[3]	1.5	1.3	2	
			0.25-0.5	School	1.2	0.9	1	
				Industrial Work	1.2	0.8	1	
				Multifamily	0.97	0.5	1	
			0.5-0.75	Office & Industrial Work	1.16	0.5	1	
			0.75-1.0	ClassRM & Lecture Hall	1.4	0.4	1	

Note:
3 The Building No.1 was categorized in Restaurant in its main report, but for lighting compliance, it was categorized in Retail Sales.

ENERGY SYSTEMS LABORATORY 29


Commercial Energy Efficiency Measures
HVAC System / Domestic How Water Measures

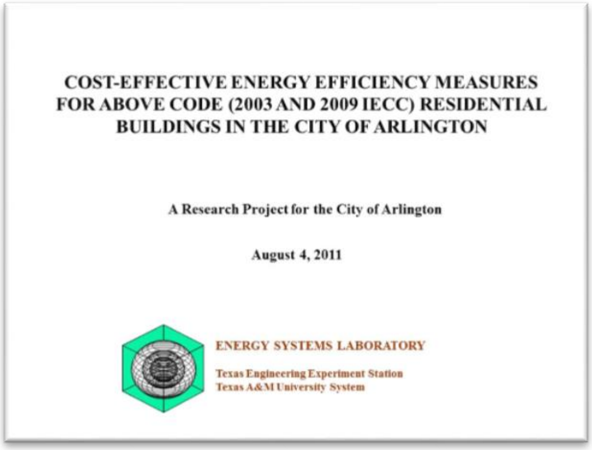
EEM #	Energy Efficiency Measure (EEM)	Description of EEM: Unit/Condition			Base Case (2003 IECC Code Building)	EEM (Proposed Building)	Number of Buildings	% of Buildings
HVAC System Measures								
7	Improved AC Efficiency[4]	Increased EER	0.2	PTHP (Packaged Terminal Heat Pump) for new consturction	9.3	9.5	1 / 9	56%
			1.0	RTU, Size >=760 kBtu/h	9.2	9.7/11.8	1	
				Split, Size <65 kBtu/h	10	11/11.5	1	
			1.9	RTU, Size>=65 & <135 kBtu/h	10.3	11.7	1	
				RTU, Size>=135 & <240 kBtu/h	9.7	12		
			2.2	Split, Evap. Cooled, Size>=240 kBtu/h, with heating	10.8	13	1	
8	Improved Heating System Efficiency	COP	PTHP (Packaged Terminal Heat Pump)		2.8	2.85	1 / 8	13%
Domestic Hot Water Measures								
9	Improved DHW Heater Efficiency[5]	EF	Gas		0.5	0.9	1 / 5	40%
					0.62	0.82	1	

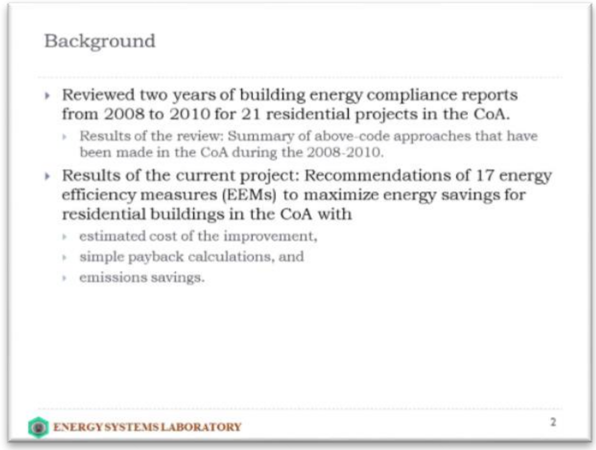
Note:
4 The Building No. 8 (activity type=industrial work, 112 sq.ft.) and No. 10 (addition) were not counted in the total number of buildings for this EEM because they had no A/C systems. The Buildings No.1 and No.5 do not have A/C EER information in their compliance reports.
5 Only five buildings (No.2, No.3, No.4, No.5, and No.7) have water heaters. The building No.3 does not have EF information for its water heater in its compliance report.

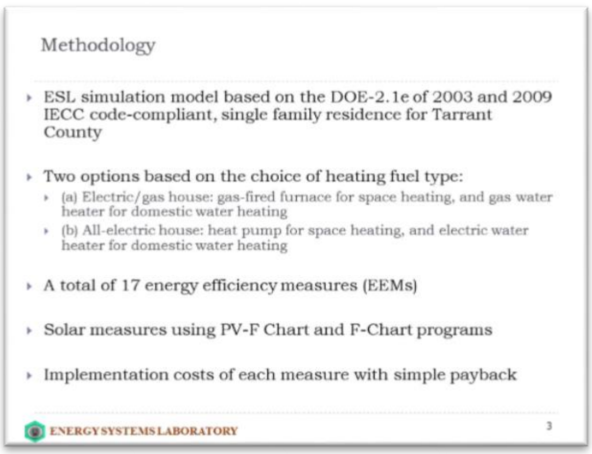
ENERGY SYSTEMS LABORATORY 30

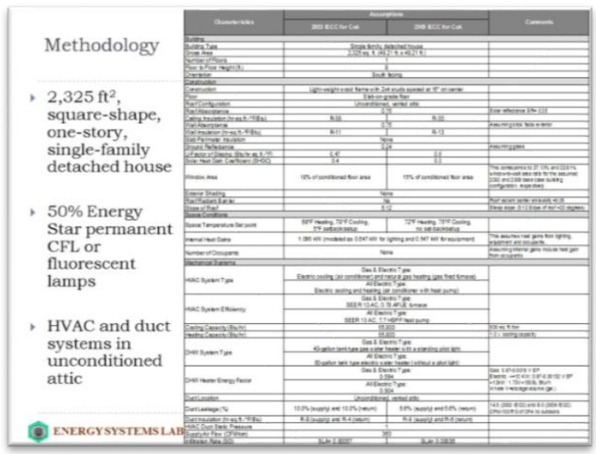
Figure 33: Presentation to the city of Arlington (Continued)

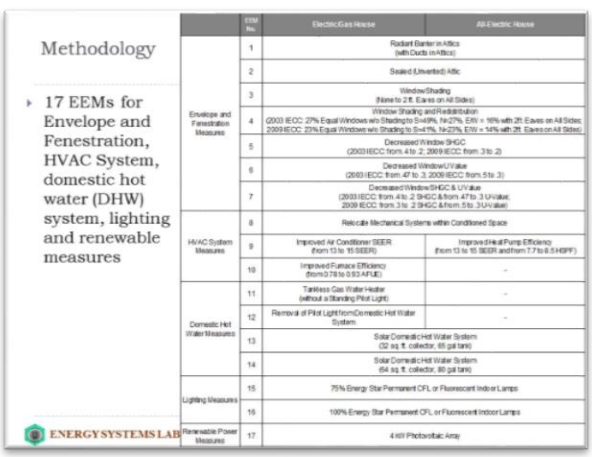
Presentation to the City of Arlington, August 4, 2011











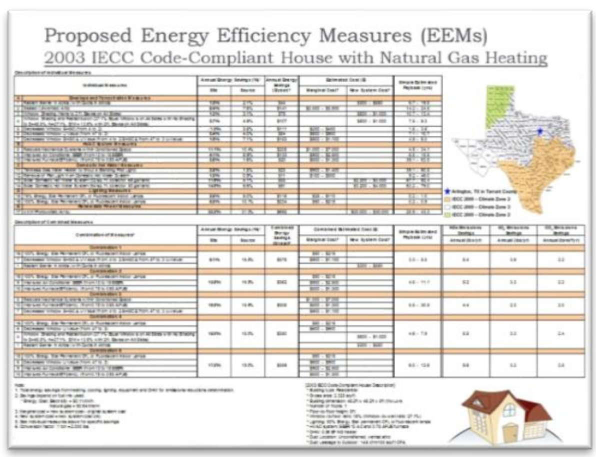
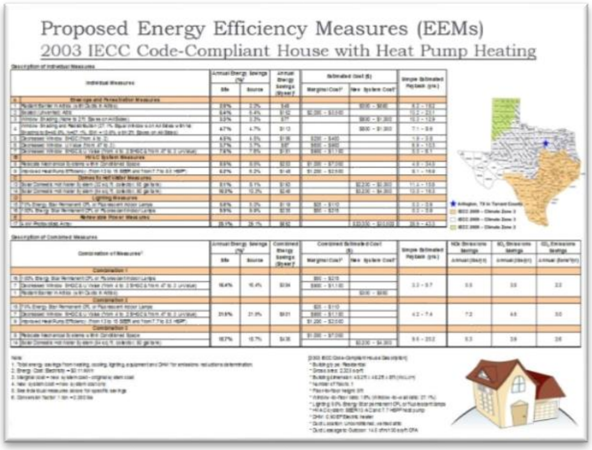
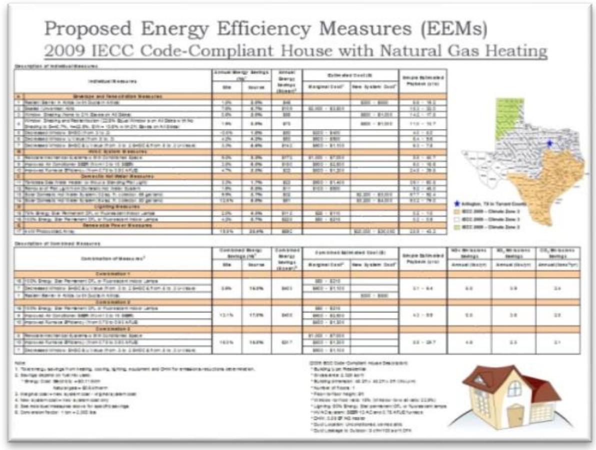
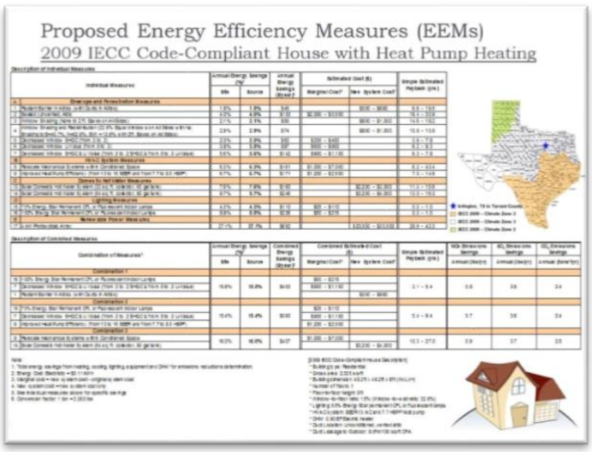
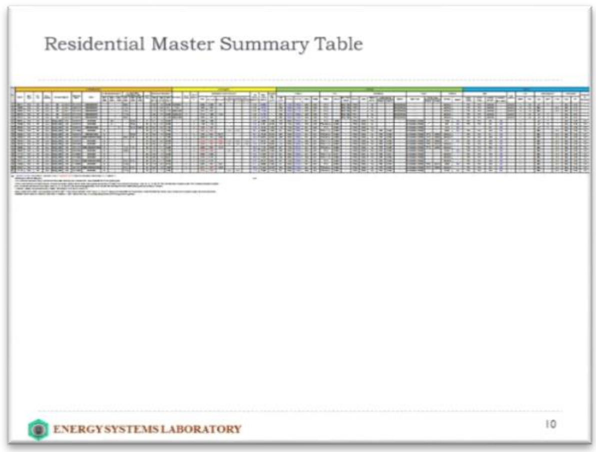


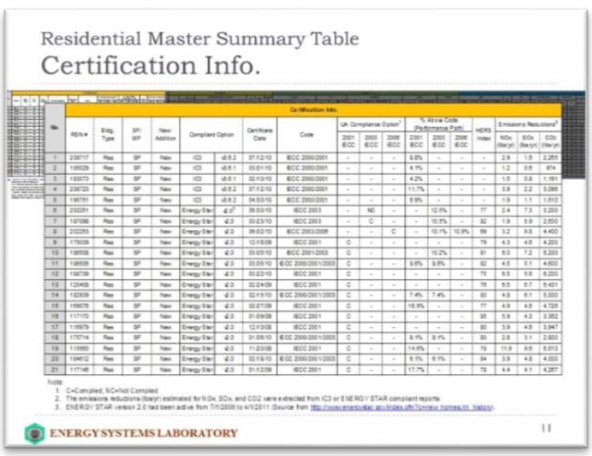
Figure 33: Presentation to the city of Arlington (Continued)











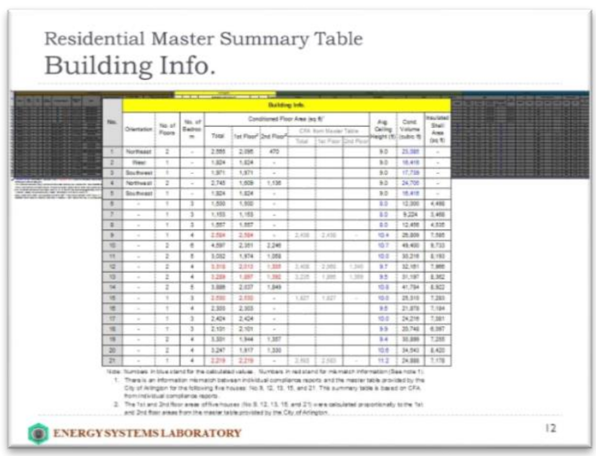
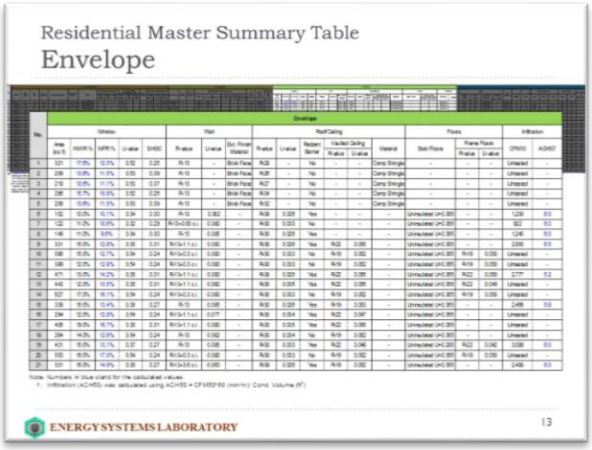
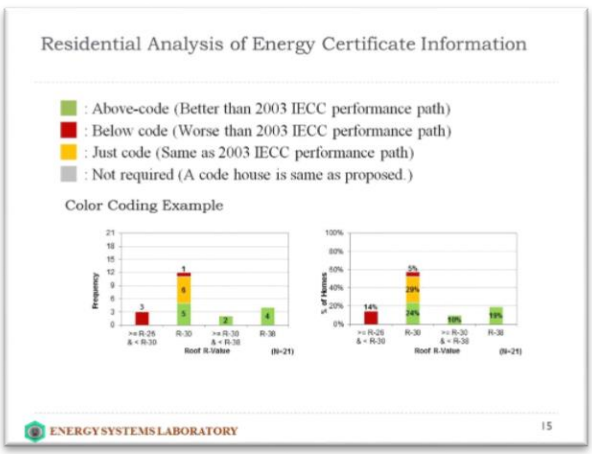
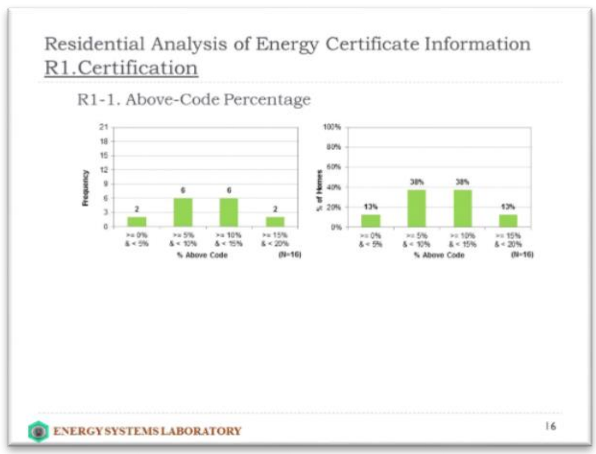
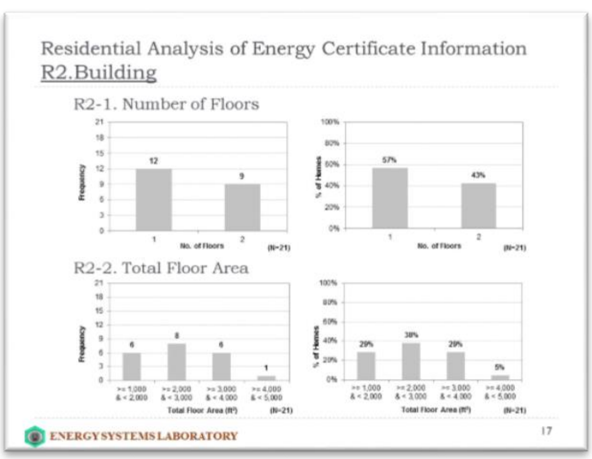


Figure 33: Presentation to the city of Arlington (Continued)









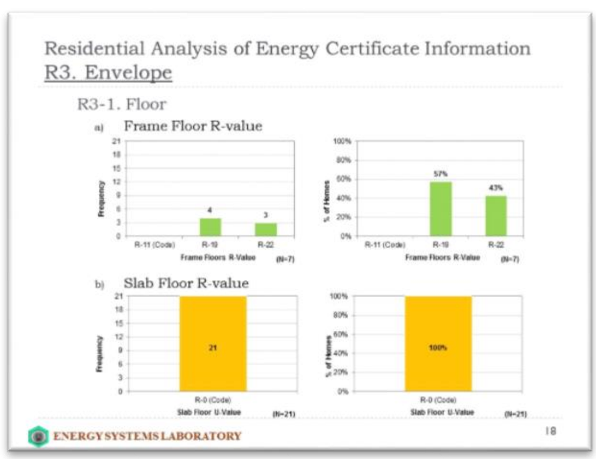
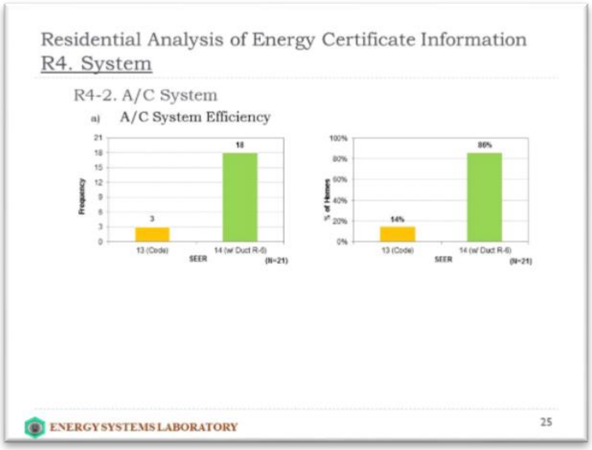
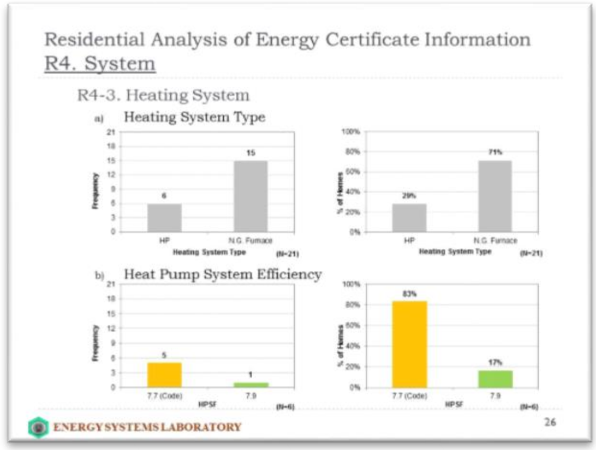
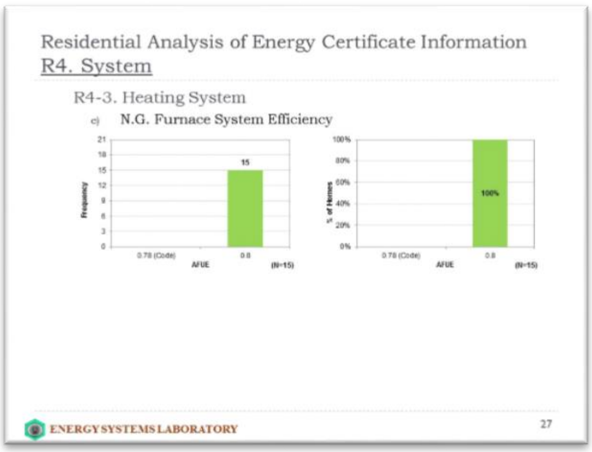


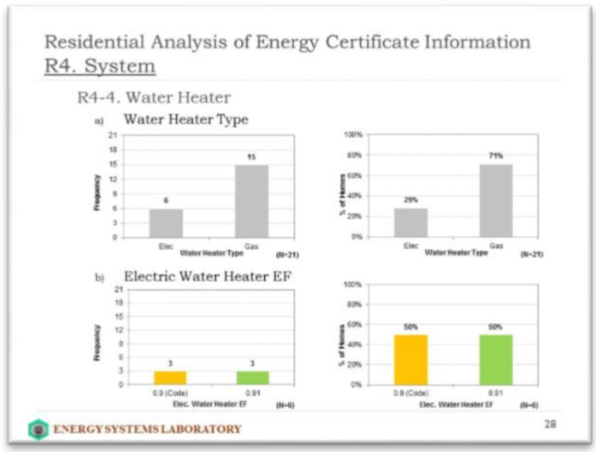
Figure 33: Presentation to the city of Arlington (Continued)

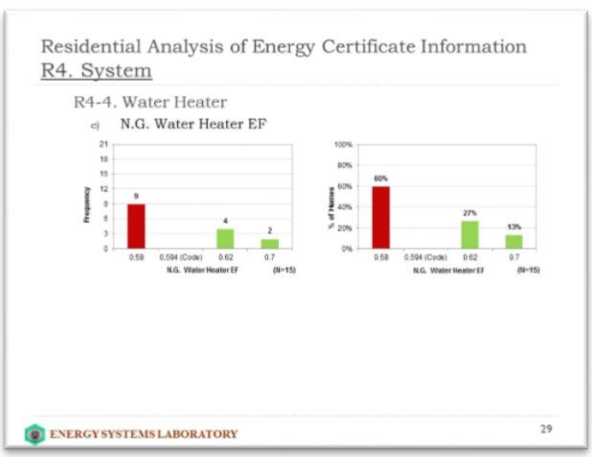
Figure 33: Presentation to the city of Arlington (Continued)

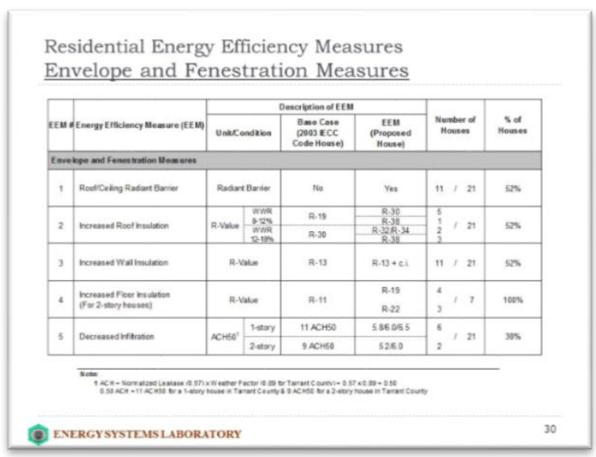










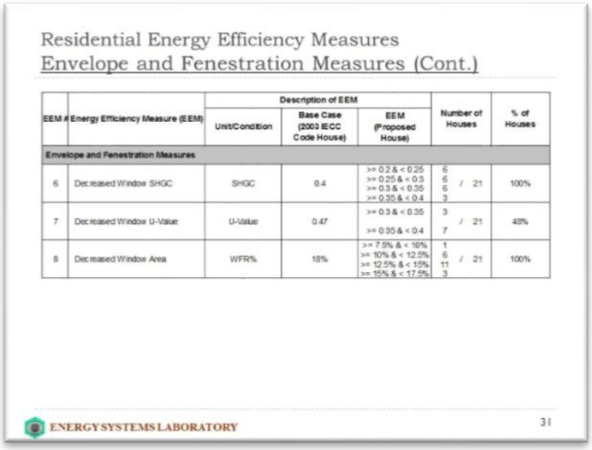

Residential Energy Efficiency Measures
Envelope and Fenestration Measures

EEM #	Energy Efficiency Measure (EEM)	Description of EEM: Unit/Condition		Base Case (2003 IECC Code House)	EEM (Proposed House)	Number of Houses	% of Houses
Envelope and Fenestration Measures							
1	Roof/Ceiling Radiant Barrier	Radiant Barrier		No	Yes	11 / 21	52%
2	Increased Roof Insulation	R-Value	WWR 8-12%	R-19	R-30 R-38	5 1 / 21	52%
			WWR 12-18%	R-30	R-32/R-34 R-38	2 3	
3	Increased Wall Insulation	R-Value		R-13	R-13 + c.i.	11 / 21	52%
4	Increased Floor Insulation (For 2-story houses)	R-Value		R-11	R-19 R-22	4 3 / 7	100%
5	Decreased Infiltration	ACH50[1]	1-story	11 ACH50	5.8/6.0/6.5	6 / 21	38%
			2-story	9 ACH50	5.2/6.0	2	

Note:
1 ACH = Normalized Leakage (0.57) x Weather Factor (0.89 for Tarrant County) = 0.57 x 0.89 = 0.50
0.50 ACH = 11 ACH50 for a 1-story house in Tarrant County & 9 ACH50 for a 2-story house in Tarrant County

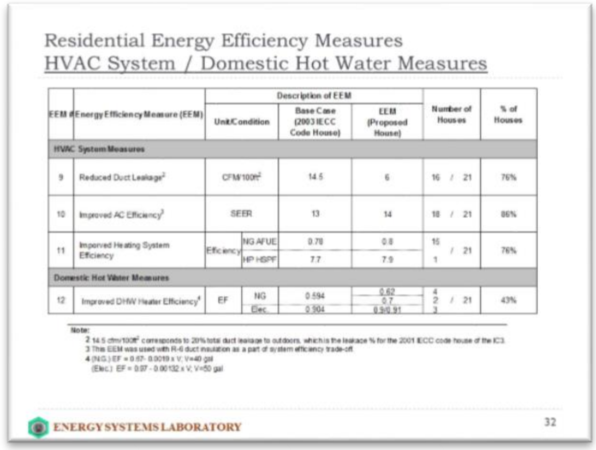
ENERGY SYSTEMS LABORATORY 30

Figure 33: Presentation to the city of Arlington (Continued)



Residential Energy Efficiency Measures
Envelope and Fenestration Measures (Cont.)

EEM #	Energy Efficiency Measure (EEM)	Description of EEM: Unit/Condition	Description of EEM: Base Case (2003 IECC Code House)	Description of EEM: EEM (Proposed House)	Number of Houses	% of Houses
Envelope and Fenestration Measures						
6	Decreased Window SHGC	SHGC	0.4	>= 0.2 & < 0.25 >= 0.25 & < 0.3 >= 0.3 & < 0.35 >= 0.35 & < 0.4	6 6 / 21 6 3	100%
7	Decreased Window U-Value	U-Value	0.47	>= 0.3 & < 0.35 >= 0.35 & < 0.4	3 / 21 7	48%
8	Decreased Window Area	WFR%	18%	>= 7.5% & < 10% >= 10% & < 12.5% >= 12.5% & < 15% >= 15% & < 17.5%	1 6 / 21 11 3	100%



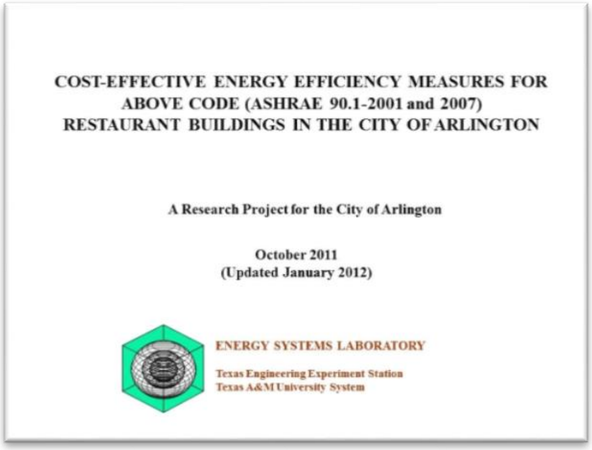
Residential Energy Efficiency Measures
HVAC System / Domestic Hot Water Measures

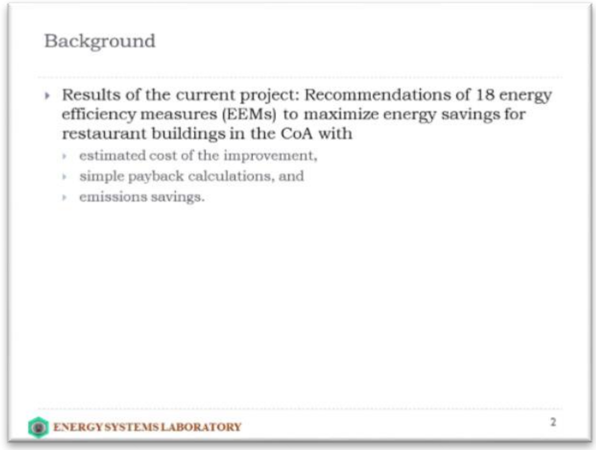
EEM #	Energy Efficiency Measure (EEM)	Description of EEM: Unit/Condition		Description of EEM: Base Case (2003 IECC Code House)	Description of EEM: EEM (Proposed House)	Number of Houses	% of Houses
HVAC System Measures							
9	Reduced Duct Leakage[2]	CFM/100ft²		14.5	6	16 / 21	76%
10	Improved AC Efficiency[3]	SEER		13	14	18 / 21	86%
11	Imporved Heating System Efficiency	Efficiency	NG AFUE HP HSPF	0.78 7.7	0.8 7.9	15 / 21 1	76%
Domestic Hot Water Measures							
12	Improved DHW Heater Efficiency[4]	EF	NG Elec.	0.594 0.904	0.62 0.7 0.9/0.91	4 2 / 21 3	43%

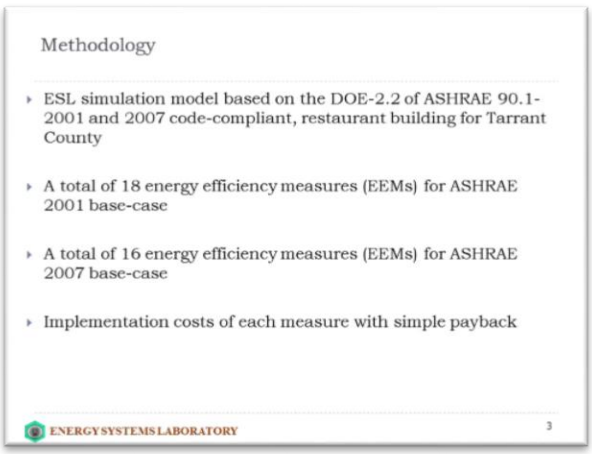
Note:
2 14.5 cfm/100ft² corresponds to 20% total duct leakage to outdoors, which is the leakage % for the 2001 IECC code house of the IC3
3 This EEM was used with R-6 duct insulation as a part of system efficiency trade-off
4 (N.G.) EF = 0.67- 0.0019 x V; V=40 gal
(Elec.) EF = 0.97 - 0.00132 x V; V=50 gal

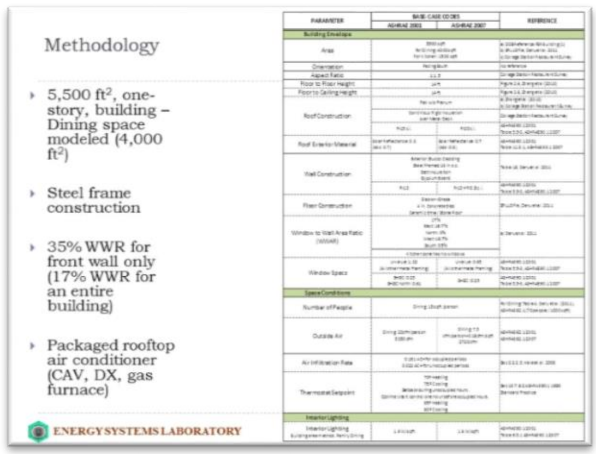
Figure 33: Presentation to the city of Arlington (Continued)

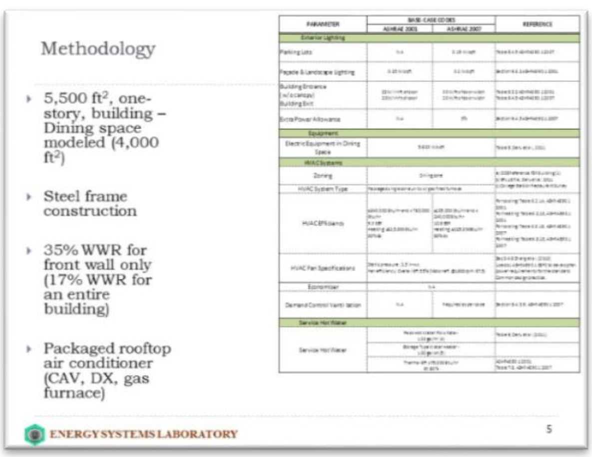
Presentation to the city of Arlington, October 2011











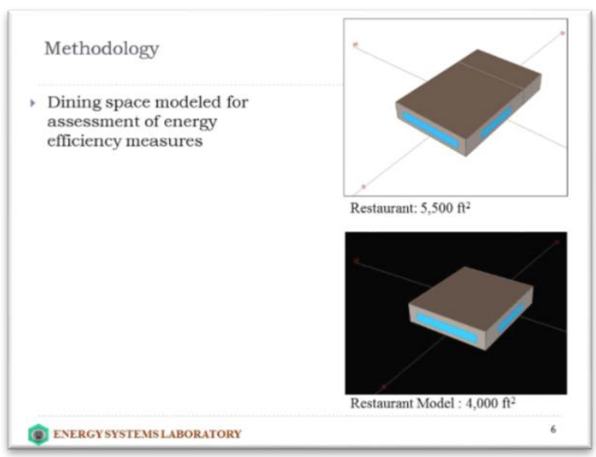


Figure 33: Presentation to the city of Arlington (Continued)

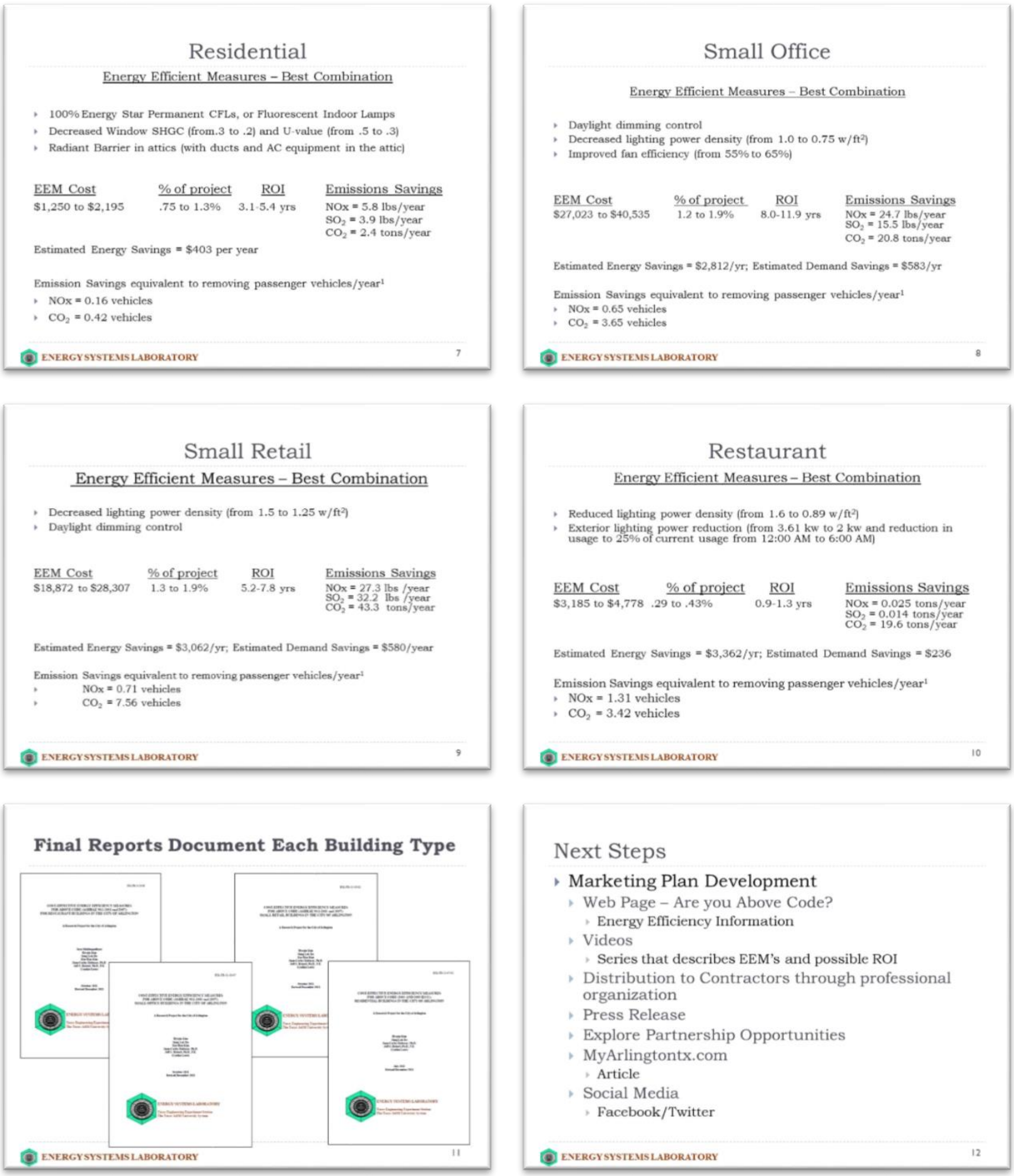
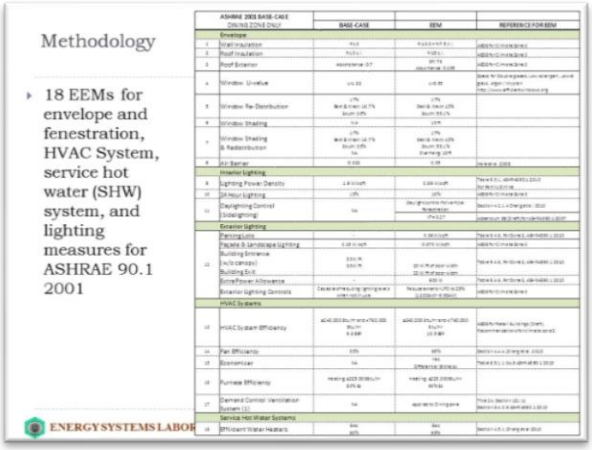
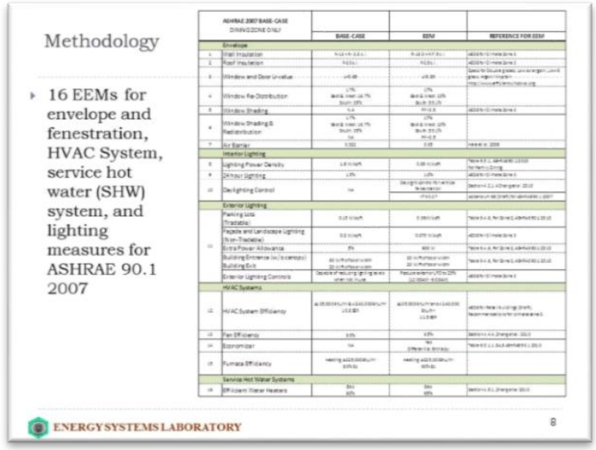
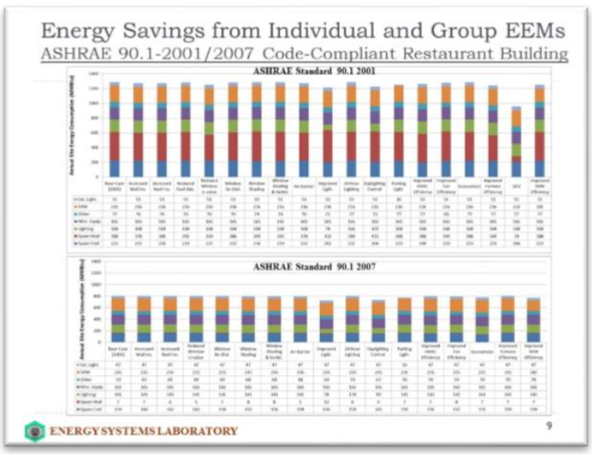
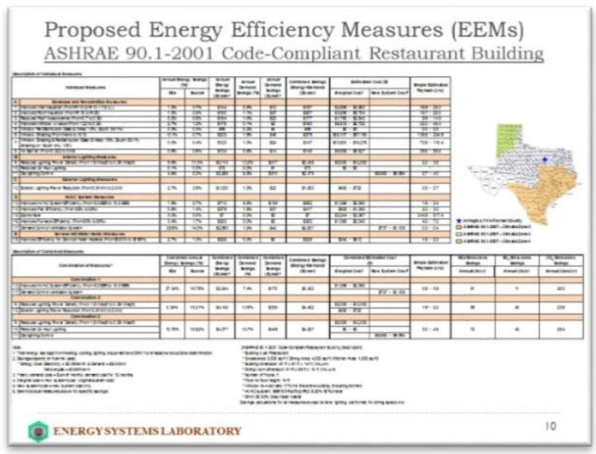


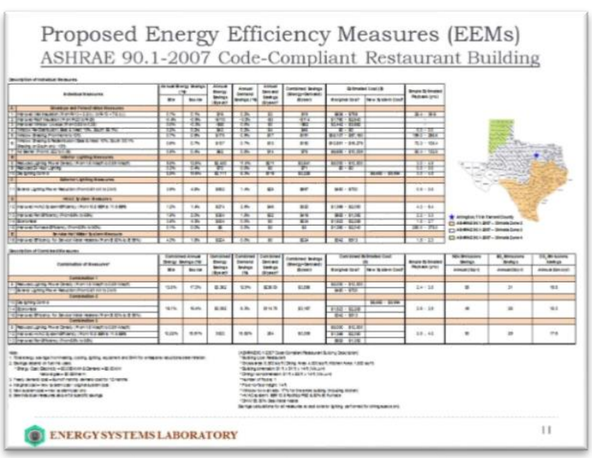
Figure 33: Presentation to the city of Arlington (Continued)











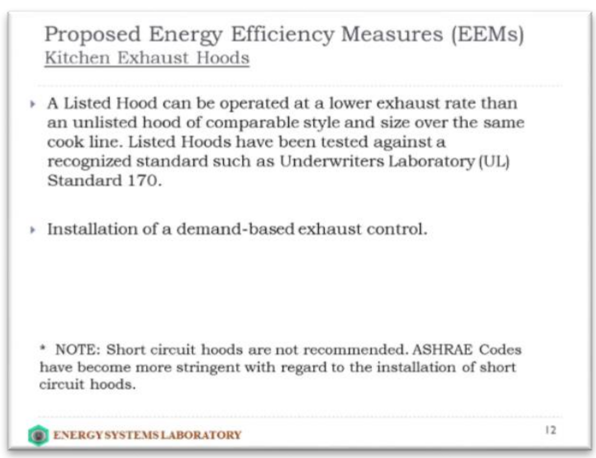


Figure 33: Presentation to the city of Arlington (Continued)

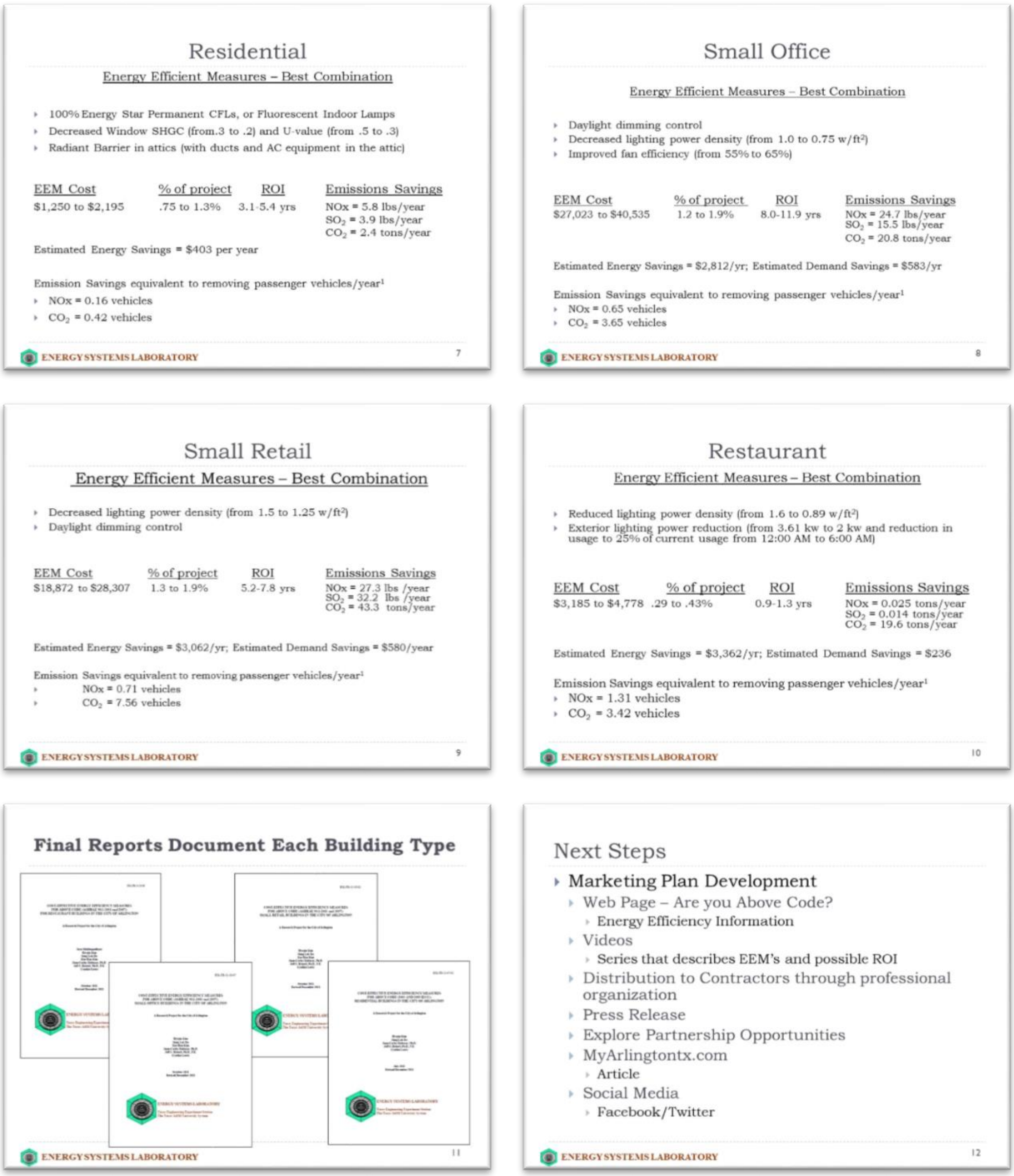


Figure 33: Presentation to the city of Arlington (Continued)

Presentation to the city of Arlington, October 5, 2011

COST-EFFECTIVE ENERGY EFFICIENCY MEASURES FOR ABOVE CODE (ASHRAE 90.1-2001 and 2007) SMALL RETAIL BUILDINGS IN THE CITY OF ARLINGTON

A Research Project for the City of Arlington

October 5, 2011
(Revised: January 5, 2012)

ENERGY SYSTEMS LABORATORY
Texas Engineering Experiment Station
Texas A&M University System

2

Background

- Results of the current project: Recommendations of 16 energy efficiency measures (EEMs) to maximize energy savings for small retail buildings in the CoA with
  - estimated cost of the improvement,
  - simple payback calculations, and
  - emissions savings.

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3

Methodology

- ESL simulation model based on the DOE-2.2 of ASHRAE 90.1-2001 and 2007 code-compliant, small retail building for Tarrant County
- A total of 16 energy efficiency measures (EEMs)
- Solar measures using PV-F Chart and F-Chart programs
- Implementation costs of each measure with simple payback

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4

Methodology

- 15,000 ft^2, one-story, strip mall building
- Mass wall construction
- 70% WWR for front wall only (28% WWR for an entire building)
- Packaged rooftop air conditioner (CAV, DX, gas furnace)

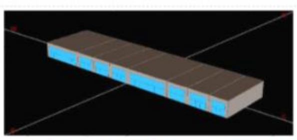
Characteristics	Information Source	Assumptions: ASHRAE 90.1-2001	Assumptions: ASHRAE 90.1-2007	Comments
Building				
Building Type		Small retail-stripmall		Number of occupants = [illegible]
Gross Area (sq. ft.)	CoA	15,000		
Aspect Ratio	PNNL 20405 ASHRAE 90.1-2010	4:1		240 ft (L) X 61 ft (W)
Number of Floors	PNNL 20405 ASHRAE 90.1-2010	1		
Floor-to-Floor Height (ft.)	PNNL 20405 ASHRAE 90.1-2010	17		Floor-to-Ceiling height = 17 ft
Orientation	PNNL 20405 ASHRAE 90.1-2010	South facing		
Construction				
Wall Construction	CoA	Mass (8-in concrete, 140 lb/ft³)		
Roof Configuration	PNNL 20405 ASHRAE 90.1-2010	Flat built-up, insulation entirely above deck		
Foundation Construction	PNNL 20405 ASHRAE 90.1-2010	6" concrete slab-on-grade floor		
Wall Absorptance	DOE 2.1E BDL SUMMARY, Page 12	0.75		Assuming gray, light oil paint
Wall Insulation (hr-sq.ft.-°F/Btu)	ASHRAE 90.1-2001 Table B-4 and ASHRAE 90.1-2007 Table 5.5-3	None	R-7.6 c.i.	Assembly maximum U-value for ASHRAE 90.1-2001 = 0.580
Roof Absorptance	ASHRAE 90.1-1989 11.4.2 and ASHRAE 90.1-2007 Sec. 5.5.3.1.1	0.7	0.3	Roof reflectance = 0.3 for 2001 and 0.7 for 2007
Roof Insulation (hr-sq.ft.-°F/Btu)	ASHRAE 90.1-2001 Table B-4 and ASHRAE 90.1-2007 Table 5.5-3	R-15 c.i.	R-20 c.i.	
Slab Perimeter Insulation	ASHRAE 90.1-2001 Table B-4 and ASHRAE 90.1-2007 Table 5.5-3	None		Slab-on-grade floor: unheated
Ground Reflectance	DOE 2.1E BDL SUMMARY, Page 23	0.24		Assuming grass
U-Factor of Glazing (Btu/hr-sq.ft.-°F)	ASHRAE 90.1-2001 Table B-4 and ASHRAE 90.1-2007 Table 5.5-3	1.22	0.6 (Window) 0.9 (Door)	Fixed fenestration
Solar Heat Gain Coefficient (SHGC)	ASHRAE 90.1-2001 Table B-4 and ASHRAE 90.1-2007 Table 5.5-3	0.25		
Window Area	PNNL TSD: AEDG-SR2006	70% window to wall ratio for front wall only		28% of WWR for an entire building
Exterior Shading	ASHRAE 90.1-2001 Sec. 11.4.3 and ASHRAE 90.1-2007 Table 11.3.1 No.5	None		
Infiltration	PNNL 20405 ASHRAE 90.1-2010	Peak: 0.2016 cfm/sq.ft. of above grade exterior wall surface area when fans are off		
Space Conditions				
Space Heating Set point	PNNL TSD: AEDG-SR2006	70 F (Occupied), 5 F setback		
Space Cooling Set point		75 F (Occupied), 5 F setup		
Lighting Power Density (W/ft²)	ASHRAE 90.1-2001 Table 9.3.1.1 and ASHRAE 90.1-2007 Table 9.5.1	1.9	1.5	
Equipment Power Density (W/ft²)	PNNL 20405 ASHRAE 90.1-2010	[illegible]		
Mechanical Systems				
HVAC System Type	ASHRAE 90.1-2001 11.4.3 and ASHRAE 90.1-2007 11.3.2	Packaged rooftop air conditioner (CAV, DX, gas furnace)		
Air Conditioning System Efficiency	FEDERAL MINIMUM EFFICIENCY STANDARDS	13 SEER (<65,000 Btu/h); 11 EER (≥65,000 Btu/h and <135,000 Btu/h)		
Heating System Efficiency (%)	ASHRAE 90.1-2001 Table 6.2.1E and ASHRAE 90.1-2007 Table 6.8.1E	80% Et		Gas-fired furnace capacity = [illegible] Btu/h
Cooling Capacity (Btu/hr)	ASHRAE 90.1-2007 Appendix G and ASHRAE HOF-2005	Autosized based on design day (1% db and wb cooling design temperature); 15% Oversized		PNNL 20405 ASHRAE 90.1-2010 internal loads schedule = 1.0 (fraction)
Heating Capacity (Btu/hr)	ASHRAE 90.1-2007 Appendix G and ASHRAE HOF-2005	Autosized based on design day (99.6% heating design temperature); 25% oversized		PNNL 20405 ASHRAE 90.1-2010 internal loads schedule = 0.0 (fraction)
Economizer	ASHRAE 90.1-2001 Table 6.3.1 and ASHRAE 90.1-2007 Table 6.5.1	No		
Ventilation (cfm/sq.ft.)	ASHRAE 62.1-1999 and ASHRAE 62.1-2004	0.12 (Total: 1800 cfm)	0.18 (Total: 2700 cfm)	ASHRAE 62.1-1999: 15cfm/person; and ASHRAE 62.1-2004: 7.5 cfm/person & 0.12 cfm/sq.ft.
Supply Air Flow (cfm/sq.ft.)		1		
SHW System Type	PNNL TSD: AEDG-SR2006	Gas-fired storage water heater 40 gallon, 40,000 Btu/hr		
SHW Heater Efficiency (%)	FEDERAL ENERGY CONSERVATION STANDARDS	0.59 EF		
SHW Temperature Setpoint (F)	PNNL 20405 ASHRAE 90.1-2010	120 F		

ENERGY SYSTEMS LAB

5

Methodology

- Selected south facing building for the EEM analysis



ENERGY SYSTEMS LABORATORY 5

6

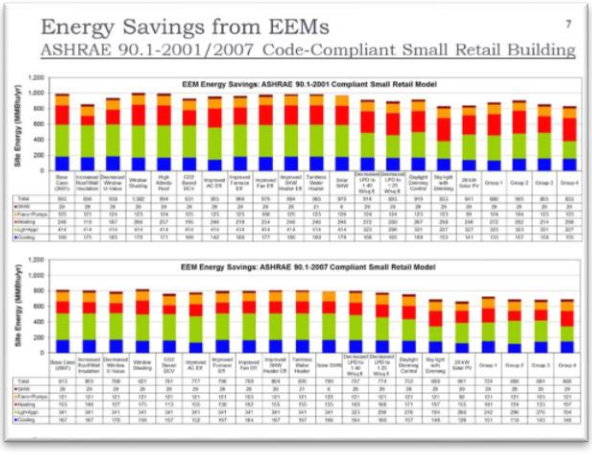
Methodology

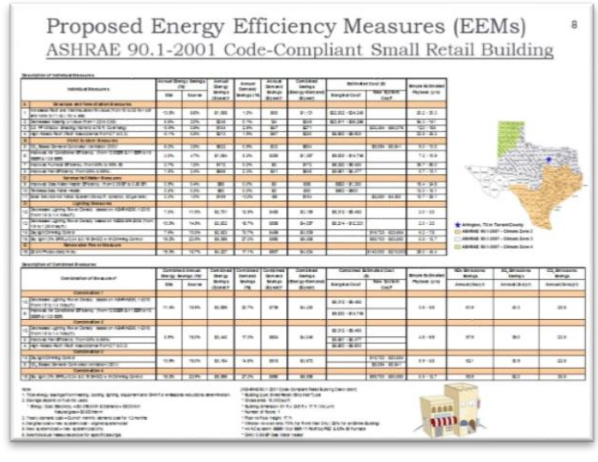
- 16 EEMs for envelope and fenestration, HVAC System, service hot water (SHW) system, lighting and renewable measures

	EEM No.	EEM Description
Envelope and Fenestration Measures	1	Increased Roof and Wall Insulation R-Value (ASHRAE 90.1-2001: from 15 to 25 for roof and 0 c.i. to 11.4 c.i. for walls; and ASHRAE 90.1-2007: from 20 to 25 for roof and 7.6 c.i. to 11.4 c.i. for walls)
	2	Decreased Glazing U-Value (ASHRAE 90.1-2001: from 1.22 to 0.35; and ASHRAE 90.1-2007: from 0.6 for window & 0.9 for door to 0.35)
	3	0.5 PF Window Shading (None to 6.75 ft. Overhang)
	4	High Albedo Roof for ASHRAE 90.1-2001 (Roof Absorptance from 0.7 to 0.3)
HVAC System Measures	5	CO_2-Based Demand-Controlled Ventilation (DCV)
	6	Improved Air Conditioner Efficiency (from 13 SEER & 11 EER to 18 SEER & 13.5 EER)
	7	Improved Furnace Efficiency (from 80% to 90% Et)
	8	Improved Fan Efficiency (from 55% to 65%)
Service Hot Water Measures	9	Improved SHW Heater Efficiency (from 0.59 EF to 0.86 EF)
	10	Tankless Gas Water Heater
	11	Solar Service Hot Water System (64 sq. ft. collector, 80 gal tank)
Lighting Measures	12	Decreased Lighting Power Density based on ASHRAE 90.1-2010 (ASHRAE 90.1-2001: from 1.9 to 1.4 W/sq. ft.; and ASHRAE 90.1-2007: from 1.5 to 1.4 W/sq. ft.)
	13	Decreased Lighting Power Density based on AEDG-SR-2006 (ASHRAE 90.1-2001: from 1.9 to 1.25 W/sq. ft.; and ASHRAE 90.1-2007: from 1.5 to 1.25 W/sq. ft.)
	14	Daylight Dimming Control
	15	Skylight (3% Skylight-roof-ratio, U-0.34 & 0.19 SHGC) with Dimming Control
Renewable Power Measure	16	28 kW Photovoltaic Array

ENERGY SYSTEMS LAB

Figure 33: Presentation to the city of Arlington (Continued)





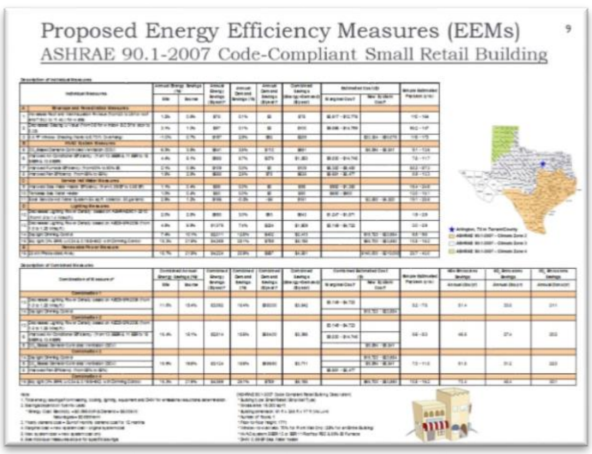
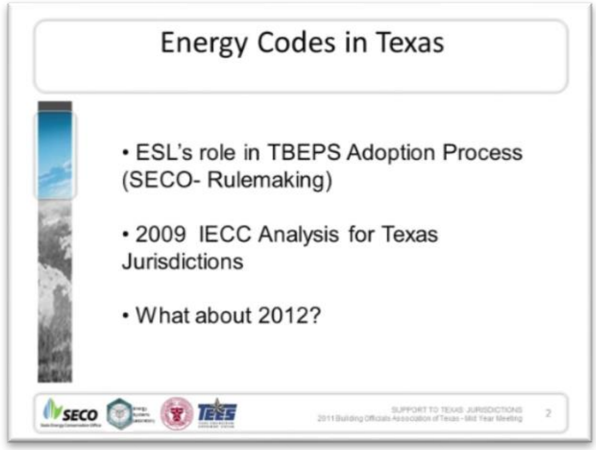
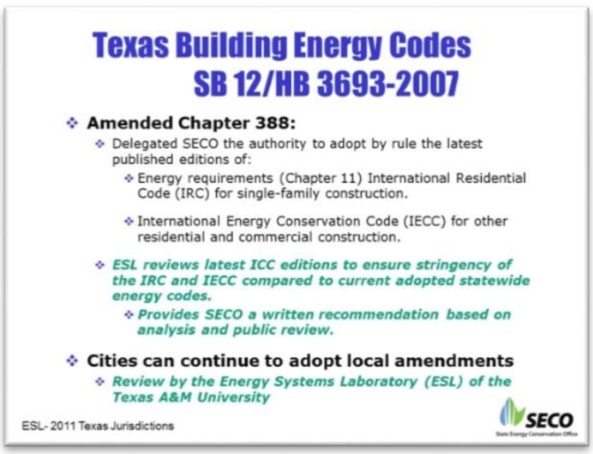
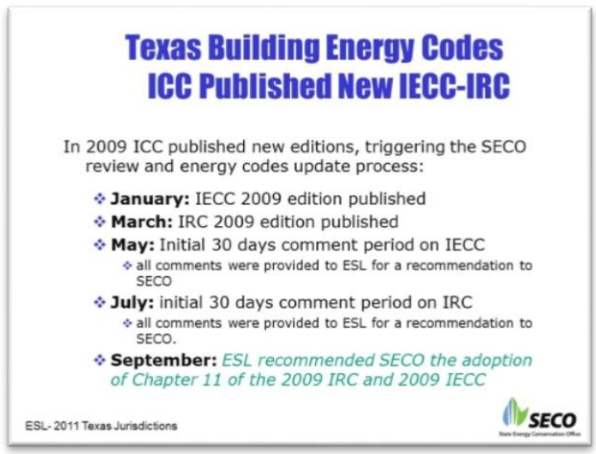


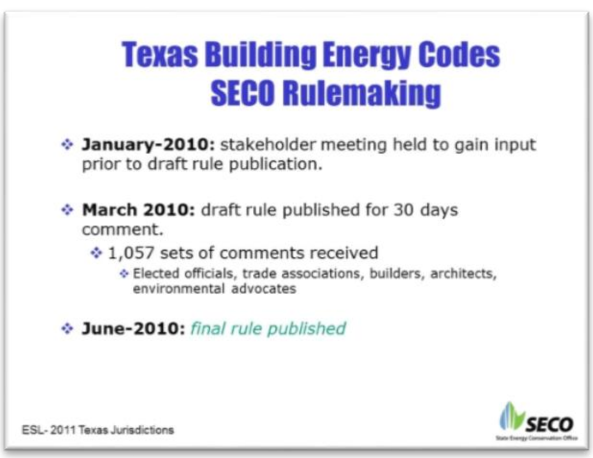
Figure 33: Presentation to the city of Arlington (Continued)

Presentation to the Sierra Club, El Paso









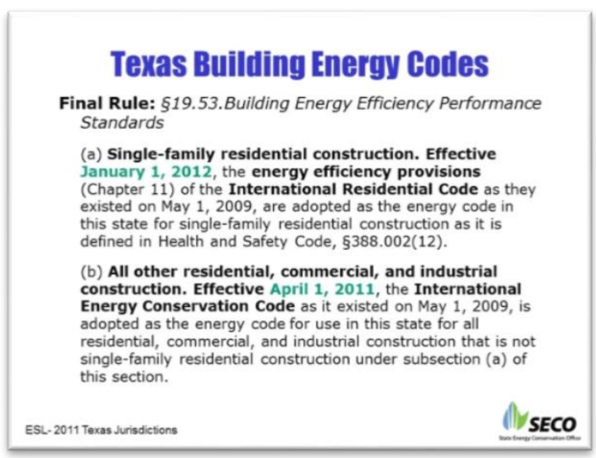
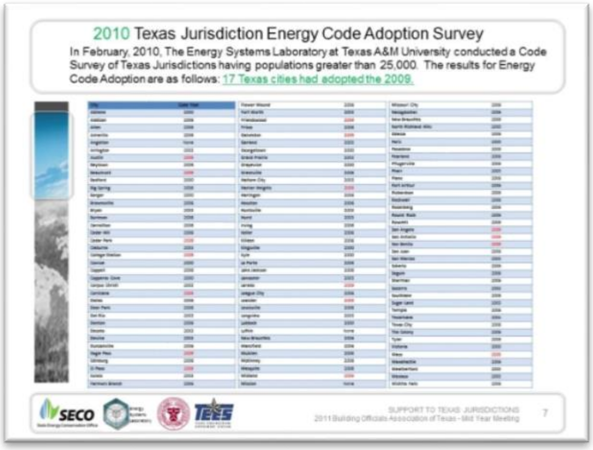
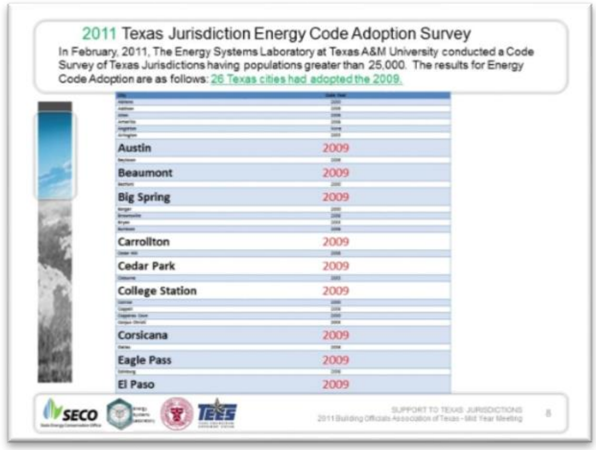
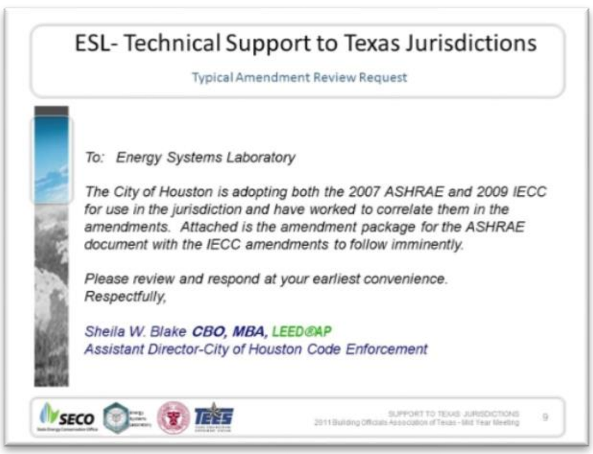
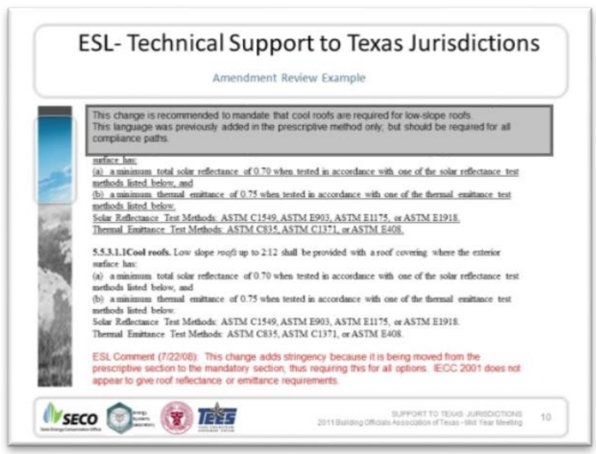


Figure 34: Presentation to the Sierra Club









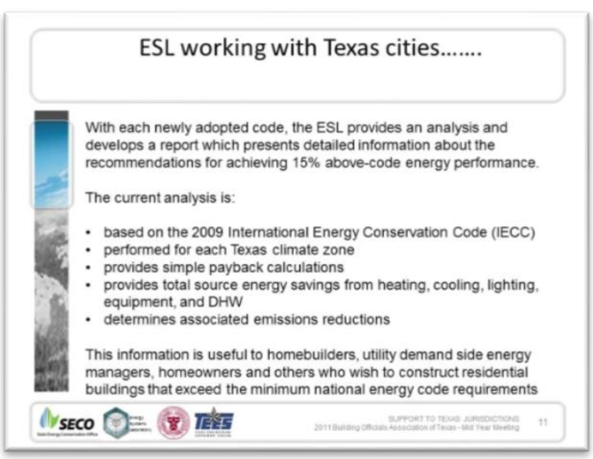
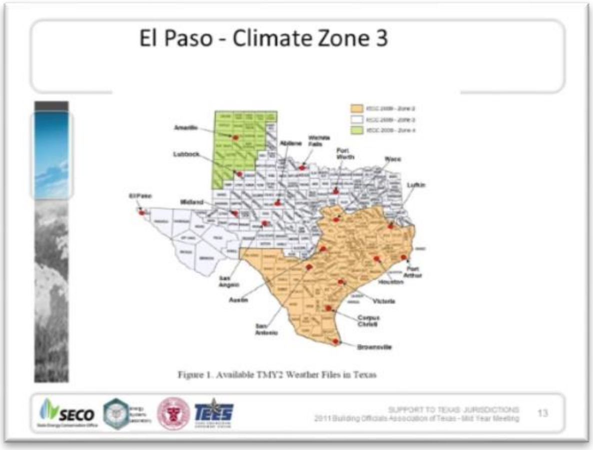
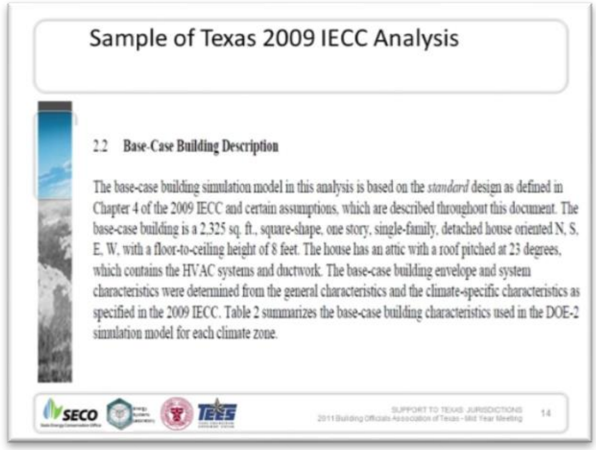


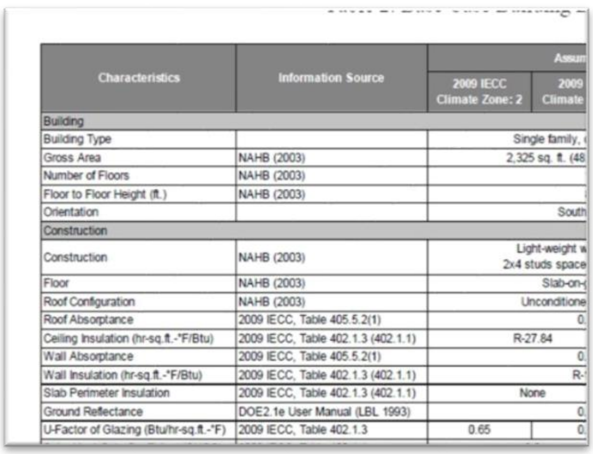

Table 1. 2009 IECC Climate Zone and TMY2 Weather Data of Seventeen Selected Counties

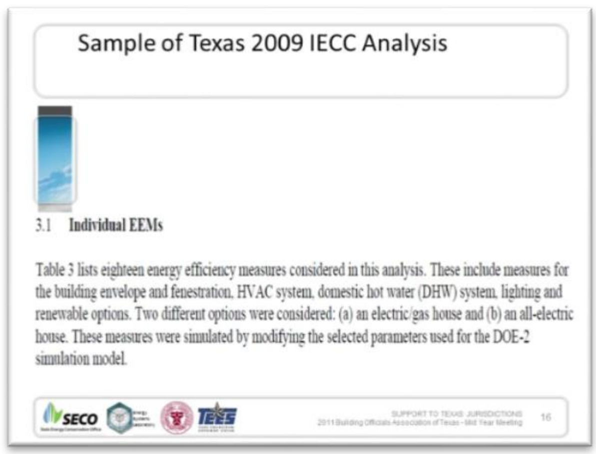
2009 IECC Climate Zone		TMY2 Weather Files	County Name
2	2A	Austin (ATT)	Travis
	2A	Brownsville (BRO)	Cameron
	2A	Corpus Christi (CRP)	Nueces
	2A	Houston (IAH)	Harris
	2A	Lufkin (LFK)	Angelina
	2A	Port Arthur (BPT)	Jefferson
	2A	San Antonio (SAT)	Bexar
	2A	Victoria (VCT)	Victoria
	2A	Waco (ACT)	McLennan
3	3A	Fort Worth (DFW)	Tarrant
	3A	Wichita Falls (SPS)	Wichita
	3B	Abilene (ABI)	Taylor
	3B	El Paso (ELP)	El Paso
	3B	Lubbock (LBB)	Lubbock
	3B	Midland (MAF)	Midland
	3B	San Angelo (SJT)	Tom Green
4	4B	Amarillo (AMA)	Potter

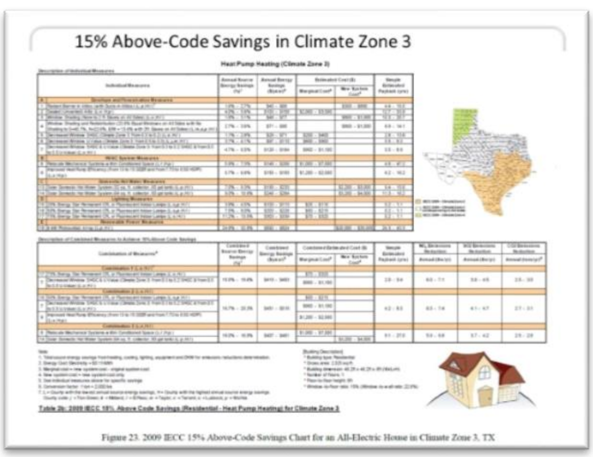
Figure 34: Presentation to the Sierra Club (Continued)











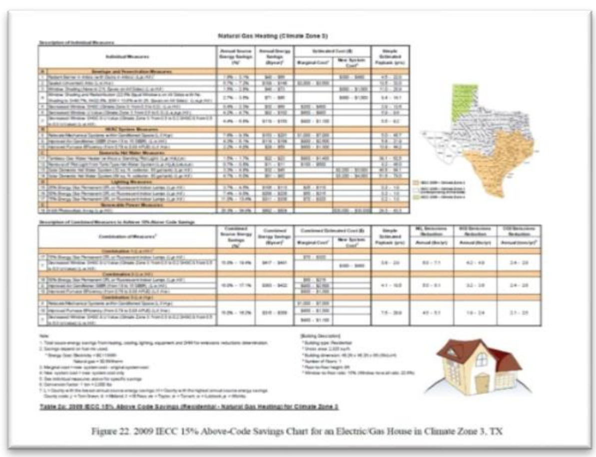
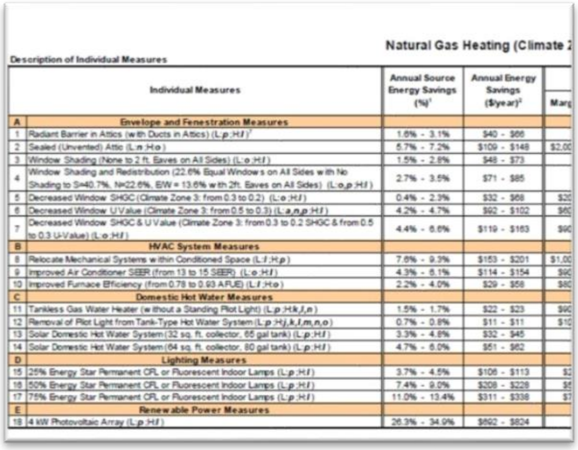


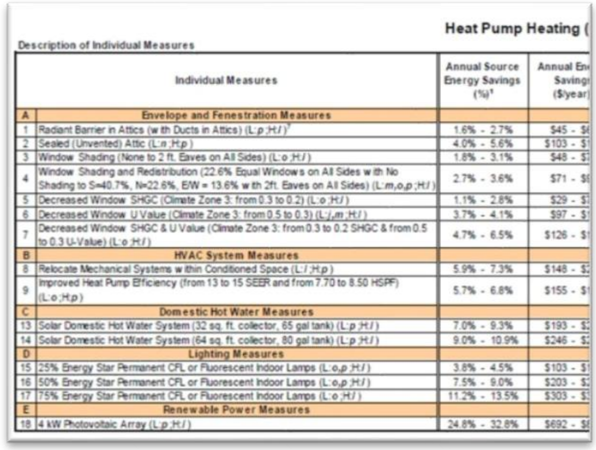
Figure 34: Presentation to the Sierra Club (Continued)



Natural Gas Heating (Climate Z

Description of Individual Measures

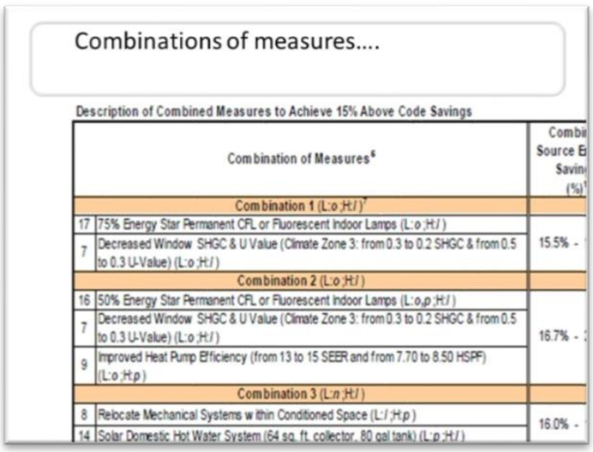
	Individual Measures	Annual Source Energy Savings (%)[1]	Annual Energy Savings ($/year)[2]	Marg
A	Envelope and Fenestration Measures			
1	Radiant Barrier in Attics (with Ducts in Attics) (L:p;H:l)[7]	1.6% - 3.1%	$40 - $66	
2	Sealed (Unvented) Attic (L:n;H:o)	5.7% - 7.2%	$109 - $148	$2,00
3	Window Shading (None to 2 ft. Eaves on All Sides) (L:o;H:l)	1.5% - 2.8%	$48 - $73	
4	Window Shading and Redistribution (22.6% Equal Windows on All Sides with No Shading to S=40.7%, N=22.6%, E/W = 13.6% with 2ft. Eaves on All Sides) (L:o,p;H:l)	2.7% - 3.5%	$71 - $85	
5	Decreased Window SHGC (Climate Zone 3: from 0.3 to 0.2) (L:o;H:l)	0.4% - 2.3%	$32 - $68	$2
6	Decreased Window U Value (Climate Zone 3: from 0.5 to 0.3) (L:a,n,p;H:l)	4.2% - 4.7%	$92 - $102	$6
7	Decreased Window SHGC & U Value (Climate Zone 3: from 0.3 to 0.2 SHGC & from 0.5 to 0.3 U-Value) (L:o;H:l)	4.4% - 6.6%	$119 - $163	$9
B	HVAC System Measures			
8	Relocate Mechanical Systems within Conditioned Space (L:l;H:p)	7.6% - 9.3%	$153 - $201	$1,00
9	Improved Air Conditioner SEER (from 13 to 15 SEER) (L:o;H:l)	4.3% - 6.1%	$114 - $154	$9
10	Improved Furnace Efficiency (from 0.78 to 0.93 AFUE) (L:l;H:o)	2.2% - 4.0%	$29 - $58	$8
C	Domestic Hot Water Measures			
11	Tankless Gas Water Heater (without a Standing Pilot Light) (L:p;H:k,l,n)	1.5% - 1.7%	$22 - $23	$9
12	Removal of Pilot Light from Tank-Type Hot Water System (L:p;H:j,k,l,m,n,o)	0.7% - 0.8%	$11 - $11	$1
13	Solar Domestic Hot Water System (32 sq. ft. collector, 65 gal tank) (L:p;H:l)	3.3% - 4.8%	$32 - $45	
14	Solar Domestic Hot Water System (64 sq. ft. collector, 80 gal tank) (L:p;H:l)	4.7% - 6.0%	$51 - $62	
D	Lighting Measures			
15	25% Energy Star Permanent CFL or Fluorescent Indoor Lamps (L:p;H:l)	3.7% - 4.5%	$106 - $113	$
16	50% Energy Star Permanent CFL or Fluorescent Indoor Lamps (L:p;H:l)	7.4% - 9.0%	$208 - $228	$
17	75% Energy Star Permanent CFL or Fluorescent Indoor Lamps (L:p;H:l)	11.0% - 13.4%	$311 - $338	$
E	Renewable Power Measures			
18	4 kW Photovoltaic Array (L:p;H:l)	26.3% - 34.9%	$692 - $824	



Heat Pump Heating (

Description of Individual Measures

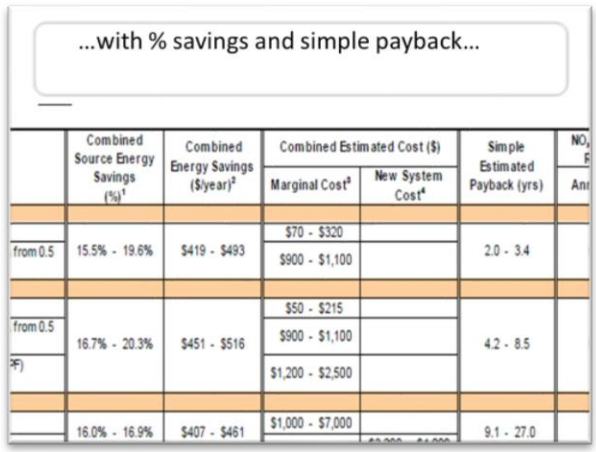
	Individual Measures	Annual Source Energy Savings (%)[1]	Annual En Saving ($/year)
A	Envelope and Fenestration Measures		
1	Radiant Barrier in Attics (with Ducts in Attics) (L:p;H:l)[7]	1.6% - 2.7%	$45 - $
2	Sealed (Unvented) Attic (L:n;H:p)	4.0% - 5.6%	$103 - $
3	Window Shading (None to 2 ft. Eaves on All Sides) (L:o;H:l)	1.8% - 3.1%	$48 - $
4	Window Shading and Redistribution (22.6% Equal Windows on All Sides with No Shading to S=40.7%, N=22.6%, E/W = 13.6% with 2ft. Eaves on All Sides) (L:m,o,p;H:l)	2.7% - 3.6%	$71 - $
5	Decreased Window SHGC (Climate Zone 3: from 0.3 to 0.2) (L:o;H:l)	1.1% - 2.8%	$29 - $
6	Decreased Window U Value (Climate Zone 3: from 0.5 to 0.3) (L:j,m;H:l)	3.7% - 4.1%	$97 - $
7	Decreased Window SHGC & U Value (Climate Zone 3: from 0.3 to 0.2 SHGC & from 0.5 to 0.3 U-Value) (L:o;H:l)	4.7% - 6.5%	$126 - $
B	HVAC System Measures		
8	Relocate Mechanical Systems within Conditioned Space (L:l;H:p)	5.9% - 7.3%	$148 - $
9	Improved Heat Pump Efficiency (from 13 to 15 SEER and from 7.70 to 8.50 HSPF) (L:o;H:p)	5.7% - 6.8%	$155 - $
C	Domestic Hot Water Measures		
13	Solar Domestic Hot Water System (32 sq. ft. collector, 65 gal tank) (L:p;H:l)	7.0% - 9.3%	$193 - $
14	Solar Domestic Hot Water System (64 sq. ft. collector, 80 gal tank) (L:p;H:l)	9.0% - 10.9%	$246 - $
D	Lighting Measures		
15	25% Energy Star Permanent CFL or Fluorescent Indoor Lamps (L:o,p;H:l)	3.8% - 4.5%	$103 - $
16	50% Energy Star Permanent CFL or Fluorescent Indoor Lamps (L:o,p;H:l)	7.5% - 9.0%	$203 - $
17	75% Energy Star Permanent CFL or Fluorescent Indoor Lamps (L:o;H:l)	11.2% - 13.5%	$303 - $
E	Renewable Power Measures		
18	4 kW Photovoltaic Array (L:p;H:l)	24.8% - 32.8%	$692 - $



Combinations of measures....

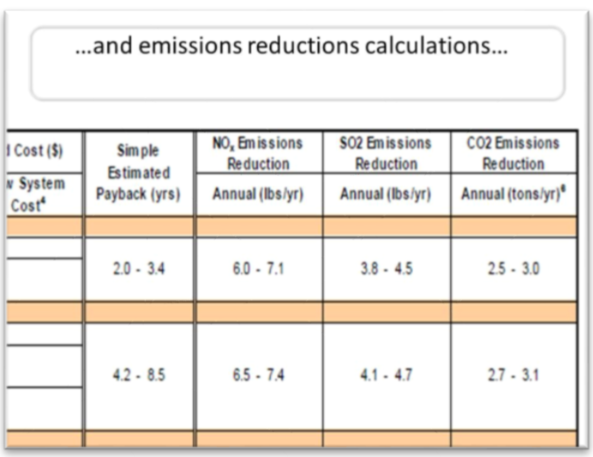
Description of Combined Measures to Achieve 15% Above Code Savings

	Combination of Measures[6]	Combi Source E Savin (%)[1]
	Combination 1 (L:o;H:l)[7]	
17	75% Energy Star Permanent CFL or Fluorescent Indoor Lamps (L:o;H:l)	15.5% -
7	Decreased Window SHGC & U Value (Climate Zone 3: from 0.3 to 0.2 SHGC & from 0.5 to 0.3 U-Value) (L:o;H:l)	
	Combination 2 (L:o;H:l)	
16	50% Energy Star Permanent CFL or Fluorescent Indoor Lamps (L:o,p;H:l)	16.7% -
7	Decreased Window SHGC & U Value (Climate Zone 3: from 0.3 to 0.2 SHGC & from 0.5 to 0.3 U-Value) (L:o;H:l)	
9	Improved Heat Pump Efficiency (from 13 to 15 SEER and from 7.70 to 8.50 HSPF) (L:o;H:p)	
	Combination 3 (L:n;H:l)	
8	Relocate Mechanical Systems within Conditioned Space (L:l;H:p)	16.0% -
14	Solar Domestic Hot Water System (64 sq. ft. collector, 80 gal tank) (L:p;H:l)	



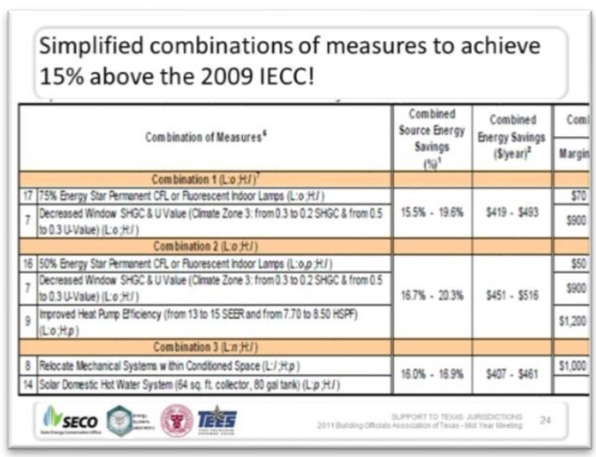
...with % savings and simple payback...

	Combined Source Energy Savings (%)[1]	Combined Energy Savings ($/year)[2]	Combined Estimated Cost ($) Marginal Cost[3]	New System Cost[4]	Simple Estimated Payback (yrs)	NO_x Ann
from 0.5	15.5% - 19.6%	$419 - $493	$70 - $320		2.0 - 3.4	
			$900 - $1,100			
from 0.5	16.7% - 20.3%	$451 - $516	$50 - $215		4.2 - 8.5	
			$900 - $1,100			
F)			$1,200 - $2,500			
	16.0% - 16.9%	$407 - $461	$1,000 - $7,000		9.1 - 27.0	



...and emissions reductions calculations...

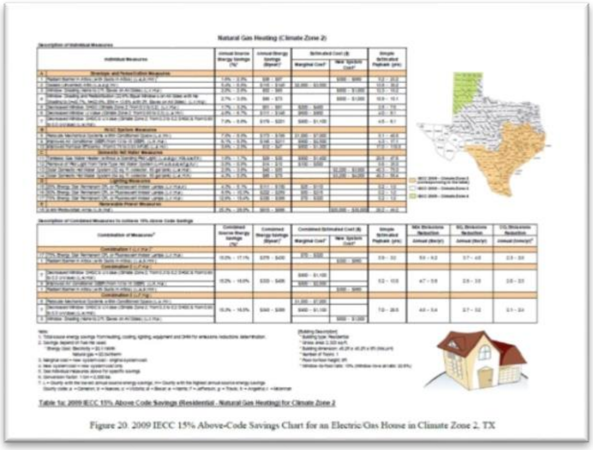
l Cost ($) w System Cost[4]	Simple Estimated Payback (yrs)	NO_x Emissions Reduction Annual (lbs/yr)	SO2 Emissions Reduction Annual (lbs/yr)	CO2 Emissions Reduction Annual (tons/yr)[8]
	2.0 - 3.4	6.0 - 7.1	3.8 - 4.5	2.5 - 3.0
	4.2 - 8.5	6.5 - 7.4	4.1 - 4.7	2.7 - 3.1

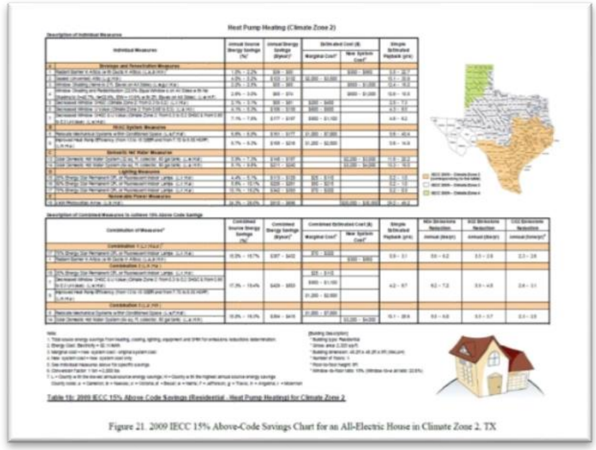


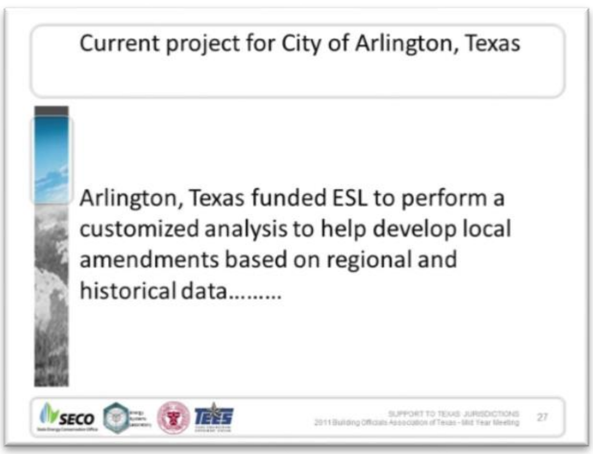
Simplified combinations of measures to achieve 15% above the 2009 IECC!

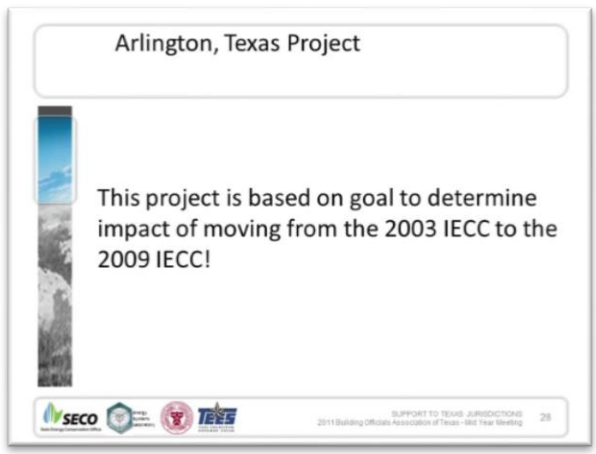
	Combination of Measures[6]	Combined Source Energy Savings (%)[1]	Combined Energy Savings ($/year)[2]	Comb Margin
	Combination 1 (L:o;H:l)[7]			
17	75% Energy Star Permanent CFL or Fluorescent Indoor Lamps (L:o;H:l)	15.5% - 19.6%	$419 - $493	$70
7	Decreased Window SHGC & U Value (Climate Zone 3: from 0.3 to 0.2 SHGC & from 0.5 to 0.3 U-Value) (L:o;H:l)			$900
	Combination 2 (L:o;H:l)			
16	50% Energy Star Permanent CFL or Fluorescent Indoor Lamps (L:o,p;H:l)	16.7% - 20.3%	$451 - $516	$50
7	Decreased Window SHGC & U Value (Climate Zone 3: from 0.3 to 0.2 SHGC & from 0.5 to 0.3 U-Value) (L:o;H:l)			$900
9	Improved Heat Pump Efficiency (from 13 to 15 SEER and from 7.70 to 8.50 HSPF) (L:o;H:p)			$1,200
	Combination 3 (L:n;H:l)			
8	Relocate Mechanical Systems within Conditioned Space (L:l;H:p)	16.0% - 16.9%	$407 - $461	$1,000
14	Solar Domestic Hot Water System (64 sq. ft. collector, 80 gal tank) (L:p;H:l)			

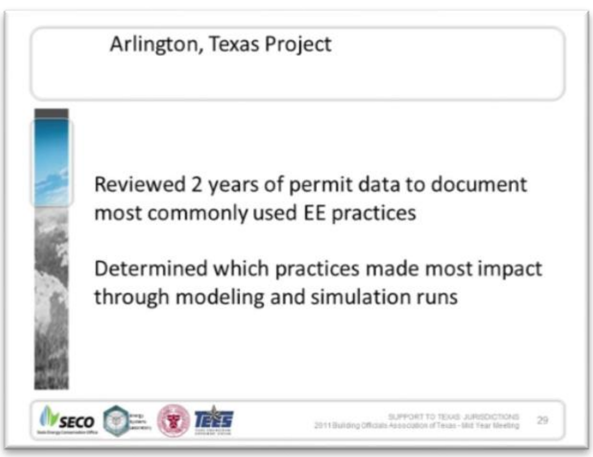
Figure 34: Presentation to the Sierra Club (Continued)











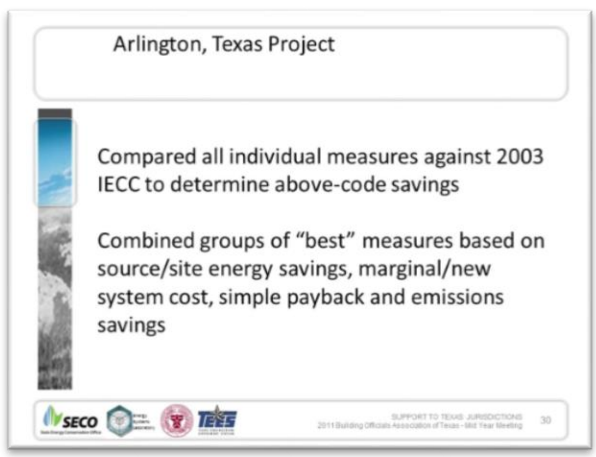
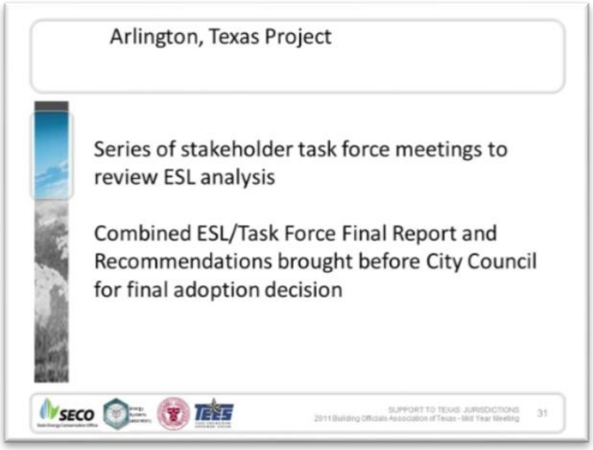
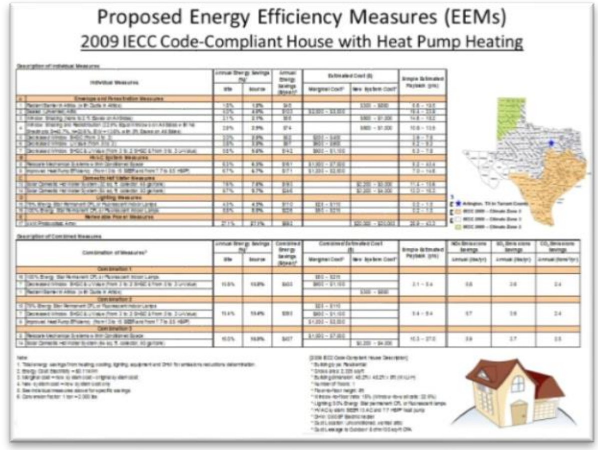
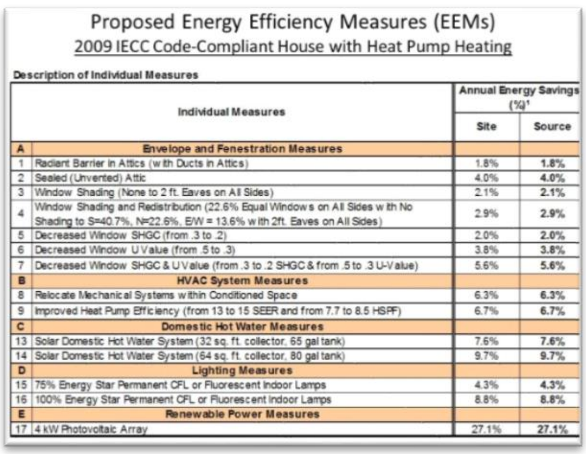


Figure 34: Presentation to the Sierra Club (Continued)



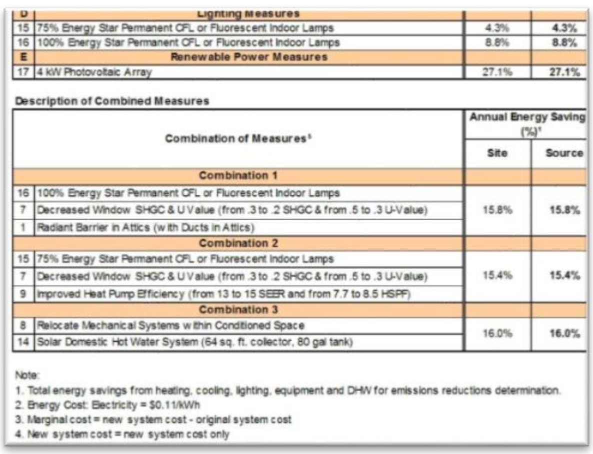



Proposed Energy Efficiency Measures (EEMs)

2009 IECC Code-Compliant House with Heat Pump Heating

Description of Individual Measures

	Individual Measures	Annual Energy Savings (%)[1] Site	Source
A	**Envelope and Fenestration Measures**		
1	Radiant Barrier in Attics (with Ducts in Attics)	1.8%	1.8%
2	Sealed (Unvented) Attic	4.0%	4.0%
3	Window Shading (None to 2 ft. Eaves on All Sides)	2.1%	2.1%
4	Window Shading and Redistribution (22.6% Equal Windows on All Sides with No Shading to S=40.7%, N=22.6%, E/W = 13.6% with 2ft. Eaves on All Sides)	2.9%	2.9%
5	Decreased Window SHGC (from .3 to .2)	2.0%	2.0%
6	Decreased Window U Value (from .5 to .3)	3.8%	3.8%
7	Decreased Window SHGC & U Value (from .3 to .2 SHGC & from .5 to .3 U-Value)	5.6%	5.6%
B	**HVAC System Measures**		
8	Relocate Mechanical Systems within Conditioned Space	6.3%	6.3%
9	Improved Heat Pump Efficiency (from 13 to 15 SEER and from 7.7 to 8.5 HSPF)	6.7%	6.7%
C	**Domestic Hot Water Measures**		
13	Solar Domestic Hot Water System (32 sq. ft. collector, 65 gal tank)	7.6%	7.6%
14	Solar Domestic Hot Water System (64 sq. ft. collector, 80 gal tank)	9.7%	9.7%
D	**Lighting Measures**		
15	75% Energy Star Permanent CFL or Fluorescent Indoor Lamps	4.3%	4.3%
16	100% Energy Star Permanent CFL or Fluorescent Indoor Lamps	8.8%	8.8%
E	**Renewable Power Measures**		
17	4 kW Photovoltaic Array	27.1%	27.1%


D	**Lighting Measures**		
15	75% Energy Star Permanent CFL or Fluorescent Indoor Lamps	4.3%	4.3%
16	100% Energy Star Permanent CFL or Fluorescent Indoor Lamps	8.8%	8.8%
E	**Renewable Power Measures**		
17	4 kW Photovoltaic Array	27.1%	27.1%

Description of Combined Measures

	Combination of Measures[3]	Annual Energy Saving (%)[1] Site	Source
	Combination 1		
16	100% Energy Star Permanent CFL or Fluorescent Indoor Lamps	15.8%	15.8%
7	Decreased Window SHGC & U Value (from .3 to .2 SHGC & from .5 to .3 U-Value)		
1	Radiant Barrier in Attics (with Ducts in Attics)		
	Combination 2		
15	75% Energy Star Permanent CFL or Fluorescent Indoor Lamps	15.4%	15.4%
7	Decreased Window SHGC & U Value (from .3 to .2 SHGC & from .5 to .3 U-Value)		
9	Improved Heat Pump Efficiency (from 13 to 15 SEER and from 7.7 to 8.5 HSPF)		
	Combination 3		
8	Relocate Mechanical Systems within Conditioned Space	16.0%	16.0%
14	Solar Domestic Hot Water System (64 sq. ft. collector, 80 gal tank)		

Note:
1. Total energy savings from heating, cooling, lighting, equipment and DHW for emissions reductions determination.
2. Energy Cost: Electricity = $0.11/kWh
3. Marginal cost = new system cost - original system cost
4. New system cost = new system cost only

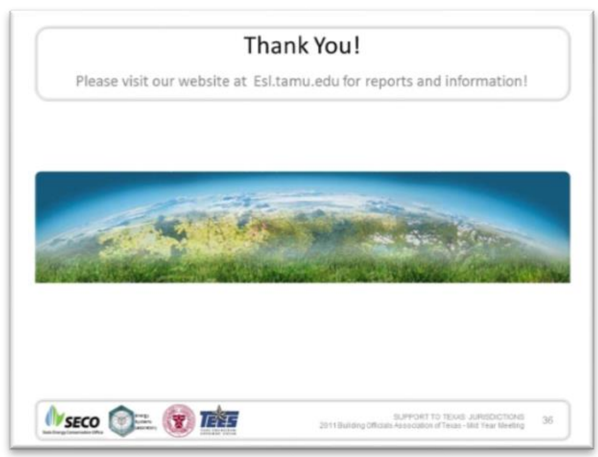


Figure 34: Presentation to the Sierra Club (Continued)

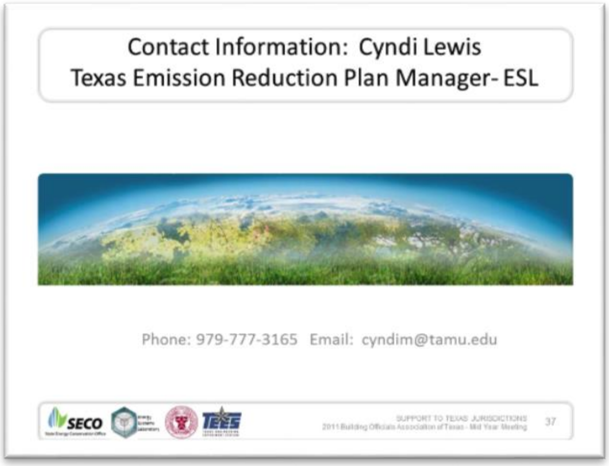


Figure 34: Presentation to the Sierra Club (Continued)

3.5.1 Presented four papers at the 2011 ICEBO Conference in New York City, October 2011

Four papers were prepared and presented at the 2011 ICEBO conference in New York City, October 2011. Copies of these papers have been posted on the Laboratory's TERP web page. Titles and abstracts for each of the papers are as follows.

- Kim, H.; Baltazar, J.C., Haberl, J. 2011."Statewide Electricity and Demand Capacity Savings from the Implementation of IECC Code in Texas: Analysis for Single-Family Residences." *Proceedings of the Eleventh International Conference for Enhanced Building Operations,* New York City, October 18-20, 2011.

This paper presents estimates of the statewide electricity and electric demand savings achieved from the adoption of the International Energy Conservation Code (IECC) for single-family residences in Texas and includes the corresponding increase in construction costs over the eight-year period from 2002 through 2009. Using the Energy Systems Laboratory's International Code Compliance Calculator (IC3) simulation tool, the annual statewide electricity savings in 2009 are estimated to be $161 million. The statewide peak electric demand reductions in 2009 are estimated to be 694 MW for the summer and 766 MW for the winter periods. Since 2002, the cumulative statewide electricity and electric demand savings over the eight year period from 2002 to 2009 are $1,803 million ($776 million from electricity savings and $1,027 million from electric demand savings) while the total increased costs are estimated to be $670 million.

- Mukhopadhyay, J.; Baltazar, J.C., Jim, H.; Haberl, J. 2011 "Comparison of ASHRAE Standard 90.1, 189.1 and IECC Codes for Large Office Buildings in Texas", *Proceedings of the Eleventh International Conference for Enhanced Building Operations,* New York City, October 18-20, 2011.

Six energy codes were compared in terms of annual site and source energy consumption. This comparison includes ASHRAE Standard 90.1-1989, ASHRAE Standard 90.1-1999, ASHRAE Standard 90.1-2007, ASHRAE Standard 90.1-2010, IECC 2009 and ASHRAE 189.1-2009. The analysis was performed for three Texas counties: Harris (climate zone 2A), Tarrant (climate zone 3A) and Potter (climate zone 4B). Both annual site and source energy consumption were compared. ASHRAE Standard 90.1-1989 was considered as the base case. ASHRAE Standard 90.1-1989 was considered as the base-case. When considering site energy consumption, ASHRAE Standard 90.1-1999 provides an improvement of 16.7%-18.6%. ASHRAE Standard 90.1-2004 provides an improvement of 22.3%-32.6%, ASHRAE Standard 90.1-2007 provides an improvement of 28.1%-33.9%, IECC 2009 provides an improvement of 27.4%-35.3%, ASHRAE Standard 90.1-2010 provides an improvement of 42.1%-47.7%, and ASHRAE 189.1- 2009 provides an improvement of 46.9%-54.9% above the ASHRAE Standard 90.1-1989 base-case. When considering source energy consumption, ASHRAE Standard 90.1-1999 provides an improvement of 14.5%-15.0%, ASHRAE Standard 90.1-2004 provides an improvement of 21.6%- 27.2%, ASHRAE Standard 90.1-2007 provides an improvement of 23.5%-28.4%, and IECC 2009 provides an improvement of 23.4%-30.5%. ASHRAE Standard 90.1-2010 provides an improvement of 41.8%-45.7% and ASHRAE 189.1-2009 provides an improvement of 44.5%-51.8% above the ASHRAE Standard 90.1-1989 base-case.

- Kim, H. 2011 "Energy Savings and Persistence from an Energy Service Performance Contract at an Army Base," *Proceedings of the Eleventh International Conference for Enhanced Building Operations,* New York City, October 18-20, 2011.

This paper examined persistence of energy savings from the application of the Monitoring and Verification (M&V) for the Fort Hood Energy Services Performance Contract (ESPC). The first and second ESPC Delivery Orders (DO) were implemented for 58 buildings in 2004-2005 and for 47 building in 2006-2008, respectively. To evaluate the long-term energy savings from the first and second ESPCs, ten sites where the hourly data in 2008-2010 were available were selected, and weather-dependent and weather-independent linear and change-point linear models were calculated with the ASHRAE's Inverse Modeling Toolkit (IMT). The results show there was a considerable difference in persistence of energy savings site-by-site: varying from -352% to 677% of the audit-estimated electricity savings for the six DO#1 and four DO#2 buildings. For all ten buildings, the long-term savings were 692,987 kWh, which corresponds to 40% of the audit-estimated electricity savings.

- Kim, H.; Baltazar, J.C.; Haberl, J.; Lewis, C.; Yazdani, B. 2011. "Cost-Effective Energy Efficiency Measures for 15% Above 2009 IECC Code-Compliant House for Residential Buildings in TX." *Proceedings of the Eleventh International Conference for Enhanced Building Operations,* New York City, October 18-20, 2011.

This paper presents detailed information about the recommendations for achieving 15% above 2009 International Energy Conservative Code (IECC) code-compliant house energy performance for single-family residences across the state of Texas.

4 Calculated NOx Reduction Potential from Implementation of the 2000 IECC/IRC and ASHRAE Standard 90.1-1999

4.1 6.1 Calculated 2011 Electricity and Natural Gas Savings Due to the Implementation of the 2001 IECC to New Residential Construction (Single-family and Multi-family) and the ASHRAE Standard 90.1-1999 to New Commercial Construction Using Code-Traceable, Fuel-Neutral Simulation

A complete reporting of the savings from the implementation of the 2000 IECC including the 2001 IECC Supplement[15] and the ASHRAE Standard 90.1-1999 requires tracking and analyzing savings for new construction buildings. The adoption of the 2001 IECC and the ASHRAE Standard 90.1-1999 in Texas is expected to impact the following types of buildings:

- single-family residential
- multi-family residential
- commercial
- industrial

The following sections report the calculated energy savings associated with new construction activities for both residential (i.e., single-family and multi-family) and commercial construction.

4.1.1 IC3 Enhancements

Most of the enhancements that are being added to IC3 in the recent years are summarized next:

In Version 3.11 (December 2011)

- Added support for IECC 2009 Austin Amendments

In Version 3.10 (September 2011)

- Three IECC 2009 compliant reports (i.e. energy, inspection list, and certificate)
- Paging enhancements on "My Page" to help organize large quantities of projects.
- Multi-family usability increased with Plan/Unit information being displayed on pages.
- Elimination of flash animation (so we will become iPad compatible).
- Updated/expanded help text.
- Updated illustrations.
- Tweaked min/max values on duct insulation, water heaters.

In Version 3.9.x (October 2010)

- Added slab insulation
- Updated the manual

[15] In the remainder of this paper, this is denoted as the 2001 IECC.

In Version 3.8.x (September 2010)

- Fixed default of Multi-family Units to be "Ducts in Conditioned Space" to YES
- Fixed wrong IECC code version on certificate
- Enhanced input screens by moving several fields from Units to Floor
- Plans

In Version 3.7.x (June 2010)

- Simple multi-family code compliance
- Updated model
    a. Floor Insulation R-Value
    b. Four foundation types
- Updated illustrations
- Updated manual

In Version 3.6.2 (April 2010)

- Fixed defect in 2nd Floor, Back Window issue
- Reference A\C tonnage matches the proposed A\C tonnage.
- Updated model
- Updated illustrations

In Version 3.6.1 (December 2009)

- Foundations
- Opt out of emails
- Copy a project
- Moved orientation from Floors tab to Project Information

In Version 3.5.2 (November 2009)

- Three code choices: IECC 2009, IECC 2006 (with Houston Amendments) and IECC 2000/2001.
- Duct insulation values
- Improved input of overhang values to allow for just inches

4.1.2 Changes in single family input file

There has been one major version change according to the changes in the single family input file since the 2010 annual simulations. Table 6 presents the summarized description of the changes in single family input file since the 2010 annual simulation.

Table 6: Changes in single family input file

BDL Version	Description
4.01.07	BDL used for the 2010 annual report.
4.01.08	Modified cooling and heating Energy-Input-Ratio (EIR) calculation methodology. Corrected door insulation to meet the requirements of 2006 IECC and 2009 IECC.

Version 4.01.08

Modified cooling and heating Energy-Input-Ratio (EIR) calculation methodology

The first change in the input file was to modify cooling and heating Energy-Input-Ratio calculation methodology from SEER and HSPF. The energy efficiency of residential air conditioning systems is rated by the SEER (or HSPF for heat pumps in a heating season) which already includes fan power. Thus if COOLING-EIR or HEATING-EIR for DOE-2.1e inputs are calculated using the nominal SEER or HSPF of the systems, then SUPPLY-KW should be set to zero. Otherwise, if the fan is modeled separately, the fan power should be excluded in the input energy use for EIR calculations.

Since the fan runs continuously during occupied hours in IC3, to model fan power separately is recommended rather than including fan energy in EIRs. Therefore, to determine EIRs for DOE-2 input, the ARI default value of 0.365 W/cfm can be assumed for fan power and subtracted from the input energy for each system (Fairey et al. 2004[16]). Based on 0.365 W/cfm, the following changes were made:

[Version 4.01.07]

```
##SET1 P-SEER sy04
##SET1 P-HSPF sy06

##SET1 P-EIR #[P-COOL-EIR-F[] * #[3.41 / P-SEER[]]]
##SET1 P-HIR #[P-HEAT-EIR-F[] * #[3.41 / P-HSPF[]]]
```

[Version 4.01.08]

```
##SET1 P-SEER sy04
##SET1 P-HSPF sy06

##SET1 P-SEER-NOFAN #[1 / #[#[1 / P-SEER[]] - 0.01095]]
                    $ 0.01095 Wh/Btu = 0.365 W/cfm * 360 cfm/ton * 1 ton/12,000 Btu/h
                    $ Fan power = 0.365 W/cfm (Fairey et al. 2004)

##SET1 P-HSPF-NOFAN #[1 / #[#[1 / P-HSPF[]] - 0.01095]]
                    $ 0.01095 Wh/Btu = 0.365 W/cfm * 360 cfm/ton * 1 ton/12,000 Btu/h
                    $ Fan power = 0.365 W/cfm (Fairey et al. 2004)

##SET1 P-EIR #[P-COOL-EIR-F[] * #[3.41 / P-SEER-NOFAN[]]]
##SET1 P-HIR #[P-HEAT-EIR-F[] * #[3.41 / P-HSPF-NOFAN[]]]
```

Corrected door insulation to meet the requirements of 2006 IECC and 2009 IECC

The change in the input file was to modify glitch in code for door insulation to meet the requirements of 2006 IECC and 2009 IECC performance path analysis. The change in the input file includes assigning door insulation to be same as window U-value for a 2006 IECC or 2009 IECC code-compliant house and to be same as user input U-value for a proposed house.

[Version 4.01.07]

```
DOORCON-1 = CONSTRUCTION                 $ MODIFIED BY JAYA M. 06/18/2007
    ##IF #[AMENDMENT[] EQS IC3]          $ TO INCORPORATE REQUIREMENTS FOR DOOR
      U = 0.2                            $ IN IECC2006 / TCV Table 404.5.2 of IECC 2006
    ##ELSEIF #[AMENDMENT[] EQS TCV]
      U = P-WINDOWU[]
    ##ENDIF
```

[Version 4.01.06]

```
DOORCON-1 = CONSTRUCTION                 $ MODIFIED BY JAYA M. 06/18/2007
    ##IF #[P-INPUTMETHOD[] EQS S01]      $ MODIFIED BY H.KIM 03/10/2011
      U = 0.2
    ##ELSEIF #[#[P-INPUTMETHOD[] EQS S06] OR #[P-INPUTMETHOD[] EQS S09]]
      U = P-WINDOWU[]
```

[16] Fairey, P., D.S. Parker, B. Wilcox and M. Lombardi. 2004. Climate Impacts on Heating Seasonal Performance Factor (HSPF) and Seasonal Energy Efficiency Ratio (SEER) for Air Source Heat Pumps. *ASHRAE Transactions* 110(2):178-188.

```
##ELSEIF #[P-INPUTMETHOD[] EQS U]
   U = P-DOORU[]
##ENDIF
```

4.1.3 2011 Results for New Single-family Residential Construction

This section provides the potential electricity, natural gas reductions and the associated emissions reductions from the implementation of the 2001 IECC for new single-family residences in the 41 non-attainment and affected counties as well as other counties in the ERCOT region[17]. To calculate the NOx emissions reductions from the implementation of the 2001 IECC, the following procedures were adopted. First, new construction activity was determined by county, and energy savings attributable to the 2001 IECC were calculated using the Laboratory's code-traceable, DOE-2.1e simulation, which was developed for the Texas Emission Reduction Project (TERP). These estimates were then applied to the NAHB Builder's survey data to determine the appropriate number of housing types. Then, the NOx reduction potential from the electricity and natural gas reductions in each county was calculated using the US EPA's 2007 eGRID database[18].

In Table 7, the 1999 and the 2001 IECC code-compliant building characteristics are shown for each county. The 1999 building characteristics reflect those published by the National Association of Home Builders (NAHB), Air-Conditioning, Heating, and Refrigeration Institute (AHRI) and Gas Appliance Manufacturers Association (GAMA) for Texas. The 2001 IECC code-compliant characteristics are the minimum building code characteristics required by for each county for single-family residences (i.e., Type A.1). In Table 7, the rows are sorted first by the US EPA's non-attainment, affected designation, and then other ERCOT counties alphabetically. In fourth column, the NAHB Builder's survey classification is listed. The fifth column: the window area for the average house as defined by the NAHB Builder's survey[19]. The sixth, seventh, eighth, and ninth columns show the NAHB Builder's survey average glazing U-value, Solar Heat Gain Coefficient (SHGC), roof insulation and wall insulation, respectively. In columns tenth through fourteenth, the corresponding values from the 2001 IECC code-compliant house are listed for each county (i.e., percent of the window area, glazing U-value, SHGC, roof and wall insulation R-value). For each county, the identical window percent area (i.e., window-to-wall area) was used for the 1999 and code-compliant calculation.

The 2001 IECC SHGC is 0.4 for all non-attainment and affected counties since they all fall below the 3,500 HDD_{65}, as required by the 2001 IECC. All the 1999 houses were assumed to have air-conditioner efficiency[20] equal to a SEER 11, furnace efficiency (AFUE) of 0.80, and a domestic water heater efficiency of 76%. All the 2001 IECC code-compliant houses were assumed to have air-conditioner efficiency equal to a SEER 13[21]. The values shown in Table 7 represent the only changes that were made to the simulation to obtain the savings calculations. All other variables in the simulation remained the same for the 1999 and the 2001 IECC code-compliant simulation. In cases where the 1999 values were more efficient than the 2001 IECC code-compliant simulation, the 1999 values were used in both simulations, since this indicates that the prevailing practice is already above code. For example, in Brazoria County, according to the NAHB Builder's survey data, the roof insulation is R-27.08, which is already above the code-required insulation of R-19. Therefore, R-27.08 was used in both simulations.

The code-traceable simulation results are shown for each county. In a similar fashion as Table 7, Table 8 is first divided into the US EPA's non-attainment and then affected classifications, followed by an alphabetical listing of other ERCOT counties. In the third column of Table 8, the 2001 IECC climate zone is listed followed by the number of projected new housing units[22] in the fourth column. In the fifth column, the total simulated energy use is listed if all new construction had been built to pre-code specifications, and, in the sixth column, the total county-wide energy use for code-compliant construction is shown. The values in the fifth and sixth columns come from the associated tables in the 2011 Volume III Appendix, which remain the same as the 2010 listing, 24 simulations were run for

[17] The three new counties, Henderson, Hood and Hunt were added in the 2003 Legislative session are included in this.
[18] This preliminary analysis does not include actual power transfers on the grid, and assumes transmission and distribution losses of 7%. Counties were assigned to utility service districts as indicated.
[19] This value represents the NAHB's reported number of window units times an average window size of 3 x 5 feet, which was determined by surveying local building suppliers. Additional information about the procedures used to determine these values can be found in the MS Thesis by Im (2003).
[20] The choice of SEER 11 efficiency for the air conditioner was based on ARI sales numbers for Texas which show an average SEER 11 for houses built in 1999.
[21] Based on the regulation effective.
[22] The number of projected new housing units uses the published values for the new housing units in 2011. A vacancy rate of 0% was assumed for 2011 calculations, based on information suggested by the Real Estate Center at Texas A&M University.

each county, which were then distributed according to the NAHB Builder's survey data to account for 1 story, 2 story, slab-on-grade, crawlspace, and three different system types. In the seventh and eighth columns, the total pre-code and code-compliant peak Ozone Season Day (OSD) energy use is reported for the OSD across all counties[23]. In a similar fashion as the annual pre-code and code-compliant energy use, these values are from the associated tables for each county in the Volume III Appendix to this report for the 2011 peak OSD results. In the ninth and tenth columns, the total annual electricity and peak OSD savings are shown for each county, respectively. A 7% transmission and distribution loss is used in the 2011 report, which represents a fixed 1.07 multiplier for the electricity use. In the eleventh and twelfth columns, the total annual pre-code and code-compliant natural gas use is shown for those residences that had natural gas-fired furnaces and domestic water heaters. Similarly, in columns thirteen and fourteen, the simulated total peak OSD natural gas use is shown for each county. Finally, in columns fifteen and sixteen, the total annual and peak OSD natural gas savings are shown for each county.

In Table 9, the PCA assignments for each county are shown. In Table 10[24], the annual electricity savings are assigned to PCA provider(s) according to Table 9. The total electricity savings for each PCA, as shown in then entered into the bottom row of Table 11, which is the 2007 US EPA's eGRID database for Texas. The eGRID then proportions each MWh of electricity savings according to the 1999 measured data from the power plants assigned to that PCA. For each county in which there is a power plant the lbs-NOx/MWh are calculated and displayed as NOx reductions (lbs) in the column adjacent to the PCA column. Adding across the rows then totals the NOx reductions in each county from multiple PCAs that have power plants in that county. Counties that do not show NOx reductions represent counties that do not have power plants in eGRID's database. In Table 12[25], the OSD electricity savings are assigned to PCA provider(s) according to Table 9. In Table 13, the PCA assignments for the peak OSD electricity reductions are shown for each county as well as the peak OSD NOx reductions that are calculated from the 2007 eGRID.

[23] In the 2005 report, the peak OSD was used to report peak savings. This is different than the peak day for 2004, which was August 19, 1999. This change was made at the request of the TCEQ. In the 2002 and 2003 reports, these dates represent the TMY2 non-coincident dates that were chosen by the DOE-2 simulation program as the peak date for the houses simulated in a specific county. Hence, the 2002 and 2003 dates did not correspond to the same calendar date.

[24] Of a total of 202 counties listed in Table 2, the annual electricity savings in 31 counties (i.e., 11,995 MWh), including 8 non-attainment and affected non-ERCOT counties (i.e, 99.96% of total savings in 31 counties), are not reported in Table 4 since the corresponding PCA could not be assigned for these 31 counties.

[25] Of a total of 202 counties listed in Table 2, the OSD electricity savings in 31 counties (i.e., 59.96 MWh), including 8 non-attainment and affected non-ERCOT counties (i.e, 94.95% of total savings in 31 counties), are not reported in Table 6 since the corresponding PCA could not be assigned for these 31 counties.

Table 7: 1999 and the 2001 IECC Code-compliant Building Characteristics used in the DOE-2 Simulations for Single-family Residential Buildings

	County	Climate Zone	Division	1999 Average					2000 IECC				
			(East or West)	Area %	Glazing U-value (Btu/ hr-ft2-F)	SHGC	Roof Insulation (hr-ft2-F/Btu)	Wall Insulation (hr-ft2-F/Btu)	Area %	Glazing U-value (Btu/ hr-ft2-F)	SHGC	Roof Insulation (hr-ft2-F/Btu)	Wall Insulation (hr-ft2-F/Btu)
	BRAZORIA	3	East Texas	13.8	1.11	0.71	27.08	13.99	13.8	0.75	0.40	19.00	11.00
	CHAMBERS	4	East Texas	13.8	1.11	0.71	27.08	13.99	13.8	0.75	0.40	26.00	13.00
	COLLIN	6	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.46	0.40	38.00	16.00
	DALLAS	5	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.50	0.40	38.00	13.00
	DENTON	6	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.46	0.40	38.00	16.00
	EL PASO	6	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.46	0.40	38.00	16.00
	FORT BEND	4	East Texas	13.8	1.11	0.71	27.08	13.99	13.8	0.75	0.40	26.00	13.00
Non-attainment	GALVESTON	3	East Texas	13.8	1.11	0.71	27.08	13.99	13.8	0.75	0.40	19.00	11.00
	HARDIN	4	East Texas	13.8	1.11	0.71	27.08	13.99	13.8	0.75	0.40	26.00	13.00
	HARRIS	4	East Texas	13.8	1.11	0.71	27.08	13.99	13.8	0.75	0.40	26.00	13.00
	JEFFERSON	4	East Texas	13.8	1.11	0.71	27.08	13.99	13.8	0.75	0.40	26.00	13.00
	LIBERTY	4	East Texas	13.8	1.11	0.71	27.08	13.99	13.8	0.75	0.40	26.00	13.00
	MONTGOMERY	4	East Texas	13.8	1.11	0.71	27.08	13.99	13.8	0.75	0.40	26.00	13.00
	ORANGE	4	East Texas	13.8	1.11	0.71	27.08	13.99	13.8	0.75	0.40	26.00	13.00
	TARRANT	5	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.50	0.40	38.00	13.00
	WALLER	4	East Texas	13.8	1.11	0.71	27.08	13.99	13.8	0.75	0.40	26.00	13.00
	BASTROP	4	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.52	0.40	30.00	13.00
	BEXAR	4	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.52	0.40	30.00	13.00
	CALDWELL	4	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.52	0.40	30.00	13.00
	COMAL	4	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.52	0.40	30.00	13.00
	ELLIS	5	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.50	0.40	38.00	13.00
	GREGG	6	East Texas	13.8	1.11	0.71	27.08	13.99	13.8	0.60	0.40	30.00	13.00
	GUADALUPE	4	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.52	0.40	30.00	13.00
	HARRISON	6	East Texas	13.8	1.11	0.71	27.08	13.99	13.8	0.60	0.40	30.00	13.00
	HAYS	5	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.50	0.40	38.00	13.00
	HENDERSON	5	East Texas	13.8	1.11	0.71	27.08	13.99	13.8	0.65	0.40	30.00	13.00
	HOOD	5	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.50	0.40	38.00	13.00
	HUNT	6	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.46	0.40	38.00	16.00
Affected	JOHNSON	5	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.50	0.40	38.00	13.00
	KAUFMAN	6	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.46	0.40	38.00	16.00
	NUECES	3	East Texas	13.8	1.11	0.71	27.08	14.18	13.8	0.75	0.40	19.00	11.00
	PARKER	6	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.46	0.40	38.00	16.00
	ROCKWALL	6	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.46	0.40	38.00	16.00
	RUSK	5	East Texas	13.8	1.11	0.71	27.08	13.99	13.8	0.65	0.40	30.00	13.00
	SAN PATRICIO	3	East Texas	13.8	1.11	0.71	27.08	14.18	13.8	0.75	0.40	19.00	11.00
	SMITH	5	East Texas	13.8	1.11	0.71	27.08	13.99	13.8	0.65	0.40	30.00	13.00
	TRAVIS	5	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.50	0.40	38.00	13.00
	UPSHUR	6	East Texas	13.8	1.11	0.71	27.08	13.99	13.8	0.60	0.40	30.00	13.00
	VICTORIA	3	East Texas	13.8	1.11	0.71	27.08	14.18	13.8	0.75	0.40	19.00	11.00
	WILLIAMSON	5	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.50	0.40	38.00	13.00
	WILSON	4	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.52	0.40	30.00	13.00
	ANDERSON	5	East Texas	13.8	1.11	0.71	27.08	13.99	13.8	0.65	0.40	30.00	13.00
	ANDREWS	6	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.46	0.40	38.00	16.00
	ANGELINA	5	East Texas	13.8	1.11	0.71	27.08	13.99	13.8	0.65	0.40	30.00	13.00
	ARANSAS	3	East Texas	13.8	1.11	0.71	27.08	14.18	13.8	0.75	0.40	19.00	11.00
	ARCHER	7	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.45	0.40	38.00	19.00
	ATASCOSA	3	West Texas	13.8	1.11	0.71	27.08	13.99	13.8	0.60	0.40	30.00	13.00
	AUSTIN	4	East Texas	13.8	1.11	0.71	27.08	13.99	13.8	0.75	0.40	26.00	13.00
	BANDERA	5	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.50	0.40	38.00	13.00
	BAYLOR	7	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.45	0.40	38.00	19.00
	BEE	3	East Texas	13.8	1.11	0.71	27.08	14.18	13.8	0.75	0.40	19.00	11.00
	BELL	5	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.50	0.40	38.00	13.00
	BLANCO	5	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.50	0.40	38.00	13.00
	BORDEN	7	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.45	0.40	38.00	19.00
	BOSQUE	5	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.50	0.40	38.00	13.00
	BRAZOS	4	East Texas	13.8	1.11	0.71	27.08	13.99	13.8	0.75	0.40	26.00	13.00
	BREWSTER	5	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.50	0.40	38.00	13.00
	BRISCOE	8	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.41	0.40	38.00	19.00
	BROOKS	2	East Texas	13.8	1.11	0.71	27.08	13.99	13.8	0.90	0.40	19.00	11.00
	BROWN	5	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.50	0.40	38.00	13.00
	BURLESON	4	East Texas	13.8	1.11	0.71	27.08	13.99	13.8	0.75	0.40	26.00	13.00
	BURNET	5	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.50	0.40	38.00	13.00
	CALHOUN	3	East Texas	13.8	1.11	0.71	27.08	14.18	13.8	0.75	0.40	19.00	11.00
	CALLAHAN	6	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.46	0.40	38.00	16.00
	CAMERON	2	East Texas	13.8	1.11	0.71	27.08	13.99	13.8	0.90	0.40	19.00	11.00
	CHEROKEE	5	East Texas	13.8	1.11	0.71	27.08	13.99	13.8	0.65	0.40	30.00	13.00
	CHILDRESS	7	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.45	0.40	38.00	19.00
	CLAY	7	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.45	0.40	38.00	19.00
ERCOT	COKE	6	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.46	0.40	38.00	16.00
	COLEMAN	5	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.50	0.40	38.00	13.00
	COLORADO	4	East Texas	13.8	1.11	0.71	27.08	13.99	13.8	0.75	0.40	26.00	13.00
	COMANCHE	5	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.50	0.40	38.00	13.00
	CONCHO	5	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.50	0.40	38.00	13.00
	COOKE	6	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.46	0.40	38.00	16.00
	CORYELL	5	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.50	0.40	38.00	13.00
	COTTLE	7	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.45	0.40	38.00	19.00
	CRANE	5	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.50	0.40	38.00	13.00
	CROCKETT	5	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.50	0.40	38.00	13.00
	CROSBY	7	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.45	0.40	38.00	19.00
	CULBERSON	6	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.46	0.40	38.00	16.00
	DAWSON	7	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.45	0.40	38.00	19.00
	DE WITT	3	East Texas	13.8	1.11	0.71	27.08	14.18	13.8	0.75	0.40	19.00	11.00
	DELTA	6	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.46	0.40	38.00	16.00
	DICKENS	7	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.45	0.40	38.00	19.00
	DIMMIT	3	West Texas	13.8	1.11	0.71	27.08	13.99	13.8	0.60	0.40	30.00	13.00
	DUVAL	3	East Texas	13.8	1.11	0.71	27.08	14.18	13.8	0.75	0.40	19.00	11.00
	EASTLAND	6	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.46	0.40	38.00	16.00
	ECTOR	6	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.46	0.40	38.00	16.00
	EDWARDS	5	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.50	0.40	38.00	13.00
	ERATH	6	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.46	0.40	38.00	16.00
	FALLS	5	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.50	0.40	38.00	13.00
	FANNIN	6	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.46	0.40	38.00	16.00
	FAYETTE	4	East Texas	13.8	1.11	0.71	27.08	13.99	13.8	0.75	0.40	26.00	13.00
	FISHER	6	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.46	0.40	38.00	16.00
	FOARD	7	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.45	0.40	38.00	19.00
	FRANKLIN	6	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.46	0.40	38.00	16.00
	FREESTONE	5	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.50	0.40	38.00	13.00

Table 7: 1999 and the 2001 IECC Code-compliant Building Characteristics used in the DOE-2 Simulations for Single-family Residential Buildings (Continued)

	County	Climate Zone	Division	1999 Average					2000 IECC				
			(East or West)	Area %	Glazing U-value (Btu/ hr-ft2-F)	SHGC	Roof Insulation (hr-ft2-F/Btu)	Wall Insulation (hr-ft2-F/Btu)	Area %	Glazing U-value (Btu/ hr-ft2-F)	SHGC	Roof Insulation (hr-ft2-F/Btu)	Wall Insulation (hr-ft2-F/Btu)
	FRIO	3	West Texas	13.8	1.11	0.71	27.08	13.99	13.8	0.60	0.40	30.00	13.00
	GILLESPIE	5	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.50	0.40	38.00	13.00
	GLASSCOCK	6	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.46	0.40	38.00	16.00
	GOLIAD	3	East Texas	13.8	1.11	0.71	27.08	14.18	13.8	0.75	0.40	19.00	11.00
	GONZALES	4	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.52	0.40	30.00	13.00
	GRAYSON	6	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.46	0.40	38.00	16.00
	GRIMES	4	East Texas	13.8	1.11	0.71	27.08	13.99	13.8	0.75	0.40	26.00	13.00
	HALL	8	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.41	0.40	38.00	19.00
	HAMILTON	5	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.50	0.40	38.00	13.00
	HARDEMAN	7	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.45	0.40	38.00	19.00
	HASKELL	6	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.46	0.40	38.00	16.00
	HIDALGO	2	East Texas	13.8	1.11	0.71	27.08	13.99	13.8	0.90	0.40	19.00	11.00
	HILL	5	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.50	0.40	38.00	13.00
	HOPKINS	6	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.46	0.40	38.00	16.00
	HOUSTON	5	East Texas	13.8	1.11	0.71	27.08	13.99	13.8	0.65	0.40	30.00	13.00
	HOWARD	6	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.46	0.40	38.00	16.00
	HUDSPETH	6	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.46	0.40	38.00	16.00
	IRION	5	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.50	0.40	38.00	13.00
	JACK	6	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.46	0.40	38.00	16.00
	JACKSON	3	East Texas	13.8	1.11	0.71	27.08	14.18	13.8	0.75	0.40	19.00	11.00
	JEFF DAVIS	6	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.46	0.40	38.00	16.00
	JIM HOGG	2	West Texas	13.8	1.11	0.71	27.08	13.99	13.8	0.60	0.40	30.00	13.00
	JIM WELLS	3	East Texas	13.8	1.11	0.71	27.08	14.18	13.8	0.75	0.40	19.00	11.00
	JONES	6	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.46	0.40	38.00	16.00
	KARNES	3	West Texas	13.8	1.11	0.71	27.08	13.99	13.8	0.60	0.40	30.00	13.00
	KENDALL	5	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.50	0.40	38.00	13.00
	KENEDY	2	East Texas	13.8	1.11	0.71	27.08	13.99	13.8	0.90	0.40	19.00	11.00
	KENT	7	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.45	0.40	38.00	19.00
	KERR	5	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.50	0.40	38.00	13.00
	KIMBLE	5	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.50	0.40	38.00	13.00
	KING	7	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.45	0.40	38.00	19.00
	KINNEY	4	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.52	0.40	30.00	13.00
	KLEBERG	2	East Texas	13.8	1.11	0.71	27.08	13.99	13.8	0.90	0.40	19.00	11.00
	KNOX	7	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.45	0.40	38.00	19.00
	LA SALLE	3	West Texas	13.8	1.11	0.71	27.08	13.99	13.8	0.60	0.40	30.00	13.00
	LAMAR	6	East Texas	13.8	1.11	0.71	27.08	13.99	13.8	0.60	0.40	30.00	13.00
	LAMPASAS	5	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.50	0.40	38.00	13.00
	LAVACA	4	East Texas	13.8	1.11	0.71	27.08	13.99	13.8	0.75	0.40	26.00	13.00
	LEE	4	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.52	0.40	30.00	13.00
	LEON	5	East Texas	13.8	1.11	0.71	27.08	13.99	13.8	0.65	0.40	30.00	13.00
	LIMESTONE	5	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.50	0.40	38.00	13.00
	LIVE OAK	3	East Texas	13.8	1.11	0.71	27.08	14.18	13.8	0.75	0.40	19.00	11.00
	LLANO	5	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.50	0.40	38.00	13.00
	LOVING	6	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.46	0.40	38.00	16.00
	MADISON	4	East Texas	13.8	1.11	0.71	27.08	13.99	13.8	0.75	0.40	26.00	13.00
	MARTIN	6	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.46	0.40	38.00	16.00
	MASON	5	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.50	0.40	38.00	13.00
	MATAGORDA	3	East Texas	13.8	1.11	0.71	27.08	14.18	13.8	0.75	0.40	19.00	11.00
	MAVERICK	3	West Texas	13.8	1.11	0.71	27.08	13.99	13.8	0.60	0.40	30.00	13.00
	MCCULLOCH	5	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.50	0.40	38.00	13.00
	MCLENNAN	5	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.50	0.40	38.00	13.00
	MCMULLEN	3	West Texas	13.8	1.11	0.71	27.08	13.99	13.8	0.60	0.40	30.00	13.00
ERCOT	MEDINA	4	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.52	0.40	30.00	13.00
	MENARD	5	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.50	0.40	38.00	13.00
	MIDLAND	6	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.46	0.40	38.00	16.00
	MILAM	4	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.52	0.40	30.00	13.00
	MILLS	5	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.50	0.40	38.00	13.00
	MITCHELL	6	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.46	0.40	38.00	16.00
	MONTAGUE	6	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.46	0.40	38.00	16.00
	MOTLEY	7	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.45	0.40	38.00	19.00
	NACOGDOCHES	5	East Texas	13.8	1.11	0.71	27.08	13.99	13.8	0.65	0.40	30.00	13.00
	NAVARRO	5	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.50	0.40	38.00	13.00
	NOLAN	6	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.46	0.40	38.00	16.00
	PALO PINTO	6	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.46	0.40	38.00	16.00
	PECOS	5	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.50	0.40	38.00	13.00
	PRESIDIO	5	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.50	0.40	38.00	13.00
	RAINS	6	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.46	0.40	38.00	16.00
	REAGAN	5	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.50	0.40	38.00	13.00
	REAL	5	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.50	0.40	38.00	13.00
	RED RIVER	6	East Texas	13.8	1.11	0.71	27.08	13.99	13.8	0.60	0.40	30.00	13.00
	REEVES	6	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.46	0.40	38.00	16.00
	REFUGIO	3	East Texas	13.8	1.11	0.71	27.08	14.18	13.8	0.75	0.40	19.00	11.00
	ROBERTSON	4	East Texas	13.8	1.11	0.71	27.08	13.99	13.8	0.75	0.40	26.00	13.00
	RUNNELS	5	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.50	0.40	38.00	13.00
	SAN SABA	5	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.50	0.40	38.00	13.00
	SCHLEICHER	5	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.50	0.40	38.00	13.00
	SCURRY	7	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.45	0.40	38.00	19.00
	SHACKELFORD	6	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.46	0.40	38.00	16.00
	SOMERVELL	5	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.50	0.40	38.00	13.00
	STARR	2	East Texas	13.8	1.11	0.71	27.08	13.99	13.8	0.90	0.40	19.00	11.00
	STEPHENS	6	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.46	0.40	38.00	16.00
	STERLING	6	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.46	0.40	38.00	16.00
	STONEWALL	7	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.45	0.40	38.00	19.00
	SUTTON	5	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.50	0.40	38.00	13.00
	TAYLOR	6	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.46	0.40	38.00	16.00
	TERRELL	5	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.50	0.40	38.00	13.00
	THROCKMORTON	6	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.46	0.40	38.00	16.00
	TITUS	6	East Texas	13.8	1.11	0.71	27.08	13.99	13.8	0.60	0.40	30.00	13.00
	TOM GREEN	5	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.50	0.40	38.00	13.00
	UPTON	5	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.50	0.40	38.00	13.00
	UVALDE	4	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.52	0.40	30.00	13.00
	VAL VERDE	4	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.52	0.40	30.00	13.00
	VAN ZANDT	6	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.46	0.40	38.00	16.00
	WARD	6	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.46	0.40	38.00	16.00
	WASHINGTON	4	East Texas	13.8	1.11	0.71	27.08	13.99	13.8	0.75	0.40	26.00	13.00
	WEBB	3	West Texas	13.8	1.11	0.71	27.08	13.99	13.8	0.60	0.40	30.00	13.00
	WHARTON	3	East Texas	13.8	1.11	0.71	27.08	14.18	13.8	0.75	0.40	19.00	11.00
	WICHITA	7	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.45	0.40	38.00	19.00
	WILBARGER	7	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.45	0.40	38.00	19.00
	WILLACY	2	East Texas	13.8	1.11	0.71	27.08	13.99	13.8	0.90	0.40	19.00	11.00
	WINKLER	6	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.46	0.40	38.00	16.00
	WISE	6	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.46	0.40	38.00	16.00
	YOUNG	6	West Texas	20.6	0.87	0.66	26.75	14.18	20.6	0.46	0.40	38.00	16.00
	ZAPATA	2	West Texas	13.8	1.11	0.71	27.08	13.99	13.8	0.60	0.40	30.00	13.00
	ZAVALA	3	West Texas	13.8	1.11	0.71	27.08	13.99	13.8	0.60	0.40	30.00	13.00

Table 8: 2011 Annual and Peak-day Electricity Savings from Implementation of the 2001 IECC for Single-family Residences Using 1999 Base Year

2011 Summary TRY 1999															
	County	Climate Zone	No. of Projected Units (2011)	Precode Total Annual Elec. Use (MWh/yr)	Code-compliant Total Annual Elec. Use (MWh/yr)	Precode OSD Elec. Use (MWh/day)	Code-compliant OSD Elec. Use (MWh/day)	Total Annual Elec. Savings (MWh/yr) w/ 7% of T&D Loss	Total OSD Elec. Savings (MWh/day) w/ 7% of T&D Loss	Precode Total NG Use (Therm/yr)	Code-compliant Total NG Use (Therm/yr)	Precode OSD NG Use (Therm/day)	Code-compliant OSD NG Use (Therm/day)	Total Annual NG Savings (Therm/yr)	Total OSD NG Savings (Therm/day)
Nonattain-ment County	BRAZORIA	3	1,562	25,445	22,247	102.49	84.16	3,422	19.61	166,568	142,969	287.68	273.88	23,599	13.80
	CHAMBERS	4	216	3,514	3,075	14.07	11.56	470	2.68	23,216	20,062	40.50	38.59	3,153	1.91
	COLLIN	6	4,396	79,220	68,521	339.99	274.12	11,448	70.49	875,768	780,064	961.64	913.63	95,704	48.00
	DALLAS	5	2,569	46,168	39,970	198.23	159.91	6,632	41.01	510,727	455,822	561.98	533.92	54,906	28.05
	DENTON	6	2,622	47,251	40,869	202.79	163.50	6,828	42.04	522,353	465,270	573.57	544.94	57,083	28.63
	EL PASO	6	3,280	55,353	47,841	191.55	159.59	8,038	34.20	611,096	541,597	780.94	745.13	69,498	35.82
	FORT BEND	4	5,110	83,296	72,813	335.65	275.55	11,217	64.30	544,833	467,716	941.12	895.99	77,116	45.13
	GALVESTON	3	1,823	29,697	25,965	119.62	98.23	3,994	22.89	194,400	166,858	335.75	319.65	27,542	16.10
	HARDIN	4	445	7,246	6,338	29.01	23.84	971	5.53	47,828	41,437	83.44	79.51	6,391	3.93
	HARRIS	4	11,107	181,051	158,265	730	599	24,380	139.77	1,184,238	1,016,619	2,045.60	1,947.50	167,619	98.10
	JEFFERSON	4	581	9,464	8,278	38	31	1,269	7.23	62,445	53,963	108.94	103.81	8,482	5.13
	LIBERTY	4	252	4,112	3,593	17	14	555	3.18	26,841	23,065	46.41	44.19	3,776	2.23
	MONTGOMERY	4	2,795	45,560	39,826	183.59	150.72	6,135	35.17	298,005	255,825	514.76	490.08	42,180	24.69
	ORANGE	4	201	3,274	2,863	13	11	439	2.50	21,674	18,718	37.69	35.91	2,956	1.78
	TARRANT	5	3,837	68,955	59,698	296	239	9,906	61.25	762,810	680,805	839.36	797.46	82,006	41.90
	WALLER	4	5	82	71	0.33	0.27	11	0.06	533	458	0.92	0.88	75	0.04
Affected County	BASTROP	4	80	1,397	1,209	5.94	4.81	202	1.21	8,334	7,553	14.54	13.84	781	0.71
	BEXAR	4	2,442	40,108	35,064	165.10	135.56	5,397	31.62	349,515	311,169	560.90	534.24	38,346	26.67
	CALDWELL	4	12	206	178	0.88	0.71	30	0.18	1,552	1,405	2.70	2.57	147	0.13
	COMAL	4	1,016	16,687	14,588	68.69	56.40	2,245	13.15	145,417	129,463	233.37	222.27	15,954	11.09
	ELLIS	5	503	9,039	7,826	38.81	31.31	1,299	8.03	99,998	89,248	110.03	104.54	10,750	5.49
	GREGG	6	222	3,860	3,326	15.99	12.79	571	3.42	35,901	29,234	39.28	37.32	6,667	1.96
	GUADALUPE	4	647	10,626	9,290	43.74	35.91	1,430	8.38	92,603	82,443	148.61	141.54	10,160	7.07
	HARRISON	6	47	815	703	3.36	2.69	120	0.71	7,687	6,246	8.32	7.90	1,441	0.42
	HAYS	5	996	17,142	14,782	73.47	59.38	2,525	15.08	128,790	116,384	223.86	212.99	12,406	10.88
	HENDERSON	5	56	969	842	3.99	3.22	136	0.81	9,199	7,604	9.91	9.41	1,595	0.49
	HOOD	5	97	1,743	1,509	7.48	6.04	250	1.55	19,284	17,211	21.22	20.16	2,073	1.06
	HUNT	6	35	630	545	2.70	2.18	91	0.56	6,989	6,218	7.66	7.27	771	0.38
	JOHNSON	5	415	7,458	6,457	32.02	25.83	1,071	6.62	82,504	73,634	90.78	86.25	8,870	4.53
	KAUFMAN	6	152	2,739	2,369	11.76	9.48	396	2.44	30,281	26,972	33.25	31.59	3,309	1.66
	NUECES	3	701	11,829	10,328	45.99	38.22	1,606	8.32	66,966	59,019	131.00	124.81	7,947	6.19
	PARKER	6	282	5,082	4,396	21.81	17.58	734	4.52	56,180	50,040	61.69	58.61	6,139	3.08
	ROCKWALL	6	411	7,407	6,406	31.79	25.63	1,070	6.59	81,879	72,931	89.91	85.42	8,948	4.49
	RUSK	5	7	112	99	0.43	0.35	14	0.08	1,126	931	1.35	1.29	194	0.06
	SAN PATRICIO	3	113	1,907	1,665	7.41	6.16	259	1.34	10,795	9,514	21.12	20.12	1,281	1.00
	SMITH	5	185	3,202	2,781	13.17	10.65	451	2.69	30,391	25,121	32.73	31.10	5,270	1.63
	TRAVIS	5	3,292	56,659	48,859	242.83	196.27	8,346	49.83	425,679	384,676	739.92	703.97	41,003	35.95
	UPSHUR	6	10	183	159	0.78	0.63	26	0.16	1,615	1,440	1.77	1.68	176	0.09
	VICTORIA	3	83	1,302	1,154	5.13	4.28	158	0.91	9,455	8,021	15.89	15.16	1,434	0.73
	WILLIAMSON	5	1,851	31,858	27,472	136.54	110.35	4,693	28.02	239,348	216,292	416.03	395.82	23,055	20.21
	WILSON	4	12	197	172	0.81	0.67	27	0.16	1,718	1,529	2.76	2.63	188	0.13
ERCOT	ANDERSON	5	13	209	184	0.79	0.66	26	0.14	2,091	1,730	2.51	2.40	361	0.11
	ANDREWS	6	60	1,081	936	3.46	2.87	155	0.64	16,161	14,428	14.87	14.21	1,733	0.66
	ANGELINA	5	120	1,925	1,697	7.30	6.07	244	1.32	19,300	15,966	23.21	22.15	3,334	1.06
	ARANSAS	3	70	1,181	1,031	4.59	3.82	160	0.83	6,687	5,894	13.08	12.46	794	0.62
	ARCHER	7	9	185	157	0.66	0.53	29	0.14	2,998	2,618	2.12	2.02	380	0.10
	ATASCOSA	3	66	1,081	946	4.45	3.66	144	0.85	9,449	8,397	15.16	14.44	1,052	0.72
	AUSTIN	4	17	277	242	1.12	0.92	37	0.21	1,813	1,556	3.13	2.98	257	0.15
	BANDERA	5	1	16	14	0.07	0.06	2	0.01	143	127	0.23	0.22	16	0.01
	BAYLOR	7	0	0	0	0.00	0.00	0	0.00	0	0	0.00	0.00	0	0.00
	BEE	3	9	141	125	0.56	0.46	17	0.10	1,025	870	1.72	1.64	156	0.08
	BELL	5	1,646	30,331	26,097	123.77	99.62	4,530	25.84	370,427	331,222	391.65	373.68	39,205	17.97
	BLANCO	5	2	34	30	0.15	0.12	5	0.03	259	234	0.45	0.43	25	0.02
	BORDEN	7	19	364	317	0.98	0.83	51	0.17	5,518	4,827	3.93	3.77	691	0.17
	BOSQUE	5	3	55	48	0.23	0.18	8	0.05	675	604	0.71	0.68	71	0.03
	BRAZOS	4	601	9,797	8,564	39.48	32.41	1,319	7.56	64,079	55,009	110.69	105.38	9,070	5.31
	BREWSTER	5	15	279	241	0.94	0.78	40	0.18	4,163	3,707	3.56	3.39	455	0.16
	BRISCOE	8	7	148	128	0.33	0.28	21	0.05	3,582	3,126	1.84	1.76	456	0.08
	BROOKS	2	0	0	0	0.00	0.00	0	0.00	0	0	0.00	0.00	0	0.00
	BROWN	5	64	1,179	1,015	4.81	3.87	176	1.00	14,403	12,879	15.23	14.53	1,524	0.70
	BURLESON	4	11	179	157	0.72	0.59	24	0.14	1,173	1,007	2.03	1.93	166	0.10
	BURNET	5	136	2,341	2,018	10.03	8.11	345	2.06	17,586	15,892	30.57	29.08	1,694	1.49
	CALHOUN	3	65	1,020	904	4.02	3.35	124	0.71	7,404	6,281	12.44	11.87	1,123	0.57
	CALLAHAN	6	4	75	65	0.26	0.21	11	0.05	1,109	987	0.96	0.92	122	0.04
	CAMERON	2	1,053	18,654	16,183	72.72	60.01	2,645	13.60	104,856	92,350	197.14	187.84	12,505	9.30
	CHEROKEE	5	68	1,091	961	4.14	3.44	138	0.75	10,937	9,047	13.15	12.55	1,889	0.60
	CHILDRESS	7	0	0	0	0.00	0.00	0	0.00	0	0	0.00	0.00	0	0.00
	CLAY	7	1	21	17	0.07	0.06	3	0.02	333	291	0.24	0.22	42	0.01
	COKE	6	2	37	32	0.13	0.10	5	0.02	554	493	0.47	0.45	61	0.02
	COLEMAN	5	1	19	16	0.07	0.05	3	0.01	278	248	0.24	0.23	31	0.01
	COLORADO	4	8	130	114	0.53	0.43	18	0.10	853	732	1.47	1.40	121	0.07
	COMANCHE	5	0	0	0	0.00	0.00	0	0.00	0	0	0.00	0.00	0	0.00
	CONCHO	5	1	19	16	0.06	0.05	3	0.01	278	247	0.24	0.23	30	0.01
	COOKE	6	15	270	234	1.16	0.93	39	0.24	2,995	2,665	3.28	3.12	330	0.16
	CORYELL	5	164	3,022	2,600	12.33	9.93	451	2.57	36,908	33,001	39.02	37.23	3,906	1.79
	COTTLE	7	0	0	0	0.00	0.00	0	0.00	0	0	0.00	0.00	0	0.00
	CRANE	5	0	0	0	0.00	0.00	0	0.00	0	0	0.00	0.00	0	0.00
	CROCKETT	5	19	353	305	1.20	0.98	51	0.23	5,273	4,696	4.50	4.30	577	0.21
	CROSBY	7	6	115	100	0.31	0.26	16	0.05	1,743	1,524	1.24	1.19	218	0.05
	CULBERSON	6	1	17	15	0.06	0.05	2	0.01	186	165	0.24	0.23	21	0.01
	DAWSON	7	1	37	32	0.10	0.09	6	0.02	556	469	0.39	0.37	87	0.02
	DE WITT	3	4	63	56	0.25	0.21	8	0.04	456	387	0.77	0.73	69	0.04
	DELTA	6	2	36	31	0.15	0.12	5	0.03	398	355	0.44	0.42	44	0.02
	DICKENS	7	0	0	0	0.00	0.00	0	0.00	0	0	0.00	0.00	0	0.00
	DIMMIT	3	5	90	77	0.36	0.29	14	0.07	584	532	1.16	1.10	51	0.05
	DUVAL	3	0	0	0	0.00	0.00	0	0.00	0	0	0.00	0.00	0	0.00
	EASTLAND	6	2	38	32	0.13	0.11	6	0.03	555	494	0.48	0.46	61	0.02
	ECTOR	6	336	6,052	5,241	19.39	16.06	868	3.56	90,500	80,796	83.25	79.58	9,704	3.67
	EDWARDS	5	0	0	0	0.00	0.00	0	0.00	0	0	0.00	0.00	0	0.00
	ERATH	6	36	677	583	2.36	1.93	101	0.46	9,984	8,886	8.67	8.27	1,097	0.39
	FALLS	5	2	37	32	0.15	0.12	6	0.03	450	402	0.48	0.45	48	0.02
	FANNIN	6	6	108	93	0.46	0.37	16	0.10	1,198	1,066	1.31	1.25	132	0.07
	FAYETTE	4	7	114	100	0.46	0.38	15	0.09	746	641	1.29	1.23	106	0.06
	FISHER	6	0	0	0	0.00	0.00	0	0.00	0	0	0.00	0.00	0	0.00
	FOARD	7	0	0	0	0.00	0.00	0	0.00	0	0	0.00	0.00	0	0.00
	FRANKLIN	6	2	36	31	0.15	0.12	5	0.03	398	355	0.44	0.42	44	0.02
	FREESTONE	5	10	184	159	0.75	0.61	28	0.16	2,250	2,012	2.38	2.27	238	0.11
	FRIO	3	11	180	158	0.74	0.61	24	0.14	1,575	1,400	2.53	2.41	175	0.12

Table 8: 2011 Annual and Peak-day Electricity Savings from Implementation of the 2001 IECC for Single-family Residences Using 1999 Base Year (Continued)

2011 Summary TRY 1999

	County	Climate Zone	No. of Projected Units (2011)	Precode Total Annual Elec. Use (MWh/yr)	Code-compliant Total Annual Elec. Use (MWh/yr)	Precode OSD Elec. Use (MWh/day)	Code-compliant OSD Elec. Use (MWh/day)	Total Annual Elec. Savings (MWh/yr) w/ 7% of T&D Loss	Total OSD Elec. Savings (MWh/day) w/ 7% of T&D Loss	Precode Total NG Use (Therm/yr)	Code-compliant Total NG Use (Therm/yr)	Precode OSD NG Use (Therm/day)	Code-compliant OSD NG Use (Therm/day)	Total Annual NG Savings (Therm/yr)	Total OSD NG Savings (Therm/day)
	GILLESPIE	5	33	568	490	2.43	1.97	84	0.50	4,267	3,856	7.42	7.06	411	0.36
	GLASSCOCK	6	0	0	0	0.00	0.00	0	0.00	0	0	0.00	0.00	0	0.00
	GOLIAD	3	0	0	0	0.00	0.00	0	0.00	0	0	0.00	0.00	0	0.00
	GONZALES	4	1	16	14	0.07	0.06	2	0.01	143	127	0.23	0.22	16	0.01
	GRAYSON	6	62	1,116	965	4.78	3.86	161	0.99	12,380	11,014	13.56	12.89	1,366	0.68
	GRIMES	4	13	212	185	0.85	0.70	29	0.16	1,386	1,190	2.39	2.28	196	0.11
	HALL	8	0	0	0	0.00	0.00	0	0.00	0	0	0.00	0.00	0	0.00
	HAMILTON	5	1	18	16	0.08	0.06	3	0.02	225	201	0.24	0.23	24	0.01
	HARDEMAN	7	0	0	0	0.00	0.00	0	0.00	0	0	0.00	0.00	0	0.00
	HASKELL	6	2	38	32	0.13	0.11	6	0.03	555	494	0.48	0.46	61	0.02
	HIDALGO	2	2,931	51,923	45,044	202.42	167.05	7,361	37.85	291,863	257,054	548.73	522.84	34,809	25.89
	HILL	5	6	111	95	0.45	0.36	17	0.09	1,350	1,207	1.43	1.36	143	0.07
	HOPKINS	6	9	162	140	0.70	0.56	23	0.14	1,793	1,597	1.97	1.87	196	0.10
	HOUSTON	5	6	96	85	0.37	0.30	12	0.07	965	798	1.16	1.11	167	0.05
	HOWARD	6	5	90	78	0.29	0.24	13	0.05	1,347	1,202	1.24	1.18	144	0.05
	HUDSPETH	6	0	0	0	0.00	0.00	0	0.00	0	0	0.00	0.00	0	0.00
	IRION	5	0	0	0	0.00	0.00	0	0.00	0	0	0.00	0.00	0	0.00
	JACK	6	6	113	97	0.39	0.32	17	0.08	1,664	1,481	1.44	1.38	183	0.07
	JACKSON	3	8	125	111	0.49	0.41	15	0.09	911	773	1.53	1.46	138	0.07
	JEFF DAVIS	6	0	0	0	0.00	0.00	0	0.00	0	0	0.00	0.00	0	0.00
	JIM HOGG	2	0	0	0	0.00	0.00	0	0.00	0	0	0.00	0.00	0	0.00
	JIM WELLS	3	23	388	339	1.51	1.25	53	0.27	2,197	1,936	4.30	4.10	261	0.20
	JONES	6	0	0	0	0.00	0.00	0	0.00	0	0	0.00	0.00	0	0.00
	KARNES	3	24	393	343	1.60	1.32	53	0.30	3,316	2,976	5.68	5.42	339	0.26
	KENDALL	5	204	3,344	2,925	13.75	11.30	448	2.63	29,113	25,865	46.86	44.63	3,248	2.23
	KENEDY	2	0	0	0	0.00	0.00	0	0.00	0	0	0.00	0.00	0	0.00
	KENT	7	0	0	0	0.00	0.00	0	0.00	0	0	0.00	0.00	0	0.00
	KERR	5	41	706	609	3.02	2.44	104	0.62	5,302	4,791	9.22	8.77	511	0.45
	KIMBLE	5	1	19	16	0.06	0.05	3	0.01	278	247	0.24	0.23	30	0.01
	KING	7	0	0	0	0.00	0.00	0	0.00	0	0	0.00	0.00	0	0.00
	KINNEY	4	0	0	0	0.00	0.00	0	0.00	0	0	0.00	0.00	0	0.00
	KLEBERG	2	18	303	265	1.18	0.98	41	0.21	1,715	1,516	3.36	3.20	200	0.16
	KNOX	7	0	0	0	0.00	0.00	0	0.00	0	0	0.00	0.00	0	0.00
	LA SALLE	3	6	108	92	0.43	0.35	17	0.08	700	639	1.39	1.32	61	0.07
	LAMAR	6	28	485	418	1.99	1.60	71	0.42	4,580	3,722	4.95	4.71	858	0.25
	LAMPASAS	5	5	92	79	0.38	0.30	14	0.08	1,125	1,006	1.19	1.14	119	0.05
	LAVACA	4	18	282	250	1.11	0.93	34	0.20	2,040	1,737	3.45	3.29	303	0.16
	LEE	4	7	120	104	0.52	0.42	18	0.11	905	819	1.57	1.50	86	0.08
	LEON	5	0	0	0	0.00	0.00	0	0.00	0	0	0.00	0.00	0	0.00
	LIMESTONE	5	26	479	412	1.95	1.57	72	0.41	5,851	5,232	6.19	5.90	619	0.28
	LIVE OAK	3	2	34	29	0.13	0.11	5	0.02	191	168	0.37	0.36	23	0.02
	LLANO	5	150	2,582	2,226	11.06	8.94	380	2.27	19,396	17,528	33.71	32.08	1,868	1.64
	LOVING	6	0	0	0	0.00	0.00	0	0.00	0	0	0.00	0.00	0	0.00
	MADISON	4	16	261	228	1.05	0.86	35	0.20	1,706	1,464	2.95	2.81	241	0.14
	MARTIN	6	2	36	31	0.12	0.10	5	0.02	539	481	0.50	0.47	58	0.02
	MASON	5	6	103	89	0.44	0.36	15	0.09	776	701	1.35	1.28	75	0.07
	MATAGORDA	3	63	988	876	3.90	3.25	120	0.69	7,177	6,088	12.06	11.50	1,089	0.56
	MAVERICK	3	66	1,186	1,011	4.70	3.83	187	0.92	7,703	7,026	15.25	14.53	676	0.72
	MCCULLOCH	5	0	0	0	0.00	0.00	0	0.00	0	0	0.00	0.00	0	0.00
	MCLENNAN	5	441	8,126	6,992	33.16	26.69	1,214	6.92	99,246	88,742	104.93	100.12	10,504	4.82
	MCMULLEN	3	0	0	0	0.00	0.00	0	0.00	0	0	0.00	0.00	0	0.00
ERCOT	MEDINA	4	22	361	316	1.49	1.22	49	0.28	3,149	2,803	5.05	4.81	345	0.24
	MENARD	5	0	0	0	0.00	0.00	0	0.00	0	0	0.00	0.00	0	0.00
	MIDLAND	6	539	9,708	8,407	31.10	25.76	1,392	5.72	145,178	129,611	133.54	127.66	15,567	5.89
	MILAM	4	1	17	15	0.07	0.06	3	0.01	130	117	0.23	0.22	13	0.01
	MILLS	5	0	0	0	0.00	0.00	0	0.00	0	0	0.00	0.00	0	0.00
	MITCHELL	6	0	0	0	0.00	0.00	0	0.00	0	0	0.00	0.00	0	0.00
	MONTAGUE	6	1	18	16	0.08	0.06	3	0.02	200	178	0.22	0.21	22	0.01
	MOTLEY	7	0	0	0	0.00	0.00	0	0.00	0	0	0.00	0.00	0	0.00
	NACOGDOCHES	5	50	802	707	3.04	2.53	102	0.55	8,042	6,653	9.67	9.23	1,389	0.44
	NAVARRO	5	77	1,419	1,221	5.79	4.66	212	1.21	17,329	15,495	18.32	17.48	1,834	0.84
	NOLAN	6	0	0	0	0.00	0.00	0	0.00	0	0	0.00	0.00	0	0.00
	PALO PINTO	6	8	150	129	0.52	0.43	22	0.10	2,219	1,975	1.93	1.84	244	0.09
	PECOS	5	6	111	96	0.38	0.31	16	0.07	1,665	1,483	1.42	1.36	182	0.07
	PRESIDIO	5	2	37	32	0.13	0.10	5	0.02	555	494	0.47	0.45	61	0.02
	RAINS	6	2	36	31	0.15	0.12	5	0.03	398	355	0.44	0.42	44	0.02
	REAGAN	5	4	72	62	0.23	0.19	10	0.04	1,078	962	0.99	0.95	116	0.04
	REAL	5	0	0	0	0.00	0.00	0	0.00	0	0	0.00	0.00	0	0.00
	RED RIVER	6	6	104	90	0.43	0.34	15	0.09	981	798	1.06	1.01	184	0.05
	REEVES	6	1	18	16	0.06	0.05	3	0.01	269	240	0.25	0.24	29	0.01
	REFUGIO	3	2	31	28	0.12	0.10	4	0.02	228	193	0.38	0.37	35	0.02
	ROBERTSON	4	7	114	100	0.46	0.38	15	0.09	746	641	1.29	1.23	106	0.06
	RUNNELS	5	2	37	32	0.13	0.10	5	0.02	555	494	0.47	0.45	61	0.02
	SAN SABA	5	0	0	0	0.00	0.00	0	0.00	0	0	0.00	0.00	0	0.00
	SCHLEICHER	5	2	37	32	0.13	0.10	5	0.02	555	494	0.47	0.45	61	0.02
	SCURRY	7	49	940	818	2.53	2.13	130	0.43	14,232	12,450	10.15	9.71	1,782	0.43
	SHACKELFORD	6	0	0	0	0.00	0.00	0	0.00	0	0	0.00	0.00	0	0.00
	SOMERVELL	5	8	144	124	0.62	0.50	21	0.13	1,590	1,419	1.75	1.66	171	0.09
	STARR	2	0	0	0	0.00	0.00	0	0.00	0	0	0.00	0.00	0	0.00
	STEPHENS	6	2	38	32	0.13	0.11	6	0.03	555	494	0.48	0.46	61	0.02
	STERLING	6	0	0	0	0.00	0.00	0	0.00	0	0	0.00	0.00	0	0.00
	STONEWALL	7	0	0	0	0.00	0.00	0	0.00	0	0	0.00	0.00	0	0.00
	SUTTON	5	0	0	0	0.00	0.00	0	0.00	0	0	0.00	0.00	0	0.00
	TAYLOR	6	149	2,800	2,411	9.77	7.97	416	1.92	41,321	36,780	35.87	34.24	4,542	1.63
	TERRELL	5	0	0	0	0.00	0.00	0	0.00	0	0	0.00	0.00	0	0.00
	THROCKMORTON	6	0	0	0	0.00	0.00	0	0.00	0	0	0.00	0.00	0	0.00
	TITUS	6	7	121	105	0.50	0.40	18	0.11	1,145	930	1.24	1.18	215	0.06
	TOM GREEN	5	145	2,694	2,329	9.12	7.50	391	1.74	40,241	35,838	34.37	32.79	4,403	1.58
	UPTON	5	1	18	16	0.06	0.05	3	0.01	270	240	0.25	0.24	29	0.01
	UVALDE	4	21	345	302	1.42	1.17	46	0.27	3,006	2,676	4.82	4.59	330	0.23
	VAL VERDE	4	47	772	675	3.18	2.61	104	0.61	6,727	5,989	10.80	10.28	738	0.51
	VAN ZANDT	6	9	162	140	0.70	0.56	23	0.14	1,793	1,597	1.97	1.87	196	0.10
	WARD	6	12	216	187	0.69	0.57	31	0.13	3,232	2,886	2.97	2.84	347	0.13
	WASHINGTON	4	56	913	798	3.68	3.02	123	0.70	5,971	5,126	10.31	9.82	845	0.49
	WEBB	3	640	11,497	9,803	45.53	37.18	1,813	8.94	74,692	68,134	147.88	140.89	6,559	6.99
	WHARTON	3	63	988	876	3.90	3.25	120	0.69	7,177	6,088	12.06	11.50	1,089	0.56
	WICHITA	7	111	2,276	1,936	8.11	6.52	363	1.71	36,975	32,285	26.16	24.95	4,690	1.21
	WILBARGER	7	0	0	0	0.00	0.00	0	0.00	0	0	0.00	0.00	0	0.00
	WILLACY	2	19	337	292	1.31	1.08	48	0.25	1,892	1,666	3.56	3.39	226	0.17
	WINKLER	6	1	18	16	0.06	0.05	3	0.01	269	240	0.25	0.24	29	0.01
	WISE	6	23	414	359	1.78	1.43	60	0.37	4,582	4,081	5.03	4.78	501	0.25
	YOUNG	6	5	94	81	0.33	0.27	14	0.06	1,387	1,234	1.20	1.15	152	0.05
	ZAPATA	2	0	0	0	0.00	0.00	0	0.00	0	0	0.00	0.00	0	0.00
	ZAVALA	3	6	108	92	0.43	0.35	17	0.08	700	639	1.39	1.32	61	0.07
	TOTAL		65,505					157,053	896					1,131,544	650

Table 9: Allocation of PCA for each of All ERCOT Counties

County	Elec. Utilities 1	PCA	Percentage	Elec. Utilities 2	PCA	Percentage
ANDERSON	ONCOR	TXU Electric/PCA	100%	Trinity Valley EC		0%
ANDREWS	ONCOR	TXU Electric/PCA	100%	Cap Rock EC		0%
ANGELINA	ONCOR	TXU Electric/PCA	100%	Sam Houston EC		0%
ARANSAS	CPL(AEP)	American Electric Power - West (ERCOT)/PCA	100%	San Patricio EC		0%
ARCHER	ONCOR	TXU Electric/PCA	98%	T-NMP	Texas-New Mexico Power Co/PCA	2%
ATASCOSA	CPL(AEP)	American Electric Power - West (ERCOT)/PCA	54%	CPSB	San Antonio Public Service Bd/PCA	46%
AUSTIN	RELIANT(CENTER POINT)	Reliant Energy HL&P/PCA	100%	Bellville		0%
BANDERA*	Bandera EC					
BASTROP	ONCOR	TXU Electric/PCA	100%	Smithville		0%
BAYLOR	ONCOR	TXU Electric/PCA	100%	Seymour		0%
BEE	CPL(AEP)	American Electric Power - West (ERCOT)/PCA	100%	San Patricio EC		0%
BELL	ONCOR	TXU Electric/PCA	100%	Bartlett EC		0%
BEXAR	CPSB	San Antonio Public Service Bd/PCA	100%	Bandera EC		0%
BLANCO*	Pedernales EC			Central Texas EC		
BORDEN*	Lyntegar EC			Big Country EC		
BOSQUE	T-NMP	Texas-New Mexico Power Co/PCA	100%	United Coop Services		0%
BRAZORIA	RELIANT(CENTER POINT)	Reliant Energy HL&P/PCA	97%	T-NMP	Texas-New Mexico Power Co/PCA	3%
BRAZOS*	BRYAN			College Station		
BREWSTER	WTU(AEP)	American Electric Power - West (ERCOT)/PCA	100%	Rio Grande EC		0%
BRISCOE	XCEL(SPS)			WTU(AEP)	American Electric Power - West (ERCOT)/PCA	100%
BROOKS	CPL(AEP)	American Electric Power - West (ERCOT)/PCA	100%	Medina EC		0%
BROWN	ONCOR	TXU Electric/PCA	85%	WTU(AEP)	American Electric Power - West (ERCOT)/PCA	15%
BURLESON	ENTERGY	Entergy Electric System/PCA	100%	BRYAN		0%
BURNET	ONCOR	TXU Electric/PCA	100%	Pedernales EC		0%
CALDWELL	CPL(AEP)	American Electric Power - West (ERCOT)/PCA	100%	Luling		0%
CALHOUN	CPL(AEP)	American Electric Power - West (ERCOT)/PCA	100%	Victoria EC		0%
CALLAHAN	WTU(AEP)	American Electric Power - West (ERCOT)/PCA	100%	Taylor EC		0%
CAMERON	CPL(AEP)	American Electric Power - West (ERCOT)/PCA	100%	Magic Valley EC		0%
CHAMBERS	RELIANT(CENTER POINT)	Reliant Energy HL&P/PCA	70%	ENTERGY	Entergy Electric System/PCA	30%
CHEROKEE	ONCOR	TXU Electric/PCA	100%	Cherokee County EC		0%
CHILDRESS	WTU(AEP)	American Electric Power - West (ERCOT)/PCA	100%	Greenbelt EC		0%
CLAY	ONCOR	TXU Electric/PCA	98%	T-NMP	Texas-New Mexico Power Co/PCA	2%
COKE	WTU(AEP)	American Electric Power - West (ERCOT)/PCA	100%	Concho Valley EC		0%
COLEMAN	WTU(AEP)	American Electric Power - West (ERCOT)/PCA	100%	Coleman		0%
COLLIN	ONCOR	TXU Electric/PCA	98%	T-NMP	Texas-New Mexico Power Co/PCA	2%
COLORADO	CPL(AEP)	American Electric Power - West (ERCOT)/PCA	100%	Weimar		0%
COMAL	CPSB	San Antonio Public Service Bd/PCA	100%	New Braunfels		0%
COMANCHE	ONCOR	TXU Electric/PCA	98%	T-NMP	Texas-New Mexico Power Co/PCA	2%
CONCHO	WTU(AEP)	American Electric Power - West (ERCOT)/PCA	100%	Concho Valley EC		0%
COOKE	ONCOR	TXU Electric/PCA	100%	Cooke County EC		0%
CORYELL	ONCOR	TXU Electric/PCA	98%	T-NMP	Texas-New Mexico Power Co/PCA	2%
COTTLE	WTU(AEP)	American Electric Power - West (ERCOT)/PCA	100%	South Plains EC		0%
CRANE	ONCOR	TXU Electric/PCA	100%			0%
CROCKETT	WTU(AEP)	American Electric Power - West (ERCOT)/PCA	100%	Rio Grande EC		0%
CROSBY*	XCEL(SPS)			Crosbyton		
CULBERSON	EPEC	El Paso Electric Co/PCA	100%	Rio Grande EC		0%
DALLAS	ONCOR	TXU Electric/PCA	100%	Garland		0%
DAWSON	ONCOR	TXU Electric/PCA	100%	Lyntegar EC		0%
DELTA	ONCOR	TXU Electric/PCA	100%	Lamar County EC		0%
DENTON	ONCOR	TXU Electric/PCA	98%	T-NMP	Texas-New Mexico Power Co/PCA	2%
DEWITT	CPL(AEP)	American Electric Power - West (ERCOT)/PCA	100%	Yoakum		0%
DICKENS	WTU(AEP)	American Electric Power - West (ERCOT)/PCA	100%	South Plains EC		0%
DIMMIT	CPL(AEP)	American Electric Power - West (ERCOT)/PCA	100%	Medina EC		0%
DUVAL	CPL(AEP)	American Electric Power - West (ERCOT)/PCA	100%	Medina EC		0%
EASTLAND	ONCOR	TXU Electric/PCA	85%	WTU(AEP)	American Electric Power - West (ERCOT)/PCA	15%
ECTOR	ONCOR	TXU Electric/PCA	100%	Goldsmith		0%
EDWARDS	CPL(AEP)	American Electric Power - West (ERCOT)/PCA	100%	Rio Grande EC		0%
ELLIS	ONCOR	TXU Electric/PCA	100%	Navarro County EC		0%
ERATH	ONCOR	TXU Electric/PCA	98%	T-NMP	Texas-New Mexico Power Co/PCA	2%
FALLS	ONCOR	TXU Electric/PCA	100%	Belfalls EC		0%
FANNIN	ONCOR	TXU Electric/PCA	98%	T-NMP	Texas-New Mexico Power Co/PCA	2%
FAYETTE*	La Grange			Schulenburg		
FISHER	WTU(AEP)	American Electric Power - West (ERCOT)/PCA	100%	Big Country EC		0%
FOARD*	XCEL(SPS)			Floydada		
FORT BEND	RELIANT(CENTER POINT)	Reliant Energy HL&P/PCA	100%			0%
FRANKLIN	SWEPCO(AEP)	Southwestern Public Service Co/PCA		FEC Electric		
FREESTONE	ONCOR	TXU Electric/PCA	100%	Navasota Valley EC		0%
FRIO	CPL(AEP)	American Electric Power - West (ERCOT)/PCA	100%	Medina EC		0%
GALVESTON	RELIANT(CENTER POINT)	Reliant Energy HL&P/PCA	97%	T-NMP	Texas-New Mexico Power Co/PCA	3%
GILLESPIE*	Fredericksburg			Pedernales EC		
GLASSCOCK	ONCOR	TXU Electric/PCA	100%	Cap Rock EC		0%
GOLIAD	CPL(AEP)	American Electric Power - West (ERCOT)/PCA	100%	Karnes EC		0%
GONZALES	CPL(AEP)	American Electric Power - West (ERCOT)/PCA	100%	Gonzales		0%
GRAYSON	ONCOR	TXU Electric/PCA	98%	T-NMP	Texas-New Mexico Power Co/PCA	2%
GRIMES	ENTERGY	Entergy Electric System/PCA	100%	Mid-South EC		0%
GUADALUPE	CPSB	San Antonio Public Service Bd/PCA	100%	Seguin		0%
HALL	WTU(AEP)	American Electric Power - West (ERCOT)/PCA	100%	Lighthouse EC		0%
HAMILTON	T-NMP	Texas-New Mexico Power Co/PCA	100%	United Coop Services		0%
HARDEMAN	WTU(AEP)	American Electric Power - West (ERCOT)/PCA	100%	South Plains EC		0%
HARRIS	RELIANT(CENTER POINT)	Reliant Energy HL&P/PCA	70%	ENTERGY	Entergy Electric System/PCA	30%
HASKELL	WTU(AEP)	American Electric Power - West (ERCOT)/PCA	100%	Big Country EC		0%
HAYS	San Marcos	Lower Colorado River Authority/PCA	100%	Pedernales EC		0%
HENDERSON	ONCOR	TXU Electric/PCA	100%	Trinity Valley EC		0%
HIDALGO	CPL(AEP)	American Electric Power - West (ERCOT)/PCA	100%	Magic Valley EC		0%
HILL	ONCOR	TXU Electric/PCA	98%	T-NMP	Texas-New Mexico Power Co/PCA	2%
HOOD	ONCOR	TXU Electric/PCA	98%	T-NMP	Texas-New Mexico Power Co/PCA	2%
HOPKINS	ONCOR	TXU Electric/PCA	100%	SWEPCO(AEP)		0%
HOUSTON	ONCOR	TXU Electric/PCA	100%	Houston County EC		0%
HOWARD	ONCOR	TXU Electric/PCA	100%	Cap Rock EC		0%
HUDSPETH	EPEC	El Paso Electric Co/PCA	100%	Rio Grande EC		0%
HUNT	ONCOR	TXU Electric/PCA	98%	T-NMP	Texas-New Mexico Power Co/PCA	2%
IRION	WTU(AEP)	American Electric Power - West (ERCOT)/PCA	100%	Cap Rock EC		0%
JACK	ONCOR	TXU Electric/PCA	98%	T-NMP	Texas-New Mexico Power Co/PCA	2%
JACKSON	CPL(AEP)	American Electric Power - West (ERCOT)/PCA	100%	Jackson EC		0%
JEFF DAVIS	WTU(AEP)	American Electric Power - West (ERCOT)/PCA	100%	Rio Grande EC		0%
JIM HOGG	CPL(AEP)	American Electric Power - West (ERCOT)/PCA	100%	Medina EC		0%
JIM WELLS	CPL(AEP)	American Electric Power - West (ERCOT)/PCA	100%	Nueces EC		0%
JOHNSON	ONCOR	TXU Electric/PCA	98%	T-NMP	Texas-New Mexico Power Co/PCA	2%
JONES	WTU(AEP)	American Electric Power - West (ERCOT)/PCA	100%	Taylor EC		0%
KARNES	CPL(AEP)	American Electric Power - West (ERCOT)/PCA	100%	Floresville		0%

Table 9: Allocation of PCA for each of All ERCOT Counties (Continued)

County	Elec. Utilities 1	PCA	Percentage	Elec. Utilities 2	PCA	Percentage
KAUFMAN	ONCOR	TXU Electric/PCA	100%	Trinity Valley EC		0%
KENDALL*	Boerne			Central Texas EC		
KENEDY*	Nueces EC			Magic Valley EC		
KENT	WTU(AEP)	American Electric Power - West (ERCOT)/PCA	100%	South Plains EC		0%
KERR*	Kerrville			Bandera EC		
KIMBLE	WTU(AEP)	American Electric Power - West (ERCOT)/PCA	100%	Central Texas EC		0%
KING	WTU(AEP)	American Electric Power - West (ERCOT)/PCA	100%	South Plains EC		0%
KINNEY	CPL(AEP)	American Electric Power - West (ERCOT)/PCA	100%	Rio Grande EC		0%
KLEBERG	CPL(AEP)	American Electric Power - West (ERCOT)/PCA	100%	Nueces EC		0%
KNOX	WTU(AEP)	American Electric Power - West (ERCOT)/PCA	100%	Tri-County EC		0%
LA SALLE	CPL(AEP)	American Electric Power - West (ERCOT)/PCA	100%	Medina EC		0%
LAMAR	ONCOR	TXU Electric/PCA	98%	T-NMP	Texas-New Mexico Power Co/PCA	2%
LAMPASAS	ONCOR	TXU Electric/PCA	100%	Lampasas		0%
LAVACA*	Schulenburg			Yoakum		
LEE*	Giddings			Lexington		
LEON	ONCOR	TXU Electric/PCA	75%	ENTERGY	Entergy Electric System/PCA	25%
LIMESTONE	ONCOR	TXU Electric/PCA	75%	ENTERGY	Entergy Electric System/PCA	25%
LIVE OAK	CPL(AEP)	American Electric Power - West (ERCOT)/PCA	100%	San Patricio EC		0%
LLANO*	Llano			Pedernales EC		
LOVING	ONCOR	TXU Electric/PCA	100%			0%
MADISON	ENTERGY	Entergy Electric System/PCA	100%	Houston County EC		0%
MARTIN	ONCOR	TXU Electric/PCA	100%	Cap Rock EC		0%
MASON*	Mason			Cap Rock EC		
MATAGORDA	CPL(AEP)	American Electric Power - West (ERCOT)/PCA	19%	RELIANT(CENTER POINT)	Reliant Energy HL&P/PCA	81%
MAVERICK	CPL(AEP)	American Electric Power - West (ERCOT)/PCA	100%	Rio Grande EC		0%
McCULLOCH	WTU(AEP)	American Electric Power - West (ERCOT)/PCA	100%	Brady		0%
McLENNAN	ONCOR	TXU Electric/PCA	98%	T-NMP	Texas-New Mexico Power Co/PCA	2%
McMULLEN	CPL(AEP)	American Electric Power - West (ERCOT)/PCA	100%	Karnes EC		0%
MEDINA	CPL(AEP)	American Electric Power - West (ERCOT)/PCA	54%	CPSB	San Antonio Public Service Bd/PCA	46%
MENARD	WTU(AEP)	American Electric Power - West (ERCOT)/PCA	100%	Cap Rock EC		0%
MIDLAND	ONCOR	TXU Electric/PCA	100%	Cap Rock EC		0%
MILAM	ONCOR	TXU Electric/PCA	75%	ENTERGY	Entergy Electric System/PCA	25%
MILLS*	Goldwaithe			Cap Rock EC		
MITCHELL	ONCOR	TXU Electric/PCA	100%	Cap Rock EC		0%
MONTAGUE	ONCOR	TXU Electric/PCA	98%	T-NMP	Texas-New Mexico Power Co/PCA	2%
MONTGOMERY	ENTERGY	Entergy Electric System/PCA	30%	RELIANT(CENTER POINT)	Reliant Energy HL&P/PCA	70%
MOTLEY	WTU(AEP)	American Electric Power - West (ERCOT)/PCA	100%	Lighthouse EC		0%
NACOGDOCHES	ONCOR	TXU Electric/PCA	100%	Cherokee County EC		0%
NAVARRO	ONCOR	TXU Electric/PCA	100%	Navarro County EC		0%
NOLAN	WTU(AEP)	American Electric Power - West (ERCOT)/PCA	15%	ONCOR	TXU Electric/PCA	85%
NUECES	CPL(AEP)	American Electric Power - West (ERCOT)/PCA	100%	Robstown		0%
PALO PINTO	ONCOR	TXU Electric/PCA	98%	T-NMP	Texas-New Mexico Power Co/PCA	2%
PARKER	ONCOR	TXU Electric/PCA	100%	Weatherford		0%
PECOS	WTU(AEP)	American Electric Power - West (ERCOT)/PCA	15%	ONCOR	TXU Electric/PCA	85%
PRESIDIO	WTU(AEP)	American Electric Power - West (ERCOT)/PCA	100%	Rio Grande EC		0%
RAINS	T-NMP	Texas-New Mexico Power Co/PCA	100%	FEC Electric		0%
REAGAN	WTU(AEP)	American Electric Power - West (ERCOT)/PCA	100%	Cap Rock EC		0%
REAL	CPL(AEP)	American Electric Power - West (ERCOT)/PCA	100%	Bandera EC		0%
RED RIVER	ONCOR	TXU Electric/PCA	100%	SWEPCO(AEP)		0%
REEVES	WTU(AEP)	American Electric Power - West (ERCOT)/PCA	15%	ONCOR	TXU Electric/PCA	85%
REFUGIO	CPL(AEP)	American Electric Power - West (ERCOT)/PCA	100%	San Patricio EC		0%
ROBERTSON	ENTERGY	Entergy Electric System/PCA	100%	Hearne		0%
ROCKWALL	ONCOR	TXU Electric/PCA	100%	FEC Electric		0%
RUNNELS	WTU(AEP)	American Electric Power - West (ERCOT)/PCA	100%	Coleman County EC		0%
RUSK	SWEPCO(AEP)	Southwestern Public Service Co/PCA	0%	ONCOR	TXU Electric/PCA	100%
SAN PATRICIO	CPL(AEP)	American Electric Power - West (ERCOT)/PCA	100%	San Patricio EC		0%
SAN SABA*	San Saba			Central Texas EC		
SCHLEICHER	WTU(AEP)	American Electric Power - West (ERCOT)/PCA	100%	Pedernales EC		0%
SCURRY	ONCOR	TXU Electric/PCA	100%	Cap Rock EC		0%
SHACKELFORD	WTU(AEP)	American Electric Power - West (ERCOT)/PCA	100%	Fort Belknap EC		0%
SMITH	ONCOR	TXU Electric/PCA	100%	SWEPCO(AEP)		0%
SOMERVELL	T-NMP	Texas-New Mexico Power Co/PCA	100%	United Coop Services		0%
STARR	CPL(AEP)	American Electric Power - West (ERCOT)/PCA	100%	Medina EC		0%
STEPHENS	ONCOR	TXU Electric/PCA	100%	Comanche EC		0%
STERLING	WTU(AEP)	American Electric Power - West (ERCOT)/PCA	100%	Cap Rock EC		0%
STONEWALL	WTU(AEP)	American Electric Power - West (ERCOT)/PCA	100%	Big Country EC		0%
SUTTON	WTU(AEP)	American Electric Power - West (ERCOT)/PCA	100%	Pedernales EC		0%
TARRANT	ONCOR	TXU Electric/PCA	100%	Tri-County EC		0%
TAYLOR	WTU(AEP)	American Electric Power - West (ERCOT)/PCA	100%	Taylor EC		0%
TERRELL	T-NMP	Texas-New Mexico Power Co/PCA	100%	Rio Grande EC		0%
THROCKMORTON	WTU(AEP)	American Electric Power - West (ERCOT)/PCA	100%	Fort Belknap EC		0%
TITUS	SWEPCO(AEP)	Southwestern Public Service Co/PCA	0%	T-NMP	Texas-New Mexico Power Co/PCA	100%
TOM GREEN	WTU(AEP)	American Electric Power - West (ERCOT)/PCA	100%	Concho Valley EC		0%
TRAVIS	ONCOR	TXU Electric/PCA	97%	Austin Energy	Austin Energy/PCA	3%
UPTON	WTU(AEP)	American Electric Power - West (ERCOT)/PCA	15%	ONCOR	TXU Electric/PCA	85%
UVALDE	CPL(AEP)	American Electric Power - West (ERCOT)/PCA	100%	Bandera EC		0%
VAL VERDE	CPL(AEP)	American Electric Power - West (ERCOT)/PCA	100%	Rio Grande EC		0%
VAN ZANDT	ONCOR	TXU Electric/PCA	100%	SWEPCO(AEP)		0%
VICTORIA	CPL(AEP)	American Electric Power - West (ERCOT)/PCA	100%	Victoria EC		0%
WALLER	RELIANT(CENTER POINT)	Reliant Energy HL&P/PCA	100%	Hempstead		0%
WARD	ONCOR	TXU Electric/PCA	98%	T-NMP	Texas-New Mexico Power Co/PCA	2%
WASHINGTON	ENTERGY	Entergy Electric System/PCA	100%	Bluebonnet EC		0%
WEBB	CPL(AEP)	American Electric Power - West (ERCOT)/PCA	100%	Rio Grande EC		0%
WHARTON	RELIANT(CENTER POINT)	Reliant Energy HL&P/PCA	81%	CPL(AEP)	American Electric Power - West (ERCOT)/PCA	19%
WICHITA	ONCOR	TXU Electric/PCA	100%	Electra		0%
WILBARGER	WTU(AEP)	American Electric Power - West (ERCOT)/PCA	100%	Vernon		0%
WILLACY	CPL(AEP)	American Electric Power - West (ERCOT)/PCA	100%	Magic Valley EC		0%
WILLIAMSON	ONCOR	TXU Electric/PCA	97%	Austin Energy	Austin Energy/PCA	3%
WILSON	Floresville	San Antonio Public Service Bd/PCA	100%	Guadalupe Valley EC		
WINKLER	ONCOR	TXU Electric/PCA	98%	T-NMP	Texas-New Mexico Power Co/PCA	2%
WISE	ONCOR	TXU Electric/PCA	100%	Bridgeport		0%
YOUNG	ONCOR	TXU Electric/PCA	98%	T-NMP	Texas-New Mexico Power Co/PCA	2%
ZAPATA	CPL(AEP)	American Electric Power - West (ERCOT)/PCA	100%	Medina EC		0%
ZAVALA	CPL(AEP)	American Electric Power - West (ERCOT)/PCA	100%	Medina EC		0%

Table 10: 2011 Totalized Annual Electricity Savings from the 2001 IECC by PCA for Single-family Residences Using 1999 Base Year[26]

PCA	Total Electricity Savings by PCA (MWh) 2011-TRY 1999
American Electric Power - West (ERCOT)/PCA	16,241.04
Austin Energy/PCA	462.93
Brownsville Public Utils Board/PCA	0.00
Lower Colorado River Authority/PCA	2,619.16
Reliant Energy HL&P/PCA	41,095.79
San Antonio Public Service Bd /PCA	9,301.30
South Texas Electric Coop Inc/PCA	0.00
Texas Municipal Power Pool/PCA	0.00
Texas-New Mexico Power Co/PCA	788.47
TXU Electric/PCA	64,647.31
El Paso Electric Co/PCA	26.37
Entergy Electric System/PCA	9,875.32
Total	145,057.69

[26] Of a total of 202 counties listed in Table 2, the annual electricity savings in 31 counties (i.e., 11,995 MWh), including 8 non-attainment and affected non-ERCOT counties (i.e, 99.96% of total savings in 31 counties), are not reported in this table since the corresponding PCA could not be assigned for these 31 counties.

Table 11: 2011 Annual NOx Reductions from the 2001 IECC by PCA for Single-family Residences by County Using 2007 eGRID[27]

Area	County	American Electric Power - West (ERCOT) /PCA	NOx Reductions (lbs)	Austin Energy/PCA	NOx Reductions (lbs)	Brownsville Public Utils Board/PCA	NOx Reductions (lbs/year)	Lower Colorado River Auhotrity /PCA	NOx Reductions (lbs)	Reliant Energy HL&P/PCA	NOx Reductions (lbs)	San Antonio Public Service Bd/PCA	NOx Reductions (lbs)	South Texas Electric Coop INC/PCA	NOx Reductions (lbs)	Texas Municipal Power Pool/PCA	NOx Reductions (lbs)	Texas-New Mexico Power Co/PCA	NOx Reductions (lbs)	TXU Electric/PCA	NOx Reductions (lbs)	Total Nox Reductions (lbs)	Total Nox Reductions (Tons)
Houston-Galveston Area	Brazoria	0.00883113	143.426773	0.010890729	5.04160651	0.006522185	0	0.003944232	10.33057524	0.0654443	2689.485056	0.014877	138.379518	0.006262	0	0.0048171	0	0.121275	95.62174509	0.00816387	527.7722564	3610.05753	1.805028765
	Chambers	0.02176222	353.441124	0.026955801	12.4785533	0.016072371	0	0.009076193	23.77200403	0.1649402	6778.349336	0.037472	348.541155	0.015056	0	0.0095532	0	0.011519	9.08206883	0.01581859	1022.62947	8548.293711	4.274146855
	Fort Bend	0.07043123	1143.87649	0.087239726	40.385577	0.052016606	0	0.029374182	76.93568954	0.5338124	21937.44286	0.121275	1128.01824	0.048726	0	0.030918	0	0.037279	29.39319827	0.05119528	3309.636971	27665.68902	13.83284451
	Galveston	0.03385674	549.868659	0.041710519	19.3089024	0.025004711	0	0.015351589	40.20827079	0.2495874	10256.99123	0.056747	527.821508	0.024143	0	0.0192972	0	0.567751	447.6551787	0.03283689	2122.816446	13964.6702	6.982335099
	Harris	0.06826733	1108.73248	0.084559408	39.1447865	0.050418468	0	0.028471701	74.57194792	0.5174117	21263.44556	0.117549	1093.36145	0.047229	0	0.0299681	0	0.036133	28.4901333	0.04962237	3207.952996	26815.69936	13.40784968
	Liberty	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Montgomery	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Waller	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Beaumont/ Port Arthur Area	Hardin	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Jefferson	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Orange	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dallas/ Fort Worth Area	Collin	0.00203914	33.1176757	0.003716345	1.72039424	0.001505992	0	0.005950953	15.58649872	0.0024815	101.9783137	0.000717	6.66950604	0.019166	0	0.0766809	0	0.000864	0.681562038	0.0040002	258.6021316	418.3560821	0.209178041
	Dallas	0.00453947	73.7257329	0.004683963	2.16833019	0.003352602	0	0.00774211	20.27782656	0.0020856	85.70984596	0.000681	6.33474833	0.007503	0	0.026717	0	0.007525	5.933188953	0.04037045	2609.841316	2803.990989	1.401995495
	Denton	0.00047388	7.69630883	0.000872802	0.40404291	0.000349982	0	0.001396994	3.65895073	0.0005854	24.05925906	0.000169	1.57164593	0.004544	0	0.0181872	0	0.000187	0.147132957	0.00084941	54.91177465	92.44911508	0.046224558
	Tarrant	0.01216249	197.531526	0.012266309	5.67839908	0.008982543	0	0.020308652	53.19161434	0.0053165	218.485968	0.001753	16.3005897	0.017326	0	0.0602168	0	0.020603	16.24521139	0.11064724	7153.046409	7660.479717	3.830239859
	Ellis	0.00327981	53.2675831	0.003307809	1.53127251	0.002422289	0	0.005476558	14.34398245	0.0014337	58.91828874	0.000473	4.39571868	0.004672	0	0.0162384	0	0.005556	4.380785018	0.02983782	1928.935105	2065.772735	1.032886368
	Johnson	0.00028606	4.64588725	0.000526868	0.24390105	0.000211267	0	0.000843297	2.208730563	0.0003534	14.52340431	0.000102	0.94872619	0.002743	0	0.0109787	0	0.000113	0.088817009	0.00051274	33.14756713	55.80703351	0.027903517
	Kaufman	0.00632545	102.731928	0.006379446	2.9532141	0.004671629	0	0.010562096	27.66382268	0.002765	113.6298861	0.000911	8.4775886	0.009011	0	0.0313175	0	0.010715	8.44878752	0.05754527	3720.14668	3984.051907	1.992025954
	Parker	0.00021749	3.53225539	0.000400576	0.1854373	0.000160626	0	0.000641157	1.679291816	0.0002687	11.04210464	7.75E-05	0.72131393	0.002085	0	0.0083471	0	8.56E-05	0.067527329	0.00038984	25.20200477	42.42993519	0.021214968
	Rockwall	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Henderson	0.00081989	13.3159465	0.000826893	0.38279084	0.000605529	0	0.001369042	3.58573998	0.0003584	14.72852216	0.000118	1.09885133	0.001168	0	0.0040593	0	0.001389	1.095118182	0.00745892	482.1993994	516.4063683	0.258203184
	Hood	0.01252711	203.453295	0.012634039	5.84863099	0.009251829	0	0.020917482	54.78623803	0.0054759	225.0359272	0.001805	16.7892627	0.017846	0	0.062022	0	0.021221	16.73222423	0.11396431	7367.486549	7890.132127	3.945066063
	Hunt	0.00618756	100.492384	0.006240374	2.88883436	0.004569788	0	0.010331844	27.06075444	0.0027047	111.1527673	0.000892	8.29277812	0.008815	0	0.0306347	0	0.010482	8.264604897	0.05629078	3639.047898	3897.200021	1.948600011
El Paso Area	El Paso	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
San Antonio Area	Bexar	0.03341375	542.67407	0.051775843	23.9684074	0.024677545	0	0.090663423	237.4620342	0.0011418	46.92487181	1.143572	10636.7072	0.046874	0	0.0046695	0	0.00052	0.409675419	0.00250387	161.8681522	11650.01437	5.825007186
	Comal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Guadalupe	0.00200047	32.4896676	0.076378745	35.3577412	0.001477434	0	0.133848731	350.5712743	0.0012371	50.84095201	0.003555	33.0642365	0.001062	0	0.0018557	0	0.000402	0.316743116	0.00183516	118.6384717	621.2790863	0.310639543
	Wilson	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Austin Area	Bastrop	0.00450233	73.1225839	0.171901148	79.5775886	0.003325174	0	0.301245466	789.0101486	0.0027843	114.4247405	0.008001	74.4157325	0.00239	0	0.0041765	0	0.000904	0.712875102	0.0041303	267.0126306	1398.2763	0.69913815
	Caldwell	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Hays	0.0024586	39.9302074	0.093870431	43.4551057	0.001815785	0	0.164501762	430.8564763	0.0015205	62.48416525	0.004369	40.6363598	0.001305	0	0.0022807	0	0.000494	0.389281247	0.00225544	145.808164	763.5597596	0.38177988
	Travis	0.00051001	8.28304434	0.299602906	138.69411	0.000376663	0	0.033939476	88.89292685	0.0003347	13.75512291	0.000906	8.42810589	0.000271	0	0.0004717	0	0.000103	0.081470204	0.00046734	30.21200107	288.3467813	0.144173391
	Williamson	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
North East Texas Area	Gregg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Harrison	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Rusk	0.00068596	11.1407825	0.00069182	0.32026184	0.000506616	0	0.001145408	3.000008246	0.0002999	12.32261352	9.88E-05	0.91935363	0.000977	0	0.0033962	0	0.001162	0.916230288	0.00624051	403.4319785	432.0512285	0.216025614
	Smith	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Upshur	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Corpus Christi Area	Nueces	0.22756873	3695.95287	0.004556851	2.109487	0.168069652	0	0.007612767	19.93905698	0.0016809	69.07741935	0.001627	15.131322	0.046792	0	0.0072464	0	0.001609	1.268985151	0.00828339	535.4991982	4338.97834	2.16948917
	San Patricio	0.05031335	817.141156	0.001007478	0.46638816	0.037158653	0	0.001683113	4.408341945	0.0003716	15.27238151	0.00036	3.34539601	0.010345	0	0.0016021	0	0.000356	0.280560935	0.00183138	118.3939431	959.3081678	0.479654084
Victoria Area	Victoria	0.02183674	354.6513	0.002215582	1.02565159	0.016127403	0	0.003612695	9.462227817	0.0011996	49.29938111	0.000555	5.16583935	0.525456	0	0.0324127	0	0.000477	0.375986443	0.00225485	145.7699363	565.7503227	0.282875161
Other ERCOT counties	Andrews	2.4742E-05	0.40183716	2.49533E-05	0.01155153	1.82731E-05	0	4.13138E-05	0.108207371	1.082E-05	0.444464648	3.57E-06	0.03316019	3.52E-05	0	0.0001225	0	4.19E-05	0.033047533	0.00022509	14.55139789	15.58366632	0.007791833
	Angelina	0.00031082	5.04803878	0.000313473	0.14511496	0.000229554	0	0.000519	1.359344192	0.0001359	5.583542357	4.48E-05	0.41657153	0.000443	0	0.0015389	0	0.000527	0.415156299	0.00282766	182.8004698	195.7682379	0.097884119
	Bosque	0.00059539	9.66978164	0.001096604	0.50764682	0.000439723	0	0.001755208	4.597171884	0.0007356	30.2284883	0.000212	1.97464437	0.005709	0	0.0228507	0	0.000234	0.184860508	0.00106721	68.99214698	116.1547405	0.05807737
	Brazos	0.00193973	31.5031548	0.003572622	1.65386118	0.001432574	0	0.005718288	14.97711356	0.0023964	98.48130837	0.000692	6.43318844	0.018599	0	0.0744451	0	0.000764	0.602256539	0.00347685	224.7693247	378.4202076	0.189210104
	Calhoun	0.08269981	1343.13091	0.001655986	0.76659993	0.061077496	0	0.002766524	7.245970027	0.0006108	25.10313857	0.000591	5.498811	0.017004	0	0.0026334	0	0.000585	0.461156633	0.00301023	194.6035434	1576.810129	0.788405064
	Cameron	0.04837175	785.607483	0.000968599	0.44839013	0.297964476	0	0.001618161	4.238222971	0.0003573	14.68301664	0.000346	3.21629637	0.009946	0	0.0015403	0	0.000342	0.269734021	0.00176071	113.8250924	922.2882352	0.461144118
	Cherokee	0.0035039	56.9069626	0.003533808	1.63589302	0.002587786	0	0.00585073	15.32400055	0.0015316	62.94373909	0.000505	4.69604559	0.004992	0	0.0173479	0	0.005936	4.680091616	0.03187642	2060.724956	2206.911688	1.103455844
	Coke	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Coleman	0.00129879	21.0936498	2.6007E-05	0.01203933	0.000959212	0	4.34478E-05	0.113796766	9.593E-06	0.394240658	9.28E-06	0.08635792	0.000267	0	4.136E-05	0	9.19E-06	0.007242389	4.7275E-05	3.056216611	24.76354348	0.012381772
	Crockett	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Ector	0.00353575	57.4242192	0.003565928	1.65076249	0.002611307	0	0.005903911	15.46328825	0.0015456	63.51586702	0.000509	4.73873035	0.005037	0	0.0175056	0	0.00599	4.722631369	0.03216616	2079.455942	2226.971441	1.11348572
	Fannin	0.00705631	114.60189	0.007116546	3.29443751	0.005211403	0	0.011782473	30.86018559	0.0030845	126.7590316	0.001017	9.45711519	0.010052	0	0.034936	0	0.011954	9.424986339	0.06419422	4149.983836	4444.381482	2.222190741
	Fayette	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Freestone	0.00367718	59.7211879	0.003708565	1.71679299	0.00271576	0	0.006140067	16.08181978	0.0016074	66.0565017	0.00053	4.92827957	0.005238	0	0.0182058	0	0.006229	4.911536624	0.03345281	2162.63418	2316.050298	1.158025149
	Frio	0.00858833	139.483488	0.000871383	0.40338626	0.006342868	0	0.001420864	3.721471023	0.0004718	19.38932583	0.000218	2.03171196	0.206661	0	0.0127478	0	0.000188	0.147874547	0.00088683	57.33095888	222.5082161	0.111254108
	Grimes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Hardeman	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Haskell	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Hidalgo	0.18852746	3061.88197	0.003775086	1.74758728	0.139235931	0	0.006306735	16.51834892	0.0013925	57.22662394	0.001348	12.5354202	0.038764	0	0.0060032	0	0.001333	1.051280385	0.00686231	443.6299376	3594.591172	1.797295586
	Howard	0.00055511	9.01561327	0.000559851	0.25917002	0.000409976	0	0.000926915	2.42773918	0.0002427	9.972003133	8E-05	0.74398156	0.000791	0	0.0027484	0	0.00094	0.741454018	0.00505009	326.4749761	349.6349373	0.174817469
	Jack	0.00212145	34.4545315	0.002139557	0.9904575	0.001566784	0	0.003542346	9.277972952	0.0009273	38.10952021	0.000306	2.84323821	0.003022	0	0.0105033	0	0.003594	2.833578822	0.0192997	1247.673565	1336.182864	0.668091432
	Jones	0.04071872	661.3144	0.000815354	0.37744911	0.030072592	0	0.001362147	3.567682263	0.0003008	12.35997691	0.000291	2.70743743	0.008372	0	0.0012966	0	0.000288	0.227058673	0.00148214	95.81651696	776.3705215	0.388185261
	Lamar	0.00095084	15.4425956	0.000958954	0.44392519	0.000702236	0	0.001587687	4.158407556	0.0004156	17.08076943	0.000137	1.27434552	0.001355	0	0.0047076	0	0.001611	1.27001616	0.00865017	559.209992	598.8800515	0.299440026
	Limestone	0.00071976	11.6895988	0.000891528	0.41271168	0.000531572	0	0.000300183	0.786227665	0.0054552	224.1849599	0.001239	11.5275388	0.000498	0	0.000316	0	0.000381	0.300377442	0.00052318	33.8221203	282.7235345	0.141361767
	Llano	0.00123817	20.1092328	0.047274044	21.8844052	0.000914447	0	0.082844655	216.9834262	0.0007657	31.4676209	0.0022	20.4648579	0.000657	0	0.0011486	0	0.000249	0.196045745	0.00113586	73.43038049	384.5359694	0.192267985
	McLennan	0.02453432	398.462831	0.024743738	11.4545309	0.018119687	0	0.040966843	107.2987269	0.0107245	440.7323691	0.003535	32.8817342	0.034951	0	0.1214699	0	0.041562	32.7700244	0.22319886	14429.20623	15452.80644	7.726403221
	Milam	0.0022454	36.4677113	0.002264571	1.04832997	0.001658332	0	0.003749326	9.82008532	0.0009815	40.33626116	0.000324	3.00936875	0.003199	0	0.011117	0	0.003804	2.999144957	0.02042738	1320.575187	1414.256088	0.707128044
	Mitchell	0.01494317	242.692603	0.015070721	6.97663549	0.011036196	0	0.024951762	65.3526635	0.006532	268.4378003	0.002153	20.0273477	0.021288	0	0.073984	0	0.025314	19.95930837	0.1359442	8788.427287	9411.873645	4.705936823
	Nolan	0.00056465	9.17056344	0.000569473	0.26362434	0.000417022	0	0.000942846	2.469464417	0.0002468	10.14339065	8.14E-05	0.75676828	0.000804	0	0.0027956	0	0.000957	0.754197292	0.00513689	332.086059	355.6440675	0.177822034
	Palo Pinto	0.003207	52.0849887	0.005906709	2.73437188	0.002368511	0	0.009454195	24.76205302	0.003962	162.8217193	0.001144	10.6361585	0.03075	0	0.1230821	0	0.001263	0.995726465	0.00574838	371.6169951	625.652013	0.312826006
	Pecos	4.0968E-05	0.66535772	4.13174E-05	0.0191269	3.02565E-05	0	6.84069E-05	0.179168621	1.791E-05	0.735939867	5.9E-06	0.05490629	5.84E-05	0	0.0002028	0	6.94E-05	0.054719755	0.0003727	24.09405085	25.80327001	0.012901635
	Presidio	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red River	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Robertson	0.00073771	11.9811409	0.000835096	0.38658821	0.00054483	0	0.000735917	1.927484704	0.0031497	129.4385072	0.000731	6.79809244	0.000761	0	0.0018663	0	0.191633	151.0966181	0.00339774	219.6545884	521.28302	0.26064151
	Taylor	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Titus	0.00569644	92.5160678	0.005745061	2.65954082	0.004207073	0	0.009511781	24.91287903	0.00249	102.330312	0.000821	7.63456091	0.008115	0	0.0282032	0	0.00965	7.608623862	0.05182285	3350.208149	3587.870134	1.793935067
	Tom Green	0.00148245	24.0764983	2.96846E-05	0.0137418	0.001094854	0	4.95918E-05	0.129888742	1.095E-05	0.449990145	1.06E-05	0.09856978	0.000305	0	4.72E-05	0	1.05E-05	0.008266534	5.396E-05	3.488395541	28.26535081	0.014132675
	Upton	3.1166E-05	0.50617032	3.14322E-05	0.01455078	2.30176E-05	0	5.20405E-05	0.136302376	1.362E-05	0.559865628	4.49E-06	0.04176991	4.44E-05	0	0.0001543	0	5.28E-05	0.041628007	0.00028353	18.3295287	19.62981572	0.009814908
	Ward	0.01855953	301.426049	0.01871795	8.66503406	0.013707039	0	0.030990277	81.16850248	0.0081128	333.4017788	0.002674	24.8741173	0.02644	0	0.0918886	0	0.03144	24.789612	0.16884373	10915.29318	11689.61827	5.844809136
	Webb	0.02001433	325.053491	0.000400768	0.18552621	0.014781473	0	0.000669531	1.753610046	0.0001478	6.075255048	0.000143	1.33077699	0.004115	0	0.0006373	0	0.000142	0.111605334	0.00072851	47.09634838	381.6066134	0.190803307
	Wharton	0.00014434	2.34422681	0.000178787	0.08276501	0.000106601	0	6.01986E-05	0.157669738	0.001094	44.95794966	0.000249	2.31172737	9.99E-05	0	6.336E-05	0	7.64E-05	0.060237555	0.00010492	6.782672588	56.69724874	0.028348624
	Wichita	0.00020763	3.37217929	0.000209406	0.09693936	0.000153346	0	0.000346701	0.90806599	9.076E-05	3.729905161	2.99E-05	0.27827716	0.000296	0	0.001028	0	0.000352	0.277331759	0.00188893	122.1139506	130.7766494	0.065388325
	Wilbarger	0.02861682	464.76689	0.000573025	0.26526846	0.021134796	0	0.000957307	2.507340821	0.0002114	8.68650075	0.000205	1.90276709	0.005884	0	0.0009112	0	0.000202	0.159575163	0.00104164	67.33914251	545.6274852	0.272813743
	Wise	0.00284449	46.1974364	0.002882008	1.33415775	0.002100781	0	0.00476997	12.49331704	0.0012561	51.61941257	0.000413	3.84368235	0.004182	0	0.0146143	0	0.004798	3.783038537	0.02576141	1665.405973	1784.677017	0.892338509
	Young	0.00623586	101.276793	0.006289085	2.91138361	0.004605458	0	0.010412491	27.27198141	0.0027258	112.0203876	0.000899	8.3575087	0.008883	0	0.0308739	0	0.010564	8.329115567	0.05673017	3667.453058	3927.620227	1.963810114
	Total	**1.12183722**	**18219.8033**	**1.172570094**	**542.813713**	**1.090766584**	**0**	**1.189130767**	**3114.524034**	**1.62936**	**66959.84146**	**1.542363**	**14345.982**	**1.359386**	**0**	**1.2316428**	**0**	**1.221806**	**963.358251**	**1.52878695**	**98831.96579**	**202978.2885**	**101.4891443**

Energy Savings by PCA (MWh)		16,241.04		462.93		0.00		2,619.16		41,095.79		9,301.30		0.00		0.00		788.47		64,647.31	

[27] In this Table, the NOx reductions from the annual electricity savings in two PCAs, including El Paso Electric Co/PCA and Entergy Electric System/PCA, (i.e., 9,902 MWh) are not reported since the emission factors for these two PCAs are not provided in the 2007 eGRID.

Table 12: 2011 Totalized OSD Electricity Savings from the 2001 IECC by PCA for Single-family Residences[28]

PCA	Total Electricity Savings by PCA (MWh) 2011-TRY 1999
American Electric Power - West (ERCOT)/PCA	83.18
Austin Energy/PCA	2.76
Brownsville Public Utils Board/PCA	0.00
Lower Colorado River Authority/PCA	15.62
Reliant Energy HL&P/PCA	235.59
San Antonio Public Service Bd /PCA	54.48
South Texas Electric Coop Inc/PCA	0.00
Texas Municipal Power Pool/PCA	0.00
Texas-New Mexico Power Co/PCA	4.71
TXU Electric/PCA	385.90
El Paso Electric Co/PCA	0.15
Entergy Electric System/PCA	56.61
Total	838.98

[28] Of a total of 202 counties listed in Table 2, the OSD electricity savings in 31 counties (i.e., 59.96 MWh), including 8 non-attainment and affected non-ERCOT counties (i.e, 94.95% of total savings in 31 counties), are not reported in this table since the corresponding PCA could not be assigned for these 31 counties.

Table 13: 2011 OSD NOx Reductions from the 2001 IECC by PCA for Single-family Residences by County Using 2007 eGRID[29]

Area	County	American Electric Power - West (ERCOT) /PCA	NOx Reductions (lbs)	Austin Energy/PCA	NOx Reductions (lbs)	Brownsville Public Utils Board/PCA	NOx Reductions (lbs/year)	Lower Colorado River Auhotrity /PCA	NOx Reductions (lbs)	Reliant Energy HL&P/PCA	NOx Reductions (lbs)	San Antonio Public Service Bd/PCA	NOx Reductions (lbs)	South Texas Electric Coop INC/PCA	NOx Reductions (lbs)	Texas Municipal Power Pool/PCA	NOx Reductions (lbs)	Texas-New Mexico Power Co/PCA	NOx Reductions (lbs)	TXU Electric/ PCA	NOx Reductions (lbs)	Total Nox Reductions (lbs)	Total Nox Reductions (Tons)
Houston-Galveston Area	Brazoria	0.00957217	0.79617687	0.011806715	0.032555284	0.007069474	0	0.004263638	0.066581877	0.0710018	16.72710655	0.01614	0.879348938	0.006781	0	0.0051797	0	0.126288	0.5942349	0.008772	3.384966456	22.48097087	0.011240485
	Chambers	0.0218814	1.82001174	0.027103415	0.07473369	0.016160386	0	0.009125896	0.142511936	0.1658435	39.0705948	0.037677	2.052717851	0.015138	0	0.0096055	0	0.011582	0.05449629	0.015905	6.137793308	49.35285962	0.02467643
	Fort Bend	0.05569551	4.63254215	0.068987309	0.190222381	0.041133619	0	0.023228475	0.362740819	0.4221274	99.44780729	0.095902	5.224857474	0.038531	0	0.0244493	0	0.029479	0.13871139	0.040484	15.62274875	125.6196302	0.062809815
	Galveston	0.02755599	2.29200266	0.033893644	0.093456748	0.020351324	0	0.012791501	0.199754815	0.2014466	47.45824576	0.045813	2.495923887	0.019824	0	0.0167751	0	0.594657	2.79809256	0.028709	11.07892336	66.41639979	0.0332082
	Harris	0.07736057	6.43455997	0.09582276	0.264217201	0.057134232	0	0.032264145	0.503843781	0.5863312	138.1321226	0.133207	7.257280705	0.05352	0	0.0339599	0	0.040946	0.19266889	0.056232	21.6998595	174.4845526	0.087242276
	Liberty	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Montgomery	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Waller	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Beaumont/ Port Arthur Area	Hardin	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Jefferson	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Orange	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dallas/ Fort Worth Area	Collin	0.00176365	0.14669365	0.003151138	0.0086888	0.001302533	0	0.005050143	0.078864107	0.0020858	0.491376271	0.000604	0.032911043	0.015958	0	0.0637888	0	0.000846	0.0039814	0.004013	1.548689199	2.311204469	0.001155602
	Dallas	0.00504555	0.41967001	0.005305276	0.01462852	0.003726366	0	0.008757286	0.136755653	0.0024131	0.568492315	0.000782	0.042618695	0.00931	0	0.033672	0	0.008209	0.03862742	0.044002	16.98035929	18.2011519	0.009100576
	Denton	0.00063576	0.05287993	0.001170951	0.003228724	0.000469535	0	0.001874207	0.029268017	0.0007854	0.18503744	0.000227	0.012350405	0.006096	0	0.0243999	0	0.00025	0.00117799	0.00114	0.439754934	0.723697446	0.000361849
	Tarrant	0.01557224	1.29524032	0.015705165	0.043304689	0.011500796	0	0.026002176	0.40605554	0.006807	1.603638413	0.002244	0.122246191	0.022184	0	0.0770985	0	0.02638	0.12412645	0.141667	54.66908726	58.26369885	0.029131849
	Ellis	0.00350282	0.29135162	0.003532723	0.009740966	0.002586991	0	0.005848935	0.091338217	0.0015312	0.360722757	0.000505	0.027498083	0.00499	0	0.0173426	0	0.005934	0.02792103	0.031867	12.2972758	13.10584848	0.006552924
	Johnson	0.00033718	0.02804503	0.000621017	0.001712363	0.00024902	0	0.000993991	0.015522379	0.0004166	0.098135151	0.00012	0.006550074	0.003233	0	0.0129406	0	0.000133	0.00062475	0.000604	0.233225325	0.383815073	0.000191908
	Kaufman	0.00649275	0.54004261	0.006548174	0.018055628	0.004795187	0	0.01084145	0.169302399	0.0028381	0.668627326	0.000936	0.050969809	0.009249	0	0.0321458	0	0.010999	0.05175377	0.059067	22.79394491	24.29269645	0.012146348
	Parker	0.00047595	0.03958785	0.000876616	0.002417141	0.000351511	0	0.0014031	0.02191111	0.000588	0.138525808	0.00017	0.009245966	0.004564	0	0.0182667	0	0.000187	0.00088189	0.000853	0.329216659	0.541786428	0.000270893
	Rockwall	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Henderson	0.00095027	0.07903995	0.000958382	0.002642599	0.000701818	0	0.001586741	0.024778885	0.0004154	0.09785945	0.000137	0.007459877	0.001354	0	0.0047048	0	0.00161	0.00757462	0.008645	3.336092952	3.555448333	0.001777724
	Hood	0.01232788	1.02538661	0.012433111	0.034282479	0.00910469	0	0.020584816	0.321456883	0.0053888	1.269532255	0.001776	0.096777104	0.017562	0	0.0610356	0	0.020884	0.09826562	0.112152	43.27918878	46.12488974	0.023062445
	Hunt	0.00635121	0.52826974	0.006405424	0.017662017	0.004690653	0	0.010605108	0.165611625	0.0027763	0.654051325	0.000915	0.049858673	0.009048	0	0.031445	0	0.010759	0.05062554	0.05778	22.29703946	23.76311838	0.011881559
El Paso Area	El Paso	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
San Antonio Area	Bexar	0.03112811	2.58911881	0.048234164	0.132998629	0.0229895	0	0.084461674	1.318971544	0.0010637	0.250602251	1.065347	58.041442	0.043667	0	0.0043501	0	0.000484	0.0022776	0.002333	0.900142282	63.23555312	0.031617777
	Comal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Guadalupe	0.00200761	0.16698546	0.076651484	0.211355219	0.00148271	0	0.134326688	2.097674249	0.0012416	0.292493369	0.003567	0.194361377	0.001066	0	0.0018623	0	0.000403	0.00189699	0.001842	0.710715479	3.675482144	0.001837741
	Wilson	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Austin Area	Bastrop	0.00446951	0.37175732	0.170648096	0.470537083	0.003300936	0	0.299049574	4.670022007	0.002764	0.65117378	0.007942	0.432703938	0.002372	0	0.0041461	0	0.000898	0.00422325	0.0041	1.582255647	8.182673026	0.004091337
	Caldwell	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Hays	0.00246935	0.20539143	0.094281013	0.259966058	0.001823727	0	0.165221279	2.580130783	0.0015271	0.359765653	0.004388	0.239063702	0.001311	0	0.0022907	0	0.000496	0.00233329	0.002265	0.874177144	4.520828067	0.002260414
	Travis	0.00050761	0.04222101	0.298194277	0.822226962	0.000374892	0	0.033779905	0.527514204	0.0003331	0.078482361	0.000902	0.049134516	0.00027	0	0.0004695	0	0.000103	0.00048391	0.000465	0.179496074	1.699559034	0.00084978
	Williamson	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
North East Texas Area	Gregg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Harrison	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Rusk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Smith	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Upshur	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Corpus Christi Area	Nueces	0.22352453	18.5919249	0.00447587	0.012341554	0.165082827	0	0.007477478	0.116769892	0.001651	0.388958261	0.001598	0.087054833	0.04596	0	0.0071176	0	0.001581	0.0074384	0.008136	3.139739383	22.34422722	0.011172114
	San Patricio	0.05533089	4.60221391	0.001107949	0.003055008	0.040864326	0	0.001850962	0.028905023	0.0004087	0.096282076	0.000396	0.021549407	0.011377	0	0.0017619	0	0.000391	0.00184129	0.002014	0.777205821	5.531052533	0.002765526
Victoria Area	Victoria	0.02060475	1.71382537	0.002090584	0.005764477	0.015217528	0	0.003408874	0.053233711	0.0011319	0.266670787	0.000524	0.028551175	0.495811	0	0.0305841	0	0.00045	0.0021172	0.002128	0.821050405	2.89121313	0.001445607
Other ERCOT counties	Andrews	2.5653E-05	0.00213369	2.58716E-05	7.13372E-05	1.89456E-05	0	4.28342E-05	0.000668909	1.121E-05	0.002641726	3.7E-06	0.00020138	3.65E-05	0	0.000127	0	4.35E-05	0.00020448	0.000233	0.090058167	0.095979687	4.79898E-05
	Angelina	0.00032149	0.02674034	0.000324234	0.000894029	0.000237435	0	0.000536817	0.008383048	0.0001405	0.033107239	4.63E-05	0.002523782	0.000458	0	0.0015917	0	0.000545	0.0025626	0.002925	1.128647531	1.202858566	0.000601429
	Bosque	0.00093945	0.07814012	0.001730301	0.004771052	0.000693828	0	0.002769496	0.043249042	0.0011606	0.273427891	0.000335	0.018250064	0.009008	0	0.0360555	0	0.00037	0.00174071	0.001684	0.649821271	1.069400153	0.0005347
	Brazos	0.00191393	0.15919316	0.003525105	0.00971996	0.00141352	0	0.005642234	0.088110325	0.0023645	0.557048645	0.000682	0.037180455	0.018351	0	0.073455	0	0.000754	0.00354631	0.003431	1.323866624	2.178665478	0.001089333
	Calhoun	0.08852525	7.36319526	0.001772635	0.004887782	0.065379841	0	0.0029614	0.046245858	0.0006539	0.154044062	0.000633	0.034477427	0.018202	0	0.0028189	0	0.000626	0.00294592	0.003222	1.243470715	8.849267028	0.004424634
	Cameron	0.05467229	4.54743417	0.001094762	0.003018644	0.285623104	0	0.001828931	0.028560969	0.0004038	0.095136039	0.000391	0.021292907	0.011242	0	0.0017409	0	0.000387	0.00181937	0.00199	0.76795481	5.46521691	0.002732608
	Cherokee	0.003513	0.29219765	0.003542982	0.009769252	0.002594504	0	0.005865919	0.091603446	0.0015356	0.361770225	0.000506	0.027577932	0.005005	0	0.0173929	0	0.005951	0.02800211	0.031959	12.33298469	13.14390531	0.006571953
	Coke	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Coleman	0.0013551	0.11271204	2.71346E-05	7.48197E-05	0.001000801	0	4.53316E-05	0.000707908	1.001E-05	0.002358028	9.69E-06	0.000527763	0.000279	0	4.315E-05	0	9.58E-06	4.5095E-05	4.93E-05	0.019034416	0.135460069	6.773E-05
	Crockett	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Ector	0.00362926	0.30186842	0.003660242	0.010092581	0.002680373	0	0.006060061	0.094635215	0.0015864	0.373743614	0.000523	0.02849067	0.00517	0	0.0179686	0	0.006148	0.02892888	0.033017	12.7411654	13.57892479	0.006789462
	Fannin	0.00762852	0.63451113	0.007693632	0.021214061	0.005633999	0	0.012737922	0.198918114	0.0033346	0.785588909	0.001099	0.059885851	0.010867	0	0.0377689	0	0.012923	0.06080695	0.0694	26.78124211	28.54216713	0.014271084
	Fayette	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Freestone	0.00377443	0.31394316	0.003806652	0.010496285	0.002787588	0	0.006302464	0.098420623	0.0016499	0.388693359	0.000544	0.029630297	0.005377	0	0.0186873	0	0.006394	0.03008604	0.034338	13.25081202	14.12208178	0.007061041
	Frio	0.01476384	1.22800024	0.001497957	0.004130397	0.010903753	0	0.002442547	0.038143332	0.0008111	0.191076522	0.000375	0.020457656	0.355262	0	0.0219143	0	0.000322	0.00151703	0.001525	0.588303869	2.07162905	0.001035815
	Grimes	0.00055442	0.04611491	0.001021149	0.002815668	0.000409467	0	0.001634436	0.025523709	0.0006849	0.16136528	0.000198	0.010770396	0.005316	0	0.0212784	0	0.000218	0.00102729	0.000994	0.383496326	0.631113581	0.000315557
	Hardeman	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Haskell	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Hidalgo	0.239737	19.9404169	0.004800509	0.0132367	0.177056459	0	0.008019827	0.125239336	0.0017708	0.417169816	0.001714	0.093369012	0.049294	0	0.0076338	0	0.001695	0.00797791	0.008726	3.367468001	23.96487765	0.011982439
	Howard	0.00058508	0.04866481	0.000590075	0.001627045	0.000432108	0	0.000976955	0.015256333	0.0002558	0.060251958	8.43E-05	0.004593038	0.000833	0	0.0028967	0	0.000991	0.00466368	0.005323	2.054028849	2.189085721	0.001094543
	Jack	0.00217756	0.18112105	0.002196145	0.006055549	0.001608224	0	0.003636037	0.056781129	0.0009519	0.224246169	0.000314	0.017094402	0.003102	0	0.0107811	0	0.003689	0.01735733	0.01981	7.644699242	8.147354873	0.004073677
	Jones	0.04250012	3.5349996	0.000851025	0.002346577	0.031388236	0	0.00142174	0.022202194	0.0003139	0.07395508	0.000304	0.016552283	0.008739	0	0.0013533	0	0.000301	0.00141431	0.001547	0.596978394	4.248448439	0.002124224
	Lamar	0.00107998	0.08982869	0.001089199	0.003003306	0.000797614	0	0.001803327	0.028161135	0.0004721	0.111216999	0.000156	0.00847813	0.001539	0	0.005347	0	0.00183	0.00860853	0.009825	3.791460571	4.040757364	0.002020379
	Limestone	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Llano	0.00124346	0.10342629	0.047475864	0.130907727	0.000918351	0	0.083198331	1.299242906	0.000769	0.181162511	0.00221	0.1203822	0.00066	0	0.0011535	0	0.00025	0.00117495	0.001141	0.440198017	2.276494601	0.001138247
	McLennan	0.02303137	1.91566215	0.023227961	0.064047693	0.017009692	0	0.038457253	0.600556683	0.0100675	2.371783341	0.003319	0.180802278	0.03281	0	0.1140288	0	0.039015	0.18358318	0.209526	80.85565258	86.17208791	0.043086044
	Milam	0.00165249	0.13744804	0.001666598	0.004595398	0.001220439	0	0.002759294	0.043089718	0.0007223	0.170174571	0.000238	0.012972496	0.002354	0	0.0081815	0	0.002799	0.01317202	0.015033	5.801362931	6.182815184	0.003091408
	Mitchell	0.01696145	1.41078953	0.017106233	0.047167928	0.012526789	0	0.028321847	0.442280014	0.0074142	1.746700019	0.002444	0.133151851	0.024163	0	0.0839765	0	0.028733	0.13519985	0.154305	59.54615142	63.46144062	0.03173072
	Nolan	0.00060327	0.05017796	0.000608422	0.001677635	0.000445544	0	0.001007331	0.015730701	0.0002637	0.062125383	8.69E-05	0.00473585	0.000859	0	0.0029868	0	0.001022	0.00480869	0.005488	2.117895141	2.257151361	0.001128576
	Palo Pinto	0.00307488	0.25575684	0.00566337	0.015615911	0.002270935	0	0.00906471	0.141556448	0.0037988	0.894944238	0.001096	0.059733444	0.029483	0	0.1180115	0	0.001211	0.00569744	0.005512	2.126900078	3.500204395	0.001750102
	Pecos	4.2262E-05	0.00351518	4.26225E-05	0.000117525	3.12122E-05	0	7.05678E-05	0.001102001	1.847E-05	0.004352142	6.09E-06	0.000331766	6.02E-05	0	0.0002092	0	7.16E-05	0.00033687	0.000384	0.148367386	0.158122865	7.90614E-05
	Presidio	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red River	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Robertson	0.00035926	0.02988168	0.000406685	0.001121374	0.000265328	0	0.000358385	0.005596624	0.0015339	0.361359339	0.000356	0.019391525	0.000371	0	0.0009089	0	0.093323	0.43912341	0.001655	0.638533882	1.495007834	0.000747504
	Taylor	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Titus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Tom Green	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Upton	3.2238E-05	0.00268143	3.25131E-05	8.96502E-05	2.38092E-05	0	5.38302E-05	0.000840624	1.409E-05	0.003319882	4.65E-06	0.000253076	4.59E-05	0	0.0001596	0	5.46E-05	0.00025697	0.000293	0.113176971	0.120618603	6.03093E-05
	Ward	0.01980763	1.64752341	0.0199767	0.05508282	0.014628815	0	0.033074321	0.516495666	0.0086584	2.039800488	0.002854	0.155495052	0.028218	0	0.098068	0	0.033554	0.15788671	0.180198	69.53813901	74.11042315	0.037055212
	Webb	0.01418005	1.17944258	0.000283942	0.000782929	0.010472596	0	0.000474359	0.007407699	0.0001047	0.024674903	0.000101	0.005522622	0.002916	0	0.0004515	0	0.0001	0.00047188	0.000516	0.199180147	1.417482762	0.000708741
	Wharton	0.00015439	0.01284158	0.000191235	0.000527303	0.000114024	0	6.43902E-05	0.001005531	0.0011702	0.275672938	0.000266	0.014483495	0.000107	0	6.777E-05	0	8.17E-05	0.00038451	0.000112	0.043306828	0.348222183	0.000174111
	Wichita	0.00021984	0.0182857	0.000221719	0.000611359	0.000162364	0	0.000367089	0.005732536	9.61E-05	0.022639551	3.17E-05	0.001725825	0.000313	0	0.0010884	0	0.000372	0.00175237	0.002	0.771797159	0.822544503	0.000411272
	Wilbarger	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Wise	0.00291847	0.24274738	0.002955932	0.008150548	0.002155421	0	0.004892446	0.076401483	0.0012878	0.303378124	0.000424	0.023085097	0.004281	0	0.0149528	0	0.004924	0.02317101	0.026441	10.20334939	10.88028303	0.005440142
	Young	0.00549666	0.45719141	0.005543579	0.015285605	0.004059529	0	0.009178198	0.143328696	0.0024027	0.566049173	0.000792	0.043150223	0.00783	0	0.0272141	0	0.009311	0.04381391	0.050005	19.29698825	20.56580727	0.010282904
	Total	**1.14303735**	**95.0735254**	**1.154658244**	**3.183800673**	**1.089429227**	**0**	**1.180868675**	**18.44069741**	**1.5393506**	**362.6512822**	**1.443965**	**78.66904597**	**1.481727**	**0**	**1.2697054**	**0**	**1.151969**	**5.42046477**	**1.517783**	**585.7094404**	**1149.148257**	**0.574574128**
Energy Savings by PCA (MWh)		83.18		2.76		0.00		15.62		235.59		54.48		0.00		0.00		4.71		385.90			

[29] In this Table, the NOx reductions from the OSD electricity savings in two PCAs, including El Paso Electric Co/PCA and Entergy Electric System/PCA, (i.e., 56.76 MWh) are not reported since the emission factors for these two PCAs are not provided in the 2007 eGRID.

4.1.4 2011 Results for New Multi-family Residential Construction

This section provides the potential electricity reductions and associated emissions reductions from the implementation of the 2001 IECC for new multi-family residences in all the counties in ERCOT region as well as the 41 non-attainment and affected counties. To calculate the NOx emissions reductions from the implementation of the 2001 IECC for multi-family residences, new construction activity was determined by county. Energy savings attributable to the 2001 IECC was then calculated using the Laboratory's code-traceable, DOE-2.1e simulation, which was developed for the TERP. Next, these estimates were applied to the NAHB Builder's survey data to determine the appropriate number of housing types. In addition, the NOx reduction potential from the electricity reductions in each county was calculated using the US EPA's 2007 eGRID database[30].

In Table 14, the 1999 and the 2001 IECC code-compliant building characteristics for multi-family are shown for each county. The 2001 IECC code-compliant characteristics are the minimum building code characteristics required by the 2001 IECC for each county for multi-family residences (i.e., Type A.2). In Table 14, the rows are sorted first by the US EPA's non-attainment and affected designation, and then other ERCOT counties, alphabetically. The fourth column lists the window area for the average house as defined by the NAHB Builder's survey[31]. The fifth, sixth, seventh, and eighth columns show the NAHB Builder's survey average glazing U-value, Solar Heat Gain Coefficient (SHGC), roof insulation and wall insulation, respectively. In columns ninth through thirteenth, the corresponding values from the 2001 IECC code-compliant house are listed for each county (i.e., percent area, glazing U-value, SHGC, roof and wall insulation R-value). For each county the identical window percent area (i.e., window-to-wall area) was used for the 1999 and code-compliant calculation.

The 2001 IECC SHGC is 0.4 for all non-attainment and affected counties since they all fall below the 3,500 HDD_{65}, as required by the 2001 IECC. All houses were assumed to have air conditioner efficiency[32] equal to a SEER 11, and furnace efficiency (AFUE) of 0.80. The values shown in Table 14 represent the only changes that were made to the simulation to obtain the savings calculations. All other variables in the simulation remained the same for the 1999 and the 2001 IECC code-compliant simulation. In cases where the 1999 values were more efficient than the 2001 IECC code-compliant simulation, the 1999 values were used in both simulations, since this indicates that the prevailing practice is already above code.

In Table 15, the code-traceable simulation results for multi-family are shown for each county. In a similar fashion as Table 14, the tables are first divided into the US EPA's non-attainment and affected classifications, followed by an alphabetical listing of other ERCOT counties. In the third column, the 2001 IECC climate zone is listed followed by the number of projected new housing units[33] in the fourth column. In the fifth column, the total simulated energy use is listed if all new construction had been built to pre-code specifications, and, in the sixth column, the total county-wide energy use for code-compliant construction is shown. In a similar fashion as the 2010 report, the values in the fifth and sixth columns come from the associated tables in the 2011 Volume III Appendix to the 2011 Volume II Technical report. As previously explained in the 2010 report, 144 simulations were run for each county, which were then distributed according to the NAHB Builder's survey data to account for 1, 2 or 3 story, and 3 fuel options (i.e., central air conditioning with electric resistance heating, heat pump heating, or a natural gas-fired furnace).

In the seventh and eighth columns of Table 15, the total pre-code and code-compliant peak-day energy use is reported for peak OSD, Episode Day for the 2011 annual report across all counties. In a similar fashion as the annual pre-code and code-compliant energy use, these values are from the associated tables for each county in the Volume III Appendix to this report. In the ninth and tenth columns, the total annual electricity and the OSD savings are shown for each county, respectively. In similar fashion as the 2010 report, a 7% transmission and distribution loss is used in the 2011 report, which represents a fixed 1.07 multiplier for the electricity use. In the eleventh and twelfth columns, the total annual pre-code and code-compliant natural gas use is shown for those residences that had natural gas-fired furnaces and domestic water heaters. Similarly, in columns thirteen and fourteen, the simulated total peak

[30] This analysis assumes transmission and distribution losses of 7%. Counties were assigned to utility service districts as indicated in a fashion similar to the 2010 report.
[31] In a similar fashion as single-family, this value represents the NAHB's reported number of window units times an average window size of 3 x 5 feet, which was determined by surveying local building suppliers. Additional information about the procedures used to determine these values can be found in the MS thesis by Im (2003).
[32] In a similar fashion as single-family, the choice of a SEER 11 efficiency for the air conditioner was based on ARI sales numbers for Texas which show an average SEER 11 for houses built in 1999.
[33] The number of projected new housing units uses the published values for the new housing units in 2011. A vacancy rate of 0% was assumed for 2010 calculations, based on information suggested by the Real Estate Center at Texas A&M University.

OSD natural gas use on the OSD, is shown for each county. Finally, in columns fifteen and sixteen, the total annual and peak-day natural gas savings are shown for each county.

In Table 16[34] and Table 18[35], the annual and OSD electricity savings respectively from Table 15 is assigned to PCA provider(s) in a similar fashion as the single-family residential assignments. The totalized annual and OSD electricity savings for each PCA, as shown in Table 16 and Table 18, are then entered into the bottom row of Table 17 and Table 19, respectively, the 2007 US EPA's eGRID database for Texas. The eGRID then proportions each MWh of electricity savings according to the 1999 measured data from the power plants assigned to that PCA. For each county in which there is a power plant, the lbs-NOx/MWh are calculated and displayed as NOx reductions (lbs) in the column adjacent to the PCA column. In a similar fashion as the single-family residences, adding across the rows then totals the NOx reductions in each county from multiple PCAs that have power plants in that county. Counties that do not show NOx reductions represent counties that do not have power plants in eGRID's database. In Table 17, the PCA assignments for peak annual NOx reductions are shown for each county, and in Table 19, the peak OSD NOx reductions are shown calculated with the 2007 eGRID.

[34] Of a total of 202 counties listed in Table 9, the annual electricity savings in 31 counties (i.e., 11,824 MWh), including 8 non-attainment and affected non-ERCOT counties (i.e, 100% of total savings in 31 counties), are not reported in Table 10 since the corresponding PCA could not be assigned for these 31 counties.

[35] Of a total of 202 counties listed in Table 9, the OSD electricity savings in 31 counties (i.e., 53.12 MWh), including 8 non-attainment and affected non-ERCOT counties (i.e, 100% of total savings in 31 counties), are not reported in Table 12 since the corresponding PCA could not be assigned for these 31 counties.

Table 14: 1999 and the 2001 IECC Code-compliant Building Characteristics used in the DOE-2 Simulations for Multi-family Residential Buildings

		Climate Zone	1999 Average					2000 IECC				
			Area %	Glazing U-value (Btu/ hr-ft2-F)	SHGC	Roof Insulation (hr-ft2-F/Btu)	Wall Insulation (hr-ft2-F/Btu)	Area %	Glazing U-value (Btu/ hr-ft2-F)	SHGC	Roof Insulation (hr-ft2-F/Btu)	Wall Insulation (hr-ft2-F/Btu)
	BRAZORIA	3	7.5%	0.75	0.61	36.08	21.41	7.5%	any	0.40	19.00	11.00
	CHAMBERS	4	7.5%	0.75	0.61	36.08	21.41	7.5%	0.85	0.40	19.00	11.00
	COLLIN	6	7.5%	0.75	0.61	36.08	21.41	7.5%	0.70	0.40	19.00	11.00
	DALLAS	5	7.5%	0.75	0.61	36.08	21.41	7.5%	0.70	0.40	19.00	11.00
	DENTON	6	7.5%	0.75	0.61	36.08	21.41	7.5%	0.55	0.40	30.00	13.00
	EL PASO	6	7.5%	0.75	0.61	36.08	21.41	7.5%	0.55	0.40	30.00	13.00
	FORT BEND	4	7.5%	0.75	0.61	36.08	21.41	7.5%	0.85	0.40	19.00	11.00
Non-attainment	GALVESTON	3	7.5%	0.75	0.61	36.08	21.41	7.5%	any	0.40	19.00	11.00
	HARDIN	4	7.5%	0.75	0.61	36.08	21.41	7.5%	0.85	0.40	19.00	11.00
	HARRIS	4	7.5%	0.75	0.61	36.08	21.41	7.5%	0.85	0.40	19.00	11.00
	JEFFERSON	4	7.5%	0.75	0.61	36.08	21.41	7.5%	0.85	0.40	19.00	11.00
	LIBERTY	4	7.5%	0.75	0.61	36.08	21.41	7.5%	0.85	0.40	19.00	11.00
	MONTGOMERY	4	7.5%	0.75	0.61	36.08	21.41	7.5%	0.85	0.40	19.00	11.00
	ORANGE	4	7.5%	0.75	0.61	36.08	21.41	7.5%	0.85	0.40	19.00	11.00
	TARRANT	5	7.5%	0.75	0.61	36.08	21.41	7.5%	0.70	0.40	19.00	11.00
	WALLER	4	7.5%	0.75	0.61	36.08	21.41	7.5%	0.85	0.40	19.00	11.00
	BASTROP	4	7.5%	0.75	0.61	36.08	21.41	7.5%	0.85	0.40	19.00	11.00
	BEXAR	4	7.5%	0.75	0.61	36.08	21.41	7.5%	0.85	0.40	19.00	11.00
	CALDWELL	4	7.5%	0.75	0.61	36.08	21.41	7.5%	0.85	0.40	19.00	11.00
	COMAL	4	7.5%	0.75	0.61	36.08	21.41	7.5%	0.85	0.40	19.00	11.00
	ELLIS	5	7.5%	0.75	0.61	36.08	21.41	7.5%	0.70	0.40	19.00	11.00
	GREGG	6	7.5%	0.75	0.61	36.08	21.41	7.5%	0.55	0.40	30.00	13.00
	GUADALUPE	4	7.5%	0.75	0.61	36.08	21.41	7.5%	0.85	0.40	19.00	11.00
	HARRISON	6	7.5%	0.75	0.61	36.08	21.41	7.5%	0.55	0.40	30.00	13.00
	HAYS	5	7.5%	0.75	0.61	36.08	21.41	7.5%	0.70	0.40	19.00	11.00
	HENDERSON	5	7.5%	0.75	0.61	36.08	21.41	7.5%	0.70	0.40	19.00	11.00
	HOOD	5	7.5%	0.75	0.61	36.08	21.41	7.5%	0.70	0.40	19.00	11.00
	HUNT	6	7.5%	0.75	0.61	36.08	21.41	7.5%	0.55	0.40	30.00	13.00
Affected	JOHNSON	5	7.5%	0.75	0.61	36.08	21.41	7.5%	0.70	0.40	19.00	11.00
	KAUFMAN	6	7.5%	0.75	0.61	36.08	21.41	7.5%	0.55	0.40	30.00	13.00
	NUECES	3	7.5%	0.75	0.61	36.08	21.41	7.5%	any	0.40	19.00	11.00
	PARKER	6	7.5%	0.75	0.61	36.08	21.41	7.5%	0.55	0.40	30.00	13.00
	ROCKWALL	6	7.5%	0.75	0.61	36.08	21.41	7.5%	0.55	0.40	30.00	13.00
	RUSK	5	7.5%	0.75	0.61	36.08	21.41	7.5%	0.70	0.40	19.00	11.00
	SAN PATRICIO	3	7.5%	0.75	0.61	36.08	21.41	7.5%	any	0.40	19.00	11.00
	SMITH	5	7.5%	0.75	0.61	36.08	21.41	7.5%	0.70	0.40	19.00	11.00
	TRAVIS	5	7.5%	0.75	0.61	36.08	21.41	7.5%	0.70	0.40	19.00	11.00
	UPSHUR	6	7.5%	0.75	0.61	36.08	21.41	7.5%	0.55	0.40	30.00	13.00
	VICTORIA	3	7.5%	0.75	0.61	36.08	21.41	7.5%	any	0.40	19.00	11.00
	WILLIAMSON	5	7.5%	0.75	0.61	36.08	21.41	7.5%	0.70	0.40	19.00	11.00
	WILSON	4	7.5%	0.75	0.61	36.08	21.41	7.5%	0.85	0.40	19.00	11.00
	ANDERSON	5	7.5%	0.75	0.61	36.08	21.41	7.5%	0.70	0.40	19.00	11.00
	ANDREWS	6	7.5%	0.75	0.61	36.08	21.41	7.5%	0.55	0.40	30.00	13.00
	ANGELINA	5	7.5%	0.75	0.61	36.08	21.41	7.5%	0.70	0.40	19.00	11.00
	ARANSAS	3	7.5%	0.75	0.61	36.08	21.41	7.5%	any	0.40	19.00	11.00
	ARCHER	7	7.5%	0.75	0.61	36.08	21.41	7.5%	0.55	0.40	30.00	13.00
	ATASCOSA	3	7.5%	0.75	0.61	36.08	21.41	7.5%	any	0.40	19.00	11.00
	AUSTIN	4	7.5%	0.75	0.61	36.08	21.41	7.5%	0.85	0.40	19.00	11.00
	BANDERA	5	7.5%	0.75	0.61	36.08	21.41	7.5%	0.70	0.40	19.00	11.00
	BAYLOR	7	7.5%	0.75	0.61	36.08	21.41	7.5%	0.55	0.40	30.00	13.00
	BEE	3	7.5%	0.75	0.61	36.08	21.41	7.5%	any	0.40	19.00	11.00
	BELL	5	7.5%	0.75	0.61	36.08	21.41	7.5%	0.70	0.40	19.00	11.00
	BLANCO	5	7.5%	0.75	0.61	36.08	21.41	7.5%	0.70	0.40	19.00	11.00
	BORDEN	7	7.5%	0.75	0.61	36.08	21.41	7.5%	0.55	0.40	30.00	13.00
	BOSQUE	5	7.5%	0.75	0.61	36.08	21.41	7.5%	0.70	0.40	19.00	11.00
	BRAZOS	4	7.5%	0.75	0.61	36.08	21.41	7.5%	0.85	0.40	19.00	11.00
	BREWSTER	5	7.5%	0.75	0.61	36.08	21.41	7.5%	0.70	0.40	19.00	11.00
	BRISCOE	8	7.5%	0.75	0.61	36.08	21.41	7.5%	0.55	0.40	30.00	13.00
	BROOKS	2	7.5%	0.75	0.61	36.08	21.41	7.5%	any	0.40	19.00	11.00
	BROWN	5	7.5%	0.75	0.61	36.08	21.41	7.5%	0.70	0.40	19.00	11.00
	BURLESON	4	7.5%	0.75	0.61	36.08	21.41	7.5%	0.85	0.40	19.00	11.00
	BURNET	5	7.5%	0.75	0.61	36.08	21.41	7.5%	0.70	0.40	19.00	11.00
	CALHOUN	3	7.5%	0.75	0.61	36.08	21.41	7.5%	any	0.40	19.00	11.00
	CALLAHAN	6	7.5%	0.75	0.61	36.08	21.41	7.5%	0.55	0.40	30.00	13.00
	CAMERON	2	7.5%	0.75	0.61	36.08	21.41	7.5%	any	0.40	19.00	11.00
	CHEROKEE	5	7.5%	0.75	0.61	36.08	21.41	7.5%	0.70	0.40	19.00	11.00
	CHILDRESS	7	7.5%	0.75	0.61	36.08	21.41	7.5%	0.55	0.40	30.00	13.00
	CLAY	7	7.5%	0.75	0.61	36.08	21.41	7.5%	0.55	0.40	30.00	13.00
ERCOT	COKE	6	7.5%	0.75	0.61	36.08	21.41	7.5%	0.55	0.40	30.00	13.00
	COLEMAN	5	7.5%	0.75	0.61	36.08	21.41	7.5%	0.70	0.40	19.00	11.00
	COLORADO	4	7.5%	0.75	0.61	36.08	21.41	7.5%	0.85	0.40	19.00	11.00
	COMANCHE	5	7.5%	0.75	0.61	36.08	21.41	7.5%	0.70	0.40	19.00	11.00
	CONCHO	5	7.5%	0.75	0.61	36.08	21.41	7.5%	0.70	0.40	19.00	11.00
	COOKE	6	7.5%	0.75	0.61	36.08	21.41	7.5%	0.55	0.40	30.00	13.00
	CORYELL	5	7.5%	0.75	0.61	36.08	21.41	7.5%	0.70	0.40	19.00	11.00
	COTTLE	7	7.5%	0.75	0.61	36.08	21.41	7.5%	0.55	0.40	30.00	13.00
	CRANE	5	7.5%	0.75	0.61	36.08	21.41	7.5%	0.70	0.40	19.00	11.00
	CROCKETT	5	7.5%	0.75	0.61	36.08	21.41	7.5%	0.70	0.40	19.00	11.00
	CROSBY	7	7.5%	0.75	0.61	36.08	21.41	7.5%	0.55	0.40	30.00	13.00
	CULBERSON	6	7.5%	0.75	0.61	36.08	21.41	7.5%	0.55	0.40	30.00	13.00
	DAWSON	7	7.5%	0.75	0.61	36.08	21.41	7.5%	0.55	0.40	30.00	13.00
	DE WITT	3	7.5%	0.75	0.61	36.08	21.41	7.5%	any	0.40	19.00	11.00
	DELTA	6	7.5%	0.75	0.61	36.08	21.41	7.5%	0.55	0.40	30.00	13.00
	DICKENS	7	7.5%	0.75	0.61	36.08	21.41	7.5%	0.55	0.40	30.00	13.00
	DIMMIT	3	7.5%	0.75	0.61	36.08	21.41	7.5%	any	0.40	19.00	11.00
	DUVAL	3	7.5%	0.75	0.61	36.08	21.41	7.5%	any	0.40	19.00	11.00
	EASTLAND	6	7.5%	0.75	0.61	36.08	21.41	7.5%	0.55	0.40	30.00	13.00
	ECTOR	6	7.5%	0.75	0.61	36.08	21.41	7.5%	0.55	0.40	30.00	13.00
	EDWARDS	5	7.5%	0.75	0.61	36.08	21.41	7.5%	0.70	0.40	19.00	11.00
	ERATH	6	7.5%	0.75	0.61	36.08	21.41	7.5%	0.55	0.40	30.00	13.00
	FALLS	5	7.5%	0.75	0.61	36.08	21.41	7.5%	0.70	0.40	19.00	11.00
	FANNIN	6	7.5%	0.75	0.61	36.08	21.41	7.5%	0.55	0.40	30.00	13.00
	FAYETTE	4	7.5%	0.75	0.61	36.08	21.41	7.5%	0.85	0.40	19.00	11.00
	FISHER	6	7.5%	0.75	0.61	36.08	21.41	7.5%	0.55	0.40	30.00	13.00
	FOARD	7	7.5%	0.75	0.61	36.08	21.41	7.5%	0.55	0.40	30.00	13.00
	FRANKLIN	6	7.5%	0.75	0.61	36.08	21.41	7.5%	0.55	0.40	30.00	13.00
	FREESTONE	5	7.5%	0.75	0.61	36.08	21.41	7.5%	0.70	0.40	19.00	11.00

Table 14: 1999 and the 2001 IECC Code-compliant Building Characteristics used in the DOE-2 Simulations for Multi-family Residential Buildings (Continued)

		Climate Zone	1999 Average					2000 IECC				
			Area %	Glazing U-value (Btu/ hr-ft2-F)	SHGC	Roof Insulation (hr-ft2-F/Btu)	Wall Insulation (hr-ft2-F/Btu)	Area %	Glazing U-value (Btu/ hr-ft2-F)	SHGC	Roof Insulation (hr-ft2-F/Btu)	Wall Insulation (hr-ft2-F/Btu)
	FRIO	3	7.5%	0.75	0.61	36.08	21.41	7.5%	any	0.40	19.00	11.00
	GILLESPIE	5	7.5%	0.75	0.61	36.08	21.41	7.5%	0.70	0.40	19.00	11.00
	GLASSCOCK	6	7.5%	0.75	0.61	36.08	21.41	7.5%	0.55	0.40	30.00	13.00
	GOLIAD	3	7.5%	0.75	0.61	36.08	21.41	7.5%	any	0.40	19.00	11.00
	GONZALES	4	7.5%	0.75	0.61	36.08	21.41	7.5%	0.85	0.40	19.00	11.00
	GRAYSON	6	7.5%	0.75	0.61	36.08	21.41	7.5%	0.55	0.40	30.00	13.00
	GRIMES	4	7.5%	0.75	0.61	36.08	21.41	7.5%	0.85	0.40	19.00	11.00
	HALL	8	7.5%	0.75	0.61	36.08	21.41	7.5%	0.55	0.40	30.00	13.00
	HAMILTON	5	7.5%	0.75	0.61	36.08	21.41	7.5%	0.70	0.40	19.00	11.00
	HARDEMAN	7	7.5%	0.75	0.61	36.08	21.41	7.5%	0.55	0.40	30.00	13.00
	HASKELL	6	7.5%	0.75	0.61	36.08	21.41	7.5%	0.55	0.40	30.00	13.00
	HIDALGO	2	7.5%	0.75	0.61	36.08	21.41	7.5%	any	0.40	19.00	11.00
	HILL	5	7.5%	0.75	0.61	36.08	21.41	7.5%	0.70	0.40	19.00	11.00
	HOPKINS	6	7.5%	0.75	0.61	36.08	21.41	7.5%	0.55	0.40	30.00	13.00
	HOUSTON	5	7.5%	0.75	0.61	36.08	21.41	7.5%	0.70	0.40	19.00	11.00
	HOWARD	6	7.5%	0.75	0.61	36.08	21.41	7.5%	0.55	0.40	30.00	13.00
	HUDSPETH	6	7.5%	0.75	0.61	36.08	21.41	7.5%	0.55	0.40	30.00	13.00
	IRION	5	7.5%	0.75	0.61	36.08	21.41	7.5%	0.70	0.40	19.00	11.00
	JACK	6	7.5%	0.75	0.61	36.08	21.41	7.5%	0.55	0.40	30.00	13.00
	JACKSON	3	7.5%	0.75	0.61	36.08	21.41	7.5%	any	0.40	19.00	11.00
	JEFF DAVIS	6	7.5%	0.75	0.61	36.08	21.41	7.5%	0.55	0.40	30.00	13.00
	JIM HOGG	2	7.5%	0.75	0.61	36.08	21.41	7.5%	any	0.40	19.00	11.00
	JIM WELLS	3	7.5%	0.75	0.61	36.08	21.41	7.5%	any	0.40	19.00	11.00
	JONES	6	7.5%	0.75	0.61	36.08	21.41	7.5%	0.55	0.40	30.00	13.00
	KARNES	3	7.5%	0.75	0.61	36.08	21.41	7.5%	any	0.40	19.00	11.00
	KENDALL	5	7.5%	0.75	0.61	36.08	21.41	7.5%	0.70	0.40	19.00	11.00
	KENEDY	2	7.5%	0.75	0.61	36.08	21.41	7.5%	any	0.40	19.00	11.00
	KENT	7	7.5%	0.75	0.61	36.08	21.41	7.5%	0.55	0.40	30.00	13.00
	KERR	5	7.5%	0.75	0.61	36.08	21.41	7.5%	0.70	0.40	19.00	11.00
	KIMBLE	5	7.5%	0.75	0.61	36.08	21.41	7.5%	0.70	0.40	19.00	11.00
	KING	7	7.5%	0.75	0.61	36.08	21.41	7.5%	0.55	0.40	30.00	13.00
	KINNEY	4	7.5%	0.75	0.61	36.08	21.41	7.5%	0.85	0.40	19.00	11.00
	KLEBERG	2	7.5%	0.75	0.61	36.08	21.41	7.5%	any	0.40	19.00	11.00
	KNOX	7	7.5%	0.75	0.61	36.08	21.41	7.5%	0.55	0.40	30.00	13.00
	LA SALLE	3	7.5%	0.75	0.61	36.08	21.41	7.5%	any	0.40	19.00	11.00
	LAMAR	6	7.5%	0.75	0.61	36.08	21.41	7.5%	0.55	0.40	30.00	13.00
	LAMPASAS	5	7.5%	0.75	0.61	36.08	21.41	7.5%	0.70	0.40	19.00	11.00
	LAVACA	4	7.5%	0.75	0.61	36.08	21.41	7.5%	0.85	0.40	19.00	11.00
	LEE	4	7.5%	0.75	0.61	36.08	21.41	7.5%	0.85	0.40	19.00	11.00
	LEON	5	7.5%	0.75	0.61	36.08	21.41	7.5%	0.70	0.40	19.00	11.00
	LIMESTONE	5	7.5%	0.75	0.61	36.08	21.41	7.5%	0.70	0.40	19.00	11.00
	LIVE OAK	3	7.5%	0.75	0.61	36.08	21.41	7.5%	any	0.40	19.00	11.00
	LLANO	5	7.5%	0.75	0.61	36.08	21.41	7.5%	0.70	0.40	19.00	11.00
	LOVING	6	7.5%	0.75	0.61	36.08	21.41	7.5%	0.55	0.40	30.00	13.00
	MADISON	4	7.5%	0.75	0.61	36.08	21.41	7.5%	0.85	0.40	19.00	11.00
	MARTIN	6	7.5%	0.75	0.61	36.08	21.41	7.5%	0.55	0.40	30.00	13.00
	MASON	5	7.5%	0.75	0.61	36.08	21.41	7.5%	0.70	0.40	19.00	11.00
	MATAGORDA	3	7.5%	0.75	0.61	36.08	21.41	7.5%	any	0.40	19.00	11.00
	MAVERICK	3	7.5%	0.75	0.61	36.08	21.41	7.5%	any	0.40	19.00	11.00
	MCCULLOCH	5	7.5%	0.75	0.61	36.08	21.41	7.5%	0.70	0.40	19.00	11.00
	MCLENNAN	5	7.5%	0.75	0.61	36.08	21.41	7.5%	0.70	0.40	19.00	11.00
	MCMULLEN	3	7.5%	0.75	0.61	36.08	21.41	7.5%	any	0.40	19.00	11.00
ERCOT	MEDINA	4	7.5%	0.75	0.61	36.08	21.41	7.5%	0.85	0.40	19.00	11.00
	MENARD	5	7.5%	0.75	0.61	36.08	21.41	7.5%	0.70	0.40	19.00	11.00
	MIDLAND	6	7.5%	0.75	0.61	36.08	21.41	7.5%	0.55	0.40	30.00	13.00
	MILAM	4	7.5%	0.75	0.61	36.08	21.41	7.5%	0.85	0.40	19.00	11.00
	MILLS	5	7.5%	0.75	0.61	36.08	21.41	7.5%	0.70	0.40	19.00	11.00
	MITCHELL	6	7.5%	0.75	0.61	36.08	21.41	7.5%	0.55	0.40	30.00	13.00
	MONTAGUE	6	7.5%	0.75	0.61	36.08	21.41	7.5%	0.55	0.40	30.00	13.00
	MOTLEY	7	7.5%	0.75	0.61	36.08	21.41	7.5%	0.55	0.40	30.00	13.00
	NACOGDOCHES	5	7.5%	0.75	0.61	36.08	21.41	7.5%	0.70	0.40	19.00	11.00
	NAVARRO	5	7.5%	0.75	0.61	36.08	21.41	7.5%	0.70	0.40	19.00	11.00
	NOLAN	6	7.5%	0.75	0.61	36.08	21.41	7.5%	0.55	0.40	30.00	13.00
	PALO PINTO	6	7.5%	0.75	0.61	36.08	21.41	7.5%	0.55	0.40	30.00	13.00
	PECOS	5	7.5%	0.75	0.61	36.08	21.41	7.5%	0.70	0.40	19.00	11.00
	PRESIDIO	5	7.5%	0.75	0.61	36.08	21.41	7.5%	0.70	0.40	19.00	11.00
	RAINS	6	7.5%	0.75	0.61	36.08	21.41	7.5%	0.55	0.40	30.00	13.00
	REAGAN	5	7.5%	0.75	0.61	36.08	21.41	7.5%	0.70	0.40	19.00	11.00
	REAL	5	7.5%	0.75	0.61	36.08	21.41	7.5%	0.70	0.40	19.00	11.00
	RED RIVER	6	7.5%	0.75	0.61	36.08	21.41	7.5%	0.55	0.40	30.00	13.00
	REEVES	6	7.5%	0.75	0.61	36.08	21.41	7.5%	0.55	0.40	30.00	13.00
	REFUGIO	3	7.5%	0.75	0.61	36.08	21.41	7.5%	any	0.40	19.00	11.00
	ROBERTSON	4	7.5%	0.75	0.61	36.08	21.41	7.5%	0.85	0.40	19.00	11.00
	RUNNELS	5	7.5%	0.75	0.61	36.08	21.41	7.5%	0.70	0.40	19.00	11.00
	SAN SABA	5	7.5%	0.75	0.61	36.08	21.41	7.5%	0.70	0.40	19.00	11.00
	SCHLEICHER	5	7.5%	0.75	0.61	36.08	21.41	7.5%	0.70	0.40	19.00	11.00
	SCURRY	7	7.5%	0.75	0.61	36.08	21.41	7.5%	0.55	0.40	30.00	13.00
	SHACKELFORD	6	7.5%	0.75	0.61	36.08	21.41	7.5%	0.55	0.40	30.00	13.00
	SOMERVELL	5	7.5%	0.75	0.61	36.08	21.41	7.5%	0.70	0.40	19.00	11.00
	STARR	2	7.5%	0.75	0.61	36.08	21.41	7.5%	any	0.40	19.00	11.00
	STEPHENS	6	7.5%	0.75	0.61	36.08	21.41	7.5%	0.55	0.40	30.00	13.00
	STERLING	6	7.5%	0.75	0.61	36.08	21.41	7.5%	0.55	0.40	30.00	13.00
	STONEWALL	7	7.5%	0.75	0.61	36.08	21.41	7.5%	0.55	0.40	30.00	13.00
	SUTTON	5	7.5%	0.75	0.61	36.08	21.41	7.5%	0.70	0.40	19.00	11.00
	TAYLOR	6	7.5%	0.75	0.61	36.08	21.41	7.5%	0.55	0.40	30.00	13.00
	TERRELL	5	7.5%	0.75	0.61	36.08	21.41	7.5%	0.70	0.40	19.00	11.00
	THROCKMORTON	6	7.5%	0.75	0.61	36.08	21.41	7.5%	0.55	0.40	30.00	13.00
	TITUS	6	7.5%	0.75	0.61	36.08	21.41	7.5%	0.55	0.40	30.00	13.00
	TOM GREEN	5	7.5%	0.75	0.61	36.08	21.41	7.5%	0.70	0.40	19.00	11.00
	UPTON	5	7.5%	0.75	0.61	36.08	21.41	7.5%	0.70	0.40	19.00	11.00
	UVALDE	4	7.5%	0.75	0.61	36.08	21.41	7.5%	0.85	0.40	19.00	11.00
	VAL VERDE	4	7.5%	0.75	0.61	36.08	21.41	7.5%	0.85	0.40	19.00	11.00
	VAN ZANDT	6	7.5%	0.75	0.61	36.08	21.41	7.5%	0.55	0.40	30.00	13.00
	WARD	6	7.5%	0.75	0.61	36.08	21.41	7.5%	0.55	0.40	30.00	13.00
	WASHINGTON	4	7.5%	0.75	0.61	36.08	21.41	7.5%	0.85	0.40	19.00	11.00
	WEBB	3	7.5%	0.75	0.61	36.08	21.41	7.5%	any	0.40	19.00	11.00
	WHARTON	3	7.5%	0.75	0.61	36.08	21.41	7.5%	any	0.40	19.00	11.00
	WICHITA	7	7.5%	0.75	0.61	36.08	21.41	7.5%	0.55	0.40	30.00	13.00
	WILBARGER	7	7.5%	0.75	0.61	36.08	21.41	7.5%	0.55	0.40	30.00	13.00
	WILLACY	2	7.5%	0.75	0.61	36.08	21.41	7.5%	any	0.40	19.00	11.00
	WINKLER	6	7.5%	0.75	0.61	36.08	21.41	7.5%	0.55	0.40	30.00	13.00
	WISE	6	7.5%	0.75	0.61	36.08	21.41	7.5%	0.55	0.40	30.00	13.00
	YOUNG	6	7.5%	0.75	0.61	36.08	21.41	7.5%	0.55	0.40	30.00	13.00
	ZAPATA	2	7.5%	0.75	0.61	36.08	21.41	7.5%	any	0.40	19.00	11.00
	ZAVALA	3	7.5%	0.75	0.61	36.08	21.41	7.5%	any	0.40	19.00	11.00

Table 15: 2011 Annual and OSD Electricity and Natural Gas Savings from Implementation of the 2001 IECC for Multi-family Residences

2011 Summary TRY 1999															
	County	Climate Zone	No. of Projected Units (2011)	Precode Total Annual Elec. Use (MWh/yr)	Code-compliant Total Annual Elec. Use (MWh/yr)	Precode OSD Elec. Use (MWh/day)	Code-compliant OSD Elec. Use (MWh/day)	Total Annual Elec. Savings (MWh/yr) w/ 7% of T&D Loss	Total OSD Elec. Savings (MWh/day) w/ 7% of T&D Loss	Precode Total NG Use (Therm/yr)	Code-compliant Total NG Use (Therm/yr)	Precode OSD NG Use (Therm/day)	Code-compliant OSD NG Use (Therm/day)	Total Annual NG Savings (Therm/yr)	Total OSD NG Savings (Therm/day)
Nonattainment County	BRAZORIA	3	379	24,138	21,336	88.35	73.96	2,998.03	15.40	204,878	186,601	368.57	368.57	18,276.04	0.00
	CHAMBERS	4	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0.00	0.00
	COLLIN	6	1,054	69,000	61,761	261.24	220.42	7,745.67	43.69	724,137	680,625	1,018.97	1,018.97	43,511.77	0.00
	DALLAS	5	5,983	390,772	350,343	1,480.36	1,251.01	43,259.61	245.40	4,100,903	3,872,377	5,784.18	5,784.18	228,526.69	0.00
	DENTON	6	2,245	146,968	131,550	556.44	469.48	16,498.13	93.05	1,542,398	1,449,719	2,170.40	2,170.40	92,679.25	0.00
	EL PASO	6	873	54,904	48,967	172.82	150.30	6,352.81	24.10	560,585	524,763	872.57	872.57	35,821.05	0.00
	FORT BEND	4	488	31,100	27,485	113.87	95.29	3,868.88	19.88	263,650	240,160	474.57	474.57	23,490.59	0.00
	GALVESTON	3	30	1,911	1,689	6.99	5.85	237.31	1.22	16,217	14,771	29.17	29.17	1,446.65	0.00
	HARDIN	4	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0.00	0.00
	HARRIS	4	6,231	397,103	350,935	1,453.94	1,216.74	49,399.61	253.80	3,366,404	3,066,466	6,059.51	6,059.51	299,938.29	0.00
	JEFFERSON	4	162	10,362	9,149	37.95	31.79	1,298.47	6.59	88,875	81,291	159.07	159.07	7,583.92	0.00
	LIBERTY	4	8	510	451	1.87	1.56	63.67	0.33	4,321	3,937	7.78	7.78	383.52	0.00
	MONTGOMERY	4	1,214	77,368	68,373	283.27	237.06	9,624.64	49.45	655,884	597,447	1,180.59	1,180.59	58,437.66	0.00
	ORANGE	4	162	10,361	9,147	37.94	31.79	1,298.11	6.59	88,968	81,323	159.07	159.07	7,644.66	0.00
	TARRANT	5	1,584	103,457	92,753	391.92	331.21	11,452.99	64.97	1,085,715	1,025,212	1,531.36	1,531.36	60,502.47	0.00
	WALLER	4	32	2,039	1,802	7.47	6.25	253.70	1.30	17,289	15,748	31.12	31.12	1,540.37	0.00
Affected County	BASTROP	4	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0.00	0.00
	BEXAR	4	2,519	152,745	138,265	558.94	479.72	15,493.61	84.76	1,339,207	1,280,105	2,406.53	2,406.53	59,102.69	0.00
	CALDWELL	4	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0.00	0.00
	COMAL	4	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0.00	0.00
	ELLIS	5	228	14,892	13,351	56.41	47.67	1,648.54	9.35	156,277	147,568	220.42	220.42	8,708.69	0.00
	GREGG	6	208	13,971	12,214	53.40	43.71	1,879.88	10.36	154,426	133,726	201.09	201.09	20,699.63	0.00
	GUADALUPE	4	176	10,672	9,660	39.05	33.52	1,082.52	5.92	93,569	89,440	168.14	168.14	4,129.45	0.00
	HARRISON	6	80	5,352	4,686	20.39	16.72	712.40	3.92	59,833	51,694	77.34	77.34	8,139.43	0.00
	HAYS	5	1,478	92,841	83,173	347.03	294.26	10,345.18	56.46	757,776	731,377	1,403.87	1,403.87	26,398.76	0.00
	HENDERSON	5	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0.00	0.00
	HOOD	5	16	1,045	937	3.96	3.35	115.69	0.66	10,967	10,356	15.47	15.47	611.14	0.00
	HUNT	6	6	392	351	1.48	1.25	43.85	0.25	4,125	3,880	5.80	5.80	245.19	0.00
	JOHNSON	5	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0.00	0.00
	KAUFMAN	6	4	262	234	0.99	0.84	29.40	0.17	2,748	2,583	3.87	3.87	165.13	0.00
	NUECES	3	258	16,997	14,950	61.29	51.49	2,190.27	10.49	128,815	119,927	238.84	238.84	8,888.61	0.00
	PARKER	6	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0.00	0.00
	ROCKWALL	6	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0.00	0.00
	RUSK	5	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0.00	0.00
	SAN PATRICIO	3	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0.00	0.00
	SMITH	5	77	5,142	4,508	19.55	16.07	678.38	3.73	57,712	49,957	74.44	74.44	7,754.70	0.00
	TRAVIS	5	2,469	155,091	138,940	579.71	491.56	17,281.63	94.31	1,265,865	1,221,765	2,345.16	2,345.16	44,099.15	0.00
	UPSHUR	6	30	1,961	1,757	7.42	6.26	218.76	1.23	20,649	19,420	29.00	29.00	1,229.27	0.00
	VICTORIA	3	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0.00	0.00
	WILLIAMSON	5	61	3,832	3,433	14.32	12.14	426.97	2.33	31,275	30,185	57.94	57.94	1,089.53	0.00
	WILSON	4	20	1,213	1,098	4.44	3.81	123.01	0.67	10,633	10,164	19.11	19.11	469.26	0.00
ERCOT	ANDERSON	5	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	**0**	**0.00**
	ANDREWS	6	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	**0**	**0.00**
	ANGELINA	5	288	17,934	15,916	63.63	53.82	2,159.49	10.49	203,093	174,798	287.55	287.55	**28,295**	**0.00**
	ARANSAS	3	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	**0**	**0.00**
	ARCHER	7	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	**0**	**0.00**
	ATASCOSA	3	2	121	110	0.44	0.38	12.26	0.07	1,064	1,017	1.91	1.91	**47**	**0.00**
	AUSTIN	4	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	**0**	**0.00**
	BANDERA	5	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	**0**	**0.00**
	BAYLOR	7	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	**0**	**0.00**
	BEE	3	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	**0**	**0.00**
	BELL	5	379	25,350	22,625	93.70	79.12	2,916.05	15.59	275,564	259,918	365.71	365.71	**15,646**	**0.00**
	BLANCO	5	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	**0**	**0.00**
	BORDEN	7	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	**0**	**0.00**
	BOSQUE	5	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	**0**	**0.00**
	BRAZOS	4	825	52,577	46,465	192.51	161.10	6,540.63	33.60	445,720	406,008	802.29	802.29	**39,713**	**0.00**
	BREWSTER	5	2	135	120	0.42	0.37	15.03	0.06	1,687	1,579	1.93	1.93	**109**	**0.00**
	BRISCOE	8	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	**0**	**0.00**
	BROOKS	2	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	**0**	**0.00**
	BROWN	5	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	**0**	**0.00**
	BURLESON	4	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	**0**	**0.00**
	BURNET	5	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	**0**	**0.00**
	CALHOUN	3	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	**0**	**0.00**
	CALLAHAN	6	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	**0**	**0.00**
	CAMERON	2	83	5,696	4,993	20.98	17.56	751.83	3.66	41,221	38,458	76.96	76.96	**2,763**	**0.00**
	CHEROKEE	5	6	374	332	1.33	1.12	44.99	0.22	4,231	3,642	5.99	5.99	**589**	**0.00**
	CHILDRESS	7	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	**0**	**0.00**
	CLAY	7	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	**0**	**0.00**
	COKE	6	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	**0**	**0.00**
	COLEMAN	5	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	**0**	**0.00**
	COLORADO	4	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	**0**	**0.00**
	COMANCHE	5	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	**0**	**0.00**
	CONCHO	5	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	**0**	**0.00**
	COOKE	6	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	**0**	**0.00**
	CORYELL	5	14	936	836	3.46	2.92	107.72	0.58	10,179	9,601	13.51	13.51	**578**	**0.00**
	COTTLE	7	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	**0**	**0.00**
	CRANE	5	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	**0**	**0.00**
	CROCKETT	5	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	**0**	**0.00**
	CROSBY	7	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	**0**	**0.00**
	CULBERSON	6	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	**0**	**0.00**
	DAWSON	7	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	**0**	**0.00**
	DE WITT	3	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	**0**	**0.00**
	DELTA	6	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	**0**	**0.00**
	DICKENS	7	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	**0**	**0.00**
	DIMMIT	3	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	**0**	**0.00**
	DUVAL	3	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	**0**	**0.00**
	EASTLAND	6	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	**0**	**0.00**
	ECTOR	6	404	26,652	23,851	80.65	69.86	2,997.11	11.55	336,074	313,575	415.98	415.98	**22,499**	**0.00**
	EDWARDS	5	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	**0**	**0.00**
	ERATH	6	12	817	729	2.64	2.26	94.17	0.41	10,262	9,582	11.83	11.83	**680**	**0.00**
	FALLS	5	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	**0**	**0.00**
	FANNIN	6	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	**0**	**0.00**
	FAYETTE	4	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	**0**	**0.00**
	FISHER	6	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	**0**	**0.00**
	FOARD	7	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	**0**	**0.00**
	FRANKLIN	6	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	**0**	**0.00**
	FREESTONE	5	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	**0**	**0.00**
	FRIO	3	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	**0**	**0.00**

Table 15: 2011 Annual and OSD Electricity and Natural Gas Savings from Implementation of the 2001 IECC for Multi-family Residences (Continued)

	2011 Summary TRY 1999														
	County	Climate Zone	No. of Projected Units (2011)	Precode Total Annual Elec. Use (MWh/yr)	Code-compliant Total Annual Elec. Use (MWh/yr)	Precode OSD Elec. Use (MWh/day)	Code-compliant OSD Elec. Use (MWh/day)	Total Annual Elec. Savings (MWh/yr) w/ 7% of T&D Loss	Total OSD Elec. Savings (MWh/day) w/ 7% of T&D Loss	Precode Total NG Use (Therm/yr)	Code-compliant Total NG Use (Therm/yr)	Precode OSD NG Use (Therm/day)	Code-compliant OSD NG Use (Therm/day)	Total Annual NG Savings (Therm/yr)	Total OSD NG Savings (Therm/day)
	GILLESPIE	5	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0	0.00
	GLASSCOCK	6	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0	0.00
	GOLIAD	3	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0	0.00
	GONZALES	4	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0	0.00
	GRAYSON	6	14	915	820	3.46	2.92	102.32	0.58	9,624	9,052	13.53	13.53	572	0.00
	GRIMES	4	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0	0.00
	HALL	8	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0	0.00
	HAMILTON	5	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0	0.00
	HARDEMAN	7	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0	0.00
	HASKELL	6	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0	0.00
	HIDALGO	2	183	12,558	11,009	46.25	38.71	1,657.66	8.07	90,884	84,793	169.68	169.68	6,091	0.00
	HILL	5	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0	0.00
	HOPKINS	6	6	393	352	1.49	1.25	44.09	0.25	4,122	3,875	5.80	5.80	248	0.00
	HOUSTON	5	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0	0.00
	HOWARD	6	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0	0.00
	HUDSPETH	6	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0	0.00
	IRION	5	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0	0.00
	JACK	6	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0	0.00
	JACKSON	3	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0	0.00
	JEFF DAVIS	6	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0	0.00
	JIM HOGG	2	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0	0.00
	JIM WELLS	3	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0	0.00
	JONES	6	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0	0.00
	KARNES	3	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0	0.00
	KENDALL	5	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0	0.00
	KENEDY	2	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0	0.00
	KENT	7	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0	0.00
	KERR	5	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0	0.00
	KIMBLE	5	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0	0.00
	KING	7	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0	0.00
	KINNEY	4	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0	0.00
	KLEBERG	2	23	1,516	1,333	5.47	4.59	195.71	0.94	11,484	10,688	21.29	21.29	796	0.00
	KNOX	7	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0	0.00
	LA SALLE	3	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0	0.00
	LAMAR	6	13	851	762	3.22	2.72	95.53	0.54	8,931	8,395	12.57	12.57	537	0.00
	LAMPASAS	5	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0	0.00
	LAVACA	4	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0	0.00
	LEE	4	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0	0.00
	LEON	5	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0	0.00
	LIMESTONE	5	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0	0.00
	LIVE OAK	3	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0	0.00
	LLANO	5	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0	0.00
	LOVING	6	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0	0.00
	MADISON	4	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0	0.00
	MARTIN	6	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0	0.00
	MASON	5	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0	0.00
	MATAGORDA	3	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0	0.00
	MAVERICK	3	70	4,612	4,056	16.63	13.97	594.26	2.85	34,950	32,538	64.80	64.80	2,412	0.00
	MCCULLOCH	5	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0	0.00
	MCLENNAN	5	82	5,485	4,895	20.27	17.12	630.91	3.37	59,621	56,236	79.12	79.12	3,385	0.00
	MCMULLEN	3	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0	0.00
ERCOT	MEDINA	4	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0	0.00
	MENARD	5	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0	0.00
	MIDLAND	6	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0	0.00
	MILAM	4	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0	0.00
	MILLS	5	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0	0.00
	MITCHELL	6	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0	0.00
	MONTAGUE	6	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0	0.00
	MOTLEY	7	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0	0.00
	NACOGDOCHE	5	14	872	774	3.09	2.62	104.98	0.51	9,873	8,497	13.98	13.98	1,375	0.00
	NAVARRO	5	11	736	657	2.72	2.30	84.63	0.45	7,998	7,544	10.61	10.61	454	0.00
	NOLAN	6	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0	0.00
	PALO PINTO	6	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0	0.00
	PECOS	5	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0	0.00
	PRESIDIO	5	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0	0.00
	RAINS	6	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0	0.00
	REAGAN	5	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0	0.00
	REAL	5	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0	0.00
	RED RIVER	6	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0	0.00
	REEVES	6	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0	0.00
	REFUGIO	3	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0	0.00
	ROBERTSON	4	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0	0.00
	RUNNELS	5	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0	0.00
	SAN SABA	5	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0	0.00
	SCHLEICHER	5	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0	0.00
	SCURRY	7	40	2,692	2,439	7.38	6.50	271.49	0.95	41,407	38,426	43.51	43.51	2,981	0.00
	SHACKELFORI	6	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0	0.00
	SOMERVELL	5	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0	0.00
	STARR	2	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0	0.00
	STEPHENS	6	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0	0.00
	STERLING	6	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0	0.00
	STONEWALL	7	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0	0.00
	SUTTON	5	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0	0.00
	TAYLOR	6	6	409	365	1.32	1.13	47.09	0.21	5,131	4,791	5.92	5.92	340	0.00
	TERRELL	5	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0	0.00
	THROCKMORT	6	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0	0.00
	TITUS	6	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0	0.00
	TOM GREEN	5	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0	0.00
	UPTON	5	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0	0.00
	UVALDE	4	125	7,580	6,861	27.74	23.81	768.84	4.21	66,455	63,522	119.42	119.42	2,933	0.00
	VAL VERDE	4	6	364	329	1.33	1.14	36.90	0.20	3,190	3,049	5.73	5.73	141	0.00
	VAN ZANDT	6	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0	0.00
	WARD	6	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0	0.00
	WASHINGTON	4	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0	0.00
	WEBB	3	316	20,818	18,311	75.07	63.06	2,682.66	12.85	157,774	146,887	292.53	292.53	10,887	0.00
	WHARTON	3	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0	0.00
	WICHITA	7	49	3,573	3,177	11.90	10.05	423.48	1.97	48,197	44,846	46.94	46.94	3,351	0.00
	WILBARGER	7	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0	0.00
	WILLACY	2	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0	0.00
	WINKLER	6	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0	0.00
	WISE	6	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0	0.00
	YOUNG	6	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0	0.00
	ZAPATA	2	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0	0.00
	ZAVALA	3	0	0	0	0.00	0.00	0.00	0.00	0	0	0.00	0.00	0	0.00
	TOTAL		31,048					230,002	1,224.54					1,218,934	0

Table 16: 2011 Totalized Annual Electricity Savings from the 2001 IECC by PCA for Multi-family Residences[36]

PCA	Total Electricity Savings by PCA (MWh) 2011 TRY 1999
American Electric Power - West(ERCOT)/PCA	9,623.83
Austin Energy/PCA	665.43
Brownsville Public Utils Board/PCA	0.00
Lower Colorado River Authority/PCA	10,591.90
Reliant Energy HL&P/PCA	50,566.28
San Antonio Public Service Bd /PCA	17,004.99
South Texas Electric Coop Inc/PCA	0.00
Texas Municipal Power Pool/PCA	0.00
Texas-New Mexico Power Co/PCA	825.51
TXU Electric/PCA	110,309.46
El Paso Electric Co/PCA	62.86
Entergy Electric System/PCA	18,527.20
Total	218,177.46

[36] Of a total of 202 counties listed in Table 9, the annual electricity savings in 31 counties (i.e., 11,824 MWh), including 8 non-attainment and affected non-ERCOT counties (i.e, 100% of total savings in 31 counties), are not reported in this table since the corresponding PCA could not be assigned for these 31 counties.

Table 17: 2011 Annual NOx Reductions from the 2001 IECC by PCA for Multi-family Residences by County using 2007 eGRID[37]

Area	County	American Electric Power - West (ERCOT) /PCA	NOx Reductions (lbs)	Austin Energy/PCA	NOx Reductions (lbs)	Brownsville Public Utils Board/PCA	NOx Reductions (lbs/year)	Lower Colorado River Auhotrity /PCA	NOx Reductions (lbs)	Reliant Energy HL&P/PCA	NOx Reductions (lbs)	San Antonio Public Service Bd/PCA	NOx Reductions (lbs)	South Texas Electric Coop INC/PCA	NOx Reductions (lbs)	Texas Municipal Power Pool/PCA	NOx Reductions (lbs)	Texas-New Mexico Power Co/PCA	NOx Reductions (lbs)	TXU Electric/PCA	NOx Reductions (lbs)	Total Nox Reductions (lbs)	Total Nox Reductions (Tons)
Houston-Galveston Area	Brazoria	0.00883113	84.9893331	0.010890729	7.24704892	0.006522185	0	0.003944232	41.77689455	0.0654443	3309.274092	0.014877	252.990639	0.006262	0	0.0048171	0	0.121275	100.1131749	0.00816387	900.5521034	4696.943285	2.348471643
	Chambers	0.02176222	209.43597	0.026955801	17.9372757	0.016072371	0	0.009076193	96.13409541	0.1649402	8340.412895	0.037472	637.216049	0.015056	0	0.0095532	0	0.011519	9.508660863	0.01581859	1744.940377	11055.58532	5.527792662
	Fort Bend	0.07043123	677.818359	0.087239726	58.0521806	0.052016606	0	0.029374182	311.128288	0.5338124	26992.90376	0.121275	2062.28537	0.048726	0	0.030918	0	0.037279	30.77382029	0.05119528	5647.323252	35780.28503	17.89014252
	Galveston	0.03385674	325.831569	0.041710519	27.7555497	0.025004711	0	0.015351589	162.602435	0.2495874	12620.7042	0.056747	964.983133	0.024143	0	0.0192972	0	0.567751	468.6819002	0.03283689	3622.21923	18192.77802	9.096389009
	Harris	0.06826733	656.993337	0.084559408	56.2686084	0.050418468	0	0.028471701	301.5693059	0.5174117	26163.58449	0.117549	1998.92453	0.047229	0	0.0299681	0	0.036133	29.82833764	0.04962237	5473.817132	34680.98574	17.34049287
	Liberty	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Montgomery	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Waller	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Beaumont/ Port Arthur Area	Hardin	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Jefferson	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Orange	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dallas/ Fort Worth Area	Collin	0.00203914	19.624294	0.003716345	2.47297784	0.001505992	0	0.005950953	63.03187364	0.0024815	125.4791101	0.000717	12.1934418	0.019166	0	0.0766809	0	0.000864	0.713575552	0.0040002	441.2598251	664.7750981	0.332387549
	Dallas	0.00453947	43.6871076	0.004683963	3.11686264	0.003352602	0	0.00774211	82.00362539	0.0020856	105.4615909	0.000681	11.5814252	0.007503	0	0.026717	0	0.007525	6.21187558	0.04037045	4453.242963	4705.305451	2.352652725
	Denton	0.00047388	4.56054431	0.000872802	0.58079081	0.000349982	0	0.001396994	14.79681385	0.0005854	29.60369031	0.000169	2.8733422	0.004544	0	0.0181872	0	0.000187	0.154043909	0.00084941	93.69744917	146.2666746	0.073133337
	Tarrant	0.01216249	117.049783	0.012266309	8.16240534	0.008982543	0	0.020308652	215.107137	0.0053165	268.8358323	0.001753	29.8013512	0.017326	0	0.0602168	0	0.020603	17.00826196	0.11064724	12205.43693	12861.4017	6.430700851
	Ellis	0.00327981	31.5643744	0.003307809	2.20112513	0.002422289	0	0.005476558	58.00713208	0.0014337	72.49594714	0.000473	8.03641822	0.004672	0	0.0162384	0	0.005556	4.586553992	0.02983782	3291.394242	3468.285793	1.734142897
	Johnson	0.00028606	2.75297875	0.000526868	0.35059516	0.000211267	0	0.000843297	8.932116719	0.0003534	17.87030774	0.000102	1.73449691	0.002743	0	0.0109787	0	0.000113	0.092988814	0.00051274	56.56059207	88.29407617	0.044147038
	Kaufman	0.00632545	60.8750923	0.006379446	4.24509271	0.004671629	0	0.010562096	111.8726282	0.002765	139.8157752	0.000911	15.4990463	0.009011	0	0.0313175	0	0.010715	8.845633823	0.05754527	6347.787094	6688.940363	3.344470182
	Parker	0.00021749	2.09308223	0.000400576	0.26655654	0.000160626	0	0.000641157	6.791063951	0.0002687	13.58674618	7.75E-05	1.31873326	0.002085	0	0.0083471	0	8.56E-05	0.070699142	0.00038984	43.00286371	67.12974501	0.033564873
	Rockwall	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Henderson	0.00081989	7.89053106	0.000826893	0.55024205	0.000605529	0	0.001369042	14.50074924	0.0003584	18.12269478	0.000118	2.00896133	0.001168	0	0.0040593	0	0.001389	1.146556758	0.00745892	822.7899025	867.0096377	0.433504819
	Hood	0.01252711	120.558801	0.012634039	8.40710491	0.009251829	0	0.020917482	221.5558026	0.0054759	276.8952227	0.001805	30.6947616	0.017846	0	0.062022	0	0.021221	17.51815017	0.11396431	12571.34195	13246.9718	6.623485898
	Hunt	0.00618756	59.5480221	0.006240374	4.15255016	0.004569788	0	0.010331844	109.4338174	0.0027047	136.767807	0.000892	15.1611689	0.008815	0	0.0306347	0	0.010482	8.652799995	0.05629078	6209.406045	6543.122211	3.271561105
El Paso Area	El Paso	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
San Antonio Area	Bexar	0.03341375	321.568326	0.051775843	34.4533475	0.024677545	0	0.090663423	960.2975761	0.0011418	57.73865975	1.143572	19446.4281	0.046874	0	0.0046695	0	0.00052	0.428918201	0.00250387	276.2000147	21097.11493	10.54855747
	Comal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Guadalupe	0.00200047	19.2521599	0.076378745	50.8249264	0.001477434	0	0.133848731	1417.711871	0.0012371	62.55719655	0.003555	60.4492808	0.001062	0	0.0018557	0	0.000402	0.331620793	0.00183516	202.4360392	1813.563095	0.906781548
	Wilson	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Austin Area	Bastrop	0.00450233	43.3297041	0.171901148	114.388673	0.003325174	0	0.301245466	3190.760728	0.0027843	140.7938031	0.008001	136.049641	0.00239	0	0.0041765	0	0.000904	0.746359415	0.0041303	455.6108875	4081.679796	2.040839898
	Caldwell	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Hays	0.0024586	23.6611451	0.093870431	62.4644696	0.001815785	0	0.164501762	1742.385604	0.0015205	76.88357618	0.004369	74.2929214	0.001305	0	0.0022807	0	0.000494	0.407566098	0.00225544	248.7964215	2228.891703	1.114445852
	Travis	0.00051001	4.9082218	0.299602906	199.365618	0.000376663	0	0.033939476	359.4834116	0.0003347	16.92497669	0.000906	15.4085802	0.000271	0	0.0004717	0	0.000103	0.085296924	0.00046734	51.55155615	647.7276617	0.323863831
	Williamson	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
North East Texas Area	Gregg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Harrison	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Rusk	0.00068596	6.60161037	0.00069182	0.46035985	0.000506616	0	0.001145408	12.13204737	0.0002999	15.16234699	9.88E-05	1.68079688	0.000977	0	0.0033962	0	0.001162	0.959266357	0.00624051	688.3869177	725.3833455	0.362691673
	Smith	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Upshur	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Corpus Christi Area	Nueces	0.22756873	2190.08322	0.004556851	3.03227859	0.168069652	0	0.007612767	80.63363959	0.0016809	84.99623884	0.001627	27.663652	0.046792	0	0.0072464	0	0.001609	1.328590398	0.00828339	913.7367936	3301.474415	1.650737207
	San Patricio	0.05031335	484.207239	0.001007478	0.67040888	0.037158653	0	0.001683113	17.82735543	0.0003716	18.79188596	0.00036	6.1161788	0.010345	0	0.0016021	0	0.000356	0.293739106	0.00183138	202.0187935	729.9256008	0.3649628
Victoria Area	Victoria	0.02183674	210.153075	0.002215582	1.47432118	0.016127403	0	0.003612695	38.26529351	0.0011996	60.66037225	0.000555	9.44438179	0.525456	0	0.0324127	0	0.000477	0.393646826	0.00225485	248.7311926	569.1222834	0.284561142
Other ERCOT counties	Andrews	2.4742E-05	0.23811365	2.49533E-05	0.01660473	1.82731E-05	0	4.13138E-05	0.437591113	1.082E-05	0.546891064	3.57E-06	0.0606247	3.52E-05	0	0.0001225	0	4.19E-05	0.034599802	0.00022509	24.82944456	26.16386962	0.013081935
	Angelina	0.00031082	2.99127868	0.000313473	0.20859525	0.000229554	0	0.000519	5.497194265	0.0001359	6.870263889	4.48E-05	0.76159173	0.000443	0	0.0015389	0	0.000527	0.434656522	0.00282766	311.9173954	328.6809758	0.164340488
	Bosque	0.00059539	5.72995037	0.001096604	0.72971608	0.000439723	0	0.001755208	18.59098458	0.0007356	37.19461201	0.000212	3.61011912	0.005709	0	0.0228507	0	0.000234	0.193543554	0.00106721	117.72317	183.7720958	0.091886048
	Brazos	0.00193973	18.6675895	0.003572622	2.37734001	0.001432574	0	0.005718288	60.56751723	0.0023964	121.1762235	0.000692	11.7613971	0.018599	0	0.0744451	0	0.000764	0.63054501	0.00347685	383.5299899	598.7106022	0.299355301
	Calhoun	0.08269981	795.889063	0.001655986	1.10194779	0.061077496	0	0.002766524	29.30273665	0.0006108	30.88813076	0.000591	10.0531331	0.017004	0	0.0026334	0	0.000585	0.482817528	0.00301023	332.0572998	1199.775129	0.599887565
	Cameron	0.04837175	465.521566	0.000968599	0.64453764	0.297964476	0	0.001618161	17.1393935	0.0003573	18.06670257	0.000346	5.880154	0.009946	0	0.0015403	0	0.000342	0.282403644	0.00176071	194.2228397	701.7575966	0.350878798
	Cherokee	0.0035039	33.7209343	0.003533808	2.35151171	0.002587786	0	0.00585073	61.97032985	0.0015316	77.44905834	0.000505	8.58548717	0.004992	0	0.0173479	0	0.005936	4.89991926	0.03187642	3516.270837	3705.248077	1.852624039
	Coke	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Coleman	0.00129879	12.4993067	2.6007E-05	0.01730591	0.000959212	0	4.34478E-05	0.460194655	9.593E-06	0.485093008	9.28E-06	0.1578828	0.000267	0	4.136E-05	0	9.19E-06	0.00758257	4.7275E-05	5.214905225	18.84227088	0.009421135
	Crockett	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Ector	0.00353575	34.0274412	0.003565928	2.37288581	0.002611307	0	0.005903911	62.53360996	0.0015456	78.15303255	0.000509	8.66352506	0.005037	0	0.0175056	0	0.00599	4.94445714	0.03216616	3548.232026	3738.926978	1.869463489
	Fannin	0.00705631	67.9087871	0.007116546	4.73558373	0.005211403	0	0.011782473	124.7987347	0.0030845	155.9705187	0.001017	17.2898537	0.010052	0	0.034936	0	0.011954	9.867685481	0.06419422	7081.229881	7461.801045	3.730900522
	Fayette	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Freestone	0.00367718	35.3885388	0.003708565	2.46780124	0.00271576	0	0.006140067	65.03495436	0.0016074	81.27915385	0.00053	9.01006607	0.005238	0	0.0182058	0	0.006229	5.142235425	0.03345281	3690.161307	3888.484057	1.944242028
	Frio	0.00858833	82.6526897	0.000871383	0.57984691	0.006342868	0	0.001420864	15.04964621	0.0004718	23.85757582	0.000218	3.71445222	0.206661	0	0.0127478	0	0.000188	0.154820333	0.00088683	97.82536877	223.8344	0.1119172
	Grimes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Hardeman	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Haskell	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Hidalgo	0.18852746	1814.35656	0.003775086	2.51206644	0.139235931	0	0.006306735	66.80028023	0.0013925	70.41443995	0.001348	22.9177266	0.038764	0	0.0060032	0	0.001333	1.100659865	0.00686231	756.9777846	2735.079518	1.367539759
	Howard	0.00055511	5.3423147	0.000559851	0.37254352	0.000409976	0	0.000926915	9.817788589	0.0002427	12.27004089	8E-05	1.36017507	0.000791	0	0.0027484	0	0.00094	0.776280706	0.00505009	557.0730991	587.0122426	0.293506121
	Jack	0.00212145	20.4164647	0.002139557	1.42373148	0.001566784	0	0.003542346	37.52016598	0.0009273	46.89181953	0.000306	5.19811504	0.003022	0	0.0105033	0	0.003594	2.966674284	0.0192997	2128.939216	2243.356187	1.121678093
	Jones	0.04071872	391.870141	0.000815354	0.5425636	0.030072592	0	0.001362147	14.42772374	0.0003008	15.20832074	0.000291	4.94983894	0.008372	0	0.0012966	0	0.000288	0.2377238	0.00148214	163.4943195	590.7306311	0.295365316
	Lamar	0.00095084	9.15070366	0.000958954	0.63811953	0.000702236	0	0.001587687	16.81661959	0.0004156	21.01701499	0.000137	2.32980641	0.001355	0	0.0047076	0	0.001611	1.329669834	0.00865017	954.1951637	1005.477098	0.502738549
	Limestone	0.00071976	6.92681835	0.000891528	0.59325172	0.000531572	0	0.000300183	3.179508351	0.0054552	275.8481509	0.001239	21.07508	0.000498	0	0.000316	0	0.000381	0.314486411	0.00052318	57.71160043	365.6488961	0.182824448
	Llano	0.00123817	11.9159781	0.047274044	31.457702	0.000914447	0	0.082844655	877.4819896	0.0007657	38.71930143	0.0022	37.414623	0.000657	0	0.0011486	0	0.000249	0.20525417	0.00113586	125.2962482	1122.491096	0.561245548
	McLennan	0.02453432	236.114147	0.024743738	16.4652965	0.018119687	0	0.040966843	433.9165529	0.0107245	542.2986855	0.003535	60.1156232	0.034951	0	0.1214699	0	0.041562	34.30925864	0.22319886	24620.94561	25944.16517	12.97208259
	Milam	0.0022454	21.6093996	0.002264571	1.50692018	0.001658332	0	0.003749326	39.71247093	0.0009815	49.63171061	0.000324	5.50184113	0.003199	0	0.011117	0	0.003804	3.140017193	0.02042738	2253.333228	2374.435587	1.187217794
	Mitchell	0.01494317	143.810545	0.015070721	10.0285531	0.011036196	0	0.024951762	264.2864766	0.006532	330.2990124	0.002153	36.6147503	0.021288	0	0.073984	0	0.025314	20.89681304	0.1359442	14995.93164	15801.86779	7.900933896
	Nolan	0.00056465	5.43413237	0.000569473	0.37894638	0.000417022	0	0.000942846	9.986525644	0.0002468	12.48092449	8.14E-05	1.38355223	0.000804	0	0.0027956	0	0.000957	0.789622541	0.00513689	566.6474419	597.1011456	0.298550573
	Palo Pinto	0.003207	30.8636132	0.005906709	3.93051832	0.002368511	0	0.009454195	100.1378581	0.003962	200.3438153	0.001144	19.445425	0.03075	0	0.1230821	0	0.001263	1.042496533	0.00574838	634.1001494	989.8638759	0.494931938
	Pecos	4.0968E-05	0.39426606	4.13174E-05	0.02749394	3.02565E-05	0	6.84069E-05	0.724558741	1.791E-05	0.905536445	5.9E-06	0.10038174	5.84E-05	0	0.0002028	0	6.94E-05	0.057289986	0.0003727	41.11233191	43.32185882	0.021660929
	Presidio	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red River	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Robertson	0.00073771	7.09957527	0.000835096	0.55570058	0.00054483	0	0.000735917	7.79475715	0.0031497	159.2674767	0.000731	12.4285283	0.000761	0	0.0018663	0	0.191633	158.1937471	0.00339774	374.8025767	720.1423617	0.360071181
	Taylor	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Titus	0.00569644	54.8215562	0.005745061	3.82295253	0.004207073	0	0.009511781	100.7477992	0.00249	125.912226	0.000821	13.9577914	0.008115	0	0.0282032	0	0.00965	7.966007007	0.05182285	5716.550954	6023.779287	3.011889643
	Tom Green	0.00148245	14.266831	2.96846E-05	0.01975313	0.001094854	0	4.95918E-05	0.525270682	1.095E-05	0.553689906	1.06E-05	0.18020897	0.000305	0	4.72E-05	0	1.05E-05	0.008654819	5.396E-05	5.952343846	21.50675233	0.010753376
	Upton	3.1166E-05	0.29993757	3.14322E-05	0.02091599	2.30176E-05	0	5.20405E-05	0.551207446	1.362E-05	0.688886081	4.49E-06	0.07636533	4.44E-05	0	0.0001543	0	5.28E-05	0.043583308	0.00028353	31.27617155	32.95706727	0.016478534
	Ward	0.01855953	178.613785	0.01871795	12.4555388	0.013707039	0	0.030990277	328.2458034	0.0081128	410.2338722	0.002674	45.4757969	0.02644	0	0.0918886	0	0.03144	25.95399989	0.16884373	18625.06055	19626.03935	9.813019673
	Webb	0.02001433	192.614523	0.000400768	0.26668434	0.014781473	0	0.000669531	7.091607222	0.0001478	7.475291259	0.000143	2.43297655	0.004115	0	0.0006373	0	0.000142	0.116847526	0.00072851	80.36177552	290.359705	0.145179852
	Wharton	0.00014434	1.38910099	0.000178787	0.11897043	0.000106601	0	6.01986E-05	0.637617155	0.001094	55.31846243	0.000249	4.22638693	9.99E-05	0	6.336E-05	0	7.64E-05	0.063066961	0.00010492	11.57345804	73.32706295	0.036663531
	Wichita	0.00020763	1.99822713	0.000209406	0.13934532	0.000153346	0	0.000346701	3.672223107	9.076E-05	4.589457928	2.99E-05	0.50875676	0.000296	0	0.001028	0	0.000352	0.290358253	0.00188893	208.3663432	219.5647117	0.109782356
	Wilbarger	0.02861682	275.403449	0.000573025	0.3813097	0.021134796	0	0.000957307	10.139698	0.0002114	10.68829582	0.000205	3.47871036	0.005884	0	0.0009112	0	0.000202	0.167070536	0.00104164	114.9026037	415.1611373	0.207580569
	Wise	0.00284449	27.3748703	0.002882008	1.91778285	0.002100781	0	0.00476997	50.52303251	0.0012561	63.51505254	0.000413	7.02716465	0.004182	0	0.0146143	0	0.004798	3.960730881	0.02576141	2841.727343	2996.045977	1.498022988
	Young	0.00623586	60.0128335	0.006289085	4.18496354	0.004605458	0	0.010412491	110.2880203	0.0027258	137.8353695	0.000899	15.2795117	0.008883	0	0.0308739	0	0.010564	8.720340782	0.05673017	6257.874538	6594.195578	3.297097789
	Total	**1.12183722**	**10796.3729**	**1.172570094**	**780.266671**	**1.090766584**	**0**	**1.189130767**	**12595.14975**	**1.62936**	**82390.66733**	**1.542363**	**26227.8638**	**1.359386**	**0**	**1.2316428**	**0**	**1.221806**	**1008.607958**	**1.52878695**	**168639.6615**	**302438.59**	**151.219295**

Energy Savings by PCA (MWh)		AEP - West (ERCOT)		Austin Energy		Brownsville Public Utils Board		LCRA		Reliant Energy HL&P		San Antonio Public Service Bd		South Texas Electric Coop		Texas Municipal Power Pool		Texas-New Mexico Power Co		TXU Electric
		9,623.83		665.43		0.00		10,591.90		50,566.28		17,004.99		0.00		0.00		825.51		110,309.46

[37] In this Table, the NOx reductions from the annual electricity savings in two PCAs, including El Paso Electric Co/PCA and Entergy Electric System/PCA, (i.e., 18,590.06 MWh) are not reported since the emission factors for these two PCAs are not provided in the 2007 eGRID.

Table 18: 2011 Totalized OSD Electricity Savings from the 2001 IECC by PCA for Multi-family Residences[38]

PCA	Total Electricity Savings by PCA (MWh) 2011 TRY 1999
American Electric Power - West(ERCOT)/PCA	47.03
Austin Energy/PCA	3.61
Brownsville Public Utils Board/PCA	0.00
Lower Colorado River Authority/PCA	57.73
Reliant Energy HL&P/PCA	259.80
San Antonio Public Service Bd /PCA	92.93
South Texas Electric Coop Inc/PCA	0.00
Texas Municipal Power Pool/PCA	0.00
Texas-New Mexico Power Co/PCA	4.50
TXU Electric/PCA	610.31
El Paso Electric Co/PCA	0.32
Entergy Electric System/PCA	95.19
Total	1,171.42

[38] Of a total of 202 counties listed in Table 9, the OSD electricity savings in 31 counties (i.e., 53.12 MWh), including 8 non-attainment and affected non-ERCOT counties (i.e, 100% of total savings in 31 counties), are not reported in this table since the corresponding PCA could not be assigned for these 31 counties.

Table 19: 2011 OSD NOx Reductions from the 2001 IECC by PCA for Multi-family Residences by County using 2007 eGRID[39]

Area	County	American Electric Power - West (ERCOT) /PCA	NOx Reductions (lbs)	Austin Energy/PCA	NOx Reductions (lbs)	Brownsville Public Utils Board/PCA	NOx Reductions (lbs/year)	Lower Colorado River Auhotrity /PCA	NOx Reductions (lbs)	Reliant Energy HL&P/PCA	NOx Reductions (lbs)	San Antonio Public Service Bd/PCA	NOx Reductions (lbs)	South Texas Electric Coop INC/PCA	NOx Reductions (lbs)	Texas Municipal Power Pool/PCA	NOx Reductions (lbs)	Texas-New Mexico Power Co/PCA	NOx Reductions (lbs)	TXU Electric/ PCA	NOx Reductions (lbs)	Total Nox Reductions (lbs)	Total Nox Reductions (Tons)
Houston-Galveston Area	Brazoria	0.00957217	0.45022642	0.011806715	0.042589371	0.007069474	0	0.004263638	0.246120433	0.0710018	18.44608423	0.01614	1.499871805	0.006781	0	0.0051797	0	0.126288	0.56822345	0.008772	5.353466987	26.60658269	0.013303291
	Chambers	0.0218814	1.02919012	0.027103415	0.097767872	0.016160386	0	0.009125896	0.526796494	0.1658435	43.08572319	0.037677	3.501242222	0.015138	0	0.0096055	0	0.011582	0.05211082	0.015905	9.707178574	58.00000929	0.029000005
	Fort Bend	0.05569551	2.61963507	0.068987309	0.248852124	0.041133619	0	0.023228475	1.340874293	0.4221274	109.6676597	0.095902	8.911839289	0.038531	0	0.0244493	0	0.029479	0.13263957	0.040484	24.70803501	147.6295351	0.073814768
	Galveston	0.02755599	1.2960941	0.033893644	0.122261693	0.020351324	0	0.012791501	0.738395247	0.2014466	52.3353394	0.045813	4.257201784	0.019824	0	0.0167751	0	0.594657	2.67561165	0.028709	17.52178382	78.9466877	0.039473344
	Harris	0.07736057	3.63864988	0.09582276	0.345653393	0.057134232	0	0.032264145	1.862462504	0.5863312	152.327407	0.133207	12.37846576	0.05352	0	0.0339599	0	0.040946	0.18423519	0.056232	34.31924155	205.0561153	0.102528058
	Liberty	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Montgomery	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Waller	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Beaumont/ Port Arthur Area	Hardin	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Jefferson	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Orange	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dallas/ Fort Worth Area	Collin	0.00176365	0.08295312	0.003151138	0.011366834	0.001302533	0	0.005050143	0.291521793	0.0020858	0.54187304	0.000604	0.056135106	0.015958	0	0.0637888	0	0.000846	0.00380712	0.004013	2.449317182	3.4369742	0.001718487
	Dallas	0.00504555	0.23731728	0.005305276	0.019137276	0.003726366	0	0.008757286	0.50551835	0.0024131	0.626913991	0.000782	0.072693076	0.00931	0	0.033672	0	0.008209	0.03693658	0.044002	26.85515324	28.35366979	0.014176835
	Denton	0.00063576	0.02990283	0.001170951	0.004223872	0.000469535	0	0.001874207	0.108189454	0.0007854	0.204052995	0.000227	0.021065612	0.006096	0	0.0243999	0	0.00025	0.00112643	0.00114	0.695490946	1.06405214	0.000532026
	Tarrant	0.01557224	0.73243952	0.015705165	0.056651924	0.011500796	0	0.026002176	1.500987503	0.006807	1.768437904	0.002244	0.208510645	0.022184	0	0.0770985	0	0.02638	0.11869306	0.141667	86.46146356	90.84718412	0.045423592
	Ellis	0.00350282	0.1647551	0.003532723	0.012743295	0.002586991	0	0.005848935	0.33763244	0.0015312	0.397792788	0.000505	0.046902428	0.00499	0	0.0173426	0	0.005934	0.02669884	0.031867	19.44865951	20.4351844	0.010217592
	Johnson	0.00033718	0.01585905	0.000621017	0.002240143	0.00024902	0	0.000993991	0.057378596	0.0004166	0.108220107	0.00012	0.01117221	0.003233	0	0.0129406	0	0.000133	0.00059741	0.000604	0.368855673	0.564323189	0.000282162
	Kaufman	0.00649275	0.30538622	0.006548174	0.023620677	0.004795187	0	0.01084145	0.625827651	0.0028381	0.737339476	0.000936	0.086937251	0.009249	0	0.0321458	0	0.010999	0.04948835	0.059067	36.0495837	37.87818333	0.018939092
	Parker	0.00047595	0.02238635	0.000876616	0.003162145	0.000351511	0	0.0014031	0.08099459	0.000588	0.15276155	0.00017	0.015770489	0.004564	0	0.0182667	0	0.000187	0.00084329	0.000853	0.520670009	0.796588424	0.000398294
	Rockwall	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Henderson	0.00095027	0.04469594	0.000958382	0.003457092	0.000701818	0	0.001586741	0.091595344	0.0004154	0.107916073	0.000137	0.012724026	0.001354	0	0.0047048	0	0.00161	0.00724305	0.008645	5.276171484	5.543803014	0.002771902
	Hood	0.01232788	0.57984118	0.012433111	0.044848916	0.00910469	0	0.020584816	1.1882679	0.0053888	1.399996995	0.001776	0.165069	0.017562	0	0.0610356	0	0.020884	0.09396424	0.112152	68.44785951	71.91984774	0.035959924
	Hunt	0.00635121	0.29872884	0.006405424	0.023105749	0.004690653	0	0.010605108	0.612184678	0.0027763	0.721265558	0.000915	0.085042029	0.009048	0	0.031445	0	0.010759	0.04840951	0.05778	35.26370681	37.05244317	0.018526222
El Paso Area	El Paso	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
San Antonio Area	Bexar	0.03112811	1.46410895	0.048234164	0.173991047	0.0229895	0	0.084461674	4.875588701	0.0010637	0.27635564	1.065347	98.99906472	0.043667	0	0.0043501	0	0.000484	0.0021779	0.002333	1.423612924	107.2148999	0.05360745
	Comal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Guadalupe	0.00200761	0.09442784	0.076651484	0.276498458	0.00148271	0	0.134326688	7.754069385	0.0012416	0.32255174	0.003567	0.331514757	0.001066	0	0.0018623	0	0.000403	0.00181396	0.001842	1.124026457	9.904902596	0.004952451
	Wilson	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Austin Area	Bastrop	0.00446951	0.21022335	0.170648096	0.61556454	0.003300936	0	0.299049574	17.26277313	0.002764	0.718092299	0.007942	0.738046535	0.002372	0	0.0041461	0	0.000898	0.00403838	0.0041	2.502403932	22.05114217	0.011025571
	Caldwell	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Hays	0.00246935	0.11614586	0.094281013	0.340091977	0.001823727	0	0.165221279	9.537473762	0.0015271	0.396737327	0.004388	0.407761801	0.001311	0	0.0022907	0	0.000496	0.00223116	0.002265	1.382547964	12.18298985	0.006091495
	Travis	0.00050761	0.02387537	0.298194277	1.075651165	0.000374892	0	0.033779905	1.949960411	0.0003331	0.086547678	0.000902	0.083806863	0.00027	0	0.0004695	0	0.000103	0.00046273	0.000465	0.2838806	3.504184807	0.001752092
	Williamson	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
North East Texas Area	Gregg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Harrison	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Rusk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Smith	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Upshur	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Corpus Christi Area	Nueces	0.22352453	10.5134626	0.00447587	0.016145429	0.165082827	0	0.007477478	0.431640826	0.001651	0.428929943	0.001598	0.148486095	0.04596	0	0.0071176	0	0.001581	0.0071128	0.008136	4.965630046	16.5114077	0.008255704
	San Patricio	0.05533089	2.60248489	0.001107949	0.003996613	0.040864326	0	0.001850962	0.106847646	0.0004087	0.106176599	0.000396	0.036755999	0.011377	0	0.0017619	0	0.000391	0.00176069	0.002014	1.229183734	4.08720617	0.002043603
Victoria Area	Victoria	0.02060475	0.96914327	0.002090584	0.007541187	0.015217528	0	0.003408874	0.196778833	0.0011319	0.294075475	0.000524	0.048698646	0.495811	0	0.0305841	0	0.00045	0.00202453	0.002128	1.298525789	2.816787725	0.001408394
Other ERCOT counties	Andrews	2.5653E-05	0.00120657	2.58716E-05	9.33246E-05	1.89456E-05	0	4.28342E-05	0.002472626	1.121E-05	0.002913205	3.7E-06	0.000343486	3.65E-05	0	0.000127	0	4.35E-05	0.00019553	0.000233	0.142430783	0.149655523	7.48278E-05
	Angelina	0.00032149	0.01512127	0.000324234	0.001169583	0.000237435	0	0.000536817	0.030988003	0.0001405	0.036509537	4.63E-05	0.004304718	0.000458	0	0.0015917	0	0.000545	0.00245043	0.002925	1.785003597	1.875547137	0.000937774
	Bosque	0.00093945	0.0441871	0.001730301	0.006241571	0.000693828	0	0.002769496	0.159870425	0.0011606	0.301526979	0.000335	0.031128435	0.009008	0	0.0360555	0	0.00037	0.00166451	0.001684	1.027719704	1.572338729	0.000786169
	Brazos	0.00191393	0.09002141	0.003525105	0.012715815	0.00141352	0	0.005642234	0.325700511	0.0023645	0.614294301	0.000682	0.063417279	0.018351	0	0.073455	0	0.000754	0.00339108	0.003431	2.093750812	3.203291208	0.001601646
	Calhoun	0.08852525	4.1637796	0.001772635	0.006394279	0.065379841	0	0.0029614	0.170948178	0.0006539	0.169874552	0.000633	0.058806827	0.018202	0	0.0028189	0	0.000626	0.00281697	0.003222	1.966601297	6.539221709	0.003269611
	Cameron	0.05467229	2.57150775	0.001094762	0.003949041	0.285623104	0	0.001828931	0.105575848	0.0004038	0.104912788	0.000391	0.036318496	0.011242	0	0.0017409	0	0.000387	0.00173973	0.00199	1.21455287	4.038556521	0.002019278
	Cherokee	0.003513	0.16523351	0.003542982	0.0127803	0.002594504	0	0.005865919	0.338612858	0.0015356	0.398947901	0.000506	0.047038623	0.005005	0	0.0173929	0	0.005951	0.02677637	0.031959	19.50513462	20.49452419	0.010247262
	Coke	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Coleman	0.0013551	0.06373702	2.71346E-05	9.78804E-05	0.001000801	0	4.53316E-05	0.002616788	1.001E-05	0.002600353	9.69E-06	0.000900185	0.000279	0	4.315E-05	0	9.58E-06	4.3121E-05	4.93E-05	0.03010373	0.100099073	5.00495E-05
	Crockett	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Ector	0.00362926	0.17070219	0.003660242	0.013203285	0.002680373	0	0.006060061	0.349819816	0.0015864	0.412151747	0.000523	0.048595445	0.00517	0	0.0179686	0	0.006148	0.02766258	0.033017	20.15068961	21.17282467	0.010586412
	Fannin	0.00762852	0.3588068	0.007693632	0.027752592	0.005633999	0	0.012737922	0.735302375	0.0033346	0.866320731	0.001099	0.102145003	0.010867	0	0.0377689	0	0.012923	0.05814525	0.0694	42.35566213	44.50413488	0.022252067
	Fayette	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Freestone	0.00377443	0.17753028	0.003806652	0.013731416	0.002787588	0	0.006302464	0.363812609	0.0016499	0.428637817	0.000544	0.050539263	0.005377	0	0.0186873	0	0.006394	0.02876908	0.034338	20.95671719	22.01973766	0.011009869
	Frio	0.01476384	0.69441624	0.001497957	0.005403455	0.010903753	0	0.002442547	0.140997128	0.0008111	0.21071269	0.000375	0.034893841	0.355262	0	0.0219143	0	0.000322	0.00145062	0.001525	0.930427342	2.018301321	0.001009151
	Grimes	0.00055442	0.02607731	0.001021149	0.003683504	0.000409467	0	0.001634436	0.09434859	0.0006849	0.177948143	0.000198	0.018370652	0.005316	0	0.0212784	0	0.000218	0.00098232	0.000994	0.606515588	0.927926111	0.000463963
	Hardeman	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Haskell	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Hidalgo	0.239737	11.2760151	0.004800509	0.017316474	0.177056459	0	0.008019827	0.462948192	0.0017708	0.460040685	0.001714	0.159255948	0.049294	0	0.0076338	0	0.001695	0.0076287	0.008726	5.325792445	17.70899756	0.008854499
	Howard	0.00058508	0.02751924	0.000590075	0.002128528	0.000432108	0	0.000976955	0.056395155	0.0002558	0.06644381	8.43E-05	0.007834169	0.000833	0	0.0028967	0	0.000991	0.00445954	0.005323	3.248533118	3.413313564	0.001706657
	Jack	0.00217756	0.10242132	0.002196145	0.007921971	0.001608224	0	0.003636037	0.20989189	0.0009519	0.247291048	0.000314	0.029157267	0.003102	0	0.0107811	0	0.003689	0.01659755	0.01981	12.09041376	12.7036948	0.006351847
	Jones	0.04250012	1.99899075	0.000851025	0.003069832	0.031388236	0	0.00142174	0.082070585	0.0003139	0.081555147	0.000304	0.028232595	0.008739	0	0.0013533	0	0.000301	0.0013524	0.001547	0.944146468	3.139417781	0.001569709
	Lamar	0.00107998	0.05079682	0.001089199	0.003928976	0.000797614	0	0.001803327	0.104097859	0.0004721	0.122646324	0.000156	0.014460821	0.001539	0	0.005347	0	0.00183	0.00823171	0.009825	5.996354548	6.300517054	0.003150259
	Limestone	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Llano	0.00124346	0.05848606	0.047475864	0.171255694	0.000918351	0	0.083198331	4.802661636	0.000769	0.199779856	0.00221	0.205331307	0.00066	0	0.0011535	0	0.00025	0.00112352	0.001141	0.6961917	6.134829771	0.003067415
	McLennan	0.02303137	1.08327902	0.023227961	0.083788271	0.017009692	0	0.038457253	2.219962508	0.0100675	2.615522006	0.003319	0.308387521	0.03281	0	0.1140288	0	0.039015	0.1755472	0.209526	127.8766193	134.3631058	0.067181553
	Milam	0.00165249	0.07772487	0.001666598	0.006011777	0.001220439	0	0.002759294	0.159281482	0.0007223	0.187662729	0.000238	0.02212669	0.002354	0	0.0081815	0	0.002799	0.01259545	0.015033	9.175099766	9.640502756	0.004820251
	Mitchell	0.01696145	0.79778092	0.017106233	0.061705878	0.012526789	0	0.028321847	1.634891556	0.0074142	1.926201378	0.002444	0.227112013	0.024163	0	0.0839765	0	0.028733	0.12928175	0.154305	94.17474591	98.9517194	0.04947586
	Nolan	0.00060327	0.0283749	0.000608422	0.002194711	0.000445544	0	0.001007331	0.058148659	0.0002637	0.06850976	8.69E-05	0.008077758	0.000859	0	0.0029868	0	0.001022	0.0045982	0.005488	3.349540348	3.519444342	0.001759722
	Palo Pinto	0.00307488	0.14462676	0.00566337	0.020428998	0.002270935	0	0.00906471	0.523264527	0.0037988	0.986914069	0.001096	0.101885048	0.029483	0	0.1180115	0	0.001211	0.00544805	0.005512	3.363782035	5.146349486	0.002573175
	Pecos	4.2262E-05	0.00198778	4.26225E-05	0.000153749	3.12122E-05	0	7.05678E-05	0.004073556	1.847E-05	0.004799394	6.09E-06	0.000565881	6.02E-05	0	0.0002092	0	7.16E-05	0.00032212	0.000384	0.234649269	0.246551752	0.000123276
	Presidio	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red River	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Robertson	0.00035926	0.01689765	0.000406685	0.001467	0.000265328	0	0.000358385	0.020687963	0.0015339	0.398494789	0.000356	0.033075382	0.000371	0	0.0009089	0	0.093323	0.41990166	0.001655	1.009868222	1.900392673	0.000950196
	Taylor	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Titus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Tom Green	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Upton	3.2238E-05	0.00151631	3.25131E-05	0.000117282	2.38092E-05	0	5.38302E-05	0.003107373	1.409E-05	0.003661053	4.65E-06	0.000431663	4.59E-05	0	0.0001596	0	5.46E-05	0.00024572	0.000293	0.178994145	0.188073546	9.40368E-05
	Ward	0.01980763	0.93165048	0.0199767	0.072060273	0.014628815	0	0.033074321	1.909230296	0.0086584	2.249422607	0.002854	0.265221956	0.028218	0	0.098068	0	0.033554	0.15097553	0.180198	109.977495	115.5560562	0.057778028
	Webb	0.01418005	0.66695759	0.000283942	0.001024241	0.010472596	0	0.000474359	0.027382618	0.0001047	0.027210643	0.000101	0.009419725	0.002916	0	0.0004515	0	0.0001	0.00045122	0.000516	0.315011789	1.047457831	0.000523729
	Wharton	0.00015439	0.00726172	0.000191235	0.000689827	0.000114024	0	6.43902E-05	0.003716952	0.0011702	0.30400274	0.000266	0.024703943	0.000107	0	6.777E-05	0	8.17E-05	0.00036768	0.000112	0.068491571	0.409234439	0.000204617
	Wichita	0.00021984	0.0103403	0.000221719	0.00079979	0.000162364	0	0.000367089	0.021190365	9.61E-05	0.024966127	3.17E-05	0.002943673	0.000313	0	0.0010884	0	0.000372	0.00167566	0.002	1.220629706	1.282545623	0.000641273
	Wilbarger	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Wise	0.00291847	0.1372701	0.002955932	0.010662684	0.002155421	0	0.004892446	0.282418683	0.0012878	0.334555078	0.000424	0.039375366	0.004281	0	0.0149528	0	0.004924	0.02215675	0.026441	16.13702672	16.96346538	0.008481733
	Young	0.00549666	0.25853508	0.005543579	0.019996886	0.004059529	0	0.009178198	0.529815654	0.0024027	0.624219777	0.000792	0.073599683	0.00783	0	0.0272141	0	0.009311	0.04189605	0.050005	30.5189995	32.06706262	0.016033531
	Total	**1.14303735**	**53.762693**	**1.154658244**	**4.165101681**	**1.089429227**	**0**	**1.180868675**	**68.16618322**	**1.5393506**	**399.9195005**	**1.443965**	**134.1827788**	**1.481727**	**0**	**1.2697054**	**0**	**1.151969**	**5.18319477**	**1.517783**	**926.3241437**	**1591.703596**	**0.795851798**

Energy Savings by PCA (MWh)		47.03		3.61		0.00		57.73		259.80		92.93		0.00		0.00		4.50		610.31	

[39] In this Table, the NOx reductions from the OSD electricity savings in two PCAs, including El Paso Electric Co/PCA and Entergy Electric System/PCA, (i.e., 95.51 MWh) are not reported since the emission factors for these two PCAs are not provided in the 2007 eGRID.

4.1.5 2011 Results for New Residential Construction (Single-family and Multi-family), Using 1999 Base Year and 2007 eGRID

In Table 20, the combined NOx emissions reductions are listed from single-family electricity savings, multi-family electricity savings, and natural gas savings[40] (single-family and multi-family), which also show the 2011 annual and OSD electricity savings are shown for the combined single-family and multi-family savings.

Using the 2007 eGRID the total NOx reductions from electricity and natural gas savings from new construction in 2011 are 263.52 tons NOx/year, which represents 101.49 tons NOx/year (38.5%) from single-family residential electricity savings, 151.22 tons NOx/year (57.4%) from multi-family residential electricity savings, and 10.81 tons NOx/year (4.1%) from natural gas savings from single-family and multi-family residential. On a peak OSD, the NOx reductions in 2011 are calculated to be 1.373 tons of NOx/day, which represents 0.57 tons NOx/day (41.5%) from single-family residential electricity savings, 0.80 tons NOx/day (58.3%) from multi-family residential electricity savings, and 0.003 tons NOx/day (0.2%) from natural gas savings from single-family and multi-family residential.

Figure 35 through Figure 40 show the electricity and NOx reductions tabulated in Table 20. Figure 35 shows the annual electricity savings by county as a stacked bar chart, and Figure 36 shows the OSD electricity savings by county in a similar fashion. Figure 37 shows the spatial distribution of the electricity savings by county across the state.

Figure 38 shows the annual NOx reductions in a similar format as the electricity savings using a stacked bar chart with the ordering of the counties determined by Table 20. Figure 39 shows the OSD NOx reductions, also as a stacked bar chart, and Figure 40 shows the spatial distribution of the NOx savings by county across the state.

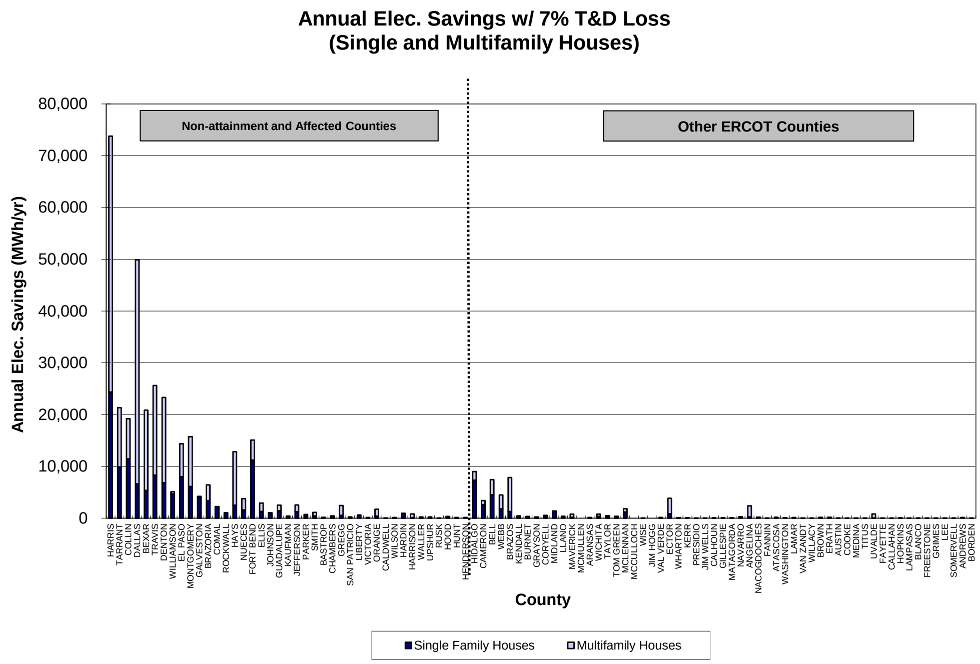
[40] 0.092 lb-NOx/MMBtu of emission rate was used for the calculation.

Table 20: 2011 Annual and OSD NOx Reductions from Electricity and Natural Gas Savings Due to the 2001 IECC for Single-family and Multi-family Residences by County (Using 1999 Base year and 2007 eGRID)

	Electricity Savings and Resultant NOx Reductions (Single Family Houses)				Electricity Savings and Resultant NOx Reductions (Multifamily Houses)				Total Electricity Savings and Resultant NOx Reductions (Single and Multi-Family Houses)				Total Natural Gas Savings and Resultant NOx Reductions (Single and Multi-Family Houses)				Total Nox Reductions	
County	Total Annual Electricity Savings per County w/ 7% T&D Loss (MWh/County)	Annual Nox Reductions (Tons)	OSD Electricity Savings per County w/ 7% T&D Loss (MWh/County)	OSD Nox Reductions (Tons)	Total Annual Electricity Savings per County w/ 7% T&D Loss (MWh/County)	Annual Nox Reductions (Tons)	OSD Electricity Savings per County w/ 7% T&D Loss (MWh/County)	OSD Nox Reductions (Tons)	Total Annual Electricity Savings per County w/ 7% T&D Loss (MWh/County)	Annual Nox Reductions (Tons)	OSD Electricity Savings per County w/ 7% T&D Loss (MWh/County)	OSD Nox Reductions (Tons)	Total Annual N.G. Savings (Therm/County)	Annual Nox Reductions (Tons)	Total OSD N.G. Savings (Therm/County)	OSD Nox Reductions (Tons)	Annual Nox Reductions (Tons)	OSD Nox Reductions (Tons)
HARRIS	24,380.48	13.41	139.77	0.09	49,399.61	17.34	253.80	0.10	73,780.09	30.75	393.5718	0.1898	467,557.07	2.15	98.0970	0.0005	32.90	0.1902
TARRANT	9,905.75	3.83	61.25	0.03	11,452.99	6.43	64.97	0.05	21,358.74	10.26	126.2184	0.0746	142,508.20	0.66	41.9000	0.0002	10.92	0.0747
COLLIN	11,448.16	0.21	70.49	0.00	7,745.67	0.33	43.69	0.00	19,193.83	0.54	114.1722	0.0029	139,215.98	0.64	48.0043	0.0002	1.18	0.0031
DALLAS	6,632.23	1.40	41.01	0.01	43,259.61	2.35	245.40	0.01	49,891.84	3.75	286.4066	0.0233	283,432.27	1.30	28.0535	0.0001	5.06	0.0234
BEXAR	5,396.53	5.83	31.62	0.03	15,493.61	10.55	84.76	0.05	20,890.14	16.37	116.3746	0.0852	97,448.49	0.45	26.6666	0.0001	16.82	0.0853
TRAVIS	8,346.23	0.14	49.83	0.00	17,281.63	0.32	94.31	0.00	25,627.85	0.47	144.1422	0.0026	85,102.58	0.39	35.9486	0.0002	0.86	0.0028
DENTON	6,828.27	0.05	42.04	0.00	16,498.13	0.07	93.05	0.00	23,326.40	0.12	135.0920	0.0009	149,762.15	0.69	28.6322	0.0001	0.81	0.0010
WILLIAMSON	4,692.85	0.00	28.02	0.00	426.97	0.00	2.33	0.00	5,119.82	0.00	30.3478	0.0000	24,144.61	0.11	20.2129	0.0001	0.11	0.0001
EL PASO	8,037.53	0.00	34.20	0.00	6,352.81	0.00	24.10	0.00	14,390.35	0.00	58.2977	0.0000	105,319.37	0.48	35.8176	0.0002	0.48	0.0002
MONTGOMERY	6,135.18	0.00	35.17	0.00	9,624.64	0.00	49.45	0.00	15,759.82	0.00	84.6208	0.0000	100,617.77	0.46	24.6854	0.0001	0.46	0.0001
GALVESTON	3,993.63	6.98	22.89	0.03	237.31	9.10	1.22	0.04	4,230.94	16.08	24.1076	0.0727	28,988.51	0.13	16.1007	0.0001	16.21	0.0728
BRAZORIA	3,421.86	1.81	19.61	0.01	2,998.03	2.35	15.40	0.01	6,419.89	4.15	35.0137	0.0245	41,874.71	0.19	13.7956	0.0001	4.35	0.0246
COMAL	2,245.24	0.00	13.15	0.00	0.00	0.00	0.00	0.00	2,245.24	0.00	13.1540	0.0000	15,953.87	0.07	11.0947	0.0001	0.07	0.0001
ROCKWALL	1,070.33	0.00	6.59	0.00	0.00	0.00	0.00	0.00	1,070.33	0.00	6.5900	0.0000	8,947.78	0.04	4.4881	0.0000	0.04	0.0000
HAYS	2,525.17	0.38	15.08	0.00	10,345.18	1.11	56.46	0.01	12,870.34	1.50	71.5338	0.0084	38,804.42	0.18	10.8763	0.0001	1.67	0.0084
NUECES	1,605.66	2.17	8.32	0.01	2,190.27	1.65	10.49	0.01	3,795.93	3.82	18.8092	0.0194	16,835.75	0.08	6.1912	0.0000	3.90	0.0195
FORT BEND	11,216.73	13.83	64.30	0.06	3,868.88	17.89	19.88	0.07	15,085.62	31.72	84.1802	0.1366	100,607.00	0.46	45.1315	0.0002	32.19	0.1368
ELLIS	1,298.57	1.03	8.03	0.01	1,648.54	1.73	9.35	0.01	2,947.10	2.77	17.3809	0.0168	19,458.98	0.09	5.4928	0.0000	2.86	0.0168
JOHNSON	1,071.38	0.03	6.62	0.00	0.00	0.04	0.00	0.00	1,071.38	0.07	6.6246	0.0005	8,869.53	0.04	4.5318	0.0000	0.11	0.0005
GUADALUPE	1,429.79	0.31	8.38	0.00	1,082.52	0.91	5.92	0.00	2,512.32	1.22	14.2986	0.0068	14,289.04	0.07	7.0652	0.0000	1.28	0.0068
KAUFMAN	395.84	1.99	2.44	0.01	29.40	3.34	0.17	0.02	425.24	5.34	2.6030	0.0311	3,474.28	0.02	1.6598	0.0000	5.35	0.0311
JEFFERSON	1,269.48	0.00	7.23	0.00	1,298.47	0.00	6.59	0.00	2,567.94	0.00	13.8197	0.0000	16,066.13	0.07	5.1314	0.0000	0.07	0.0000
PARKER	734.39	0.02	4.52	0.00	0.00	0.03	0.00	0.00	734.39	0.05	4.5216	0.0007	6,139.35	0.03	3.0794	0.0000	0.08	0.0007
SMITH	450.72	0.00	2.69	0.00	678.38	0.00	3.73	0.00	1,129.10	0.00	6.4192	0.0000	13,024.43	0.06	1.6339	0.0000	0.06	0.0000
BASTROP	201.50	0.70	1.21	0.00	0.00	2.04	0.00	0.01	201.50	2.74	1.2056	0.0151	781.26	0.00	0.7066	0.0000	2.74	0.0151
CHAMBERS	469.84	4.27	2.68	0.02	0.00	5.53	0.00	0.03	469.84	9.80	2.6781	0.0537	3,153.45	0.01	1.9077	0.0000	9.82	0.0537
GREGG	571.39	0.00	3.42	0.00	1,879.88	0.00	10.36	0.00	2,451.28	0.00	13.7812	0.0000	27,366.44	0.13	1.9607	0.0000	0.13	0.0000
SAN PATRICIO	258.83	0.48	1.34	0.00	0.00	0.36	0.00	0.00	258.83	0.84	1.3414	0.0048	1,281.06	0.01	0.9980	0.0000	0.85	0.0048
LIBERTY	554.93	0.00	3.18	0.00	63.67	0.00	0.33	0.00	618.60	0.00	3.5063	0.0000	4,159.50	0.02	2.2257	0.0000	0.02	0.0000
VICTORIA	157.96	0.28	0.91	0.00	0.00	0.28	0.00	0.00	157.96	0.57	0.9092	0.0029	1,434.45	0.01	0.7331	0.0000	0.57	0.0029
ORANGE	439.25	0.00	2.50	0.00	1,298.11	0.00	6.59	0.00	1,737.37	0.00	9.0843	0.0000	10,600.68	0.05	1.7752	0.0000	0.05	0.0000
CALDWELL	30.33	0.00	0.18	0.00	0.00	0.00	0.00	0.00	30.33	0.00	0.1813	0.0000	147.05	0.00	0.1310	0.0000	0.00	0.0000
WILSON	26.52	0.00	0.16	0.00	123.01	0.00	0.67	0.00	149.53	0.00	0.8283	0.0000	657.69	0.00	0.1310	0.0000	0.00	0.0000
HARDIN	971.46	0.00	5.53	0.00	0.00	0.00	0.00	0.00	971.46	0.00	5.5293	0.0000	6,391.47	0.03	3.9302	0.0000	0.03	0.0000
HARRISON	119.78	0.00	0.71	0.00	712.40	0.00	3.92	0.00	832.18	0.00	4.6338	0.0000	9,580.42	0.04	0.4151	0.0000	0.04	0.0000
WALLER	10.98	0.00	0.06	0.00	253.70	0.00	1.30	0.00	264.67	0.00	1.3664	0.0000	1,615.82	0.01	0.0442	0.0000	0.01	0.0000
UPSHUR	25.97	0.00	0.16	0.00	218.76	0.00	1.23	0.00	244.74	0.00	1.3934	0.0000	1,404.79	0.01	0.0883	0.0000	0.01	0.0000
RUSK	14.23	0.22	0.08	0.00	0.00	0.36	0.00	0.00	14.23	0.58	0.0770	0.0000	194.48	0.00	0.0618	0.0000	0.58	0.0000
HOOD	250.42	3.95	1.55	0.02	115.69	6.62	0.66	0.04	366.11	10.57	2.2046	0.0590	2,684.25	0.01	1.0592	0.0000	10.58	0.0590
HUNT	90.70	1.95	0.56	0.01	43.85	3.27	0.25	0.02	134.55	5.22	0.8060	0.0304	1,016.05	0.00	0.3822	0.0000	5.22	0.0304
HENDERSON	136.43	0.26	0.81	0.00	0.00	0.43	0.00	0.00	136.43	0.69	0.8149	0.0045	1,595.16	0.01	0.4946	0.0000	0.70	0.0046
HIDALGO	7,360.96	1.80	37.85	0.01	1,657.66	1.37	8.07	0.01	9,018.62	3.16	45.9173	0.0208	40,899.82	0.19	25.8866	0.0001	3.35	0.0210
CAMERON	2,644.52	0.46	13.60	0.00	751.83	0.35	3.66	0.00	3,396.36	0.81	17.2571	0.0048	15,268.12	0.07	9.3001	0.0000	0.88	0.0048
BELL	4,530.42		25.84		2,916.05		15.59		7,446.48	0.00	41.4330	0.0000	54,851.05	0.25	17.9743	0.0001	0.25	0.0001
WEBB	1,813.01	0.19	8.94	0.00	2,682.66	0.15	12.85	0.00	4,495.67	0.34	21.7843	0.0012	17,445.44	0.08	6.9888	0.0000	0.42	0.0013
BRAZOS	1,319.23	0.19	7.56	0.00	6,540.63	0.30	33.60	0.00	7,859.86	0.49	41.1672	0.0027	48,782.44	0.22	5.3080	0.0000	0.71	0.0027
KENDALL	448.38		2.63		0.00		0.00		448.38	0.00	2.6266	0.0000	3,248.17	0.01	2.2277	0.0000	0.01	0.0000
BURNET	344.80		2.06		0.00		0.00		344.80	0.00	2.0586	0.0000	1,693.94	0.01	1.4851	0.0000	0.01	0.0000
GRAYSON	160.67		0.99		102.32		0.58		262.98	0.00	1.5669	0.0000	1,937.63	0.01	0.6770	0.0000	0.01	0.0000
CORYELL	451.39		2.57		107.72		0.58		559.11	0.00	3.1505	0.0000	4,484.16	0.02	1.7909	0.0000	0.02	0.0000
MIDLAND	1,391.80		5.72		0.00		0.00		1,391.80	0.00	5.7164	0.0000	15,566.85	0.07	5.8859	0.0000	0.07	0.0000
LLANO	380.30	0.19	2.27	0.00	0.00	0.56	0.00	0.00	380.30	0.75	2.2705	0.0042	1,868.32	0.01	1.6380	0.0000	0.76	0.0042
MAVERICK	186.97		0.92		594.26		2.85		781.23	0.00	3.7674	0.0000	3,088.00	0.01	0.7207	0.0000	0.01	0.0000
MCMULLEN	0.00		0.00		0.00		0.00		0.00	0.00	0.0000	0.0000	0.00	0.00	0.0000	0.0000	0.00	0.0000
ARANSAS	160.34		0.83		0.00		0.00		160.34	0.00	0.8309	0.0000	793.58	0.00	0.6182	0.0000	0.00	0.0000
WICHITA	363.44	0.07	1.71	0.00	423.48	0.11	1.97	0.00	786.92	0.18	3.6795	0.0011	8,040.62	0.04	1.2121	0.0000	0.21	0.0011
TAYLOR	416.34	0.00	1.92	0.00	47.09	0.00	0.21	0.00	463.43	0.00	2.1241	0.0000	4,881.64	0.02	1.6271	0.0000	0.02	0.0000
TOM GREEN	390.52	0.01	1.74	0.00	0.00	0.01	0.00	0.00	390.52	0.02	1.7363	0.0000	4,402.78	0.02	1.5834	0.0000	0.05	0.0000
MCLENNAN	1,213.80	7.73	6.92	0.04	630.91	12.97	3.37	0.07	1,844.71	20.70	10.2967	0.1103	13,889.05	0.06	4.8157	0.0000	20.76	0.1103
MCCULLOCH	0.00		0.00		0.00		0.00		0.00	0.00	0.0000	0.0000	0.00	0.00	0.0000	0.0000	0.00	0.0000
WISE	59.90	0.89	0.37	0.01	0.00	1.50	0.00	0.01	59.90	2.39	0.3688	0.0139	500.73	0.00	0.2512	0.0000	2.39	0.0139
JIM HOGG	0.00		0.00		0.00		0.00		0.00	0.00	0.0000	0.0000	0.00	0.00	0.0000	0.0000	0.00	0.0000
VAL VERDE	103.86		0.61		36.90		0.20		140.77	0.00	0.8104	0.0000	878.80	0.00	0.5132	0.0000	0.00	0.0000
ECTOR	867.62	1.11	3.56	0.01	2,997.11	1.87	11.55	0.01	3,864.72	2.98	15.1104	0.0174	32,203.17	0.15	3.6691	0.0000	3.13	0.0174
WHARTON	119.90	0.03	0.69	0.00	0.00	0.04	0.00	0.00	119.90	0.07	0.6901	0.0004	1,088.80	0.01	0.5564	0.0000	0.07	0.0004
KERR	103.95		0.62		0.00		0.00		103.95	0.00	0.6206	0.0000	510.67	0.00	0.4477	0.0000	0.00	0.0000
PRESIDIO	5.39	0.00	0.02	0.00	0.00	0.00	0.00	0.00	5.39	0.00	0.0239	0.0000	60.73	0.00	0.0218	0.0000	0.00	0.0000
JIM WELLS	52.68		0.27		0.00		0.00		52.68	0.00	0.2730	0.0000	260.75	0.00	0.2031	0.0000	0.00	0.0000
CALHOUN	123.71	0.79	0.71	0.00	0.00	0.60	0.00	0.00	123.71	1.39	0.7120	0.0077	1,123.37	0.01	0.5741	0.0000	1.39	0.0077
GILLESPIE	83.67		0.50		0.00		0.00		83.67	0.00	0.4995	0.0000	411.03	0.00	0.3604	0.0000	0.00	0.0000
MATAGORDA	119.90		0.69		0.00		0.00		119.90	0.00	0.6901	0.0000	1,088.80	0.01	0.5564	0.0000	0.01	0.0000
NAVARRO	211.93		1.21		84.63		0.45		296.57	0.00	1.6613	0.0000	2,288.12	0.01	0.8408	0.0000	0.01	0.0000
ANGELINA	243.98	0.10	1.32	0.00	2,159.49	0.16	10.49	0.00	2,403.46	0.26	11.8144	0.0015	31,628.83	0.15	1.0598	0.0000	0.41	0.0015
NACOGDOCHES	101.66		0.55		104.98		0.51		206.63	0.00	1.0604	0.0000	2,764.57	0.01	0.4416	0.0000	0.01	0.0000
FANNIN	15.55	2.22	0.10	0.01	0.00	3.73	0.00	0.02	15.55	5.95	0.0958	0.0365	132.15	0.00	0.0655	0.0000	5.95	0.0365
ATASCOSA	144.39		0.85		12.26		0.07		156.65	0.00	0.9156	0.0000	1,098.98	0.01	0.7207	0.0000	0.01	0.0000
WASHINGTON	122.92		0.70		0.00		0.00		122.92	0.00	0.7047	0.0000	845.11	0.00	0.4946	0.0000	0.00	0.0000
LAMAR	71.02	0.30	0.42	0.00	95.53	0.50	0.54	0.00	166.56	0.80	0.9608	0.0052	1,394.93	0.01	0.2473	0.0000	0.81	0.0052
VAN ZANDT	23.44		0.14		0.00		0.00		23.44	0.00	0.1443	0.0000	195.94	0.00	0.0983	0.0000	0.00	0.0000
WILLACY	47.72		0.25		0.00		0.00		47.72	0.00	0.2454	0.0000	225.64	0.00	0.1678	0.0000	0.00	0.0000
BROWN	176.15		1.00		0.00		0.00		176.15	0.00	1.0046	0.0000	1,524.37	0.01	0.6989	0.0000	0.01	0.0000
ERATH	100.59		0.46		94.17		0.41		194.77	0.00	0.8740	0.0000	1,777.39	0.01	0.3931	0.0000	0.01	0.0000
AUSTIN	37.32		0.21		0.00		0.00		37.32	0.00	0.2139	0.0000	256.55	0.00	0.1501	0.0000	0.00	0.0000
COOKE	38.87		0.24		0.00		0.00		38.87	0.00	0.2394	0.0000	330.37	0.00	0.1638	0.0000	0.00	0.0000
MEDINA	48.62		0.28		0.00		0.00		48.62	0.00	0.2848	0.0000	345.46	0.00	0.2402	0.0000	0.00	0.0000
TITUS	17.76	1.79	0.11	0.00	0.00	3.01	0.00	0.00	17.76	4.81	0.1055	0.0000	214.56	0.00	0.0618	0.0000	4.81	0.0000
UVALDE	46.41		0.27		768.84		4.21		815.24	0.00	4.4778	0.0000	3,262.60	0.02	0.2293	0.0000	0.02	0.0000
FAYETTE	15.37	0.00	0.09	0.00	0.00	0.00	0.00	0.00	15.37	0.00	0.0881	0.0000	105.64	0.00	0.0618	0.0000	0.00	0.0000
CALLAHAN	11.18		0.05		0.00		0.00		11.18	0.00	0.0515	0.0000	121.92	0.00	0.0437	0.0000	0.00	0.0000
HOPKINS	23.44		0.14		44.09		0.25		67.53	0.00	0.3930	0.0000	443.63	0.00	0.0983	0.0000	0.00	0.0000
LAMPASAS	13.76		0.08		0.00		0.00		13.76	0.00	0.0785	0.0000	0.00	0.00	0.0000	0.0000	0.00	0.0000
BLANCO	5.07		0.03		0.00		0.00		5.07	0.00	0.0303	0.0000	24.91	0.00	0.0218	0.0000	0.00	0.0000
FREESTONE	27.52	1.16	0.16	0.01	0.00	1.94	0.00	0.01	27.52	3.10	0.1570	0.0181	238.18	0.00	0.1092	0.0000	3.10	0.0181
GRIMES	28.54	0.00	0.16	0.00	0.00	0.00	0.00	0.00	28.54	0.00	0.1636	0.0008	196.19	0.00	0.1148	0.0000	0.00	0.0008
LEE	17.69		0.11		0.00		0.00		17.69	0.00	0.1058	0.0000	85.78	0.00	0.0764	0.0000	0.00	0.0000
SOMERVELL	20.65		0.13		0.00		0.00		20.65	0.00	0.1277	0.0000	170.98	0.00	0.0874	0.0000	0.00	0.0000
ANDREWS	154.93	0.01	0.64	0.00	0.00	0.01	0.00	0.00	154.93	0.02	0.6363	0.0001	1,732.86	0.01	0.6552	0.0000	0.03	0.0001
BORDEN	50.60		0.17		0.00		0.00		50.60	0.00	0.1659	0.0000	691.01	0.00	0.1678	0.0000	0.00	0.0000

Table 20: 2011 Annual and OSD NOx Reductions from Electricity and Natural Gas Savings Due to the 2001 IECC for Single-family and Multi-family Residences by County (Using 1999 Base year and 2007 eGRID) (Continued)

	Electricity Savings and Resultant NOx Reductions (Single Family Houses)				Electricity Savings and Resultant NOx Reductions (Multifamily Houses)				Total Electricity Savings and Resultant NOx Reductions (Single and Multi-Family Houses)				Total Natural Gas Savings and Resultant NOx Reductions (Single and Multi-Family Houses)				Total Nox Reductions	
County	Total Annual Electricity Savings per County w/ 7% T&D Loss (MWh/County)	Annual Nox Reductions (Tons)	OSD Electricity Savings per County w/ 7% T&D Loss (MWh/County)	OSD Nox Reductions (Tons)	Total Annual Electricity Savings per County w/ 7% T&D Loss (MWh/County)	Annual Nox Reductions (Tons)	OSD Electricity Savings per County w/ 7% T&D Loss (MWh/County)	OSD Nox Reductions (Tons)	Total Annual Electricity Savings per County w/ 7% T&D Loss (MWh/County)	Annual Nox Reductions (Tons)	OSD Electricity Savings per County w/ 7% T&D Loss (MWh/County)	OSD Nox Reductions (Tons)	Total Annual N.G. Savings (Therm/County)	Annual Nox Reductions (Tons)	Total OSD N.G. Savings (Therm/County)	OSD Nox Reductions (Tons)	Annual Nox Reductions (Tons)	OSD Nox Reductions (Tons)
CHEROKEE	138.25	1.10	0.75	0.01	44.99	1.85	0.22	0.01	183.24	2.96	0.9670	0.0168	2,478.68	0.01	0.6006	0.0000	2.97	0.0168
DIMMIT	14.16		0.07		0.00		0.00		14.16	0.00	0.0698	0.0000	51.24	0.00	0.0546	0.0000	0.00	0.0000
FALLS	5.50		0.03		0.00		0.00		5.50	0.00	0.0314	0.0000	47.64	0.00	0.0218	0.0000	0.00	0.0000
COLORADO	17.56		0.10		0.00		0.00		17.56	0.00	0.1007	0.0000	120.73	0.00	0.0707	0.0000	0.00	0.0000
FRIO	24.07	0.11	0.14	0.00	0.00	0.11	0.00	0.00	24.07	0.22	0.1414	0.0020	175.33	0.00	0.1201	0.0000	0.22	0.0020
MILAM	2.58	0.71	0.01	0.00	0.00	1.19	0.00	0.00	2.58	1.89	0.0143	0.0079	13.27	0.00	0.0109	0.0000	1.89	0.0079
JACKSON	15.23		0.09		0.00		0.00		15.23	0.00	0.0876	0.0000	138.26	0.00	0.0707	0.0000	0.00	0.0000
ANDERSON	26.43		0.14		0.00		0.00		26.43	0.00	0.1431	0.0000	361.17	0.00	0.1148	0.0000	0.00	0.0000
HILL	16.51		0.09		0.00		0.00		16.51	0.00	0.0942	0.0000	142.91	0.00	0.0655	0.0000	0.00	0.0000
CULBERSON	2.42		0.01		0.00		0.00		2.42	0.00	0.0103	0.0000	21.17	0.00	0.0109	0.0000	0.00	0.0000
MASON	15.21		0.09		0.00		0.00		15.21	0.00	0.0908	0.0000	74.73	0.00	0.0655	0.0000	0.00	0.0000
PECOS	16.16	0.01	0.07	0.00	0.00	0.02	0.00	0.00	16.16	0.03	0.0718	0.0002	182.18	0.00	0.0655	0.0000	0.04	0.0002
RAINS	5.21		0.03		0.00		0.00		5.21	0.00	0.0321	0.0000	43.54	0.00	0.0218	0.0000	0.00	0.0000
LAVACA	34.21		0.20		0.00		0.00		34.21	0.00	0.1969	0.0000	302.70	0.00	0.1590	0.0000	0.00	0.0000
PALO PINTO	22.35	0.31	0.10	0.00	0.00	0.49	0.00	0.00	22.35	0.81	0.1030	0.0043	243.84	0.00	0.0874	0.0000	0.81	0.0043
KIMBLE	2.69		0.01		0.00		0.00		2.69	0.00	0.0120	0.0000	30.36	0.00	0.0109	0.0000	0.00	0.0000
MADISON	35.12		0.20		0.00		0.00		35.12	0.00	0.2013	0.0000	241.46	0.00	0.1413	0.0000	0.00	0.0000
ARCHER	29.47		0.14		0.00		0.00		29.47	0.00	0.1384	0.0000	380.23	0.00	0.0983	0.0000	0.00	0.0000
REFUGIO	3.81		0.02		0.00		0.00		3.81	0.00	0.0219	0.0000	34.57	0.00	0.0177	0.0000	0.00	0.0000
LIMESTONE	71.56	0.14	0.41	0.00	0.00	0.18	0.00	0.00	71.56	0.32	0.4081	0.0000	619.28	0.00	0.2839	0.0000	0.33	0.0000
CLAY	3.27		0.02		0.00		0.00		3.27	0.00	0.0154	0.0000	42.25	0.00	0.0109	0.0000	0.00	0.0000
BEE	17.13		0.10		0.00		0.00		17.13	0.00	0.0986	0.0000	155.54	0.00	0.0795	0.0000	0.00	0.0000
MARTIN	5.16		0.02		0.00		0.00		5.16	0.00	0.0212	0.0000	57.76	0.00	0.0218	0.0000	0.00	0.0000
GONZALES	2.21		0.01		0.00		0.00		2.21	0.00	0.0129	0.0000	15.70	0.00	0.0109	0.0000	0.00	0.0000
BURLESON	24.15		0.14		0.00		0.00		24.15	0.00	0.1384	0.0000	166.00	0.00	0.0972	0.0000	0.00	0.0000
KARNES	53.01		0.30		0.00		0.00		53.01	0.00	0.3041	0.0000	339.27	0.00	0.2621	0.0000	0.00	0.0000
KLEBERG	40.78		0.21		195.71		0.94		236.49	0.00	1.1487	0.0000	995.69	0.00	0.1590	0.0000	0.00	0.0000
BREWSTER	40.40		0.18		15.03		0.06		55.43	0.00	0.2432	0.0000	564.24	0.00	0.1638	0.0000	0.00	0.0000
WINKLER	2.58		0.01		0.00		0.00		2.58	0.00	0.0106	0.0000	28.88	0.00	0.0109	0.0000	0.00	0.0000
FRANKLIN	5.21		0.03		0.00		0.00		5.21	0.00	0.0321	0.0000	43.54	0.00	0.0218	0.0000	0.00	0.0000
YOUNG	13.97	1.96	0.06	0.01	0.00	3.30	0.00	0.02	13.97	5.26	0.0644	0.0263	152.40	0.00	0.0546	0.0000	5.26	0.0263
HOUSTON	12.20		0.07		0.00		0.00		12.20	0.00	0.0660	0.0000	166.69	0.00	0.0530	0.0000	0.00	0.0000
SCURRY	130.49		0.43		271.49		0.95		401.97	0.00	1.3756	0.0000	4,762.83	0.02	0.4328	0.0000	0.02	0.0000
BOSQUE	8.26	0.06	0.05	0.00	0.00	0.09	0.00	0.00	8.26	0.15	0.0471	0.0013	71.45	0.00	0.0328	0.0000	0.15	0.0013
COMANCHE	0.00		0.00		0.00		0.00		0.00	0.00	0.0000	0.0000	0.00	0.00	0.0000	0.0000	0.00	0.0000
BRISCOE	21.32		0.05		0.00		0.00		21.32	0.00	0.0549	0.0000	456.09	0.00	0.0764	0.0000	0.00	0.0000
CONCHO	2.69		0.01		0.00		0.00		2.69	0.00	0.0120	0.0000	30.36	0.00	0.0109	0.0000	0.00	0.0000
ZAVALA	17.00		0.08		0.00		0.00		17.00	0.00	0.0838	0.0000	61.49	0.00	0.0655	0.0000	0.00	0.0000
NOLAN	0.00	0.18	0.00	0.00	0.00	0.30	0.00	0.00	0.00	0.48	0.0000	0.0029	0.00	0.00	0.0000	0.0000	0.48	0.0029
BROOKS	0.00		0.00		0.00		0.00		0.00	0.00	0.0000	0.0000	0.00	0.00	0.0000	0.0000	0.00	0.0000
ROBERTSON	15.37	0.26	0.09	0.00	0.00	0.36	0.00	0.00	15.37	0.62	0.0881	0.0017	105.64	0.00	0.0618	0.0000	0.62	0.0017
LIVE OAK	4.58		0.02		0.00		0.00		4.58	0.00	0.0237	0.0000	22.67	0.00	0.0177	0.0000	0.00	0.0000
HAMILTON	2.75		0.02		0.00		0.00		2.75	0.00	0.0157	0.0000	23.82	0.00	0.0109	0.0000	0.00	0.0000
JONES	0.00	0.39	0.00	0.00	0.00	0.30	0.00	0.00	0.00	0.68	0.0000	0.0037	0.00	0.00	0.0000	0.0000	0.68	0.0037
REAGAN	10.33		0.04		0.00		0.00		10.33	0.00	0.0424	0.0000	116.24	0.00	0.0437	0.0000	0.00	0.0000
WARD	30.99	5.84	0.13	0.04	0.00	9.81	0.00	0.06	30.99	15.66	0.1273	0.0948	346.57	0.00	0.1310	0.0000	15.66	0.0948
RED RIVER	15.22	0.00	0.09	0.00	0.00	0.00	0.00	0.00	15.22	0.00	0.0904	0.0000	183.91	0.00	0.0530	0.0000	0.00	0.0000
HASKELL	5.59	0.00	0.03	0.00	0.00	0.00	0.00	0.00	5.59	0.00	0.0258	0.0000	60.96	0.00	0.0218	0.0000	0.00	0.0000
HOWARD	12.91	0.17	0.05	0.00	0.00	0.29	0.00	0.00	12.91	0.47	0.0530	0.0028	144.40	0.00	0.0546	0.0000	0.47	0.0028
SAN SABA	0.00		0.00		0.00		0.00		0.00	0.00	0.0000	0.0000	0.00	0.00	0.0000	0.0000	0.00	0.0000
JACK	16.77	0.67	0.08	0.00	0.00	1.12	0.00	0.01	16.77	1.79	0.0773	0.0104	182.88	0.00	0.0655	0.0000	1.79	0.0104
STEPHENS	5.59		0.03		0.00		0.00		5.59	0.00	0.0258	0.0000	60.96	0.00	0.0218	0.0000	0.00	0.0000
RUNNELS	5.39		0.02		0.00		0.00		5.39	0.00	0.0239	0.0000	60.73	0.00	0.0218	0.0000	0.00	0.0000
REEVES	2.58		0.01		0.00		0.00		2.58	0.00	0.0106	0.0000	28.88	0.00	0.0109	0.0000	0.00	0.0000
DE WITT	7.61		0.04		0.00		0.00		7.61	0.00	0.0438	0.0000	69.13	0.00	0.0353	0.0000	0.00	0.0000
CHILDRESS	0.00		0.00		0.00		0.00		0.00	0.00	0.0000	0.0000	0.00	0.00	0.0000	0.0000	0.00	0.0000
CROSBY	15.98		0.05		0.00		0.00		15.98	0.00	0.0524	0.0000	218.21	0.00	0.0530	0.0000	0.00	0.0000
DAWSON	5.78		0.02		0.00		0.00		5.78	0.00	0.0173	0.0000	87.48	0.00	0.0165	0.0000	0.00	0.0000
MITCHELL	0.00	4.71	0.00	0.03	0.00	7.90	0.00	0.05	0.00	12.61	0.0000	0.0812	0.00	0.00	0.0000	0.0000	12.61	0.0812
WILBARGER	0.00	0.27	0.00	0.00	0.00	0.21	0.00	0.00	0.00	0.48	0.0000	0.0000	0.00	0.00	0.0000	0.0000	0.48	0.0000
COLEMAN	2.78	0.01	0.01	0.00	0.00	0.01	0.00	0.00	2.78	0.02	0.0128	0.0001	30.50	0.00	0.0109	0.0000	0.02	0.0001
UPTON	2.58	0.01	0.01	0.00	0.00	0.02	0.00	0.00	2.58	0.03	0.0106	0.0002	29.06	0.00	0.0109	0.0000	0.03	0.0002
COKE	5.39	0.00	0.02	0.00	0.00	0.00	0.00	0.00	5.39	0.00	0.0240	0.0000	60.65	0.00	0.0218	0.0000	0.00	0.0000
CROCKETT	51.17	0.00	0.23	0.00	0.00	0.00	0.00	0.00	51.17	0.00	0.2275	0.0000	576.92	0.00	0.2075	0.0000	0.00	0.0000
HARDEMAN	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0000	0.0000	0.00	0.00	0.0000	0.0000	0.00	0.0000
BANDERA	2.20		0.01		0.00		0.00		2.20	0.00	0.0129	0.0000	15.92	0.00	0.0109	0.0000	0.00	0.0000
BAYLOR	0.00		0.00		0.00		0.00		0.00	0.00	0.0000	0.0000	0.00	0.00	0.0000	0.0000	0.00	0.0000
COTTLE	0.00		0.00		0.00		0.00		0.00	0.00	0.0000	0.0000	0.00	0.00	0.0000	0.0000	0.00	0.0000
CRANE	0.00		0.00		0.00		0.00		0.00	0.00	0.0000	0.0000	0.00	0.00	0.0000	0.0000	0.00	0.0000
DELTA	5.21		0.03		0.00		0.00		5.21	0.00	0.0321	0.0000	43.54	0.00	0.0218	0.0000	0.00	0.0000
DICKENS	0.00		0.00		0.00		0.00		0.00	0.00	0.0000	0.0000	0.00	0.00	0.0000	0.0000	0.00	0.0000
DUVAL	0.00		0.00		0.00		0.00		0.00	0.00	0.0000	0.0000	0.00	0.00	0.0000	0.0000	0.00	0.0000
EASTLAND	5.59		0.03		0.00		0.00		5.59	0.00	0.0258	0.0000	60.96	0.00	0.0218	0.0000	0.00	0.0000
EDWARDS	0.00		0.00		0.00		0.00		0.00	0.00	0.0000	0.0000	0.00	0.00	0.0000	0.0000	0.00	0.0000
FISHER	0.00		0.00		0.00		0.00		0.00	0.00	0.0000	0.0000	0.00	0.00	0.0000	0.0000	0.00	0.0000
FOARD	0.00		0.00		0.00		0.00		0.00	0.00	0.0000	0.0000	0.00	0.00	0.0000	0.0000	0.00	0.0000
GLASSCOCK	0.00		0.00		0.00		0.00		0.00	0.00	0.0000	0.0000	0.00	0.00	0.0000	0.0000	0.00	0.0000
GOLIAD	0.00		0.00		0.00		0.00		0.00	0.00	0.0000	0.0000	0.00	0.00	0.0000	0.0000	0.00	0.0000
HALL	0.00		0.00		0.00		0.00		0.00	0.00	0.0000	0.0000	0.00	0.00	0.0000	0.0000	0.00	0.0000
HUDSPETH	0.00		0.00		0.00		0.00		0.00	0.00	0.0000	0.0000	0.00	0.00	0.0000	0.0000	0.00	0.0000
IRION	0.00		0.00		0.00		0.00		0.00	0.00	0.0000	0.0000	0.00	0.00	0.0000	0.0000	0.00	0.0000
JEFF DAVIS	0.00		0.00		0.00		0.00		0.00	0.00	0.0000	0.0000	0.00	0.00	0.0000	0.0000	0.00	0.0000
KENEDY	0.00		0.00		0.00		0.00		0.00	0.00	0.0000	0.0000	0.00	0.00	0.0000	0.0000	0.00	0.0000
KENT	0.00		0.00		0.00		0.00		0.00	0.00	0.0000	0.0000	0.00	0.00	0.0000	0.0000	0.00	0.0000
KING	0.00		0.00		0.00		0.00		0.00	0.00	0.0000	0.0000	0.00	0.00	0.0000	0.0000	0.00	0.0000
KINNEY	0.00		0.00		0.00		0.00		0.00	0.00	0.0000	0.0000	0.00	0.00	0.0000	0.0000	0.00	0.0000
KNOX	0.00		0.00		0.00		0.00		0.00	0.00	0.0000	0.0000	0.00	0.00	0.0000	0.0000	0.00	0.0000
LA SALLE	17.00		0.08		0.00		0.00		17.00	0.00	0.0838	0.0000	61.49	0.00	0.0655	0.0000	0.00	0.0000
LEON	0.00		0.00		0.00		0.00		0.00	0.00	0.0000	0.0000	0.00	0.00	0.0000	0.0000	0.00	0.0000
LOVING	0.00		0.00		0.00		0.00		0.00	0.00	0.0000	0.0000	0.00	0.00	0.0000	0.0000	0.00	0.0000
MENARD	0.00		0.00		0.00		0.00		0.00	0.00	0.0000	0.0000	0.00	0.00	0.0000	0.0000	0.00	0.0000
MILLS	0.00		0.00		0.00		0.00		0.00	0.00	0.0000	0.0000	0.00	0.00	0.0000	0.0000	0.00	0.0000
MONTAGUE	2.59		0.02		0.00		0.00		2.59	0.00	0.0160	0.0000	22.02	0.00	0.0109	0.0000	0.00	0.0000
MOTLEY	0.00		0.00		0.00		0.00		0.00	0.00	0.0000	0.0000	0.00	0.00	0.0000	0.0000	0.00	0.0000
REAL	0.00		0.00		0.00		0.00		0.00	0.00	0.0000	0.0000	0.00	0.00	0.0000	0.0000	0.00	0.0000
SCHLEICHER	5.39		0.02		0.00		0.00		5.39	0.00	0.0239	0.0000	60.73	0.00	0.0218	0.0000	0.00	0.0000
SHACKELFORD	0.00		0.00		0.00		0.00		0.00	0.00	0.0000	0.0000	0.00	0.00	0.0000	0.0000	0.00	0.0000
STARR	0.00		0.00		0.00		0.00		0.00	0.00	0.0000	0.0000	0.00	0.00	0.0000	0.0000	0.00	0.0000
STERLING	0.00		0.00		0.00		0.00		0.00	0.00	0.0000	0.0000	0.00	0.00	0.0000	0.0000	0.00	0.0000
STONEWALL	0.00		0.00		0.00		0.00		0.00	0.00	0.0000	0.0000	0.00	0.00	0.0000	0.0000	0.00	0.0000
SUTTON	0.00		0.00		0.00		0.00		0.00	0.00	0.0000	0.0000	0.00	0.00	0.0000	0.0000	0.00	0.0000
TERRELL	0.00		0.00		0.00		0.00		0.00	0.00	0.0000	0.0000	0.00	0.00	0.0000	0.0000	0.00	0.0000
THROCKMORTON	0.00		0.00		0.00		0.00		0.00	0.00	0.0000	0.0000	0.00	0.00	0.0000	0.0000	0.00	0.0000
ZAPATA	0.00		0.00		0.00		0.00		0.00	0.00	0.0000	0.0000	0.00	0.00	0.0000	0.0000	0.00	0.0000
TOTAL	**157,052.70**	**101.49**	**895.94**	**0.57**	**230,001.57**	**151.22**	**1,224.54**	**0.80**	**387,054.27**	**252.71**	**2,120.48**	**1.37**	**2,350,359.23**	**10.81**	**650.42**	**0.003**	**263.52**	**1.37**



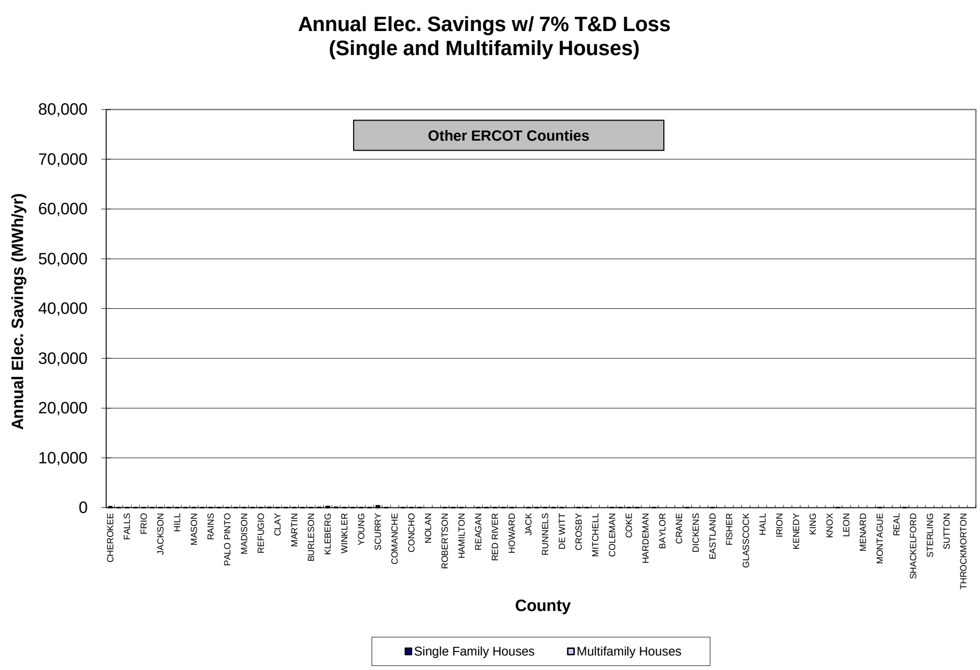
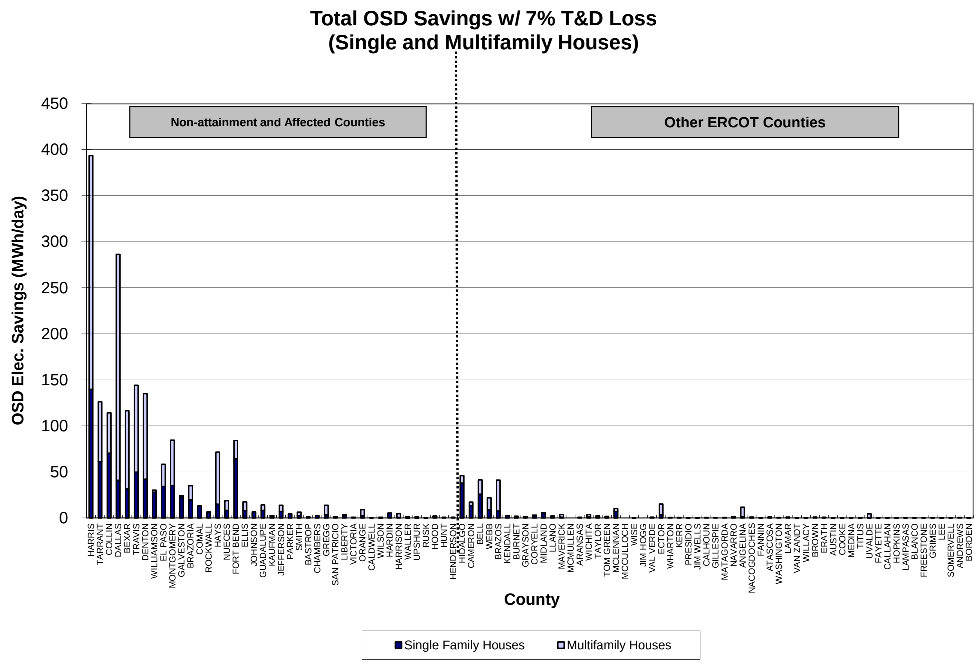


Figure 35: 2011 Annual Electricity Reductions from the 2001 IECC for Single-family and Multi-family Residences by County



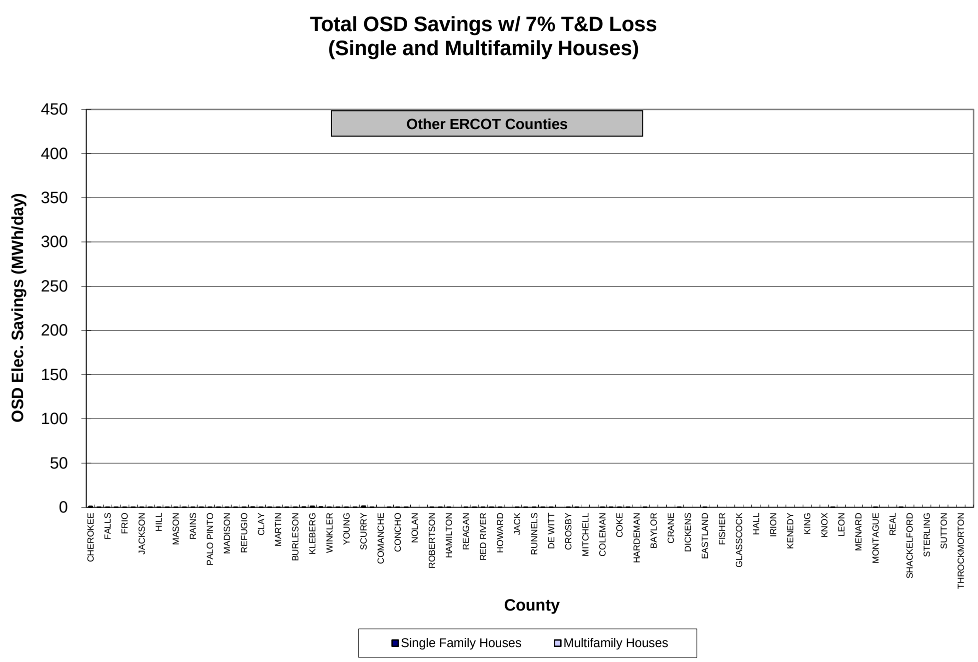


Figure 36: 2011 OSD Electricity Reductions from the 2001 IECC for Single-family and Multi-family Residences by County

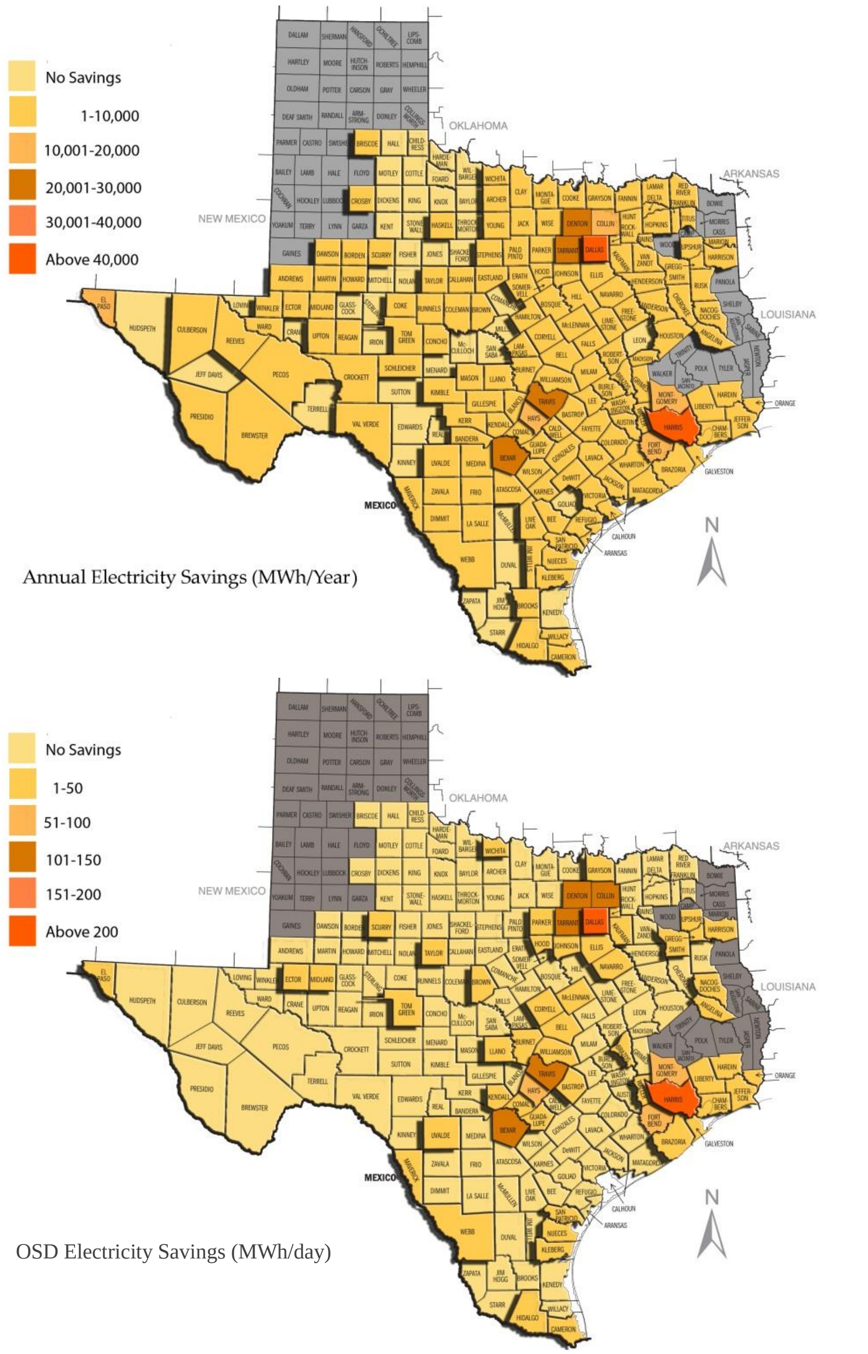
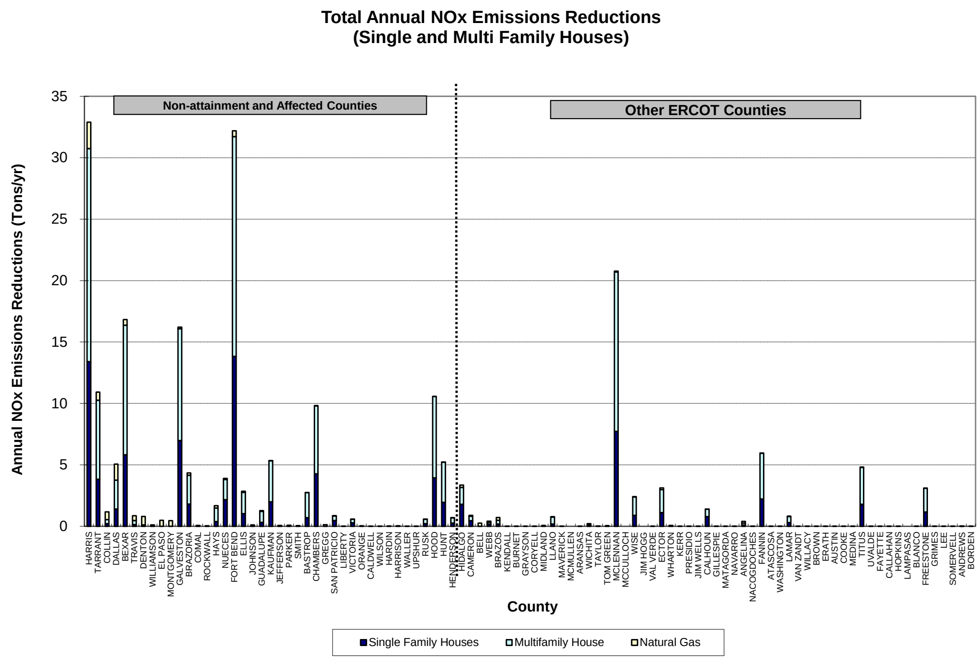


Figure 37: 2011 Annual and OSD Electricity Reductions from the 2001 IECC for Single-family and Multi-family Residences by County



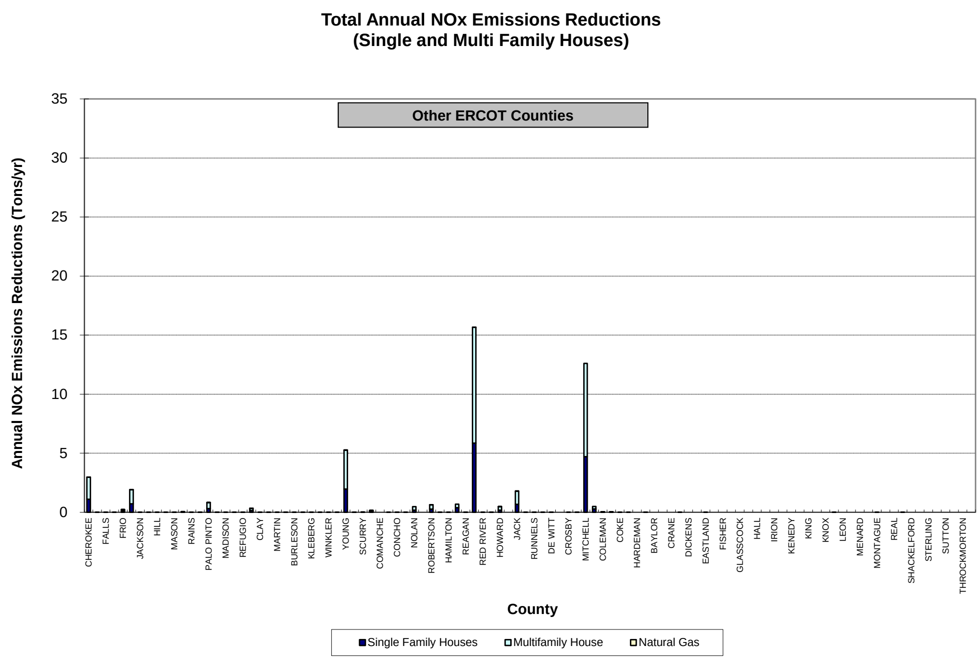
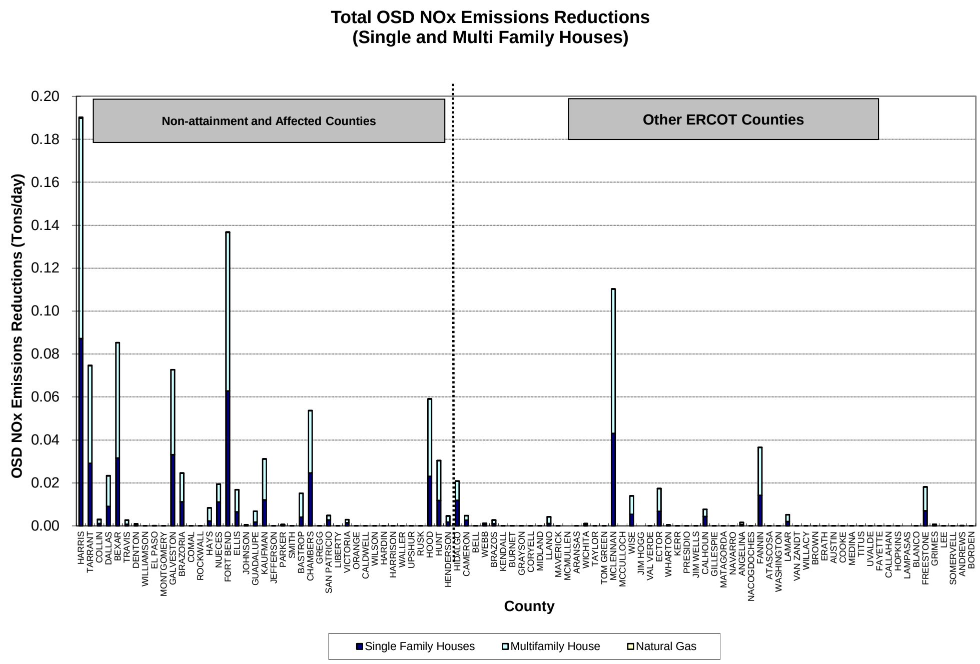


Figure 38: 2011 Annual NOx Reductions from Electricity and Natural Gas Savings Due to the 2001 IECC for Single-family and Multi-family Residences by County (using 1999 Base Year and 2007 eGRID)



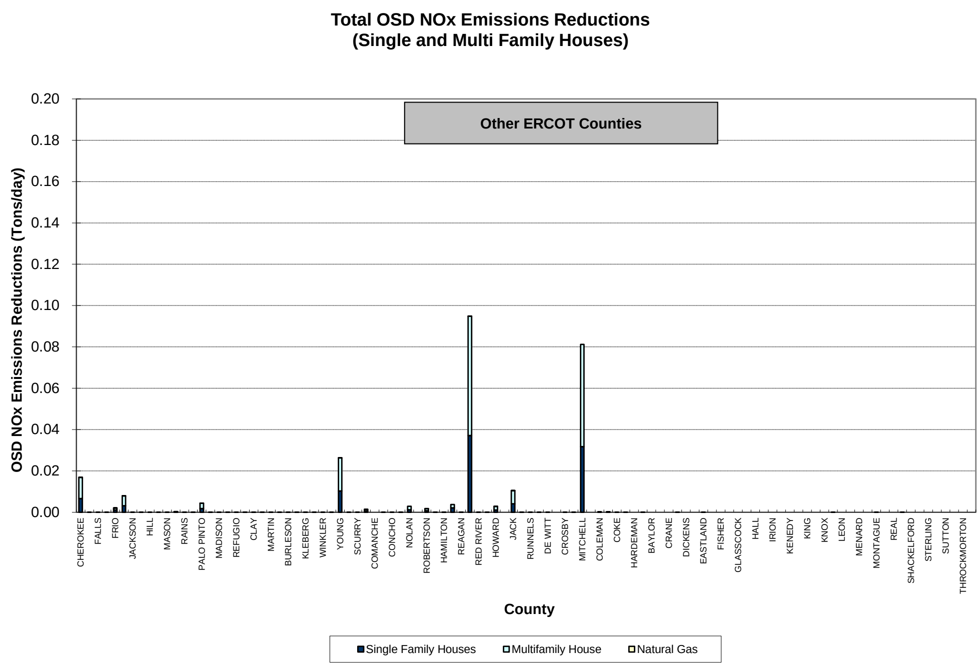
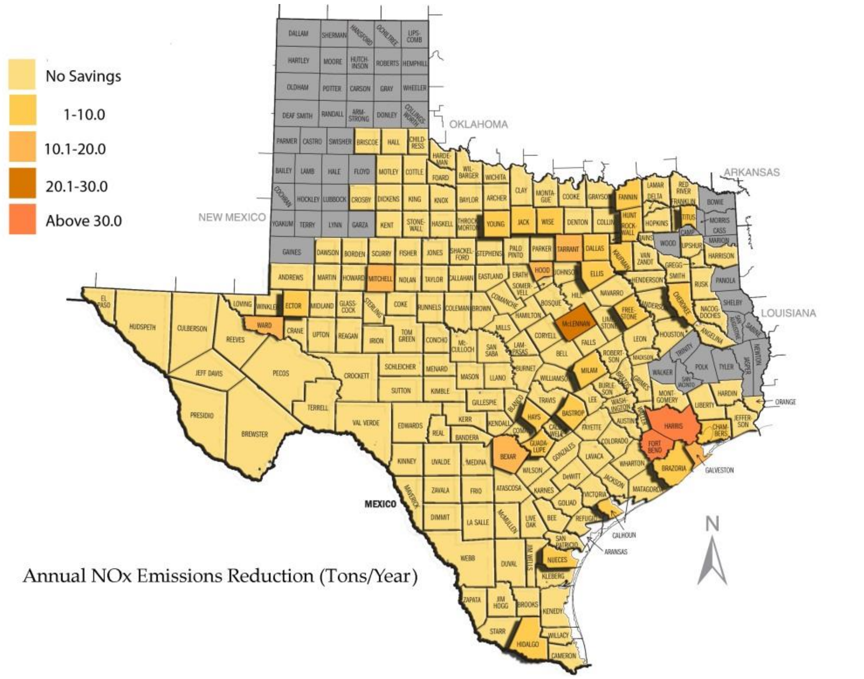


Figure 39: 2011 OSD NOx Reductions from Electricity and Natural Gas Savings Due to the 2001 IECC for Single-family and Multi-family Residences by County (using 1999 Base Year and 2007 eGRID)



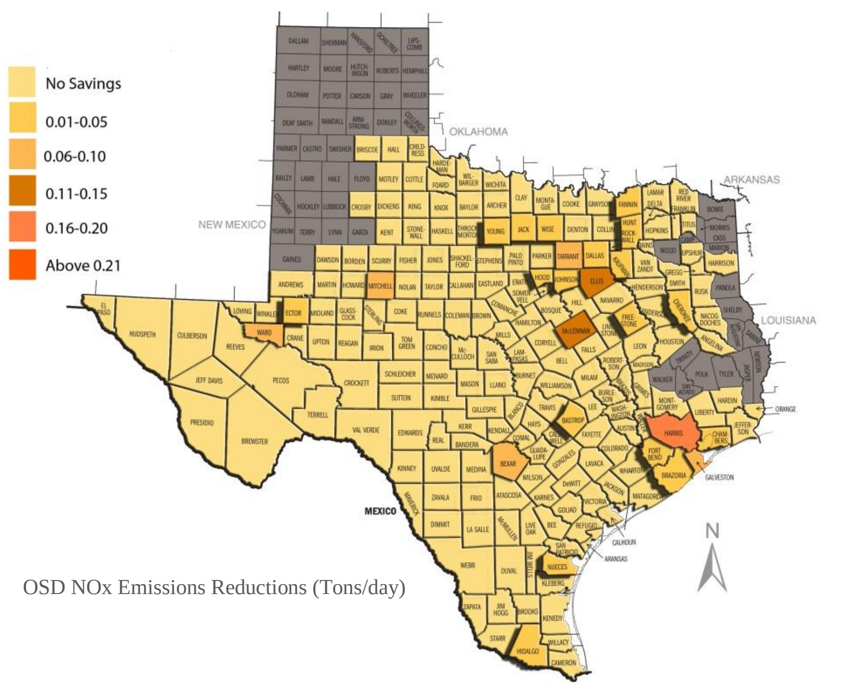
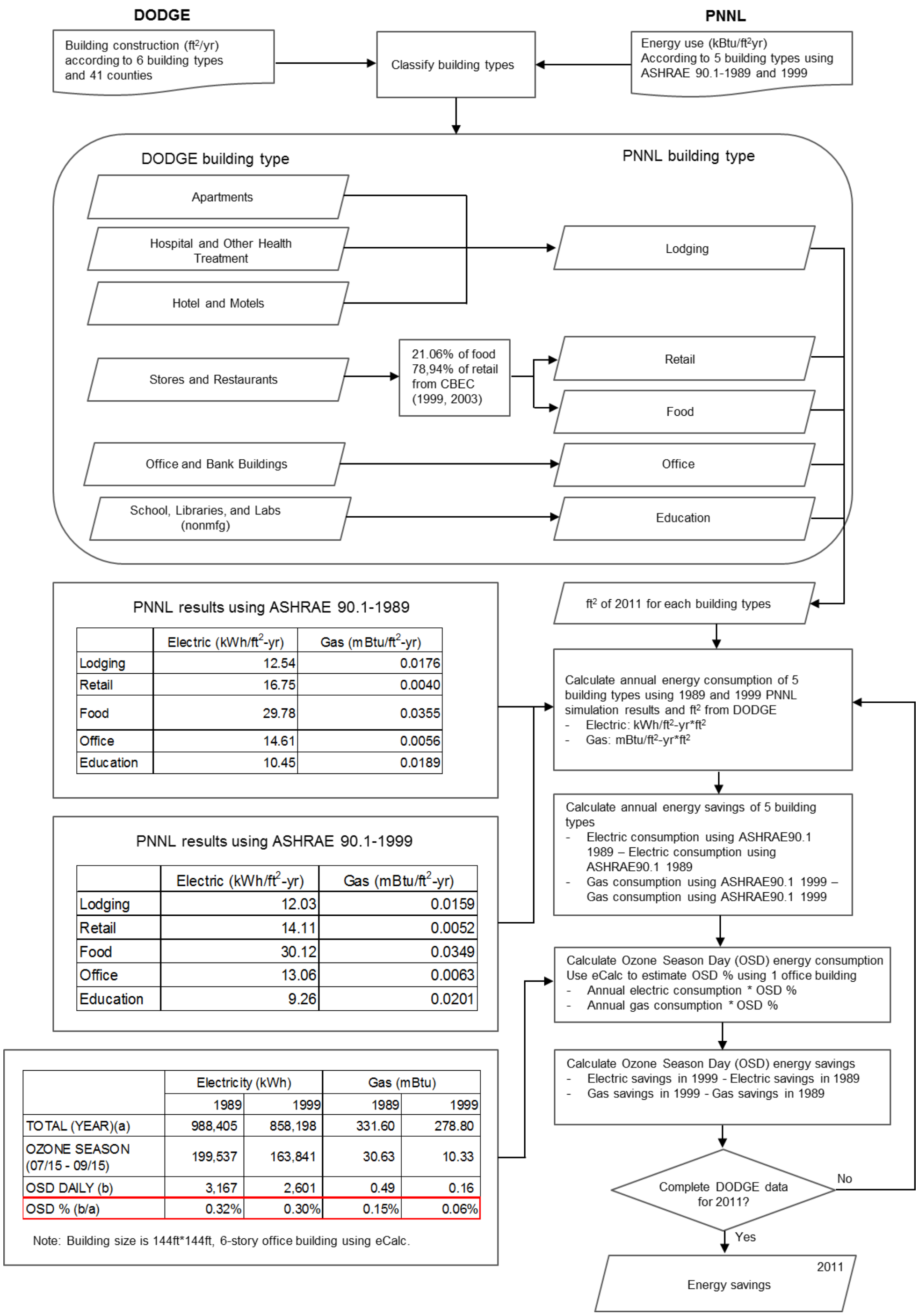


Figure 40: 2011 Annual and OSD NOx Reductions from Electricity and Natural Gas Savings Due to the 2001 IECC for Single-family and Multi-family Residences by County (Using 1999 Base year and 2007 eGRID)

4.1.6 2011 Results for Commercial Construction

This section reports on the calculated energy and emissions savings from new commercial construction in 2011 that was built to meet the ASHRAE Standard 90.1-1999 energy code. Construction prior to September 2001 was assumed to comply with ASHRAE Standard 90.1-1989, which was determined from a survey of engineers and architects reported in the Laboratory's 2006 Annual report to the TCEQ. To determine the energy and emissions savings from new commercial construction in all counties in ERCOT region as well as the 41 non-attainment and affected counties, data from two sources were merged into one analysis as shown in



PNNL results using ASHRAE 90.1-1989

	Electric (kWh/ft²-yr)	Gas (mBtu/ft²-yr)
Lodging	12.54	0.0176
Retail	16.75	0.0040
Food	29.78	0.0355
Office	14.61	0.0056
Education	10.45	0.0189

PNNL results using ASHRAE 90.1-1999

	Electric (kWh/ft²-yr)	Gas (mBtu/ft²-yr)
Lodging	12.03	0.0159
Retail	14.11	0.0052
Food	30.12	0.0349
Office	13.06	0.0063
Education	9.26	0.0201

	Electricity (kWh)		Gas (mBtu)	
	1989	1999	1989	1999
TOTAL (YEAR)(a)	988,405	858,198	331.60	278.80
OZONE SEASON (07/15 - 09/15)	199,537	163,841	30.63	10.33
OSD DAILY (b)	3,167	2,601	0.49	0.16
OSD % (b/a)	0.32%	0.30%	0.15%	0.06%

Note: Building size is 144ft*144ft, 6-story office building using eCalc.

Figure 41. In this figure, the analysis covers results shown in Figure 42 and in Table 23 and Table 24.

Beginning in the upper left of Figure 41, the Dodge database of the square footage of new commercial construction in Texas (Dodge 2011) was merged with the energy savings calculations published by the Pacific Northwest National Laboratory (PNNL) in a report prepared for the U.S.D.O.E. (USDOE 2004). This allowed for the new construction to be tracked by county, and energy savings to be calculated by building type. In the next block in Figure 41 and Table 21, the merged categories from the Dodge and the PNNL database can be seen. This resulted in six Dodge categories being merged into five PNNL energy use categories. In the second and third PNNL category, the Dodge "stores and restaurant" category had to be split into two categories to match the two PNNL categories for "retail" and "food". To accomplish this, information published in the 1999 and 2003 CBECS database (Table 22) by the U.S.D.O.E's Energy Information Agency (EIA) was used to determine the percentages used to split the Dodge conditioned area for each county as shown (i.e., 21.06% for food and 78.94% for retail). The square footage of all PNNL building types is shown by individual graphs of each building type in Figure 42.

In the next step the PNNL energy savings, which represent buildings built to comply with the ASHRAE Standard 90.1-1989 versus ASHRAE Standard 90.1-1999, which are expressed per square foot, were then multiplied by the published square feet of new construction. Table 23 to
Table 24 show the annual and OSD energy use calculated for new construction, by building type, for ASHRAE Standard 90.1-1989 and ASHRAE Standard 90.1-1999. Table 25 and Table 26 show the county-wide annual electricity and natural gas savings by building type.[41] [42]

In order to calculate the OSD electricity and natural gas savings, simulations were performed on a typical office building that simulated a six-story, 90,000-sq. ft. office building in Central Texas as shown in Figure 44. Figure 43 provides an image of the office building (three-story shown). Table 27 (building LOADS) and Table 28 (building SYSTEM and PLANT information) provide the input characteristics used to simulate the office building. The results of these simulations show about a 13% annual energy use reduction (Haberl et al. 2005). The simulations were also used to simulate the electricity and natural gas used during the OSD (July 15 to Sept. 15) as shown in Figure 45, Figure 46 and Table 29. In the bottom row of Table 29, a ratio was calculated to allow for the conversion of annual savings to OSD savings. This ratio was then used in the remaining building types to accomplish this conversion.

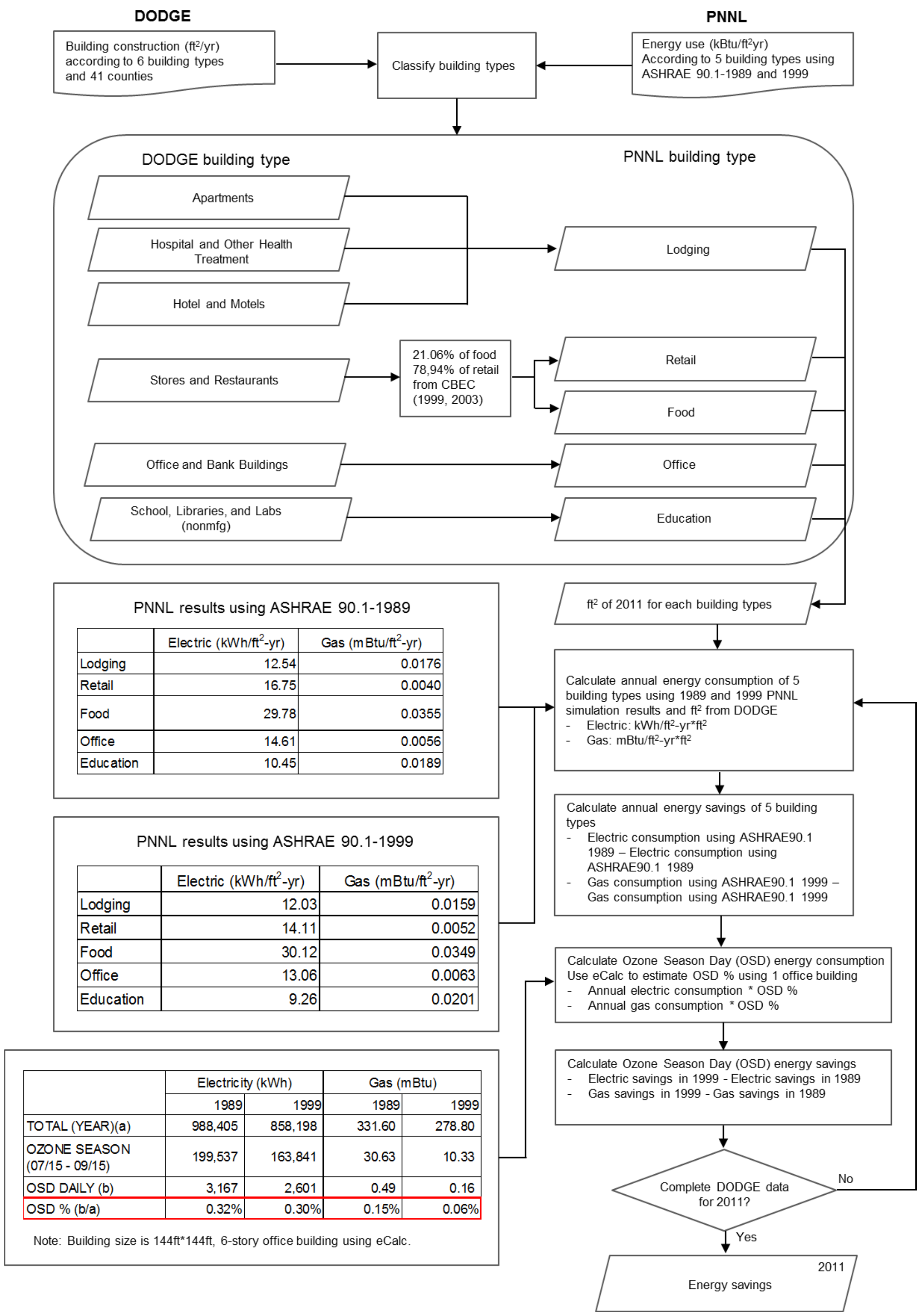
In the next calculation step, electric utility providers were assigned to each county according to the published sales data from the Texas Public Utilities Commission as shown in Table 30[43]. In the case where more than one utility was shown selling electricity in a county, a percentage of electricity use was allocated according to the PUCT's sales data. In Table 30, the total electricity savings by utility provider is shown for 2011 for all estimated new commercial construction. Table 31 shows the calculated annual NOx emissions reductions from electricity using the 2007 eGRID table for Texas.

In a similar fashion as the annual calculations, electric utility providers were assigned to each county to calculate the OSD electricity savings by utility, as shown in Table 32[44]. Table 33 shows the calculated NOx emissions reductions from electricity savings using the 2007 eGRID table for Texas.

Table 34 shows the transformation of the annual and OSD county-wide electricity and natural gas savings, along with the associated 2011 NOx emissions reductions with 7% T&D losses. Figure 47 and Figure 48 show the bar chart of the annual and OSD electricity savings for 2011, respectively. Figure 49 and Figure 50 present the NOx emissions reductions from the electricity and natural gas savings using the 2007 eGRID for Texas.

Using the 2007 eGRID, the total NOx reductions from electricity and natural gas savings from new commercial construction in 2011 are calculated to be 52.01 tons NOx/year which represents 50.42 tons NOx/year from electricity savings and 1.59 tons NOx/year from natural gas. On a peak OSD, the NOx reductions in 2011 are calculated to be 0.33 tons of NOx/day which represents 0.28 tons NOx/day from electricity savings and 0.05 tons NOx/day from natural gas savings.

[41] In this table (-) values are savings, (+) values are increased energy use.
[42] In a similar fashion as the proceeding table, in this table (-) values are savings, (+) values are increased energy use.
[43] Of a total of 202 counties listed in Table 21, the annual electricity savings in 31 counties (i.e., 2,424 MWh), including 8 non-attainment and affected non-ERCOT counties (i.e, 99.99% of total savings in 31 counties), are not reported in Table 26 since the corresponding PCA could not be assigned for these 31 counties.
[44] Of a total of 202 counties listed in Table 22, the OSD electricity savings in 31 counties (i.e., 14.02 MWh), including 8 non-attainment and affected non-ERCOT counties (i.e, 99.93% of total savings in 31 counties), are not reported in Table 28 since the corresponding PCA could not be assigned for these 31 counties.



PNNL results using ASHRAE 90.1-1989

	Electric (kWh/ft²-yr)	Gas (mBtu/ft²-yr)
Lodging	12.54	0.0176
Retail	16.75	0.0040
Food	29.78	0.0355
Office	14.61	0.0056
Education	10.45	0.0189

PNNL results using ASHRAE 90.1-1999

	Electric (kWh/ft²-yr)	Gas (mBtu/ft²-yr)
Lodging	12.03	0.0159
Retail	14.11	0.0052
Food	30.12	0.0349
Office	13.06	0.0063
Education	9.26	0.0201

	Electricity (kWh)		Gas (mBtu)	
	1989	1999	1989	1999
TOTAL (YEAR)(a)	988,405	858,198	331.60	278.80
OZONE SEASON (07/15 - 09/15)	199,537	163,841	30.63	10.33
OSD DAILY (b)	3,167	2,601	0.49	0.16
OSD % (b/a)	0.32%	0.30%	0.15%	0.06%

Note: Building size is 144ft*144ft, 6-story office building using eCalc.

Figure 41: Analysis Method for Calculating the 2011 Energy and Emissions Savings from Commercial Buildings

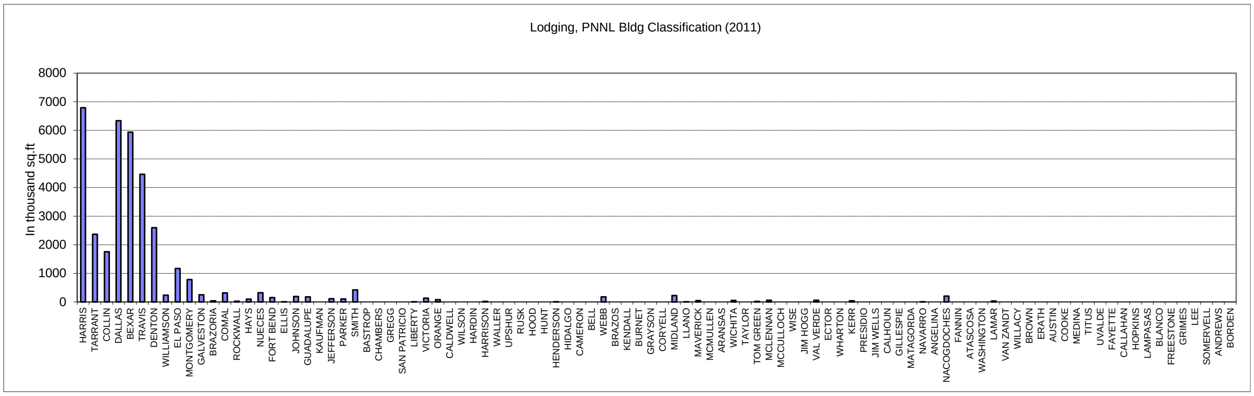
Table 21: Commercial Building Descriptions from USDOE (2004) Report and Dodge (2011)

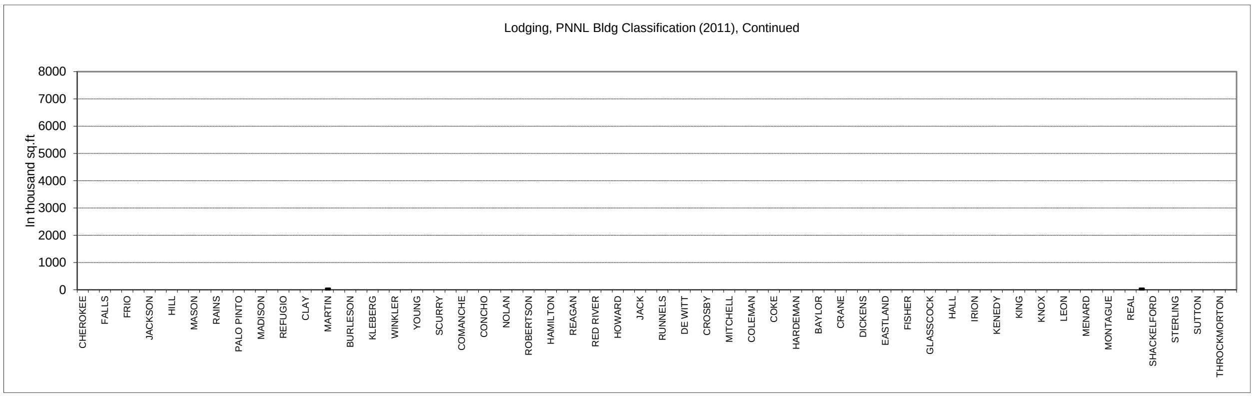
No	PNNL Building Types	Dodge Building Types
1	Lodging	Apartments
2		Hospitals and Other Health Treatment
3		Hotels and Motels
4	Office	Office and Bank Buildings
5	Education	Schools, Libraries, and Labs (nonmfg)
6	Retail	Stores and Restaurants
7	Food Service	

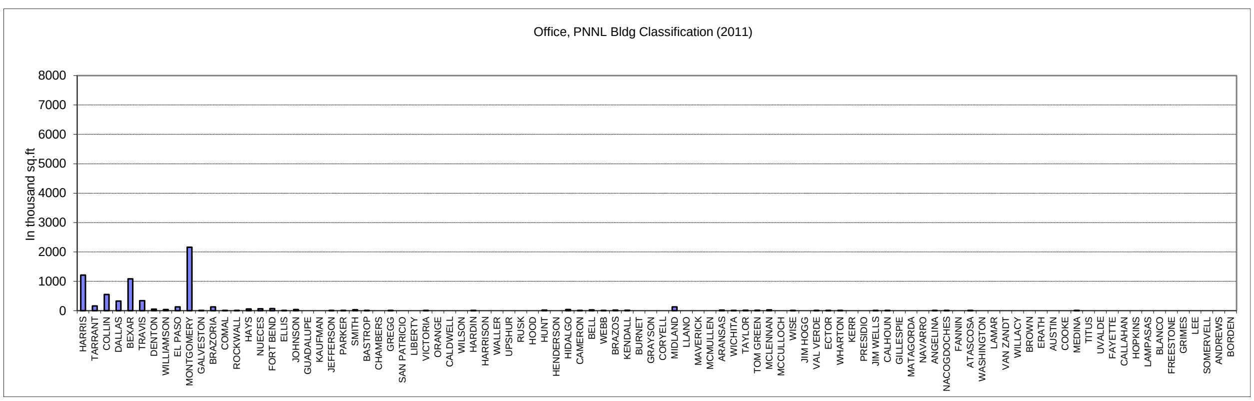
Table 22: Floor Area from CBECS (1999, 2003) database for Retail and Food Type Commercial Buildings

		CBECS (1999)		CBECS (2003)	
		All (million square feet)	South (million square feet)	All (million square feet)	South (million square feet)
Food	Food Sales	904	392	1,255	487
	Food Service	1,851	676	1,654	764
Retail	Retail (Other Than Mall)	4,766	1,566	4,317	1,844
	Enclosed and Strip Malls	5,631	2,513	6,875	3,251

	South		All	
	Food %	Retail %	Food %	Retail %
CBECS (1999)	20.75	79.25	21.48	78.52
CBECS (2003)	19.71	80.29	20.63	79.37
Average	20.23	79.77	21.06	78.94







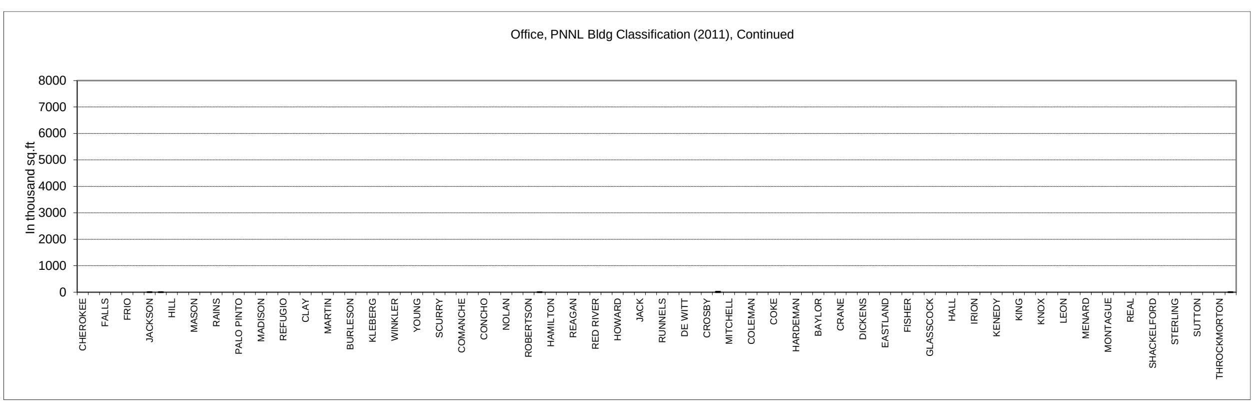
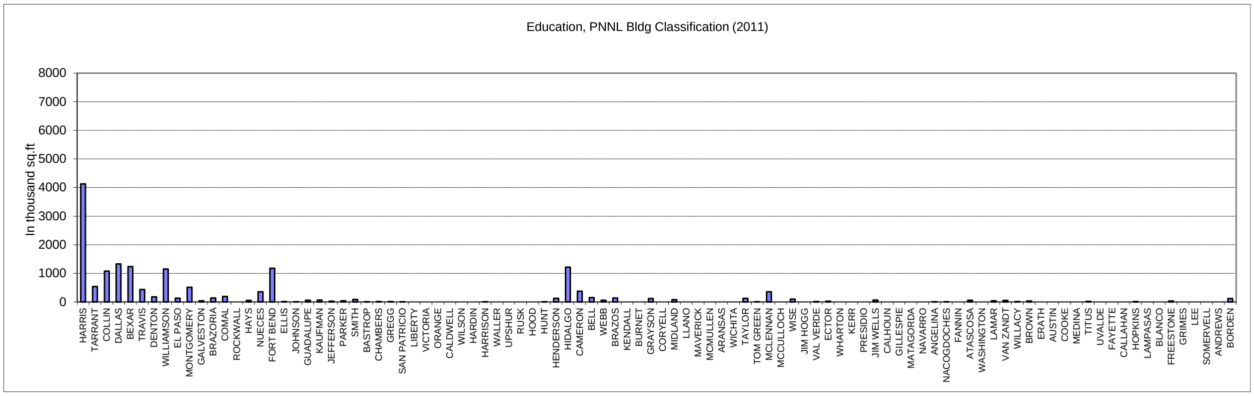
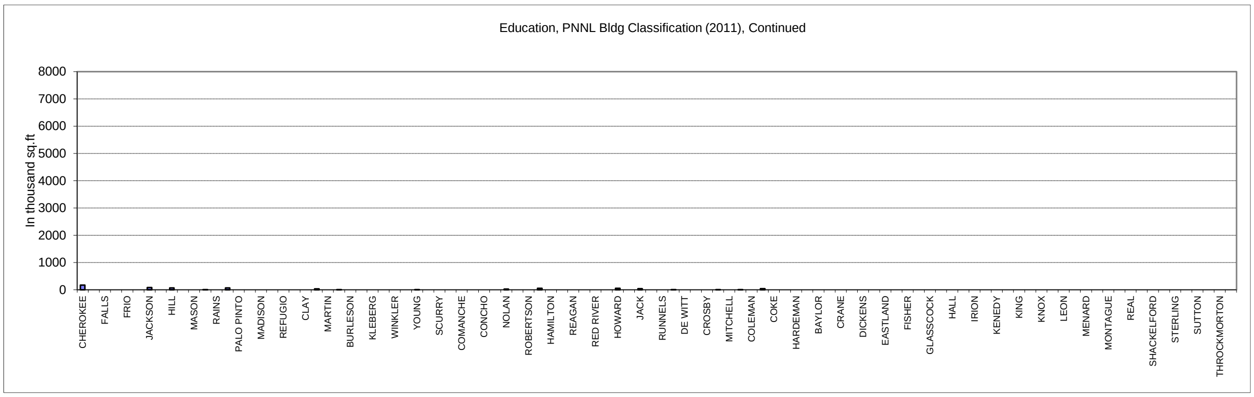
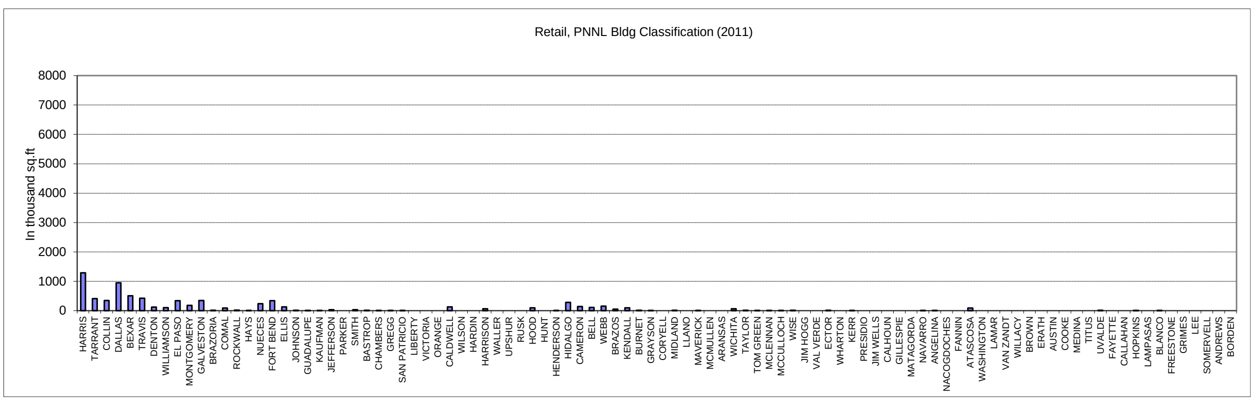


Figure 42: 2011 New Commercial Building Constructions (sq. ft. x 1000) (Dodge 2011)







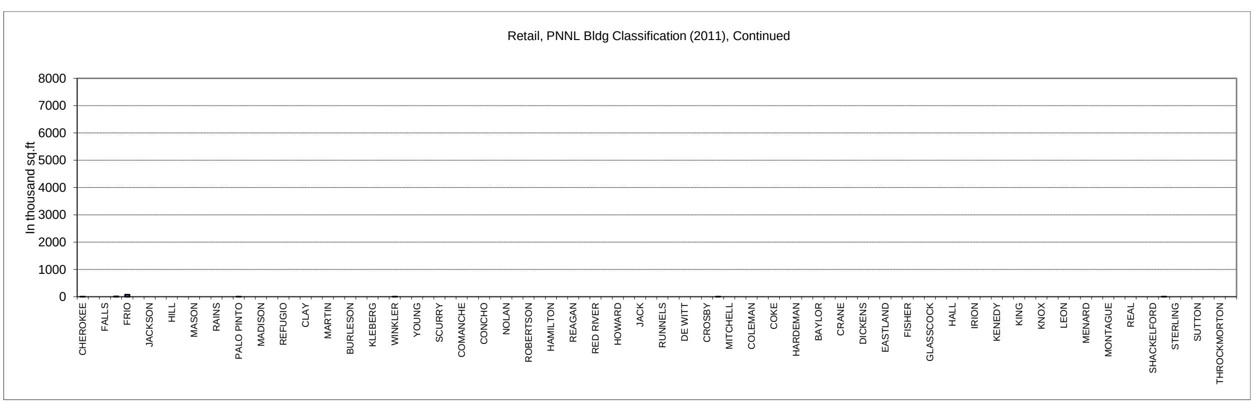
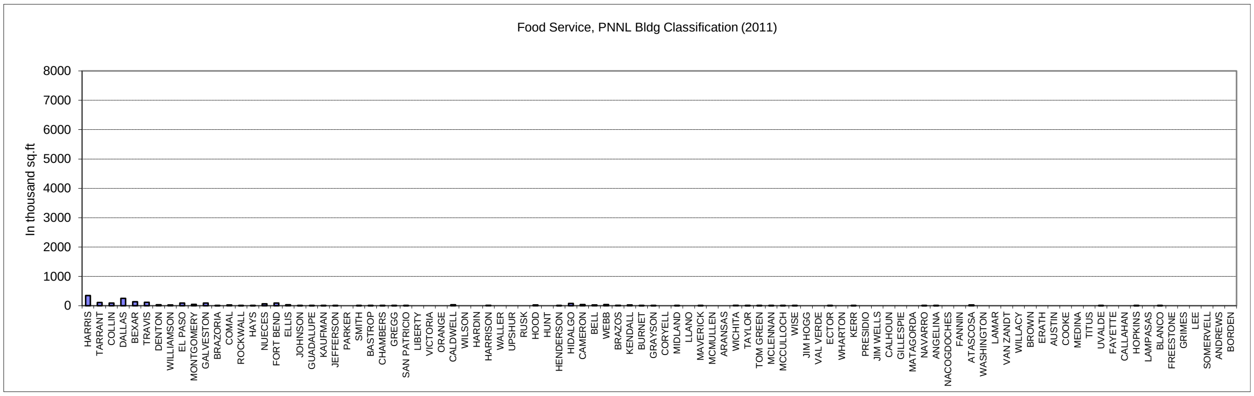


Figure 42: 2011 New Commercial Building Constructions (sq. ft. x 1000) (Dodge 2011) (Continued)



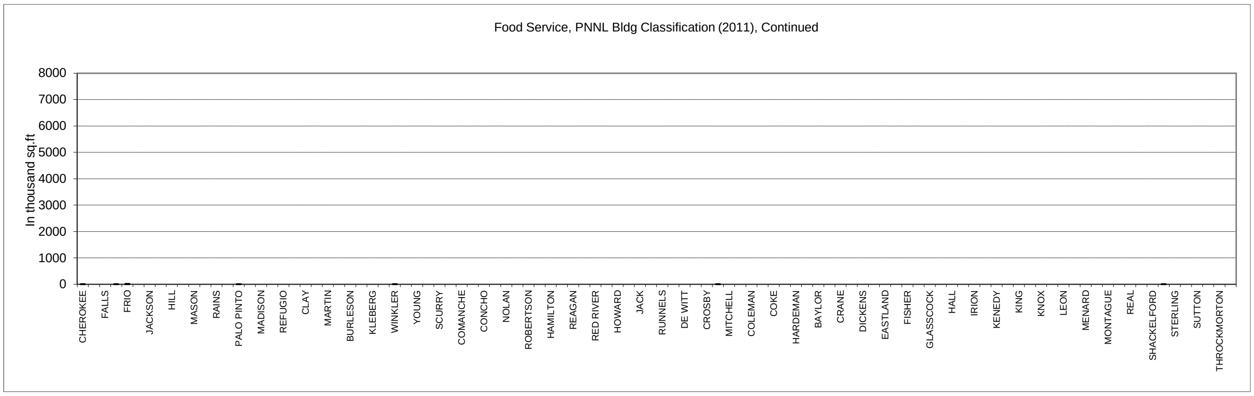


Figure 42: 2011 New Commercial Building Constructions (sq. ft. x 1000) (Dodge 2011) (Continued)

Table 23: Energy Use of ASHRAE Standard 90.1-1989 and 90.1-1999 Code-Compliant Lodging, Office, and Education Building Types (USDOE 2004)

Non-attainment Counties	Lodging								Office								Education							
	Electricity (kWh/yr), DOE				Gas (mBtu/yr), DOE				Electricity (kWh/yr), DOE				Gas (mBtu/yr), DOE				Electricity (kWh/yr), DOE				Gas (mBtu/yr), DOE			
	1989(Annual)	1989 (OSD)	1999 (Annual)	1999 (OSD)	1989(Annual)	1989 (OSD)	1999 (Annual)	1999 (OSD)	1989(Annual)	1989 (OSD)	1999 (Annual)	1999 (OSD)	1989(Annual)	1989 (OSD)	1999 (Annual)	1999 (OSD)	1989(Annual)	1989 (OSD)	1999 (Annual)	1999 (OSD)	1989(Annual)	1989 (OSD)	1999 (Annual)	1999 (OSD)
Brazoria	539368	1815	517189	1646	757	1	685	0	1899248	6390	1697703	5402	729	1	822	1	1481525	4985	1312801	4177	2674	4	2843	2
Chambers	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	168213	566	149056	474	304	0	323	0
Collin	21977375	73946	21073632	67054	30854	48	27928	17	8089335	27218	7230908	23008	3106	5	3499	2	11250394	37853	9969143	31721	20308	31	21590	13
Dallas	79460233	267354	76192710	242436	111556	172	100977	62	4829934	16251	4317389	13737	1855	3	2089	1	13854033	46614	12276267	39062	25008	39	26586	16
Denton	32569062	109583	31229774	99370	45724	70	41388	26	800606	2694	715647	2277	307	0	346	0	1854518	6240	1643316	5229	3348	5	3559	2
El Paso	14672071	49366	14068733	44765	20598	32	18645	12	1918240	6454	1714680	5456	737	1	830	1	1380179	4644	1222998	3891	2491	4	2649	2
Fort Bend	1931691	6499	1852257	5894	2712	4	2455	2	1051891	3539	940266	2992	404	1	455	0	12307731	41411	10906065	34702	22217	34	23619	15
Galveston	3173492	10678	3042994	9682	4455	7	4033	2	124182	418	111004	353	48	0	54	0	435681	1466	386064	1228	786	1	836	1
Hardin	0	0	0	0	0	0	0	0	49673	167	44401	141	19	0	21	0	0	0	0	0	0	0	0	0
Harris	85113565	286376	81613568	259685	119493	184	108161	67	17714140	59602	15834344	50383	6802	10	7663	5	43120939	145086	38210111	121580	77839	120	82750	51
Jefferson	1432462	4820	1373557	4371	2011	3	1820	1	137330	462	122757	391	53	0	59	0	301947	1016	267560	851	545	1	579	0
Liberty	79024	266	75774	241	111	0	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Montgomery	9822774	33050	9418847	29970	13790	21	12483	8	31526055	106074	28180562	89667	12106	19	13638	8	5366087	18055	4754970	15130	9686	15	10298	6
Orange	1003476	3376	962211	3062	1409	2	1275	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tarrant	29642676	99737	28423725	90441	41616	64	37669	23	2376982	7998	2124740	6761	913	1	1028	1	5625197	18927	4984572	15860	10154	16	10795	7
Waller	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Affected Counties	Lodging								Office								Education							
	Electricity (kWh/yr), DOE				Gas (mBtu/yr), DOE				Electricity (kWh/yr), DOE				Gas (mBtu/yr), DOE				Electricity (kWh/yr), DOE				Gas (mBtu/yr), DOE			
	1989(Annual)	1989 (OSD)	1999 (Annual)	1999 (OSD)	1989(Annual)	1989 (OSD)	1999 (Annual)	1999 (OSD)	1989(Annual)	1989 (OSD)	1999 (Annual)	1999 (OSD)	1989(Annual)	1989 (OSD)	1999 (Annual)	1999 (OSD)	1989(Annual)	1989 (OSD)	1999 (Annual)	1999 (OSD)	1989(Annual)	1989 (OSD)	1999 (Annual)	1999 (OSD)
Bastrop	0	0	0	0	0	0	0	0	81814	275	73132	233	31	0	35	0	50150	169	44439	141	91	0	96	0
Bexar	74454143	250511	71392477	227163	104528	161	94615	58	15788595	53123	14113135	44906	6063	9	6830	4	12885504	43355	11418039	36331	23260	36	24728	15
Caldwell	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Comal	3941151	13261	3779085	12025	5533	9	5008	3	131486	442	117533	374	50	0	57	0	2026910	6820	1796075	5715	3659	6	3890	2
Ellis	32613	110	31272	100	46	0	41	0	128564	433	114921	366	49	0	56	0	149406	503	132391	421	270	0	287	0
Gregg	0	0	0	0	0	0	0	0	18992	64	16977	54	7	0	8	0	125376	422	111097	353	226	0	241	0
Guadalupe	2207647	7428	2116865	6736	3099	5	2805	2	0	0	0	0	0	0	0	0	595535	2004	527713	1679	1075	2	1143	1
Harrison	238326	802	228525	727	335	1	303	0	0	0	0	0	0	0	0	0	10448	35	9258	29	19	0	20	0
Hays	1226749	4128	1176303	3743	1722	3	1559	1	873654	2940	780943	2485	335	1	378	0	582998	1962	516603	1644	1052	2	1119	1
Henderson	125434	422	120276	383	176	0	159	0	0	0	0	0	0	0	0	0	1293461	4352	1146155	3647	2335	4	2482	2
Hood	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hunt	0	0	0	0	0	0	0	0	292192	983	261185	831	112	0	126	0	20896	70	18516	59	38	0	40	0
Johnson	2395799	8061	2297280	7310	3364	5	3045	2	612142	2060	547183	1741	235	0	265	0	52240	176	46291	147	94	0	100	0
Kaufman	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	685388	2306	607333	1932	1237	2	1315	1
Nueces	4033973	13573	3868090	12308	5663	9	5126	3	983226	3308	878888	2797	378	1	425	0	3695454	12434	3274597	10419	6671	10	7092	4
Parker	1299501	4372	1246064	3965	1824	3	1651	1	109572	369	97944	312	42	0	47	0	424188	1427	375880	1196	766	1	814	1
Rockwall	318604	1072	305502	972	447	1	405	0	65743	221	58767	187	25	0	28	0	0	0	0	0	0	0	0	0
Rusk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
San Patricio	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	104480	352	92581	295	189	0	201	0
Smith	5288318	17793	5070854	16135	7424	11	6720	4	527407	1775	471439	1500	203	0	228	0	924647	3111	819344	2607	1669	3	1774	1
Travis	55938760	188213	53638474	170671	78534	121	71086	44	4945350	16639	4420557	14066	1899	3	2139	1	4554278	15323	4035614	12841	8221	13	8740	5
Upshur	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Victoria	1670787	5622	1602082	5098	2346	4	2123	1	73048	246	65296	208	28	0	32	0	0	0	0	0	0	0	0	0
Williamson	2991612	10066	2868593	9128	4200	6	3802	2	572696	1927	511923	1629	220	0	248	0	12000560	40377	10633876	33836	21663	33	23029	14
Wilson	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 23: Energy Use of ASHRAE Standard 90.1-1989 and 90.1-1999 Code-Compliant Lodging, Office, and Education Building Types (USDOE 2004) (Continued)

Other ERCOT Counties	Lodging								Office								Education							
	Electricity (kWh/yr), DOE				Gas (mBtu/yr), DOE				Electricity (kWh/yr), DOE				Gas (mBtu/yr), DOE				Electricity (kWh/yr), DOE				Gas (mBtu/yr), DOE			
	1989(Annual)	1989 (OSD)	1999 (Annual)	1999 (OSD)	1989(Annual)	1989 (OSD)	1999 (Annual)	1999 (OSD)	1989(Annual)	1989 (OSD)	1999 (Annual)	1999 (OSD)	1989(Annual)	1989 (OSD)	1999 (Annual)	1999 (OSD)	1989(Annual)	1989 (OSD)	1999 (Annual)	1999 (OSD)	1989(Annual)	1989 (OSD)	1999 (Annual)	1999 (OSD)
ANDERSON	0	0	0	0	0	0	0	0	20453	69	18283	58	8	0	9	0	0	0	0	0	0	0	0	0
ANDREWS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ANGELINA	1994408	6710	1912395	6085	2800	4	2534	2	43829	147	39178	125	17	0	19	0	27165	91	24071	77	49	0	52	0
ARANSAS	0	0	0	0	0	0	0	0	336021	1131	300363	956	129	0	145	0	0	0	0	0	0	0	0	0
ARCHER	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ATASCOSA	0	0	0	0	0	0	0	0	10227	34	9141	29	4	0	4	0	658223	2215	583262	1856	1188	2	1263	1
AUSTIN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BANDERA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bastrop	0	0	0	0	0	0	0	0	81814	275	73132	233	31	0	35	0	50150	169	44439	141	91	0	96	0
BAYLOR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BEE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	417920	1406	370325	1178	754	1	802	0
BELL	19000815	63931	18219473	57972	26676	41	24146	15	382772	1288	342152	1089	147	0	166	0	1580781	5319	1400753	4457	2854	4	3034	2
Bexar	74454143	250511	71392477	227163	104528	161	94615	58	15788595	53123	14113135	44906	6063	9	6830	4	12885504	43355	11418039	36331	23260	36	24728	15
BLANCO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BORDEN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1232863	4148	1092458	3476	2225	3	2366	1
BOSQUE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Brazoria	539368	1815	517189	1646	757	1	685	0	1899248	6390	1697703	5402	729	1	822	1	1481525	4985	1312801	4177	2674	4	2843	2
BRAZOS	9247030	31113	8866778	28213	12982	20	11751	7	302419	1018	270327	860	116	0	131	0	1436598	4834	1272991	4051	2593	4	2757	2
BREWSTER	551912	1857	529216	1684	775	1	701	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BRISCOE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BROOKS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BROWN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	370904	1248	328663	1046	670	1	712	0
BURLESON	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BURNET	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Caldwell	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CALHOUN	0	0	0	0	0	0	0	0	109572	369	97944	312	42	0	47	0	0	0	0	0	0	0	0	0
CALLAHAN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CAMERON	2901299	9762	2781994	8852	4073	6	3687	2	29219	98	26119	83	11	0	13	0	3889786	13088	3446798	10967	7022	11	7465	5
Chambers	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	168213	566	149056	474	304	0	323	0
CHEROKEE	125434	422	120276	383	176	0	159	0	0	0	0	0	0	0	0	0	1833622	6169	1624800	5170	3310	5	3519	2
CHILDRESS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CLAY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COKE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COLEMAN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Collin	21977375	73946	21073632	67054	30854	48	27928	17	8089335	27218	7230908	23008	3106	5	3499	2	11250394	37853	9969143	31721	20308	31	21590	13
COLORADO	127943	430	122682	390	180	0	163	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Comal	3941151	13261	3779085	12025	5533	9	5008	3	131486	442	117533	374	50	0	57	0	2026910	6820	1796075	5715	3659	6	3890	2
COMANCHE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CONCHO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COOKE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CORYELL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COTTLE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CRANE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CROCKETT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CROSBY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CULBERSON	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dallas	79460233	267354	76192710	242436	111556	172	100977	62	4829934	16251	4317389	13737	1855	3	2089	1	13854033	46614	12276267	39062	25008	39	26586	16
DAWSON	0	0	0	0	0	0	0	0	306802	1032	274244	873	118	0	133	0	53285	179	47216	150	96	0	102	0
DE WITT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DELTA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Denton	32569062	109583	31229774	99370	45724	70	41388	26	800606	2694	715647	2277	307	0	346	0	1854518	6240	1643316	5229	3348	5	3559	2
DICKENS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DIMMIT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DUVAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
EASTLAND	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ECTOR	820341	2760	786608	2503	1152	2	1042	1	92040	310	82273	262	35	0	40	0	313440	1055	277744	884	566	1	602	0
EDWARDS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ellis	32613	110	31272	100	46	0	41	0	128564	433	114921	366	49	0	56	0	149406	503	132391	421	270	0	287	0
ERATH	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FALLS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FANNIN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FAYETTE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FISHER	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FOARD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fort Bend	1931691	6499	1852257	5894	2712	4	2455	2	1051891	3539	940266	2992	404	1	455	0	12307731	41411	10906065	34702	22217	34	23619	15
FRANKLIN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FREESTONE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	359411	1209	318479	1013	649	1	690	0
FRIO	489194	1646	469078	1493	687	1	622	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Galveston	3173492	10678	3042994	9682	4455	7	4033	2	124182	418	111004	353	48	0	54	0	435681	1466	386064	1228	786	1	836	1
GILLESPIE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GLASSCOCK	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GOLIAD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GONZALES	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	104480	352	92581	295	189	0	201	0
GRAYSON	1714689	5769	1644179	5232	2407	4	2179	1	0	0	0	0	0	0	0	0	1243311	4183	1101716	3506	2244	3	2386	1
GRIMES	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Guadalupe	2207647	7428	2116865	6736	3099	5	2805	2	0	0	0	0	0	0	0	0	595535	2004	527713	1679	1075	2	1143	1
HALL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HAMILTON	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HARDEMAN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Harris	85113565	286376	81613568	259685	119493	184	108161	67	17714140	59602	15834344	50383	6802	10	7663	5	43120939	145086	38210111	121580	77839	120	82750	51
HASKELL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hays	1226749	4128	1176303	3743	1722	3	1559	1	873654	2940	780943	2485	335	1	378	0	582998	1962	516603	1644	1052	2	1119	1
Henderson	125434	422	120276	383	176	0	159	0	0	0	0	0	0	0	0	0	1293461	4352	1146155	3647	2335	4	2482	2
HIDALGO	3544778	11927	3399012	10815	4977	8	4505	3	625291	2104	558936	1778	240	0	270	0	12699530	42729	11253244	35807	22924	35	24371	15
HILL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	730314	2457	647143	2059	1318	2	1401	1
Hood	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HOPKINS	194423	654	186428	593	273	0	247	0	0	0	0	0	0	0	0	0	130600	439	115726	368	236	0	251	0
HOUSTON	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HOWARD	13798	46	13230	42	19	0	18	0	0	0	0	0	0	0	0	0	626879	2109	555487	1767	1132	2	1203	1
HUDSPETH	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hunt	0	0	0	0	0	0	0	0	292192	983	261185	831	112	0	126	0	20896	70	18516	59	38	0	40	0
IRION	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
JACK	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	434636	1462	385138	1225	785	1	834	1
JACKSON	0	0	0	0	0	0	0	0	49673	167	44401	141	19	0	21	0	902706	3037	799902	2545	1630	3	1732	1
JEFF DAVIS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
JIM HOGG	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 23: Energy Use of ASHRAE Standard 90.1-1989 and 90.1-1999 Code-Compliant Lodging, Office, and Education Building Types (USDOE 2004) (Continued)

Other ERCOT Counties	Lodging								Office								Education							
	Electricity (kWh/yr), DOE				Gas (mBtu/yr), DOE				Electricity (kWh/yr), DOE				Gas (mBtu/yr), DOE				Electricity (kWh/yr), DOE				Gas (mBtu/yr), DOE			
	1989(Annual)	1989 (OSD)	1999 (Annual)	1999 (OSD)	1989(Annual)	1989 (OSD)	1999 (Annual)	1999 (OSD)	1989(Annual)	1989 (OSD)	1999 (Annual)	1999 (OSD)	1989(Annual)	1989 (OSD)	1999 (Annual)	1999 (OSD)	1989(Annual)	1989 (OSD)	1999 (Annual)	1999 (OSD)	1989(Annual)	1989 (OSD)	1999 (Annual)	1999 (OSD)
JIM HOGG	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
JIM WELLS	0	0	0	0	0	0	0	0	29219	98	26119	83	11	0	13	0	701060	2359	621220	1977	1266	2	1345	1
Johnson	2395799	8061	2297280	7310	3364	5	3045	2	612142	2060	547183	1741	235	0	265	0	52240	176	46291	147	94	0	100	0
JONES	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
KARNES	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Kaufman	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	685388	2306	607333	1932	1237	2	1315	1
KENDALL	627172	2110	601382	1914	881	1	797	0	230832	777	206336	657	89	0	100	0	0	0	0	0	0	0	0	0
KENEDY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
KENT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
KERR	501738	1688	481106	1531	704	1	638	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
KIMBLE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
KING	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
KINNEY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
KLEBERG	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
KNOX	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LA SALLE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LAMAR	388847	1308	372857	1186	546	1	494	0	0	0	0	0	0	0	0	0	436726	1469	386989	1231	788	1	838	1
LAMPASAS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LAVACA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	720911	2426	638810	2033	1301	2	1383	1
LEE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LEON	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LIMESTONE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LIVE OAK	0	0	0	0	0	0	0	0	39446	133	35260	112	15	0	17	0	605983	2039	536971	1709	1094	2	1163	1
LLANO	112891	380	108249	344	158	0	143	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LOVING	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MADISON	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MARTIN	767659	2583	736092	2342	1078	2	976	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MASON	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MATAGORDA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MAVERICK	617138	2076	591760	1883	866	1	784	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MCCULLOCH	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MCLENNAN	752607	2532	721659	2296	1057	2	956	1	369623	1244	330399	1051	142	0	160	0	3685006	12399	3265339	10390	6652	10	7072	4
MCMULLEN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MEDINA	0	0	0	0	0	0	0	0	55516	187	49625	158	21	0	24	0	0	0	0	0	0	0	0	0
MENARD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MIDLAND	2832311	9530	2715842	8641	3976	6	3599	2	1852497	6233	1655913	5269	711	1	801	0	855690	2879	758240	2413	1545	2	1642	1
MILAM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MILLS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MITCHELL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MONTAGUE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Montgomery	9822774	33050	9418847	29970	13790	21	12483	8	31526055	106074	28180562	89667	12106	19	13638	8	5366087	18055	4754970	15130	9686	15	10298	6
MOTLEY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NACOGDOCHES	2558863	8610	2453639	7807	3592	6	3252	2	64282	216	57461	183	25	0	28	0	76270	257	67584	215	138	0	146	0
NAVARRO	120417	405	115465	367	169	0	153	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NOLAN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	282096	949	249969	795	509	1	541	0
Nueces	4033973	13573	3868090	12308	5663	9	5126	3	983226	3308	878888	2797	378	1	425	0	3695454	12434	3274597	10419	6671	10	7092	4
PALO PINTO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Parker	1299501	4372	1246064	3965	1824	3	1651	1	109572	369	97944	312	42	0	47	0	424188	1427	375880	1196	766	1	814	1
PECOS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	83584	281	74065	236	151	0	160	0
PRESIDIO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RAINS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
REAGAN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
REAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RED RIVER	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
REEVES	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	104480	352	92581	295	189	0	201	0
REFUGIO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ROBERTSON	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rockwall	318604	1072	305502	972	447	1	405	0	65743	221	58767	187	25	0	28	0	0	0	0	0	0	0	0	0
RUNNELS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rusk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
San Patricio	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	104480	352	92581	295	189	0	201	0
SAN SABA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SCHLEICHER	737555	2482	707225	2250	1035	2	937	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SCURRY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SHACKELFORD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Smith	5288318	17793	5070854	16135	7424	11	6720	4	527407	1775	471439	1500	203	0	228	0	924647	3111	819344	2607	1669	3	1774	1
SOMERVELL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
STARR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
STEPHENS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
STERLING	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
STONEWALL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SUTTON	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tarrant	29642676	99737	28423725	90441	41616	64	37669	23	2376982	7998	2124740	6761	913	1	1028	1	5625197	18927	4984572	15860	10154	16	10795	7
TAYLOR	0	0	0	0	0	0	0	0	248363	836	222007	706	95	0	107	0	1314357	4422	1164671	3706	2373	4	2522	2
TERRELL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
THROCKMORTON	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TITUS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	198512	668	175904	560	358	1	381	0
TOM GREEN	227036	764	217700	693	319	0	289	0	207456	698	185441	590	80	0	90	0	31344	105	27774	88	57	0	60	0
Travis	55938760	188213	53638474	170671	78534	121	71086	44	4945350	16639	4420557	14066	1899	3	2139	1	4554278	15323	4035614	12841	8221	13	8740	5
UPTON	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	438816	1476	388841	1237	792	1	842	1
UVALDE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
VAL VERDE	755116	2541	724064	2304	1060	2	960	1	93501	315	83579	266	36	0	40	0	170302	573	150907	480	307	0	327	0
VAN ZANDT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	590311	1986	523084	1664	1066	2	1133	1
Victoria	1670787	5622	1602082	5098	2346	4	2123	1	73048	246	65296	208	28	0	32	0	0	0	0	0	0	0	0	0
Waller	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WARD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WASHINGTON	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WEBB	2205138	7419	2114460	6728	3096	5	2802	2	58438	197	52237	166	22	0	25	0	623745	2099	552710	1759	1126	2	1197	1
WHARTON	0	0	0	0	0	0	0	0	81814	275	73132	233	31	0	35	0	0	0	0	0	0	0	0	0
WICHITA	632190	2127	606193	1929	888	1	803	0	86197	290	77050	245	33	0	37	0	0	0	0	0	0	0	0	0
WILBARGER	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7314	25	6481	21	13	0	14	0
WILLACY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	181795	612	161091	513	328	1	349	0
Williamson	2991612	10066	2868593	9128	4200	6	3802	2	572696	1927	511923	1629	220	0	248	0	12000560	40377	10633876	33836	21663	33	23029	14
Wilson	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WINKLER	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WISE	0	0	0	0	0	0	0	0	26297	88	23507	75	10	0	11	0	1042709	3508	923960	2940	1882	3	2001	1
YOUNG	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	39702	134	35181	112	72	0	76	0
ZAPATA	0	0	0	0	0	0	0	0	144635	487	129287	411	56	0	63	0	0	0	0	0	0	0	0	0
ZAVALA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	492143429	1655881	471905755	1501550	690930	1064	625407	386	101618533	341909	90834941	289026	39021	60	43959	27	178565529	600807	158229595	503468	322334	496	342673	212

Table 24: Energy Use of ASHRAE Standard 90.1-1989 and 90.1-1999 Code-Compliant Retail and Food Building Types (USDOE 2004)

Non-attainment Counties	Retail								Food Service							
	Electricity (kWh/yr), DOE				Gas (mBtu/yr), DOE				Electricity (kWh/yr), DOE				Gas (mBtu/yr), DOE			
	1989(Annual)	1989 (OSD)	1999 (Annual)	1999 (OSD)	1989(Annual)	1989 (OSD)	1999 (Annual)	1999 (OSD)	1989(Annual)	1989 (OSD)	1999 (Annual)	1999 (OSD)	1989(Annual)	1989 (OSD)	1999 (Annual)	1999 (OSD)
Brazoria	288182	970	242791	773	68	0	89	0	136704	460	138292	440	163	0	160	0
Chambers	140125	471	118054	376	33	0	43	0	66471	224	67243	214	79	0	78	0
Collin	5779505	19446	4869188	15493	1363	2	1784	1	2741608	9224	2773450	8825	3270	5	3214	2
Dallas	15896284	53485	13392494	42613	3750	6	4908	3	7540677	25372	7628255	24272	8995	14	8841	5
Denton	2089981	7032	1760793	5603	493	1	645	0	991419	3336	1002933	3191	1183	2	1162	1
El Paso	5669785	19077	4776749	15199	1337	2	1750	1	2689560	9049	2720797	8657	3208	5	3153	2
Fort Bend	5746457	19335	4841345	15405	1355	2	1774	1	2725931	9172	2757591	8774	3252	5	3196	2
Galveston	5760998	19384	4853596	15444	1359	2	1779	1	2732829	9195	2764569	8797	3260	5	3204	2
Hardin	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Harris	21620268	72744	18214905	57958	5100	8	6675	4	10255947	34507	10375062	33012	12234	19	12024	7
Jefferson	518199	1744	436579	1389	122	0	160	0	245817	827	248672	791	293	0	288	0
Liberty	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Montgomery	3040453	10230	2561558	8151	717	1	939	1	1442292	4853	1459043	4643	1721	3	1691	1
Orange	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tarrant	6878034	23142	5794690	18438	1622	2	2123	1	3262714	10978	3300608	10502	3892	6	3825	2
Waller	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Affected Counties	Retail								Food Service							
	Electricity (kWh/yr), DOE				Gas (mBtu/yr), DOE				Electricity (kWh/yr), DOE				Gas (mBtu/yr), DOE			
	1989(Annual)	1989 (OSD)	1999 (Annual)	1999 (OSD)	1989(Annual)	1989 (OSD)	1999 (Annual)	1999 (OSD)	1989(Annual)	1989 (OSD)	1999 (Annual)	1999 (OSD)	1989(Annual)	1989 (OSD)	1999 (Annual)	1999 (OSD)
Bastrop	195647	658	164831	524	46	0	60	0	92808	312	93886	299	111	0	109	0
Bexar	8517235	28657	7175704	22832	2009	3	2630	2	4040298	13594	4087222	13005	4820	7	4737	3
Caldwell	2115098	7117	1781953	5670	499	1	653	0	1003333	3376	1014986	3230	1197	2	1176	1
Comal	1496432	5035	1260732	4012	353	1	462	0	709858	2388	718103	2285	847	1	832	1
Ellis	2113776	7112	1780840	5666	499	1	653	0	1002706	3374	1014352	3228	1196	2	1176	1
Gregg	95179	320	80188	255	22	0	29	0	45150	152	45674	145	54	0	53	0
Guadalupe	50234	169	42321	135	12	0	16	0	23829	80	24106	77	28	0	28	0
Harrison	1068125	3594	899886	2863	252	0	330	0	506683	1705	512568	1631	604	1	594	0
Hays	178461	600	150352	478	42	0	55	0	84656	285	85639	272	101	0	99	0
Henderson	30405	102	25616	82	7	0	9	0	14423	49	14590	46	17	0	17	0
Hood	1636557	5506	1378786	4387	386	1	505	0	776329	2612	785346	2499	926	1	910	1
Hunt	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Johnson	257778	867	217176	691	61	0	80	0	122281	411	123701	394	146	0	143	0
Kaufman	99145	334	83529	266	23	0	31	0	47031	158	47577	151	56	0	55	0
Nueces	3961843	13330	3337822	10621	935	1	1223	1	1879369	6323	1901196	6049	2242	3	2203	1
Parker	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rockwall	315943	1063	266179	847	75	0	98	0	149873	504	151614	482	179	0	176	0
Rusk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
San Patricio	101789	342	85757	273	24	0	31	0	48285	162	48846	155	58	0	57	0
Smith	565789	1904	476673	1517	133	0	175	0	268392	903	271509	864	320	0	315	0
Travis	7114661	23938	5994046	19072	1678	3	2197	1	3374962	11356	3414160	10863	4026	6	3957	2
Upshur	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Victoria	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Williamson	1755531	5907	1479021	4706	414	1	542	0	832767	2802	842439	2681	993	2	976	1
Wilson	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 24: Energy Use of ASHRAE Standard 90.1-1989 and 90.1-1999 Code-Compliant Retail and Food Building Types (USDOE 2004) (Continued)

Other ERCOT Counties	Retail								Food Service							
	Electricity (kWh/yr), DOE				Gas (mBtu/yr), DOE				Electricity (kWh/yr), DOE				Gas (mBtu/yr), DOE			
	1989(Annual)	1989 (OSD)	1999 (Annual)	1999 (OSD)	1989(Annual)	1989 (OSD)	1999 (Annual)	1999 (OSD)	1989(Annual)	1989 (OSD)	1999 (Annual)	1999 (OSD)	1989(Annual)	1989 (OSD)	1999 (Annual)	1999 (OSD)
ANDERSON	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ANDREWS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ANGELINA	31726	107	26729	85	7	0	10	0	15050	51	15225	48	18	0	18	0
ARANSAS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ARCHER	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ATASCOSA	1546665	5204	1303053	4146	365	1	478	0	733687	2469	742209	2362	875	1	860	1
AUSTIN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BANDERA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bastrop	195647	658	164831	524	46	0	60	0	92808	312	93886	299	111	0	109	0
BAYLOR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BEE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BELL	1805765	6076	1521343	4841	426	1	557	0	856596	2882	866544	2757	1022	2	1004	1
Bexar	8517235	28657	7175704	22832	2009	3	2630	2	4040298	13594	4087222	13005	4820	7	4737	3
BLANCO	59487	200	50117	159	14	0	18	0	28219	95	28546	91	34	0	33	0
BORDEN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BOSQUE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Brazoria	288182	970	242791	773	68	0	89	0	136704	460	138292	440	163	0	160	0
BRAZOS	909492	3060	766240	2438	215	0	281	0	431433	1452	436444	1389	515	1	506	0
BREWSTER	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BRISCOE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BROOKS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BROWN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BURLESON	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BURNET	183749	618	154807	493	43	0	57	0	87165	293	88177	281	104	0	102	0
Caldw ell	2115098	7117	1781953	5670	499	1	653	0	1003333	3376	1014986	3230	1197	2	1176	1
CALHOUN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CALLAHAN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CAMERON	2400636	8077	2022517	6435	566	1	741	0	1138783	3832	1152009	3666	1358	2	1335	1
Chambers	140125	471	118054	376	33	0	43	0	66471	224	67243	214	79	0	78	0
CHEROKEE	64775	218	54572	174	15	0	20	0	30727	103	31084	99	37	0	36	0
CHILDRESS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CLAY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COKE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COLEMAN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Collin	5779505	19446	4869188	15493	1363	2	1784	1	2741608	9224	2773450	8825	3270	5	3214	2
COLORADO	252490	850	212721	677	60	0	78	0	119773	403	121164	386	143	0	140	0
Comal	1496432	5035	1260732	4012	353	1	462	0	709858	2388	718103	2285	847	1	832	1
COMANCHE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CONCHO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COOKE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CORYELL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COTTLE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CRANE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CROCKETT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CROSBY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CULBERSON	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dallas	15896284	53485	13392494	42613	3750	6	4908	3	7540677	25372	7628255	24272	8995	14	8841	5
DAWSON	63453	213	53459	170	15	0	20	0	30100	101	30450	97	36	0	35	0
DE WITT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DELTA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Denton	2089981	7032	1760793	5603	493	1	645	0	991419	3336	1002933	3191	1183	2	1162	1
DICKENS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DIMMIT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DUVAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
EASTLAND	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ECTOR	211510	712	178195	567	50	0	65	0	100333	338	101499	323	120	0	118	0
EDWARDS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ellis	2113776	7112	1780840	5666	499	1	653	0	1002706	3374	1014352	3228	1196	2	1176	1
ERATH	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FALLS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FANNIN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FAYETTE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FISHER	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FOARD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fort Bend	5746457	19335	4841345	15405	1355	2	1774	1	2725931	9172	2757591	8774	3252	5	3196	2
FRANKLIN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FREESTONE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FRIO	1321936	4448	1113721	3544	312	0	408	0	627083	2110	634366	2018	748	1	735	0
Galveston	5760998	19384	4853596	15444	1359	2	1779	1	2732829	9195	2764569	8797	3260	5	3204	2
GILLESPIE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GLASSCOCK	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GOLIAD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GONZALES	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GRAYSON	68741	231	57913	184	16	0	21	0	32608	110	32987	105	39	0	38	0
GRIMES	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Guadalupe	50234	169	42321	135	12	0	16	0	23829	80	24106	77	28	0	28	0
HALL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HAMILTON	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HARDEMAN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Harris	21620268	72744	18214905	57958	5100	8	6675	4	10255947	34507	10375062	33012	12234	19	12024	7
HASKELL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hays	178461	600	150352	478	42	0	55	0	84656	285	85639	272	101	0	99	0
Henderson	30405	102	25616	82	7	0	9	0	14423	49	14590	46	17	0	17	0
HIDALGO	4711381	15852	3969301	12630	1111	2	1455	1	2234925	7520	2260882	7194	2666	4	2620	2
HILL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hood	1636557	5506	1378786	4387	386	1	505	0	776329	2612	785346	2499	926	1	910	1
HOPKINS	112365	378	94666	301	27	0	35	0	53302	179	53921	172	64	0	62	0
HOUSTON	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HOWARD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HUDSPETH	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hunt	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IRION	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
JACK	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
JACKSON	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
JEFF DAVIS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
JIM HOGG	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 24: Energy Use of ASHRAE Standard 90.1-1989 and 90.1-1999 Code-Compliant Retail and Food Building Types (USDOE 2004) (Continued)

Other ERCOT Counties	Retail								Food Service							
	Electricity (kWh/yr), DOE				Gas (mBtu/yr), DOE				Electricity (kWh/yr), DOE				Gas (mBtu/yr), DOE			
	1989(Annual)	1989 (OSD)	1999 (Annual)	1999 (OSD)	1989(Annual)	1989 (OSD)	1999 (Annual)	1999 (OSD)	1989(Annual)	1989 (OSD)	1999 (Annual)	1999 (OSD)	1989(Annual)	1989 (OSD)	1999 (Annual)	1999 (OSD)
JIM WELLS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Johnson	257778	867	217176	691	61	0	80	0	122281	411	123701	394	146	0	143	0
JONES	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
KARNES	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Kaufman	99145	334	83529	266	23	0	31	0	47031	158	47577	151	56	0	55	0
KENDALL	1596899	5373	1345375	4281	377	1	493	0	757517	2549	766315	2438	904	1	888	1
KENEDY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
KENT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
KERR	122940	414	103576	330	29	0	38	0	58319	196	58996	188	70	0	68	0
KIMBLE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
KING	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
KINNEY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
KLEBERG	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
KNOX	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LA SALLE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LAMAR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LAMPASAS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LAVACA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LEE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LEON	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LIMESTONE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LIVE OAK	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LLANO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LOVING	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MADISON	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MARTIN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MASON	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MATAGORDA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MAVERICK	63453	213	53459	170	15	0	20	0	30100	101	30450	97	36	0	35	0
MCCULLOCH	39658	133	33412	106	9	0	12	0	18812	63	19031	61	22	0	22	0
MCLENNAN	96501	325	81302	259	23	0	30	0	45777	154	46309	147	55	0	54	0
MCMULLEN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MEDINA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MENARD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MIDLAND	226051	761	190446	606	53	0	70	0	107231	361	108477	345	128	0	126	0
MILAM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MILLS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MITCHELL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MONTAGUE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Montgomery	3040453	10230	2561558	8151	717	1	939	1	1442292	4853	1459043	4643	1721	3	1691	1
MOTLEY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NACOGDOCHES	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NAVARRO	59487	200	50117	159	14	0	18	0	28219	95	28546	91	34	0	33	0
NOLAN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nueces	3961843	13330	3337822	10621	935	1	1223	1	1879369	6323	1901196	6049	2242	3	2203	1
PALO PINTO	75350	254	63482	202	18	0	23	0	35744	120	36159	115	43	0	42	0
Parker	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PECOS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PRESIDIO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RAINS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
REAGAN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
REAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RED RIVER	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
REEVES	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
REFUGIO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ROBERTSON	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rockwall	315943	1063	266179	847	75	0	98	0	149873	504	151614	482	179	0	176	0
RUNNELS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rusk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
San Patricio	101789	342	85757	273	24	0	31	0	48285	162	48846	155	58	0	57	0
SAN SABA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SCHLEICHER	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SCURRY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SHACKELFORD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Smith	565789	1904	476673	1517	133	0	175	0	268392	903	271509	864	320	0	315	0
SOMERVELL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
STARR	63453	213	53459	170	15	0	20	0	30100	101	30450	97	36	0	35	0
STEPHENS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
STERLING	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
STONEWALL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SUTTON	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tarrant	6878034	23142	5794690	18438	1622	2	2123	1	3262714	10978	3300608	10502	3892	6	3825	2
TAYLOR	248524	836	209380	666	59	0	77	0	117892	397	119261	379	141	0	138	0
TERRELL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
THROCKMORTON	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TITUS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOM GREEN	144091	485	121396	386	34	0	44	0	68352	230	69146	220	82	0	80	0
Travis	7114661	23938	5994046	19072	1678	3	2197	1	3374962	11356	3414160	10863	4026	6	3957	2
UPTON	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
UVALDE	185071	623	155921	496	44	0	57	0	87792	295	88811	283	105	0	103	0
VAL VERDE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
VAN ZANDT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Victoria	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Waller	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WARD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WASHINGTON	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WEBB	2628009	8842	2214077	7045	620	1	811	1	1246642	4194	1261120	4013	1487	2	1462	1
WHARTON	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WICHITA	1049617	3532	884294	2814	248	0	324	0	497904	1675	503687	1603	594	1	584	0
WILBARGER	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WILLACY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Williamson	1755531	5907	1479021	4706	414	1	542	0	832767	2802	842439	2681	993	2	976	1
Wilson	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WINKLER	108399	365	91325	291	26	0	33	0	51421	173	52018	166	61	0	60	0
WISE	196969	663	165944	528	46	0	61	0	93435	314	94521	301	111	0	110	0
YOUNG	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ZAPATA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ZAVALA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	125746543	423091	105940472	337090	29661	46	38822	24	59650044	200700	60342830	192004	71157	110	69935	43

Table 25: Calculated the ASHRAE Standard 90.1-1989 and 90.1-1999 Annual Electricity and Natural Gas Savings (USDOE 2004). A decrease in energy use is negative (i.e., savings); a positive value represents an energy use increase (+)

Counties	Lodging		Office		Education		Retail		Food Service		Total		Total*1.07 (T&D loss) for eGrid	
	kWh/yr	mBtu/yr	kWh/yr	mBtu/yr	kWh/yr	mBtu/yr	kWh/yr	mBtu/yr	kWh/yr	mBtu/yr	kWh/yr	mBtu/yr	MWh/yr	Therm/yr
Non-attainment Counties														
(square feet in thousands)														
Brazoria	-22180	-72	-201545	92	-168723	169	-45391	21	1588	-3	-436251	207	467	-2219
Chambers	0	0	0	0	-19157	19	-22071	10	772	-1	-40456	28	43	-300
Collin	-903743	-2926	-858427	393	-1281251	1281	-910318	421	31842	-56	-3921897	-887	4196	9487
Dallas	-3267524	-10579	-512545	235	-1577766	1578	-2503790	1158	87579	-154	-7774046	-7763	8318	83062
Denton	-1339289	-4336	-84959	39	-211202	211	-329189	152	11515	-20	-1953123	-3954	2090	42309
El Paso	-603337	-1953	-203561	93	-157182	157	-893036	413	31237	-55	-1825878	-1345	1954	14392
Fort Bend	-79434	-257	-111625	51	-1401666	1402	-905112	419	31659	-56	-2466178	1559	2639	-16677
Galveston	-130499	-423	-13178	6	-49618	50	-907403	420	31740	-56	-1068957	-3	1144	34
Hardin	0	0	-5271	2	0	0	0	0	0	0	-5271	2	6	-26
Harris	-3499997	-11332	-1879795	861	-4910828	4911	-3405362	1575	119114	-210	-13576868	-4195	14527	44882
Jefferson	-58905	-191	-14573	7	-34387	34	-81620	38	2855	-5	-186631	-117	200	1251
Liberty	-3250	-11	0	0	0	0	0	0	0	0	-3250	-11	3	113
Montgomery	-403927	-1308	-3345493	1532	-611117	611	-478895	222	16751	-30	-4822681	1027	5160	-10994
Orange	-41264	-134	0	0	0	0	0	0	0	0	-41264	-134	44	1430
Tarrant	-1218951	-3947	-252241	116	-640626	641	-1083345	501	37894	-67	-3157269	-2756	3378	29490
Waller	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Affected Counties														
(square feet in thousands)														
Bastrop	0	0	-8682	4	-5711	6	-30816	14	1078	-2	-44131	22	47	-236
Bexar	-3061666	-9913	-1675460	767	-1467466	1468	-1341532	621	46925	-83	-7499198	-7140	8024	76398
Caldwell	0	0	0	0	0	0	-333145	154	11653	-21	-321492	134	344	-1429
Comal	-162066	-525	-13953	6	-230835	231	-235700	109	8244	-15	-634309	-193	679	2065
Ellis	-1341	-4	-13643	6	-17015	17	-332936	154	11646	-21	-353290	152	378	-1630
Gregg	0	0	-2015	1	-14278	14	-14992	7	524	-1	-30761	21	33	-227
Guadalupe	-90782	-294	0	0	-67823	68	-7912	4	277	0	-166240	-223	178	2385
Harrison	-9800	-32	0	0	-1190	1	-168238	78	5885	-10	-173343	37	185	-395
Hays	-50446	-163	-92711	42	-66395	66	-28109	13	983	-2	-236677	-43	253	462
Henderson	-5158	-17	0	0	-147306	147	-4789	2	168	0	-157085	133	168	-1418
Hood	0	0	0	0	0	0	-257771	119	9016	-16	-248754	103	266	-1106
Hunt	0	0	-31007	14	-2380	2	0	0	0	0	-33387	17	36	-177
Johnson	-98519	-319	-64960	30	-5949	6	-40602	19	1420	-3	-208609	-267	223	2857
Kaufman	0	0	0	0	-78055	78	-15616	7	546	-1	-93125	84	100	-902
Nueces	-165883	-537	-104338	48	-420857	421	-624021	289	21827	-39	-1293272	182	1384	-1945
Parker	-53437	-173	-11628	5	-48309	48	0	0	0	0	-113374	-119	121	1277
Rockwall	-13101	-42	-6977	3	0	0	-49763	23	1741	-3	-68101	-19	73	206
Rusk	0	0	0	0	0	0	0	0	0	0	0	0	0	0
San Patricio	0	0	0	0	-11899	12	-16033	7	561	-1	-27370	18	29	-196
Smith	-217464	-704	-55968	26	-105303	105	-89116	41	3117	-5	-464733	-537	497	5750
Travis	-2300285	-7448	-524792	240	-518664	519	-1120615	518	39197	-69	-4425159	-6239	4735	66760
Upshur	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Victoria	-68705	-222	-7752	4	0	0	0	0	0	0	-76457	-219	82	2342
Williamson	-123020	-398	-60774	28	-1366684	1367	-276510	128	9672	-17	-1817315	1107	1945	-11847
Wilson	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 25: Calculated the ASHRAE Standard 90.1-1989 and 90.1-1999 Annual Electricity and Natural Gas Savings (USDOE 2004). A decrease in energy use is negative (i.e., savings); a positive value represents an energy use increase (+) (Continued)

Counties	Lodging		Office		Education		Retail		Food Service		Total		Total*1.07 (T&D loss) for eGrid	
	kWh/yr	mBtu/yr	kWh/yr	mBtu/yr	kWh/yr	mBtu/yr	kWh/yr	mBtu/yr	kWh/yr	mBtu/yr	kWh/yr	mBtu/yr	MWh/yr	Therm/yr
Other ERCOT Counties														
(square feet in thousands)														
ANDERSON	0	0	-2170	1	0	0	0	0	0	0	-2170	1	2	-11
ANDREWS	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ANGELINA	-82013	-266	-4651	2	-3094	3	-4997	2	175	0	-94580	-258	101	2764
ARANSAS	0	0	-35658	16	0	0	0	0	0	0	-35658	16	38	-175
ARCHER	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ATASCOSA	0	0	-1085	0	-74962	75	-243612	113	8521	-15	-311138	173	333	-1852
AUSTIN	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BANDERA	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BAYLOR	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BEE	0	0	0	0	-47595	48	0	0	0	0	-47595	48	51	-509
BELL	-781342	-2530	-40619	19	-180027	180	-284422	132	9949	-18	-1276462	-2217	1366	23723
BLANCO	0	0	0	0	0	0	-9370	4	328	-1	-9042	4	10	-40
BORDEN	0	0	0	0	-140405	140	0	0	0	0	-140405	140	150	-1502
BOSQUE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BRAZOS	-380252	-1231	-32092	15	-163607	164	-143252	66	5011	-9	-714192	-995	764	10651
BREWSTER	-22695	-73	0	0	0	0	0	0	0	0	-22695	-73	24	786
BRISCOE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BROOKS	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BROWN	0	0	0	0	-42240	42	0	0	0	0	-42240	42	45	-452
BURLESON	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BURNET	0	0	0	0	0	0	-28942	13	1012	-2	-27930	12	30	-124
CALHOUN	0	0	-11628	5	0	0	0	0	0	0	-11628	5	12	-57
CALLAHAN	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CAMERON	-119306	-386	-3101	1	-442988	443	-378119	175	13226	-23	-930288	210	995	-2244
CHEROKEE	-5158	-17	0	0	-208822	209	-10203	5	357	-1	-223826	196	239	-2100
CHILDRESS	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CLAY	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COKE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COLEMAN	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COLORADO	-5261	-17	0	0	0	0	-39769	18	1391	-2	-43639	-1	47	12
COMANCHE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CONCHO	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COOKE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CORYELL	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COTTLE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CRANE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CROCKETT	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CROSBY	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CULBERSON	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DAWSON	0	0	-32557	15	-6068	6	-9994	5	350	-1	-48270	25	52	-267
DE WITT	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DELTA	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DICKENS	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DIMMIT	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DUVAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0
EASTLAND	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ECTOR	-33734	-109	-9767	4	-35696	36	-33314	15	1165	-2	-111346	-56	119	596
EDWARDS	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ERATH	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FALLS	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FANNIN	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FAYETTE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FISHER	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FOARD	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FRANKLIN	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 25: Calculated the ASHRAE Standard 90.1-1989 and 90.1-1999 Annual Electricity and Natural Gas Savings (USDOE 2004). A decrease in energy use is negative (i.e., savings); a positive value represents an energy use increase (+) (Continued)

Counties	Lodging		Office		Education		Retail		Food Service		Total		Total*1.07 (T&D loss) for eGrid	
	kWh/yr	mBtu/yr	kWh/yr	mBtu/yr	kWh/yr	mBtu/yr	kWh/yr	mBtu/yr	kWh/yr	mBtu/yr	kWh/yr	mBtu/yr	MWh/yr	Therm/yr
Other ERCOT Counties														
(square feet in thousands)														
FREESTONE	0	0	0	0	-40931	41	0	0	0	0	-40931	41	44	-438
FRIO	-20116	-65	0	0	0	0	-208215	96	7283	-13	-221049	18	237	-196
GILLESPIE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GLASSCOCK	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GOLIAD	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GONZALES	0	0	0	0	-11899	12	0	0	0	0	-11899	12	13	-127
GRAYSON	-70511	-228	0	0	-141594	142	-10827	5	379	-1	-222553	-82	238	881
GRIMES	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HALL	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HAMILTON	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HARDEMAN	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HASKELL	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HIDALGO	-145767	-472	-66355	30	-1446286	1446	-742080	343	25957	-46	-2374530	1302	2541	-13935
HILL	0	0	0	0	-83172	83	0	0	0	0	-83172	83	89	-890
HOPKINS	-7995	-26	0	0	-14873	15	-17698	8	619	-1	-39948	-4	43	42
HOUSTON	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HOWARD	-567	-2	0	0	-71392	71	0	0	0	0	-71960	70	77	-744
HUDSPETH	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IRION	0	0	0	0	0	0	0	0	0	0	0	0	0	0
JACK	0	0	0	0	-49499	50	0	0	0	0	-49499	50	53	-530
JACKSON	0	0	-5271	2	-102805	103	0	0	0	0	-108076	105	116	-1126
JEFF DAVIS	0	0	0	0	0	0	0	0	0	0	0	0	0	0
JIM HOGG	0	0	0	0	0	0	0	0	0	0	0	0	0	0
JIM WELLS	0	0	-3101	1	-79840	80	0	0	0	0	-82941	81	89	-870
JONES	0	0	0	0	0	0	0	0	0	0	0	0	0	0
KARNES	0	0	0	0	0	0	0	0	0	0	0	0	0	0
KENDALL	-25790	-84	-24495	11	0	0	-251524	116	8798	-16	-293012	29	314	-305
KENEDY	0	0	0	0	0	0	0	0	0	0	0	0	0	0
KENT	0	0	0	0	0	0	0	0	0	0	0	0	0	0
KERR	-20632	-67	0	0	0	0	-19364	9	677	-1	-39319	-59	42	632
KIMBLE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
KING	0	0	0	0	0	0	0	0	0	0	0	0	0	0
KINNEY	0	0	0	0	0	0	0	0	0	0	0	0	0	0
KLEBERG	0	0	0	0	0	0	0	0	0	0	0	0	0	0
KNOX	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LA SALLE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LAMAR	-15990	-52	0	0	-49737	50	0	0	0	0	-65726	-2	70	22
LAMPASAS	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LAVACA	0	0	0	0	-82101	82	0	0	0	0	-82101	82	88	-879
LEE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LEON	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LIMESTONE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LIVE OAK	0	0	-4186	2	-69012	69	0	0	0	0	-73198	71	78	-759
LLANO	-4642	-15	0	0	0	0	0	0	0	0	-4642	-15	5	161
LOVING	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MADISON	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MARTIN	-31567	-102	0	0	0	0	0	0	0	0	-31567	-102	34	1094
MASON	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MATAGORDA	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MAVERICK	-25378	-82	0	0	0	0	-9994	5	350	-1	-35022	-78	37	836
MCCULLOCH	0	0	0	0	0	0	-6246	3	218	0	-6028	3	6	-27
MCLENNAN	-30948	-100	-39224	18	-419667	420	-15200	7	532	-1	-504507	344	540	-3676
MCMULLEN	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MEDINA	0	0	-5891	3	0	0	0	0	0	0	-5891	3	6	-29
MENARD	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MIDLAND	-116469	-377	-196584	90	-97450	97	-35605	16	1245	-2	-444863	-175	476	1876
MILAM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MILLS	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MITCHELL	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MONTAGUE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MOTLEY	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 25: Calculated the ASHRAE Standard 90.1-1989 and 90.1-1999 Annual Electricity and Natural Gas Savings (USDOE 2004). A decrease in energy use is negative (i.e., savings); a positive value represents an energy use increase (+) (Continued)

Counties	Lodging		Office		Education		Retail		Food Service		Total		Total*1.07 (T&D loss) for eGrid	
	kWh/yr	mBtu/yr	kWh/yr	mBtu/yr	kWh/yr	mBtu/yr	kWh/yr	mBtu/yr	kWh/yr	mBtu/yr	kWh/yr	mBtu/yr	MWh/yr	Therm/yr
Other ERCOT Counties														
(square feet in thousands)														
NACOGDOCHES	-105224	-341	-6822	3	-8686	9	0	0	0	0	-120732	-329	129	3519
NAVARRO	-4952	-16	0	0	0	0	-9370	4	328	-1	-13994	-12	15	131
NOLAN	0	0	0	0	-32126	32	0	0	0	0	-32126	32	34	-344
PALO PINTO	0	0	0	0	0	0	-11868	5	415	-1	-11453	5	12	-51
PECOS	0	0	0	0	-9519	10	0	0	0	0	-9519	10	10	-102
PRESIDIO	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RAINS	0	0	0	0	0	0	0	0	0	0	0	0	0	0
REAGAN	0	0	0	0	0	0	0	0	0	0	0	0	0	0
REAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RED RIVER	0	0	0	0	0	0	0	0	0	0	0	0	0	0
REEVES	0	0	0	0	-11899	12	0	0	0	0	-11899	12	13	-127
REFUGIO	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ROBERTSON	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RUNNELS	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SAN SABA	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SCHLEICHER	-30329	-98	0	0	0	0	0	0	0	0	-30329	-98	32	1051
SCURRY	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SHACKELFORD	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SOMERVELL	0	0	0	0	0	0	0	0	0	0	0	0	0	0
STARR	0	0	0	0	0	0	-9994	5	350	-1	-9645	4	10	-43
STEPHENS	0	0	0	0	0	0	0	0	0	0	0	0	0	0
STERLING	0	0	0	0	0	0	0	0	0	0	0	0	0	0
STONEWALL	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SUTTON	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TAYLOR	0	0	-26356	12	-149686	150	-39144	18	1369	-2	-213817	177	229	-1899
TERRELL	0	0	0	0	0	0	0	0	0	0	0	0	0	0
THROCKMORTON	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TITUS	0	0	0	0	-22608	23	0	0	0	0	-22608	23	24	-242
TOM GREEN	-9336	-30	-22015	10	-3570	4	-22695	10	794	-1	-56822	-7	61	80
UPTON	0	0	0	0	-49975	50	0	0	0	0	-49975	50	53	-535
UVALDE	0	0	0	0	0	0	-29150	13	1020	-2	-28131	12	30	-125
VAL VERDE	-31051	-101	-9922	5	-19395	19	0	0	0	0	-60369	-77	65	820
VAN ZANDT	0	0	0	0	-67228	67	0	0	0	0	-67228	67	72	-719
WARD	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WASHINGTON	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WEBB	-90679	-294	-6201	3	-71035	71	-413932	191	14479	-26	-567369	-54	607	575
WHARTON	0	0	-8682	4	0	0	0	0	0	0	-8682	4	9	-43
WICHITA	-25997	-84	-9147	4	0	0	-165323	76	5783	-10	-194684	-14	208	147
WILBARGER	0	0	0	0	-833	1	0	0	0	0	-833	1	1	-9
WILLACY	0	0	0	0	-20704	21	0	0	0	0	-20704	21	22	-222
WINKLER	0	0	0	0	0	0	-17074	8	597	-1	-16476	7	18	-73
WISE	0	0	-2791	1	-118749	119	-31024	14	1085	-2	-151478	132	162	-1417
YOUNG	0	0	0	0	-4522	5	0	0	0	0	-4522	5	5	-48
ZAPATA	0	0	-15348	7	0	0	0	0	0	0	-15348	7	16	-75
ZAVALA	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	-20237674	-65523	-10783592	4938	-20335934	20338	-19806071	9161	692786	-1222	-70470484	-32307	75403	345685

Table 26: Calculated the ASHRAE Standard 90.1-1989 and 90.1-1999 OSD Electricity and Natural Gas Savings (USDOE 2004). A decrease in energy use is negative (i.e., savings); a positive value represents an energy use increase (+)

Counties	Lodging		Office		Education		Retail		Food Service		Total		Total*1.07 (T&D loss) for eGrid	
	kWh/yr	mBtu/yr	kWh/yr	mBtu/yr	kWh/yr	mBtu/yr	kWh/yr	mBtu/yr	kWh/yr	mBtu/yr	kWh/yr	mBtu/yr	MWh/yr	Therm/yr
Non-attainment Counties														
(square feet in thousands)														
Brazoria	-169	-1	-988	-1	-808	-2	-197	0	-20	0	-2182	-4	2	42
Chambers	0	0	0	0	-92	0	-96	0	-10	0	-197	0	0	4
Collin	-6892	-30	-4210	-3	-6133	-18	-3953	-1	-400	-3	-21587	-55	23	587
Dallas	-24918	-109	-2514	-2	-7552	-22	-10872	-3	-1099	-8	-46954	-144	50	1543
Denton	-10213	-45	-417	0	-1011	-3	-1429	0	-145	-1	-13215	-50	14	530
El Paso	-4601	-20	-998	-1	-752	-2	-3878	-1	-392	-3	-10621	-27	11	289
Fort Bend	-606	-3	-547	0	-6709	-20	-3930	-1	-397	-3	-12190	-27	13	285
Galveston	-995	-4	-65	0	-237	-1	-3940	-1	-398	-3	-5636	-9	6	98
Hardin	0	0	-26	0	0	0	0	0	0	0	-26	0	0	0
Harris	-26691	-117	-9218	-6	-23506	-69	-14786	-4	-1495	-11	-75697	-207	81	2213
Jefferson	-449	-2	-71	0	-165	0	-354	0	-36	0	-1076	-3	1	31
Liberty	-25	0	0	0	0	0	0	0	0	0	-25	0	0	1
Montgomery	-3080	-14	-16406	-10	-2925	-9	-2079	-1	-210	-2	-24701	-34	26	368
Orange	-315	-1	0	0	0	0	0	0	0	0	-315	-1	0	15
Tarrant	-9296	-41	-1237	-1	-3066	-9	-4704	-1	-476	-4	-18779	-55	20	592
Waller	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Affected Counties														
(square feet in thousands)														
Bastrop	0	0	-43	0	-27	0	-134	0	-14	0	-217	0	0	3
Bexar	-23348	-102	-8216	-5	-7024	-21	-5825	-1	-589	-4	-45003	-134	48	1435
Caldwell	0	0	0	0	0	0	-1447	0	-146	-1	-1593	-1	2	16
Comal	-1236	-5	-68	0	-1105	-3	-1023	0	-103	-1	-3536	-10	4	104
Ellis	-10	0	-67	0	-81	0	-1446	0	-146	-1	-1750	-2	2	19
Gregg	0	0	-10	0	-68	0	-65	0	-7	0	-150	0	0	3
Guadalupe	-692	-3	0	0	-325	-1	-34	0	-3	0	-1055	-4	1	43
Harrison	-75	0	0	0	-6	0	-731	0	-74	-1	-885	-1	1	12
Hays	-385	-2	-455	0	-318	-1	-122	0	-12	0	-1292	-3	1	32
Henderson	-39	0	0	0	-705	-2	-21	0	-2	0	-767	-2	1	24
Hood	0	0	0	0	0	0	-1119	0	-113	-1	-1232	-1	1	12
Hunt	0	0	-152	0	-11	0	0	0	0	0	-163	0	0	1
Johnson	-751	-3	-319	0	-28	0	-176	0	-18	0	-1292	-4	1	40
Kaufman	0	0	0	0	-374	-1	-68	0	-7	0	-448	-1	0	12
Nueces	-1265	-6	-512	0	-2014	-6	-2710	-1	-274	-2	-6775	-15	7	156
Parker	-408	-2	-57	0	-231	-1	0	0	0	0	-696	-3	1	27
Rockwall	-100	0	-34	0	0	0	-216	0	-22	0	-372	-1	0	7
Rusk	0	0	0	0	0	0	0	0	0	0	0	0	0	0
San Patricio	0	0	0	0	-57	0	-70	0	-7	0	-134	0	0	3
Smith	-1658	-7	-274	0	-504	-1	-387	0	-39	0	-2863	-9	3	100
Travis	-17542	-77	-2574	-2	-2483	-7	-4866	-1	-492	-4	-27956	-91	30	972
Upshur	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Victoria	-524	-2	-38	0	0	0	0	0	0	0	-562	-2	1	25
Williamson	-938	-4	-298	0	-6542	-19	-1201	0	-121	-1	-9100	-25	10	264
Wilson	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 26: Calculated the ASHRAE Standard 90.1-1989 and 90.1-1999 OSD Electricity and Natural Gas Savings (USDOE 2004). A decrease in energy use is negative (i.e., savings); a positive value represents an energy use increase (+) (Continued)

Counties	Lodging		Office		Education		Retail		Food Service		Total		Total*1.07 (T&D loss) for eGrid	
	kWh/yr	mBtu/yr	kWh/yr	mBtu/yr	kWh/yr	mBtu/yr	kWh/yr	mBtu/yr	kWh/yr	mBtu/yr	kWh/yr	mBtu/yr	MWh/yr	Therm/yr
Other ERCOT Counties														
(square feet in thousands)														
ANDERSON	0	0	-11	0	0	0	0	0	0	0	-11	0	0	0
ANDREWS	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ANGELINA	-625	-3	-23	0	-15	0	-22	0	-2	0	-687	-3	1	30
ARANSAS	0	0	-175	0	0	0	0	0	0	0	-175	0	0.19	1
ARCHER	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ATASCOSA	0	0	-5	0	-359	-1	-1058	0	-107	-1	-1529	-2	2	23
AUSTIN	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BANDERA	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BAYLOR	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BEE	0	0	0	0	-228	-1	0	0	0	0	-228	-1	0	7
BELL	-5958	-26	-199	0	-862	-3	-1235	0	-125	-1	-8379	-30	9	322
BLANCO	0	0	0	0	0	0	-41	0	-4	0	-45	0	0	0
BORDEN	0	0	0	0	-672	-2	0	0	0	0	-672	-2	1	21
BOSQUE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BRAZOS	-2900	-13	-157	0	-783	-2	-622	0	-63	0	-4525	-16	5	169
BREWSTER	-173	-1	0	0	0	0	0	0	0	0	-173	-1	0	8
BRISCOE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BROOKS	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BROWN	0	0	0	0	-202	-1	0	0	0	0	-202	-1	0	6
BURLESON	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BURNET	0	0	0	0	0	0	-126	0	-13	0	-138	0	0	1
CALHOUN	0	0	-57	0	0	0	0	0	0	0	-57	0	0	0
CALLAHAN	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CAMERON	-910	-4	-15	0	-2120	-6	-1642	0	-166	-1	-4853	-12	5	127
CHEROKEE	-39	0	0	0	-1000	-3	-44	0	-4	0	-1088	-3	1	34
CHILDRESS	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CLAY	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COKE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COLEMAN	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COLORADO	-40	0	0	0	0	0	-173	0	-17	0	-230	0	0	4
COMANCHE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CONCHO	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COOKE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CORYELL	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COTTLE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CRANE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CROCKETT	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CROSBY	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CULBERSON	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DAWSON	0	0	-160	0	-29	0	-43	0	-4	0	-236	0	0	2
DE WITT	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DELTA	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DICKENS	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DIMMIT	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DUVAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0
EASTLAND	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ECTOR	-257	-1	-48	0	-171	0	-145	0	-15	0	-635	-2	1	19
EDWARDS	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ERATH	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FALLS	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FANNIN	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FAYETTE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FISHER	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FOARD	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FRANKLIN	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 26: Calculated the ASHRAE Standard 90.1-1989 and 90.1-1999 OSD Electricity and Natural Gas Savings (USDOE 2004). A decrease in energy use is negative (i.e., savings); a positive value represents an energy use increase (+) (Continued)

Counties	Lodging		Office		Education		Retail		Food Service		Total		Total*1.07 (T&D loss) for eGrid	
	kWh/yr	mBtu/yr	kWh/yr	mBtu/yr	kWh/yr	mBtu/yr	kWh/yr	mBtu/yr	kWh/yr	mBtu/yr	kWh/yr	mBtu/yr	MWh/yr	Therm/yr
Other ERCOT Counties														
(square feet in thousands)														
FREESTONE	0	0	0	0	-196	-1	0	0	0	0	-196	-1	0	6
FRIO	-153	-1	0	0	0	0	-904	0	-91	-1	-1149	-2	1	17
GILLESPIE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GLASSCOCK	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GOLIAD	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GONZALES	0	0	0	0	-57	0	0	0	0	0	-57	0	0	2
GRAYSON	-538	-2	0	0	-678	-2	-47	0	-5	0	-1267	-4	1	47
GRIMES	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HALL	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HAMILTON	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HARDEMAN	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HASKELL	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HIDALGO	-1112	-5	-325	0	-6923	-20	-3222	-1	-326	-2	-11908	-29	13	306
HILL	0	0	0	0	-398	-1	0	0	0	0	-398	-1	0	12
HOPKINS	-61	0	0	0	-71	0	-77	0	-8	0	-217	-1	0	6
HOUSTON	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HOWARD	-4	0	0	0	-342	-1	0	0	0	0	-346	-1	0	11
HUDSPETH	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IRION	0	0	0	0	0	0	0	0	0	0	0	0	0	0
JACK	0	0	0	0	-237	-1	0	0	0	0	-237	-1	0	7
JACKSON	0	0	-26	0	-492	-1	0	0	0	0	-518	-1	1	16
JEFF DAVIS	0	0	0	0	0	0	0	0	0	0	0	0	0	0
JIM HOGG	0	0	0	0	0	0	0	0	0	0	0	0	0	0
JIM WELLS	0	0	-15	0	-382	-1	0	0	0	0	-397	-1	0	12
JONES	0	0	0	0	0	0	0	0	0	0	0	0	0	0
KARNES	0	0	0	0	0	0	0	0	0	0	0	0	0	0
KENDALL	-197	-1	-120	0	0	0	-1092	0	-110	-1	-1519	-2	2	22
KENEDY	0	0	0	0	0	0	0	0	0	0	0	0	0	0
KENT	0	0	0	0	0	0	0	0	0	0	0	0	0	0
KERR	-157	-1	0	0	0	0	-84	0	-9	0	-250	-1	0	8
KIMBLE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
KING	0	0	0	0	0	0	0	0	0	0	0	0	0	0
KINNEY	0	0	0	0	0	0	0	0	0	0	0	0	0	0
KLEBERG	0	0	0	0	0	0	0	0	0	0	0	0	0	0
KNOX	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LA SALLE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LAMAR	-122	-1	0	0	-238	-1	0	0	0	0	-360	-1	0	13
LAMPASAS	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LAVACA	0	0	0	0	-393	-1	0	0	0	0	-393	-1	0	12
LEE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LEON	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LIMESTONE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LIVE OAK	0	0	-21	0	-330	-1	0	0	0	0	-351	-1	0	10
LLANO	-35	0	0	0	0	0	0	0	0	0	-35	0	0	2
LOVING	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MADISON	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MARTIN	-241	-1	0	0	0	0	0	0	0	0	-241	-1	0	11
MASON	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MATAGORDA	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MAVERICK	-194	-1	0	0	0	0	-43	0	-4	0	-241	-1	0	10
MCCULLOCH	0	0	0	0	0	0	-27	0	-3	0	-30	0	0	0
MCLENNAN	-236	-1	-192	0	-2009	-6	-66	0	-7	0	-2510	-7	3	76
MCMULLEN	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MEDINA	0	0	-29	0	0	0	0	0	0	0	-29	0	0	0
MENARD	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MIDLAND	-888	-4	-964	-1	-466	-1	-155	0	-16	0	-2489	-6	3	64
MILAM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MILLS	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MITCHELL	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MONTAGUE	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MOTLEY	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 26: Calculated the ASHRAE Standard 90.1-1989 and 90.1-1999 OSD Electricity and Natural Gas Savings (USDOE 2004). A decrease in energy use is negative (i.e., savings); a positive value represents an energy use increase (+) (Continued)

Counties	Lodging		Office		Education		Retail		Food Service		Total		Total*1.07 (T&D loss) for eGrid	
	kWh/yr	mBtu/yr	kWh/yr	mBtu/yr	kWh/yr	mBtu/yr	kWh/yr	mBtu/yr	kWh/yr	mBtu/yr	kWh/yr	mBtu/yr	MWh/yr	Therm/yr
Other ERCOT Counties														
(square feet in thousands)														
NACOGDOCHES	-802	-4	-33	0	-42	0	0	0	0	0	-877	-4	1	39
NAVARRO	-38	0	0	0	0	0	-41	0	-4	0	-83	0	0	2
NOLAN	0	0	0	0	-154	0	0	0	0	0	-154	0	0	5
PALO PINTO	0	0	0	0	0	0	-52	0	-5	0	-57	0	0	1
PECOS	0	0	0	0	-46	0	0	0	0	0	-46	0	0	1
PRESIDIO	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RAINS	0	0	0	0	0	0	0	0	0	0	0	0	0	0
REAGAN	0	0	0	0	0	0	0	0	0	0	0	0	0	0
REAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RED RIVER	0	0	0	0	0	0	0	0	0	0	0	0	0	0
REEVES	0	0	0	0	-57	0	0	0	0	0	-57	0	0	2
REFUGIO	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ROBERTSON	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RUNNELS	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SAN SABA	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SCHLEICHER	-231	-1	0	0	0	0	0	0	0	0	-231	-1	0	11
SCURRY	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SHACKELFORD	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SOMERVELL	0	0	0	0	0	0	0	0	0	0	0	0	0	0
STARR	0	0	0	0	0	0	-43	0	-4	0	-48	0	0	0
STEPHENS	0	0	0	0	0	0	0	0	0	0	0	0	0	0
STERLING	0	0	0	0	0	0	0	0	0	0	0	0	0	0
STONEWALL	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SUTTON	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TAYLOR	0	0	-129	0	-716	-2	-170	0	-17	0	-1033	-2	1	25
TERRELL	0	0	0	0	0	0	0	0	0	0	0	0	0	0
THROCKMORTON	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TITUS	0	0	0	0	-108	0	0	0	0	0	-108	0	0	3
TOM GREEN	-71	0	-108	0	-17	0	-99	0	-10	0	-305	-1	0	6
UPTON	0	0	0	0	-239	-1	0	0	0	0	-239	-1	0	7
UVALDE	0	0	0	0	0	0	-127	0	-13	0	-139	0	0	1
VAL VERDE	-237	-1	-49	0	-93	0	0	0	0	0	-378	-1	0	14
VAN ZANDT	0	0	0	0	-322	-1	0	0	0	0	-322	-1	0	10
WARD	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WASHINGTON	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WEBB	-692	-3	-30	0	-340	-1	-1797	0	-182	-1	-3041	-6	3	63
WHARTON	0	0	-43	0	0	0	0	0	0	0	-43	0	0	0
WICHITA	-198	-1	-45	0	0	0	-718	0	-73	-1	-1034	-2	1	17
WILBARGER	0	0	0	0	-4	0	0	0	0	0	-4	0	0	0
WILLACY	0	0	0	0	-99	0	0	0	0	0	-99	0	0	3
WINKLER	0	0	0	0	0	0	-74	0	-7	0	-82	0	0	1
WISE	0	0	-14	0	-568	-2	-135	0	-14	0	-730	-2	1	19
YOUNG	0	0	0	0	-22	0	0	0	0	0	-22	0	0	1
ZAPATA	0	0	-75	0	0	0	0	0	0	0	-75	0	0	1
ZAVALA	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	-154331	-678	-52882	-33	-97339	-285	-86000	-22	-8696	-66	-399248	-1083	427	11589

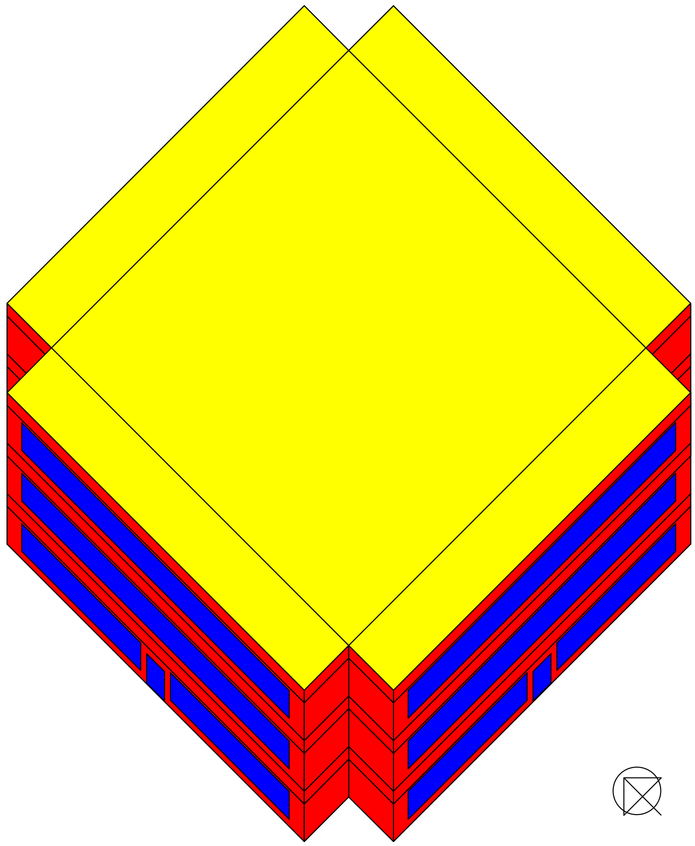


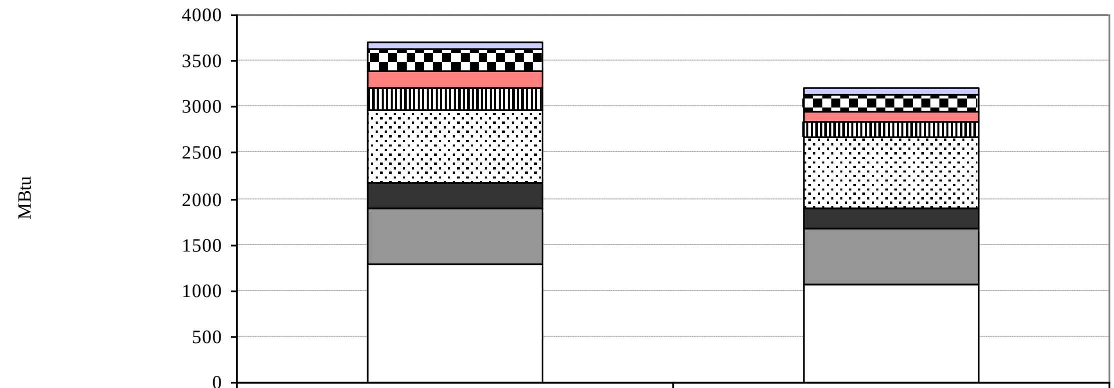
Figure 43: Typical Office Building Used for Annual to OSD Calculation (3-Story Shown)

Table 27: Office/Retail Simulation Input Parameters (LOADS)

NAME	DESCRIPTION	DEFAULT	STATUS	COMMENT
LOADS				
b01	Quick or thermal mode (Q or T)	Quick (Q)	Fixed	Q simulates the building as massless, T will include thermal mass
b02	Location	Bastrop (BAS)	User Defined	41 counties linked to 9 TRY packed weather files according to climate zone
b03	Azimuth of building (degree)	0	User Defined	Orientation of the building
b04	Length of building (ft)	122	User Defined	
b05	Width of building (ft)	122	User Defined	
b06	Floor to ceiling height (ft)	9	User Defined	
b07	Door height (ft)	7	Fixed	
b08	Door width (ft)	6	Fixed	
b09	Run year	2000	User Defined	
b10	Floor to floor height (ft)	13	User Defined	This defines the plenum height in conjunction with b06
b11	Number of floor	6	User Defined	
b12	Perimeter depth (ft)	15	Fixed	Used for thermal zoning
b13	Void			
b14	Underground floor mode	No (N)	User Defined	This allows the user to activate/deactivate underground floors
b15	Front wall: Attached to another building?	No (N)	User Defined	These 4 parameters are used to attach buildings to the different orientations of the model for the retail scenario
b16	Right wall: Attached to another building?	No (N)	User Defined	
b17	Back wall: Attached to another building?	No (N)	User Defined	
b18	Left wall: Attached to another building?	No (N)	User Defined	
b19	Building type	Office (O)	User Defined	Allows the user to switch between Office and Retail
b20	Code compliance	Code (C)	User Defined	Allows user to run user defined model or either of ASHRAE 90.1 1989 or 1999
c01	Roof absorptance	0.45	User Defined	c01 and c03 are used to determine "roof color"
c02	Roof roughness	1	Fixed	This is used to calculate the outside film coefficient for heat transfer calculations, DOE-2 allows values from 1 to 6 increasing in smoothness
c03	Roof outside emissivity	0.89	User Defined	c01 and c03 are used to determine "roof color"
c04	Roof insulation R-value (hr-sq.ft-F/Btu)	R-15	User Defined	
c05	Wall absorptance	0.57	User Defined	c05 and c07 are used to define "wall color"
c06	Wall roughness	2	Fixed	This is used to calculate the outside film coefficient for heat transfer calculations, DOE-2 allows values from 1 to 6 increasing in smoothness
c07	Wall outside emissivity	0.9	User Defined	c05 and c07 are used to define "wall color"
c08	Wall insulation R-value (hr-sq.ft-F/Btu)	R-13	User Defined	
c09	Ground reflectance	0.24	Fixed	This defines the fraction of sunlight reflected from the ground
c10	Void			
c11	U-Factor of glazing (Btu/hr-sq.ft-F)	1.22	User Defined	
c12	Solar Heat Gain Coefficient(SHGC)	0.17	User Defined	
c13	Number of pane of glazing	1	Fixed	
c14	Frame absorptance of glazing	0.7	Fixed	
c15	Frame type - A,B,C,D,E	Aluminum w/o thermal break (A)	User Defined	Allows user to select from 5 different frame types
c16	Void			
c17	Floor weight (lb/sq-ft)	70	User Defined	This corresponds to medium construction, user has a choice of light, medium or heavy construction
c18	Slab-on-grade floor insulation R-value (Exterior insulation, horizontal) (hr-sq.ft-F/Btu)	R-0 (A)	User Defined	User can choose from 9 insulation R-values and insulation depths
c19	Slab-on-grade floor R-value (hr-sq.ft-F/Btu)	0.88	Fixed	
c20	Below-grade wall insulation R-value (hr-sq.ft-F/Btu) (Exterior insulation, vertical, basement wall = 8 ft)	R-0 (A)	User Defined	User can choose from 9 insulation R-values
c21	Below-grade wall R-value (concrete wall) (hr-sq.ft-F/Btu)	0.88	Fixed	
c22	Void			
c23	Floor R-value	1.67	Fixed	
c24	Void			
c25	Ceiling R-value (hr-sq.ft-F/Btu)	1.89	Fixed	
c26	Interior wall R-value (hr-sq.ft-F/Btu)	2.01	Fixed	
c27	Percent window-front (%)	50	User Defined	
c28	Percent window-right (%)	50	User Defined	
c29	Percent window-back (%)	50	User Defined	
c30	Percent window-left (%)	50	User Defined	
sp01	void			
sp02	void			
sp03	Area per person (ft^2/person) for office	275	User Defined	
sp04	Lighting load (W/ft2) for office	1.3	User Defined	
sp05	Equipment load (W/ft2) for office	0.75	User Defined	
sp06	Area per person (ft^2/person) for retail	300	User Defined	
sp07	Lighting load (W/ft2) for retail	1.9	User Defined	
sp08	Equipment load (W/ft2) for retail	0.25	User Defined	
s01	Front Shade (S)	0	User Defined	
s02	Back Shade (N)	0	User Defined	
s03	Left Shade (W)	0	User Defined	
s04	Right Shade (E)	0	User Defined	

Table 28: Office/Retail Simulation Input Parameters (SYSTEMS and PLANT)

NAME	DESCRIPTION	DEFAULT	STATUS	COMMENT
SYSTEM				
sy01	Mode of system	Variable air volume (2)	User Defined	User can choose from Packaged single zone, variable air volume or packaged variable volume system
sy02	Cooling Capacity of cooling system (Btu/hr)	0	Fixed	DOE-2 is autosizing the system
sy03	Heating Capacity of heating system (Btu/hr)	0	Fixed	DOE-2 is autosizing the system
sy04	Seasonal Energy Efficiency Ratio (SEER) for PVAVS and PSZ	10	User Defined	
sy05	ANNUAL FUEL UTILIZATION EFFICIENCY (AFUE) for PSZ	0.8	User Defined	
sy06	**Spare parameter for systems other than VAVS**HEATING SEASONAL PERFORMANCE FACTOR (HSPF)	6.8	User Defined	Unused, since heatpump systems are not included in the office/retail scenario
sy07	**Spare parameter for Pilot light	0	Fixed	Unused
sy08	**Spare parameter for Pilot light	0	Fixed	Unused
sy09	**Spare parameter for Pilot light	0	Fixed	Unused
sy10	Void			
sy11	Exterior lighting (kW)	0	Fixed	
sy12	Void			
sy13	Fan control type	Variable frequency drives (1)	User Defined	User can choose from 4 different type of fan control
sy14	Economizer type	None (1)	User Defined	
sy15	Economizer drybulb limit (F) (use when economizer type(sy14) = dry bulb(2))	65	Fixed	This corresponds to the temperature above which the outside air dampers return to the minimum position
sy16	User input for numbers of fans	Autosized (A)	Fixed	Autosized by DOE-2
sy17	Number of Fans	6	Fixed	equal to the number of floors
sy18	Supply fan total pressure (in W.G)	5.5	Fixed	
sy19	Supply fan efficiency	0.54	Fixed	
sy20	Return fan total pressure (in W.G)	2	Fixed	
sy21	Return fan efficiency	0.51	Fixed	
sy22	Supply motor efficiency	0.5	Fixed	
sy23	Return motor efficiency	0.5	Fixed	
sy24	User input for DHW gallon/hr-person	Autosized (A)	Fixed	The size of DHW depends on the gallons per hour per person requirements of ASHRAE 90.1
sy25	Maximum DHW gallon/h-person (maximum hourly, to be used with occupancy schedule)	0.4	Fixed	
PLANT				
p01	Chiller type	Electric Centrifugal (1)	Fixed	
p02	Number of chillers	1	Fixed	
p03	Chillers size (MBtu/h)	-999	Fixed	Chiller is being autosized by DOE-2
p04	Condenser type	water-cooled (W)	Fixed	
p05	COP	5	User Defined	
p06	Switch for a chiller sizing	Autosized (A)	Fixed	Chiller is being autosized by DOE-2
p07	Cooling tower type	Open tower (O)		
p08	Void			
p09	Gpm/hp	38.2	Fixed	Value from ASHRAE 90.1 1999 for axial fan cooling towers
p10	Cooling tower capacity control	Two-speed fan (1)	Fixed	
p11	Boiler type	Gas fired-hotwater boiler (1)	User Defined	User can choose from gas fired or electric boilers
p12	Number of boilers	1	Fixed	
p13	Boiler size (MBtu/h)	-999	Fixed	Boiler is being autosized by DOE-2
p14	Boiler fuel type	Gas (G)	Fixed	Depends on the value of p10
p15	Boilers efficiency (Et,Ec,AFUE) (%)	80	User Defined	
p16	Switch for a boiler sizing	Autosized (A)	Fixed	Boiler is being autosized by DOE-2
p17	Void			
p18	DHW heater type	Gas water heater (1)	User Defined	User can choose from gas fired or electric water heaters
p19	Number of DHW heater	1	Fixed	
p20	DHW size (MBtu/h)	-999	Fixed	Water heater is being autosized by DOE-2
p21	DHW fuel type	Gas (G)	Fixed	Depends on the value of p18
p22	DHW heater Efficiency (Et,Ec,Energy factor) (%)	54	User Defined	
p23	Switch for a DHW heater sizing	Autosized (A)	Fixed	Water heater is being autosized by DOE-2
p24	DHW Storage Capacity (gal)	75	Fixed	



	ASHRAE 90.1-1989	ASHRAE 90.1-1999
DOMHOT WATER	71.5	71.5
VENT FANS	239.2	177.9
PUMPS & MISC	184.1	111.2
HEAT REJECT	233.9	174.3
SPACE COOL	798.1	774.3
SPACE HEAT	272.1	214.3
MISC EQUIPMT	616.2	616.2
AREA LIGHTS	1289.9	1068.1

AREA LIGHTS, MISC EQUIPMT, SPACE HEAT, SPACE COOL, HEAT REJECT, PUMPS & MISC, VENT FANS, DOMHOT WATER

Figure 44: Comparison of Annual Energy Use the ASHRAE Standard 90.1-1989 vs. 90.1-1999

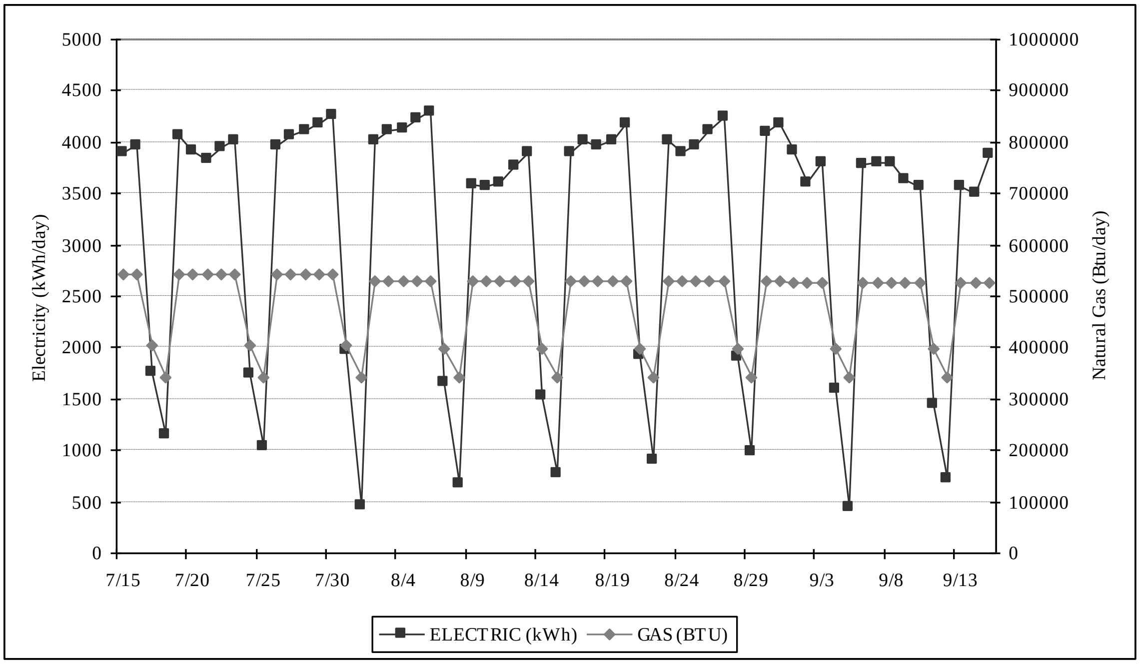


Figure 45: Simulated Electricity and Natural Gas for Building Built to Comply with the ASHRAE Standard 90.1-1989 for OSD (07/15-09/15)

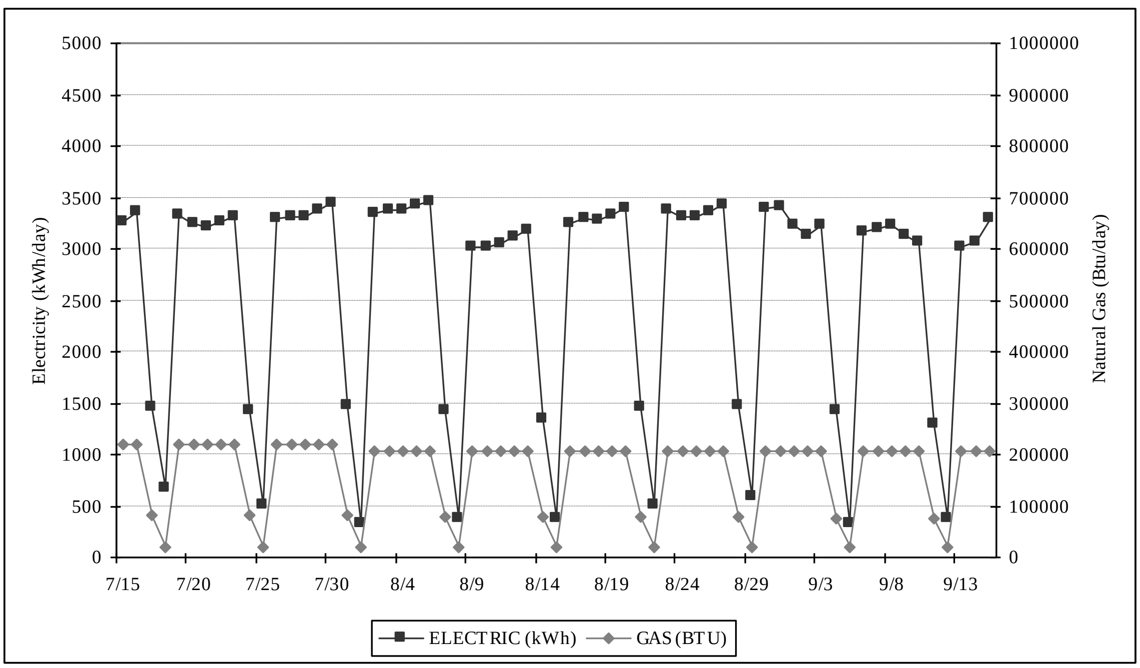


Figure 46: Simulated Electricity and Natural Gas for Building Built to Comply with the ASHRAE Standard 90.1-1999 for OSD (07/15-09/15)

Table 29: Simulated Electricity and Natural Gas for Building Built to Comply with the ASHRAE Standard 90.1-1989 and 90.1-1999 for Annual and OSD (07/15-09/15)

	Electricity (kW)		Gas (Btu)	
	1989	1999	1989	1999
TOTAL (YEAR) (a)	988,405	858,198	331,600,000	278,800,000
OSD (07/15 - 09/15)	199,537	163,841	30,633,205	10,332,355
OSD PER DAY (b)	3167	2601	486241	164006
OSD % (b/a)	0.32%	0.30%	0.15%	0.06%

Table 30: Totalized Annual Electricity Savings from the ASHRAE Standard 90.1-1999 by PCA for Commercial Buildings[45]

PCA	Total Electricity Savings by PCA (MWh)
American Electric Power - West (ERCOT)/PCA	7,547.22
Austin Energy/PCA	238.26
Brownsville Public Utils Board/PCA	0.00
Lower Colorado River Authority/PCA	305.02
Reliant Energy HL&P/PCA	18,420.51
San Antonio Public Service Bd /PCA	9,099.89
South Texas Electric Coop Inc/PCA	0.00
Texas Municipal Power Pool/PCA	0.00
Texas-New Mexico Power Co/PCA	274.47
TXU Electric/PCA	30,968.84
El Paso Electric Co/PCA	13.19
Entergy Electric System/PCA	6,110.98
Total	72,978.37

[45] Of a total of 202 counties listed in Table 21, the annual electricity savings in 31 counties (i.e., 2,424 MWh), including 8 non-attainment and affected non-ERCOT counties (i.e, 99.99% of total savings in 31 counties), are not reported in this table since the corresponding PCA could not be assigned for these 31 counties.

Table 31: 2011 Annual NOx Reductions from the ASHRAE Standard 90.1-1999 by PCA for Commercial Buildings by County using 2007 eGRID[46]

Area	County	American Electric Power - West (ERCOT) /PCA	NOx Reductions (lbs)	Austin Energy/PCA	NOx Reductions (lbs)	Brownsville Public Utils Board/PCA	NOx Reductions (lbs/year)	Lower Colorado River Auhotrity /PCA	NOx Reductions (lbs)	Reliant Energy HL&P/PCA	NOx Reductions (lbs)	San Antonio Public Service Bd/PCA	NOx Reductions (lbs)	South Texas Electric Coop INC/PCA	NOx Reductions (lbs)	Texas Municipal Power Pool/PCA	NOx Reductions (lbs)	Texas-New Mexico Power Co/PCA	NOx Reductions (lbs)	TXU Electric/PCA	NOx Reductions (lbs)	Total Nox Reductions (lbs)	Total Nox Reductions (Tons)
Houston-Galveston Area	Brazoria	0.00883113	66.650494	0.010890729	2.59479895	0.006522185	0	0.003944232	1.203056291	0.0654443	1205.517179	0.014877434	135.382976	0.006262315	0	0.0048171	0	0.121274957	33.28654916	0.00816387	252.8255924	1697.460646	0.848730323
	Chambers	0.02176222	164.244269	0.026955801	6.42242444	0.016072371	0	0.009076193	2.768389789	0.1649402	3038.282942	0.037472294	340.993666	0.015055623	0	0.0095532	0	0.011518588	3.161527018	0.01581859	489.8834648	4045.756682	2.022878341
	Fort Bend	0.07043123	531.559983	0.087239726	20.7855279	0.052016606	0	0.029374182	8.959613881	0.5338124	9833.095805	0.121275295	1103.59155	0.048726002	0	0.030918	0	0.037278747	10.23196281	0.05119528	1585.458344	13093.68279	6.546841394
	Galveston	0.03385674	255.524243	0.041710519	9.93784808	0.025004711	0	0.015351589	4.682489794	0.2495874	4597.526617	0.056747051	516.39179	0.024143087	0	0.0192972	0	0.567751219	155.8316688	0.03283689	1016.920308	6556.814966	3.278407483
	Harris	0.06826733	515.228545	0.084559408	20.1469216	0.050418468	0	0.028471701	8.684342256	0.5174117	9530.987668	0.117549281	1069.68524	0.047228963	0	0.0299681	0	0.03613341	9.917600037	0.04962237	1536.747351	12691.39767	6.345698834
	Liberty	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Montgomery	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Waller	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Beaumont/ Port Arthur Area	Hardin	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Jefferson	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Orange	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dallas/ Fort Worth Area	Collin	0.00203914	15.3898006	0.003716345	0.88544736	0.001505992	0	0.005950953	1.815139516	0.0024815	45.71009189	0.000717051	6.52508112	0.019166247	0	0.0766809	0	0.00086441	0.237256163	0.0040002	123.8815348	194.4443514	0.097222176
	Dallas	0.00453947	34.2603853	0.004683963	1.11598969	0.003352602	0	0.00774211	2.361472256	0.0020856	38.41802038	0.00068106	6.19757244	0.007502816	0	0.026717	0	0.007524933	2.065381525	0.04037045	1250.226151	1334.644973	0.667322487
	Denton	0.00047388	3.5764786	0.000872802	0.2079516	0.000349982	0	0.001396994	0.426106349	0.0005854	10.78416481	0.000168971	1.5376127	0.00454374	0	0.0181872	0	0.000186605	0.051217936	0.00084941	26.30509996	42.88863195	0.021444316
	Tarrant	0.01216249	91.7929997	0.012266309	2.92254144	0.008982543	0	0.020308652	6.19447657	0.0053165	97.93272031	0.001752506	15.9476084	0.017326428	0	0.0602168	0	0.020603444	5.655063365	0.11064724	3426.61664	3647.06205	1.823531025
	Ellis	0.00327981	24.7534728	0.003307809	0.78811075	0.002422289	0	0.005476558	1.670441184	0.0014337	26.40914812	0.000472592	4.30053153	0.004672353	0	0.0162384	0	0.005556053	1.524979655	0.02983782	924.0428135	983.4894975	0.491744749
	Johnson	0.00028606	2.15894615	0.000526868	0.12553026	0.000211267	0	0.000843297	0.257219674	0.0003534	6.509875693	0.000101999	0.92818199	0.002742835	0	0.0109787	0	0.000112645	0.030917776	0.00051274	15.87910921	25.88978076	0.01294489
	Kaufman	0.00632545	47.7395788	0.006379446	1.51995139	0.004671629	0	0.010562096	3.221614978	0.002765	50.93271643	0.000911441	8.29401054	0.009011105	0	0.0313175	0	0.010715411	2.941077689	0.05754527	1782.110137	1896.759087	0.948379544
	Parker	0.00021749	1.64144086	0.000400576	0.09544032	0.000160626	0	0.000641157	0.195563416	0.0002687	4.949440713	7.75498E-05	0.70569423	0.00208537	0	0.0083471	0	8.56434E-05	0.023506701	0.00038984	12.07284337	19.68392961	0.009841965
	Rockwall	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Henderson	0.00081989	6.18792704	0.000826893	0.19701364	0.000605529	0	0.001369042	0.417580526	0.0003584	6.601816375	0.00011814	1.07505624	0.001168005	0	0.0040593	0	0.001388914	0.381217736	0.00745892	230.9942354	245.8548469	0.122927423
	Hood	0.01252711	94.5448487	0.012634039	3.01015589	0.009251829	0	0.020917482	6.380179884	0.0054759	100.8686311	0.001805044	16.4256994	0.017845854	0	0.062022	0	0.021221112	5.824595689	0.11396431	3529.342683	3756.396794	1.878198397
	Hunt	0.00618756	46.6988614	0.006240374	1.48681662	0.004569788	0	0.010331844	3.151384131	0.0027047	49.82238891	0.000891572	8.11320204	0.008814664	0	0.0306347	0	0.010481817	2.876962525	0.05629078	1743.260336	1855.409951	0.927704976
El Paso Area	El Paso	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
San Antonio Area	Bexar	0.03341375	252.180914	0.051775843	12.3359882	0.024677545	0	0.090663423	27.65385156	0.0011418	21.03329742	1.143571754	10406.3744	0.046873844	0	0.0046695	0	0.000519582	0.142610668	0.00250387	77.5418014	10797.2629	5.39863145
	Comal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Guadalupe	0.00200047	15.0979649	0.076378745	18.1978164	0.001477434	0	0.133848731	40.82608831	0.0012371	22.78861557	0.003554796	32.3482465	0.001061766	0	0.0018557	0	0.000401718	0.110260331	0.00183516	56.83292655	186.2019186	0.093100959
	Wilson	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Austin Area	Bastrop	0.00450233	33.9801017	0.171901148	40.9567551	0.003325174	0	0.301245466	91.88487582	0.0027843	51.28899678	0.008000571	72.804296	0.002389654	0	0.0041765	0	0.000904124	0.248156443	0.0041303	127.9105252	419.073707	0.209536854
	Caldwell	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Hays	0.0024586	18.5555875	0.093870431	22.3653437	0.001815785	0	0.164501762	50.17577263	0.0015205	28.00749327	0.004368889	39.7563992	0.001304924	0	0.0022807	0	0.000493717	0.135511325	0.00225544	69.84837683	228.8444845	0.114422242
	Travis	0.00051001	3.84913489	0.299602906	71.3826694	0.000376663	0	0.033939476	10.35210454	0.0003347	6.165506266	0.000906121	8.24559935	0.000271138	0	0.0004717	0	0.000103327	0.028360306	0.00046734	14.47284691	114.4962216	0.057248111
	Williamson	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
North East Texas Area	Gregg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Harrison	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Rusk	0.00068596	5.17712725	0.00069182	0.1648314	0.000506616	0	0.001145408	0.349368618	0.0002999	5.52340763	9.88414E-05	0.89944547	0.000977211	0	0.0033962	0	0.001162035	0.318945701	0.00624051	193.2612557	205.6943817	0.102847191
	Smith	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Upshur	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Corpus Christi Area	Nueces	0.22756873	1717.51116	0.004556851	1.08570446	0.168069652	0	0.007612767	2.322020544	0.0016809	30.96281034	0.001626796	14.8036606	0.046792036	0	0.0072464	0	0.001609426	0.441741955	0.00828339	256.5271296	2023.654232	1.011827116
	San Patricio	0.05031335	379.725908	0.001007478	0.24003926	0.037158653	0	0.001683113	0.513377366	0.0003716	6.845592332	0.00035967	3.27295308	0.010345288	0	0.0016021	0	0.000355829	0.09766508	0.00183138	56.71578685	447.4113217	0.223705661
Victoria Area	Victoria	0.02183674	164.806638	0.002215582	0.52787929	0.016127403	0	0.003612695	1.101932123	0.0011996	22.09763192	0.000555389	5.05397561	0.52545648	0	0.0324127	0	0.000476855	0.130883317	0.00225485	69.83006411	263.5490045	0.131774502
Other ERCOT counties	Andrews	2.4742E-05	0.18673393	2.49533E-05	0.00594531	1.82731E-05	0	4.13138E-05	0.012601385	1.082E-05	0.199223925	3.56511E-06	0.03244212	3.5247E-05	0	0.0001225	0	4.19135E-05	0.01150406	0.00022509	6.970744954	7.419195682	0.003709598
	Angelina	0.00031082	2.34582617	0.000313473	0.07468733	0.000229554	0	0.000519	0.158303632	0.0001359	2.502730482	4.47864E-05	0.40755087	0.000442787	0	0.0015389	0	0.000526534	0.144518598	0.00282766	87.5692811	93.20289819	0.046601449
	Bosque	0.00059539	4.49355241	0.001096604	0.26127415	0.000439723	0	0.001755208	0.535367724	0.0007356	13.54941975	0.000212298	1.93188441	0.005708837	0	0.0228507	0	0.000234455	0.064351141	0.00106721	33.05020342	53.886053	0.026943026
	Brazos	0.00193973	14.639532	0.003572622	0.85120432	0.001432574	0	0.005718288	1.744173028	0.0023964	44.1426171	0.000691644	6.29388088	0.018598805	0	0.0744451	0	0.000763829	0.209649404	0.00347685	107.6741663	175.5552229	0.087777611
	Calhoun	0.08269981	624.153612	0.001655986	0.39455136	0.061077496	0	0.002766524	0.843835859	0.0006108	11.25206653	0.000591187	5.37973692	0.0170045	0	0.0026334	0	0.000584875	0.160531612	0.00301023	93.2234606	735.4077944	0.367703897
	Cameron	0.04837175	365.072194	0.000968599	0.23077609	0.297964476	0	0.001618161	0.493566011	0.0003573	6.58141928	0.00034579	3.14664904	0.009946061	0	0.0015403	0	0.000342098	0.093896161	0.00176071	54.52711102	430.1456113	0.215072806
	Cherokee	0.0035039	26.4446942	0.003533808	0.84195652	0.002587786	0	0.00585073	1.78457006	0.0015316	28.21348964	0.00050488	4.594355	0.00499158	0	0.0173479	0	0.005935657	1.629170222	0.03187642	987.1758159	1050.684052	0.525342026
	Coke	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Coleman	0.00129879	9.80222971	2.6007E-05	0.00619636	0.000959212	0	4.34478E-05	0.013252303	9.593E-06	0.176711852	9.2845E-06	0.08448788	0.000267053	0	4.136E-05	0	9.18536E-06	0.002521123	4.7275E-05	1.464059101	11.54945834	0.005774729
	Crockett	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Ector	0.00353575	26.6850636	0.003565928	0.8496095	0.002611307	0	0.005903911	1.800790932	0.0015456	28.46993652	0.00050947	4.63611545	0.005036951	0	0.0175056	0	0.00598961	1.643978585	0.03216616	996.1487633	1060.234258	0.530117129
	Fannin	0.00705631	53.2555562	0.007116546	1.69557124	0.005211403	0	0.011782473	3.593850251	0.0030845	56.81763868	0.001016752	9.25232595	0.010052276	0	0.034936	0	0.011953503	3.280898825	0.06419422	1988.020608	2115.916449	1.057958224
	Fayette	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Freestone	0.00367718	27.7524662	0.003708565	0.88359388	0.00271576	0	0.006140067	1.872822569	0.0016074	29.60873398	0.000529848	4.82156007	0.005238429	0	0.0182058	0	0.006229194	1.709737729	0.03345281	1035.994714	1102.643628	0.551321814
	Frio	0.00858833	64.8180471	0.000871383	0.20761363	0.006342868	0	0.001420864	0.433387205	0.0004718	8.690944508	0.000218433	1.98771623	0.206660746	0	0.0127478	0	0.000187546	0.051476088	0.00088683	27.46399317	103.6531779	0.051826589
	Grimes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Hardeman	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Haskell	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Hidalgo	0.18852746	1422.8581	0.003775086	0.89944299	0.139235931	0	0.006306735	1.923658957	0.0013925	25.65088737	0.001347706	12.2639717	0.03876448	0	0.0060032	0	0.001333316	0.365957515	0.00686231	212.5178056	1676.479823	0.838239911
	Howard	0.00055511	4.18956004	0.000559851	0.13338885	0.000409976	0	0.000926915	0.282724517	0.0002427	4.469785417	7.99868E-05	0.727871	0.000790802	0	0.0027484	0	0.00094037	0.258104949	0.00505009	156.3955442	166.456979	0.083228489
	Jack	0.00212145	16.0110382	0.002139557	0.5097657	0.001566784	0	0.003542346	1.080474559	0.0009273	17.08196191	0.000305682	2.78166927	0.00302217	0	0.0105033	0	0.003593766	0.986387151	0.0192997	597.689258	636.1405547	0.318070277
	Jones	0.04071872	307.313136	0.000815354	0.19426438	0.030072592	0	0.001362147	0.415477598	0.0003008	5.540155152	0.000291082	2.64880919	0.008372468	0	0.0012966	0	0.000287974	0.079040596	0.00148214	45.90022945	362.0911119	0.181045556
	Lamar	0.00095084	7.17618196	0.000958954	0.22847809	0.000702236	0	0.001587687	0.484271036	0.0004156	7.656172296	0.000137007	1.24675019	0.001354543	0	0.0047076	0	0.001610734	0.442100856	0.00865017	267.8856189	285.1195733	0.142559787
	Limestone	0.00071976	5.43216245	0.000891528	0.21241321	0.000531572	0	0.000300183	0.091560839	0.0054552	100.4871991	0.001239347	11.2779155	0.000497945	0	0.000316	0	0.000380962	0.104563334	0.00052318	16.20224917	133.8080637	0.066904032
	Llano	0.00123817	9.34477065	0.047274044	11.2634002	0.000914447	0	0.082844655	25.26899712	0.0007657	14.10484044	0.002200214	20.0217014	0.000657172	0	0.0011486	0	0.000248641	0.068244794	0.00113586	35.17630801	115.2482626	0.057624131
	McLennan	0.02453432	185.165878	0.024743738	5.8953837	0.018119687	0	0.040966843	12.49556829	0.0107245	197.5509925	0.003535175	32.1696962	0.034951066	0	0.1214699	0	0.041561501	11.40745787	0.22319886	6912.209894	7356.894871	3.678447436
	Milam	0.0022454	16.9465638	0.002264571	0.53955133	0.001658332	0	0.003749326	1.143606735	0.0009815	18.0800617	0.000323543	2.94420233	0.003198756	0	0.011117	0	0.00380375	1.044021796	0.02042738	632.6122676	673.3102754	0.336655138
	Mitchell	0.01494317	112.779375	0.015070721	3.59071387	0.011036196	0	0.024951762	7.610702322	0.006532	120.3228027	0.002153177	19.5936652	0.02128772	0	0.073984	0	0.025313952	6.947964594	0.1359442	4210.034364	4480.879587	2.240439794
	Nolan	0.00056465	4.26156546	0.000569473	0.13568139	0.000417022	0	0.000942846	0.287583666	0.0002468	4.546607037	8.13615E-05	0.74038083	0.000804394	0	0.0027956	0	0.000956532	0.262540965	0.00513689	159.0834941	169.3178534	0.084658927
	Palo Pinto	0.003207	24.2039205	0.005906709	1.40731834	0.002368511	0	0.009454195	2.883686821	0.003962	72.98214178	0.001143513	10.4058376	0.030749889	0	0.1230821	0	0.001262858	0.346618835	0.00574838	178.0205113	290.2500353	0.145125018
	Pecos	4.0968E-05	0.30919207	4.13174E-05	0.00984418	3.02565E-05	0	6.84069E-05	0.02086524	1.791E-05	0.329872869	5.90308E-06	0.05371732	5.83617E-05	0	0.0002028	0	6.93999E-05	0.019048301	0.0003727	11.54208583	12.28462581	0.006142313
	Presidio	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red River	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Robertson	0.00073771	5.56764221	0.000835096	0.19896806	0.00054483	0	0.000735917	0.224466939	0.0031497	58.0186693	0.000730875	6.65088305	0.00076086	0	0.0018663	0	0.191632518	52.59771198	0.00339774	105.2239878	228.4823293	0.114241165
	Taylor	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Titus	0.00569644	42.9922634	0.005745061	1.36880451	0.004207073	0	0.009511781	2.901251397	0.00249	45.86786929	0.000820806	7.4692382	0.008115023	0	0.0282032	0	0.00964985	2.648611275	0.05182285	1604.893683	1708.141721	0.85407086
	Tom Green	0.00148245	11.1883609	2.96846E-05	0.00707259	0.001094854	0	4.95918E-05	0.015126309	1.095E-05	0.201700637	1.05974E-05	0.0964353	0.000304817	0	4.72E-05	0	1.04843E-05	0.002877634	5.396E-05	1.671091382	13.18266475	0.006591332
	Upton	3.1166E-05	0.2352176	3.14322E-05	0.00748895	2.30176E-05	0	5.20405E-05	0.015873214	1.362E-05	0.250950505	4.49076E-06	0.04086541	4.43986E-05	0	0.0001543	0	5.27959E-05	0.014490979	0.00028353	8.780631982	9.345518638	0.004672759
	Ward	0.01855953	140.072837	0.01871795	4.45969379	0.013707039	0	0.030990277	9.452549862	0.0081128	149.4418312	0.002674262	24.3354804	0.026439509	0	0.0918886	0	0.03144012	8.62942459	0.16884373	5228.89453	5565.286347	2.782643174
	Webb	0.02001433	151.052522	0.000400768	0.09548607	0.014781473	0	0.000669531	0.204218211	0.0001478	2.72313256	0.000143074	1.30195967	0.004115289	0	0.0006373	0	0.000141547	0.03885054	0.00072851	22.56117489	177.9773435	0.088988672
	Wharton	0.00014434	1.08936338	0.000178787	0.04259725	0.000106601	0	6.01986E-05	0.018361569	0.001094	20.1516571	0.000248538	2.26166804	9.98576E-05	0	6.336E-05	0	7.6398E-05	0.020969083	0.00010492	3.249191663	26.83380809	0.013416904
	Wichita	0.00020763	1.56705342	0.000209406	0.04989246	0.000153346	0	0.000346701	0.105749629	9.076E-05	1.671868277	2.99181E-05	0.2722512	0.00029579	0	0.001028	0	0.000351734	0.096540983	0.00188893	58.49783035	62.26118631	0.031130593
	Wilbarger	0.02861682	215.977409	0.000573025	0.13652758	0.021134796	0	0.000957307	0.291994597	0.0002114	3.893580243	0.00020457	1.86156359	0.005884109	0	0.0009112	0	0.000202386	0.055549148	0.00104164	32.25834324	254.4749669	0.127237483
	Wise	0.00284449	21.467972	0.002882008	0.68666032	0.002100781	0	0.00476997	1.454920304	0.0012561	23.13754764	0.000413241	3.76044928	0.004181914	0	0.0146143	0	0.004797945	1.316900231	0.02576141	797.8010337	849.6254835	0.424812742
	Young	0.00623586	47.0633766	0.006289085	1.4984222	0.004605458	0	0.010412491	3.175982754	0.0027258	50.21128538	0.000898531	8.17653091	0.008883468	0	0.0308739	0	0.010563634	2.899419107	0.05673017	1756.867628	1869.892645	0.934946322
	Total	**1.12183722**	**8466.75178**	**1.172570094**	**279.373737**	**1.090766584**	**0**	**1.189130767**	**362.7046555**	**1.62936**	**30013.64108**	**1.542362643**	**14035.3267**	**1.359385821**	**0**	**1.2316428**	**0**	**1.221806085**	**335.3512503**	**1.52878695**	**47344.75903**	**100837.9082**	**50.41895412**
Energy Savings by PCA (MWh)		7,547.22		238.26		0.00		305.02		18,420.51		9,099.89		0.00		0.00		274.47		30,969			

[46] In this Table, the NOx reductions from the annual electricity savings in two PCAs, including El Paso Electric Co/PCA and Entergy Electric System/PCA, (i.e., 6,124 MWh) are not reported since the emission factors for these two PCAs are not provided in the 2007 eGRID.

Table 32: 2011 Totalized OSD Electricity Savings from the ASHRAE Standard 90.1-1999 by PCA for Commercial Building (w/7% T&D)[47]

PCA	Total Electricity Savings by PCA (MWh)
American Electric Power - West (ERCOT)/PCA	39.06
Austin Energy/PCA	1.41
Brownsville Public Utils Board/PCA	0.00
Lower Colorado River Authority/PCA	1.68
Reliant Energy HL&P/PCA	98.88
San Antonio Public Service Bd /PCA	54.20
South Texas Electric Coop Inc/PCA	0.00
Texas Municipal Power Pool/PCA	0.00
Texas-New Mexico Power Co/PCA	1.54
TXU Electric/PCA	182.95
El Paso Electric Co/PCA	0.08
Entergy Electric System/PCA	33.38
Total	413.18

[47] Of a total of 202 counties listed in Table 22, the OSD electricity savings in 31 counties (i.e., 14.02 MWh), including 8 non-attainment and affected non-ERCOT counties (i.e, 99.93% of total savings in 31 counties), are not reported in this table since the corresponding PCA could not be assigned for these 31 counties.

Table 33: 2011 OSD NOx Reductions from Electricity Savings from the ASHRAE Standard 90.1-1999 by PCA for Commercial Buildings by County using 2007 eGRID (w/7% T&D)[48]

Area	County	American Electric Power - West (ERCOT) /PCA	NOx Reductions (lbs)	Austin Energy/PCA	NOx Reductions (lbs)	Brownsville Public Utils Board/PCA	NOx Reductions (lbs/year)	Lower Colorado River Auhotrity /PCA	NOx Reductions (lbs)	Reliant Energy HL&P/PCA	NOx Reductions (lbs)	San Antonio Public Service Bd/PCA	NOx Reductions (lbs)	South Texas Electric Coop INC/PCA	NOx Reductions (lbs)	Texas Municipal Power Pool/PCA	NOx Reductions (lbs)	Texas-New Mexico Power Co/PCA	NOx Reductions (lbs)	TXU Electric/ PCA	NOx Reductions (lbs)	Total Nox Reductions (lbs)	Total Nox Reductions (Tons)
Houston-Galveston Area	Brazoria	0.00957217	0.37391298	0.011806715	0.016672707	0.007069474	0	0.004263638	0.0071724	0.0710018	7.020462928	0.016140391	0.874772354	0.006781035	0	0.0051797	0	0.126288	0.19445664	0.008772	1.604763854	10.09221387	0.005046107
	Chambers	0.0218814	0.85474226	0.027103415	0.038273754	0.016160386	0	0.009125896	0.015351814	0.1658435	16.39815359	0.037677498	2.042034453	0.01513807	0	0.0096055	0	0.011582	0.01783329	0.015905	2.909839425	22.27622859	0.011138114
	Fort Bend	0.05569551	2.17560659	0.068987309	0.09741958	0.041133619	0	0.023228475	0.039075532	0.4221274	41.73881731	0.095901908	5.197664632	0.038531479	0	0.0244493	0	0.029479	0.04539173	0.040484	7.406520221	56.7004956	0.028350248
	Galveston	0.02755599	1.07640599	0.033893644	0.047862492	0.020351324	0	0.012791501	0.02151819	0.2014466	19.91849899	0.045812515	2.482933817	0.019823685	0	0.0167751	0	0.594657	0.9156441	0.028709	5.252358034	29.71522161	0.014857611
	Harris	0.07736057	3.02189826	0.09582276	0.135314933	0.057134232	0	0.032264145	0.054275568	0.5863312	57.97484717	0.1332069	7.219510088	0.053519883	0	0.0339599	0	0.040946	0.06304871	0.056232	10.28759092	78.75648565	0.039378243
	Liberty	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Montgomery	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Waller	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Beaumont/ Port Arthur Area	Hardin	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Jefferson	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Orange	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dallas/ Fort Worth Area	Collin	0.00176365	0.06889255	0.003151138	0.00444984	0.001302533	0	0.005050143	0.008495479	0.0020858	0.20623345	0.00060408	0.032739757	0.015958397	0	0.0637888	0	0.000846	0.00130287	0.004013	0.734211249	1.056325199	0.000528163
	Dallas	0.00504555	0.19709197	0.005305276	0.00749178	0.003726366	0	0.008757286	0.01473173	0.0024131	0.238599498	0.000782263	0.042396885	0.009310387	0	0.033672	0	0.008209	0.01264038	0.044002	8.050143826	8.563096072	0.004281548
	Denton	0.00063576	0.0248343	0.001170951	0.001653543	0.000469535	0	0.001874207	0.003152839	0.0007854	0.077661279	0.000226691	0.012286127	0.006095882	0	0.0243999	0	0.00025	0.00038549	0.00114	0.208481482	0.328455052	0.000164228
	Tarrant	0.01557224	0.60829093	0.015705165	0.022177856	0.011500796	0	0.026002176	0.043741524	0.006807	0.673056275	0.002243821	0.121609959	0.022183886	0	0.0770985	0	0.02638	0.04061897	0.141667	25.91782705	27.42732257	0.013713661
	Ellis	0.00350282	0.13682909	0.003532723	0.004988692	0.002586991	0	0.005848935	0.009839228	0.0015312	0.151397418	0.000504725	0.027354969	0.004990048	0	0.0173426	0	0.005934	0.00913684	0.031867	5.829961381	6.169507615	0.003084754
	Johnson	0.00033718	0.01317094	0.000621017	0.000876962	0.00024902	0	0.000993991	0.001672117	0.0004166	0.041187888	0.000120226	0.006515984	0.003232969	0	0.0129406	0	0.000133	0.00020444	0.000604	0.110568768	0.174197105	8.70986E-05
	Kaufman	0.00649275	0.25362322	0.006548174	0.009246923	0.004795187	0	0.01084145	0.018237764	0.0028381	0.280626739	0.000935547	0.050704536	0.009249437	0	0.0321458	0	0.010999	0.01693584	0.059067	10.80628106	11.43565607	0.005717828
	Parker	0.00047595	0.01859186	0.000876616	0.001237903	0.000351511	0	0.0014031	0.002360331	0.000588	0.058140079	0.000169709	0.009197845	0.0045636	0	0.0182667	0	0.000187	0.00028859	0.000853	0.156076877	0.245893488	0.000122947
	Rockwall	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Henderson	0.00095027	0.03711997	0.000958382	0.001353368	0.000701818	0	0.001586741	0.002669256	0.0004154	0.041072175	0.000136926	0.007421052	0.001353736	0	0.0047048	0	0.00161	0.00247871	0.008645	1.58159363	1.673708162	0.000836854
	Hood	0.01232788	0.48155803	0.012433111	0.017557265	0.00910469	0	0.020584816	0.034628303	0.0053888	0.532829997	0.001776337	0.096273427	0.017562038	0	0.0610356	0	0.020884	0.03215631	0.112152	20.5180402	21.71304353	0.010856522
	Hunt	0.00635121	0.24809426	0.006405424	0.009045341	0.004690653	0	0.010605108	0.017840183	0.0027763	0.274509107	0.000915153	0.049599183	0.0090478	0	0.031445	0	0.010759	0.01656664	0.05778	10.57070534	11.18636005	0.00559318
El Paso Area	El Paso	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
San Antonio Area	Bexar	0.03112811	1.2159423	0.048234164	0.068113282	0.0229895	0	0.084461674	0.142083583	0.0010637	0.105179208	1.065346769	57.73936452	0.043667482	0	0.0043501	0	0.000484	0.00074532	0.002333	0.426744494	59.6981727	0.029849086
	Comal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Guadalupe	0.00200761	0.07842231	0.076651484	0.108242451	0.00148271	0	0.134326688	0.225967781	0.0012416	0.122761151	0.00356749	0.193349821	0.001065557	0	0.0018623	0	0.000403	0.00062077	0.001842	0.336939974	1.066304259	0.000533152
	Wilson	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Austin Area	Bastrop	0.00446951	0.17459046	0.170648096	0.240978611	0.003300936	0	0.299049574	0.503068821	0.002764	0.273301385	0.007942252	0.430451924	0.002372235	0	0.0041461	0	0.000898	0.00138201	0.0041	0.750124618	2.373897833	0.001186949
	Caldwell	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Hays	0.00246935	0.09645912	0.094281013	0.133137773	0.001823727	0	0.165221279	0.277939451	0.0015271	0.150995716	0.004387998	0.237819492	0.001310631	0	0.0022907	0	0.000496	0.00076354	0.002265	0.414434796	1.311549895	0.000655775
	Travis	0.00050761	0.01982849	0.298194277	0.421091383	0.000374892	0	0.033779905	0.056825417	0.0003331	0.032939499	0.000901861	0.048878795	0.000269863	0	0.0004695	0	0.000103	0.00015835	0.000465	0.085096504	0.664818439	0.000332409
	Williamson	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
North East Texas Area	Gregg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Harrison	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Rusk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Smith	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Upshur	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Corpus Christi Area	Nueces	0.22352453	8.73142931	0.00447587	0.006320545	0.165082827	0	0.007477478	0.012578804	0.001651	0.163248022	0.001597886	0.086601755	0.045960479	0	0.0071176	0	0.001581	0.00243413	0.008136	1.48850523	10.4911178	0.005245559
	San Patricio	0.05533089	2.16136337	0.001107949	0.001564577	0.040864326	0	0.001850962	0.003113736	0.0004087	0.040410142	0.000395538	0.021437253	0.01137698	0	0.0017619	0	0.000391	0.00060254	0.002014	0.368462088	2.596953706	0.001298477
Victoria Area	Victoria	0.02060475	0.80487336	0.002090584	0.002952192	0.015217528	0	0.003408874	0.005734496	0.0011319	0.111923265	0.000524055	0.02840258	0.495811308	0	0.0305841	0	0.00045	0.00069283	0.002128	0.389248174	1.343826899	0.000671913
Other ERCOT counties	Andrews	2.5653E-05	0.00100206	2.58716E-05	3.65343E-05	1.89456E-05	0	4.28342E-05	7.20568E-05	1.121E-05	0.001108748	3.69632E-06	0.000200332	3.65442E-05	0	0.000127	0	4.35E-05	6.6913E-05	0.000233	0.04269528	0.045181921	2.2591E-05
	Angelina	0.00032149	0.01255821	0.000324234	0.000457864	0.000237435	0	0.000536817	0.000903047	0.0001405	0.013895299	4.63239E-05	0.002510647	0.000457988	0	0.0015917	0	0.000545	0.00083858	0.002925	0.535075543	0.566239194	0.00028312
	Bosque	0.00093945	0.03669738	0.001730301	0.002443424	0.000693828	0	0.002769496	0.004658917	0.0011606	0.11475926	0.000334979	0.018155081	0.009007821	0	0.0360555	0	0.00037	0.00056963	0.001684	0.308070907	0.485354599	0.000242677
	Brazos	0.00191393	0.07476277	0.003525105	0.004977934	0.00141352	0	0.005642234	0.009491509	0.0023645	0.233796524	0.000682445	0.036986949	0.018351436	0	0.073455	0	0.000754	0.00116049	0.003431	0.627626103	0.988802279	0.000494401
	Calhoun	0.08852525	3.45801843	0.001772635	0.002503205	0.065379841	0	0.0029614	0.004981743	0.0006539	0.06465318	0.000632831	0.034297989	0.01820231	0	0.0028189	0	0.000626	0.00096402	0.003222	0.58951156	4.154930127	0.002077465
	Cameron	0.05467229	2.13563685	0.001094762	0.001545954	0.285623104	0	0.001828931	0.003076674	0.0004038	0.039929143	0.00039083	0.021182088	0.011241561	0	0.0017409	0	0.000387	0.00059537	0.00199	0.364076317	2.566042399	0.001283021
	Cherokee	0.003513	0.13722641	0.003542982	0.005003178	0.002594504	0	0.005865919	0.009867799	0.0015356	0.151837046	0.000506191	0.027434403	0.005004538	0	0.0173929	0	0.005951	0.00916337	0.031959	5.846890452	6.187422663	0.003093711
	Coke	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Coleman	0.0013551	0.05293358	2.71346E-05	3.83178E-05	0.001000801	0	4.53316E-05	7.6258E-05	1.001E-05	0.000989678	9.68705E-06	0.000525016	0.000278632	0	4.315E-05	0	9.58E-06	1.4757E-05	4.93E-05	0.009023943	0.063601553	3.18008E-05
	Crockett	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Ector	0.00362926	0.14176815	0.003660242	0.005168766	0.002680373	0	0.006060061	0.01019439	0.0015864	0.156862347	0.000522944	0.02834239	0.005170172	0	0.0179686	0	0.006148	0.00946665	0.033017	6.040403049	6.392205741	0.003196103
	Fannin	0.00762852	0.297989	0.007693632	0.010864468	0.005633999	0	0.012737922	0.021428058	0.0033346	0.329716188	0.001099201	0.059574174	0.010867422	0	0.0377689	0	0.012923	0.01989839	0.0694	12.69660124	13.43607152	0.006718036
	Fayette	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Freestone	0.00377443	0.14743888	0.003806652	0.005375517	0.002787588	0	0.006302464	0.010602166	0.0016499	0.163136841	0.000543862	0.029476086	0.005376978	0	0.0186873	0	0.006394	0.00984532	0.034338	6.282019171	6.647893971	0.003323947
	Frio	0.01476384	0.5767126	0.001497957	0.002115322	0.010903753	0	0.002442547	0.004108914	0.0008111	0.080195917	0.000375499	0.020351184	0.355261637	0	0.0219143	0	0.000322	0.00049643	0.001525	0.278906393	0.96288676	0.000481443
	Grimes	0.00055442	0.0216572	0.001021149	0.001442003	0.000409467	0	0.001634436	0.002749491	0.0006849	0.067725937	0.00019769	0.010714341	0.005316025	0	0.0212784	0	0.000218	0.00033617	0.000994	0.181810086	0.28643523	0.000143218
	Hardeman	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Haskell	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Hidalgo	0.239737	9.36472912	0.004800509	0.00677898	0.177056459	0	0.008019827	0.013491158	0.0017708	0.175088574	0.001713782	0.092883072	0.049294041	0	0.0076338	0	0.001695	0.00261068	0.008726	1.596468089	11.25204967	0.005626025
	Howard	0.00058508	0.02285473	0.000590075	0.000833267	0.000432108	0	0.000976955	0.001643458	0.0002558	0.025288094	8.43049E-05	0.004569134	0.000833494	0	0.0028967	0	0.000991	0.00152614	0.005323	0.9737855	1.030500318	0.00051525
	Jack	0.00217756	0.08506089	0.002196145	0.00310126	0.001608224	0	0.003636037	0.006116634	0.0009519	0.094117408	0.000313767	0.017005434	0.003102103	0	0.0107811	0	0.003689	0.00567999	0.01981	3.62424183	3.835323445	0.001917662
	Jones	0.04250012	1.66016157	0.000851025	0.001201765	0.031388236	0	0.00142174	0.002391687	0.0003139	0.031039373	0.000303816	0.016466136	0.008738755	0	0.0013533	0	0.000301	0.00046282	0.001547	0.28301886	1.994742204	0.000997371
	Lamar	0.00107998	0.04218675	0.001089199	0.001538099	0.000797614	0	0.001803327	0.003033602	0.0004721	0.046678415	0.000155616	0.008434005	0.001538517	0	0.005347	0	0.00183	0.00281704	0.009825	1.797476861	1.902164775	0.000951082
	Limestone	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Llano	0.00124346	0.04857267	0.047475864	0.067042457	0.000918351	0	0.083198331	0.139958355	0.000769	0.076034949	0.002209607	0.119755669	0.000659977	0	0.0011535	0	0.00025	0.00038449	0.001141	0.208691541	0.660440125	0.00033022
	McLennan	0.02303137	0.89966309	0.023227961	0.032801079	0.017009692	0	0.038457253	0.064693773	0.0100675	0.995451124	0.003318614	0.17986129	0.032809997	0	0.1140288	0	0.039015	0.06007552	0.209526	38.33250059	40.56504647	0.020282523
	Milam	0.00165249	0.06455049	0.001666598	0.002353465	0.001220439	0	0.002759294	0.004641754	0.0007223	0.071423247	0.000238109	0.012904981	0.002354105	0	0.0081815	0	0.002799	0.0043104	0.015033	2.750342628	2.910526962	0.001455263
	Mitchell	0.01696145	0.66255695	0.017106233	0.024156357	0.012526789	0	0.028321847	0.047643734	0.0074142	0.733100055	0.002443993	0.132458861	0.024162925	0	0.0839765	0	0.028733	0.04424262	0.154305	28.22997294	29.87413152	0.014937066
	Nolan	0.00060327	0.02356535	0.000608422	0.000859176	0.000445544	0	0.001007331	0.001694558	0.0002637	0.026074381	8.69262E-05	0.004711202	0.00085941	0	0.0029868	0	0.001022	0.00157359	0.005488	1.004063589	1.062541852	0.000531271
	Palo Pinto	0.00307488	0.12011251	0.00566337	0.007997458	0.002270935	0	0.00906471	0.015248887	0.0037988	0.37561325	0.001096403	0.059422561	0.029483083	0	0.1180115	0	0.001211	0.00186442	0.005512	1.0083327	1.588591786	0.000794296
	Pecos	4.2262E-05	0.00165085	4.26225E-05	6.01889E-05	3.12122E-05	0	7.05678E-05	0.000118711	1.847E-05	0.001826619	6.08954E-06	0.000330039	6.02052E-05	0	0.0002092	0	7.16E-05	0.00011024	0.000384	0.070338841	0.074435487	3.72177E-05
	Presidio	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red River	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Robertson	0.00035926	0.0140335	0.000406685	0.000574295	0.000265328	0	0.000358385	0.000602885	0.0015339	0.151664595	0.00035593	0.019290602	0.000370532	0	0.0009089	0	0.093323	0.14369816	0.001655	0.302719719	0.632583758	0.000316292
	Taylor	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Titus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Tom Green	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Upton	3.2238E-05	0.0012593	3.25131E-05	4.5913E-05	2.38092E-05	0	5.38302E-05	9.05545E-05	1.409E-05	0.001393374	4.6452E-06	0.000251759	4.59255E-05	0	0.0001596	0	5.46E-05	8.409E-05	0.000293	0.053655572	0.056780558	2.83903E-05
	Ward	0.01980763	0.7737356	0.0199767	0.028209852	0.014628815	0	0.033074321	0.055638467	0.0086584	0.85611601	0.002854101	0.154685776	0.028217522	0	0.098068	0	0.033554	0.05166664	0.180198	32.96703038	34.88708272	0.017443541
	Webb	0.01418005	0.55390819	0.000283942	0.000400965	0.010472596	0	0.000474359	0.00079798	0.0001047	0.010356199	0.000101367	0.00549388	0.002915661	0	0.0004515	0	0.0001	0.00015442	0.000516	0.094428439	0.665540074	0.00033277
	Wharton	0.00015439	0.00603086	0.000191235	0.000270051	0.000114024	0	6.43902E-05	0.000108319	0.0011702	0.115701519	0.000265844	0.014408115	0.000106811	0	6.777E-05	0	8.17E-05	0.00012583	0.000112	0.020531143	0.157175835	7.85879E-05
	Wichita	0.00021984	0.00858762	0.000221719	0.000313098	0.000162364	0	0.000367089	0.000617526	9.61E-05	0.00950195	3.16774E-05	0.001716843	0.000313184	0	0.0010884	0	0.000372	0.00057344	0.002	0.365897919	0.387208397	0.000193604
	Wilbarger	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Wise	0.00291847	0.1140028	0.002955932	0.004174183	0.002155421	0	0.004892446	0.008230198	0.0012878	0.127329546	0.000423725	0.02296495	0.004280539	0	0.0149528	0	0.004924	0.00758245	0.026441	4.837261023	5.121545154	0.002560773
	Young	0.00549666	0.21471335	0.005543579	0.007828297	0.004059529	0	0.009178198	0.015439798	0.0024027	0.237574097	0.000792019	0.042925647	0.007830425	0	0.0272141	0	0.009311	0.01433761	0.050005	9.14842426	9.681243056	0.004840622
	Total	**1.14303735**	**44.6499097**	**1.154658244**	**1.630536445**	**1.089429227**	**0**	**1.180868675**	**1.986487406**	**1.5393506**	**152.2068312**	**1.443965054**	**78.25961184**	**1.48172714**	**0**	**1.2697054**	**0**	**1.151969**	**1.7737857**	**1.517783**	**277.6764117**	**558.1835739**	**0.279091787**
Energy Savings by PCA (MWh)		39.06		1.41		0.00		1.68		98.88		54.20		0.00		0.00		1.54		182.95			

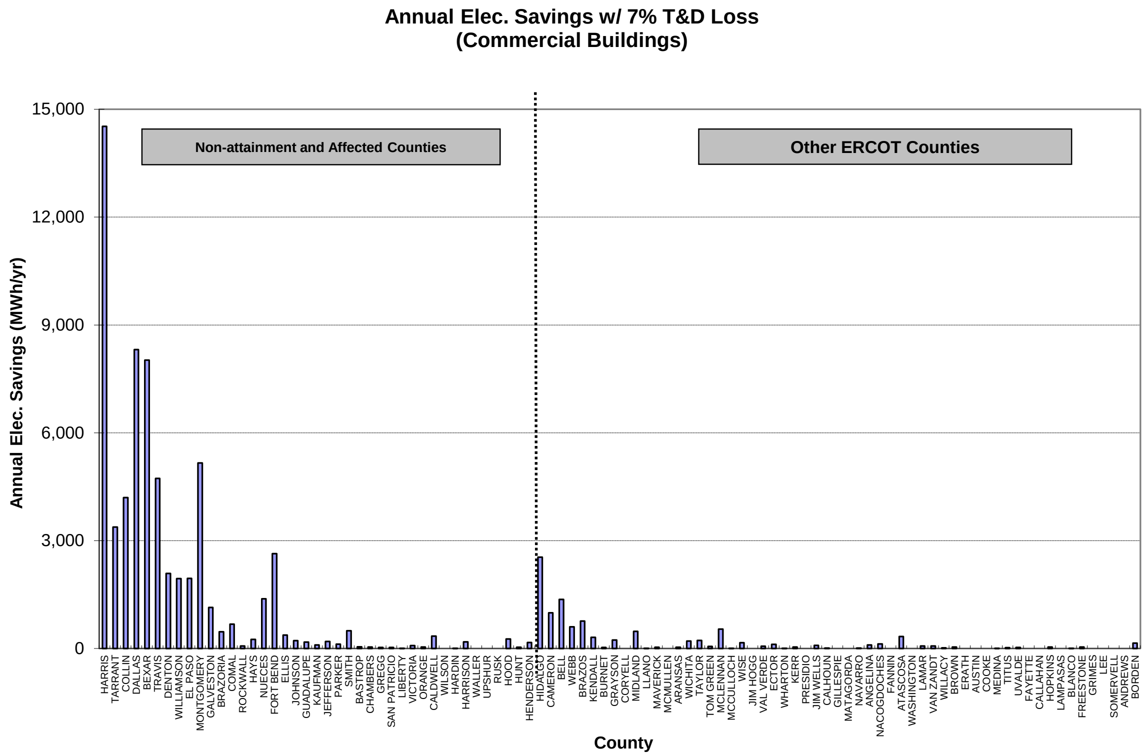
[48] In this Table, the NOx reductions from the OSD electricity savings in two PCAs, including El Paso Electric Co/PCA and Entergy Electric System/PCA, (i.e., 33.46 MWh) are not reported since the emission factors for these two PCAs are not provided in the 2007 eGRID.

Table 34: 2011 Annual and OSD NOx Reductions from the ASHRAE Standard 90.1-1999 for Commercial Buildings by County using 2007 eGRID (w/7% T&D)

	Electricity Savings and Resultant NOx Reductions (Commercial)				Total Natural Gas Savings and Resultant NOx Reductions (Commercial)				Total Nox Reductions	
County	Total Annual Electricity Savings per County w/ 7% T&D Loss (MWh/County)	Annual Nox Reductions (Tons)	OSD Electricity Savings per County w/ 7% T&D Loss (MWh/County)	OSD Nox Reductions (Tons)	Total Annual N.G. Savings (Therm/County)	Annual Nox Reductions (Tons)	Total OSD N.G. Savings (Therm/County)	OSD Nox Reductions (Tons)	Annual Nox Reductions (Tons)	OSD Nox Reductions (Tons)
HARRIS	14,527.25	6.35	81.00	0.04	44,881.69	0.21	2,212.5911	0.0102	6.55	0.0496
TARRANT	3,378.28	1.82	20.09	0.01	29,490.14	0.14	592.3558	0.0027	1.96	0.0164
COLLIN	4,196.43	0.10	23.10	0.00	9,486.62	0.04	586.9604	0.0027	0.14	0.0032
DALLAS	8,318.23	0.67	50.24	0.00	83,062.40	0.38	1,542.5958	0.0071	1.05	0.0114
BEXAR	8,024.14	5.40	48.15	0.03	76,397.58	0.35	1,435.0446	0.0066	5.75	0.0365
TRAVIS	4,734.92	0.06	29.91	0.00	66,760.44	0.31	972.1134	0.0045	0.36	0.0048
DENTON	2,089.84	0.02	14.14	0.00	42,308.56	0.19	529.8116	0.0024	0.22	0.0026
WILLIAMSON	1,944.53	0.00	9.74	0.00	(11,847.11)	(0.05)	263.8822	0.0012	(0.05)	0.0012
EL PASO	1,953.69	0.00	11.36	0.00	14,391.67	0.07	288.7922	0.0013	0.07	0.0013
MONTGOMERY	5,160.27	0.00	26.43	0.00	(10,993.98)	(0.05)	368.2958	0.0017	(0.05)	0.0017
GALVESTON	1,143.78	3.28	6.03	0.01	33.52	0.00	97.7707	0.0004	3.28	0.0153
BRAZORIA	466.79	0.85	2.33	0.01	(2,219.46)	(0.01)	41.9572	0.0002	0.84	0.0052
COMAL	678.71	0.00	3.78	0.00	2,064.96	0.01	104.2915	0.0005	0.01	0.0005
ROCKWALL	72.87	0.00	0.40	0.00	206.25	0.00	7.2882	0.0000	0.00	0.0000
HAYS	253.24	0.11	1.38	0.00	462.23	0.00	32.3797	0.0001	0.12	0.0008
NUECES	1,383.80	1.01	7.25	0.01	(1,944.66)	(0.01)	155.5416	0.0007	1.00	0.0060
FORT BEND	2,638.81	6.55	13.04	0.03	(16,676.61)	(0.08)	285.0711	0.0013	6.47	0.0297
ELLIS	378.02	0.49	1.87	0.00	(1,630.42)	(0.01)	19.3115	0.0001	0.48	0.0032
JOHNSON	223.21	0.01	1.38	0.00	2,856.86	0.01	40.2351	0.0002	0.03	0.0003
GUADALUPE	177.88	0.09	1.13	0.00	2,385.23	0.01	43.0525	0.0002	0.10	0.0007
KAUFMAN	99.64	0.95	0.48	0.01	(902.26)	(0.00)	12.4325	0.0001	0.94	0.0058
JEFFERSON	199.70	0.00	1.15	0.00	1,251.18	0.01	30.6089	0.0001	0.01	0.0001
PARKER	121.31	0.01	0.74	0.00	1,277.29	0.01	26.7565	0.0001	0.02	0.0002
SMITH	497.26	0.00	3.06	0.00	5,750.23	0.03	99.7357	0.0005	0.03	0.0005
BASTROP	47.22	0.21	0.23	0.00	(235.83)	(0.00)	2.6048	0.0000	0.21	0.0012
CHAMBERS	43.29	2.02	0.21	0.01	(299.66)	(0.00)	3.9188	0.0000	2.02	0.0112
GREGG	32.91	0.00	0.16	0.00	(226.97)	(0.00)	2.9173	0.0000	(0.00)	0.0000
SAN PATRICIO	29.29	0.22	0.14	0.00	(196.09)	(0.00)	2.5446	0.0000	0.22	0.0013
LIBERTY	3.48	0.00	0.03	0.00	112.57	0.00	1.1640	0.0000	0.00	0.0000
VICTORIA	81.81	0.13	0.60	0.00	2,342.17	0.01	24.8642	0.0001	0.14	0.0008
ORANGE	44.15	0.00	0.34	0.00	1,429.52	0.01	14.7813	0.0001	0.01	0.0001
CALDWELL	344.00	0.00	1.70	0.00	(1,428.84)	(0.01)	15.8470	0.0001	(0.01)	0.0001
WILSON	0.00	0.00	0.00	0.00	0.00	0.00	0.0000	0.0000	0.00	0.0000
HARDIN	5.64	0.00	0.03	0.00	(25.83)	(0.00)	0.1722	0.0000	(0.00)	0.0000
HARRISON	185.48	0.00	0.95	0.00	(394.79)	(0.00)	11.6915	0.0001	(0.00)	0.0001
WALLER	0.00	0.00	0.00	0.00	0.00	0.00	0.0000	0.0000	0.00	0.0000
UPSHUR	0.00	0.00	0.00	0.00	0.00	0.00	0.0000	0.0000	0.00	0.0000
RUSK	0.00	0.10	0.00	0.00	0.00	0.00	0.0000	0.0000	0.10	0.0000
HOOD	266.17	1.88	1.32	0.01	(1,105.56)	(0.01)	12.2616	0.0001	1.87	0.0109
HUNT	35.72	0.93	0.17	0.01	(177.41)	(0.00)	1.3694	0.0000	0.93	0.0056
HENDERSON	168.08	0.12	0.82	0.00	(1,418.19)	(0.01)	24.1362	0.0001	0.12	0.0009
HIDALGO	2,540.75	0.84	12.74	0.01	(13,935.07)	(0.06)	306.2803	0.0014	0.77	0.0070
CAMERON	995.41	0.22	5.19	0.00	(2,244.32)	(0.01)	127.1669	0.0006	0.20	0.0019
BELL	1,365.81		8.97		23,722.55	0.11	321.7025	0.0015	0.11	0.0015
WEBB	607.08	0.09	3.25	0.00	575.49	0.00	63.0129	0.0003	0.09	0.0006
BRAZOS	764.19	0.09	4.84	0.00	10,650.58	0.05	168.5749	0.0008	0.14	0.0013
KENDALL	313.52		1.63		(305.36)	(0.00)	22.0032	0.0001	(0.00)	0.0001
BURNET	29.88		0.15		(124.13)	(0.00)	1.3767	0.0000	(0.00)	0.0000
GRAYSON	238.13		1.36		881.03	0.00	46.9781	0.0002	0.00	0.0002
CORYELL	0.00		0.00		0.00	0.00	0.0000	0.0000	0.00	0.0000
MIDLAND	476.00		2.66		1,875.98	0.01	64.4310	0.0003	0.01	0.0003
LLANO	4.97	0.06	0.04	0.00	160.82	0.00	1.6629	0.0000	0.06	0.0003
MAVERICK	37.47		0.26		836.29	0.00	9.5659	0.0000	0.00	0.0000
MCMULLEN	0.00		0.00		0.00	0.00	0.0000	0.0000	0.00	0.0000
ARANSAS	38.15		0.19		(174.73)	(0.00)	1.1650	0.0000	(0.00)	0.0000
WICHITA	208.31	0.03	1.11	0.00	146.71	0.00	17.4752	0.0001	0.03	0.0003
TAYLOR	228.78	0.00	1.11	0.00	(1,898.85)	(0.01)	25.1403	0.0001	(0.01)	0.0001
TOM GREEN	60.80	0.01	0.33	0.00	80.01	0.00	5.6777	0.0000	0.01	0.0000
MCLENNAN	539.82	3.68	2.69	0.02	(3,676.18)	(0.02)	75.9405	0.0003	3.66	0.0206
MCCULLOCH	6.45		0.03		(26.79)	(0.00)	0.2971	0.0000	(0.00)	0.0000
WISE	162.08	0.42	0.78	0.00	(1,417.49)	(0.01)	19.3510	0.0001	0.42	0.0026
JIM HOGG	0.00		0.00		0.00	0.00	0.0000	0.0000	0.00	0.0000
VAL VERDE	64.59		0.40		819.55	0.00	14.3517	0.0001	0.00	0.0001
ECTOR	119.14	0.53	0.68	0.00	595.90	0.00	19.3335	0.0001	0.53	0.0033
WHARTON	9.29	0.01	0.05	0.00	(42.54)	(0.00)	0.2837	0.0000	0.01	0.0001
KERR	42.07		0.27		631.71	0.00	8.3118	0.0000	0.00	0.0000
PRESIDIO	0.00	0.00	0.00	0.00	0.00	0.00	0.0000	0.0000	0.00	0.0000
JIM WELLS	88.75		0.43		(869.58)	(0.00)	12.0583	0.0001	(0.00)	0.0001
CALHOUN	12.44	0.37	0.06	0.00	(56.98)	(0.00)	0.3799	0.0000	0.37	0.0021
GILLESPIE	0.00		0.00		0.00	0.00	0.0000	0.0000	0.00	0.0000
MATAGORDA	0.00		0.00		0.00	0.00	0.0000	0.0000	0.00	0.0000
NAVARRO	14.97		0.09		131.36	0.00	2.2195	0.0000	0.00	0.0000
ANGELINA	101.20	0.05	0.74	0.00	2,763.84	0.01	30.2309	0.0001	0.06	0.0004
NACOGDOCHES	129.18		0.94		3,518.90	0.02	39.2161	0.0002	0.02	0.0002
FANNIN	0.00	1.06	0.00	0.01	0.00	0.00	0.0000	0.0000	1.06	0.0067
ATASCOSA	332.92		1.64		(1,852.34)	(0.01)	22.8500	0.0001	(0.01)	0.0001
WASHINGTON	0.00		0.00		0.00	0.00	0.0000	0.0000	0.00	0.0000
LAMAR	70.33	0.14	0.39	0.00	21.70	0.00	13.1764	0.0001	0.14	0.0010
VAN ZANDT	71.93		0.34		(719.41)	(0.00)	10.0681	0.0000	(0.00)	0.0000
WILLACY	22.15		0.11		(221.55)	(0.00)	3.1006	0.0000	(0.00)	0.0000
BROWN	45.20		0.22		(452.02)	(0.00)	6.3260	0.0000	(0.00)	0.0000
ERATH	0.00		0.00		0.00	0.00	0.0000	0.0000	0.00	0.0000
AUSTIN	0.00		0.00		0.00	0.00	0.0000	0.0000	0.00	0.0000
COOKE	0.00		0.00		0.00	0.00	0.0000	0.0000	0.00	0.0000
MEDINA	6.30		0.03		(28.87)	(0.00)	0.1925	0.0000	(0.00)	0.0000
TITUS	24.19	0.85	0.12	0.00	(241.93)	(0.00)	3.3857	0.0000	0.85	0.0000
UVALDE	30.10		0.15		(125.02)	(0.00)	1.3866	0.0000	(0.00)	0.0000
FAYETTE	0.00	0.00	0.00	0.00	0.00	0.00	0.0000	0.0000	0.00	0.0000
CALLAHAN	0.00		0.00		0.00	0.00	0.0000	0.0000	0.00	0.0000
HOPKINS	42.74		0.23		41.90	0.00	5.9332	0.0000	0.00	0.0000
LAMPASAS	0.00		0.00		0.00	0.00	0.0000	0.0000	0.00	0.0000
BLANCO	9.67		0.05		(40.19)	(0.00)	0.4457	0.0000	(0.00)	0.0000
FREESTONE	43.80	0.55	0.21	0.00	(438.02)	(0.00)	6.1300	0.0000	0.55	0.0034
GRIMES	0.00	0.00	0.00	0.00	0.00	0.00	0.0000	0.0000	0.00	0.0001
LEE	0.00		0.00		0.00	0.00	0.0000	0.0000	0.00	0.0000
SOMERVELL	0.00		0.00		0.00	0.00	0.0000	0.0000	0.00	0.0000
ANDREWS	0.00	0.00	0.00	0.00	0.00	0.00	0.0000	0.0000	0.00	0.0000
BORDEN	150.23		0.72		(1,502.49)	(0.01)	21.0272	0.0001	(0.01)	0.0001

Table 34: 2011 Annual and OSD NOx Reductions from the ASHRAE Standard 90.1-1999 for Commercial Buildings by County using 2007 eGRID (w/7% T&D) (Continued)

	Electricity Savings and Resultant NOx Reductions (Commercial)				Total Natural Gas Savings and Resultant NOx Reductions (Commercial)				Total Nox Reductions	
County	Total Annual Electricity Savings per County w/ 7% T&D Loss (MWh/County)	Annual Nox Reductions (Tons)	OSD Electricity Savings per County w/ 7% T&D Loss (MWh/County)	OSD Nox Reductions (Tons)	Total Annual N.G. Savings (Therm/County)	Annual Nox Reductions (Tons)	Total OSD N.G. Savings (Therm/County)	OSD Nox Reductions (Tons)	Annual Nox Reductions (Tons)	OSD Nox Reductions (Tons)
CHEROKEE	239.49	0.53	1.16	0.00	(2,099.71)	(0.01)	33.6065	0.0002	0.52	0.0032
DIMMIT	0.00		0.00		0.00	0.00	0.0000	0.0000	0.00	0.0000
FALLS	0.00		0.00		0.00	0.00	0.0000	0.0000	0.00	0.0000
COLORADO	46.69		0.25		11.70	0.00	3.7764	0.0000	0.00	0.0000
FRIO	236.52	0.05	1.23	0.00	(196.13)	(0.00)	17.1103	0.0001	0.05	0.0006
MILAM	0.00	0.34	0.00	0.00	0.00	0.00	0.0000	0.0000	0.34	0.0015
JACKSON	115.64		0.55		(1,125.96)	(0.01)	15.5684	0.0001	(0.01)	0.0001
ANDERSON	2.32		0.01		(10.64)	(0.00)	0.0709	0.0000	(0.00)	0.0000
HILL	88.99		0.43		(890.04)	(0.00)	12.4559	0.0001	(0.00)	0.0001
CULBERSON	0.00		0.00		0.00	0.00	0.0000	0.0000	0.00	0.0000
MASON	0.00		0.00		0.00	0.00	0.0000	0.0000	0.00	0.0000
PECOS	10.19	0.01	0.05	0.00	(101.86)	(0.00)	1.4256	0.0000	0.01	0.0000
RAINS	0.00		0.00		0.00	0.00	0.0000	0.0000	0.00	0.0000
LAVACA	87.85		0.42		(878.58)	(0.00)	12.2956	0.0001	(0.00)	0.0001
PALO PINTO	12.25	0.15	0.06	0.00	(50.90)	(0.00)	0.5646	0.0000	0.14	0.0008
KIMBLE	0.00		0.00		0.00	0.00	0.0000	0.0000	0.00	0.0000
MADISON	0.00		0.00		0.00	0.00	0.0000	0.0000	0.00	0.0000
ARCHER	0.00		0.00		0.00	0.00	0.0000	0.0000	0.00	0.0000
REFUGIO	0.00		0.00		0.00	0.00	0.0000	0.0000	0.00	0.0000
LIMESTONE	0.00	0.07	0.00	0.00	0.00	0.00	0.0000	0.0000	0.07	0.0000
CLAY	0.00		0.00		0.00	0.00	0.0000	0.0000	0.00	0.0000
BEE	50.93		0.24		(509.32)	(0.00)	7.1279	0.0000	(0.00)	0.0000
MARTIN	33.78		0.26		1,093.58	0.01	11.3077	0.0001	0.01	0.0001
GONZALES	12.73		0.06		(127.33)	(0.00)	1.7820	0.0000	(0.00)	0.0000
BURLESON	0.00		0.00		0.00	0.00	0.0000	0.0000	0.00	0.0000
KARNES	0.00		0.00		0.00	0.00	0.0000	0.0000	0.00	0.0000
KLEBERG	0.00		0.00		0.00	0.00	0.0000	0.0000	0.00	0.0000
BREWSTER	24.28		0.19		786.24	0.00	8.1297	0.0000	0.00	0.0000
WINKLER	17.63		0.09		(73.23)	(0.00)	0.8122	0.0000	(0.00)	0.0000
FRANKLIN	0.00		0.00		0.00	0.00	0.0000	0.0000	0.00	0.0000
YOUNG	4.84	0.93	0.02	0.00	(48.39)	(0.00)	0.6771	0.0000	0.93	0.0048
HOUSTON	0.00		0.00		0.00	0.00	0.0000	0.0000	0.00	0.0000
SCURRY	0.00		0.00		0.00	0.00	0.0000	0.0000	0.00	0.0000
BOSQUE	0.00	0.03	0.00	0.00	0.00	0.00	0.0000	0.0000	0.03	0.0002
COMANCHE	0.00		0.00		0.00	0.00	0.0000	0.0000	0.00	0.0000
BRISCOE	0.00		0.00		0.00	0.00	0.0000	0.0000	0.00	0.0000
CONCHO	0.00		0.00		0.00	0.00	0.0000	0.0000	0.00	0.0000
ZAVALA	0.00		0.00		0.00	0.00	0.0000	0.0000	0.00	0.0000
NOLAN	34.38	0.08	0.16	0.00	(343.79)	(0.00)	4.8113	0.0000	0.08	0.0006
BROOKS	0.00		0.00		0.00	0.00	0.0000	0.0000	0.00	0.0000
ROBERTSON	0.00	0.11	0.00	0.00	0.00	0.00	0.0000	0.0000	0.11	0.0003
LIVE OAK	78.32		0.38		(759.03)	(0.00)	10.4722	0.0000	(0.00)	0.0000
HAMILTON	0.00		0.00		0.00	0.00	0.0000	0.0000	0.00	0.0000
JONES	0.00	0.18	0.00	0.00	0.00	0.00	0.0000	0.0000	0.18	0.0010
REAGAN	0.00		0.00		0.00	0.00	0.0000	0.0000	0.00	0.0000
WARD	0.00	2.78	0.00	0.02	0.00	0.00	0.0000	0.0000	2.78	0.0174
RED RIVER	0.00	0.00	0.00	0.00	0.00	0.00	0.0000	0.0000	0.00	0.0000
HASKELL	0.00	0.00	0.00	0.00	0.00	0.00	0.0000	0.0000	0.00	0.0000
HOWARD	77.00	0.08	0.37	0.00	(744.32)	(0.00)	10.8950	0.0001	0.08	0.0006
SAN SABA	0.00		0.00		0.00	0.00	0.0000	0.0000	0.00	0.0000
JACK	52.96	0.32	0.25	0.00	(529.69)	(0.00)	7.4130	0.0000	0.32	0.0020
STEPHENS	0.00		0.00		0.00	0.00	0.0000	0.0000	0.00	0.0000
RUNNELS	0.00		0.00		0.00	0.00	0.0000	0.0000	0.00	0.0000
REEVES	12.73		0.06		(127.33)	(0.00)	1.7820	0.0000	(0.00)	0.0000
DE WITT	0.00		0.00		0.00	0.00	0.0000	0.0000	0.00	0.0000
CHILDRESS	0.00		0.00		0.00	0.00	0.0000	0.0000	0.00	0.0000
CROSBY	0.00		0.00		0.00	0.00	0.0000	0.0000	0.00	0.0000
DAWSON	51.65		0.25		(267.34)	(0.00)	2.4479	0.0000	(0.00)	0.0000
MITCHELL	0.00	2.24	0.00	0.01	0.00	0.00	0.0000	0.0000	2.24	0.0149
WILBARGER	0.89	0.13	0.00	0.00	(8.91)	(0.00)	0.1247	0.0000	0.13	0.0000
COLEMAN	0.00	0.01	0.00	0.00	0.00	0.00	0.0000	0.0000	0.01	0.0000
UPTON	53.47	0.00	0.26	0.00	(534.79)	(0.00)	7.4843	0.0000	0.00	0.0001
COKE	0.00	0.00	0.00	0.00	0.00	0.00	0.0000	0.0000	0.00	0.0000
CROCKETT	0.00	0.00	0.00	0.00	0.00	0.00	0.0000	0.0000	0.00	0.0000
HARDEMAN	0.00	0.00	0.00	0.00	0.00	0.00	0.0000	0.0000	0.00	0.0000
BANDERA	0.00		0.00		0.00	0.00	0.0000	0.0000	0.00	0.0000
BAYLOR	0.00		0.00		0.00	0.00	0.0000	0.0000	0.00	0.0000
COTTLE	0.00		0.00		0.00	0.00	0.0000	0.0000	0.00	0.0000
CRANE	0.00		0.00		0.00	0.00	0.0000	0.0000	0.00	0.0000
DELTA	0.00		0.00		0.00	0.00	0.0000	0.0000	0.00	0.0000
DICKENS	0.00		0.00		0.00	0.00	0.0000	0.0000	0.00	0.0000
DUVAL	0.00		0.00		0.00	0.00	0.0000	0.0000	0.00	0.0000
EASTLAND	0.00		0.00		0.00	0.00	0.0000	0.0000	0.00	0.0000
EDWARDS	0.00		0.00		0.00	0.00	0.0000	0.0000	0.00	0.0000
FISHER	0.00		0.00		0.00	0.00	0.0000	0.0000	0.00	0.0000
FOARD	0.00		0.00		0.00	0.00	0.0000	0.0000	0.00	0.0000
GLASSCOCK	0.00		0.00		0.00	0.00	0.0000	0.0000	0.00	0.0000
GOLIAD	0.00		0.00		0.00	0.00	0.0000	0.0000	0.00	0.0000
HALL	0.00		0.00		0.00	0.00	0.0000	0.0000	0.00	0.0000
HUDSPETH	0.00		0.00		0.00	0.00	0.0000	0.0000	0.00	0.0000
IRION	0.00		0.00		0.00	0.00	0.0000	0.0000	0.00	0.0000
JEFF DAVIS	0.00		0.00		0.00	0.00	0.0000	0.0000	0.00	0.0000
KENEDY	0.00		0.00		0.00	0.00	0.0000	0.0000	0.00	0.0000
KENT	0.00		0.00		0.00	0.00	0.0000	0.0000	0.00	0.0000
KING	0.00		0.00		0.00	0.00	0.0000	0.0000	0.00	0.0000
KINNEY	0.00		0.00		0.00	0.00	0.0000	0.0000	0.00	0.0000
KNOX	0.00		0.00		0.00	0.00	0.0000	0.0000	0.00	0.0000
LA SALLE	0.00		0.00		0.00	0.00	0.0000	0.0000	0.00	0.0000
LEON	0.00		0.00		0.00	0.00	0.0000	0.0000	0.00	0.0000
LOVING	0.00		0.00		0.00	0.00	0.0000	0.0000	0.00	0.0000
MENARD	0.00		0.00		0.00	0.00	0.0000	0.0000	0.00	0.0000
MILLS	0.00		0.00		0.00	0.00	0.0000	0.0000	0.00	0.0000
MONTAGUE	0.00		0.00		0.00	0.00	0.0000	0.0000	0.00	0.0000
MOTLEY	0.00		0.00		0.00	0.00	0.0000	0.0000	0.00	0.0000
REAL	0.00		0.00		0.00	0.00	0.0000	0.0000	0.00	0.0000
SCHLEICHER	32.45		0.25		1,050.70	0.00	10.8643	0.0000	0.00	0.0000
SHACKELFORD	0.00		0.00		0.00	0.00	0.0000	0.0000	0.00	0.0000
STARR	10.32		0.05		(42.87)	(0.00)	0.4754	0.0000	(0.00)	0.0000
STERLING	0.00		0.00		0.00	0.00	0.0000	0.0000	0.00	0.0000
STONEWALL	0.00		0.00		0.00	0.00	0.0000	0.0000	0.00	0.0000
SUTTON	0.00		0.00		0.00	0.00	0.0000	0.0000	0.00	0.0000
TERRELL	0.00		0.00		0.00	0.00	0.0000	0.0000	0.00	0.0000
THROCKMORTON	0.00		0.00		0.00	0.00	0.0000	0.0000	0.00	0.0000
ZAPATA	16.42		0.08		(75.21)	(0.00)	0.5015	0.0000	(0.00)	0.0000
TOTAL	**75,403.42**	**50.42**	**427.20**	**0.28**	**345,684.74**	**1.59**	**11,589.34**	**0.05**	**52.01**	**0.33**



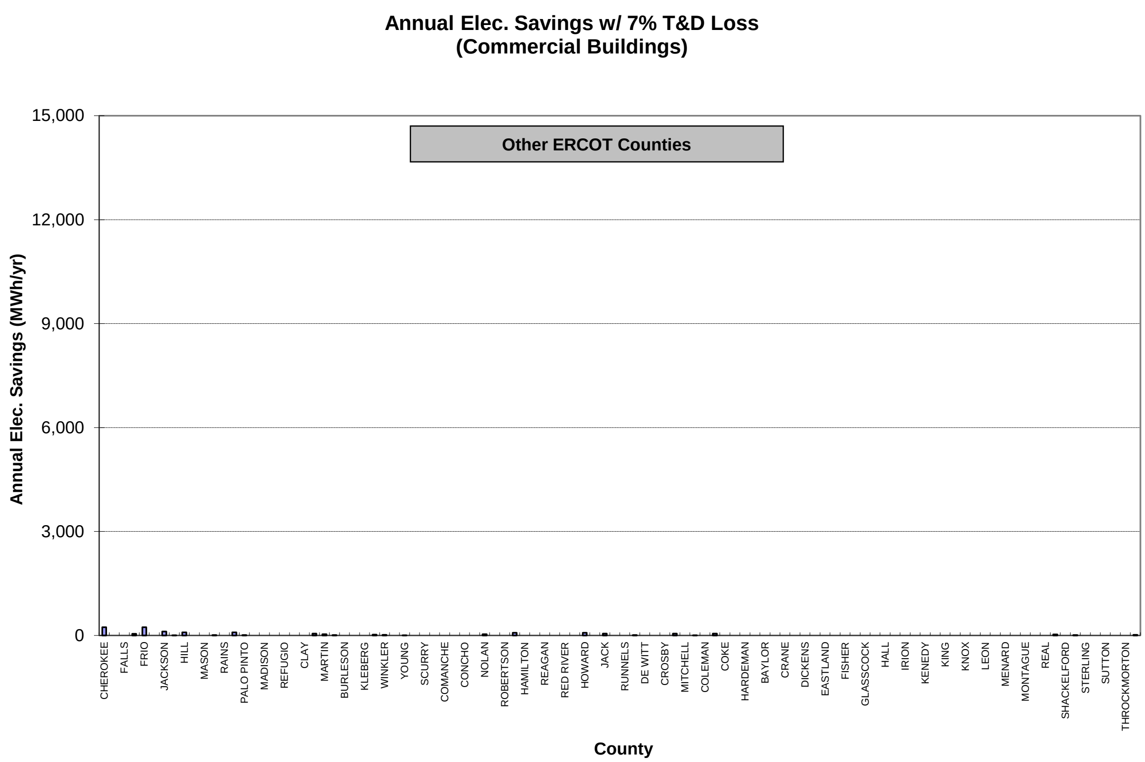
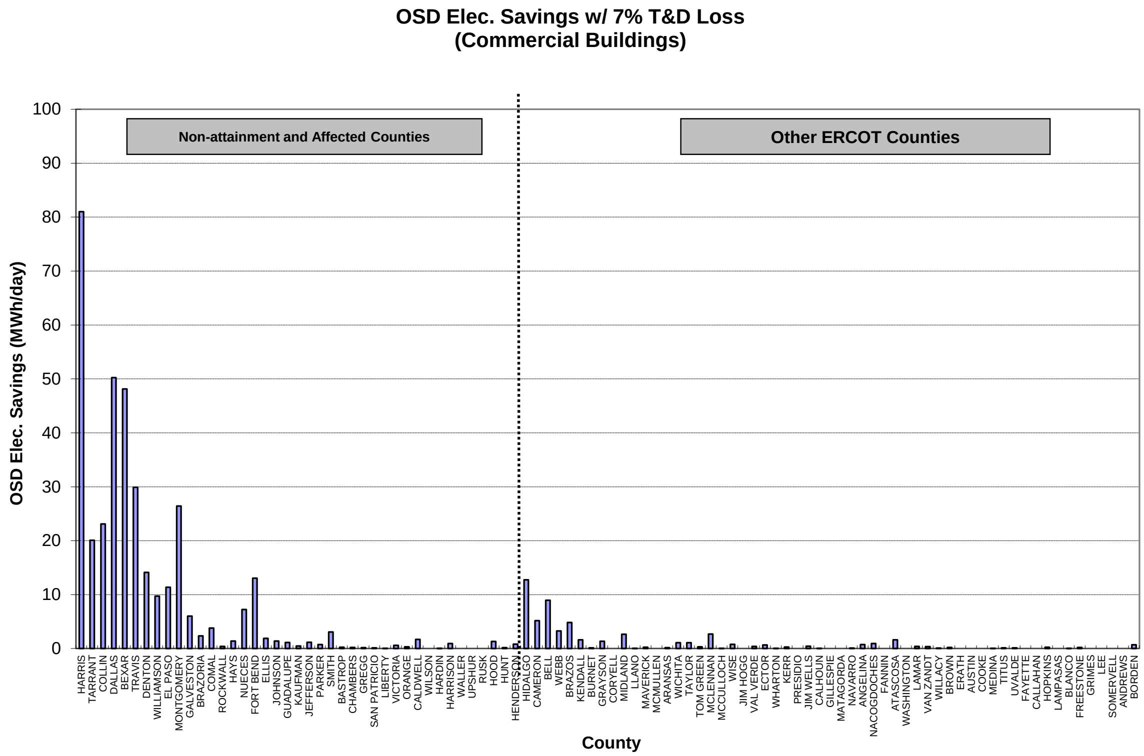


Figure 47: 2011 Annual Electricity Reductions from the ASHRAE Standard 90.1-1999 for Commercial Buildings with 7% T&D Losses



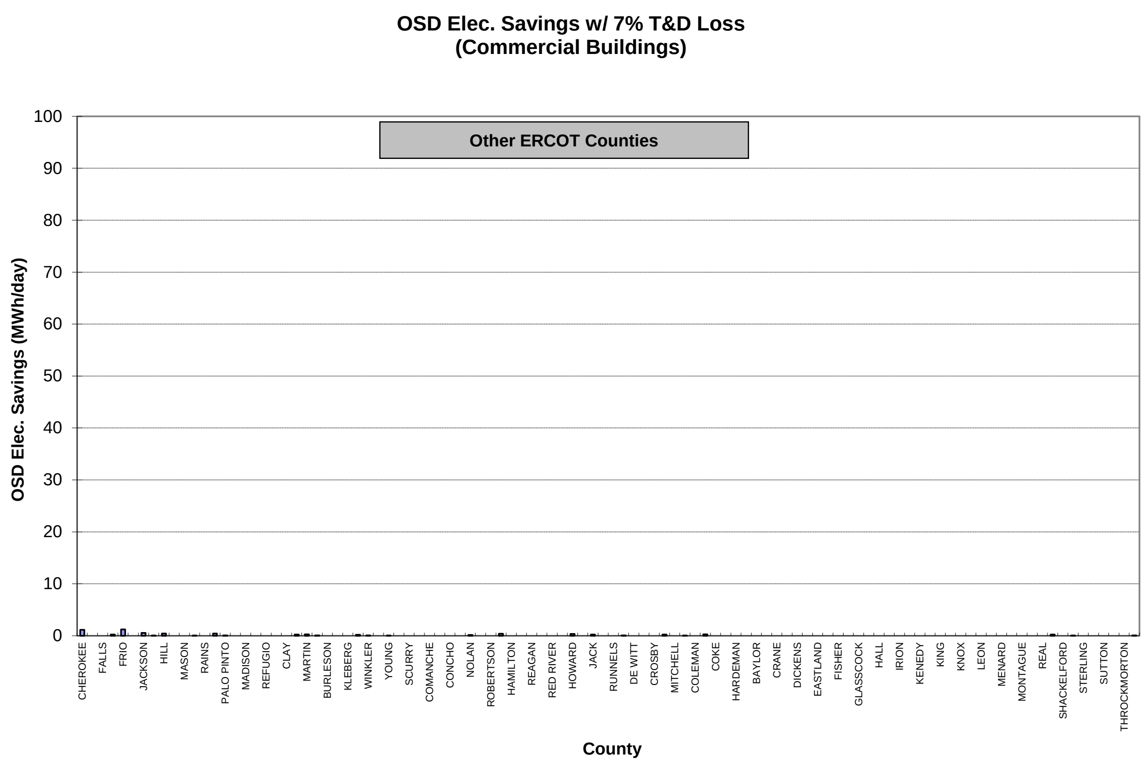
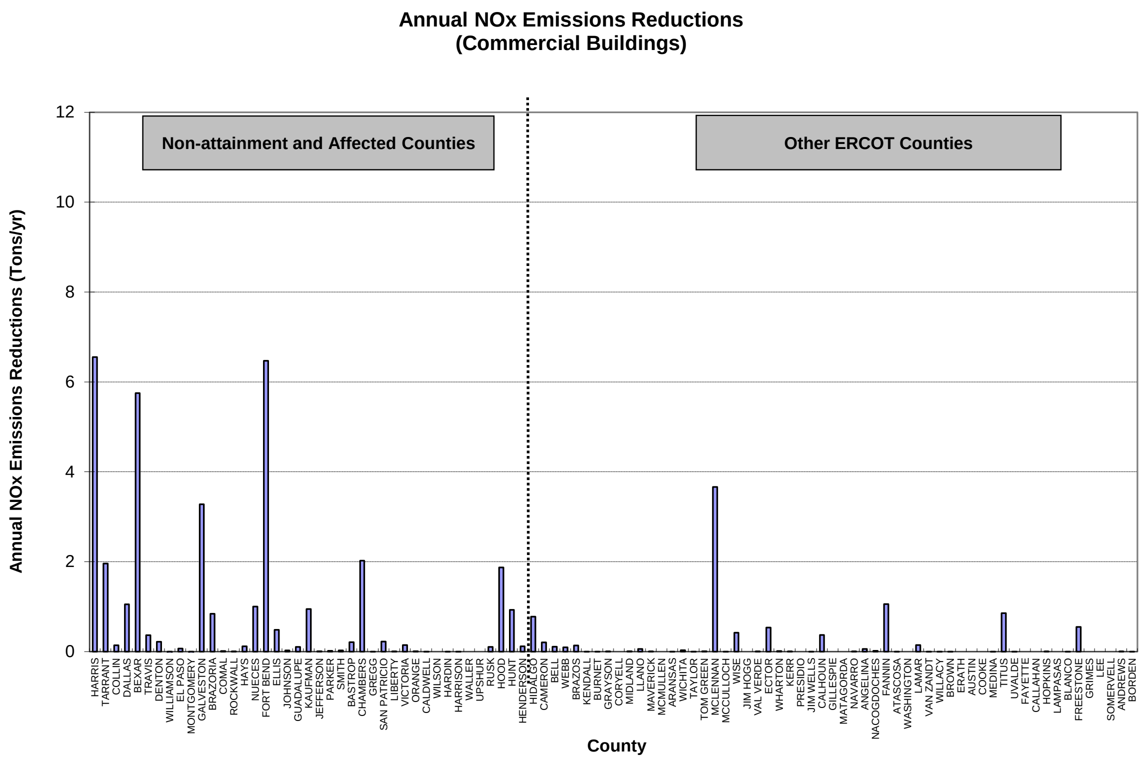


Figure 48: 2011 OSD Electricity Reductions from the ASHRAE Standard 90.1-1999 for Commercial Buildings with 7% T&D Losses.



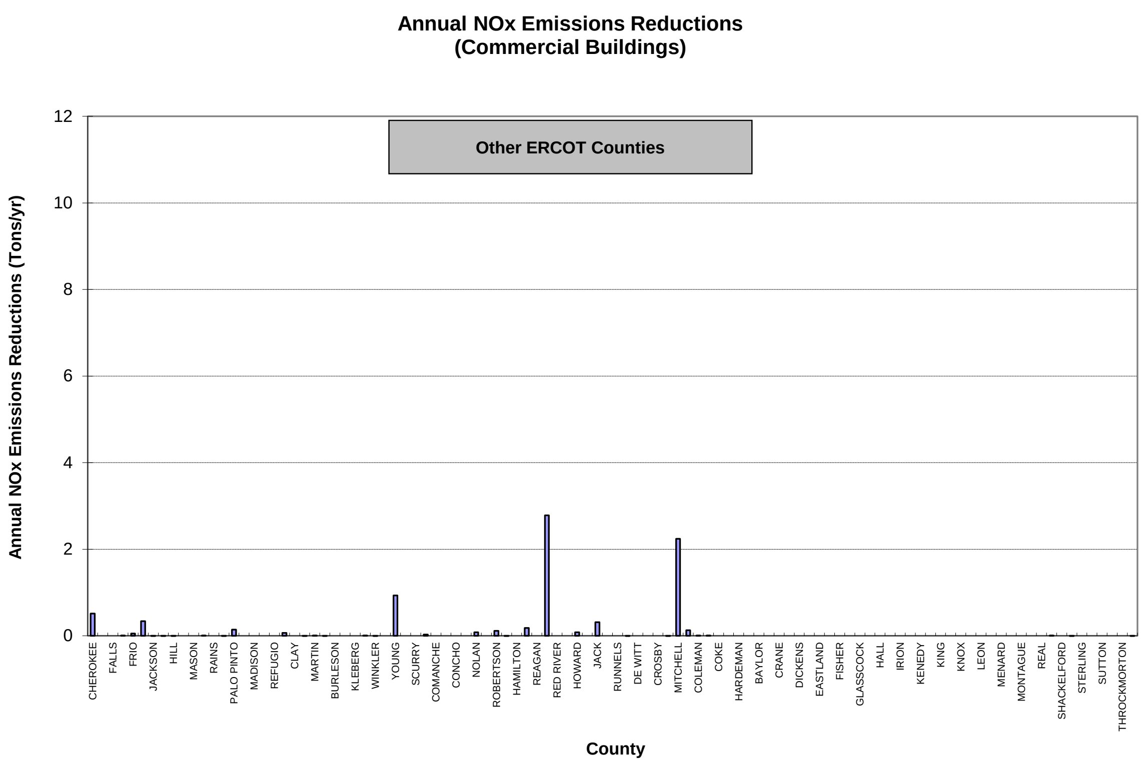
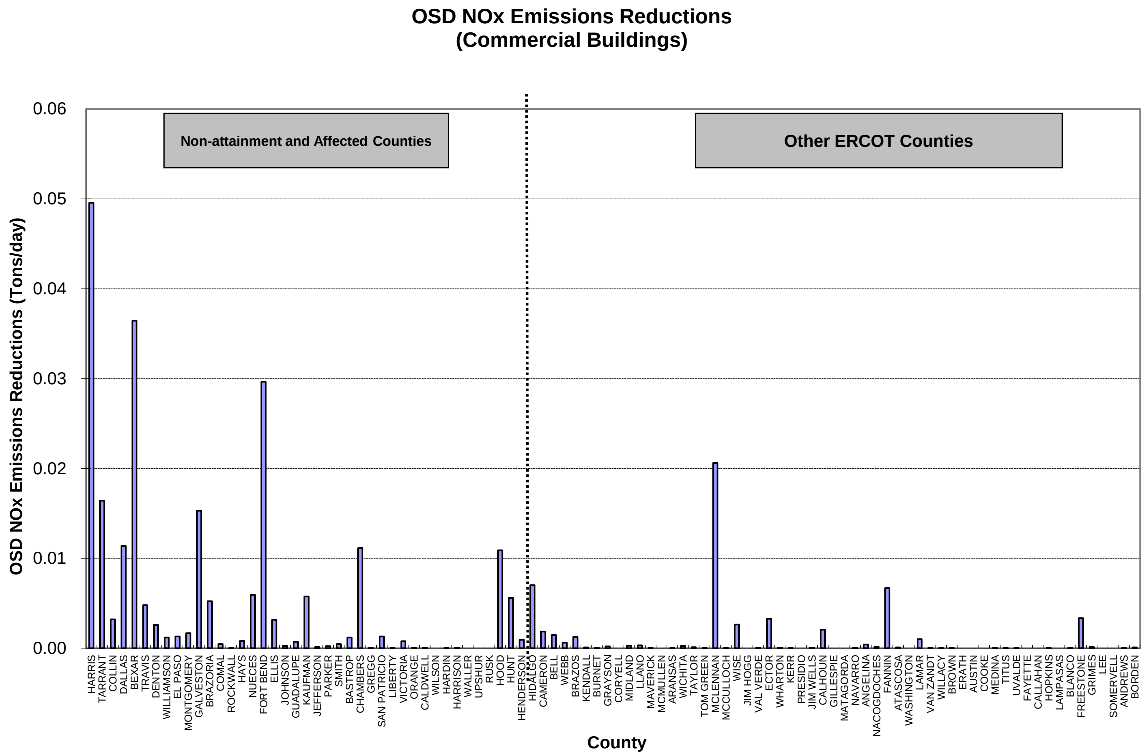


Figure 49: 2011 Annual NOx Reductions from Electricity Savings from the ASHRAE Standard 90.1-1999 for Commercial Buildings by County using 2007 eGRID with 7% T&D Losses



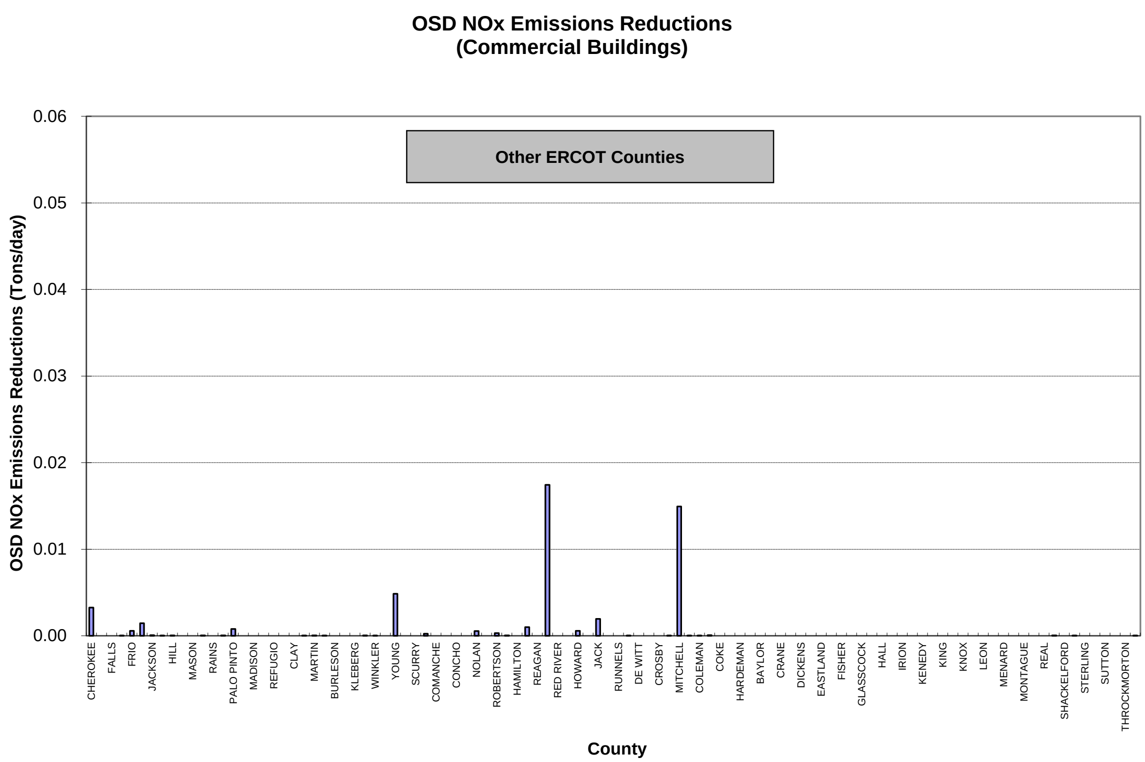


Figure 50: 2011 OSD NOx Reductions from Electricity Savings from the ASHRAE Standard 90.1-1999 for Commercial Buildings by County using 2007 eGRID with 7% T&D Losses

4.1.7 2011 Results for New Residential (Single-family and Multi-family), and Commercial Construction Using 2007 eGRID.

As shown in Table 35, the total annual electricity savings in 2011 were calculated to be 462,458 MWh/yr [1] which includes 157,053 MWh/yr (i.e., 33.96%) for single-family residential, 230,002 MWh/yr (i.e., 49.73%) for multi-family residential, and 75,403 MWh/yr (i.e., 16.31%) for new commercial buildings. The total annual natural gas savings were calculated to be 269,616 MMBtu (2,696,163 therms) for new residential and commercial construction. The OSD annual electricity savings in 2011 were calculated to be 2,548 MWh/yr [1] which includes 896 MWh/yr (i.e., 35.2%) for single-family residential, 1,225 MWh/yr (i.e., 48.1%) for multi-family residential, and 427 MWh/yr (i.e., 16.7%) for new commercial buildings. The total OSD natural gas savings were calculated to be 1,224 MMBtu (12,240 therms) for new residential and commercial construction.

Using the 2007 eGRID, the total NOx reductions from electricity and natural gas savings from new residential (single-family and multi-family) and commercial construction in 2011 were calculated to be 315.53 tons NOx/year which represents 303.13 tons NOx/year from electricity savings and 12.40 tons NOx/year from natural gas savings. On an OSD, the NOx reductions in 2011 are calculated to be 1.71 tons of NOx/day which represents 1.65 tons NOx/day from electricity savings and 0.06 tons NOx/day from natural gas savings.

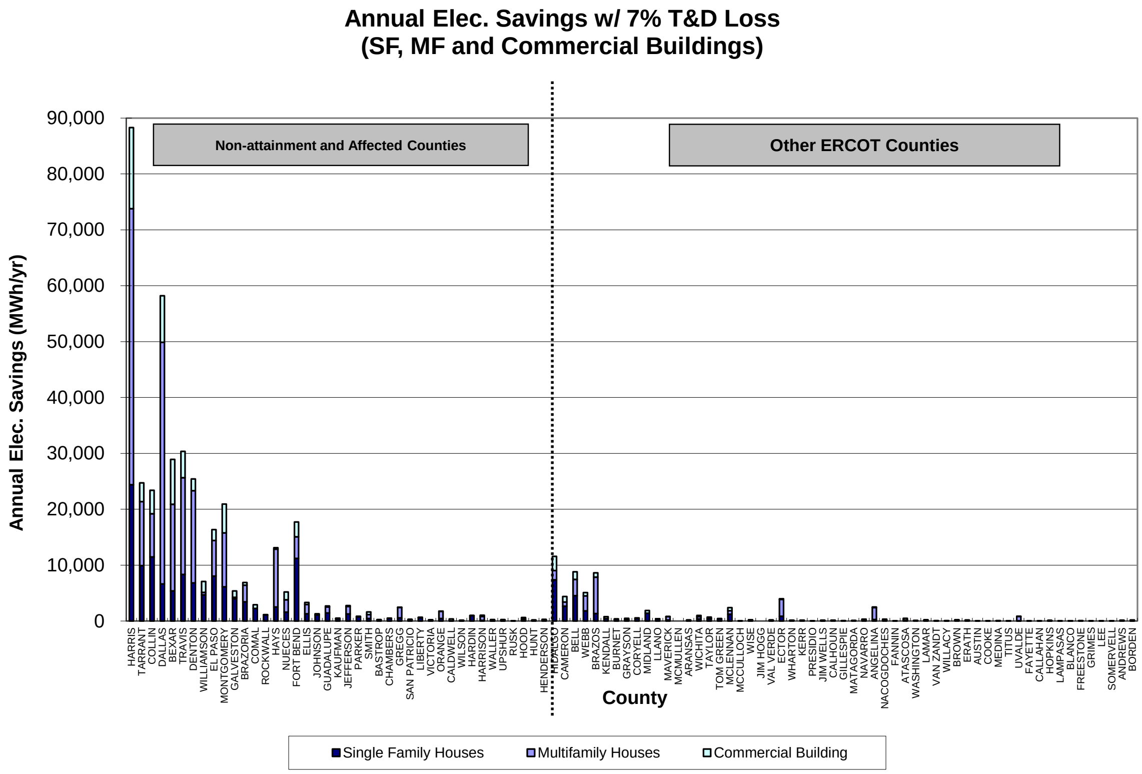
Figure 51 through Figure 56 show the electricity and NOx reductions tabulated in Table 35. Figure 51 and Figure 52 show the annual and OSD electricity savings by county as a stacked bar chart, respectively. Figure 53 shows the spatial distribution of the annual and OSD electricity savings by county across the state. Figure 54 and Figure 55 show the annual and OSD NOx reductions respectively in a similar format as the electricity savings using a stacked bar chart with the ordering of the counties determined by Table 35, and Figure 56 shows the spatial distribution of the annual and OSD NOx savings by county across the state.

Table 35: 2011 Annual and OSD NOx Reductions from Electricity and Natural Gas Savings Due to the 2001 IECC for Single-family and Multi-family Residences and the ASHRAE Standard 90.1-1999 for Commercial Buildings by County (using 2007 eGRID)

	Electricity Savings and Resultant NOx Reductions (Single Family Houses)				Electricity Savings and Resultant NOx Reductions (Multifamily Houses)				Electricity Savings and Resultant NOx Reductions (Commercial Buildings)				Total Electricity Savings and Resultant NOx Reductions (SF, MF and Commecial Buildings)				Total Natural Gas Savings and Resultant NOx Reductions (SF, MF and Commecial Buildings)				Total Nox Reductions	
County	Total Annual Electricity Savings per County w/ 7% T&D Loss (MWh/County)	Annual Nox Reductions (Tons)	OSD Electricity Savings per County w/ 7% T&D Loss (MWh/County)	OSD Nox Reductions (Tons)	Total Annual Electricity Savings per County w/ 7% T&D Loss (MWh/County)	Annual Nox Reductions (Tons)	OSD Electricity Savings per County w/ 7% T&D Loss (MWh/County)	OSD Nox Reductions (Tons)	Total Annual Electricity Savings per County w/ 7% T&D Loss (MWh/County)	Annual Nox Reductions (Tons)	OSD Electricity Savings per County w/ 7% T&D Loss (MWh/County)	OSD Nox Reductions (Tons)	Total Annual Electricity Savings per County w/ 7% T&D Loss (MWh/County)	Annual Nox Reductions (Tons)	OSD Electricity Savings per County w/ 7% T&D Loss (MWh/County)	OSD Nox Reductions (Tons)	Total Annual N.G. Savings (Therm/County)	Annual Nox Reductions (Tons)	Total OSD N.G. Savings (Therm/County)	OSD Nox Reductions (Tons)	Annual Nox Reductions (Tons)	OSD Nox Reductions (Tons)
HARRIS	24,380.48	13.41	139.77	0.09	49,399.61	17.34	253.80	0.10	14,527.25	6.35	81.00	0.04	88,307.34	37.09	474.57	0.23	512,438.76	2.36	2,310.69	0.01	39.45	0.24
TARRANT	9,905.75	3.83	61.25	0.03	11,452.99	6.43	64.97	0.05	3,378.28	1.82	20.09	0.01	24,737.02	12.08	146.31	0.09	171,998.34	0.79	634.26	0.00	12.88	0.09
COLLIN	11,448.16	0.21	70.49	0.00	7,745.67	0.33	43.69	0.00	4,196.43	0.10	23.10	0.00	23,390.26	0.64	137.27	0.00	148,702.60	0.68	634.96	0.00	1.32	0.01
DALLAS	6,632.23	1.40	41.01	0.01	43,259.61	2.35	245.40	0.01	8,318.23	0.67	50.24	0.00	58,210.07	4.42	336.65	0.03	366,494.67	1.69	1,570.65	0.01	6.11	0.03
BEXAR	5,396.53	5.83	31.62	0.03	15,493.61	10.55	84.76	0.05	8,024.14	5.40	48.15	0.03	28,914.28	21.77	164.53	0.12	173,846.08	0.80	1,461.71	0.01	22.57	0.12
TRAVIS	8,346.23	0.14	49.83	0.00	17,281.63	0.32	94.31	0.00	4,734.92	0.06	29.91	0.00	30,362.78	0.53	174.05	0.00	151,863.02	0.70	1,008.06	0.00	1.22	0.01
DENTON	6,828.27	0.05	42.04	0.00	16,498.13	0.07	93.05	0.00	2,089.84	0.02	14.14	0.00	25,416.24	0.14	149.23	0.00	192,070.72	0.88	558.44	0.00	1.02	0.00
WILLIAMSON	4,692.85	0.00	28.02	0.00	426.97	0.00	2.33	0.00	1,944.53	0.00	9.74	0.00	7,064.35	0.00	40.08	0.00	12,297.51	0.06	284.10	0.00	0.06	0.00
EL PASO	8,037.53	0.00	34.20	0.00	6,352.81	0.00	24.10	0.00	1,953.69	0.00	11.36	0.00	16,344.04	0.00	69.66	0.00	119,711.05	0.55	324.61	0.00	0.55	0.00
MONTGOMERY	6,135.18	0.00	35.17	0.00	9,624.64	0.00	49.45	0.00	5,160.27	0.00	26.43	0.00	20,920.09	0.00	111.05	0.00	89,623.80	0.41	392.98	0.00	0.41	0.00
GALVESTON	3,993.63	6.98	22.89	0.03	237.31	9.10	1.22	0.04	1,143.78	3.28	6.03	0.01	5,374.72	19.36	30.14	0.09	29,022.02	0.13	113.87	0.00	19.49	0.09
BRAZORIA	3,421.86	1.81	19.61	0.01	2,998.03	2.35	15.40	0.01	466.79	0.85	2.33	0.01	6,886.68	5.00	37.35	0.03	39,655.25	0.18	55.75	0.00	5.18	0.03
COMAL	2,245.24	0.00	13.15	0.00	0.00	0.00	0.00	0.00	678.71	0.00	3.78	0.00	2,923.95	0.00	16.94	0.00	18,018.83	0.08	115.39	0.00	0.08	0.00
ROCKWALL	1,070.33	0.00	6.59	0.00	0.00	0.00	0.00	0.00	72.87	0.00	0.40	0.00	1,143.20	0.00	6.99	0.00	9,154.03	0.04	11.78	0.00	0.04	0.00
HAYS	2,525.17	0.38	15.08	0.00	10,345.18	1.11	56.46	0.01	253.24	0.11	1.38	0.00	13,123.59	1.61	72.92	0.01	39,266.65	0.18	43.26	0.00	1.79	0.01
NUECES	1,605.66	2.17	8.32	0.01	2,190.27	1.65	10.49	0.01	1,383.80	1.01	7.25	0.01	5,179.73	4.83	26.06	0.02	14,891.08	0.07	161.73	0.00	4.90	0.03
FORT BEND	11,216.73	13.83	64.30	0.06	3,868.88	17.89	19.88	0.07	2,638.81	6.55	13.04	0.03	17,724.43	38.27	97.22	0.16	83,930.39	0.39	330.20	0.00	38.66	0.17
ELLIS	1,298.57	1.03	8.03	0.01	1,648.54	1.73	9.35	0.01	378.02	0.49	1.87	0.00	3,325.12	3.26	19.25	0.02	17,828.56	0.08	24.80	0.00	3.34	0.02
JOHNSON	1,071.38	0.03	6.62	0.00	0.00	0.04	0.00	0.00	223.21	0.01	1.38	0.00	1,294.59	0.08	8.01	0.00	11,726.39	0.05	44.77	0.00	0.14	0.00
GUADALUPE	1,429.79	0.31	8.38	0.00	1,082.52	0.91	5.92	0.00	177.88	0.09	1.13	0.00	2,690.19	1.31	15.43	0.01	16,674.27	0.08	50.12	0.00	1.39	0.01
KAUFMAN	395.84	1.99	2.44	0.01	29.40	3.34	0.17	0.02	99.64	0.95	0.48	0.01	524.88	6.28	3.08	0.04	2,572.02	0.01	14.09	0.00	6.30	0.04
JEFFERSON	1,269.48	0.00	7.23	0.00	1,298.47	0.00	6.59	0.00	199.70	0.00	1.15	0.00	2,767.64	0.00	14.97	0.00	17,317.31	0.08	35.74	0.00	0.08	0.00
PARKER	734.39	0.02	4.52	0.00	0.00	0.03	0.00	0.00	121.31	0.01	0.74	0.00	855.70	0.06	5.27	0.00	7,416.64	0.03	29.84	0.00	0.10	0.00
SMITH	450.72	0.00	2.69	0.00	678.38	0.00	3.73	0.00	497.26	0.00	3.06	0.00	1,626.37	0.00	9.48	0.00	18,774.66	0.09	101.37	0.00	0.09	0.00
BASTROP	201.50	0.70	1.21	0.00	0.00	2.04	0.00	0.01	47.22	0.21	0.23	0.00	248.72	2.95	1.44	0.02	545.43	0.00	3.31	0.00	2.95	0.02
CHAMBERS	469.84	4.27	2.68	0.02	0.00	5.53	0.00	0.03	43.29	2.02	0.21	0.01	513.13	11.82	2.89	0.06	2,853.79	0.01	5.83	0.00	11.84	0.06
GREGG	571.39	0.00	3.42	0.00	1,879.88	0.00	10.36	0.00	32.91	0.00	0.16	0.00	2,484.19	0.00	13.94	0.00	27,139.47	0.12	4.88	0.00	0.12	0.00
SAN PATRICIO	258.83	0.48	1.34	0.00	0.00	0.36	0.00	0.00	29.29	0.22	0.14	0.00	288.12	1.07	1.48	0.01	1,084.97	0.00	3.54	0.00	1.07	0.01
LIBERTY	554.93	0.00	3.18	0.00	63.67	0.00	0.33	0.00	3.48	0.00	0.03	0.00	622.07	0.00	3.53	0.00	4,272.07	0.02	3.39	0.00	0.02	0.00
VICTORIA	157.96	0.28	0.91	0.00	0.00	0.28	0.00	0.00	81.81	0.13	0.60	0.00	239.77	0.70	1.51	0.00	3,776.62	0.02	25.60	0.00	0.72	0.00
ORANGE	439.25	0.00	2.50	0.00	1,298.11	0.00	6.59	0.00	44.15	0.00	0.34	0.00	1,781.52	0.00	9.42	0.00	12,030.20	0.06	16.56	0.00	0.06	0.00
CALDWELL	30.33	0.00	0.18	0.00	0.00	0.00	0.00	0.00	344.00	0.00	1.70	0.00	374.32	0.00	1.89	0.00	(1,281.79)	(0.01)	15.98	0.00	(0.01)	0.00
WILSON	26.52	0.00	0.16	0.00	123.01	0.00	0.67	0.00	0.00	0.00	0.00	0.00	149.53	0.00	0.83	0.00	657.69	0.00	0.13	0.00	0.00	0.00
HARDIN	971.46	0.00	5.53	0.00	0.00	0.00	0.00	0.00	5.64	0.00	0.03	0.00	977.10	0.00	5.56	0.00	6,365.64	0.03	4.10	0.00	0.03	0.00
HARRISON	119.78	0.00	0.71	0.00	712.40	0.00	3.92	0.00	185.48	0.00	0.95	0.00	1,017.66	0.00	5.58	0.00	9,185.64	0.04	12.11	0.00	0.04	0.00
WALLER	10.98	0.00	0.06	0.00	253.70	0.00	1.30	0.00	0.00	0.00	0.00	0.00	264.67	0.00	1.37	0.00	1,615.82	0.01	0.04	0.00	0.01	0.00
UPSHUR	25.97	0.00	0.16	0.00	218.76	0.00	1.23	0.00	0.00	0.00	0.00	0.00	244.74	0.00	1.39	0.00	1,404.79	0.01	0.09	0.00	0.01	0.00
RUSK	14.23	0.22	0.08	0.00	0.00	0.36	0.00	0.00	0.00	0.10	0.00	0.00	14.23	0.68	0.08	0.00	194.48	0.00	0.06	0.00	0.68	0.00
HOOD	250.42	3.95	1.55	0.02	115.69	6.62	0.66	0.04	266.17	1.88	1.32	0.01	632.27	12.45	3.52	0.07	1,578.69	0.01	13.32	0.00	12.45	0.07
HUNT	90.70	1.95	0.56	0.01	43.85	3.27	0.25	0.02	35.72	0.93	0.17	0.01	170.27	6.15	0.98	0.04	838.64	0.00	1.75	0.00	6.15	0.04
HENDERSON	136.43	0.26	0.81	0.00	0.00	0.43	0.00	0.00	168.08	0.12	0.82	0.00	304.52	0.81	1.64	0.01	176.97	0.00	24.63	0.00	0.82	0.01
HIDALGO	7,360.96	1.80	37.85	0.01	1,657.66	1.37	8.07	0.01	2,540.75	0.84	12.74	0.01	11,559.37	4.00	58.66	0.03	26,964.75	0.12	332.17	0.00	4.13	0.03
CAMERON	2,644.52	0.46	13.60	0.00	751.83	0.35	3.66	0.00	995.41	0.22	5.19	0.00	4,391.76	1.03	22.45	0.01	13,023.80	0.06	136.47	0.00	1.09	0.01
BELL	4,530.42		25.84		2,916.05		15.59		1,365.81	0.00	8.97	0.00	8,812.29	0.00	50.40	0.00	78,573.59	0.36	339.68	0.00	0.36	0.00
WEBB	1,813.01	0.19	8.94	0.00	2,682.66	0.15	12.85	0.00	607.08	0.09	3.25	0.00	5,102.76	0.42	25.04	0.00	18,020.93	0.08	70.00	0.00	0.51	0.00
BRAZOS	1,319.23	0.19	7.56	0.00	6,540.63	0.30	33.60	0.00	764.19	0.09	4.84	0.00	8,624.05	0.58	46.01	0.00	59,433.02	0.27	173.88	0.00	0.85	0.00
KENDALL	448.38		2.63		0.00		0.00		313.52	0.00	1.63	0.00	761.91	0.00	4.25	0.00	2,942.81	0.01	24.23	0.00	0.01	0.00
BURNET	344.80		2.06		0.00		0.00		29.88	0.00	0.15	0.00	374.69	0.00	2.21	0.00	1,569.81	0.01	2.86	0.00	0.01	0.00
GRAYSON	160.67		0.99		102.32		0.58		238.13	0.00	1.36	0.00	501.12	0.00	2.92	0.00	2,818.65	0.01	47.66	0.00	0.01	0.00
CORYELL	451.39		2.57		107.72		0.58		0.00	0.00	0.00	0.00	559.11	0.00	3.15	0.00	4,484.16	0.02	1.79	0.00	0.02	0.00
MIDLAND	1,391.80		5.72		0.00		0.00		476.00	0.00	2.66	0.00	1,867.81	0.00	8.38	0.00	17,442.83	0.08	70.32	0.00	0.08	0.00
LLANO	380.30	0.19	2.27	0.00	0.00	0.56	0.00	0.00	4.97	0.06	0.04	0.00	385.26	0.81	2.31	0.00	2,029.14	0.01	3.30	0.00	0.82	0.00
MAVERICK	186.97		0.92		594.26		2.85		37.47	0.00	0.26	0.00	818.70	0.00	4.03	0.00	3,924.29	0.02	10.29	0.00	0.02	0.00
MCMULLEN	0.00		0.00		0.00		0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ARANSAS	160.34		0.83		0.00		0.00		38.15	0.00	0.19	0.00	198.49	0.00	1.02	0.00	618.85	0.00	1.78	0.00	0.00	0.00
WICHITA	363.44	0.07	1.71	0.00	423.48	0.11	1.97	0.00	208.31	0.03	1.11	0.00	995.23	0.21	4.79	0.00	8,187.34	0.04	18.69	0.00	0.24	0.00
TAYLOR	416.34	0.00	1.92	0.00	47.09	0.00	0.21	0.00	228.78	0.00	1.11	0.00	692.21	0.00	3.23	0.00	2,982.79	0.01	26.77	0.00	0.01	0.00
TOM GREEN	390.52	0.01	1.74	0.00	0.00	0.01	0.00	0.00	60.80	0.01	0.33	0.00	451.32	0.03	2.06	0.00	4,482.80	0.02	7.26	0.00	0.05	0.00
MCLENNAN	1,213.80	7.73	6.92	0.04	630.91	12.97	3.37	0.07	539.82	3.68	2.69	0.02	2,384.54	24.38	12.98	0.13	10,212.87	0.05	80.76	0.00	24.42	0.13
MCCULLOCH	0.00		0.00		0.00		0.00		6.45	0.00	0.03	0.00	6.45	0.00	0.03	0.00	(26.79)	(0.00)	0.30	0.00	(0.00)	0.00
WISE	59.90	0.89	0.37	0.01	0.00	1.50	0.00	0.01	162.08	0.42	0.78	0.00	221.98	2.82	1.15	0.02	(916.76)	(0.00)	19.60	0.00	2.81	0.02
JIM HOGG	0.00		0.00		0.00		0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
VAL VERDE	103.86		0.61		36.90		0.20		64.59	0.00	0.40	0.00	205.36	0.00	1.22	0.00	1,698.34	0.01	14.86	0.00	0.01	0.00
ECTOR	867.62	1.11	3.56	0.01	2,997.11	1.87	11.55	0.01	119.14	0.53	0.68	0.00	3,983.86	3.51	15.79	0.02	32,799.06	0.15	23.00	0.00	3.66	0.02
WHARTON	119.90	0.03	0.69	0.00	0.00	0.04	0.00	0.00	9.29	0.01	0.05	0.00	129.19	0.08	0.74	0.00	1,046.26	0.00	0.84	0.00	0.08	0.00
KERR	103.95		0.62		0.00		0.00		42.07	0.00	0.27	0.00	146.02	0.00	0.89	0.00	1,142.38	0.01	8.76	0.00	0.01	0.00
PRESIDIO	5.39	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.39	0.00	0.02	0.00	60.73	0.00	0.02	0.00	0.00	0.00
JIM WELLS	52.68		0.27		0.00		0.00		88.75	0.00	0.43	0.00	141.43	0.00	0.70	0.00	(608.83)	(0.00)	12.26	0.00	(0.00)	0.00
CALHOUN	123.71	0.79	0.71	0.00	0.00	0.60	0.00	0.00	12.44	0.37	0.06	0.00	136.15	1.76	0.77	0.01	1,066.39	0.00	0.95	0.00	1.76	0.01
GILLESPIE	83.67		0.50		0.00		0.00		0.00	0.00	0.00	0.00	83.67	0.00	0.50	0.00	411.03	0.00	0.36	0.00	0.00	0.00
MATAGORDA	119.90		0.69		0.00		0.00		0.00	0.00	0.00	0.00	119.90	0.00	0.69	0.00	1,088.80	0.01	0.56	0.00	0.01	0.00
NAVARRO	211.93		1.21		84.63		0.45		14.97	0.00	0.09	0.00	311.54	0.00	1.75	0.00	2,419.48	0.01	3.06	0.00	0.01	0.00
ANGELINA	243.98	0.10	1.32	0.00	2,159.49	0.16	10.49	0.00	101.20	0.05	0.74	0.00	2,504.67	0.31	12.55	0.00	34,392.67	0.16	31.29	0.00	0.47	0.00
NACOGDOCHES	101.66		0.55		104.98		0.51		129.18	0.00	0.94	0.00	335.81	0.00	2.00	0.00	6,283.47	0.03	39.66	0.00	0.03	0.00
FANNIN	15.55	2.22	0.10	0.01	0.00	3.73	0.00	0.02	0.00	1.06	0.00	0.01	15.55	7.01	0.10	0.04	132.15	0.00	0.07	0.00	7.01	0.04
ATASCOSA	144.39		0.85		12.26		0.07		332.92	0.00	1.64	0.00	489.57	0.00	2.55	0.00	(753.36)	(0.00)	23.57	0.00	(0.00)	0.00
WASHINGTON	122.92		0.70		0.00		0.00		0.00	0.00	0.00	0.00	122.92	0.00	0.70	0.00	845.11	0.00	0.49	0.00	0.00	0.00
LAMAR	71.02	0.30	0.42	0.00	95.53	0.50	0.54	0.00	70.33	0.14	0.39	0.00	236.88	0.94	1.35	0.01	1,416.62	0.01	13.42	0.00	0.95	0.01
VAN ZANDT	23.44		0.14		0.00		0.00		71.93	0.00	0.34	0.00	95.37	0.00	0.49	0.00	(523.48)	(0.00)	10.17	0.00	(0.00)	0.00
WILLACY	47.72		0.25		0.00		0.00		22.15	0.00	0.11	0.00	69.87	0.00	0.35	0.00	4.09	0.00	3.27	0.00	0.00	0.00
BROWN	176.15		1.00		0.00		0.00		45.20	0.00	0.22	0.00	221.35	0.00	1.22	0.00	1,072.35	0.00	7.02	0.00	0.00	0.00
ERATH	100.59		0.46		94.17		0.41		0.00	0.00	0.00	0.00	194.77	0.00	0.87	0.00	1,777.39	0.01	0.39	0.00	0.01	0.00
AUSTIN	37.32		0.21		0.00		0.00		0.00	0.00	0.00	0.00	37.32	0.00	0.21	0.00	256.55	0.00	0.15	0.00	0.00	0.00
COOKE	38.87		0.24		0.00		0.00		0.00	0.00	0.00	0.00	38.87	0.00	0.24	0.00	330.37	0.00	0.16	0.00	0.00	0.00
MEDINA	48.62		0.28		0.00		0.00		6.30	0.00	0.03	0.00	54.92	0.00	0.32	0.00	316.59	0.00	0.43	0.00	0.00	0.00
TITUS	17.76	1.79	0.11	0.00	0.00	3.01	0.00	0.00	24.19	0.85	0.12	0.00	41.95	5.66	0.22	0.00	(27.36)	(0.00)	3.45	0.00	5.66	0.00
UVALDE	46.41		0.27		768.84		4.21		30.10	0.00	0.15	0.00	845.34	0.00	4.63	0.00	3,137.58	0.01	1.62	0.00	0.01	0.00
FAYETTE	15.37	0.00	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	15.37	0.00	0.09	0.00	105.64	0.00	0.06	0.00	0.00	0.00
CALLAHAN	11.18		0.05		0.00		0.00		0.00	0.00	0.00	0.00	11.18	0.00	0.05	0.00	121.92	0.00	0.04	0.00	0.00	0.00
HOPKINS	23.44		0.14		44.09		0.25		42.74	0.00	0.23	0.00	110.27	0.00	0.62	0.00	485.53	0.00	6.03	0.00	0.00	0.00
LAMPASAS	13.76		0.08		0.00		0.00		0.00	0.00	0.00	0.00	13.76	0.00	0.08	0.00	119.09	0.00	0.05	0.00	0.00	0.00
BLANCO	5.07		0.03		0.00		0.00		9.67	0.00	0.05	0.00	14.75	0.00	0.08	0.00	(15.28)	(0.00)	0.47	0.00	(0.00)	0.00
FREESTONE	27.52	1.16	0.16	0.01	0.00	1.94	0.00	0.01	43.80	0.55	0.21	0.00	71.32	3.65	0.37	0.02	(199.83)	(0.00)	6.24	0.00	3.65	0.02
GRIMES	28.54	0.00	0.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	28.54	0.00	0.16	0.00	196.19	0.00	0.11	0.00	0.00	0.00
LEE	17.69		0.11		0.00		0.00		0.00	0.00	0.00	0.00	17.69	0.00	0.11	0.00	85.78	0.00	0.08	0.00	0.00	0.00
SOMERVELL	20.65		0.13		0.00		0.00		0.00	0.00	0.00	0.00	20.65	0.00	0.13	0.00	170.98	0.00	0.09	0.00	0.00	0.00
ANDREWS	154.93	0.01	0.64	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	154.93	0.02	0.64	0.00	1,732.86	0.01	0.66	0.00	0.03	0.00
BORDEN	50.60		0.17		0.00		0.00		150.23	0.00	0.72	0.00	200.83	0.00	0.88	0.00	(811.49)	(0.00)	21.20	0.00	(0.00)	0.00

Table 35: 2011 Annual and OSD NOx Reductions from Electricity and Natural Gas Savings Due to the 2001 IECC for Single-family and Multi-family Residences and the ASHRAE Standard 90.1-1999 for Commercial Buildings by County (using 2007 eGRID) (Continued)

	Electricity Savings and Resultant NOx Reductions (Single Family Houses)				Electricity Savings and Resultant NOx Reductions (Multifamily Houses)				Electricity Savings and Resultant NOx Reductions (Commercial Buildings)				Total Electricity Savings and Resultant NOx Reductions (SF, MF and Commecial Buildings)				Total Natural Gas Savings and Resultant NOx Reductions (SF, MF and Commecial Buildings)				Total Nox Reductions	
County	Total Annual Electricity Savings per County w/ 7% T&D Loss (MWh/County)	Annual Nox Reductions (Tons)	OSD Electricity Savings per County w/ 7% T&D Loss (MWh/County)	OSD Nox Reductions (Tons)	Total Annual Electricity Savings per County w/ 7% T&D Loss (MWh/County)	Annual Nox Reductions (Tons)	OSD Electricity Savings per County w/ 7% T&D Loss (MWh/County)	OSD Nox Reductions (Tons)	Total Annual Electricity Savings per County w/ 7% T&D Loss (MWh/County)	Annual Nox Reductions (Tons)	OSD Electricity Savings per County w/ 7% T&D Loss (MWh/County)	OSD Nox Reductions (Tons)	Total Annual Electricity Savings per County w/ 7% T&D Loss (MWh/County)	Annual Nox Reductions (Tons)	OSD Electricity Savings per County w/ 7% T&D Loss (MWh/County)	OSD Nox Reductions (Tons)	Total Annual N.G. Savings (Therm/County)	Annual Nox Reductions (Tons)	Total OSD N.G. Savings (Therm/County)	OSD Nox Reductions (Tons)	Annual Nox Reductions (Tons)	OSD Nox Reductions (Tons)
CHEROKEE	138.25	1.10	0.75	0.01	44.99	1.85	0.22	0.01	239.49	0.53	1.16	0.00	422.74	3.48	2.13	0.02	378.97	0.00	34.21	0.00	3.48	0.02
DIMMIT	14.16		0.07		0.00		0.00		0.00	0.00	0.00	0.00	14.16	0.00	0.07	0.00	51.24	0.00	0.05	0.00	0.00	0.00
FALLS	5.50		0.03		0.00		0.00		0.00	0.00	0.00	0.00	5.50	0.00	0.03	0.00	47.64	0.00	0.02	0.00	0.00	0.00
COLORADO	17.56		0.10		0.00		0.00		46.69	0.00	0.25	0.00	64.25	0.00	0.35	0.00	132.43	0.00	3.85	0.00	0.00	0.00
FRIO	24.07	0.11	0.14	0.00	0.00	0.11	0.00	0.00	236.52	0.05	1.23	0.00	260.59	0.27	1.37	0.00	(20.80)	(0.00)	17.23	0.00	0.27	0.00
MILAM	2.58	0.71	0.01	0.00	0.00	1.19	0.00	0.00	0.00	0.34	0.00	0.00	2.58	2.23	0.01	0.01	13.27	0.00	0.01	0.00	2.23	0.01
JACKSON	15.23		0.09		0.00		0.00		115.64	0.00	0.55	0.00	130.87	0.00	0.64	0.00	(987.70)	(0.00)	15.64	0.00	(0.00)	0.00
ANDERSON	26.43		0.14		0.00		0.00		2.32	0.00	0.01	0.00	28.75	0.00	0.15	0.00	350.54	0.00	0.19	0.00	0.00	0.00
HILL	16.51		0.09		0.00		0.00		88.99	0.00	0.43	0.00	105.51	0.00	0.52	0.00	(747.13)	(0.00)	12.52	0.00	(0.00)	0.00
CULBERSON	2.42		0.01		0.00		0.00		0.00	0.00	0.00	0.00	2.42	0.00	0.01	0.00	21.17	0.00	0.01	0.00	0.00	0.00
MASON	15.21		0.09		0.00		0.00		0.00	0.00	0.00	0.00	15.21	0.00	0.09	0.00	74.73	0.00	0.07	0.00	0.00	0.00
PECOS	16.16	0.01	0.07	0.00	0.00	0.02	0.00	0.00	10.19	0.01	0.05	0.00	26.34	0.04	0.12	0.00	80.32	0.00	1.49	0.00	0.04	0.00
RAINS	5.21		0.03		0.00		0.00		0.00	0.00	0.00	0.00	5.21	0.00	0.03	0.00	43.54	0.00	0.02	0.00	0.00	0.00
LAVACA	34.21		0.20		0.00		0.00		87.85	0.00	0.42	0.00	122.06	0.00	0.62	0.00	(575.88)	(0.00)	12.45	0.00	(0.00)	0.00
PALO PINTO	22.35	0.31	0.10	0.00	0.00	0.49	0.00	0.00	12.25	0.15	0.06	0.00	34.61	0.95	0.16	0.01	192.94	0.00	0.65	0.00	0.95	0.01
KIMBLE	2.69		0.01		0.00		0.00		0.00	0.00	0.00	0.00	2.69	0.00	0.01	0.00	30.36	0.00	0.01	0.00	0.00	0.00
MADISON	35.12		0.20		0.00		0.00		0.00	0.00	0.00	0.00	35.12	0.00	0.20	0.00	241.46	0.00	0.14	0.00	0.00	0.00
ARCHER	29.47		0.14		0.00		0.00		0.00	0.00	0.00	0.00	29.47	0.00	0.14	0.00	380.23	0.00	0.10	0.00	0.00	0.00
REFUGIO	3.81		0.02		0.00		0.00		0.00	0.00	0.00	0.00	3.81	0.00	0.02	0.00	34.57	0.00	0.02	0.00	0.00	0.00
LIMESTONE	71.56	0.14	0.41	0.00	0.00	0.18	0.00	0.00	0.00	0.07	0.00	0.00	71.56	0.39	0.41	0.00	619.28	0.00	0.28	0.00	0.39	0.00
CLAY	3.27		0.02		0.00		0.00		0.00	0.00	0.00	0.00	3.27	0.00	0.02	0.00	42.25	0.00	0.01	0.00	0.00	0.00
BEE	17.13		0.10		0.00		0.00		50.93	0.00	0.24	0.00	68.06	0.00	0.34	0.00	(353.78)	(0.00)	7.21	0.00	(0.00)	0.00
MARTIN	5.16		0.02		0.00		0.00		33.78	0.00	0.26	0.00	38.94	0.00	0.28	0.00	1,151.34	0.01	11.33	0.00	0.01	0.00
GONZALES	2.21		0.01		0.00		0.00		12.73	0.00	0.06	0.00	14.94	0.00	0.07	0.00	(111.63)	(0.00)	1.79	0.00	(0.00)	0.00
BURLESON	24.15		0.14		0.00		0.00		0.00	0.00	0.00	0.00	24.15	0.00	0.14	0.00	166.00	0.00	0.10	0.00	0.00	0.00
KARNES	53.01		0.30		0.00		0.00		0.00	0.00	0.00	0.00	53.01	0.00	0.30	0.00	339.27	0.00	0.26	0.00	0.00	0.00
KLEBERG	40.78		0.21		195.71		0.94		0.00	0.00	0.00	0.00	236.49	0.00	1.15	0.00	995.69	0.00	0.16	0.00	0.00	0.00
BREWSTER	40.40		0.18		15.03		0.06		24.28	0.00	0.19	0.00	79.71	0.00	0.43	0.00	1,350.47	0.01	8.29	0.00	0.01	0.00
WINKLER	2.58		0.01		0.00		0.00		17.63	0.00	0.09	0.00	20.21	0.00	0.10	0.00	(44.35)	(0.00)	0.82	0.00	(0.00)	0.00
FRANKLIN	5.21		0.03		0.00		0.00		0.00	0.00	0.00	0.00	5.21	0.00	0.03	0.00	43.54	0.00	0.02	0.00	0.00	0.00
YOUNG	13.97	1.96	0.06	0.01	0.00	3.30	0.00	0.02	4.84	0.93	0.02	0.00	18.81	6.20	0.09	0.03	104.02	0.00	0.73	0.00	6.20	0.03
HOUSTON	12.20		0.07		0.00		0.00		0.00	0.00	0.00	0.00	12.20	0.00	0.07	0.00	166.69	0.00	0.05	0.00	0.00	0.00
SCURRY	130.49		0.43		271.49		0.95		0.00	0.00	0.00	0.00	401.97	0.00	1.38	0.00	4,762.83	0.02	0.43	0.00	0.02	0.00
BOSQUE	8.26	0.06	0.05	0.00	0.00	0.09	0.00	0.00	0.00	0.03	0.00	0.00	8.26	0.18	0.05	0.00	71.45	0.00	0.03	0.00	0.18	0.00
COMANCHE	0.00		0.00		0.00		0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BRISCOE	21.32		0.05		0.00		0.00		0.00	0.00	0.00	0.00	21.32	0.00	0.05	0.00	456.09	0.00	0.08	0.00	0.00	0.00
CONCHO	2.69		0.01		0.00		0.00		0.00	0.00	0.00	0.00	2.69	0.00	0.01	0.00	30.36	0.00	0.01	0.00	0.00	0.00
ZAVALA	17.00		0.08		0.00		0.00		0.00	0.00	0.00	0.00	17.00	0.00	0.08	0.00	61.49	0.00	0.07	0.00	0.00	0.00
NOLAN	0.00	0.18	0.00	0.00	0.00	0.30	0.00	0.00	34.38	0.08	0.16	0.00	34.38	0.56	0.16	0.00	(343.79)	(0.00)	4.81	0.00	0.56	0.00
BROOKS	0.00		0.00		0.00		0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ROBERTSON	15.37	0.26	0.09	0.00	0.00	0.36	0.00	0.00	0.00	0.11	0.00	0.00	15.37	0.73	0.09	0.00	105.64	0.00	0.06	0.00	0.74	0.00
LIVE OAK	4.58		0.02		0.00		0.00		78.32	0.00	0.38	0.00	82.90	0.00	0.40	0.00	(736.35)	(0.00)	10.49	0.00	(0.00)	0.00
HAMILTON	2.75		0.02		0.00		0.00		0.00	0.00	0.00	0.00	2.75	0.00	0.02	0.00	23.82	0.00	0.01	0.00	0.00	0.00
JONES	0.00	0.39	0.00	0.00	0.00	0.30	0.00	0.00	0.00	0.18	0.00	0.00	0.00	0.86	0.00	0.00	0.00	0.00	0.00	0.00	0.86	0.00
REAGAN	10.33		0.04		0.00		0.00		0.00	0.00	0.00	0.00	10.33	0.00	0.04	0.00	116.24	0.00	0.04	0.00	0.00	0.00
WARD	30.99	5.84	0.13	0.04	0.00	9.81	0.00	0.06	0.00	2.78	0.00	0.02	30.99	18.44	0.13	0.11	346.57	0.00	0.13	0.00	18.44	0.11
RED RIVER	15.22	0.00	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	15.22	0.00	0.09	0.00	183.91	0.00	0.05	0.00	0.00	0.00
HASKELL	5.59	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.59	0.00	0.03	0.00	60.96	0.00	0.02	0.00	0.00	0.00
HOWARD	12.91	0.17	0.05	0.00	0.00	0.29	0.00	0.00	77.00	0.08	0.37	0.00	89.91	0.55	0.42	0.00	(599.92)	(0.00)	10.95	0.00	0.55	0.00
SAN SABA	0.00		0.00		0.00		0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
JACK	16.77	0.67	0.08	0.00	0.00	1.12	0.00	0.01	52.96	0.32	0.25	0.00	69.73	2.11	0.33	0.01	(346.81)	(0.00)	7.48	0.00	2.11	0.01
STEPHENS	5.59		0.03		0.00		0.00		0.00	0.00	0.00	0.00	5.59	0.00	0.03	0.00	60.96	0.00	0.02	0.00	0.00	0.00
RUNNELS	5.39		0.02		0.00		0.00		0.00	0.00	0.00	0.00	5.39	0.00	0.02	0.00	60.73	0.00	0.02	0.00	0.00	0.00
REEVES	2.58		0.01		0.00		0.00		12.73	0.00	0.06	0.00	15.31	0.00	0.07	0.00	(98.45)	(0.00)	1.79	0.00	(0.00)	0.00
DE WITT	7.61		0.04		0.00		0.00		0.00	0.00	0.00	0.00	7.61	0.00	0.04	0.00	69.13	0.00	0.04	0.00	0.00	0.00
CHILDRESS	0.00		0.00		0.00		0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CROSBY	15.98		0.05		0.00		0.00		0.00	0.00	0.00	0.00	15.98	0.00	0.05	0.00	218.21	0.00	0.05	0.00	0.00	0.00
DAWSON	5.78		0.02		0.00		0.00		51.65	0.00	0.25	0.00	57.43	0.00	0.27	0.00	(179.86)	(0.00)	2.46	0.00	(0.00)	0.00
MITCHELL	0.00	4.71	0.00	0.03	0.00	7.90	0.00	0.05	0.00	2.24	0.00	0.01	0.00	14.85	0.00	0.10	0.00	0.00	0.00	0.00	14.85	0.10
WILBARGER	0.00	0.27	0.00	0.00	0.00	0.21	0.00	0.00	0.89	0.13	0.00	0.00	0.89	0.61	0.00	0.00	(8.91)	(0.00)	0.12	0.00	0.61	0.00
COLEMAN	2.78	0.01	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.00	2.78	0.03	0.01	0.00	30.50	0.00	0.01	0.00	0.03	0.00
UPTON	2.58	0.01	0.01	0.00	0.00	0.02	0.00	0.00	53.47	0.00	0.26	0.00	56.05	0.03	0.27	0.00	(505.73)	(0.00)	7.50	0.00	0.03	0.00
COKE	5.39	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.39	0.00	0.02	0.00	60.65	0.00	0.02	0.00	0.00	0.00
CROCKETT	51.17	0.00	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.17	0.00	0.23	0.00	576.92	0.00	0.21	0.00	0.00	0.00
HARDEMAN	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BANDERA	2.20		0.01		0.00		0.00		0.00	0.00	0.00	0.00	2.20	0.00	0.01	0.00	15.92	0.00	0.01	0.00	0.00	0.00
BAYLOR	0.00		0.00		0.00		0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
COTTLE	0.00		0.00		0.00		0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CRANE	0.00		0.00		0.00		0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
DELTA	5.21		0.03		0.00		0.00		0.00	0.00	0.00	0.00	5.21	0.00	0.03	0.00	43.54	0.00	0.02	0.00	0.00	0.00
DICKENS	0.00		0.00		0.00		0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
DUVAL	0.00		0.00		0.00		0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EASTLAND	5.59		0.03		0.00		0.00		0.00	0.00	0.00	0.00	5.59	0.00	0.03	0.00	60.96	0.00	0.02	0.00	0.00	0.00
EDWARDS	0.00		0.00		0.00		0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FISHER	0.00		0.00		0.00		0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FOARD	0.00		0.00		0.00		0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GLASSCOCK	0.00		0.00		0.00		0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GOLIAD	0.00		0.00		0.00		0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
HALL	0.00		0.00		0.00		0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
HUDSPETH	0.00		0.00		0.00		0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
IRION	0.00		0.00		0.00		0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
JEFF DAVIS	0.00		0.00		0.00		0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
KENEDY	0.00		0.00		0.00		0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
KENT	0.00		0.00		0.00		0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
KING	0.00		0.00		0.00		0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
KINNEY	0.00		0.00		0.00		0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
KNOX	0.00		0.00		0.00		0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LA SALLE	17.00		0.08		0.00		0.00		0.00	0.00	0.00	0.00	17.00	0.00	0.08	0.00	61.49	0.00	0.07	0.00	0.00	0.00
LEON	0.00		0.00		0.00		0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LOVING	0.00		0.00		0.00		0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MENARD	0.00		0.00		0.00		0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MILLS	0.00		0.00		0.00		0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MONTAGUE	2.59		0.02		0.00		0.00		0.00	0.00	0.00	0.00	2.59	0.00	0.02	0.00	22.02	0.00	0.01	0.00	0.00	0.00
MOTLEY	0.00		0.00		0.00		0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
REAL	0.00		0.00		0.00		0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SCHLEICHER	5.39		0.02		0.00		0.00		32.45	0.00	0.25	0.00	37.84	0.00	0.27	0.00	1,111.43	0.01	10.89	0.00	0.01	0.00
SHACKELFORD	0.00		0.00		0.00		0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
STARR	0.00		0.00		0.00		0.00		10.32	0.00	0.05	0.00	10.32	0.00	0.05	0.00	(42.87)	(0.00)	0.48	0.00	(0.00)	0.00
STERLING	0.00		0.00		0.00		0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
STONEWALL	0.00		0.00		0.00		0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SUTTON	0.00		0.00		0.00		0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TERRELL	0.00		0.00		0.00		0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
THROCKMORTON	0.00		0.00		0.00		0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ZAPATA	0.00		0.00		0.00		0.00		16.42	0.00	0.08	0.00	16.42	0.00	0.08	0.00	(75.21)	(0.00)	0.50	0.00	(0.00)	0.00
TOTAL	**157,052.70**	**101.49**	**895.94**	**0.57**	**230,001.57**	**151.22**	**1,224.54**	**0.80**	**75,403.42**	**50.42**	**427.20**	**0.28**	**462,457.68**	**303.13**	**2,547.67**	**1.65**	**2,696,163.07**	**12.40**	**12,239.81**	**0.06**	**315.53**	**1.71**



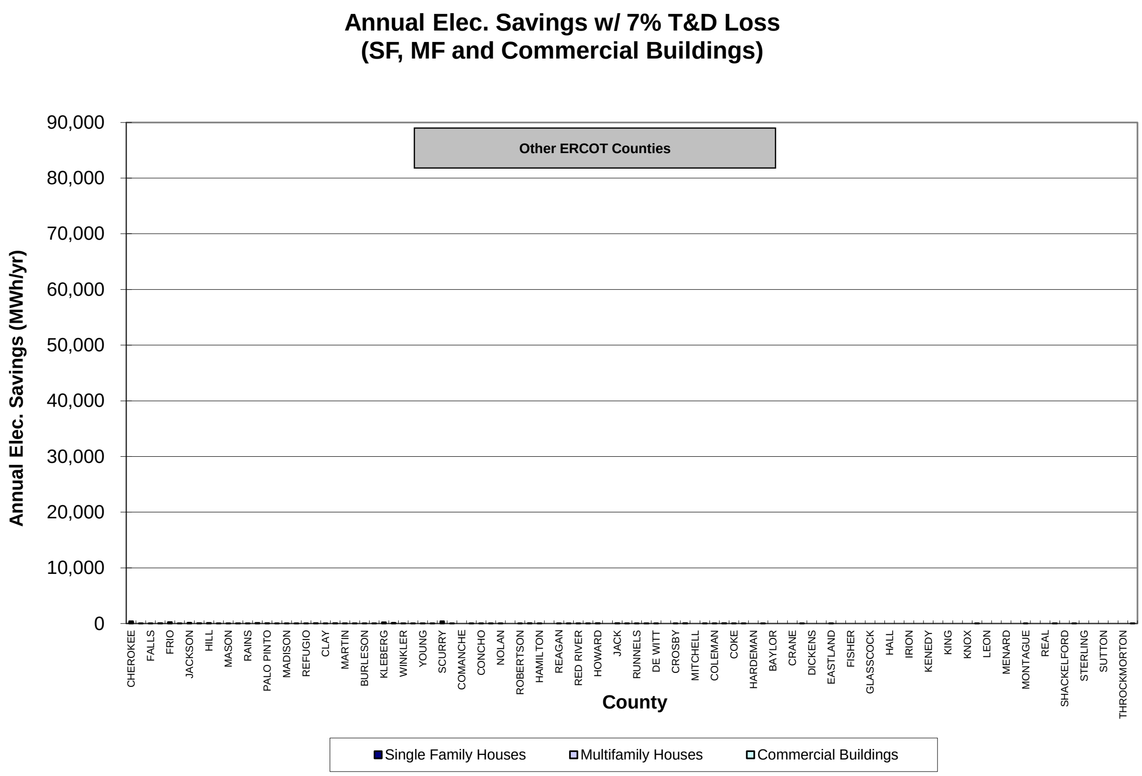
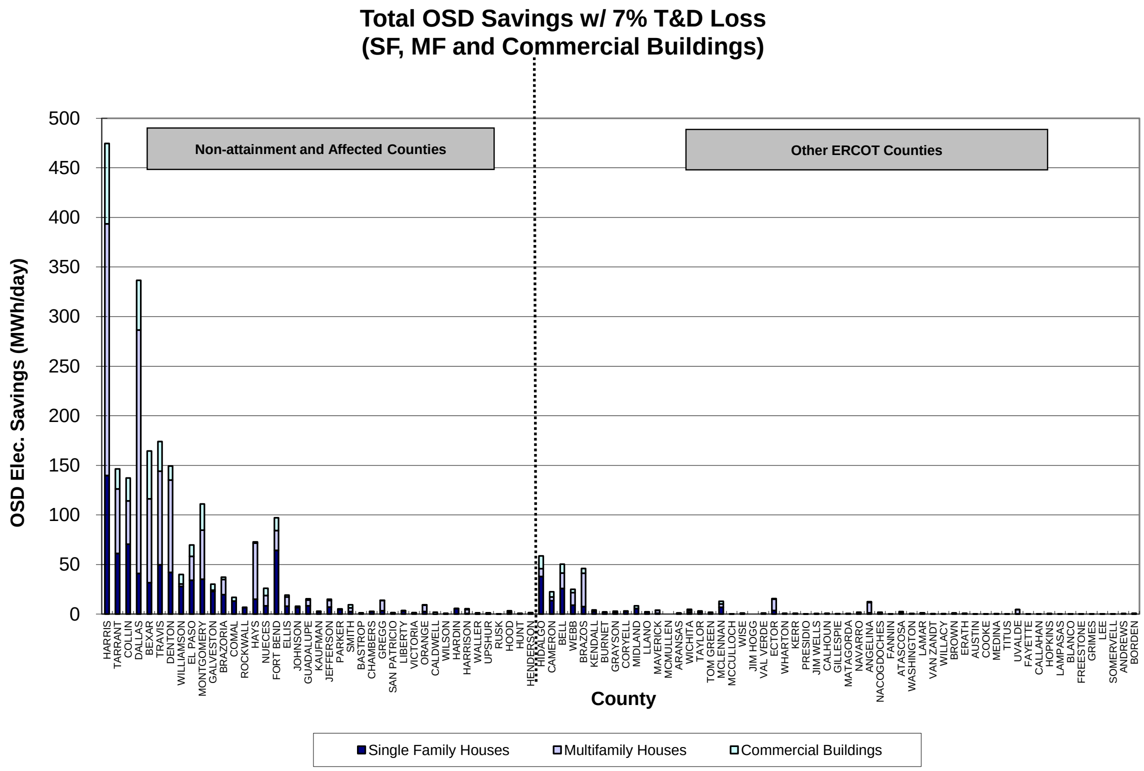


Figure 51: 2011 Annual Electricity Reductions from the 2001 IECC for Single-family and Multi-family Residences and the ASHRAE Standard 90.1-1999 for Commercial Buildings by County



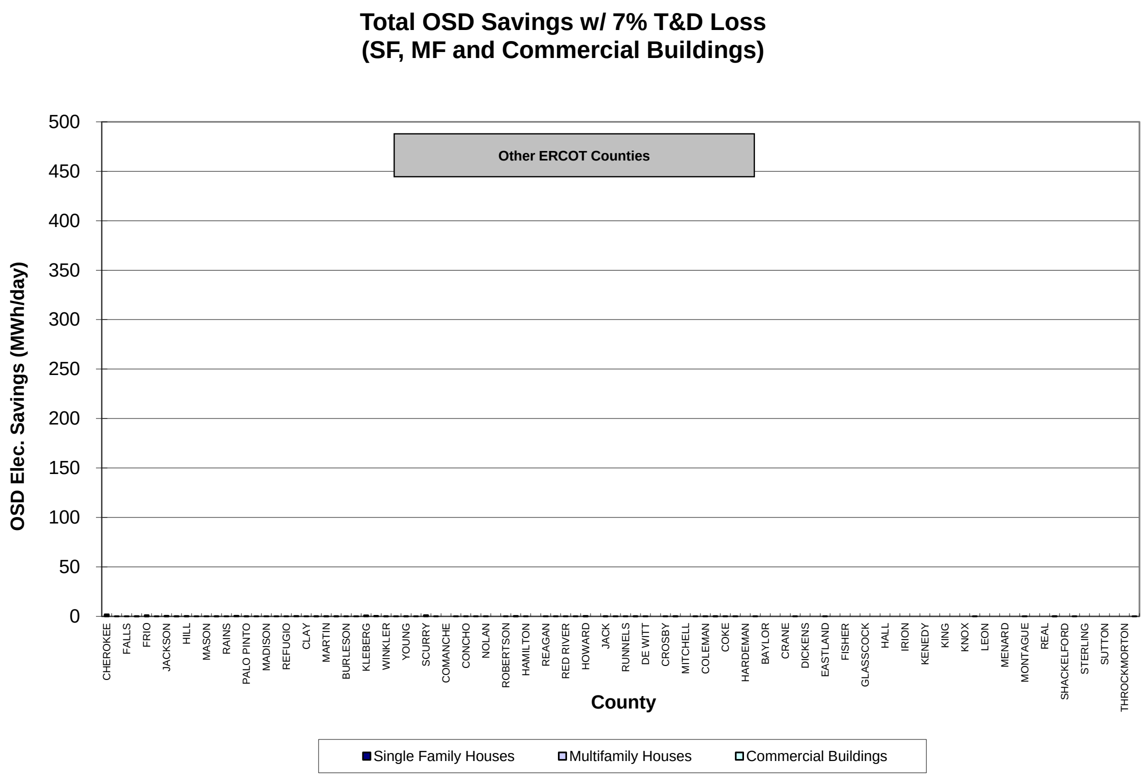


Figure 52: 2011 OSD Electricity Reductions from the 2001 IECC for Single-family and Multi-family Residences and the ASHRAE Standard 90.1-1999 for Commercial Buildings by County

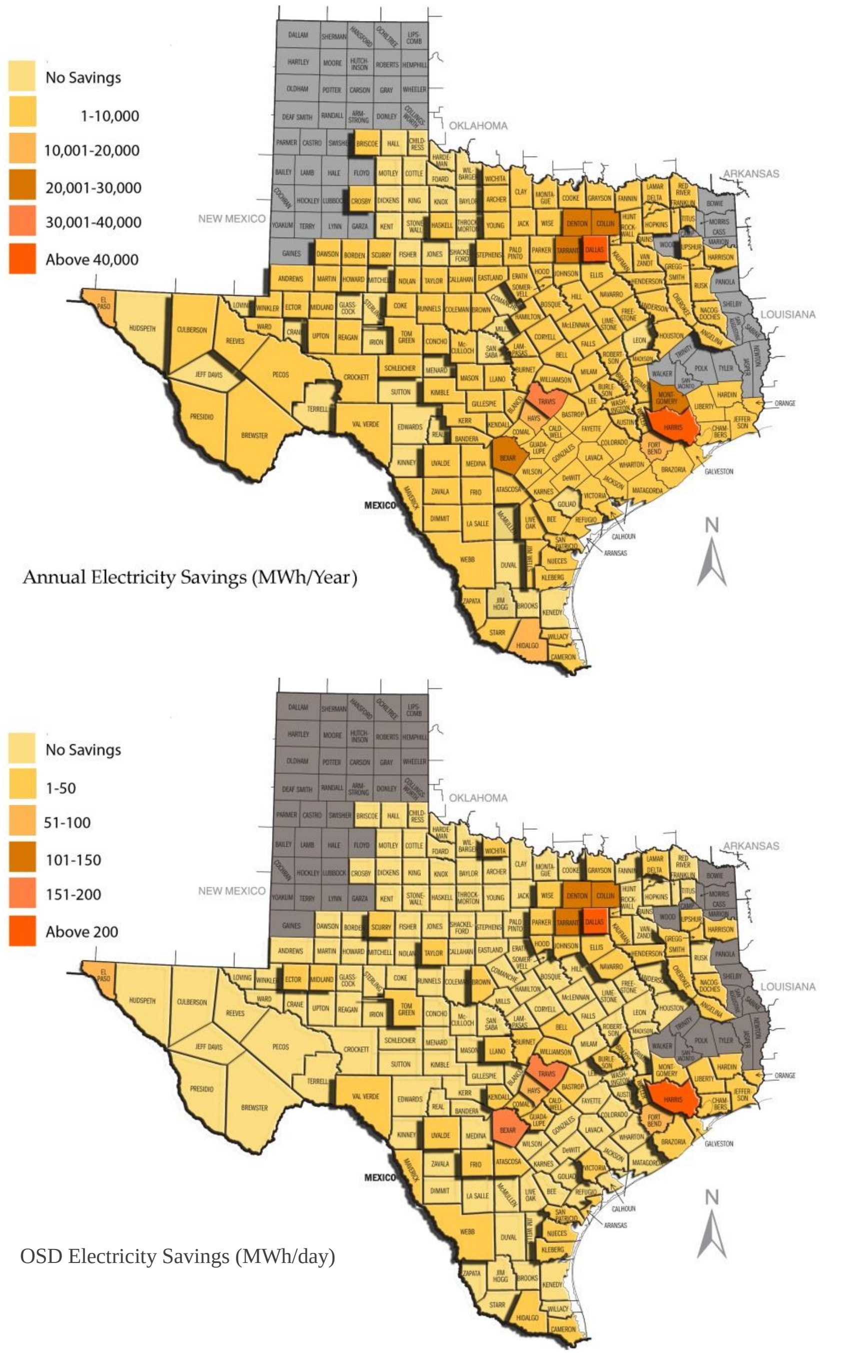
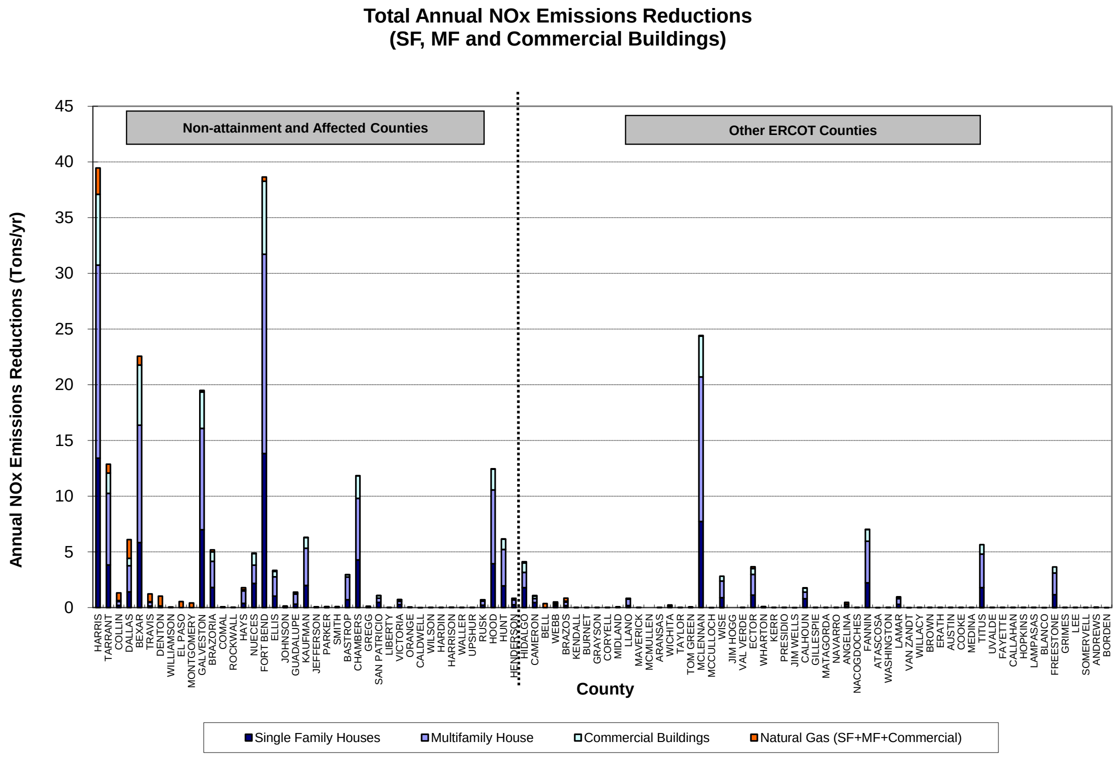


Figure 53: 2011 Annual and OSD Electricity Reductions from the 2001 IECC for Single-family and Multi-family Residences and the ASHRAE Standard 90.1-1999 for Commercial Buildings by County



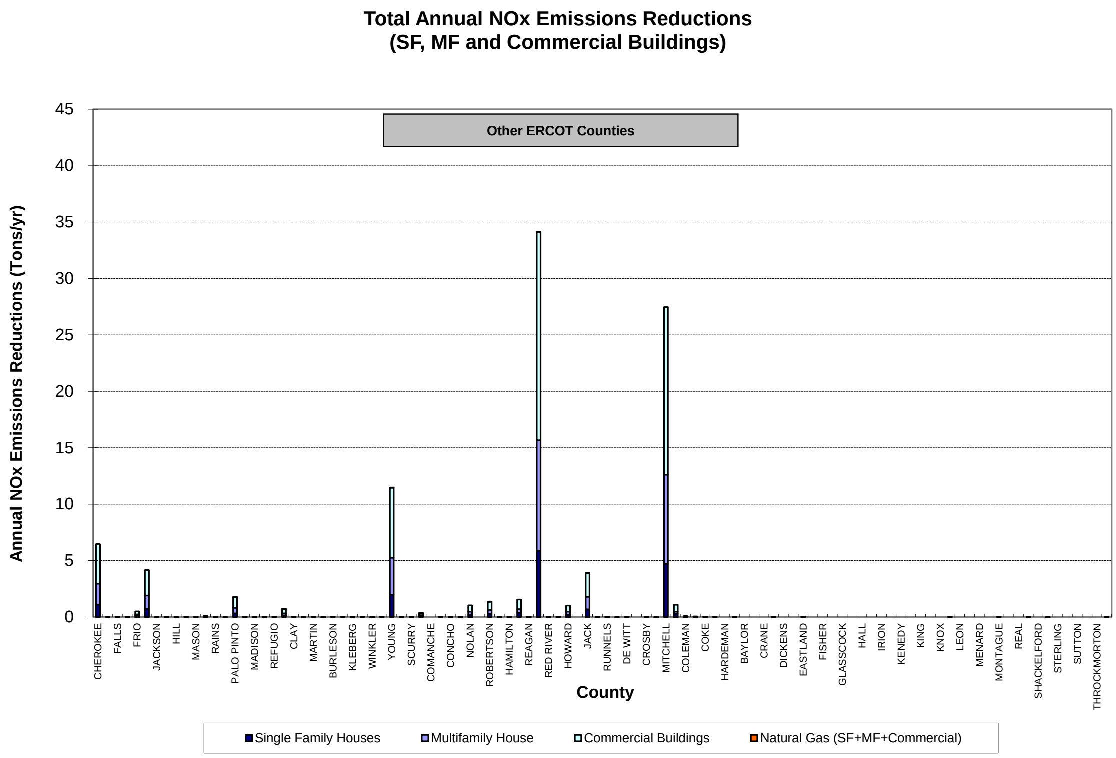
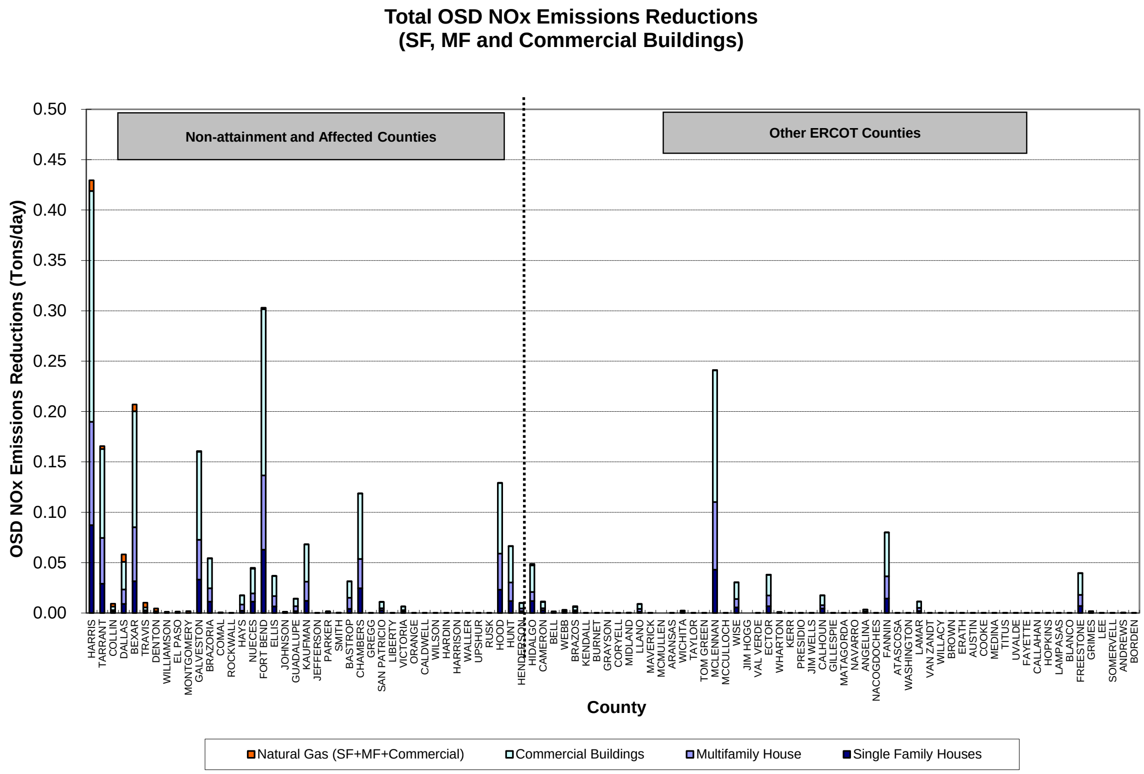


Figure 54: 2011 Annual NOx Reductions from Electricity and Natural Gas Savings Due to the 2001 IECC for Single-family and Multi-family Residences and the ASHRAE Standard 90.1-1999 for Commercial Buildings by County (using 2007 eGRID)



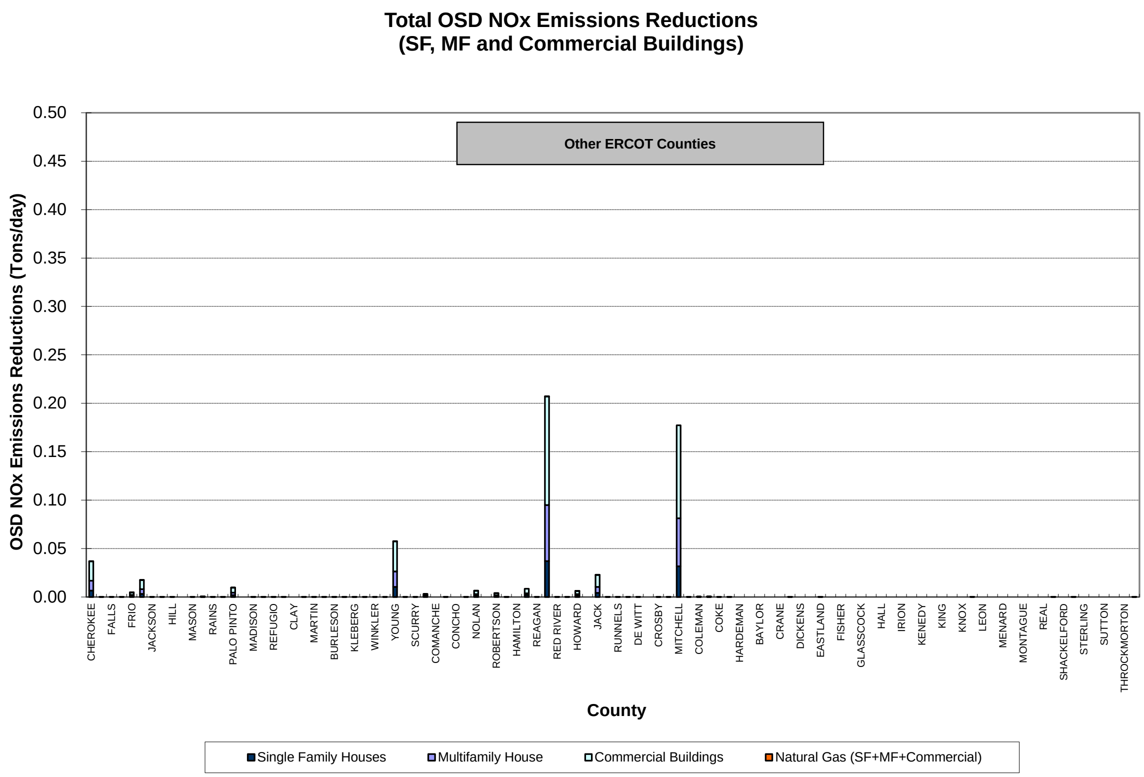
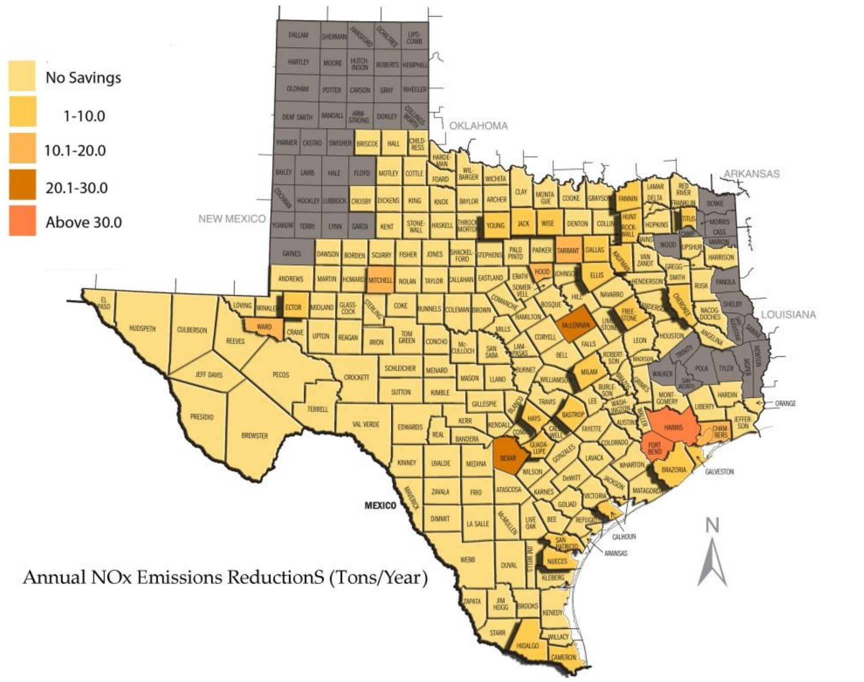


Figure 55: 2011 OSD NOx Reductions from Electricity and Natural Gas Savings Due to the 2001 IECC for Single-family and Multi-family Residences and the ASHRAE Standard 90.1-1999 for Commercial Buildings by County (using 2007 eGRID)



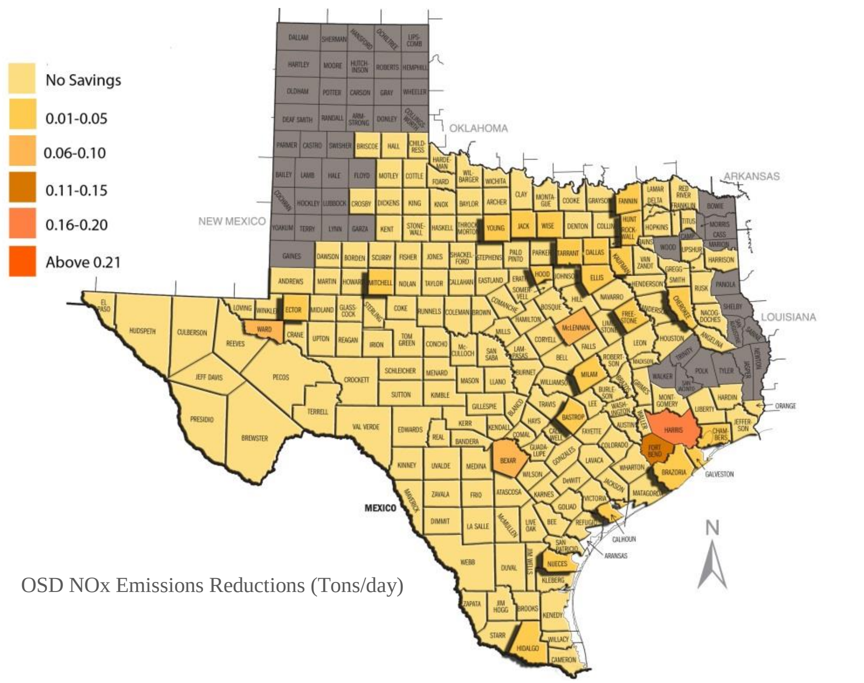
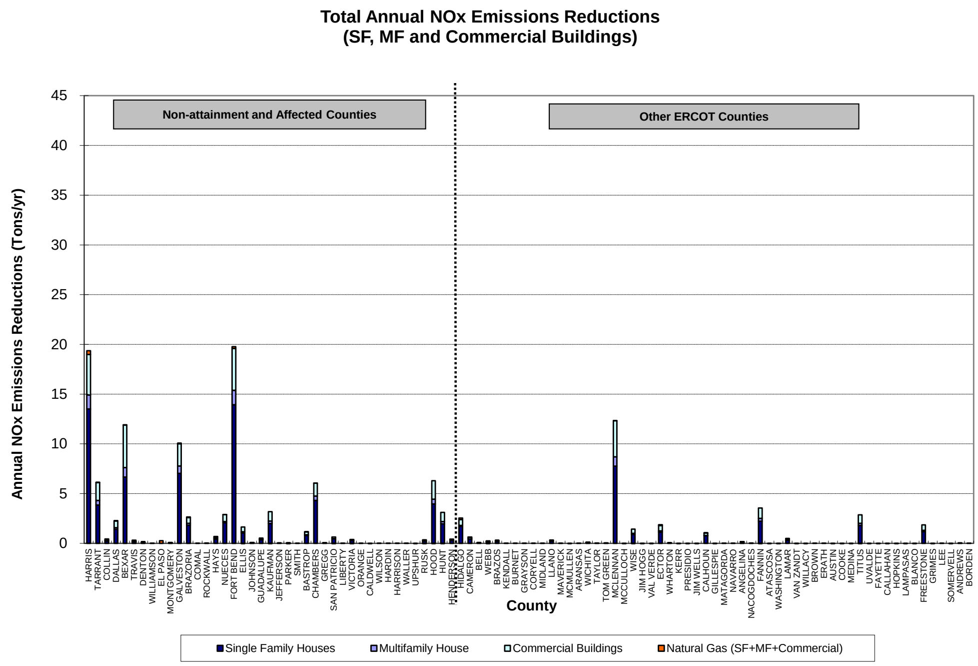


Figure 56: 2011 Annual and OSD NOx Reductions from Electricity and Natural Gas Savings Due to the 2001 IECC for Single-family and Multi-family Residences and the ASHRAE Standard 90.1-1999 for Commercial Buildings by County (using 2007 eGRID)

5 Comparison of 2011 Emissions Reductions vs. 2010 Emissions Reductions from Implementation of the 2000 IECC/IRC and ASHRAE Standard 90.1-1999

In this section a side-by-side comparison is presented of the 2011 emissions reductions calculations versus the 2010 emissions reductions for both the annual and the OSD. In Figure 57 and Figure 58, the annual and OSD NOx reductions are presented for the 2010 analysis, respectively. These can be compared to the values presented in Figure 59and Figure 60 for the 2011 analysis.



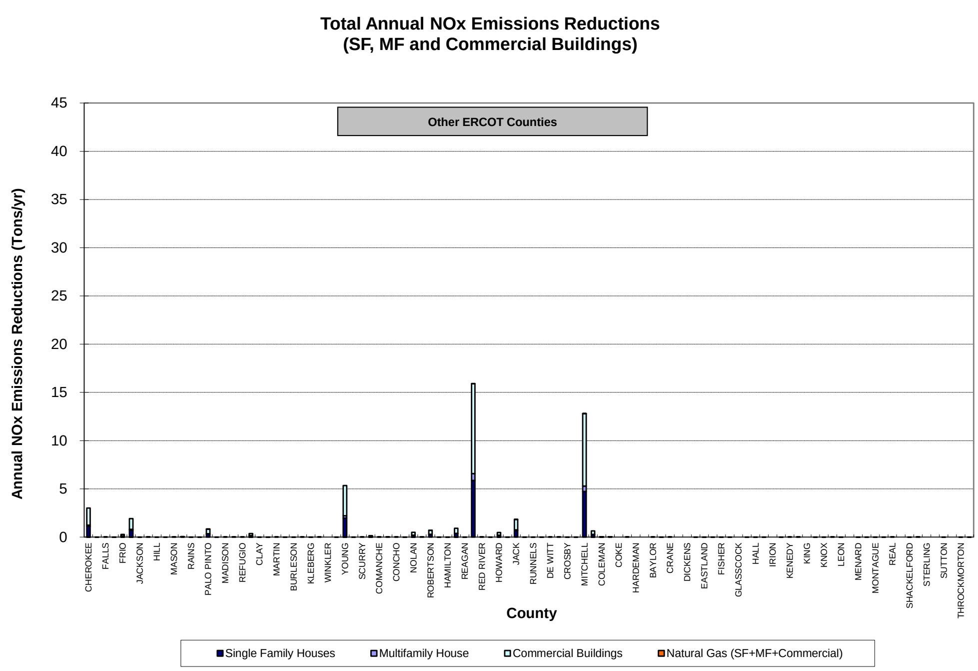
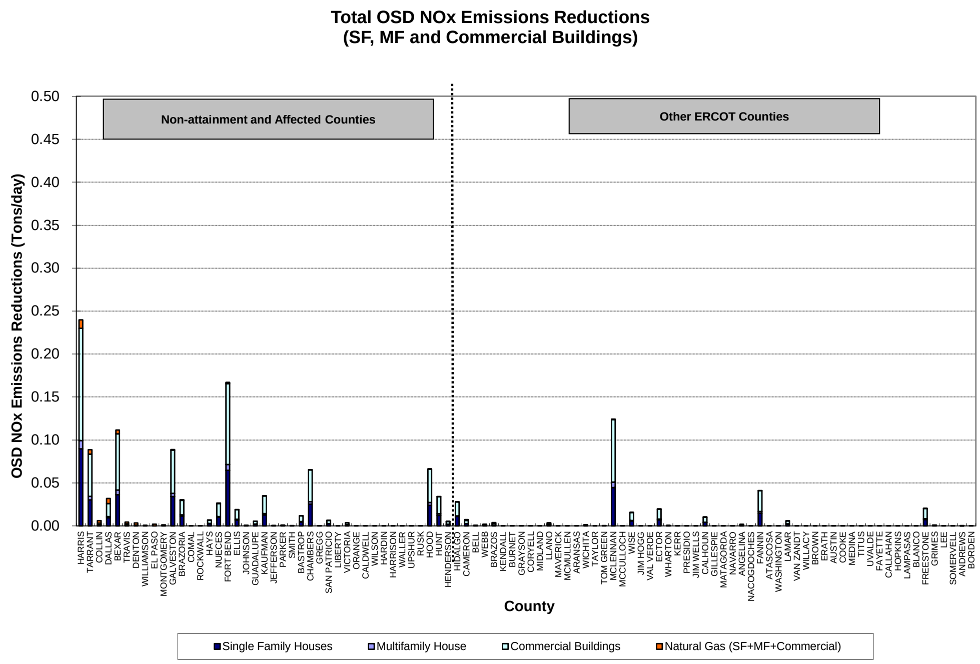


Figure 57: 2010 Annual NOx Reductions from Electricity and Natural Gas Savings Due to the 2001 IECC for Single-family, Multi-family Residences, and the ASHRAE Standard 90.1-1999 Commercial Buildings by County (using 2007 eGRID)



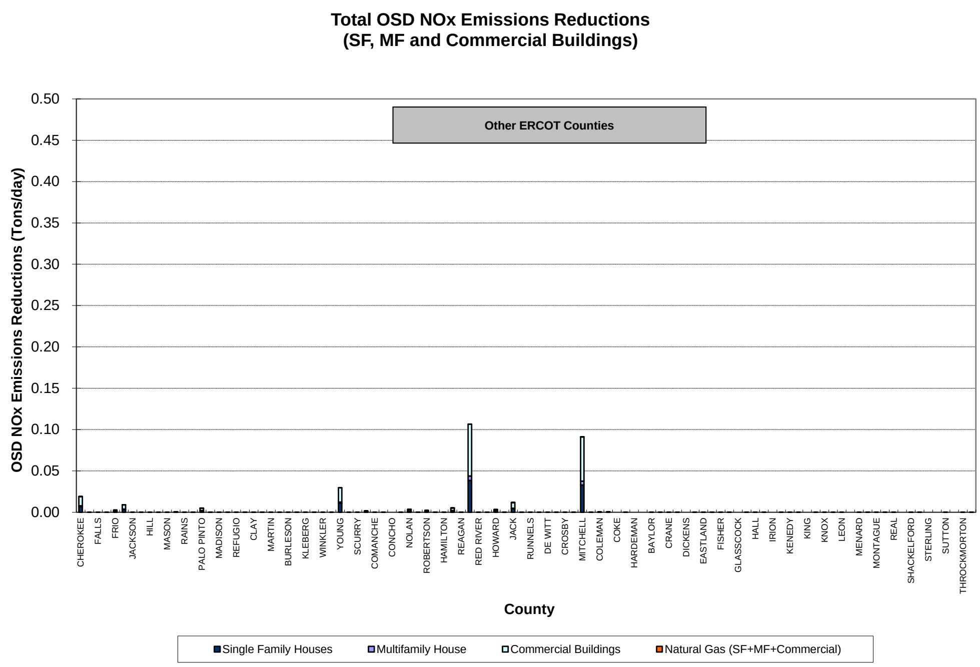
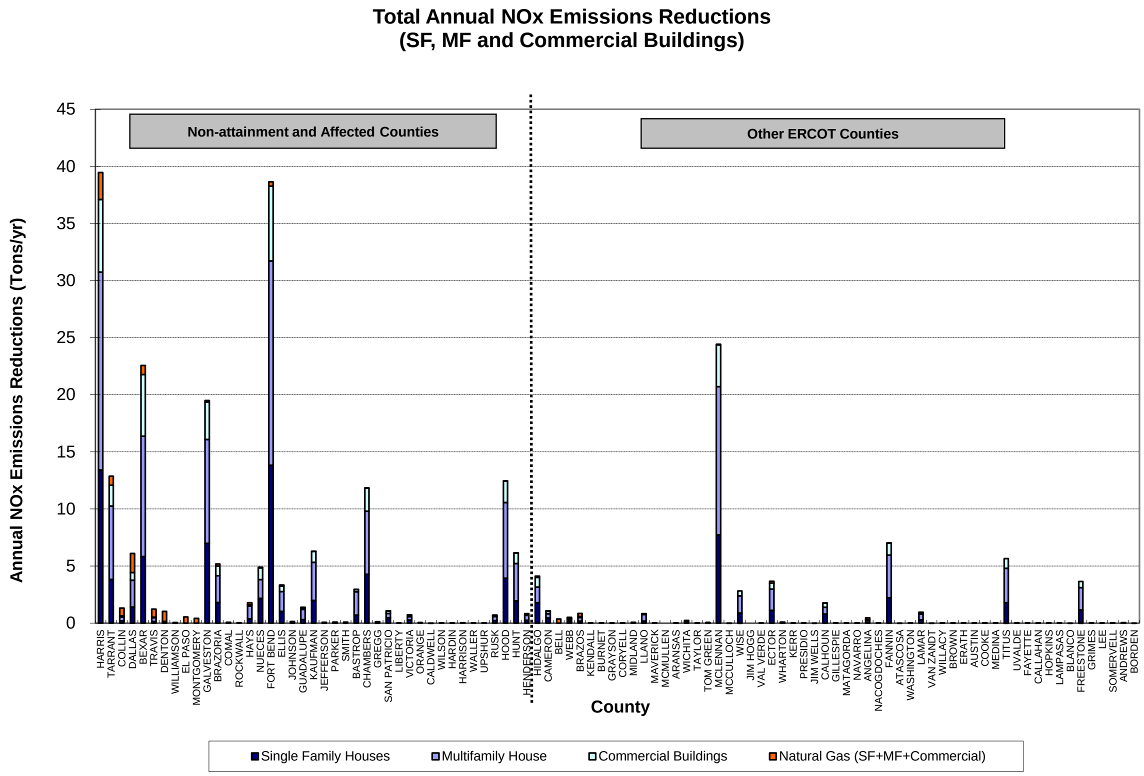


Figure 58: 2010 OSD NOx Reductions from Electricity and Natural Gas Savings Due to the 2001 IECC for Single-family, Multi-family Residences, and the ASHRAE Standard 90.1-1999 Commercial Buildings by County (Using 2007 eGRID)



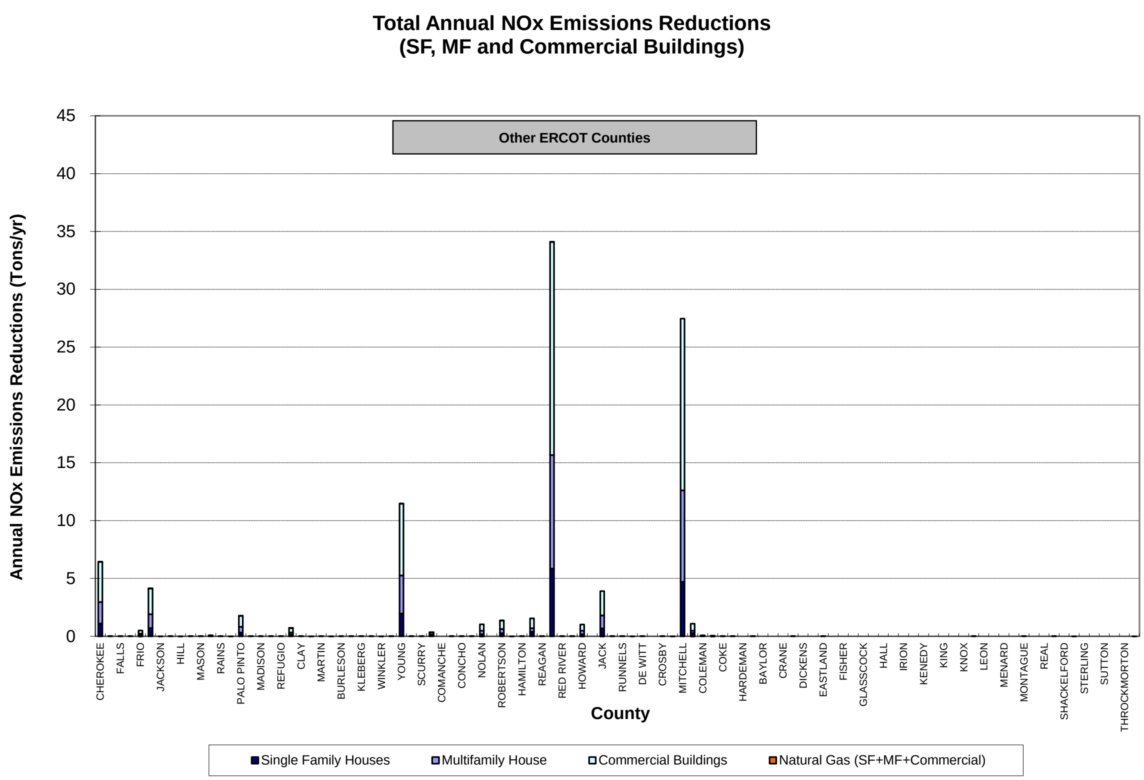
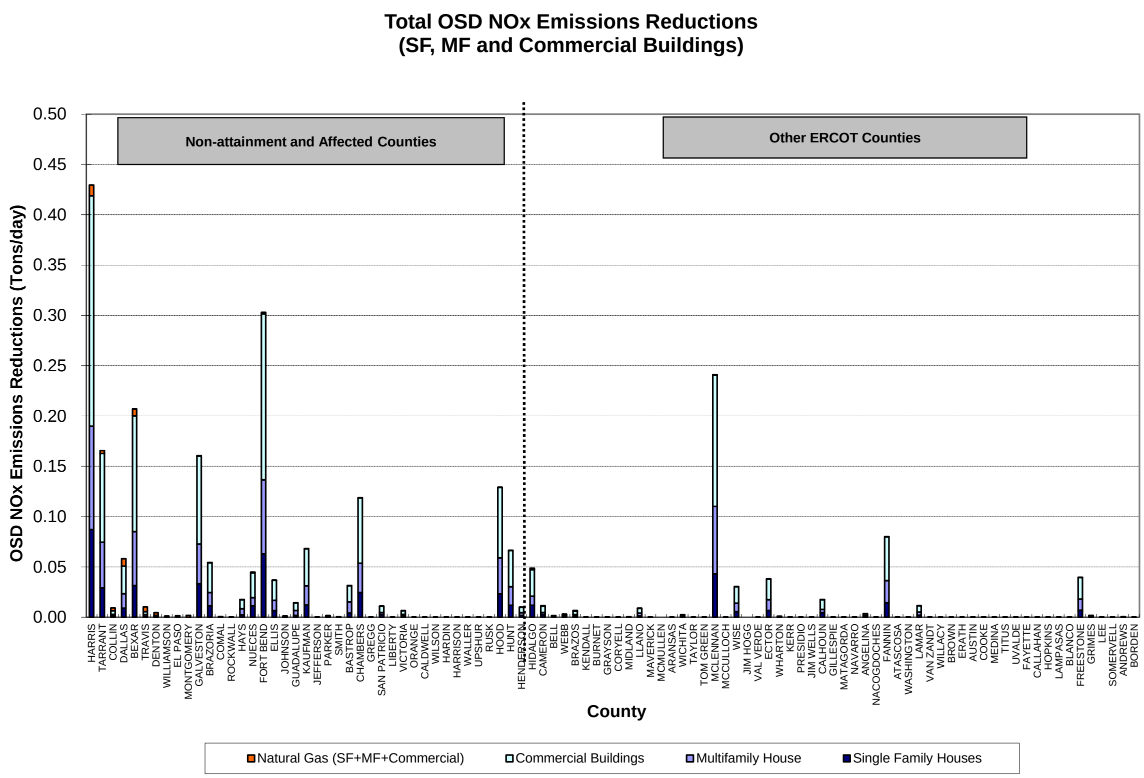


Figure 59: 2011 Annual NOx Reductions from Electricity and Natural Gas Savings Due to the 2001 IECC for Single-family and Multi-family Residences and the ASHRAE Standard 90.1-1999 for Commercial Buildings by County (using 2007 eGRID)



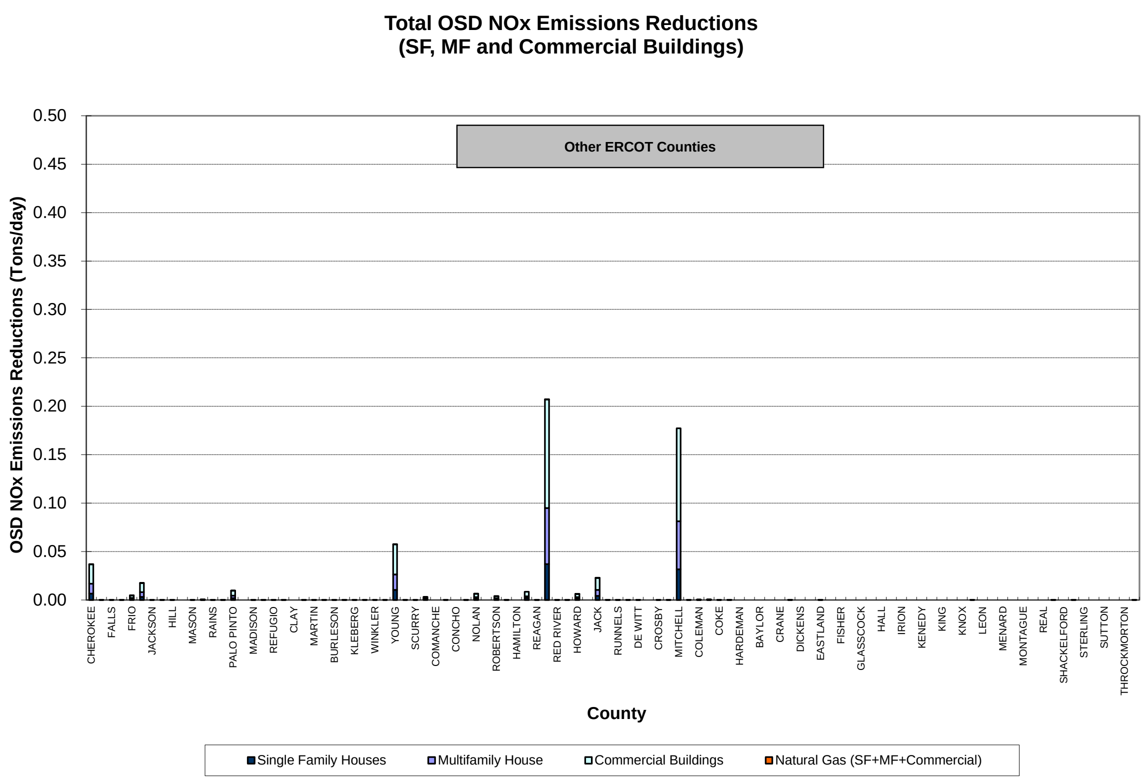


Figure 60: 2011 OSD NOx Reductions from Electricity and Natural Gas Savings Due to the 2001 IECC for Single-family and Multi-family Residences and the ASHRAE Standard 90.1-1999 for Commercial Buildings by County (using 2007 eGRID)

6 Calculation of Integrated NOx Emissions Reductions from Multiple State Agencies Participating in the Texas Emissions Reduction Plan (TERP)

6.1 Background

In January 2005, the Laboratory was asked by the Texas Commission on Environmental Quality (TCEQ) to develop a method by which the NOx emissions savings from the energy-efficiency programs from multiple Texas State Agencies working under Senate Bill 5 and Senate Bill 7 could be reported in a uniform format to allow the TCEQ to consider the combined savings for Texas' State Implementation Plan (SIP) planning purposes. This required that the analysis should include the integrated savings estimates from all projects projected through 2020 for both the annual NOx reductions. The NOx emissions reduction from all these programs were calculated using estimated emissions factors for 2010 from the US Environmental Protection Agency (US EPA) eGRID database, which had been specially prepared for this purpose. The different programs included in this 2011 integrated analysis are:

- ESL Single-family new construction
- ESL Multi-family new construction
- ESL Commercial new construction
- PUC Senate Bill 7 Program
- SECO Senate Bill 5 Program
- Electricity generated by wind farms in Texas (ERCOT)[49]

The Laboratory's single-family and multi-family programs include the energy savings attained by constructing new residences in Texas according to the IECC 2000/2001 building code (IECC 2000). The baseline for comparison for the code programs is the published data on residential construction characteristics by the National Association of Home Builders (NAHB) for 1999 (NAHB 1999). Annual electricity (MWh) and natural gas (MMBtu) savings are from the Laboratory's Annual Reports to the TCEQ (Haberl et al., 2002 - 2009).

The Texas Public Utility Commission's (PUC) Senate Bill 7 program include the energy efficiency programs implemented by electric utilities under the Public Utility Regulatory Act §39.905 (PUC 2012). The PUC regulated energy efficiency program was adopted pursuant to 1999 legislation (SB 7) and subsequent legislation in 2001 (SB 5), 2007 (HB 3693), and 2011 (SB 1125). The energy efficiency measures include high efficiency HVAC equipment, variable speed drives, increased insulation levels, infiltration reduction, duct sealing, Energy Star Homes, etc. Annual electricity savings according to the utilities were reported for the different programs completed in the years 2001 through 2011.

The Texas State Energy Conservation Office (SECO) funds energy-efficiency programs are directed towards school districts, government agencies, city and county governments, private industries and residential energy consumers. For the 2011 reporting year SECO submitted annual energy savings values for projects funded by SECO and by Energy Service projects.

The *Electric Reliability Council of Texas (ERCOT) electricity production from currently installed green power generation (wind)* in Texas is reported. Projections through 2013 include planned projects by ERCOT, annual growth factors beyond 2013 comply with the Legislative requirements. Actual measured electricity production for 2001 through 2011, were included.

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6.2 Description of the Analysis Method

Annual NOx emissions reduction was calculated for 2011 and integrated from 2009 to 2020 using several factors to discount the potential savings. These factors include an annual degradation factor, a transmission and distribution factor, a discount factor and growth factors as shown in Table 36, and are described as follows:

[49] ERCOT is the Electric Reliability Council of Texas.

Annual degradation factor: This factor was used to account for an assumed decrease in the performance of the measures installed as the equipment wears down and degrades. With the exception of electricity generated from wind, an annual degradation factor of 5% was used for all the programs[50]. This value was taken from a study by Kats et al. (1996).

Transmission and distribution loss: This factor adjusts the reported savings to account for the loss in energy resulting from the transmission and distribution of the power from the electricity producers to the electricity consumers. For this calculation, the energy savings reported at the consumer level are increased by 7% to give credit for the actual power produced that is lost in the transmission and distribution system on its way to the customer. In the case of electricity generated by wind, the T&D losses were assumed to cancel out since wind energy is displacing power produced by conventional power plants; therefore, there is no net increase or decrease in T&D losses.

Initial discount factor: This factor was used to discount the reported savings for any inaccuracies in the assumptions and methods employed in the calculation procedures. For the Laboratory's single- and multi-family program, the discount factor was assumed to be 20%. For PUC's Senate Bill 5 and Senate Bill 7 programs and electricity from wind, the discount factor was taken as 25%. For the savings in the SECO program, the discount factor was 60%.

Growth factor: The growth factors shown in Table 36 were used to account for several different factors. Growth factors for single-family (3.25%) and multi-family residential (1.54%) construction are projections based on the average growth rate for these housing types from recent U.S. Census data for Texas. Growth factors for wind energy are from the Texas Public Utilities Commission[51]. No growth was assumed for Federal buildings, pilot lights, PUC programs and SECO entries.

Figure 61 shows the overall information flow that was used to calculate the NOx emissions savings from the annual electricity savings (MWh) from all programs. For the Laboratory's single-family and multi-family code-implementation programs, the annual and ozone season savings were calculated from DOE-2 hourly simulation models[52]. The base case is taken as the average characteristics of single- and multi-family residences for Texas published by the National Association of Home Builders for 1999 (NAHB 1999). The annual electricity savings from PUC programs were calculated using demand savings tables and spreadsheets created for the utilities incentive programs by Frontier Associates in Austin, Texas (PUC 2012).

The SECO electricity savings were submitted as annual savings by project[53]. A description of the measures completed for the project was also submitted for information purposes. The electricity production from wind farms in Texas was from the actual on-site metered data measured at 15-minute intervals.

Integration of the savings from the different programs into a uniform format allowed for creditable NOx emissions to be evaluated using different criteria as shown in Table 36. These include evaluation across programs, evaluation across individual counties by program, evaluation by SIP area, evaluation for all ERCOT counties except Houston/Galveston, and evaluation within a 200 km radius of Dallas/Ft.Worth.

6.3 Calculation Procedure

This report had several changes for the calculation, as follow:

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[50] A degradation of 5% per year would accumulate as a 5%, 10%, 15%...etc, degradation in performance. Although the assumption of this high level of degradation may not actually occur, it was chosen as a conservative estimate. For wind energy, a degradation factor of 0% was used. The choice of a 0% degradation factor for wind is based on two year's of analysis of measured wind data from all Texas wind farms that shows no degradation, on average, for a two year period after the wind farms became operational.

[51] The growth factors for wind energy through 2012 are based on permitted wind farms registered with the Texas Public Utilities Commission, http://www.puc.state.tx.us/electric/maps/gen_tables.xls. Growth factors for 2013 through 2020 assume a linear projection based on the permits for 2011 and 2012.

[52] These values are based on a performance analysis as defined by Chapter 4 of IECC 2000/2001. This analysis is discussed in the Laboratory's annual reports to the TCEQ.

[53] The reporting requirements to the SECO did not require energy savings by project type, although for selected sites, energy savings by project type was available. Annual savings were reported by SECO in 2004. Values for 2005 to 2007 use the adjusted values from 2004 as shown, www.seco.cpa.state.tx.us.

- The 2007 eGrid has two separate versions of the eGRID: One of the versions contains estimates of annual SOx, NOx, and CO2 data for 2007, using a 25% capacity factor. The second version contains estimates of SOx, NOx, and CO2 data for 2007 for an average day in the ozone season period, which runs from Mid July to Mid September. On the other hand, the 2010 eGrid has only one version of the eGrid, which contains estimates of annual SOx, NOx, and CO2 data for 2007.
- The 2007 eGrid database used in the previous report was changed to the 2010 eGrid database. Whereas the 2007 eGrid uses the ten different Power Control Authorities (PCAs), the 2010 eGrid uses the four different Congestion Management (CM) zones.
- Whereas the previous report estimated the electricity savings and NOx emissions reductions for each year based on year 1999 savings with using the 2007 eGrid, this report estimated the electricity savings and NOx emissions reductions for each year based on year 2008 savings with using the 2010 eGrid and
- Several programs (federal buildings program, furnace pilot light program, PUC SB5 grant program, and SEER 13 single-family and multi-family programs) which were discontinued before year 2008 did not considered for this report.

ESL Single-family and Multi-family. The calculation of the annual electricity savings reported for the years 2002 through 2011 included the savings from code-compliant new housing in all 41 non-attainment and affected counties as reported in the Laboratory's annual report submitted by the Laboratory to the Texas Commission of Environmental Quality (TCEQ). From 2009 to 2011, based on year 2008, the annual electricity savings were calculated for new residential construction in all the counties in ERCOT region, which includes the 41 non-attainment and affected counties. These savings were then tabulated by county and program. Using the calculated values through 2011, savings were then projected to 2020 by incorporating the different adjustment factors mentioned above.

In these calculations, it was assumed that the same amount of electricity savings from the code-complaint construction would be achieved for each year after 2011 through 2020[54]. The projected energy savings through 2020, according to county, were then divided into the CM zones in the 2010 eGRID. To determine which CM zone was to be used, or in counties with multiple CM zone, the allocation to each CM zone by county was obtained from CM zone's listing published in the Laboratory's 2010 annual report[55].

For the 2011 annual NOx emissions calculations, the US EPA's 2010 eGRID were used. An example of the eGRID spreadsheet[56] is given in Table 37. The total electricity savings for each CM zone were used to calculate the NOx emissions reduction for each of the different counties using the emissions factors contained in eGRID. Similar calculations were performed for each year for which the analysis was required. The integrated NOx emissions reduction for the electricity savings from residential new construction for 2009 through 2020 is provided in Table 1. NOx emissions reduction is provided in Table 2 .

ESL-Commercial Buildings. The annual electricity savings for 2004 through 2010 for commercial buildings were obtained from the annual reports for 2004 through 2010 submitted by the Laboratory to TCEQ[57]. From 2009 to 2011, based on year 2008, the annual electricity savings were also calculated for new commercial construction by county. Using the calculated values through 2011, savings were then projected to 2020 by incorporating the different adjustment factors mentioned above[58]. In the projected annual electricity savings, it was assumed that the same 2011 amount of electricity savings would be achieved for each year through 2020. Similarly to the single family calculations, the projected energy saving numbers through 2020, by county, were allocated into the appropriate CM zones

[54] This would include the appropriate discount and degradation factors for each year.
[55] Haberl et al., 2010, pp. 265.
[56] To use this spreadsheet electricity savings for each eGrid zone is entered in the bottom row of the spreadsheet (MWh). The spreadsheet then allocates the MWh of electricity savings according to the counties (blue columns) where the CM zone owned and operated a power plant. Totals for all CM zones are then listed on the far right columns (white columns). Similar spreadsheets for the 2010 eGRID exist for SOx and CO2.
[57] These savings include new construction in office, assembly, education, retail, food, lodging and warehouse construction as defined by Dodge building type (Dodge 2005), using energy savings from the Pacific Northwest National Laboratory (USDOE 2004), and data from CBECS (1995 - 2003).
[58] This also includes the appropriate discount and degradation factors for each year.

PUC-Senate Bill 7. For the PUC Senate Bill 7 program savings, the annual electricity savings for 2001 through 2011 were obtained from the Public Utilities Commission. Using these values savings were projected through 2020 by incorporating the different adjustment factors mentioned above. Similar savings were assumed for each year after 2011 until 2020. The 2010 annual eGRID was also used to calculate the NOx emissions savings for the PUC-Senate Bill 7 program. The total electricity savings for each CM zone was used to calculate the NOx emissions reduction for each county using the emissions factors contained in the US EPA's eGRID spreadsheet. The integrated NOx emissions reduction for each county was then calculated.

SECO Savings. The annual electricity savings from energy conservation projects reported by political subdivisions for 39 counties through 2011 were obtained from the State Energy Conservation Office. These submittals included information gathered from SECO's website[59] and paper submittals[60]. The annual and average day electricity values were then summarized according to county and program. Using the actual reported numbers for 2007 through 2011, savings through 2020 were projected using the different adjustment factors mentioned above. In a similar fashion to the previous programs, it was assumed that the same amount of electricity savings will be achieved for each year through 2020. The 2010 annual eGRID were then used to calculate the NOx emissions savings for the SECO program.

Electricity Generated by Wind Farms. The measured electricity production from all the wind farms in Texas for 2001 through 2011 was obtained from the Energy Reliability Council of Texas (ERCOT). To obtain the annual production, the 15-minute data were summed for the 12 months. Using the reported numbers for 2011, savings through 2020 were projected incorporating the different adjustment factors mentioned above. The 2007 annual eGRID were then used to calculate the NOx emissions reduction for the electricity generated by Texas' wind farms[61]. The total electricity savings for each CM zone was used to calculate the NOx emissions reduction for each of the different counties.

6.4 Results

The total integrated annual electricity savings for all the different programs in the integrated format was calculated using the adjustment factors shown in Table 36 for 2009 through 2020 as shown in Table 1. NOx emissions reduction from the electricity savings for the annual for all the programs in the integrated format is shown in Table 2. In Table 1 and Table 2 annual integrated values are shown for 2009 through 2020.

In 2011 (Table 1), the total integrated annual savings from all programs is 13,354,918 MWh/year. The integrated annual electricity savings from all the different programs is:

- Savings from code-compliant residential and commercial construction is 315,876 MWh/year (2.4% of the total electricity savings),
- Savings from the PUC's Senate Bill 7 program is 1,197,953 MWh/year (9.0%),
- Savings from SECO's Senate Bill 5 program is 509,616 MWh/year (3.8%),
- Electricity savings from green power purchases (wind) is 10,995,427 MWh/year (82.3%), and
- Savings from residential air conditioner retrofits[62] is 336,046 MWh/year (2.5%).

By 2013, the total integrated annual savings from all programs is 15,391,293 MWh/year. The integrated annual electricity savings from all the different programs is:

[59] This web site was developed for SECO by the Laboratory, at the request of the TCEQ.
[60] In these submittals, there were several municipalities whose electricity or natural consumption increased in 2004 as compared to 2001, which caused the reported savings from these municipalities to be negative. Since no additional information was reported from these projects that might have indicated what the cause of this was, it was assumed that the energy conservation projects were working as designed, but that other factors had changed the energy consumption. Therefore, in the final values of electricity savings from the political subdivisions that reported to SECO for the calculation of annual NOx reductions, the negative savings were omitted.
[61] This credited the electricity generated by the wind farm to the utility that either owned the wind farm or was associated with the wind farm owner.
[62] This assumes air conditioners in existing homes are replaced with the more efficient SEER 13 units, versus an average of SEER 11, which is slightly more efficient than the previous minimum standard of SEER 10.

- Savings from code-compliant residential and commercial construction is 597,699 MWh/year (3.9% of the total electricity savings),
- Savings from the PUC's Senate Bill 7 program is 1,908,944 MWh/year (12.4%),
- Savings from SECO's Senate Bill 5 program is 909,903 MWh/year (5.9%),
- Electricity savings from green power purchases (wind) is 11,671,466 MWh/year (75.8%), and
- Savings from residential air conditioner retrofits is 303,281 MWh/year (2.0%).

In 2011 (Table 2), the total integrated annual NOx emissions reduction from all programs is 3,723 tons-NOx/year. The integrated annual NOx emissions reduction from all the different programs is:

- NOx emissions reduction from code-compliant residential and commercial construction is 80 tons-NOx/year (2.1% of the total NOx savings),
- NOx emissions reduction from the PUC's Senate Bill 7 programs is 340 tons-NOx/year (9.1%),
- NOx emissions reduction from SECO's Senate Bill 5 program is 162 tons-NOx/year (4.4%),
- NOx emissions reduction from green power purchases (wind) is 3,062 tons-NOx/year (82.2%), and
- NOx emissions reduction from residential air conditioner retrofits is 72 tons-NOx/year (2.1%).

By 2013, the total integrated annual NOx emissions reduction from all programs will be 4,296 tons-NOx/year. The integrated annual NOx emissions reduction from all the different programs is:

- NOx emissions reduction from code-compliant residential and commercial construction will be 150 tons-NOx/year (3.5% of the total NOx savings),
- NOx emissions reduction from the PUC's Senate Bill 7 programs will be 547 tons-NOx/year (12.7%),
- NOx emissions reduction from SECO's Senate Bill 5 program will be 277 tons-NOx/year (6.4%),
- NOx emissions reduction from green power purchases (wind) will be 3,250 tons-NOx/year (75.7%), and
- NOx emissions reduction from residential air conditioner retrofits will be 72 tons-NOx/year (1.7%).

Table 36: Final Adjustment Factors used for the Calculation of the Annual and OSD NOx Savings for the Different Programs

	ESL-Single-Family	ESL-Multi-Family	ESL-Commercial	PUC (SB7)	SECO	Wind-ERCOT
Annual Degradation Factor	5.00%	5.00%	5.00%	5.00%	5.00%	0.00%
T&D Loss	7.00%	7.00%	7.00%	7.00%	7.00%	0.00%
Initial Discount Factor	20.00%	20.00%	20.00%	25.00%	60.00%	50.00%
Growth Factor	3.25%	1.54%	3.25%	0.00%	0.00%	Actual Rates
Weather Normalized	Yes	Yes	Yes	No	No	See note 7

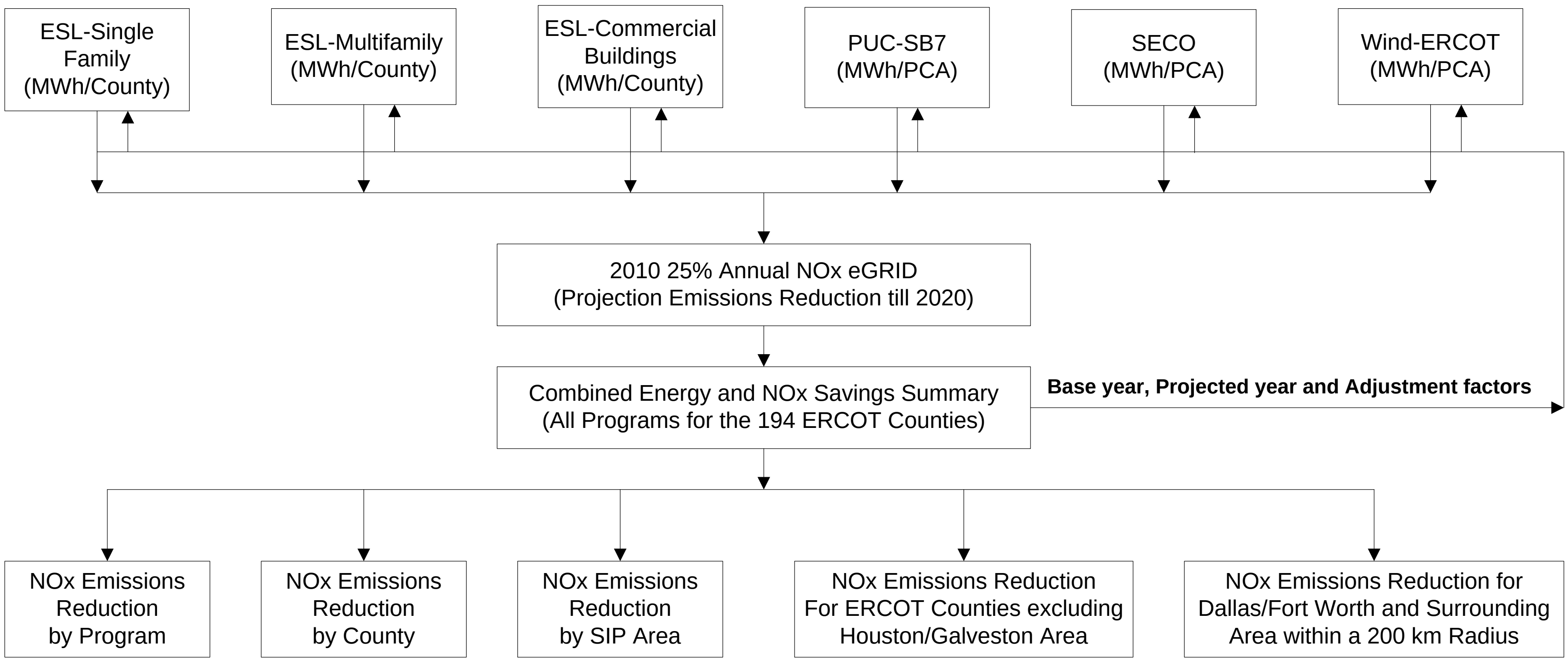

Figure 61: Process Flow Diagram of the NOx Emissions Reduction Calculations

Table 37: Example of NOx Emissions Reduction Calculations using 2010 eGRID

Area	County	CM Zones								Total Nox Reductions (lbs)	Total Nox Reductions (Tons)
		H		N		W		S			
Houston-Galveston Area	Brazoria	0.0562032	347.6943	0.0000071	0.0710	0.0000003	0.0002	0.0005265	3.8055	351.57	0.18
	Chambers	0.0204500	126.5115	0.0000026	0.0258	0.0000001	0.0001	0.0001916	1.3847	127.92	0.06
	Fort Bend	0.0313463	193.9202	0.0000040	0.0396	0.0000002	0.0001	0.0002937	2.1224	196.08	0.10
	Galveston	0.0226620	140.1955	0.0000029	0.0286	0.0000001	0.0001	0.0002123	1.5344	141.76	0.07
	Harris	0.1486911	919.8596	0.0000189	0.1877	0.0000009	0.0006	0.0013930	10.0678	930.12	0.47
	Liberty	0.0000000	0.0000	0.0000000	0.0000	0.0000000	0.0000	0.0000000	0.0000	0.00	0.00
	Montgomery	0.0000000	0.0000	0.0000000	0.0000	0.0000000	0.0000	0.0000000	0.0000	0.00	0.00
	Waller	0.0000000	0.0000	0.0000000	0.0000	0.0000000	0.0000	0.0000000	0.0000	0.00	0.00
Beaumont/ Port Arthur Area	Hardin	0.0000000	0.0000	0.0000000	0.0000	0.0000000	0.0000	0.0000000	0.0000	0.00	0.00
	Jefferson	0.0000000	0.0000	0.0000000	0.0000	0.0000000	0.0000	0.0000000	0.0000	0.00	0.00
	Orange	0.0000000	0.0000	0.0000000	0.0000	0.0000000	0.0000	0.0000000	0.0000	0.00	0.00
Dallas/ Fort Worth Area	Collin	0.0012932	8.0000	0.0079329	78.9444	0.0003832	0.2345	0.0000809	0.5849	87.76	0.04
	Dallas	0.0024826	15.3584	0.0152295	151.5565	0.0007356	0.4503	0.0001554	1.1230	168.49	0.08
	Denton	0.0001267	0.7836	0.0007770	7.7325	0.0000375	0.0230	0.0000079	0.0573	8.60	0.00
	Tarrant	0.0004742	2.9335	0.0029089	28.9476	0.0001405	0.0860	0.0000297	0.2145	32.18	0.02
	Ellis	0.0029920	18.5096	0.0183544	182.6530	0.0008865	0.5426	0.0001873	1.3534	203.06	0.10
	Johnson	0.0007256	4.4888	0.0044512	44.2958	0.0002150	0.1316	0.0000454	0.3282	49.24	0.02
	Kaufman	0.0059718	36.9441	0.0366343	364.5651	0.0017695	1.0831	0.0003738	2.7012	405.29	0.20
	Parker	0.0000012	0.0076	0.0000075	0.0751	0.0000004	0.0002	0.0000001	0.0006	0.08	0.00
	Rockwall	0.0000000	0.0000	0.0000000	0.0000	0.0000000	0.0000	0.0000000	0.0000	0.00	0.00
	Henderson	0.0006908	4.2734	0.0042376	42.1700	0.0002047	0.1253	0.0000432	0.3125	46.88	0.02
	Hood	0.0050771	31.4088	0.0311454	309.9429	0.0015044	0.9208	0.0003178	2.2965	344.57	0.17
	Hunt	0.0088463	54.7268	0.0047066	46.8380	0.0002273	0.1391	0.0652823	471.8144	573.52	0.29
El Paso Area	El Paso	0.0000000	0.0000	0.0000000	0.0000	0.0000000	0.0000	0.0000000	0.0000	0.00	0.00
San Antonio Area	Bexar	0.0138906	85.9325	0.0009368	9.3227	0.0000452	0.0277	0.1109355	801.7639	897.05	0.45
	Comal	0.0000000	0.0000	0.0000000	0.0000	0.0000000	0.0000	0.0000000	0.0000	0.00	0.00
	Guadalupe	0.0032029	19.8143	0.0002160	2.1496	0.0000104	0.0064	0.0255795	184.8703	206.84	0.10
	Wilson	0.0000000	0.0000	0.0000000	0.0000	0.0000000	0.0000	0.0000000	0.0000	0.00	0.00
Austin Area	Bastrop	0.0033782	20.8990	0.0002278	2.2673	0.0000110	0.0067	0.0269798	194.9906	218.16	0.11
	Caldwell	0.0000000	0.0000	0.0000000	0.0000	0.0000000	0.0000	0.0000000	0.0000	0.00	0.00
	Hays	0.0008331	5.1541	0.0000562	0.5592	0.0000027	0.0017	0.0066537	48.0881	53.80	0.03
	Travis	0.0051785	32.0364	0.0003493	3.4756	0.0000169	0.0103	0.0413577	298.9044	334.43	0.17
	Williamson	0.0000000	0.0000	0.0000000	0.0000	0.0000000	0.0000	0.0000000	0.0000	0.00	0.00
North East Texas Area	Gregg	0.0000000	0.0000	0.0000000	0.0000	0.0000000	0.0000	0.0000000	0.0000	0.00	0.00
	Harrison	0.0000000	0.0000	0.0000000	0.0000	0.0000000	0.0000	0.0000000	0.0000	0.00	0.00
	Rusk	0.0000000	0.0000	0.0000000	0.0000	0.0000000	0.0000	0.0000000	0.0000	0.00	0.00
	Smith	0.0000000	0.0000	0.0000000	0.0000	0.0000000	0.0000	0.0000000	0.0000	0.00	0.00
	Upshur	0.0000000	0.0000	0.0000000	0.0000	0.0000000	0.0000	0.0000000	0.0000	0.00	0.00
Corpus Christi Area	Nueces	0.0128578	79.5431	0.0008672	8.6295	0.0000419	0.0256	0.1026870	742.1493	830.35	0.42
	San Patricio	0.0015100	9.3411	0.0001018	1.0134	0.0000049	0.0030	0.0120591	87.1543	97.51	0.05
Victoria Area	Victoria	0.0021192	13.1099	0.0001429	1.4223	0.0000069	0.0042	0.0169244	122.3174	136.85	0.07
Other ERCOT counties	Andrews	0.0000037	0.0232	0.0000230	0.2286	0.0039003	2.3873	0.0000002	0.0017	2.64	0.00
	Angelina	0.0000000	0.0000	0.0000000	0.0000	0.0000000	0.0000	0.0000000	0.0000	0.00	0.00
	Bosque	0.0022204	13.7364	0.0136212	135.5508	0.0006579	0.4027	0.0001390	1.0044	150.69	0.08
	Brazos	0.0024089	14.9022	0.0112305	111.7603	0.0005425	0.3320	0.0047829	34.5675	161.56	0.08
	Calhoun	0.0009466	5.8559	0.0000638	0.6353	0.0000031	0.0019	0.0075598	54.6366	61.13	0.03
	Cameron	0.0063536	39.3060	0.0004285	4.2642	0.0000207	0.0127	0.0507425	366.7307	410.31	0.21
	Cherokee	0.0027392	16.9455	0.0168033	167.2180	0.0008116	0.4968	0.0001714	1.2390	185.90	0.09
	Coke	0.0000000	0.0000	0.0000000	0.0000	0.0000000	0.0000	0.0000000	0.0000	0.00	0.00
	Coleman	0.0000000	0.0000	0.0000000	0.0000	0.0000000	0.0000	0.0000000	0.0000	0.00	0.00
	Crockett	0.0000000	0.0000	0.0000000	0.0000	0.0000000	0.0000	0.0000000	0.0000	0.00	0.00
	Ector	0.0019215	11.8872	0.0006604	6.5715	0.0911346	55.7813	0.0146527	105.8993	180.14	0.09
	Fannin	0.0000041	0.0251	0.0000249	0.2475	0.0000012	0.0007	0.0000003	0.0018	0.28	0.00
	Fayette	0.0051867	32.0869	0.0103217	102.7160	0.0004986	0.3052	0.0283993	205.2502	340.36	0.17
	Freestone	0.0047643	29.4740	0.0292268	290.8499	0.0014117	0.8641	0.0002982	2.1551	323.34	0.16
	Frio	0.0000000	0.0000	0.0000000	0.0000	0.0000000	0.0000	0.0000000	0.0000	0.00	0.00
	Grimes	0.0000000	0.0000	0.0000000	0.0000	0.0000000	0.0000	0.0000000	0.0000	0.00	0.00
	Hardeman	0.0000000	0.0000	0.0000000	0.0000	0.0000000	0.0000	0.0000000	0.0000	0.00	0.00
	Haskell	0.0000000	0.0000	0.0000000	0.0000	0.0000000	0.0000	0.0000000	0.0000	0.00	0.00
	Hidalgo	0.0053716	33.2306	0.0003623	3.6051	0.0000175	0.0107	0.0428994	310.0466	346.89	0.17
	Howard	0.0002411	1.4916	0.0007641	7.6036	0.1283942	78.5870	0.0009490	6.8586	94.54	0.05
	Jack	0.0030783	19.0436	0.0188839	187.9227	0.0009121	0.5583	0.0001927	1.3924	208.92	0.10
	Jones	0.0000000	0.0000	0.0000000	0.0000	0.0000000	0.0000	0.0000000	0.0000	0.00	0.00
	Lamar	0.0040001	24.7464	0.0245388	244.1978	0.0011853	0.7255	0.0002504	1.8094	271.48	0.14
	Limestone	0.0000000	0.0000	0.0000000	0.0000	0.0000000	0.0000	0.0000000	0.0000	0.00	0.00
	Llano	0.0040314	24.9401	0.0002719	2.7057	0.0000131	0.0080	0.0321966	232.6946	260.35	0.13
	McLennan	0.0056576	35.0002	0.0347066	345.3824	0.0016764	1.0261	0.0003541	2.5591	383.97	0.19
	Milam	0.0012686	7.8481	0.0000856	0.8514	0.0000041	0.0025	0.0101316	73.2238	81.93	0.04
	Mitchell	0.0000311	0.1926	0.0001910	1.9003	0.0324260	19.8472	0.0000019	0.0141	21.95	0.01
	Nolan	0.0000293	0.1810	0.0001795	1.7860	0.0304745	18.6527	0.0000018	0.0132	20.63	0.01
	Palo Pinto	0.0036129	22.3510	0.0221635	220.5601	0.0010705	0.6552	0.0002261	1.6342	245.20	0.12
	Pecos	0.0000020	0.0122	0.0000121	0.1203	0.0020520	1.2560	0.0000001	0.0009	1.39	0.00
	Presidio	0.0000000	0.0000	0.0000000	0.0000	0.0000000	0.0000	0.0000000	0.0000	0.00	0.00
	Red River	0.0000000	0.0000	0.0000000	0.0000	0.0000000	0.0000	0.0000000	0.0000	0.00	0.00
	Robertson	0.0039506	24.4397	0.0055755	55.4842	0.0002693	0.1648	0.0246170	177.9140	258.00	0.13
	Taylor	0.0000000	0.0000	0.0000000	0.0000	0.0000000	0.0000	0.0000000	0.0000	0.00	0.00
	Titus	0.0000000	0.0000	0.0000000	0.0000	0.0000000	0.0000	0.0000000	0.0000	0.00	0.00
	Tom Green	0.0000000	0.0000	0.0000000	0.0000	0.0000000	0.0000	0.0000000	0.0000	0.00	0.00
	Upton	0.0000025	0.0157	0.0000156	0.1553	0.0026494	1.6217	0.0000002	0.0012	1.79	0.00
	Ward	0.0001995	1.2343	0.0012239	12.1801	0.2078335	127.2099	0.0000125	0.0902	140.71	0.07
	Webb	0.0042017	25.9935	0.0002834	2.8200	0.0000137	0.0084	0.0335565	242.5231	271.34	0.14
	Wharton	0.0021095	13.0502	0.0001423	1.4158	0.0000069	0.0042	0.0168474	121.7608	136.23	0.07
	Wichita	0.0000121	0.0749	0.0000743	0.7395	0.0126190	7.7238	0.0000008	0.0055	8.54	0.00
	Wilbarger	0.0179710	111.1755	0.1102430	1097.0811	0.0053249	3.2593	0.0011247	8.1288	1219.64	0.61
	Wise	0.0010202	6.3112	0.0062583	62.2792	0.0003023	0.1850	0.0000638	0.4615	69.24	0.03
	Young	0.0071054	43.9567	0.0435880	433.7654	0.0021054	1.2886	0.0004447	3.2140	482.22	0.24
	Total	**0.4414501**	**2730.9774**	**0.4812863**	**4789.5112**	**0.5345786**	**327.2027**	**0.6829349**	**4935.7718**	12783.46	**6.39**
Energy Savings (MWh)		6,186		9,951		612		7,227			

Table 38: Annual and OSD Electricity Savings for the Different Programs (Base Year 2008)

PROGRAM	ANNUAL												
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
ESL-Single Family (MWh)	0	21,748	55,268	93,760	132,768	172,325	212,462	253,214	294,613	336,694	379,492	423,044	467,388
ESL-Multifamily (MWh)	0	50,218	94,867	167,566	239,960	312,072	383,927	455,547	526,957	598,177	669,233	740,146	810,939
ESL-Commercial (MWh)	0	0	25,750	54,550	83,726	113,302	143,303	173,752	204,674	236,097	268,045	300,545	333,627
PUC (SB7) (MWh)	0	449,034	814,153	1,197,953	1,562,564	1,908,944	2,238,004	2,550,612	2,847,590	3,129,718	3,397,740	3,652,361	3,894,251
SECO (MWh)	0	235,216	293,537	509,616	714,891	909,903	1,095,163	1,271,161	1,438,359	1,597,197	1,748,093	1,891,444	2,027,628
Wind-ERCOT (MWh)	0	3,273,150	8,135,429	10,995,427	11,328,405	11,671,466	12,024,917	12,389,071	12,764,253	13,150,797	13,549,046	13,959,356	14,382,092
SEER13-Single Family (MWh)	0	343,330	326,163	309,855	294,362	279,644	265,662	252,379	239,760	227,772	216,383	205,564	195,286
SEER13-Multifamily (MWh)	0	29,021	27,569	26,191	24,881	23,637	22,456	21,333	20,266	19,253	18,290	17,376	16,507
Total Annual (MWh)	0	4,401,717	9,772,736	13,354,918	14,381,557	15,391,293	16,385,894	17,367,069	18,336,472	19,295,705	20,246,322	21,189,836	22,127,718

PROGRAM	OZONE SEASON DAY - OSD												
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
ESL-Single Family (MWh)	0	124	283	468	655	844	1,037	1,232	1,431	1,633	1,838	2,047	2,259
ESL-Multifamily (MWh)	0	233	460	744	1,027	1,308	1,589	1,869	2,148	2,426	2,704	2,981	3,258
ESL-Commercial (MWh)	0	0	71	149	229	310	393	476	561	647	734	823	914
PUC (SB7) (MWh)	0	1,230	2,231	3,282	4,281	5,230	6,132	6,988	7,802	8,575	9,309	10,006	10,669
SECO (MWh)	0	644	804	1,396	1,959	2,493	3,000	3,483	3,941	4,376	4,789	5,182	5,555
Wind-ERCOT (MWh)	0	14,246	23,054	27,654	28,492	29,355	30,244	31,160	32,103	33,075	34,077	35,109	36,172
SEER13-Single Family (MWh)	0	2,445	2,323	2,207	2,097	1,992	1,892	1,798	1,708	1,622	1,541	1,464	1,391
SEER13-Multifamily (MWh)	0	195	186	176	167	159	151	144	136	130	123	117	111
Total OSD (MWh)	0	19,117	29,412	36,076	38,907	41,691	44,438	47,150	49,830	52,484	55,115	57,729	60,329

Table 39: Annualand OSD NOx Emissions Reduction Values for the Different Programs (Base Year 2008)

PROGRAM	ANNUAL (in tons NOx)												
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
ESL-Single Family	0	5	14	23	33	42	52	62	72	83	93	104	115
ESL-Multifamily	0	13	24	43	61	80	98	117	135	153	171	190	208
ESL-Commercial	0	0	6	14	21	28	36	43	51	59	67	75	83
PUC (SB7)	0	126	229	340	447	547	643	734	821	903	981	1,055	1,125
SECO	0	67	99	162	221	277	330	381	429	475	518	559	599
Wind-ERCOT	0	893	2,268	3,062	3,154	3,250	3,348	3,450	3,554	3,662	3,773	3,887	4,005
SEER13-Single Family	0	81	77	73	69	66	62	59	56	53	51	48	46
SEER13-Multifamily	0	7	6	6	6	6	5	5	5	5	4	4	4
Total Annual (Tons NOx)	0	1,192	2,723	3,723	4,012	4,296	4,574	4,851	5,123	5,393	5,658	5,922	6,185

PROGRAM	OZONE SEASON DAY - OSD (in tons NOx/day)												
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
ESL-Single Family	0.00	0.03	0.07	0.11	0.16	0.21	0.25	0.30	0.35	0.40	0.45	0.50	0.55
ESL-Multifamily	0.00	0.06	0.12	0.19	0.26	0.33	0.41	0.48	0.55	0.62	0.69	0.76	0.83
ESL-Commercial	0.00	0.00	0.02	0.04	0.06	0.08	0.10	0.12	0.14	0.16	0.18	0.20	0.23
PUC (SB7)	0.00	0.35	0.63	0.93	1.22	1.50	1.76	2.01	2.25	2.47	2.69	2.89	3.08
SECO	0.00	0.18	0.27	0.44	0.60	0.76	0.90	1.04	1.18	1.30	1.42	1.53	1.64
Wind-ERCOT	0.00	3.94	6.42	7.63	7.87	8.10	8.35	8.60	8.86	9.13	9.41	9.69	9.99
SEER13-Single Family	0.00	0.57	0.54	0.51	0.49	0.46	0.44	0.42	0.40	0.38	0.36	0.34	0.32
SEER13-Multifamily	0.00	0.05	0.04	0.04	0.04	0.04	0.04	0.03	0.03	0.03	0.03	0.03	0.03
Total OSD (Tons NOx)	0.00	5.18	8.11	9.89	10.70	11.48	12.25	13.00	13.76	14.49	15.23	15.94	16.67

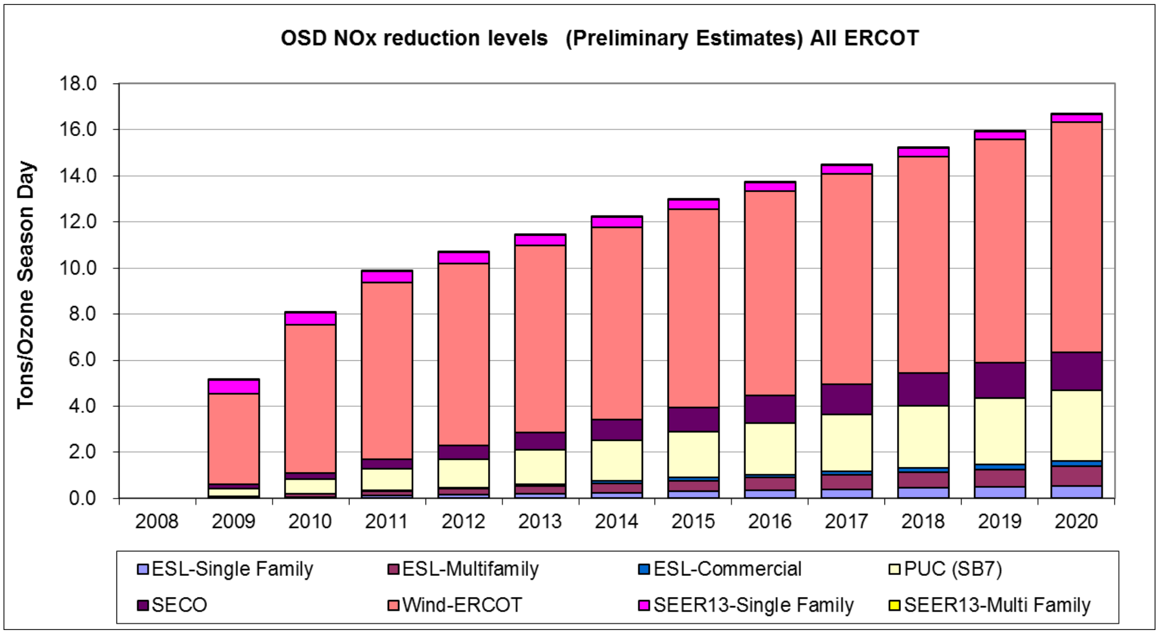

Figure 62: Integrated OSD NOx Emissions Reduction Projections through 2020 (Base Year 2008)

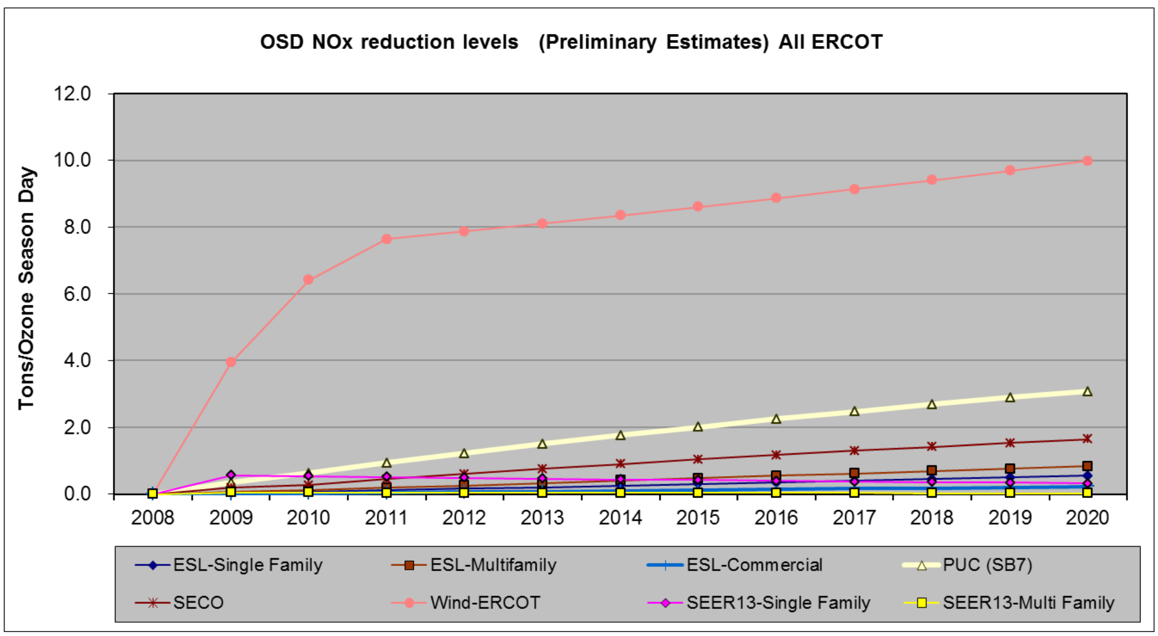

Figure 63: Integrated OSD NOx Emissions Reduction Projections through 2020 (Base Year 2008)

7 Calculated NOx Reduction Potential from the Implementation of the 2006 IECC and the ASHRAE Standard 90.1-2007

7.1 Calculated 2011 Electricity and Natural Gas Savings Due to the Implementation of the 2006 IECC to New Residential Construction (Single-family and Multi-family) and the ASHRAE Standard 90.1-2007 to New Commercial Construction Using Code-Traceable, Fuel-Neutral Simulation

A complete reporting of the savings from the implementation of the 2006 IECC and the ASHRAE Standard 90.1-2007 requires tracking and analyzing savings for new construction buildings that undergo a building permit. The adoption of the 2006 IECC and the ASHRAE Standard 90.1-2007 in Texas is expected to impact the following types of buildings:

- single-family residential
- multi-family residential
- commercial
- industrial

The following sections report the calculated energy savings associated with new construction activities for both residential (i.e., single-family and multi-family) and commercial construction. The calculation of energy savings from the adoption of the ASHRAE Standard 90.1-2007 in industrial buildings is currently under development at the Laboratory, and will be reported in future reports.

7.1.1 2011 Results for New Single-family Residential Construction

This section provides the potential electricity and natural gas reductions and the associated emissions reductions from the implementation of the 2006 IECC for new single-family residences in the 41 non-attainment and affected counties as well as other counties in the ERCOT region[63]. To calculate the NOx emissions reductions from the implementation of the 2006 IECC, the following procedures were adopted. First, new construction activity was determined by county, and energy savings attributable to the 2006 IECC were calculated using the Laboratory's code-traceable, DOE-2.1e simulation, which was developed for the TERP. These estimates were then applied to the NAHB Builder's survey data to determine the appropriate number of housing types. Then the NOx reduction potential from the electricity and natural gas reductions in each county was calculated using the US EPA's 2010 eGRID database[64].

In Table 40, the 2008 and the 2006 IECC code-compliant building characteristics are shown for each county. The 2008 building characteristics reflect those published by the NAHB, ARI and GAMA for Texas. The 2006 IECC code-compliant characteristics are the minimum building code characteristics required by the 2006 IECC for each county for single-family residences (i.e., Type A.1). In Table 40, the rows are sorted first by the US EPA's non-attainment, affected designation, and then other ERCOT counties alphabetically. Next, in the fourth column, the NAHB Builder's survey classification is listed. The fifth, sixth, seventh, and eighth columns show the NAHB Builder's survey average glazing U-value, Solar Heat Gain Coefficient (SHGC), roof insulation and wall insulation, respectively. In columns nine through twelve, the corresponding values from the 2006 IECC code-compliant house are listed for each county (i.e., glazing U-value, SHGC, roof and wall insulation R-value).

The 2006 IECC SHGC is 0.4 for all non-attainment and affected counties as required by the 2006 IECC. All the 2008 houses were assumed to have air-conditioner efficiency equal to a SEER 13, furnace efficiency (AFUE) of 0.80, and a domestic water heater efficiency of 76%. All the 2006 IECC code-compliant houses were assumed to have air-conditioner efficiency equal to a SEER 13[65]. The values shown in Table 40 represent the only changes that were made to the simulation to obtain the savings calculations. All other variables in the simulation remained the same for the 2008 and the 2006 IECC code-compliant simulation. In cases where the 2008 values were more

[63]The three new counties, Henderson, Hood and Hunt were added in the 2003 Legislative session are included in this.
[64] This preliminary analysis does not include actual power transfers on the grid, and assumes transmission and distribution losses of 7%. Counties were assigned to utility service districts as indicated.
[65] Based on the regulation effective.

efficient than the 2006 IECC code-compliant simulation, the 2008 values were used in both simulations, since this indicates that the prevailing practice is already above code. For example, in Brazoria County, according to the NAHB Builder's survey data, the wall insulation is R-14.56, which is already above the code-required insulation of R-13. Therefore, R-14.56 was used in both simulations.

The code-traceable simulation results are shown for each county. In a similar fashion as Table 40, Table 41 is first divided into the US EPA's non-attainment and affected classifications, followed by an alphabetical listing of other ERCOT counties. In the third column of Table 41, the 2006 IECC climate zone is listed followed by the number of projected new housing units[66] in the fourth column. In the fifth column, the total simulated energy use is listed if all new construction had been built to pre-code specifications, and, in the sixth column, the total county-wide energy use for code-compliant construction is shown. The values in the fifth and sixth columns come from the associated 24 simulations runs for each county, which were then distributed according to the NAHB Builder's survey data to account for 1 story, 2 story, slab-on-grade, crawlspace, and three different system types. In the seventh column, the total annual electricity savings are shown for each county, respectively. A 7% transmission and distribution loss is used in the 2011 report, which represents a fixed 1.07 multiplier for the electricity use. In the eighth and ninth columns, the total annual pre-code and code-compliant natural gas use is shown for those residences that had natural gas-fired furnaces and domestic water heaters. Finally, in tenth column, the total annual natural gas savings are shown for each county.

In Table 42, the Congestion Management (CM) Zones[67] assignments for each county are shown. In Table 43[68], the annual electricity savings are assigned to CM Zones provider(s) according to Table 42. The total electricity savings for each CM Zone, as shown in then entered into the bottom row of Table 44, which is the 2010 US EPA's eGRID database[69] for Texas. eGRID then proportions each MWh of electricity savings according to the 2008 measured data from the power plants assigned to that CM Zones. For each county in which there is a power plant the lbs-NOx/MWh are calculated and displayed as NOx reductions (lbs) in the column adjacent to the CM Zones column. Adding across the rows then totals the NOx reductions in each county from multiple CM Zones that have power plants in that county. Counties that do not show NOx reductions represent counties that do not have power plants in eGRID's database.

[66] The number of projected new housing units uses the published values for the new housing units in 2011. A vacancy rate of 0% was assumed for 2011 calculations, based on information suggested by the Real Estate Center at Texas A&M University.
[67] ERCOT region has employed the Congestion Management (CM) since 2010, and it is currently divided into four zones, Houston (H), North (N), South (S), and West (W).
[68] Of a total of 202 counties listed in Table 33, the annual electricity savings in 138 counties (i.e., 10,499 MWh), including 8 non-attainment and affected non-ERCOT counties (i.e, 29.56 % of total savings in 138 counties), are not reported in Table 35 since the corresponding providers could not be assigned for these 138 counties.
[69] This preliminary analysis does not include actual power transfers on the grid, and assumes transmission and distribution losses of 7%. Counties were assigned to CM Zones as indicated.

Table 40: 2008 and the 2006 IECC Code-compliant Building Characteristics used in the DOE-2 Simulations for Single-family Residential Buildings

	COUNTY	Climate Zone	Division (East or West)	2008 Average Glazing U-value (Btu/hr-ft2-F)	2008 Average SHGC	2008 Average Roof Insulation (hr-ft2-F/Btu)	2008 Average Wall Insulation (hr-ft2-F/Btu)	2006 IECC Glazing U-value (Btu/hr-ft2-F)	2006 IECC SHGC	2006 IECC Roof Insulation (hr-ft2-F/Btu)	2006 IECC Wall Insulation (hr-ft2-F/Btu)
Non-attainment	Brazoria	2	East Texas	0.44	0.53	28.17	14.56	0.75	0.40	30	13.00
	Chambers	2	East Texas	0.44	0.53	28.17	14.56	0.75	0.40	30	13.00
	Collin	3	West Texas	0.44	0.53	25.29	14.74	0.65	0.40	30	13.00
	Dallas	3	West Texas	0.44	0.53	25.29	14.74	0.65	0.40	30	13.00
	Denton	3	West Texas	0.44	0.53	25.29	14.74	0.65	0.40	30	13.00
	El Paso	3	West Texas	0.44	0.53	25.29	14.74	0.65	0.40	30	13.00
	Fort Bend	2	East Texas	0.44	0.53	28.17	14.56	0.75	0.40	30	13.00
	Galveston	2	East Texas	0.44	0.53	28.17	14.56	0.75	0.40	30	13.00
	Hardin	2	East Texas	0.44	0.53	28.17	14.56	0.75	0.40	30	13.00
	Harris	2	East Texas	0.44	0.53	28.17	14.56	0.75	0.40	30	13.00
	Jefferson	2	East Texas	0.44	0.53	28.17	14.56	0.75	0.40	30	13.00
	Liberty	2	East Texas	0.44	0.53	28.17	14.56	0.75	0.40	30	13.00
	Montgomery	2	East Texas	0.44	0.53	28.17	14.56	0.75	0.40	30	13.00
	Orange	2	East Texas	0.44	0.53	28.17	14.56	0.75	0.40	30	13.00
	Tarrant	3	West Texas	0.44	0.53	25.29	14.74	0.65	0.40	30	13.00
	Waller	2	East Texas	0.44	0.53	28.17	14.56	0.75	0.40	30	13.00
Affected	Bastrop	2	West Texas	0.44	0.53	25.29	14.74	0.75	0.40	30	13.00
	Bexar	2	West Texas	0.44	0.53	25.29	14.74	0.75	0.40	30	13.00
	Caldwell	2	West Texas	0.44	0.53	25.29	14.74	0.75	0.40	30	13.00
	Comal	2	West Texas	0.44	0.53	25.29	14.74	0.75	0.40	30	13.00
	Ellis	3	West Texas	0.44	0.53	25.29	14.74	0.65	0.40	30	13.00
	Gregg	3	East Texas	0.44	0.53	28.17	14.56	0.65	0.40	30	13.00
	Guadalupe	2	West Texas	0.44	0.53	25.29	14.74	0.75	0.40	30	13.00
	Harrison	3	East Texas	0.44	0.53	28.17	14.56	0.65	0.40	30	13.00
	Hays	2	West Texas	0.44	0.53	25.29	14.74	0.75	0.40	30	13.00
	Henderson	3	East Texas	0.44	0.53	28.17	14.56	0.65	0.40	30	13.00
	Hood	3	West Texas	0.44	0.53	25.29	14.74	0.65	0.40	30	13.00
	Hunt	3	West Texas	0.44	0.53	25.29	14.74	0.65	0.40	30	13.00
	Johnson	3	West Texas	0.44	0.53	25.29	14.74	0.65	0.40	30	13.00
	Kaufman	3	West Texas	0.44	0.53	25.29	14.74	0.65	0.40	30	13.00
	Nueces	2	East Texas	0.44	0.53	28.17	14.56	0.75	0.40	30	13.00
	Parker	3	West Texas	0.44	0.53	25.29	14.74	0.65	0.40	30	13.00
	Rockwall	3	West Texas	0.44	0.53	25.29	14.74	0.65	0.40	30	13.00
	Rusk	3	East Texas	0.44	0.53	28.17	14.56	0.65	0.40	30	13.00
	San Patricio	2	East Texas	0.44	0.53	28.17	14.56	0.75	0.40	30	13.00
	Smith	3	East Texas	0.44	0.53	28.17	14.56	0.65	0.40	30	13.00
	Travis	2	West Texas	0.44	0.53	25.29	14.74	0.75	0.40	30	13.00
	Upshur	3	West Texas	0.44	0.53	25.29	14.74	0.65	0.40	30	13.00
	Victoria	2	East Texas	0.44	0.53	28.17	14.56	0.75	0.40	30	13.00
	Williamson	2	West Texas	0.44	0.53	25.29	14.74	0.75	0.40	30	13.00
	Wilson	2	West Texas	0.44	0.53	25.29	14.74	0.75	0.40	30	13.00
ERCOT	ANDERSON	2	East Texas	0.44	0.53	28.17	14.56	0.75	0.40	30	13.00
	ANDREWS	3	West Texas	0.44	0.53	25.29	14.74	0.65	0.40	30	13.00
	ANGELINA	2	East Texas	0.44	0.53	28.17	14.56	0.75	0.40	30	13.00
	ARANSAS	2	East Texas	0.44	0.53	28.17	14.56	0.75	0.40	30	13.00
	ARCHER	3	West Texas	0.44	0.53	25.29	14.74	0.65	0.40	30	13.00
	ATASCOSA	2	West Texas	0.44	0.53	25.29	14.74	0.75	0.40	30	13.00
	AUSTIN	2	East Texas	0.44	0.53	28.17	14.56	0.75	0.40	30	13.00
	BANDERA	2	West Texas	0.44	0.53	25.29	14.74	0.75	0.40	30	13.00
	BASTROP	2	West Texas	0.44	0.53	25.29	14.74	0.75	0.40	30	13.00
	BAYLOR	3	West Texas	0.44	0.53	25.29	14.74	0.65	0.40	30	13.00
	BEE	2	East Texas	0.44	0.53	28.17	14.56	0.75	0.40	30	13.00
	BELL	2	West Texas	0.44	0.53	25.29	14.74	0.75	0.40	30	13.00
	BEXAR	2	West Texas	0.44	0.53	25.29	14.74	0.75	0.40	30	13.00
	BLANCO	3	West Texas	0.44	0.53	25.29	14.74	0.65	0.40	30	13.00
	BORDEN	3	West Texas	0.44	0.53	25.29	14.74	0.65	0.40	30	13.00
	BOSQUE	2	West Texas	0.44	0.53	25.29	14.74	0.75	0.40	30	13.00
	BRAZORIA	2	East Texas	0.44	0.53	28.17	14.56	0.75	0.40	30	13.00
	BRAZOS	2	East Texas	0.44	0.53	28.17	14.56	0.75	0.40	30	13.00
	BREWSTER	3	West Texas	0.44	0.53	25.29	14.74	0.65	0.40	30	13.00
	BRISCOE	4	West Texas	0.44	0.53	25.29	14.74	0.40	NR	38	13.00
	BROOKS	2	East Texas	0.44	0.53	28.17	14.56	0.75	0.40	30	13.00
	BROWN	3	West Texas	0.44	0.53	25.29	14.74	0.65	0.40	30	13.00
	BURLESON	2	East Texas	0.44	0.53	28.17	14.56	0.75	0.40	30	13.00
	BURNET	3	West Texas	0.44	0.53	25.29	14.74	0.65	0.40	30	13.00
	CALDWELL	2	West Texas	0.44	0.53	25.29	14.74	0.75	0.40	30	13.00
	CALHOUN	2	East Texas	0.44	0.53	28.17	14.56	0.75	0.40	30	13.00
	CALLAHAN	3	West Texas	0.44	0.53	25.29	14.74	0.65	0.40	30	13.00
	CAMERON	2	East Texas	0.44	0.53	28.17	14.56	0.75	0.40	30	13.00
	CHAMBERS	2	East Texas	0.44	0.53	28.17	14.56	0.75	0.40	30	13.00
	CHEROKEE	2	East Texas	0.44	0.53	28.17	14.56	0.75	0.40	30	13.00
	CHILDRESS	3	West Texas	0.44	0.53	25.29	14.74	0.65	0.40	30	13.00
	CLAY	3	West Texas	0.44	0.53	25.29	14.74	0.65	0.40	30	13.00
	COKE	3	West Texas	0.44	0.53	25.29	14.74	0.65	0.40	30	13.00
	COLEMAN	3	West Texas	0.44	0.53	25.29	14.74	0.65	0.40	30	13.00
	COLLIN	3	West Texas	0.44	0.53	25.29	14.74	0.65	0.40	30	13.00
	COLORADO	2	East Texas	0.44	0.53	28.17	14.56	0.75	0.40	30	13.00
	COMAL	2	West Texas	0.44	0.53	25.29	14.74	0.75	0.40	30	13.00
	COMANCHE	3	West Texas	0.44	0.53	25.29	14.74	0.65	0.40	30	13.00
	CONCHO	3	West Texas	0.44	0.53	25.29	14.74	0.65	0.40	30	13.00
	COOKE	3	West Texas	0.44	0.53	25.29	14.74	0.65	0.40	30	13.00
	CORYELL	2	West Texas	0.44	0.53	25.29	14.74	0.75	0.40	30	13.00
	COTTLE	3	West Texas	0.44	0.53	25.29	14.74	0.65	0.40	30	13.00
	CRANE	3	West Texas	0.44	0.53	25.29	14.74	0.65	0.40	30	13.00
	CROCKETT	3	West Texas	0.44	0.53	25.29	14.74	0.65	0.40	30	13.00
	CROSBY	3	West Texas	0.44	0.53	25.29	14.74	0.65	0.40	30	13.00
	CULBERSON	3	West Texas	0.44	0.53	25.29	14.74	0.65	0.40	30	13.00
	DALLAS	3	West Texas	0.44	0.53	25.29	14.74	0.65	0.40	30	13.00
	DAWSON	3	West Texas	0.44	0.53	25.29	14.74	0.65	0.40	30	13.00
	DE WITT	2	East Texas	0.44	0.53	28.17	14.56	0.75	0.40	30	13.00
	DELTA	3	West Texas	0.44	0.53	25.29	14.74	0.65	0.40	30	13.00
	DENTON	3	West Texas	0.44	0.53	25.29	14.74	0.65	0.40	30	13.00
	DICKENS	3	West Texas	0.44	0.53	25.29	14.74	0.65	0.40	30	13.00
	DIMMIT	2	West Texas	0.44	0.53	25.29	14.74	0.75	0.40	30	13.00
	DUVAL	2	East Texas	0.44	0.53	28.17	14.56	0.75	0.40	30	13.00
	EASTLAND	3	West Texas	0.44	0.53	25.29	14.74	0.65	0.40	30	13.00
	ECTOR	3	West Texas	0.44	0.53	25.29	14.74	0.65	0.40	30	13.00
	EDWARDS	2	West Texas	0.44	0.53	25.29	14.74	0.75	0.40	30	13.00
	ELLIS	3	West Texas	0.44	0.53	25.29	14.74	0.65	0.40	30	13.00
	ERATH	3	West Texas	0.44	0.53	25.29	14.74	0.65	0.40	30	13.00
	FALLS	2	West Texas	0.44	0.53	25.29	14.74	0.75	0.40	30	13.00
	FANNIN	3	West Texas	0.44	0.53	25.29	14.74	0.65	0.40	30	13.00
	FAYETTE	2	East Texas	0.44	0.53	28.17	14.56	0.75	0.40	30	13.00
	FISHER	3	West Texas	0.44	0.53	25.29	14.74	0.65	0.40	30	13.00
	FOARD	3	West Texas	0.44	0.53	25.29	14.74	0.65	0.40	30	13.00
	FORT BEND	2	East Texas	0.44	0.53	28.17	14.56	0.75	0.40	30	13.00
	FRANKLIN	3	West Texas	0.44	0.53	25.29	14.74	0.65	0.40	30	13.00
	FREESTONE	2	West Texas	0.44	0.53	25.29	14.74	0.75	0.40	30	13.00

Table 40: 2008 and the 2006 IECC Code-compliant Building Characteristics used in the DOE-2 Simulations for Single-family Residential Buildings (Continued)

	COUNTY	Climate Zone	Division (East or West)	2008 Average Glazing U-value (Btu/hr-ft2-F)	2008 Average SHGC	2008 Average Roof Insulation (hr-ft2-F/Btu)	2008 Average Wall Insulation (hr-ft2-F/Btu)	2006 IECC Glazing U-value (Btu/hr-ft2-F)	2006 IECC SHGC	2006 IECC Roof Insulation (hr-ft2-F/Btu)	2006 IECC Wall Insulation (hr-ft2-F/Btu)
	FRIO	2	West Texas	0.44	0.53	25.29	14.74	0.75	0.40	30	13.00
	GALVESTON	2	East Texas	0.44	0.53	28.17	14.56	0.75	0.40	30	13.00
	GILLESPIE	3	West Texas	0.44	0.53	25.29	14.74	0.65	0.40	30	13.00
	GLASSCOCK	3	West Texas	0.44	0.53	25.29	14.74	0.65	0.40	30	13.00
	GOLIAD	2	East Texas	0.44	0.53	28.17	14.56	0.75	0.40	30	13.00
	GONZALES	2	West Texas	0.44	0.53	25.29	14.74	0.75	0.40	30	13.00
	GRAYSON	3	West Texas	0.44	0.53	25.29	14.74	0.65	0.40	30	13.00
	GRIMES	2	East Texas	0.44	0.53	28.17	14.56	0.75	0.40	30	13.00
	GUADALUPE	2	West Texas	0.44	0.53	25.29	14.74	0.75	0.40	30	13.00
	HALL	3	West Texas	0.44	0.53	25.29	14.74	0.65	0.40	30	13.00
	HAMILTON	3	West Texas	0.44	0.53	25.29	14.74	0.65	0.40	30	13.00
	HARDEMAN	3	West Texas	0.44	0.53	25.29	14.74	0.65	0.40	30	13.00
	HARRIS	2	East Texas	0.44	0.53	28.17	14.56	0.75	0.40	30	13.00
	HASKELL	3	West Texas	0.44	0.53	25.29	14.74	0.65	0.40	30	13.00
	HAYS	2	West Texas	0.44	0.53	25.29	14.74	0.75	0.40	30	13.00
	HENDERSON	3	East Texas	0.44	0.53	28.17	14.56	0.65	0.40	30	13.00
	HIDALGO	2	East Texas	0.44	0.53	28.17	14.56	0.75	0.40	30	13.00
	HILL	2	West Texas	0.44	0.53	25.29	14.74	0.75	0.40	30	13.00
	HOOD	3	West Texas	0.44	0.53	25.29	14.74	0.65	0.40	30	13.00
	HOPKINS	3	West Texas	0.44	0.53	25.29	14.74	0.65	0.40	30	13.00
	HOUSTON	2	East Texas	0.44	0.53	28.17	14.56	0.75	0.40	30	13.00
	HOWARD	3	West Texas	0.44	0.53	25.29	14.74	0.65	0.40	30	13.00
	HUDSPETH	3	West Texas	0.44	0.53	25.29	14.74	0.65	0.40	30	13.00
	HUNT	3	West Texas	0.44	0.53	25.29	14.74	0.65	0.40	30	13.00
	IRION	3	West Texas	0.44	0.53	25.29	14.74	0.65	0.40	30	13.00
	JACK	3	West Texas	0.44	0.53	25.29	14.74	0.65	0.40	30	13.00
	JACKSON	2	East Texas	0.44	0.53	28.17	14.56	0.75	0.40	30	13.00
	JEFF DAVIS	3	West Texas	0.44	0.53	25.29	14.74	0.65	0.40	30	13.00
	JIM HOGG	2	West Texas	0.44	0.53	25.29	14.74	0.75	0.40	30	13.00
	JIM WELLS	2	East Texas	0.44	0.53	28.17	14.56	0.75	0.40	30	13.00
	JOHNSON	3	West Texas	0.44	0.53	25.29	14.74	0.65	0.40	30	13.00
	JONES	3	West Texas	0.44	0.53	25.29	14.74	0.65	0.40	30	13.00
	KARNES	2	West Texas	0.44	0.53	25.29	14.74	0.75	0.40	30	13.00
	KAUFMAN	3	West Texas	0.44	0.53	25.29	14.74	0.65	0.40	30	13.00
	KENDALL	3	West Texas	0.44	0.53	25.29	14.74	0.65	0.40	30	13.00
	KENEDY	2	East Texas	0.44	0.53	28.17	14.56	0.75	0.40	30	13.00
	KENT	3	West Texas	0.44	0.53	25.29	14.74	0.65	0.40	30	13.00
	KERR	3	West Texas	0.44	0.53	25.29	14.74	0.65	0.40	30	13.00
	KIMBLE	3	West Texas	0.44	0.53	25.29	14.74	0.65	0.40	30	13.00
	KING	3	West Texas	0.44	0.53	25.29	14.74	0.65	0.40	30	13.00
	KINNEY	2	West Texas	0.44	0.53	25.29	14.74	0.75	0.40	30	13.00
	KLEBERG	2	East Texas	0.44	0.53	28.17	14.56	0.75	0.40	30	13.00
	KNOX	3	West Texas	0.44	0.53	25.29	14.74	0.65	0.40	30	13.00
	LA SALLE	2	West Texas	0.44	0.53	25.29	14.74	0.75	0.40	30	13.00
	LAMAR	3	East Texas	0.44	0.53	28.17	14.56	0.65	0.40	30	13.00
	LAMPASAS	3	West Texas	0.44	0.53	25.29	14.74	0.65	0.40	30	13.00
	LAVACA	2	East Texas	0.44	0.53	28.17	14.56	0.75	0.40	30	13.00
	LEE	2	West Texas	0.44	0.53	25.29	14.74	0.75	0.40	30	13.00
	LEON	2	East Texas	0.44	0.53	28.17	14.56	0.75	0.40	30	13.00
	LIMESTONE	2	West Texas	0.44	0.53	25.29	14.74	0.75	0.40	30	13.00
	LIVE OAK	2	East Texas	0.44	0.53	28.17	14.56	0.75	0.40	30	13.00
	LLANO	3	West Texas	0.44	0.53	25.29	14.74	0.65	0.40	30	13.00
	LOVING	3	West Texas	0.44	0.53	25.29	14.74	0.65	0.40	30	13.00
	MADISON	2	East Texas	0.44	0.53	28.17	14.56	0.75	0.40	30	13.00
	MARTIN	3	West Texas	0.44	0.53	25.29	14.74	0.65	0.40	30	13.00
	MASON	3	West Texas	0.44	0.53	25.29	14.74	0.65	0.40	30	13.00
	MATAGORDA	2	East Texas	0.44	0.53	28.17	14.56	0.75	0.40	30	13.00
	MAVERICK	2	West Texas	0.44	0.53	25.29	14.74	0.75	0.40	30	13.00
	MCCULLOCH	3	West Texas	0.44	0.53	25.29	14.74	0.65	0.40	30	13.00
	MCLENNAN	2	West Texas	0.44	0.53	25.29	14.74	0.75	0.40	30	13.00
	MCMULLEN	2	West Texas	0.44	0.53	25.29	14.74	0.75	0.40	30	13.00
	MEDINA	2	West Texas	0.44	0.53	25.29	14.74	0.75	0.40	30	13.00
	MENARD	3	West Texas	0.44	0.53	25.29	14.74	0.65	0.40	30	13.00
ERCOT	MIDLAND	3	West Texas	0.44	0.53	25.29	14.74	0.65	0.40	30	13.00
	MILAM	2	West Texas	0.44	0.53	25.29	14.74	0.75	0.40	30	13.00
	MILLS	3	West Texas	0.44	0.53	25.29	14.74	0.65	0.40	30	13.00
	MITCHELL	3	West Texas	0.44	0.53	25.29	14.74	0.65	0.40	30	13.00
	MONTAGUE	3	West Texas	0.44	0.53	25.29	14.74	0.65	0.40	30	13.00
	MONTGOMERY	2	East Texas	0.44	0.53	28.17	14.56	0.75	0.40	30	13.00
	MOTLEY	3	West Texas	0.44	0.53	25.29	14.74	0.65	0.40	30	13.00
	NACOGDOCHES	3	East Texas	0.44	0.53	28.17	14.56	0.65	0.40	30	13.00
	NAVARRO	3	West Texas	0.44	0.53	25.29	14.74	0.65	0.40	30	13.00
	NOLAN	3	West Texas	0.44	0.53	25.29	14.74	0.65	0.40	30	13.00
	NUECES	2	East Texas	0.44	0.53	28.17	14.56	0.75	0.40	30	13.00
	PALO PINTO	3	West Texas	0.44	0.53	25.29	14.74	0.65	0.40	30	13.00
	PARKER	3	West Texas	0.44	0.53	25.29	14.74	0.65	0.40	30	13.00
	PECOS	3	West Texas	0.44	0.53	25.29	14.74	0.65	0.40	30	13.00
	PRESIDIO	3	West Texas	0.44	0.53	25.29	14.74	0.65	0.40	30	13.00
	RAINS	3	West Texas	0.44	0.53	25.29	14.74	0.65	0.40	30	13.00
	REAGAN	3	West Texas	0.44	0.53	25.29	14.74	0.65	0.40	30	13.00
	REAL	2	West Texas	0.44	0.53	25.29	14.74	0.75	0.40	30	13.00
	RED RIVER	3	East Texas	0.44	0.53	28.17	14.56	0.65	0.40	30	13.00
	REEVES	3	West Texas	0.44	0.53	25.29	14.74	0.65	0.40	30	13.00
	REFUGIO	2	East Texas	0.44	0.53	28.17	14.56	0.75	0.40	30	13.00
	ROBERTSON	2	East Texas	0.44	0.53	28.17	14.56	0.75	0.40	30	13.00
	ROCKWALL	3	West Texas	0.44	0.53	25.29	14.74	0.65	0.40	30	13.00
	RUNNELS	3	West Texas	0.44	0.53	25.29	14.74	0.65	0.40	30	13.00
	RUSK	3	East Texas	0.44	0.53	28.17	14.56	0.65	0.40	30	13.00
	SAN PATRICIO	2	East Texas	0.44	0.53	28.17	14.56	0.75	0.40	30	13.00
	SAN SABA	3	West Texas	0.44	0.53	25.29	14.74	0.65	0.40	30	13.00
	SCHLEICHER	3	West Texas	0.44	0.53	25.29	14.74	0.65	0.40	30	13.00
	SCURRY	3	West Texas	0.44	0.53	25.29	14.74	0.65	0.40	30	13.00
	SHACKELFORD	3	West Texas	0.44	0.53	25.29	14.74	0.65	0.40	30	13.00
	SMITH	3	East Texas	0.44	0.53	28.17	14.56	0.65	0.40	30	13.00
	SOMERVELL	3	West Texas	0.44	0.53	25.29	14.74	0.65	0.40	30	13.00
	STARR	2	East Texas	0.44	0.53	28.17	14.56	0.75	0.40	30	13.00
	STEPHENS	3	West Texas	0.44	0.53	25.29	14.74	0.65	0.40	30	13.00
	STERLING	3	West Texas	0.44	0.53	25.29	14.74	0.65	0.40	30	13.00
	STONEWALL	3	West Texas	0.44	0.53	25.29	14.74	0.65	0.40	30	13.00
	SUTTON	3	West Texas	0.44	0.53	25.29	14.74	0.65	0.40	30	13.00
	TARRANT	3	West Texas	0.44	0.53	25.29	14.74	0.65	0.40	30	13.00
	TAYLOR	3	West Texas	0.44	0.53	25.29	14.74	0.65	0.40	30	13.00
	TERRELL	3	West Texas	0.44	0.53	25.29	14.74	0.65	0.40	30	13.00
	THROCKMORTON	3	West Texas	0.44	0.53	25.29	14.74	0.65	0.40	30	13.00
	TITUS	3	East Texas	0.44	0.53	28.17	14.56	0.65	0.40	30	13.00
	TOM GREEN	3	West Texas	0.44	0.53	25.29	14.74	0.65	0.40	30	13.00
	TRAVIS	2	West Texas	0.44	0.53	25.29	14.74	0.75	0.40	30	13.00
	UPTON	3	West Texas	0.44	0.53	25.29	14.74	0.65	0.40	30	13.00
	UVALDE	2	West Texas	0.44	0.53	25.29	14.74	0.75	0.40	30	13.00
	VAL VERDE	2	West Texas	0.44	0.53	25.29	14.74	0.75	0.40	30	13.00
	VAN ZANDT	3	West Texas	0.44	0.53	25.29	14.74	0.65	0.40	30	13.00
	VICTORIA	2	East Texas	0.44	0.53	28.17	14.56	0.75	0.40	30	13.00
	WALLER	2	East Texas	0.44	0.53	28.17	14.56	0.75	0.40	30	13.00
	WARD	3	West Texas	0.44	0.53	25.29	14.74	0.65	0.40	30	13.00
	WASHINGTON	2	East Texas	0.44	0.53	28.17	14.56	0.75	0.40	30	13.00
	WEBB	2	West Texas	0.44	0.53	25.29	14.74	0.75	0.40	30	13.00
	WHARTON	2	East Texas	0.44	0.53	28.17	14.56	0.75	0.40	30	13.00
	WICHITA	3	West Texas	0.44	0.53	25.29	14.74	0.65	0.40	30	13.00
	WILBARGER	3	West Texas	0.44	0.53	25.29	14.74	0.65	0.40	30	13.00
	WILLACY	2	East Texas	0.44	0.53	28.17	14.56	0.75	0.40	30	13.00
	WILLIAMSON	2	West Texas	0.44	0.53	25.29	14.74	0.75	0.40	30	13.00
	WILSON	2	West Texas	0.44	0.53	25.29	14.74	0.75	0.40	30	13.00
	WINKLER	3	West Texas	0.44	0.53	25.29	14.74	0.65	0.40	30	13.00
	WISE	3	West Texas	0.44	0.53	25.29	14.74	0.65	0.40	30	13.00
	YOUNG	3	West Texas	0.44	0.53	25.29	14.74	0.65	0.40	30	13.00
	ZAPATA	2	West Texas	0.44	0.53	25.29	14.74	0.75	0.40	30	13.00
	ZAVALA	2	West Texas	0.44	0.53	25.29	14.74	0.75	0.40	30	13.00

Table 41: 2011 Annual Electricity Savings from Implementation of the 2006 IECC for Single-family Residences Using 2008 Base Year

2011 Summary TRY 2008									
	County	Climate Zone	No. of Projected Units (2011)	Precode Total Annual Elec. Use (MWh/yr)	Code-compliant Total Annual Elec. Use (MWh/yr)	Total Annual Elec. Savings (MWh/yr) w/ 7% of T&D Loss	Precode Total NG Use (Therm/yr)	Code-compliant Total NG Use (Therm/yr)	Total Annual NG Savings (Therm/yr)
Nonattain-ment County	BRAZORIA	3	1,562	24,181	22,866	**1,407**	176,617	166,079	**10,537**
	CHAMBERS	4	216	3,272	3,099	**185**	25,296	23,885	**1,411**
	COLLIN	6	4,396	39,107	36,445	**2,847**	970,499	852,457	**118,042**
	DALLAS	5	2,569	22,811	21,264	**1,656**	569,492	500,407	**69,085**
	DENTON	6	2,622	23,325	21,738	**1,698**	578,855	508,449	**70,406**
	EL PASO	6	3,280	24,383	22,967	**1,515**	832,939	720,856	**112,083**
	FORT BEND	4	5,110	79,118	74,814	**4,606**	577,244	543,319	**33,925**
	GALVESTON	3	1,823	28,222	26,687	**1,642**	206,128	193,830	**12,298**
	HARDIN	4	445	6,743	6,387	**381**	52,110	49,159	**2,951**
	HARRIS	4	11,107	171,970	162,614	**10,011**	1,254,687	1,180,949	**73,738**
	JEFFERSON	4	581	8,807	8,341	**499**	68,026	64,173	**3,853**
	LIBERTY	4	252	3,904	3,691	**228**	28,467	26,788	**1,679**
	MONTGOMERY	4	2,795	43,275	40,921	**2,519**	315,733	297,178	**18,556**
	ORANGE	4	201	3,047	2,886	**173**	23,486	22,200	**1,287**
	TARRANT	5	3,837	34,070	31,759	**2,473**	850,581	747,397	**103,184**
	WALLER	4	5	77	73	**5**	565	532	**33**
Affected County	BASTROP	4	80	1,428	1,330	**105**	12,252	10,767	**1,485**
	BEXAR	4	2,442	20,245	19,010	**1,321**	371,913	329,725	**42,188**
	CALDWELL	4	12	103	96	**7**	2,280	2,001	**280**
	COMAL	4	1,016	8,423	7,909	**550**	154,735	137,183	**17,553**
	ELLIS	5	503	4,466	4,163	**324**	111,504	97,978	**13,527**
	GREGG	6	222	3,835	3,609	**242**	34,373	32,428	**1,946**
	GUADALUPE	4	647	5,364	5,037	**350**	98,537	87,359	**11,178**
	HARRISON	6	47	810	762	**51**	7,358	6,918	**440**
	HAYS	5	996	8,525	7,952	**613**	189,009	165,867	**23,142**
	HENDERSON	5	56	964	908	**60**	8,774	8,262	**511**
	HOOD	5	97	861	803	**63**	21,503	18,894	**2,608**
	HUNT	6	35	311	290	**23**	7,744	6,811	**932**
	JOHNSON	5	415	3,685	3,435	**267**	91,997	80,837	**11,160**
	KAUFMAN	6	152	1,352	1,260	**98**	33,557	29,475	**4,082**
	NUECES	3	701	11,330	10,680	**695**	69,258	65,435	**3,823**
	PARKER	6	282	2,509	2,338	**183**	62,257	54,684	**7,572**
	ROCKWALL	6	411	3,656	3,407	**266**	90,736	79,700	**11,036**
	RUSK	5	7	108	102	**7**	973	911	**63**
	SAN PATRICIO	3	113	1,826	1,722	**112**	11,164	10,548	**616**
	SMITH	5	185	3,186	2,999	**199**	28,985	27,295	**1,689**
	TRAVIS	5	3,292	28,176	26,284	**2,025**	624,716	548,227	**76,489**
	UPSHUR	6	10	186	173	**14**	1,786	1,572	**214**
	VICTORIA	3	83	1,313	1,239	**79**	9,358	8,777	**581**
	WILLIAMSON	5	1,851	15,843	14,779	**1,139**	351,261	308,253	**43,007**
	WILSON	4	12	99	93	**6**	1,828	1,620	**207**
ERCOT	ANDERSON	5	13	201	189	**12**	1,808	1,691	**116**
	ANDREWS	6	60	496	461	**37**	14,732	12,863	**1,869**
	ANGELINA	5	120	1,852	1,746	**114**	16,685	15,611	**1,074**
	ARANSAS	3	70	1,131	1,066	**69**	6,916	6,534	**382**
	ARCHER	7	9	79	74	**6**	2,631	2,296	**335**
	ATASCOSA	3	66	544	512	**35**	9,531	8,387	**1,144**
	AUSTIN	4	17	263	249	**15**	1,920	1,808	**113**
	BANDERA	5	1	8	8	**1**	144	127	**17**
	BAYLOR	7	0	0	0	**0**	0	0	**0**
	BEE	3	9	142	134	**9**	1,015	952	**63**
	BELL	5	1,646	13,525	12,661	**925**	358,687	312,490	**46,198**
	BLANCO	5	2	17	16	**1**	380	333	**46**
	BORDEN	7	19	341	320	**23**	5,483	4,804	**680**
	BOSQUE	5	3	25	23	**2**	654	570	**84**
	BRAZOS	4	601	9,305	8,799	**542**	67,891	63,901	**3,990**
	BREWSTER	5	15	127	118	**10**	3,220	2,805	**416**
	BRISCOE	8	7	57	54	**4**	3,384	2,968	**417**
	BROOKS	2	0	0	0	**0**	0	0	**0**
	BROWN	5	64	526	492	**36**	13,947	12,150	**1,796**
	BURLESON	4	11	170	161	**10**	1,243	1,170	**73**
	BURNET	5	136	1,164	1,086	**84**	25,808	22,649	**3,160**
	CALHOUN	3	65	1,028	970	**62**	7,328	6,873	**455**
	CALLAHAN	6	4	33	31	**2**	991	869	**123**
	CAMERON	2	1,053	17,371	16,361	**1,081**	82,593	77,968	**4,625**
	CHEROKEE	5	68	1,050	989	**65**	9,455	8,846	**609**
	CHILDRESS	7	0	0	0	**0**	0	0	**0**
	CLAY	7	1	9	8	**1**	292	255	**37**
	COKE	6	2	17	16	**1**	429	373	**56**
	COLEMAN	5	1	8	8	**1**	249	218	**31**
	COLORADO	4	8	124	117	**7**	904	851	**53**
	COMANCHE	5	0	0	0	**0**	0	0	**0**
	CONCHO	5	1	8	8	**1**	215	187	**28**
	COOKE	6	15	133	124	**10**	3,319	2,919	**400**
	CORYELL	5	164	1,348	1,261	**92**	35,738	31,135	**4,603**
	COTTLE	7	0	0	0	**0**	0	0	**0**
	CRANE	5	0	0	0	**0**	0	0	**0**
	CROCKETT	5	19	161	149	**12**	4,079	3,552	**526**
	CROSBY	7	6	108	101	**7**	1,732	1,517	**215**
	CULBERSON	6	1	7	7	**0**	245	211	**34**
	DAWSON	7	1	35	32	**3**	544	470	**73**
	DE WITT	3	4	63	60	**4**	451	423	**28**
	DELTA	6	2	18	17	**1**	442	388	**54**
	DICKENS	7	0	0	0	**0**	0	0	**0**
	DIMMIT	3	5	43	40	**3**	620	559	**61**
	DUVAL	3	0	0	0	**0**	0	0	**0**
	EASTLAND	6	2	17	16	**1**	496	434	**61**
	ECTOR	6	336	2,776	2,583	**207**	82,499	72,033	**10,467**
	EDWARDS	5	0	0	0	**0**	0	0	**0**
	ERATH	6	36	301	280	**22**	8,922	7,818	**1,104**
	FALLS	5	2	16	15	**1**	436	380	**56**
	FANNIN	6	6	53	50	**4**	1,327	1,168	**160**
	FAYETTE	4	7	108	102	**6**	791	744	**46**
	FISHER	6	0	0	0	**0**	0	0	**0**
	FOARD	7	0	0	0	**0**	0	0	**0**
	FRANKLIN	6	2	18	17	**1**	442	388	**54**
	FREESTONE	5	10	82	77	**6**	2,179	1,898	**281**
	FRIO	3	11	91	85	**6**	1,588	1,398	**191**

Table 41: 2011 Annual Electricity Savings from Implementation of the 2006 IECC for Single-family Residences Using 2008 Base Year (Continued)

2011 Summary TRY 2008									
	County	Climate Zone	No. of Projected Units (2011)	Precode Total Annual Elec. Use (MWh/yr)	Code-compliant Total Annual Elec. Use (MWh/yr)	Total Annual Elec. Savings (MWh/yr) w/ 7% of T&D Loss	Precode Total NG Use (Therm/yr)	Code-compliant Total NG Use (Therm/yr)	Total Annual NG Savings (Therm/yr)
ERCOT	GILLESPIE	5	33	282	263	20	6,262	5,496	767
	GLASSCOCK	6	0	0	0	0	0	0	0
	GOLIAD	3	0	0	0	0	0	0	0
	GONZALES	4	1	8	8	1	152	135	17
	GRAYSON	6	62	551	514	40	13,717	12,066	1,652
	GRIMES	4	13	201	190	12	1,469	1,382	86
	HALL	8	0	0	0	0	0	0	0
	HAMILTON	5	1	8	8	1	218	190	28
	HARDEMAN	7	0	0	0	0	0	0	0
	HASKELL	6	2	17	16	1	496	434	61
	HIDALGO	2	2,931	48,353	45,540	3,009	229,895	217,022	12,874
	HILL	5	6	49	46	3	1,307	1,139	168
	HOPKINS	6	9	80	75	6	1,987	1,745	242
	HOUSTON	5	6	93	87	6	834	781	54
	HOWARD	6	5	41	38	3	1,228	1,072	156
	HUDSPETH	6	0	0	0	0	0	0	0
	IRION	5	0	0	0	0	0	0	0
	JACK	6	6	50	47	4	1,487	1,303	184
	JACKSON	3	8	127	119	8	902	846	56
	JEFF DAVIS	6	0	0	0	0	0	0	0
	JIM HOGG	2	0	0	0	0	0	0	0
	JIM WELLS	3	23	372	350	23	2,272	2,147	125
	JONES	6	0	0	0	0	0	0	0
	KARNES	3	24	196	185	12	3,498	3,088	410
	KENDALL	5	204	1,685	1,583	109	29,367	25,882	3,484
	KENEDY	2	0	0	0	0	0	0	0
	KENT	7	0	0	0	0	0	0	0
	KERR	5	41	351	327	25	7,780	6,828	953
	KIMBLE	5	1	8	8	1	215	187	28
	KING	7	0	0	0	0	0	0	0
	KINNEY	4	0	0	0	0	0	0	0
	KLEBERG	2	18	288	272	17	1,657	1,559	98
	KNOX	7	0	0	0	0	0	0	0
	LA SALLE	3	6	51	48	3	744	670	74
	LAMAR	6	28	476	451	27	4,192	3,939	252
	LAMPASAS	5	5	41	38	3	1,090	949	140
	LAVACA	4	18	282	266	16	1,906	1,780	126
	LEE	4	7	60	56	4	1,330	1,167	163
	LEON	5	0	0	0	0	0	0	0
	LIMESTONE	5	26	214	200	15	5,666	4,936	730
	LIVE OAK	3	2	32	30	2	198	187	11
	LLANO	5	150	1,284	1,198	92	28,465	24,980	3,485
	LOVING	6	0	0	0	0	0	0	0
	MADISON	4	16	248	234	14	1,807	1,701	106
	MARTIN	6	2	17	15	1	491	429	62
	MASON	5	6	51	48	4	1,139	999	139
	MATAGORDA	3	63	996	940	60	7,103	6,662	441
	MAVERICK	3	66	562	528	36	8,185	7,373	812
	MCCULLOCH	5	0	0	0	0	0	0	0
	MCLENNAN	5	441	3,624	3,392	248	96,100	83,723	12,377
	MCMULLEN	3	0	0	0	0	0	0	0
	MEDINA	4	22	182	171	12	3,351	2,970	380
	MENARD	5	0	0	0	0	0	0	0
	MIDLAND	6	539	4,453	4,144	331	132,342	115,552	16,790
	MILAM	4	1	8	8	0	146	129	17
	MILLS	5	0	0	0	0	0	0	0
	MITCHELL	6	0	0	0	0	0	0	0
	MONTAGUE	6	1	9	8	1	221	195	27
	MOTLEY	7	0	0	0	0	0	0	0
	NACOGDOCHES	5	50	772	728	47	6,952	6,504	448
	NAVARRO	5	77	633	592	43	16,779	14,618	2,161
	NOLAN	6	0	0	0	0	0	0	0
	PALO PINTO	6	8	67	62	5	1,983	1,737	245
	PECOS	5	6	51	47	4	1,288	1,122	166
	PRESIDIO	5	2	17	16	1	429	374	55
	RAINS	6	2	18	17	1	442	388	54
	REAGAN	5	4	33	31	2	984	858	125
	REAL	5	0	0	0	0	0	0	0
	RED RIVER	6	6	102	97	6	898	844	54
	REEVES	6	1	8	8	1	246	214	31
	REFUGIO	3	2	32	30	2	225	211	14
	ROBERTSON	4	7	108	102	6	791	744	46
	RUNNELS	5	2	17	16	1	429	374	55
	SAN SABA	5	0	0	0	0	0	0	0
	SCHLEICHER	5	2	17	16	1	429	374	55
	SCURRY	7	49	881	824	61	14,141	12,389	1,753
	SHACKELFORD	6	0	0	0	0	0	0	0
	SOMERVELL	5	8	71	66	5	1,773	1,558	215
	STARR	2	0	0	0	0	0	0	0
	STEPHENS	6	2	17	16	1	496	434	61
	STERLING	6	0	0	0	0	0	0	0
	STONEWALL	7	0	0	0	0	0	0	0
	SUTTON	5	0	0	0	0	0	0	0
	TAYLOR	6	149	1,245	1,159	92	36,929	32,358	4,571
	TERRELL	5	0	0	0	0	0	0	0
	THROCKMORTO	6	0	0	0	0	0	0	0
	TITUS	6	7	119	113	7	1,048	985	63
	TOM GREEN	5	145	1,226	1,138	94	31,129	27,111	4,018
	UPTON	5	1	8	8	1	246	215	31
	UVALDE	4	21	174	163	11	3,198	2,835	363
	VAL VERDE	4	47	390	366	25	7,158	6,346	812
	VAN ZANDT	6	9	80	75	6	1,987	1,745	242
	WARD	6	12	99	92	7	2,946	2,573	374
	WASHINGTON	4	56	867	820	50	6,326	5,954	372
	WEBB	3	640	5,447	5,122	347	79,371	71,499	7,872
	WHARTON	3	63	996	940	60	7,103	6,662	441
	WICHITA	7	111	974	907	72	32,452	28,316	4,136
	WILBARGER	7	0	0	0	0	0	0	0
	WILLACY	2	19	313	295	20	1,490	1,407	83
	WINKLER	6	1	8	8	1	246	214	31
	WISE	6	23	205	191	15	5,078	4,460	618
	YOUNG	6	5	42	39	3	1,239	1,086	153
	ZAPATA	2	0	0	0	0	0	0	0
	ZAVALA	3	6	51	48	3	744	670	74
	TOTAL		65,505			49,361			1,083,170

Table 42: Allocation of CM Zones for each of Applicable ERCOT Counties[70]

County	Plant	CM Zones Percentage H	N	W	S
Andrews	Fullerton	0.10	0.58	99.31	0.01
Atascosa	San Miguel	11.04	0.74	0.04	88.18
Bastrop	Bastrop Energy Center	11.04	0.74	0.04	88.18
	Lost Pines 1 Power Project				
	Sim Gideon 1				
	Sim Gideon 2				
	Sim Gideon 3				
Bexar	Arthur Von Rosenberg	11.04	0.74	0.04	88.18
	Covel Gardens				
	J K Spruce				
	J K Spruce 2				
	J T Deely 1				
	J T Deely 2				
	Leon Creek				
	O W Sommers 1				
	O W Sommers 2				
	University of Texas at San Antonio				
	V H Braunig 1				
	V H Braunig 2				
	V H Braunig 3				
	V H Braunig 6				
	W B Tuttle				
Bosque	Bosque County Peaking	13.35	81.87	3.95	0.84
Brazoria	BASF Freeport Works	99.06	0.01	0.00	0.93
	Chocolate Bayou Plant				
	Chocolate Bayou Works				
	Dow Chemical Texas Operation				
	Freeport Energy Center (expansion)				
	Oyster Creek Unit VIII				
	Sweeny Cogen Facility				
Brazos	Bryan 3	13.09	72.93	3.52	10.45
	Bryan 4				
	Bryan 5				
	Bryan 6				
	Bryan 7				
	Dansby 1				
	Dansby 2				
	Dansby 3				
Calhoun	Point Comfort Operations	11.04	0.74	0.04	88.18
	Seadrift Coke LP				
	Union Carbide Seadrift Cogen				
Cameron	La Palma 4	11.04	0.74	0.04	88.18
	La Palma 5				
	La Palma 6				
	La Palma 7				
	Silas Ray				
Chambers	Baytown Energy Center	99.06	0.01	0.00	0.93
	Cedar Bayou 1				
	Cedar Bayou 2				
	Enterprise Products Operating				
Cherokee	Stryker Creek 1	13.35	81.87	3.95	0.84
	Stryker Creek 2				
	Stryker Creek 3				
Coke	Jameson Gas Processing Plant	0.00	0.00	0.00	0.00
Collin	Ray Olinger 2	13.35	81.87	3.95	0.84
	Ray Olinger 3				
	Ray Olinger 4				
	Ray Olinger 5				
	University of Texas at Dallas				
Dallas	C E Newman	13.35	81.87	3.95	0.84
	Lake Hubbard 1				
	Lake Hubbard 2				
	Mountain Creek				
	State Farm Insur Support Center Central				
Denton	Spencer 4	13.35	81.87	3.95	0.84
	Spencer 5				
Ector	Odessa Ector Generating Station	0.97	0.60	91.36	7.07
	Quail Run Energy Center				
	Quail Run Energy Center				
	Quail Run Energy Center				
Ellis	Ennis Tractebel Power LP	13.35	81.87	3.95	0.84
	Midlothian Energy Facility				
Fannin	Valley	13.35	81.87	3.95	0.84
Fayette	Fayette Power Project	11.89	30.55	1.48	56.09
	Winchester Power Park				
Fort Bend	Brazos Valley Generating Facility	99.06	0.01	0.00	0.93
	W A Parish 1				
	W A Parish 2				
	W A Parish 3				
	W A Parish 4				
	W A Parish 5				
	W A Parish 7 (Uprated)				
	W A Parish 8				
	W A Parish GT1				
Freestone	Big Brown 1 (Upgrade)	13.35	81.87	3.95	0.84
	Big Brown 2				
	Freestone Power Generation LP				
Frio	Pearsall 1	0.10	0.58	99.31	0.01
	Pearsall 2				
	Pearsall 3				
Galveston	Green Power 2	99.06	0.01	0.00	0.93
	P H Robinson				
	Power Station 4				
	S&L Cogeneration				
	Texas City Plant Union Carbide				
	Texas City Power Plant				
	Valero Refining Texas City				
Goliad	Coleto Creek	0.00	0.00	0.00	0.00
Grimes	Gibbons Creek	0.00	0.00	0.00	0.00
Guadalupe	Guadalupe Generating Station	11.04	0.74	0.04	88.18
	Rio Nogales Power Project				

[70] Of a total of 202 counties listed in Table 33, 138 counties are not included in this table since the corresponding providers could not be assigned for these 138 counties.

Table 42: Allocation of CM Zones for each of Applicable ERCOT Counties (Continued)[71]

County	Plant	CM Zones Percentage			
		H	N	W	S
Harris	AES Deepwater	99.06	0.01	0.00	0.93
	Altura Cogen				
	Bayou Cogen Plant				
	Cedar Bayou 4				
	Channel Energy Center				
	Channelview Cogeneration Plant				
	Clear Lake Cogeneration Ltd				
	Deepwater				
	Deer Creek Energy Center				
	Deer Park Energy Center				
	Exelon LaPorte Generating Station				
	ExxonMobil Baytown Refinery				
	ExxonMobil Baytown Turbine				
	Greens Bayou 5				
	Greens Bayou Others				
	Hiram Clarke				
	Houston Chemical Complex Battleground				
	Pasadena				
	Pasadena Cogeneration				
	Rice University				
	Sam Bertron 1				
	Sam Bertron 2				
	Sam Bertron 3				
	Sam Bertron 4				
	Sam Bertron Others				
	San Jacinto Steam Electric Station				
	Shell Deer Park				
	T H Wharton				
	Texas Medical Center				
	Texas Petrochemicals				
	Valero Refining Texas Houston				
	Webster				
	Westhollow Technology Center				
Hays	Hays Energy Project	11.04	0.74	0.04	88.18
	Southwest Texas State University				
Henderson	Trinidad	13.35	81.87	3.95	0.84
Hidalgo	Frontera Energy Center	11.04	0.74	0.04	88.18
	Hidalgo Energy Center				
	J L Bates 1				
	J L Bates 2				
	Magic Valley Generating Station				
Hood	DeCordova Steam Electric Station 1	13.35	81.87	3.95	0.84
	DeCordova Steam Electric Station CTs				
	Wolf Hollow I, L.P.				
Howard	Big Spring Carbon Plant	0.20	0.59	98.34	0.87
	C R Wing Cogen Plant				
Hunt	Engine Plant	11.08	2.24	0.11	86.57
	Greenville				
	Powerlane Plant				
Jack	Jack County Project	13.35	81.87	3.95	0.84
	Jack Energy Facility				
Johnson	Johnson County	13.35	81.87	3.95	0.84
Kaufman	Forney Energy Center	13.35	81.87	3.95	0.84
Lamar	Lamar Power Project	13.35	81.87	3.95	0.84
	Paris Generating Station				
Limestone	Limestone 1	0.00	0.00	0.00	0.00
	Limestone 2 (Uprated)				
Llano	Thomas C Ferguson	11.04	0.74	0.04	88.18
McLennan	Baylor University Cogen	13.35	81.87	3.95	0.84
	Lake Creek				
	Tradinghouse 1				
	Tradinghouse 2				
Milam	Sandow 5	11.04	0.74	0.04	88.18
	Sandow No 4				
	Sandow Station				
Mitchell	Morgan Creek	0.10	0.58	99.31	0.01
Nolan	TXU Sweetwater Generating Plant	0.10	0.58	99.31	0.01
Nueces	Barney M. Davis 1	11.04	0.74	0.04	88.18
	Barney M. Davis 2				
	Barney M. Davis Power Plant (repowering)				
	Celanese Engineering Resin				
	Corpus Christi				
	Corpus Christi Energy Center				
	Corpus Refinery				
	Nueces Bay Power Plant (repowering)				
	Valero Refinery Corpus Christi East				
	Valero Refinery Corpus Christi West				
Palo Pinto	R W Miller 1	13.35	81.87	3.95	0.84
	R W Miller 2				
	R W Miller 3				
	R W Miller Others				
Parker	North Texas	13.35	81.87	3.95	0.84
	Weatherford				
Pecos	Yates Gas Plant	0.10	0.58	99.31	0.01
Reagan	Midkiff Plant	0.10	0.58	99.31	0.01
Robertson	Oak Grove 1	11.34	11.28	0.55	76.83
	Oak Grove 2				
	Twin Oaks Power One 1				
	Twin Oaks Power One 2				
Rusk	Martin Lake	0.00	0.00	0.00	0.00
San Patricio	Gregory Power Facility	11.04	0.74	0.04	88.18
	Ingleside Cogeneration				
Scurry	EG178 Facility	0.10	0.58	99.31	0.01
Tarrant	Eagle Mountain	13.35	81.87	3.95	0.84
	Handley				
Titus	Monticello	0.00	0.00	0.00	0.00

[71] Of a total of 202 counties listed in Table 33, 138 counties are not included in this table since the corresponding providers could not be assigned for these 138 counties.

Table 42: Allocation of CM Zones for each of Applicable ERCOT Counties (Continued)[72]

County	Plant	CM Zones Percentage			
		H	N	W	S
Travis	Central Utility Plant	11.04	0.74	0.04	88.18
	Decker Creek 1				
	Decker Creek 2				
	Decker Creek GT (1-4)				
	Hal C Weaver Power Plant				
	Holly Street 3				
	Holly Street 4				
	Mueller Energy Center				
	Sand Hill				
Upton	Benedum Plant	0.10	0.58	99.31	0.01
Victoria	Sam Rayburn	11.04	0.74	0.04	88.18
	Victoria (refurbish)				
	Victoria Texas Plant				
Ward	Permian Basin 5	0.10	0.58	99.31	0.01
	Permian Basin 6				
	Permian Basin Others				
Webb	Laredo 1	11.04	0.74	0.04	88.18
	Laredo 2				
	Laredo 3				
	Laredo Energy Center (refurbish)				
Wharton	Colorado Bend Energy Center	11.04	0.74	0.04	88.18
	Colorado Bend Energy Center				
	Colorado Bend Energy Center				
	New gulf Cogen				
Wichita	PPG Industries Works 4	0.10	0.58	99.31	0.01
	Signal Hill Wichita Falls Power LP				
Wilbarger	Oklaunion	13.35	81.87	3.95	0.84
Wise	Bridgeport Gas Processing Plant	13.35	81.87	3.95	0.84
	Wise County Power LP				
Young	Graham 1	13.35	81.87	3.95	0.84
	Graham 2				

Table 43: 2011 Totalized Annual Electricity Savings from the 2006 IECC by CM Zones for Single-family Residences Using 2008 Base Year[73]

CM Zones	Total Electricity Savings by CM Zones (MWh) 2011-TRY 2008
H	20,203.71
N	8,702.55
W	800.63
S	9,155.66
Total	38,862.55

[72] Of a total of 202 counties listed in Table 33, 138 counties are not included in this table since the corresponding providers could not be assigned for these 138 counties.
[73] Of a total of 202 counties listed in Table 33, the annual electricity savings in 138 counties (i.e., 10,499 MWh), including 8 non-attainment and affected non-ERCOT counties (i.e, 29.56 % of total savings in 138 counties), are not reported in Table 35 since the corresponding providers could not be assigned for these 138 counties.

Table 44: 2011 Annual NOx Reductions from the 2006 IECC by CM Zones for Single-family Residences by County Using 2010 eGRID

Area	County	H	NOx Reductions (lbs)	N	NOx Reductions (lbs)	W	NOx Reductions (lbs/year)	S	NOx Reductions (lbs)	Total Nox Reductions (lbs)	Total Nox Reductions (Tons)
Houston-Galveston Area	Brazoria	0.0562032	1135.5132871	0.0000071	0.0620540	0.0000003	0.0002758	0.0005265	4.8208400	1140.3964568	0.5701982
	Chambers	0.0204500	413.1660466	0.0000026	0.0225789	0.0000001	0.0001003	0.0001916	1.7541031	414.9428289	0.2074714
	Fort Bend	0.0313463	633.3121145	0.0000040	0.0346095	0.0000002	0.0001538	0.0002937	2.6887368	636.0356145	0.3180178
	Galveston	0.0226620	457.8558604	0.0000029	0.0250211	0.0000001	0.0001112	0.0002123	1.9438344	459.8248271	0.2299124
	Harris	0.1486911	3004.1128041	0.0000189	0.1641700	0.0000009	0.0007295	0.0013930	12.7540093	3017.0317130	1.5085159
Dallas/ Fort Worth Area	Collin	0.0012932	26.1267964	0.0079329	69.0367176	0.0003832	0.3067798	0.0000809	0.7410104	96.2113042	0.0481057
	Dallas	0.0024826	50.1579083	0.0152295	132.5358568	0.0007356	0.5889522	0.0001554	1.4225828	184.7053001	0.0923527
	Denton	0.0001267	2.5590739	0.0007770	6.7620254	0.0000375	0.0300485	0.0000079	0.0725807	9.4237284	0.0047119
	Tarrant	0.0004742	9.5802508	0.0029089	25.3145872	0.0001405	0.1124909	0.0000297	0.2717159	35.2790448	0.0176395
	Ellis	0.0029920	60.4493525	0.0183544	159.7296817	0.0008865	0.7097940	0.0001873	1.7144696	222.6032977	0.1113016
	Johnson	0.0007256	14.6597929	0.0044512	38.7366277	0.0002150	0.1721347	0.0000454	0.4157823	53.9843377	0.0269922
	Kaufman	0.0059718	120.6535122	0.0366343	318.8114731	0.0017695	1.4167089	0.0003738	3.4219850	444.3036792	0.2221518
	Parker	0.0000012	0.0248409	0.0000075	0.0656388	0.0000004	0.0002917	0.0000001	0.0007045	0.0914759	0.0000457
	Henderson	0.0006908	13.9562448	0.0042376	36.8775917	0.0002047	0.1638737	0.0000432	0.3958282	51.3935384	0.0256968
	Hood	0.0050771	102.5761827	0.0311454	271.0444421	0.0015044	1.2044456	0.0003178	2.9092742	377.7343446	0.1888672
	Hunt	0.0088463	178.7288312	0.0047066	40.9597494	0.0002273	0.1820137	0.0652823	597.7024637	817.5730580	0.4087865
San Antonio Area	Bexar	0.0138906	280.6417996	0.0009368	8.1526706	0.0000452	0.0362282	0.1109355	1015.6880374	1304.5187359	0.6522594
	Guadalupe	0.0032029	64.7102542	0.0002160	1.8798390	0.0000104	0.0083535	0.0255795	234.1968701	300.7953167	0.1503977
Austin Area	Bastrop	0.0033782	68.2526681	0.0002278	1.9827464	0.0000110	0.0088108	0.0269798	247.0174387	317.2616640	0.1586308
	Hays	0.0008331	16.8322964	0.0000562	0.4889798	0.0000027	0.0021729	0.0066537	60.9188017	78.2422508	0.0391211
	Travis	0.0051785	104.6256399	0.0003493	3.0393847	0.0000169	0.0135062	0.0413577	378.6571031	486.3356338	0.2431678
	Rusk	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Corpus Christi Area	Nueces	0.0128578	259.7748701	0.0008672	7.5464844	0.0000419	0.0335345	0.1026870	940.1672465	1207.5221354	0.6037611
	San Patricio	0.0015100	30.5066699	0.0001018	0.8862216	0.0000049	0.0039381	0.0120591	110.4085696	141.8053993	0.0709027
Victoria Area	Victoria	0.0021192	42.8148155	0.0001429	1.2437744	0.0000069	0.0055270	0.0169244	154.9537382	199.0178552	0.0995089
Other ERCOT counties	Andrews	0.0000037	0.0756477	0.0000230	0.1998892	0.0039003	3.1226715	0.0000002	0.0021455	3.4003539	0.0017002
	Bosque	0.0022204	44.8608115	0.0136212	118.5389561	0.0006579	0.5267539	0.0001390	1.2723461	165.1988676	0.0825994
	Brazos	0.0024089	48.6682670	0.0112305	97.7341490	0.0005425	0.4343032	0.0047829	43.7906837	190.6274029	0.0953137
	Calhoun	0.0009466	19.1244877	0.0000638	0.5555682	0.0000031	0.0024688	0.0075598	69.2146124	88.8971371	0.0444486
	Cameron	0.0063536	128.3669295	0.0004285	3.7290714	0.0000207	0.0165709	0.0507425	464.5806678	596.6932396	0.2983466
	Cherokee	0.0027392	55.3411072	0.0168033	146.2317970	0.0008116	0.6498132	0.0001714	1.5695891	203.7923064	0.1018962
	Coke	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
	Ector	0.0019215	38.8216045	0.0006604	5.7467733	0.0911346	72.9649938	0.0146527	134.1549850	251.6883564	0.1258442
	Fannin	0.0000041	0.0819244	0.0000249	0.2164746	0.0000012	0.0009620	0.0000003	0.0023235	0.3016845	0.0001508
	Fayette	0.0051867	104.7906439	0.0103217	89.8249237	0.0004986	0.3991568	0.0283993	260.0143752	455.0290997	0.2275145
	Freestone	0.0047643	96.2573344	0.0292268	254.3476938	0.0014117	1.1302499	0.0002982	2.7300585	354.4653367	0.1772327
	Frio	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
	Grimes	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
	Hidalgo	0.0053716	108.5257708	0.0003623	3.1526838	0.0000175	0.0140096	0.0428994	392.7723073	504.4647715	0.2522324
	Howard	0.0002411	4.8714744	0.0007641	6.6493607	0.1283942	102.7960323	0.0009490	8.6886390	123.0055065	0.0615028
	Jack	0.0030783	62.1933601	0.0188839	164.3379988	0.0009121	0.7302721	0.0001927	1.7639333	229.0255642	0.1145128
	Lamar	0.0040001	80.8177171	0.0245388	213.5504800	0.0011853	0.9489585	0.0002504	2.2921588	297.6093145	0.1488047
	Limestone	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
	Llano	0.0040314	81.4502075	0.0002719	2.3661362	0.0000131	0.0105144	0.0321966	294.7814669	378.6083250	0.1893042
	McLennan	0.0056576	114.3049777	0.0347066	302.0362828	0.0016764	1.3421647	0.0003541	3.2419273	420.9253525	0.2104627
	Milam	0.0012686	25.6305565	0.0000856	0.7445701	0.0000041	0.0033087	0.0101316	92.7611271	119.1395624	0.0595698
	Mitchell	0.0000311	0.6289168	0.0001910	1.6618321	0.0324260	25.9611553	0.0000019	0.0178374	28.2697415	0.0141349
	Nolan	0.0000293	0.5910667	0.0001795	1.5618182	0.0304745	24.3987372	0.0000018	0.0167639	26.5683859	0.0132842
	Palo Pinto	0.0036129	72.9947735	0.0221635	192.8793522	0.0010705	0.8571018	0.0002261	2.0702839	268.8015114	0.1344008
	Pecos	0.0000020	0.0398001	0.0000121	0.1051666	0.0020520	1.6429140	0.0000001	0.0011288	1.7890095	0.0008945
	Robertson	0.0039506	79.8162632	0.0055755	48.5208480	0.0002693	0.2156131	0.0246170	225.3844837	353.9372080	0.1769686
	Titus	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
	Upton	0.0000025	0.0513869	0.0000156	0.1357834	0.0026494	2.1212091	0.0000002	0.0014574	2.3098369	0.0011549
	Ward	0.0001995	4.0310281	0.0012239	10.6514762	0.2078335	166.3974555	0.0000125	0.1143284	181.1942883	0.0905971
	Webb	0.0042017	84.8904679	0.0002834	2.4660761	0.0000137	0.0109586	0.0335565	307.2323255	394.5998280	0.1972999
	Wharton	0.0021095	42.6199979	0.0001423	1.2381149	0.0000069	0.0055018	0.0168474	154.2486619	198.1122766	0.0990561
	Wichita	0.0000121	0.2447511	0.0000743	0.6467236	0.0126190	10.1031212	0.0000008	0.0069417	11.0015376	0.0055008
	Wilbarger	0.0179710	363.0810991	0.1102430	959.3953623	0.0053249	4.2632844	0.0011247	10.2977364	1337.0374822	0.6685187
	Wise	0.0010202	20.6114354	0.0062583	54.4630815	0.0003023	0.2420187	0.0000638	0.5845832	75.9011188	0.0379506
	Young	0.0071054	143.5554872	0.0435880	379.3270125	0.0021054	1.6856230	0.0004447	4.0715327	528.6396554	0.2643198
	Total	**0.4414501**	**8918.931209**	**0.4812863**	**4188.41838**	**0.5345786**	**427.9988736**	**0.6829349**	**6252.719138**	**19788.0676020**	**9.8940338**

Energy Savings by PCA (MWh)		20,203.71		8,702.55		800.63		9,155.66	

7.1.2 2011 Results for New Multi-family Residential Construction

This section provides potential electricity and natural gas reductions and associated emissions reductions from the implementation of the 2006 IECC for new multi-family residences in all the counties in ERCOT region as well as the 41 non-attainment and affected counties. To calculate the NOx emissions reductions from the implementation of the 2006 IECC for multi-family residences, new construction activity was determined by county. Energy savings attributable to the 2006 IECC was then calculated using the Laboratory's code-traceable, DOE-2.1e simulation, which was developed for the TERP. Next, these estimates were applied to the NAHB Builder's survey data to determine the appropriate number of housing types. In addition, the NOx reduction potential from the electricity reductions in each county was calculated using the US EPA's 2010 eGRID database[74].

In Table 45, the 2008 and the 2006 IECC code-compliant building characteristics for multi-family are shown for each county. The 2006 IECC code-compliant characteristics are the minimum building code characteristics required by the 2006 IECC for each county for multi-family residences (i.e., Type A.2). In Table 45, the rows are sorted first by the US EPA's non-attainment and affected designation, and other ERCOT counties, alphabetically. The fifth, sixth, seventh, and eighth columns in Table 45 show the NAHB Builder's survey average glazing U-value, Solar Heat Gain Coefficient (SHGC), roof insulation and wall insulation, respectively. In columns ninth through twelfth, the corresponding values from the 2006 IECC code-compliant house are listed for each county (i.e., glazing U-value, SHGC, roof and wall insulation R-value).

The 2006 IECC SHGC is 0.4 for all non-attainment and affected counties as required by the 2001 IECC. All houses were assumed to have air conditioner efficiency equal to a SEER 13, and furnace efficiency (AFUE) of 0.80. The values shown in Table 45 represent the only changes that were made to the simulation to obtain the savings calculations. All other variables in the simulation remained the same for the 2008 and the 2006 IECC code-compliant simulation. In cases where the 2008 values were more efficient than the 2006 IECC code-compliant simulation, the 2008 values were used in both simulations, since this indicates that the prevailing practice is already above code.

In Table 46, the code-traceable simulation results for multi-family are shown for each county. In a similar fashion as Table 45, the tables are first divided into US EPA's non-attainment and affected classifications, followed by an alphabetical listing of other ERCOT counties. In the third column, the 2006 IECC climate zone is listed followed by the number of projected new housing units[75] in the fourth column. In the fifth column, the total simulated energy use is listed if all new construction had been built to pre-code specifications, and, in the sixth column, the total county-wide energy use for code-compliant construction is shown. 144 simulations were run for each county, which were then distributed according to the NAHB Builder's survey data to account for 1, 2 or 3 story, and 3 fuel options (i.e., central air conditioning with electric resistance heating, heat pump heating, or a natural gas-fired furnace).

In the seventh column of Table 46, the total annual electricity savings are shown for each county, respectively. In similar fashion as the 2010 report, a 7% transmission and distribution loss is used in the 2011 report, which represents a fixed 1.07 multiplier for the electricity use. In the eighth and ninth columns, the total annual pre-code and code-compliant natural gas use is shown for those residences that had natural gas-fired furnaces and domestic water heaters. Finally, in column in tenth, the total annual natural gas savings are shown for each county.

In Table 47[76], the annual electricity savings from Table 46 is assigned to CM Zones provider(s) in a similar fashion as the single-family residential assignments. The total electricity savings for each CM Zone, as shown in Table 47, are then entered into the bottom row of Table 48, the 2010 US EPA's eGRID database for Texas. eGRID then proportions each MWh of electricity savings according to the 2008 measured data from the power plants assigned to that CM Zones. For each county in which there is a power plant, the lbs-NOx/MWh are calculated and displayed as NOx reductions (lbs) in the column adjacent to the CM Zone column. In a similar fashion as the single-family residences, adding across the rows then totals the NOx reductions in each county from multiple CM Zones that have power plants in that county. Counties that do not show NOx reductions represent counties that do not have power plants in eGRID's database.

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[74] This analysis assumes transmission and distribution losses of 7%. Counties were assigned to utility service districts as indicated in a fashion similar to the 2010 report.
[75] The number of projected new housing units uses the published values for the new housing units in 2011. A vacancy rate of 0% was assumed for 2010 calculations, based on information suggested by the Real Estate Center at Texas A&M University.
[76] Of a total of 202 counties listed in Table 38, the annual electricity savings in 138 counties (i.e., 9,966 MWh), including 8 non-attainment and affected non-ERCOT counties (i.e, 39.13 % of total savings in 138 counties), are not reported in Table 39 since the corresponding providers could not be assigned for these 138 counties.

Table 45: 2008 and the 2006 IECC Code-compliant Building Characteristics used in the DOE-2 Simulations for Multi-family Residential Buildings

	COUNTY	Climate Zone	Division (East or West)	2008 Average				2006 IECC			
				Glazing U-value (Btu/hr-ft2-F)	SHGC	Roof Insulation (hr-ft2-F/Btu)	Wall Insulation (hr-ft2-F/Btu)	Glazing U-value (Btu/hr-ft2-F)	SHGC	Roof Insulation (hr-ft2-F/Btu)	Wall Insulation (hr-ft2-F/Btu)
Non-attainment	Brazoria	2	East Texas	0.44	0.53	30.87	15.95	0.75	0.40	30	13.00
	Chambers	2	East Texas	0.44	0.53	30.87	15.95	0.75	0.40	30	13.00
	Collin	3	West Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	Dallas	3	West Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	Denton	3	West Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	El Paso	3	West Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	Fort Bend	2	East Texas	0.44	0.53	30.87	15.95	0.75	0.40	30	13.00
	Galveston	2	East Texas	0.44	0.53	30.87	15.95	0.75	0.40	30	13.00
	Hardin	2	East Texas	0.44	0.53	30.87	15.95	0.75	0.40	30	13.00
	Harris	2	East Texas	0.44	0.53	30.87	15.95	0.75	0.40	30	13.00
	Jefferson	2	East Texas	0.44	0.53	30.87	15.95	0.75	0.40	30	13.00
	Liberty	2	East Texas	0.44	0.53	30.87	15.95	0.75	0.40	30	13.00
	Montgomery	2	East Texas	0.44	0.53	30.87	15.95	0.75	0.40	30	13.00
	Orange	2	East Texas	0.44	0.53	30.87	15.95	0.75	0.40	30	13.00
	Tarrant	3	West Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	Waller	2	East Texas	0.44	0.53	30.87	15.95	0.75	0.40	30	13.00
Affected	Bastrop	2	West Texas	0.44	0.53	30.87	15.95	0.75	0.40	30	13.00
	Bexar	2	West Texas	0.44	0.53	30.87	15.95	0.75	0.40	30	13.00
	Caldwell	2	West Texas	0.44	0.53	30.87	15.95	0.75	0.40	30	13.00
	Comal	2	West Texas	0.44	0.53	30.87	15.95	0.75	0.40	30	13.00
	Ellis	3	West Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	Gregg	3	East Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	Guadalupe	2	West Texas	0.44	0.53	30.87	15.95	0.75	0.40	30	13.00
	Harrison	3	East Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	Hays	2	West Texas	0.44	0.53	30.87	15.95	0.75	0.40	30	13.00
	Henderson	3	East Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	Hood	3	West Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	Hunt	3	West Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	Johnson	3	West Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	Kaufman	3	West Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	Nueces	2	East Texas	0.44	0.53	30.87	15.95	0.75	0.40	30	13.00
	Parker	3	West Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	Rockwall	3	West Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	Rusk	3	East Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	San Patricio	2	East Texas	0.44	0.53	30.87	15.95	0.75	0.40	30	13.00
	Smith	3	East Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	Travis	2	West Texas	0.44	0.53	30.87	15.95	0.75	0.40	30	13.00
	Upshur	3	West Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	Victoria	2	East Texas	0.44	0.53	30.87	15.95	0.75	0.40	30	13.00
	Williamson	2	West Texas	0.44	0.53	30.87	15.95	0.75	0.40	30	13.00
	Wilson	2	West Texas	0.44	0.53	30.87	15.95	0.75	0.40	30	13.00
ERCOT	ANDERSON	2	East Texas	0.44	0.53	30.87	15.95	0.75	0.40	30	13.00
	ANDREWS	3	West Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	ANGELINA	2	East Texas	0.44	0.53	30.87	15.95	0.75	0.40	30	13.00
	ARANSAS	2	East Texas	0.44	0.53	30.87	15.95	0.75	0.40	30	13.00
	ARCHER	3	West Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	ATASCOSA	2	West Texas	0.44	0.53	30.87	15.95	0.75	0.40	30	13.00
	AUSTIN	2	East Texas	0.44	0.53	30.87	15.95	0.75	0.40	30	13.00
	BANDERA	2	West Texas	0.44	0.53	30.87	15.95	0.75	0.40	30	13.00
	BASTROP	2	West Texas	0.44	0.53	30.87	15.95	0.75	0.40	30	13.00
	BAYLOR	3	West Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	BEE	2	East Texas	0.44	0.53	30.87	15.95	0.75	0.40	30	13.00
	BELL	2	West Texas	0.44	0.53	30.87	15.95	0.75	0.40	30	13.00
	BEXAR	2	West Texas	0.44	0.53	30.87	15.95	0.75	0.40	30	13.00
	BLANCO	3	West Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	BORDEN	3	West Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	BOSQUE	2	West Texas	0.44	0.53	30.87	15.95	0.75	0.40	30	13.00
	BRAZORIA	2	East Texas	0.44	0.53	30.87	15.95	0.75	0.40	30	13.00
	BRAZOS	2	East Texas	0.44	0.53	30.87	15.95	0.75	0.40	30	13.00
	BREWSTER	3	West Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	BRISCOE	4	West Texas	0.44	0.53	30.87	15.95	0.40	NR	38	13.00
	BROOKS	2	East Texas	0.44	0.53	30.87	15.95	0.75	0.40	30	13.00
	BROWN	3	West Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	BURLESON	2	East Texas	0.44	0.53	30.87	15.95	0.75	0.40	30	13.00
	BURNET	3	West Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	CALDWELL	2	West Texas	0.44	0.53	30.87	15.95	0.75	0.40	30	13.00
	CALHOUN	2	East Texas	0.44	0.53	30.87	15.95	0.75	0.40	30	13.00
	CALLAHAN	3	West Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	CAMERON	2	East Texas	0.44	0.53	30.87	15.95	0.75	0.40	30	13.00
	CHAMBERS	2	East Texas	0.44	0.53	30.87	15.95	0.75	0.40	30	13.00
	CHEROKEE	2	East Texas	0.44	0.53	30.87	15.95	0.75	0.40	30	13.00
	CHILDRESS	3	West Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	CLAY	3	West Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	COKE	3	West Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	COLEMAN	3	West Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	COLLIN	3	West Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	COLORADO	2	East Texas	0.44	0.53	30.87	15.95	0.75	0.40	30	13.00
	COMAL	2	West Texas	0.44	0.53	30.87	15.95	0.75	0.40	30	13.00
	COMANCHE	3	West Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	CONCHO	3	West Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	COOKE	3	West Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	CORYELL	2	West Texas	0.44	0.53	30.87	15.95	0.75	0.40	30	13.00
	COTTLE	3	West Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	CRANE	3	West Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	CROCKETT	3	West Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	CROSBY	3	West Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	CULBERSON	3	West Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	DALLAS	3	West Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	DAWSON	3	West Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	DE WITT	2	East Texas	0.44	0.53	30.87	15.95	0.75	0.40	30	13.00
	DELTA	3	West Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	DENTON	3	West Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	DICKENS	3	West Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	DIMMIT	2	West Texas	0.44	0.53	30.87	15.95	0.75	0.40	30	13.00
	DUVAL	2	East Texas	0.44	0.53	30.87	15.95	0.75	0.40	30	13.00
	EASTLAND	3	West Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	ECTOR	3	West Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	EDWARDS	2	West Texas	0.44	0.53	30.87	15.95	0.75	0.40	30	13.00
	ELLIS	3	West Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	ERATH	3	West Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	FALLS	2	West Texas	0.44	0.53	30.87	15.95	0.75	0.40	30	13.00
	FANNIN	3	West Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	FAYETTE	2	East Texas	0.44	0.53	30.87	15.95	0.75	0.40	30	13.00
	FISHER	3	West Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	FOARD	3	West Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	FORT BEND	2	East Texas	0.44	0.53	30.87	15.95	0.75	0.40	30	13.00
	FRANKLIN	3	West Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	FREESTONE	2	West Texas	0.44	0.53	30.87	15.95	0.75	0.40	30	13.00

Table 45: 2008 and the 2006 IECC Code-compliant Building Characteristics used in the DOE-2 Simulations for Multi-family Residential Buildings (Continued)

	COUNTY	Climate Zone	Division (East or West)	2008 Average Glazing U-value (Btu/hr-ft2-F)	2008 Average SHGC	2008 Average Roof Insulation (hr-ft2-F/Btu)	2008 Average Wall Insulation (hr-ft2-F/Btu)	2006 IECC Glazing U-value (Btu/hr-ft2-F)	2006 IECC SHGC	2006 IECC Roof Insulation (hr-ft2-F/Btu)	2006 IECC Wall Insulation (hr-ft2-F/Btu)
	FRIO	2	West Texas	0.44	0.53	30.87	15.95	0.75	0.40	30	13.00
	GALVESTON	2	East Texas	0.44	0.53	30.87	15.95	0.75	0.40	30	13.00
	GILLESPIE	3	West Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	GLASSCOCK	3	West Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	GOLIAD	2	East Texas	0.44	0.53	30.87	15.95	0.75	0.40	30	13.00
	GONZALES	2	West Texas	0.44	0.53	30.87	15.95	0.75	0.40	30	13.00
	GRAYSON	3	West Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	GRIMES	2	East Texas	0.44	0.53	30.87	15.95	0.75	0.40	30	13.00
	GUADALUPE	2	West Texas	0.44	0.53	30.87	15.95	0.75	0.40	30	13.00
	HALL	3	West Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	HAMILTON	3	West Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	HARDEMAN	3	West Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	HARRIS	2	East Texas	0.44	0.53	30.87	15.95	0.75	0.40	30	13.00
	HASKELL	3	West Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	HAYS	2	West Texas	0.44	0.53	30.87	15.95	0.75	0.40	30	13.00
	HENDERSON	3	East Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	HIDALGO	2	East Texas	0.44	0.53	30.87	15.95	0.75	0.40	30	13.00
	HILL	2	West Texas	0.44	0.53	30.87	15.95	0.75	0.40	30	13.00
	HOOD	3	West Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	HOPKINS	3	West Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	HOUSTON	2	East Texas	0.44	0.53	30.87	15.95	0.75	0.40	30	13.00
	HOWARD	3	West Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	HUDSPETH	3	West Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	HUNT	3	West Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	IRION	3	West Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	JACK	3	West Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	JACKSON	2	East Texas	0.44	0.53	30.87	15.95	0.75	0.40	30	13.00
	JEFF DAVIS	3	West Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	JIM HOGG	2	West Texas	0.44	0.53	30.87	15.95	0.75	0.40	30	13.00
	JIM WELLS	2	East Texas	0.44	0.53	30.87	15.95	0.75	0.40	30	13.00
	JOHNSON	3	West Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	JONES	3	West Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	KARNES	2	West Texas	0.44	0.53	30.87	15.95	0.75	0.40	30	13.00
	KAUFMAN	3	West Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	KENDALL	3	West Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	KENEDY	2	East Texas	0.44	0.53	30.87	15.95	0.75	0.40	30	13.00
	KENT	3	West Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	KERR	3	West Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	KIMBLE	3	West Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	KING	3	West Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	KINNEY	2	West Texas	0.44	0.53	30.87	15.95	0.75	0.40	30	13.00
	KLEBERG	2	East Texas	0.44	0.53	30.87	15.95	0.75	0.40	30	13.00
	KNOX	3	West Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	LA SALLE	2	West Texas	0.44	0.53	30.87	15.95	0.75	0.40	30	13.00
	LAMAR	3	East Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	LAMPASAS	3	West Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	LAVACA	2	East Texas	0.44	0.53	30.87	15.95	0.75	0.40	30	13.00
	LEE	2	West Texas	0.44	0.53	30.87	15.95	0.75	0.40	30	13.00
	LEON	2	East Texas	0.44	0.53	30.87	15.95	0.75	0.40	30	13.00
	LIMESTONE	2	West Texas	0.44	0.53	30.87	15.95	0.75	0.40	30	13.00
	LIVE OAK	2	East Texas	0.44	0.53	30.87	15.95	0.75	0.40	30	13.00
	LLANO	3	West Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	LOVING	3	West Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	MADISON	2	East Texas	0.44	0.53	30.87	15.95	0.75	0.40	30	13.00
	MARTIN	3	West Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	MASON	3	West Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	MATAGORDA	2	East Texas	0.44	0.53	30.87	15.95	0.75	0.40	30	13.00
	MAVERICK	2	West Texas	0.44	0.53	30.87	15.95	0.75	0.40	30	13.00
	MCCULLOCH	3	West Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	MCLENNAN	2	West Texas	0.44	0.53	30.87	15.95	0.75	0.40	30	13.00
	MCMULLEN	2	West Texas	0.44	0.53	30.87	15.95	0.75	0.40	30	13.00
	MEDINA	2	West Texas	0.44	0.53	30.87	15.95	0.75	0.40	30	13.00
	MENARD	3	West Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
ERCOT	MIDLAND	3	West Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	MILAM	2	West Texas	0.44	0.53	30.87	15.95	0.75	0.40	30	13.00
	MILLS	3	West Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	MITCHELL	3	West Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	MONTAGUE	3	West Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	MONTGOMERY	2	East Texas	0.44	0.53	30.87	15.95	0.75	0.40	30	13.00
	MOTLEY	3	West Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	NACOGDOCHES	3	East Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	NAVARRO	3	West Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	NOLAN	3	West Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	NUECES	2	East Texas	0.44	0.53	30.87	15.95	0.75	0.40	30	13.00
	PALO PINTO	3	West Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	PARKER	3	West Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	PECOS	3	West Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	PRESIDIO	3	West Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	RAINS	3	West Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	REAGAN	3	West Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	REAL	2	West Texas	0.44	0.53	30.87	15.95	0.75	0.40	30	13.00
	RED RIVER	3	East Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	REEVES	3	West Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	REFUGIO	2	East Texas	0.44	0.53	30.87	15.95	0.75	0.40	30	13.00
	ROBERTSON	2	East Texas	0.44	0.53	30.87	15.95	0.75	0.40	30	13.00
	ROCKWALL	3	West Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	RUNNELS	3	West Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	RUSK	3	East Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	SAN PATRICIO	2	East Texas	0.44	0.53	30.87	15.95	0.75	0.40	30	13.00
	SAN SABA	3	West Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	SCHLEICHER	3	West Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	SCURRY	3	West Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	SHACKELFORD	3	West Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	SMITH	3	East Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	SOMERVELL	3	West Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	STARR	2	East Texas	0.44	0.53	30.87	15.95	0.75	0.40	30	13.00
	STEPHENS	3	West Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	STERLING	3	West Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	STONEWALL	3	West Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	SUTTON	3	West Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	TARRANT	3	West Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	TAYLOR	3	West Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	TERRELL	3	West Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	THROCKMORTON	3	West Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	TITUS	3	East Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	TOM GREEN	3	West Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	TRAVIS	2	West Texas	0.44	0.53	30.87	15.95	0.75	0.40	30	13.00
	UPTON	3	West Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	UVALDE	2	West Texas	0.44	0.53	30.87	15.95	0.75	0.40	30	13.00
	VAL VERDE	2	West Texas	0.44	0.53	30.87	15.95	0.75	0.40	30	13.00
	VAN ZANDT	3	West Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	VICTORIA	2	East Texas	0.44	0.53	30.87	15.95	0.75	0.40	30	13.00
	WALLER	2	East Texas	0.44	0.53	30.87	15.95	0.75	0.40	30	13.00
	WARD	3	West Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	WASHINGTON	2	East Texas	0.44	0.53	30.87	15.95	0.75	0.40	30	13.00
	WEBB	2	West Texas	0.44	0.53	30.87	15.95	0.75	0.40	30	13.00
	WHARTON	2	East Texas	0.44	0.53	30.87	15.95	0.75	0.40	30	13.00
	WICHITA	3	West Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	WILBARGER	3	West Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	WILLACY	2	East Texas	0.44	0.53	30.87	15.95	0.75	0.40	30	13.00
	WILLIAMSON	2	West Texas	0.44	0.53	30.87	15.95	0.75	0.40	30	13.00
	WILSON	2	West Texas	0.44	0.53	30.87	15.95	0.75	0.40	30	13.00
	WINKLER	3	West Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	WISE	3	West Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	YOUNG	3	West Texas	0.44	0.53	30.87	15.95	0.65	0.40	30	13.00
	ZAPATA	2	West Texas	0.44	0.53	30.87	15.95	0.75	0.40	30	13.00
	ZAVALA	2	West Texas	0.44	0.53	30.87	15.95	0.75	0.40	30	13.00

Table 46: 2011 Annual Electricity and Natural Gas Savings from Implementation of the 2006 IECC for Multi-family Residences Buildings

2011 Summary TRY 2008

	County	Climate Zone	No. of Projected Units (2011)	Precode Total Annual Elec. Use (MWh/yr)	Code-compliant Total Annual Elec. Use (MWh/yr)	Total Annual Elec. Savings (MWh/yr) w/ 7% of T&D Loss	Precode Total NG Use (Therm/yr)	Code-compliant Total NG Use (Therm/yr)	Total Annual NG Savings (Therm/yr)
Nonattainment County	BRAZORIA	3	379	22,744	21,916	886.19	205,210	206,671	-1,460.81
	CHAMBERS	4	0	0	0	0.00	0	0	0.00
	COLLIN	6	1,054	70,182	66,802	3,617.39	793,783	742,556	51,227.51
	DALLAS	5	5,983	397,768	378,761	20,337.89	4,515,634	4,221,016	294,617.82
	DENTON	6	2,245	149,487	142,286	7,704.97	1,690,744	1,581,630	109,113.62
	EL PASO	6	873	51,007	48,829	2,329.85	683,143	628,140	55,003.49
	FORT BEND	4	488	29,293	28,221	1,146.12	264,153	266,076	-1,922.55
	GALVESTON	3	30	1,800	1,735	70.15	16,244	16,359	-115.63
	HARDIN	4	0	0	0	0.00	0	0	0.00
	HARRIS	4	6,231	374,020	360,343	14,634.15	3,372,827	3,397,375	-24,547.96
	JEFFERSON	4	162	9,550	9,207	366.23	89,356	90,222	-866.09
	LIBERTY	4	8	481	463	18.88	4,326	4,360	-34.52
	MONTGOMERY	4	1,214	72,871	70,207	2,851.21	657,136	661,918	-4,782.74
	ORANGE	4	162	9,551	9,209	366.73	89,356	90,222	-866.09
	TARRANT	5	1,584	105,309	100,277	5,384.46	1,195,515	1,117,515	78,000.10
	WALLER	4	32	1,921	1,851	75.16	17,322	17,448	-126.07
Affected County	BASTROP	4	0	0	0	0.00	0	0	0.00
	BEXAR	4	2,519	155,487	149,162	6,767.68	1,437,949	1,365,805	72,144.43
	CALDWELL	4	0	0	0	0.00	0	0	0.00
	COMAL	4	0	0	0	0.00	0	0	0.00
	ELLIS	5	228	15,158	14,434	775.04	172,082	160,854	11,227.29
	GREGG	6	208	13,698	13,212	519.89	144,354	146,058	-1,704.19
	GUADALUPE	4	176	10,864	10,422	472.85	100,468	95,427	5,040.66
	HARRISON	6	80	5,251	5,068	195.50	55,760	56,461	-701.17
	HAYS	5	1,478	94,950	90,507	4,754.34	957,109	894,640	62,469.87
	HENDERSON	5	0	0	0	0.00	0	0	0.00
	HOOD	5	16	1,064	1,013	54.39	12,076	11,288	787.88
	HUNT	6	6	399	380	20.54	4,523	4,231	292.07
	JOHNSON	5	0	0	0	0.00	0	0	0.00
	KAUFMAN	6	4	266	254	13.73	3,012	2,818	194.41
	NUECES	3	258	16,148	15,475	719.91	127,506	127,972	-466.32
	PARKER	6	0	0	0	0.00	0	0	0.00
	ROCKWALL	6	0	0	0	0.00	0	0	0.00
	RUSK	5	0	0	0	0.00	0	0	0.00
	SAN PATRICIO	3	0	0	0	0.00	0	0	0.00
	SMITH	5	77	5,050	4,874	188.01	53,725	54,359	-634.19
	TRAVIS	5	2,469	158,614	151,192	7,942.13	1,598,852	1,494,496	104,355.96
	UPSHUR	6	30	1,997	1,901	102.90	22,630	21,160	1,470.09
	VICTORIA	3	0	0	0	0.00	0	0	0.00
	WILLIAMSON	5	61	3,919	3,735	196.22	39,502	36,924	2,578.26
	WILSON	4	20	1,235	1,184	53.73	11,417	10,844	572.80
ERCOT	ANDERSON	5	0	0	0	0.00	0	0	**0**
	ANDREWS	6	0	0	0	0.00	0	0	**0**
	ANGELINA	5	288	17,097	16,491	648.00	172,682	174,666	**-1,984**
	ARANSAS	3	0	0	0	0.00	0	0	**0**
	ARCHER	7	0	0	0	0.00	0	0	**0**
	ATASCOSA	3	2	123	118	5.36	1,142	1,085	**58**
	AUSTIN	4	0	0	0	0.00	0	0	**0**
	BANDERA	5	0	0	0	0.00	0	0	**0**
	BAYLOR	7	0	0	0	0.00	0	0	**0**
	BEE	3	0	0	0	0.00	0	0	**0**
	BELL	5	379	23,924	22,811	1,190.92	279,842	260,459	**19,383**
	BLANCO	5	0	0	0	0.00	0	0	**0**
	BORDEN	7	0	0	0	0.00	0	0	**0**
	BOSQUE	5	0	0	0	0.00	0	0	**0**
	BRAZOS	4	825	49,521	47,710	1,937.60	446,571	449,821	**-3,250**
	BREWSTER	5	2	131	124	7.24	1,506	1,401	**104**
	BRISCOE	8	0	0	0	0.00	0	0	**0**
	BROOKS	2	0	0	0	0.00	0	0	**0**
	BROWN	5	0	0	0	0.00	0	0	**0**
	BURLESON	4	0	0	0	0.00	0	0	**0**
	BURNET	5	0	0	0	0.00	0	0	**0**
	CALHOUN	3	0	0	0	0.00	0	0	**0**
	CALLAHAN	6	0	0	0	0.00	0	0	**0**
	CAMERON	2	83	5,334	5,098	253.55	37,009	37,082	**-73**
	CHEROKEE	5	6	356	344	13.50	3,598	3,639	**-41**
	CHILDRESS	7	0	0	0	0.00	0	0	**0**
	CLAY	7	0	0	0	0.00	0	0	**0**
	COKE	6	0	0	0	0.00	0	0	**0**
	COLEMAN	5	0	0	0	0.00	0	0	**0**
	COLORADO	4	0	0	0	0.00	0	0	**0**
	COMANCHE	5	0	0	0	0.00	0	0	**0**
	CONCHO	5	0	0	0	0.00	0	0	**0**
	COOKE	6	0	0	0	0.00	0	0	**0**
	CORYELL	5	14	884	843	43.99	10,337	9,621	**716**
	COTTLE	7	0	0	0	0.00	0	0	**0**
	CRANE	5	0	0	0	0.00	0	0	**0**
	CROCKETT	5	0	0	0	0.00	0	0	**0**
	CROSBY	7	0	0	0	0.00	0	0	**0**
	CULBERSON	6	0	0	0	0.00	0	0	**0**
	DAWSON	7	0	0	0	0.00	0	0	**0**
	DE WITT	3	0	0	0	0.00	0	0	**0**
	DELTA	6	0	0	0	0.00	0	0	**0**
	DICKENS	7	0	0	0	0.00	0	0	**0**
	DIMMIT	3	0	0	0	0.00	0	0	**0**
	DUVAL	3	0	0	0	0.00	0	0	**0**
	EASTLAND	6	0	0	0	0.00	0	0	**0**
	ECTOR	6	404	26,353	24,970	1,480.54	332,986	308,597	**24,389**
	EDWARDS	5	0	0	0	0.00	0	0	**0**
	ERATH	6	12	786	745	43.97	9,964	9,259	**705**
	FALLS	5	0	0	0	0.00	0	0	**0**
	FANNIN	6	0	0	0	0.00	0	0	**0**
	FAYETTE	4	0	0	0	0.00	0	0	**0**
	FISHER	6	0	0	0	0.00	0	0	**0**
	FOARD	7	0	0	0	0.00	0	0	**0**
	FRANKLIN	6	0	0	0	0.00	0	0	**0**
	FREESTONE	5	0	0	0	0.00	0	0	**0**
	FRIO	3	0	0	0	0.00	0	0	**0**

Table 46: 2011 Annual Electricity and Natural Gas Savings from Implementation of the 2006 IECC for Multi-family Residences Buildings (Continued)

2011 Summary TRY 2008									
	County	Climate Zone	No. of Projected Units (2011)	Precode Total Annual Elec. Use (MWh/yr)	Code-compliant Total Annual Elec. Use (MWh/yr)	Total Annual Elec. Savings (MWh/yr) w/ 7% of T&D Loss	Precode Total NG Use (Therm/yr)	Code-compliant Total NG Use (Therm/yr)	Total Annual NG Savings (Therm/yr)
	GILLESPIE	5	0	0	0	0.00	0	0	**0**
	GLASSCOCK	6	0	0	0	0.00	0	0	**0**
	GOLIAD	3	0	0	0	0.00	0	0	**0**
	GONZALES	4	0	0	0	0.00	0	0	**0**
	GRAYSON	6	14	932	887	47.93	10,554	9,872	**681**
	GRIMES	4	0	0	0	0.00	0	0	**0**
	HALL	8	0	0	0	0.00	0	0	**0**
	HAMILTON	5	0	0	0	0.00	0	0	**0**
	HARDEMAN	7	0	0	0	0.00	0	0	**0**
	HASKELL	6	0	0	0	0.00	0	0	**0**
	HIDALGO	2	183	11,762	11,239	559.02	81,598	81,758	**-161**
	HILL	5	0	0	0	0.00	0	0	**0**
	HOPKINS	6	6	400	380	20.59	4,519	4,227	**292**
	HOUSTON	5	0	0	0	0.00	0	0	**0**
	HOWARD	6	0	0	0	0.00	0	0	**0**
	HUDSPETH	6	0	0	0	0.00	0	0	**0**
	IRION	5	0	0	0	0.00	0	0	**0**
	JACK	6	0	0	0	0.00	0	0	**0**
	JACKSON	3	0	0	0	0.00	0	0	**0**
	JEFF DAVIS	6	0	0	0	0.00	0	0	**0**
	JIM HOGG	2	0	0	0	0.00	0	0	**0**
	JIM WELLS	3	0	0	0	0.00	0	0	**0**
	JONES	6	0	0	0	0.00	0	0	**0**
	KARNES	3	0	0	0	0.00	0	0	**0**
	KENDALL	5	0	0	0	0.00	0	0	**0**
	KENEDY	2	0	0	0	0.00	0	0	**0**
	KENT	7	0	0	0	0.00	0	0	**0**
	KERR	5	0	0	0	0.00	0	0	**0**
	KIMBLE	5	0	0	0	0.00	0	0	**0**
	KING	7	0	0	0	0.00	0	0	**0**
	KINNEY	4	0	0	0	0.00	0	0	**0**
	KLEBERG	2	23	1,439	1,380	64.11	11,370	11,408	**-38**
	KNOX	7	0	0	0	0.00	0	0	**0**
	LA SALLE	3	0	0	0	0.00	0	0	**0**
	LAMAR	6	13	866	824	44.62	9,790	9,159	**632**
	LAMPASAS	5	0	0	0	0.00	0	0	**0**
	LAVACA	4	0	0	0	0.00	0	0	**0**
	LEE	4	0	0	0	0.00	0	0	**0**
	LEON	5	0	0	0	0.00	0	0	**0**
	LIMESTONE	5	0	0	0	0.00	0	0	**0**
	LIVE OAK	3	0	0	0	0.00	0	0	**0**
	LLANO	5	0	0	0	0.00	0	0	**0**
	LOVING	6	0	0	0	0.00	0	0	**0**
	MADISON	4	0	0	0	0.00	0	0	**0**
	MARTIN	6	0	0	0	0.00	0	0	**0**
	MASON	5	0	0	0	0.00	0	0	**0**
	MATAGORDA	3	0	0	0	0.00	0	0	**0**
	MAVERICK	3	70	4,381	4,199	195.32	34,595	34,721	**-127**
	MCCULLOCH	5	0	0	0	0.00	0	0	**0**
	MCLENNAN	5	82	5,176	4,935	257.67	60,546	56,353	**4,194**
	MCMULLEN	3	0	0	0	0.00	0	0	**0**
ERCOT	MEDINA	4	0	0	0	0.00	0	0	**0**
	MENARD	5	0	0	0	0.00	0	0	**0**
	MIDLAND	6	0	0	0	0.00	0	0	**0**
	MILAM	4	0	0	0	0.00	0	0	**0**
	MILLS	5	0	0	0	0.00	0	0	**0**
	MITCHELL	6	0	0	0	0.00	0	0	**0**
	MONTAGUE	6	0	0	0	0.00	0	0	**0**
	MOTLEY	7	0	0	0	0.00	0	0	**0**
	NACOGDOCHE	5	14	831	802	31.50	8,394	8,491	**-96**
	NAVARRO	5	11	694	662	34.56	8,122	7,559	**563**
	NOLAN	6	0	0	0	0.00	0	0	**0**
	PALO PINTO	6	0	0	0	0.00	0	0	**0**
	PECOS	5	0	0	0	0.00	0	0	**0**
	PRESIDIO	5	0	0	0	0.00	0	0	**0**
	RAINS	6	0	0	0	0.00	0	0	**0**
	REAGAN	5	0	0	0	0.00	0	0	**0**
	REAL	5	0	0	0	0.00	0	0	**0**
	RED RIVER	6	0	0	0	0.00	0	0	**0**
	REEVES	6	0	0	0	0.00	0	0	**0**
	REFUGIO	3	0	0	0	0.00	0	0	**0**
	ROBERTSON	4	0	0	0	0.00	0	0	**0**
	RUNNELS	5	0	0	0	0.00	0	0	**0**
	SAN SABA	5	0	0	0	0.00	0	0	**0**
	SCHLEICHER	5	0	0	0	0.00	0	0	**0**
	SCURRY	7	40	2,638	2,497	150.31	43,560	40,063	**3,497**
	SHACKELFORD	6	0	0	0	0.00	0	0	**0**
	SOMERVELL	5	0	0	0	0.00	0	0	**0**
	STARR	2	0	0	0	0.00	0	0	**0**
	STEPHENS	6	0	0	0	0.00	0	0	**0**
	STERLING	6	0	0	0	0.00	0	0	**0**
	STONEWALL	7	0	0	0	0.00	0	0	**0**
	SUTTON	5	0	0	0	0.00	0	0	**0**
	TAYLOR	6	6	393	373	21.99	4,982	4,629	**353**
	TERRELL	5	0	0	0	0.00	0	0	**0**
	THROCKMORT	6	0	0	0	0.00	0	0	**0**
	TITUS	6	0	0	0	0.00	0	0	**0**
	TOM GREEN	5	0	0	0	0.00	0	0	**0**
	UPTON	5	0	0	0	0.00	0	0	**0**
	UVALDE	4	125	7,716	7,402	335.83	71,355	67,775	**3,580**
	VAL VERDE	4	6	370	355	16.12	3,425	3,253	**172**
	VAN ZANDT	6	0	0	0	0.00	0	0	**0**
	WARD	6	0	0	0	0.00	0	0	**0**
	WASHINGTON	4	0	0	0	0.00	0	0	**0**
	WEBB	3	316	19,779	18,954	881.75	156,170	156,741	**-571**
	WHARTON	3	0	0	0	0.00	0	0	**0**
	WICHITA	7	49	3,357	3,177	193.19	46,261	42,750	**3,511**
	WILBARGER	7	0	0	0	0.00	0	0	**0**
	WILLACY	2	0	0	0	0.00	0	0	**0**
	WINKLER	6	0	0	0	0.00	0	0	**0**
	WISE	6	0	0	0	0.00	0	0	**0**
	YOUNG	6	0	0	0	0.00	0	0	**0**
	ZAPATA	2	0	0	0	0.00	0	0	**0**
	ZAVALA	3	0	0	0	0.00	0	0	**0**
	TOTAL		**31,048**			**91,045**			**867,356**

Table 47: 2011 Totalized Annual Electricity Savings from the 2006 IECC by CM Zones for Multi-family Residences[77]

CM Zones	Total Electricity Savings by CM Zones (MWh) 2011-TRY 2008
H	24,416.46
N	32,868.61
W	3,280.90
S	20,513.03
Total	81,079.00

[77] Of a total of 202 counties listed in Table 38, the annual electricity savings in 138 counties (i.e., 9,966 MWh), including 8 non-attainment and affected non-ERCOT counties (i.e, 39.13 % of total savings in 138 counties), are not reported in Table 39 since the corresponding providers could not be assigned for these 138 counties.

Table 48: 2011 Annual NOx Reductions from the 2006 IECC by CM Zones for Multi-family Residences by County using 2010 eGRID

Area	County	H	NOx Reductions (lbs)	N	NOx Reductions (lbs)	W	NOx Reductions (lbs/year)	S	NOx Reductions (lbs)	Total Nox Reductions (lbs)	Total Nox Reductions (Tons)
Houston-Galveston Area	Brazoria	0.0562032	1372.2833397	0.0000071	0.2343713	0.0000003	0.0011300	0.0005265	10.8009753	1383.3198163	0.6916599
	Chambers	0.0204500	499.3168189	0.0000026	0.0852780	0.0000001	0.0004112	0.0001916	3.9300256	503.3325336	0.2516663
	Fort Bend	0.0313463	765.3663532	0.0000040	0.1307164	0.0000002	0.0006302	0.0002937	6.0240497	771.5217495	0.3857609
	Galveston	0.0226620	553.3250701	0.0000029	0.0945020	0.0000001	0.0004556	0.0002123	4.3551140	557.7751418	0.2788876
	Harris	0.1486911	3630.5114159	0.0000189	0.6200524	0.0000009	0.0029895	0.0013930	28.5750494	3659.7095072	1.8298548
Dallas/ Fort Worth Area	Collin	0.0012932	31.5745908	0.0079329	260.7443049	0.0003832	1.2571538	0.0000809	1.6602158	295.2362654	0.1476181
	Dallas	0.0024826	60.6165182	0.0152295	500.5737684	0.0007356	2.4134686	0.0001554	3.1872623	566.7910176	0.2833955
	Denton	0.0001267	3.0926758	0.0007770	25.5394472	0.0000375	0.1231360	0.0000079	0.1626152	28.9178742	0.0144589
	Tarrant	0.0004742	11.5778641	0.0029089	95.6104908	0.0001405	0.4609769	0.0000297	0.6087728	108.2581046	0.0541291
	Ellis	0.0029920	73.0538693	0.0183544	603.2819390	0.0008865	2.9086663	0.0001873	3.8412276	683.0857021	0.3415429
	Johnson	0.0007256	17.7165603	0.0044512	146.3041034	0.0002150	0.7053913	0.0000454	0.9315501	165.6576051	0.0828288
	Kaufman	0.0059718	145.8114199	0.0366343	1204.1168654	0.0017695	5.8055345	0.0003738	7.6668745	1363.4006943	0.6817003
	Parker	0.0000012	0.0300205	0.0000075	0.2479109	0.0000004	0.0011953	0.0000001	0.0015785	0.2807052	0.0001404
	Henderson	0.0006908	16.8663127	0.0042376	139.2827232	0.0002047	0.6715384	0.0000432	0.8868435	157.7074178	0.0788537
	Hood	0.0050771	123.9647199	0.0311454	1023.7058937	0.0015044	4.9357002	0.0003178	6.5181586	1159.1244723	0.5795622
	Hunt	0.0088463	215.9962373	0.0047066	154.7005966	0.0002273	0.7458742	0.0652823	1339.1379109	1710.5806189	0.8552903
San Antonio Area	Bexar	0.0138906	339.1594536	0.0009368	30.7917657	0.0000452	0.1484596	0.1109355	2275.6244772	2645.7241562	1.3228621
	Guadalupe	0.0032029	78.2032273	0.0002160	7.0999509	0.0000104	0.0342317	0.0255795	524.7124219	610.0498319	0.3050249
Austin Area	Bastrop	0.0033782	82.4842830	0.0002278	7.4886213	0.0000110	0.0361057	0.0269798	553.4365957	643.4456058	0.3217228
	Hays	0.0008331	20.3420605	0.0000562	1.8468244	0.0000027	0.0089043	0.0066537	136.4871014	158.6848906	0.0793424
	Travis	0.0051785	126.4415169	0.0003493	11.4794311	0.0000169	0.0553470	0.0413577	848.3720794	986.3483744	0.4931742
	Rusk	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Corpus Christi Area	Nueces	0.0128578	313.9414839	0.0008672	28.5022650	0.0000419	0.1374209	0.1026870	2106.4219720	2449.0031418	1.2245016
	San Patricio	0.0015100	36.8677279	0.0001018	3.3471644	0.0000049	0.0161380	0.0120591	247.3677293	287.5987596	0.1437994
Victoria Area	Victoria	0.0021192	51.7422902	0.0001429	4.6976030	0.0000069	0.0226490	0.0169244	347.1701020	403.6326443	0.2018163
Other ERCOT counties	Andrews	0.0000037	0.0914212	0.0000230	0.7549603	0.0039003	12.7964021	0.0000002	0.0048070	13.6475906	0.0068238
	Bosque	0.0022204	54.2149043	0.0136212	447.7089701	0.0006579	2.1585861	0.0001390	2.8506606	506.9331211	0.2534666
	Brazos	0.0024089	58.8162664	0.0112305	369.1314367	0.0005425	1.7797320	0.0047829	98.1119674	527.8394026	0.2639197
	Calhoun	0.0009466	23.1122050	0.0000638	2.0983216	0.0000031	0.0101169	0.0075598	155.0736648	180.2943082	0.0901472
	Cameron	0.0063536	155.1331902	0.0004285	14.0843040	0.0000207	0.0679061	0.0507425	1040.8817475	1210.1671478	0.6050836
	Cherokee	0.0027392	66.8804850	0.0168033	552.3018708	0.0008116	2.6628707	0.0001714	3.5166264	625.3618530	0.3126809
	Coke	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
	Ector	0.0019215	46.9164400	0.0006604	21.7049485	0.0911346	299.0034017	0.0146527	300.5709985	668.1957887	0.3340979
	Fannin	0.0000041	0.0990067	0.0000249	0.8176016	0.0000012	0.0039420	0.0000003	0.0052058	0.9257561	0.0004629
	Fayette	0.0051867	126.6409265	0.0103217	339.2591382	0.0004986	1.6357055	0.0283993	582.5559177	1050.0916879	0.5250458
	Freestone	0.0047643	116.3283053	0.0292268	960.6440598	0.0014117	4.6316536	0.0002982	6.1166301	1087.7206488	0.5438603
	Frio	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
	Grimes	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
	Hidalgo	0.0053716	131.1548785	0.0003623	11.9073499	0.0000175	0.0574102	0.0428994	879.9968528	1023.1164914	0.5115582
	Howard	0.0002411	5.8872435	0.0007641	25.1139247	0.1283942	421.2480776	0.0009490	19.4666855	471.7159313	0.2358580
	Jack	0.0030783	75.1615264	0.0188839	620.6870601	0.0009121	2.9925834	0.0001927	3.9520498	702.7932196	0.3513966
	Lamar	0.0040001	97.6693166	0.0245388	806.5573428	0.0011853	3.8887392	0.0002504	5.1355264	913.2509251	0.4566255
	Limestone	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
	Llano	0.0040314	98.4336899	0.0002719	8.9366435	0.0000131	0.0430872	0.0321966	660.4507456	767.8641661	0.3839321
	McLennan	0.0056576	138.1391291	0.0347066	1140.7587642	0.0016764	5.5000595	0.0003541	7.2634597	1291.6614125	0.6458307
	Milam	0.0012686	30.9748781	0.0000856	2.8121616	0.0000041	0.0135586	0.0101316	207.8290613	241.6296596	0.1208148
	Mitchell	0.0000311	0.7600545	0.0001910	6.2765622	0.0324260	106.3862731	0.0000019	0.0399642	113.4628540	0.0567314
	Nolan	0.0000293	0.7143122	0.0001795	5.8988203	0.0304745	99.9836365	0.0000018	0.0375591	106.6343281	0.0533172
	Palo Pinto	0.0036129	88.2151823	0.0221635	728.4847020	0.0010705	3.5123194	0.0002261	4.6384209	824.8506246	0.4124253
	Pecos	0.0000020	0.0480989	0.0000121	0.3972031	0.0020520	6.7325006	0.0000001	0.0025291	7.1803317	0.0035902
	Robertson	0.0039506	96.4590458	0.0055755	183.2580580	0.0002693	0.8835612	0.0246170	504.9684835	785.5691485	0.3927846
	Titus	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
	Upton	0.0000025	0.0621018	0.0000156	0.5128393	0.0026494	8.6925073	0.0000002	0.0032654	9.2707138	0.0046354
	Ward	0.0001995	4.8715526	0.0012239	40.2294875	0.2078335	681.8804837	0.0000125	0.2561499	727.2376738	0.3636188
	Webb	0.0042017	102.5912916	0.0002834	9.3141058	0.0000137	0.0449071	0.0335565	688.3465930	800.2968974	0.4001484
	Wharton	0.0021095	51.5068505	0.0001423	4.6762278	0.0000069	0.0225460	0.0168474	345.5903956	401.7960199	0.2008980
	Wichita	0.0000121	0.2957851	0.0000743	2.4426058	0.0126190	41.4016017	0.0000008	0.0155526	44.1555451	0.0220778
	Wilbarger	0.0179710	438.7884748	0.1102430	3623.5337618	0.0053249	17.4705221	0.0011247	23.0718293	4102.8645879	2.0514323
	Wise	0.0010202	24.9092016	0.0062583	205.7012389	0.0003023	0.9917689	0.0000638	1.3097446	232.9119539	0.1164560
	Young	0.0071054	173.4887699	0.0435880	1432.6775911	0.0021054	6.9075182	0.0004447	9.1221705	1622.1960498	0.8110980
	Total	**0.4414501**	**10778.65036**	**0.4812863**	**15819.20865**	**0.5345786**	**1753.897486**	**0.6829349**	**14009.06597**	**42360.8224696**	**21.1804112**

Energy Savings by PCA (MWh)		24,416.46		32,868.61		3,280.90		20,513.03	

7.1.3 2011 Results for New Residential Construction (Single-family and Multi-family), Using 2008 Base Year and 2010 eGRID

In Table 49, the combined NOx emissions reductions are listed from single-family electricity savings, multi-family electricity savings, and natural gas savings[78] (single-family and multi-family), which also show the 2011 annual electricity savings are shown for the combined single-family and multi-family savings.

Using the 2010 eGRID the total NOx reductions from electricity and natural gas savings from new construction in 2011 are 40.05 tons NOx/year, which represents 9.89 tons NOx/year (24.7%) from single-family residential electricity savings, 21.18 tons NOx/year (52.9%) from multi-family residential electricity savings, and 8.97 tons NOx/year (22.4%) from natural gas savings from single-family and multi-family residential.

Figure 64 through Figure 67 show the electricity and NOx reductions tabulated in Table 49. Figure 64 shows the annual electricity savings by county as a stacked bar chart. Figure 65 shows the spatial distribution of the electricity savings by county across the state. Figure 66 shows the annual NOx reductions in a similar format as the electricity savings using a stacked bar chart with the ordering of the counties determined by Table 49, and Figure 67 shows the spatial distribution of the NOx savings by county across the state.

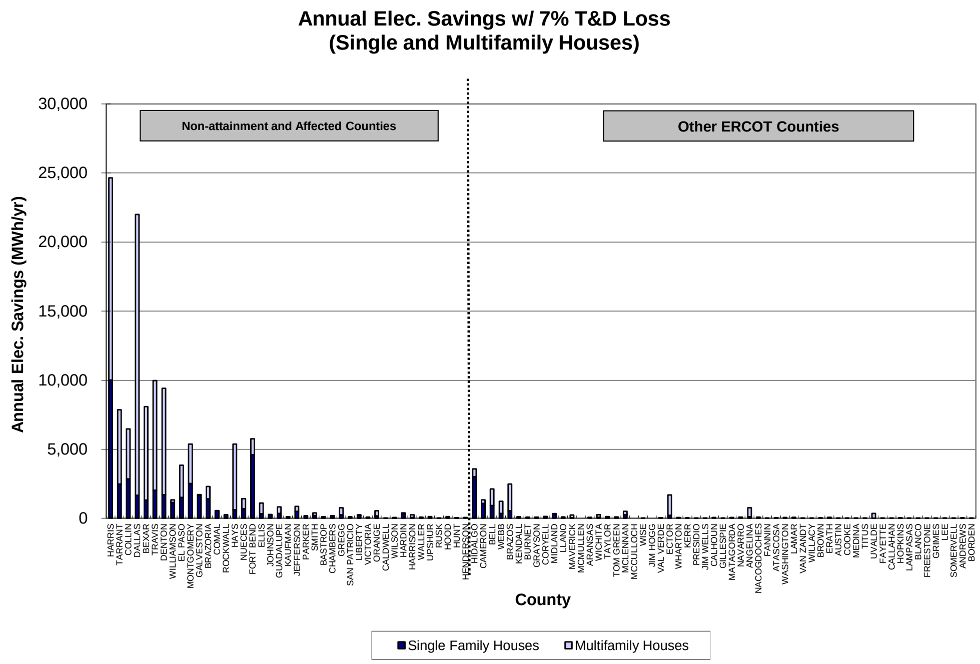
[78] 0.092 lb-NOx/MMBtu of emission rate was used for the calculation.

Table 49: 2011 Annual NOx Reductions from Electricity and Natural Gas Savings Due to the 2006 IECC for Single-family and Multi-family Residences by County (Using 2008 Base year and 2010 eGRID)

	Electricity Savings and Resultant NOx Reductions (Single Family Houses)		Electricity Savings and Resultant NOx Reductions (Multifamily Houses)		Total Electricity Savings and Resultant NOx Reductions (Single and Multi-Family Houses)		Total Natural Gas Savings and Resultant NOx Reductions (Single and Multi-Family Houses)		Total Nox Reductions
County	Total Annual Electricity Savings per County w/ 7% T&D Loss (MWh/County)	Annual Nox Reductions (Tons)	Total Annual Electricity Savings per County w/ 7% T&D Loss (MWh/County)	Annual Nox Reductions (Tons)	Total Annual Electricity Savings per County w/ 7% T&D Loss (MWh/County)	Annual Nox Reductions (Tons)	Total Annual N.G. Savings (Therm/County)	Annual Nox Reductions (Tons)	Annual Nox Reductions (Tons)
HARRIS	10,010.83	1.51	14,634.15	1.83	24,644.98	3.34	49,190.14	0.23	3.56
TARRANT	2,473.12	0.02	5,384.46	0.05	7,857.57	0.07	181,183.70	0.83	0.91
COLLIN	2,847.43	0.05	3,617.39	0.15	6,464.82	0.20	169,269.57	0.78	0.97
DALLAS	1,655.83	0.09	20,337.89	0.28	21,993.72	0.38	363,702.69	1.67	2.05
BEXAR	1,321.30	0.65	6,767.68	1.32	8,088.98	1.98	114,332.76	0.53	2.50
TRAVIS	2,024.96	0.24	7,942.13	0.49	9,967.09	0.74	180,844.64	0.83	1.57
DENTON	1,698.35	0.00	7,704.97	0.01	9,403.32	0.02	179,519.97	0.83	0.84
WILLIAMSON	1,138.58		196.22		1,334.80	0.00	45,585.72	0.21	0.21
EL PASO	1,515.15		2,329.85		3,845.00	0.00	167,086.79	0.77	0.77
MONTGOMERY	2,519.16		2,851.21		5,370.36	0.00	13,772.95	0.06	0.06
GALVESTON	1,642.39	0.23	70.15	0.28	1,712.54	0.51	12,182.55	0.06	0.56
BRAZORIA	1,407.25	0.57	886.19	0.69	2,293.44	1.26	9,076.63	0.04	1.30
COMAL	549.73		0.00		549.73	0.00	17,552.56	0.08	0.08
ROCKWALL	266.22		0.00		266.22	0.00	11,036.23	0.05	0.05
HAYS	612.66	0.04	4,754.34	0.08	5,366.99	0.12	85,611.65	0.39	0.51
NUECES	695.28	0.60	719.91	1.22	1,415.19	1.83	3,356.67	0.02	1.84
FORT BEND	4,605.69	0.32	1,146.12	0.39	5,751.80	0.70	32,002.15	0.15	0.85
ELLIS	324.21	0.11	775.04	0.34	1,099.24	0.45	24,753.83	0.11	0.57
JOHNSON	267.49	0.03	0.00	0.08	267.49	0.11	11,160.07	0.05	0.16
GUADALUPE	350.07	0.15	472.85	0.31	822.93	0.46	16,218.32	0.07	0.53
KAUFMAN	98.46	0.22	13.73	0.68	112.18	0.90	4,275.94	0.02	0.92
JEFFERSON	499.14		366.23		865.36	0.00	2,986.70	0.01	0.01
PARKER	182.66	0.00	0.00	0.00	182.66	0.00	7,572.31	0.03	0.04
SMITH	199.43		188.01		387.43	0.00	1,055.19	0.00	0.00
BASTROP	105.36	0.16	0.00	0.32	105.36	0.48	1,485.29	0.01	0.49
CHAMBERS	184.92	0.21	0.00	0.25	184.92	0.46	1,410.84	0.01	0.47
GREGG	242.40		519.89		762.29	0.00	241.37	0.00	0.00
SAN PATRICIO	112.08	0.07	0.00	0.14	112.08	0.21	616.26	0.00	0.22
LIBERTY	227.77		18.88		246.66	0.00	1,644.60	0.01	0.01
VICTORIA	78.96	0.10	0.00	0.20	78.96	0.30	580.94	0.00	0.30
ORANGE	172.69		366.73		539.42	0.00	420.80	0.00	0.00
CALDWELL	7.37		0.00		7.37	0.00	279.79	0.00	0.00
WILSON	6.49		53.73		60.23	0.00	780.12	0.00	0.00
HARDIN	381.46		0.00		381.46	0.00	2,950.93	0.01	0.01
HARRISON	50.81		195.50		246.31	0.00	(261.22)	(0.00)	(0.00)
WALLER	4.51		75.16		79.66	0.00	(92.87)	(0.00)	(0.00)
UPSHUR	14.02		102.90		116.93	0.00	1,683.73	0.01	0.01
RUSK	6.64	0.00	0.00	0.00	6.64	0.00	62.66	0.00	0.00
HOOD	62.52	0.19	54.39	0.58	116.91	0.77	3,396.38	0.02	0.78
HUNT	22.61	0.41	20.54	0.86	43.15	1.26	1,224.40	0.01	1.27
HENDERSON	60.37	0.03	0.00	0.08	60.37	0.10	511.38	0.00	0.11
HIDALGO	3,008.86	0.25	559.02	0.51	3,567.88	0.76	12,713.15	0.06	0.82
CAMERON	1,080.97	0.30	253.55	0.61	1,334.52	0.90	4,552.21	0.02	0.92
BELL	925.04		1,190.92		2,115.96	0.00	65,580.92	0.30	0.30
WEBB	347.34	0.20	881.75	0.40	1,229.08	0.60	7,300.65	0.03	0.63
BRAZOS	541.69	0.10	1,937.60	0.26	2,479.28	0.36	739.76	0.00	0.36
KENDALL	109.40		0.00		109.40	0.00	3,484.42	0.02	0.02
BURNET	83.66		0.00		83.66	0.00	3,159.92	0.01	0.01
GRAYSON	40.05		47.93		87.98	0.00	2,333.05	0.01	0.01
CORYELL	92.17		43.99		136.16	0.00	5,318.93	0.02	0.02
MIDLAND	331.43		0.00		331.43	0.00	16,790.18	0.08	0.08
LLANO	92.27	0.19	0.00	0.38	92.27	0.57	3,485.21	0.02	0.59
MAVERICK	35.82		195.32		231.14	0.00	685.26	0.00	0.00
MCMULLEN	0.00		0.00		0.00	0.00	0.00	0.00	0.00
ARANSAS	69.43		0.00		69.43	0.00	381.75	0.00	0.00
WICHITA	72.37	0.01	193.19	0.02	265.56	0.03	7,647.35	0.04	0.06
TAYLOR	92.49		21.99		114.48	0.00	4,923.81	0.02	0.02
TOM GREEN	93.70		0.00		93.70	0.00	4,017.63	0.02	0.02
MCLENNAN	247.84	0.21	257.67	0.65	505.51	0.86	16,571.12	0.08	0.93
MCCULLOCH	0.00		0.00		0.00	0.00	0.00	0.00	0.00
WISE	14.90	0.04	0.00	0.12	14.90	0.15	617.60	0.00	0.16
JIM HOGG	0.00		0.00		0.00	0.00	0.00	0.00	0.00
VAL VERDE	25.43		16.12		41.55	0.00	983.82	0.00	0.00
ECTOR	206.60	0.13	1,480.54	0.33	1,687.14	0.46	34,855.61	0.16	0.62
WHARTON	59.94	0.10	0.00	0.20	59.94	0.30	440.96	0.00	0.30
KERR	25.22		0.00		25.22	0.00	952.62	0.00	0.00
PRESIDIO	1.29		0.00		1.29	0.00	55.42	0.00	0.00
JIM WELLS	22.81		0.00		22.81	0.00	125.43	0.00	0.00
CALHOUN	61.84	0.04	0.00	0.09	61.84	0.13	454.95	0.00	0.14
GILLESPIE	20.30		0.00		20.30	0.00	766.75	0.00	0.00
MATAGORDA	59.94		0.00		59.94	0.00	440.96	0.00	0.00
NAVARRO	43.27		34.56		77.84	0.00	2,723.70	0.01	0.01
ANGELINA	113.89		648.00		761.89	0.00	(910.09)	(0.00)	(0.00)
NACOGDOCHES	47.45		31.50		78.95	0.00	351.13	0.00	0.00
FANNIN	3.88	0.00	0.00	0.00	3.88	0.00	159.83	0.00	0.00
ATASCOSA	35.17		5.36		40.53	0.00	1,201.65	0.01	0.01
WASHINGTON	50.47		0.00		50.47	0.00	371.78	0.00	0.00
LAMAR	26.74	0.15	44.62	0.46	71.35	0.61	884.31	0.00	0.61
VAN ZANDT	5.83		0.00		5.83	0.00	241.67	0.00	0.00
WILLACY	19.50		0.00		19.50	0.00	83.45	0.00	0.00
BROWN	35.97		0.00		35.97	0.00	1,796.26	0.01	0.01
ERATH	22.35		43.97		66.32	0.00	1,809.82	0.01	0.01
AUSTIN	15.32		0.00		15.32	0.00	112.86	0.00	0.00
COOKE	9.69		0.00		9.69	0.00	399.57	0.00	0.00
MEDINA	11.90		0.00		11.90	0.00	380.08	0.00	0.00
TITUS	6.68	0.00	0.00	0.00	6.68	0.00	63.12	0.00	0.00
UVALDE	11.36		335.83		347.19	0.00	3,942.81	0.02	0.02
FAYETTE	6.31	0.23	0.00	0.53	6.31	0.75	46.47	0.00	0.75
CALLAHAN	2.48		0.00		2.48	0.00	122.71	0.00	0.00
HOPKINS	5.83		20.59		26.42	0.00	533.29	0.00	0.00
LAMPASAS	2.81		0.00		2.81	0.00	0.00	0.00	0.00
BLANCO	1.23		0.00		1.23	0.00	46.47	0.00	0.00
FREESTONE	5.62	0.18	0.00	0.54	5.62	0.72	280.67	0.00	0.72
GRIMES	11.72	0.00	0.00	0.00	11.72	0.00	86.31	0.00	0.00
LEE	4.30		0.00		4.30	0.00	163.21	0.00	0.00
SOMERVELL	5.16		0.00		5.16	0.00	215.13	0.00	0.00
ANDREWS	36.89	0.00	0.00	0.01	36.89	0.01	1,869.04	0.01	0.02
BORDEN	23.46		0.00		23.46	0.00	679.55	0.00	0.00

Table 49: 2011 Annual NOx Reductions from Electricity and Natural Gas Savings Due to the 2006 IECC for Single-family and Multi-family Residences by County (Using 2008 Base year and 2010 eGRID) (Continued)

	Electricity Savings and Resultant NOx Reductions (Single Family Houses)		Electricity Savings and Resultant NOx Reductions (Multifamily Houses)		Total Electricity Savings and Resultant NOx Reductions (Single and Multi-Family Houses)		Total Natural Gas Savings and Resultant NOx Reductions (Single and Multi-Family Houses)		Total Nox Reductions
County	Total Annual Electricity Savings per County w/ 7% T&D Loss (MWh/County)	Annual Nox Reductions (Tons)	Total Annual Electricity Savings per County w/ 7% T&D Loss (MWh/County)	Annual Nox Reductions (Tons)	Total Annual Electricity Savings per County w/ 7% T&D Loss (MWh/County)	Annual Nox Reductions (Tons)	Total Annual N.G. Savings (Therm/County)	Annual Nox Reductions (Tons)	Annual Nox Reductions (Tons)
CHEROKEE	64.54	0.10	13.50	0.31	78.04	0.41	567.38	0.00	0.42
DIMMIT	2.71		0.00		2.71	0.00	61.50	0.00	0.00
FALLS	1.12		0.00		1.12	0.00	56.13	0.00	0.00
COLORADO	7.21		0.00		7.21	0.00	53.11	0.00	0.00
FRIO	5.86	0.00	0.00	0.00	5.86	0.00	190.68	0.00	0.00
MILAM	0.50	0.06	0.00	0.12	0.50	0.18	16.86	0.00	0.18
JACKSON	7.61		0.00		7.61	0.00	55.99	0.00	0.00
ANDERSON	12.34		0.00		12.34	0.00	116.37	0.00	0.00
HILL	3.37		0.00		3.37	0.00	168.40	0.00	0.00
CULBERSON	0.45		0.00		0.45	0.00	33.96	0.00	0.00
MASON	3.69		0.00		3.69	0.00	139.41	0.00	0.00
PECOS	3.88	0.00	0.00	0.00	3.88	0.00	166.25	0.00	0.01
RAINS	1.30		0.00		1.30	0.00	53.70	0.00	0.00
LAVACA	16.18		0.00		16.18	0.00	125.69	0.00	0.00
PALO PINTO	4.97	0.13	0.00	0.41	4.97	0.55	245.43	0.00	0.55
KIMBLE	0.65		0.00		0.65	0.00	27.71	0.00	0.00
MADISON	14.42		0.00		14.42	0.00	106.22	0.00	0.00
ARCHER	5.87		0.00		5.87	0.00	335.35	0.00	0.00
REFUGIO	1.90		0.00		1.90	0.00	14.00	0.00	0.00
LIMESTONE	14.61	0.00	0.00	0.00	14.61	0.00	729.73	0.00	0.00
CLAY	0.65		0.00		0.65	0.00	37.26	0.00	0.00
BEE	8.56		0.00		8.56	0.00	62.99	0.00	0.00
MARTIN	1.23		0.00		1.23	0.00	62.30	0.00	0.00
GONZALES	0.54		0.00		0.54	0.00	17.28	0.00	0.00
BURLESON	9.91		0.00		9.91	0.00	73.03	0.00	0.00
KARNES	12.48		0.00		12.48	0.00	409.93	0.00	0.00
KLEBERG	17.21		64.11		81.32	0.00	60.12	0.00	0.00
BREWSTER	9.69		7.24		16.93	0.00	520.07	0.00	0.00
WINKLER	0.61		0.00		0.61	0.00	31.15	0.00	0.00
FRANKLIN	1.30		0.00		1.30	0.00	53.70	0.00	0.00
YOUNG	3.10	0.26	0.00	0.81	3.10	1.08	153.39	0.00	1.08
HOUSTON	5.69		0.00		5.69	0.00	53.71	0.00	0.00
SCURRY	60.51		150.31		210.82	0.00	5,249.61	0.02	0.02
BOSQUE	1.69	0.08	0.00	0.25	1.69	0.34	84.20	0.00	0.34
COMANCHE	0.00		0.00		0.00	0.00	0.00	0.00	0.00
BRISCOE	4.13		0.00		4.13	0.00	416.53	0.00	0.00
CONCHO	0.65		0.00		0.65	0.00	27.71	0.00	0.00
ZAVALA	3.26		0.00		3.26	0.00	73.80	0.00	0.00
NOLAN	0.00	0.01	0.00	0.05	0.00	0.07	0.00	0.00	0.07
BROOKS	0.00		0.00		0.00	0.00	0.00	0.00	0.00
ROBERTSON	6.31	0.18	0.00	0.39	6.31	0.57	46.47	0.00	0.57
LIVE OAK	1.98		0.00		1.98	0.00	10.91	0.00	0.00
HAMILTON	0.56		0.00		0.56	0.00	28.07	0.00	0.00
JONES	0.00		0.00		0.00	0.00	0.00	0.00	0.00
REAGAN	2.42		0.00		2.42	0.00	125.41	0.00	0.00
WARD	7.38	0.09	0.00	0.36	7.38	0.45	373.81	0.00	0.46
RED RIVER	5.73		0.00		5.73	0.00	54.10	0.00	0.00
HASKELL	1.24		0.00		1.24	0.00	61.36	0.00	0.00
HOWARD	3.07	0.06	0.00	0.24	3.07	0.30	155.75	0.00	0.30
SAN SABA	0.00		0.00		0.00	0.00	0.00	0.00	0.00
JACK	3.72	0.11	0.00	0.35	3.72	0.47	184.07	0.00	0.47
STEPHENS	1.24		0.00		1.24	0.00	61.36	0.00	0.00
RUNNELS	1.29		0.00		1.29	0.00	55.42	0.00	0.00
REEVES	0.61		0.00		0.61	0.00	31.15	0.00	0.00
DE WITT	3.81		0.00		3.81	0.00	28.00	0.00	0.00
CHILDRESS	0.00		0.00		0.00	0.00	0.00	0.00	0.00
CROSBY	7.41		0.00		7.41	0.00	214.60	0.00	0.00
DAWSON	2.52		0.00		2.52	0.00	73.06	0.00	0.00
MITCHELL	0.00	0.01	0.00	0.06	0.00	0.07	0.00	0.00	0.07
WILBARGER	0.00	0.67	0.00	2.05	0.00	2.72	0.00	0.00	2.72
COLEMAN	0.62		0.00		0.62	0.00	30.87	0.00	0.00
UPTON	0.61	0.00	0.00	0.00	0.61	0.01	31.35	0.00	0.01
COKE	1.29	0.00	0.00	0.00	1.29	0.00	55.77	0.00	0.00
CROCKETT	12.28		0.00		12.28	0.00	526.45	0.00	0.00
HARDEMAN	0.00		0.00		0.00	0.00	0.00	0.00	0.00
BANDERA	0.54		0.00		0.54	0.00	17.08	0.00	0.00
BAYLOR	0.00		0.00		0.00	0.00	0.00	0.00	0.00
COTTLE	0.00		0.00		0.00	0.00	0.00	0.00	0.00
CRANE	0.00		0.00		0.00	0.00	0.00	0.00	0.00
DELTA	1.30		0.00		1.30	0.00	53.70	0.00	0.00
DICKENS	0.00		0.00		0.00	0.00	0.00	0.00	0.00
DUVAL	0.00		0.00		0.00	0.00	0.00	0.00	0.00
EASTLAND	1.24		0.00		1.24	0.00	61.36	0.00	0.00
EDWARDS	0.00		0.00		0.00	0.00	0.00	0.00	0.00
FISHER	0.00		0.00		0.00	0.00	0.00	0.00	0.00
FOARD	0.00		0.00		0.00	0.00	0.00	0.00	0.00
GLASSCOCK	0.00		0.00		0.00	0.00	0.00	0.00	0.00
GOLIAD	0.00		0.00		0.00	0.00	0.00	0.00	0.00
HALL	0.00		0.00		0.00	0.00	0.00	0.00	0.00
HUDSPETH	0.00		0.00		0.00	0.00	0.00	0.00	0.00
IRION	0.00		0.00		0.00	0.00	0.00	0.00	0.00
JEFF DAVIS	0.00		0.00		0.00	0.00	0.00	0.00	0.00
KENEDY	0.00		0.00		0.00	0.00	0.00	0.00	0.00
KENT	0.00		0.00		0.00	0.00	0.00	0.00	0.00
KING	0.00		0.00		0.00	0.00	0.00	0.00	0.00
KINNEY	0.00		0.00		0.00	0.00	0.00	0.00	0.00
KNOX	0.00		0.00		0.00	0.00	0.00	0.00	0.00
LA SALLE	3.26		0.00		3.26	0.00	73.80	0.00	0.00
LEON	0.00		0.00		0.00	0.00	0.00	0.00	0.00
LOVING	0.00		0.00		0.00	0.00	0.00	0.00	0.00
MENARD	0.00		0.00		0.00	0.00	0.00	0.00	0.00
MILLS	0.00		0.00		0.00	0.00	0.00	0.00	0.00
MONTAGUE	0.65		0.00		0.65	0.00	26.64	0.00	0.00
MOTLEY	0.00		0.00		0.00	0.00	0.00	0.00	0.00
REAL	0.00		0.00		0.00	0.00	0.00	0.00	0.00
SCHLEICHER	1.29		0.00		1.29	0.00	55.42	0.00	0.00
SHACKELFORD	0.00		0.00		0.00	0.00	0.00	0.00	0.00
STARR	0.00		0.00		0.00	0.00	0.00	0.00	0.00
STERLING	0.00		0.00		0.00	0.00	0.00	0.00	0.00
STONEWALL	0.00		0.00		0.00	0.00	0.00	0.00	0.00
SUTTON	0.00		0.00		0.00	0.00	0.00	0.00	0.00
TERRELL	0.00		0.00		0.00	0.00	0.00	0.00	0.00
THROCKMORTON	0.00		0.00		0.00	0.00	0.00	0.00	0.00
ZAPATA	0.00		0.00		0.00	0.00	0.00	0.00	0.00
TOTAL	**49,361.19**	**9.89**	**91,045.38**	**21.18**	**140,406.57**	**31.07**	**1,950,386.00**	**8.97**	**40.05**



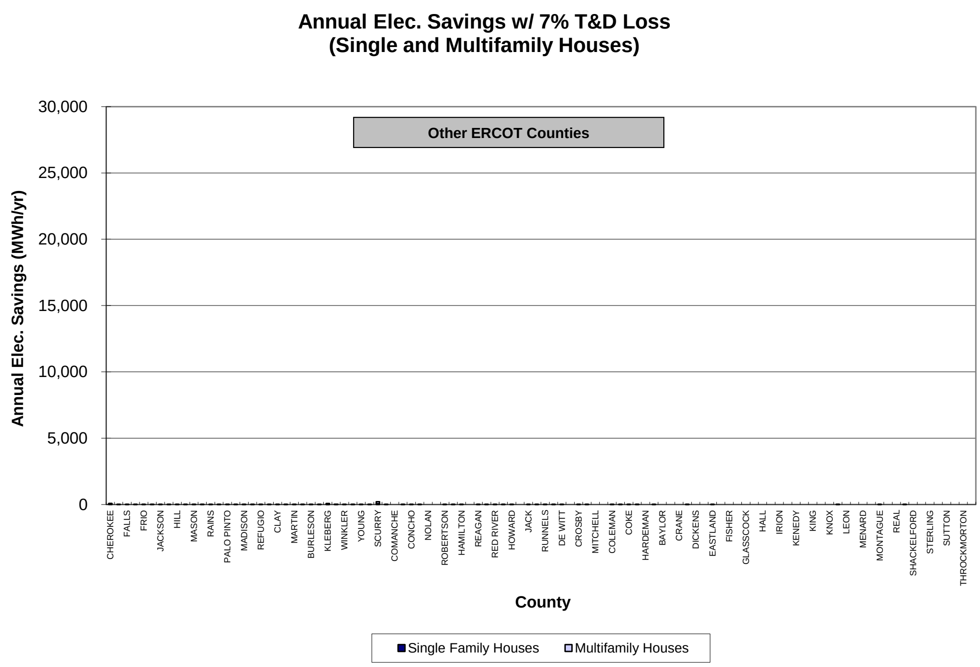


Figure 64: 2011 Annual Electricity Reductions from the 2006 IECC for Single-family and Multi-family Residences by County

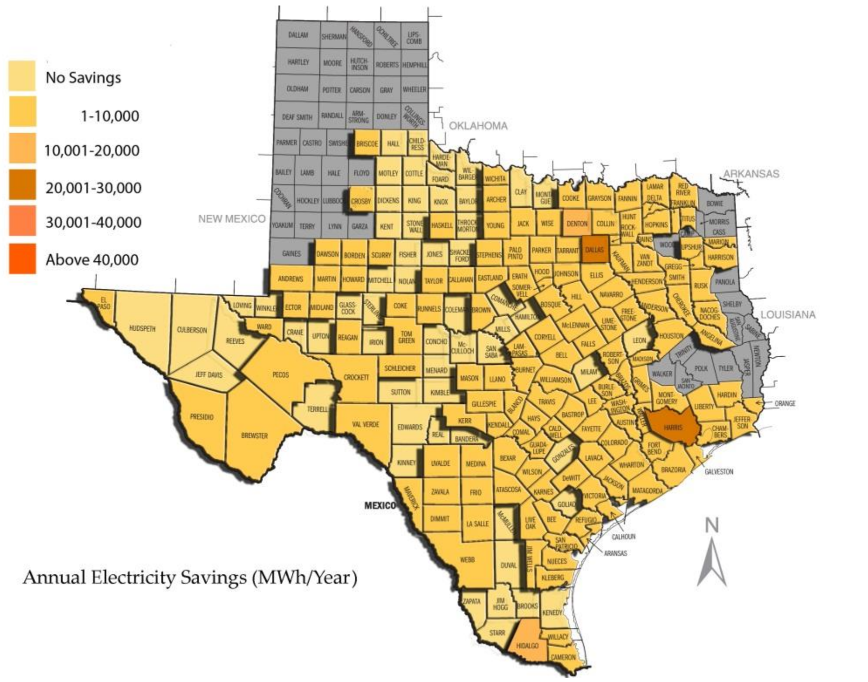
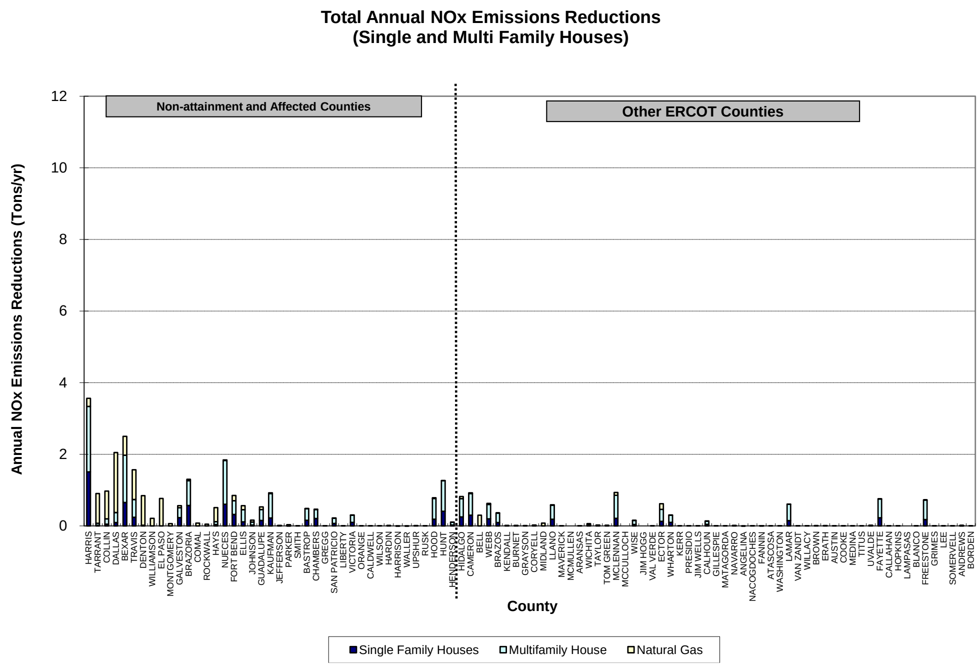


Figure 65: 2011 Annual Electricity Reductions from the 2006 IECC for Single-family and Multi-family Residences by County



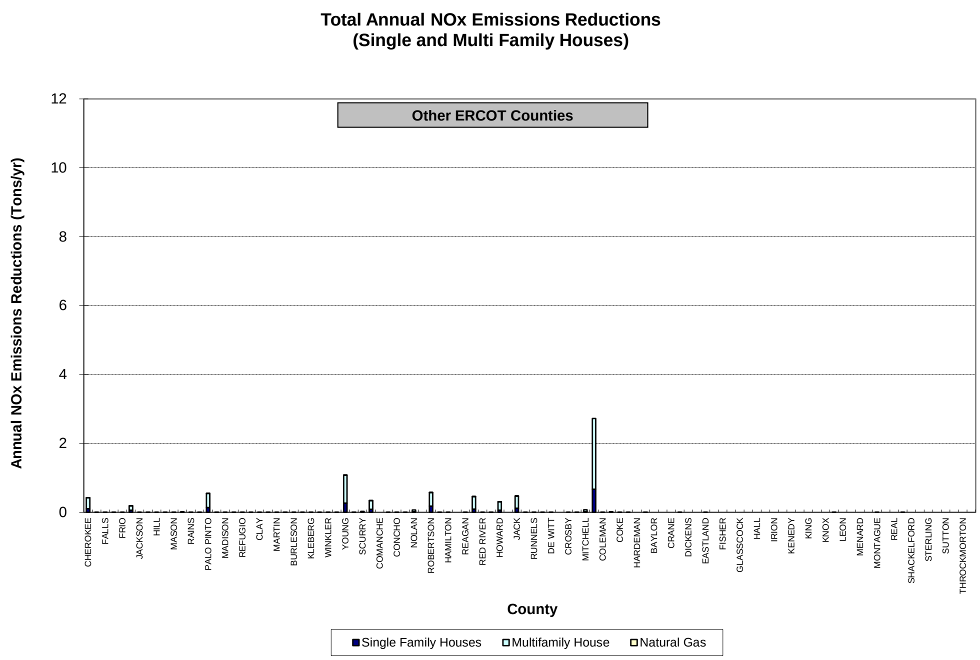


Figure 66: 2011 Annual NOx Reductions from Electricity and Natural Gas Savings Due to the 2006 IECC for Single-family and Multi-family Residences by County (using 2008 Base Year and 2010 eGRID)

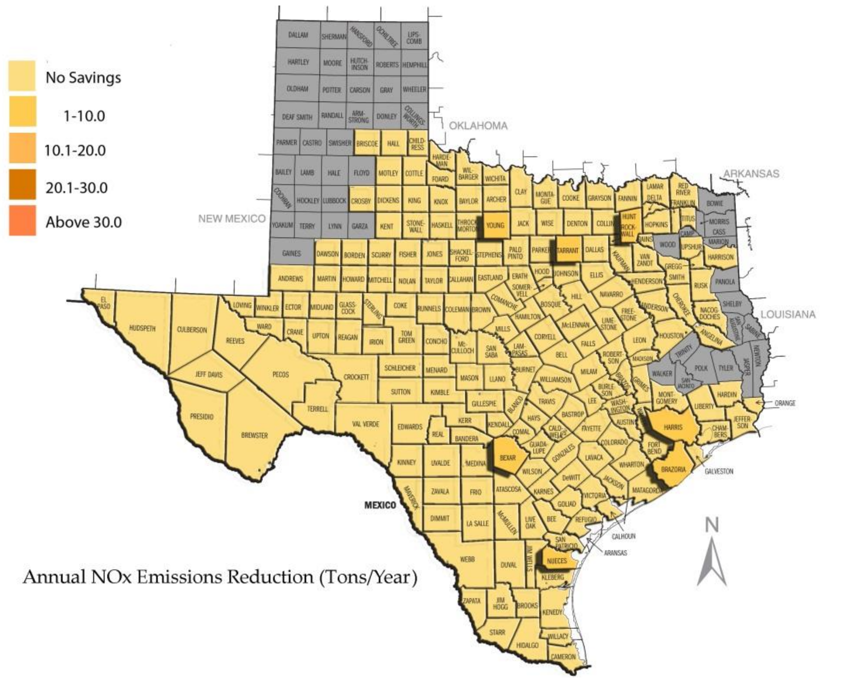


Figure 67: 2011 Annual NOx Reductions from Electricity and Natural Gas Savings Due to the 2006 IECC for Single-family and Multi-family Residences by County (Using 2008 Base year and 2010 eGRID)

7.1.4 2011 Results for Commercial Construction

This section reports on the calculated energy and emissions savings from new commercial construction in 2011 that was built to meet the new ASHRAE Standard 90.1-2007 energy code. To determine the energy and emissions savings from new commercial construction in all counties in ERCOT region as well as the 41 non-attainment and affected counties, data from two sources were merged into one analysis as shown in Figure 68. In this figure, the analysis covers results shown in Figure 69 and in to Table 54.

Beginning in the upper left of Figure 68, the Dodge database of the square footage of new commercial construction in Texas (Dodge 2011) was categorized with the energy savings calculations published by the United States Department of Energy (DOE) in a report. This allowed for the new construction to be tracked by county, and energy savings to be calculated by building type. In the next block in Figure 68 and Table 50, the categories from the Dodge and DOE database can be seen. This resulted in 6 Dodge categories being categorized into 7 DOE energy use categories. In the third and fourth DOE category, the Dodge "stores and restaurant" category had to be split into two categories to match the two DOE categories for "retail" and "food". To accomplish this, information published in the 1999 and 2003 CBECS database (Table 51) by the U.S.D.O.E's EIA was used to determine the percentages used to split the Dodge conditioned area for each county as shown (i.e., 21.06% for food and 78.94% for retail). The square footage of all DOE building types is shown by individual graphs of each building type in Figure 69.

In the next step the DOE energy savings, which represent buildings built to comply with the ASHRAE Standard 90.1-2004 versus ASHRAE Standard 90.1-2007, which are expressed per square foot, were then multiplied by the published square feet of new construction. Table 52 to

Other ERCOT Counties	Office				Education			
	Electricity (kWh/yr), DOE		Gas (mBtu/yr), DOE		Electricity (kWh/yr), DOE		Gas (mBtu/yr), DOE	
	2004 (Annual)	2007 (Annual)	2004 (Annual)	2007 (Annual)	2004 (Annual)	2007 (Annual)	2004 (Annual)	2007 (Annual)
JIM WELLS	21902	21453	9	8	900661	877062	3073	1225
JONES	0	0	0	0	0	0	0	0
KARNES	0	0	0	0	0	0	0	0
KENDALL	173027	169477	71	64	0	0	0	0
KENEDY	0	0	0	0	0	0	0	0
KENT	0	0	0	0	0	0	0	0
KERR	0	0	0	0	0	0	0	0
KIMBLE	0	0	0	0	0	0	0	0
KING	0	0	0	0	0	0	0	0
KINNEY	0	0	0	0	0	0	0	0
KLEBERG	0	0	0	0	0	0	0	0
KNOX	0	0	0	0	0	0	0	0
LA SALLE	0	0	0	0	0	0	0	0
LAMAR	0	0	0	0	561067	546367	1914	763
LAMPASAS	0	0	0	0	0	0	0	0
LAVACA	0	0	0	0	926164	901897	3160	1259
LEE	0	0	0	0	0	0	0	0
LEON	0	0	0	0	0	0	0	0
LIMESTONE	0	0	0	0	0	0	0	0
LIVE OAK	29568	28961	12	11	778514	758117	2656	1059
LLANO	0	0	0	0	0	0	0	0
LOVING	0	0	0	0	0	0	0	0
MADISON	0	0	0	0	0	0	0	0
MARTIN	0	0	0	0	0	0	0	0
MASON	0	0	0	0	0	0	0	0
MATAGORDA	0	0	0	0	0	0	0	0
MAVERICK	0	0	0	0	0	0	0	0
MCCULLOCH	0	0	0	0	0	0	0	0
MCLENNAN	277063	271378	114	103	4734173	4610133	16154	6437
MCMULLEN	0	0	0	0	0	0	0	0
MEDINA	41614	40760	17	15	0	0	0	0
MENARD	0	0	0	0	0	0	0	0
MIDLAND	1388599	1360108	571	516	1099316	1070513	3751	1495
MILAM	0	0	0	0	0	0	0	0
MILLS	0	0	0	0	0	0	0	0
MITCHELL	0	0	0	0	0	0	0	0
MONTAGUE	0	0	0	0	0	0	0	0
MOTLEY	0	0	0	0	0	0	0	0
NACOGDOCHES	48185	47196	20	18	97985	95418	334	133
NAVARRO	0	0	0	0	0	0	0	0
NOLAN	0	0	0	0	362412	352916	1237	493
PALO PINTO	0	0	0	0	0	0	0	0
PECOS	0	0	0	0	107381	104568	366	146
PRESIDIO	0	0	0	0	0	0	0	0
RAINS	0	0	0	0	0	0	0	0
REAGAN	0	0	0	0	0	0	0	0
REAL	0	0	0	0	0	0	0	0
RED RIVER	0	0	0	0	0	0	0	0
REEVES	0	0	0	0	134227	130710	458	183
REFUGIO	0	0	0	0	0	0	0	0
ROBERTSON	0	0	0	0	0	0	0	0
RUNNELS	0	0	0	0	0	0	0	0
SAN SABA	0	0	0	0	0	0	0	0
SCHLEICHER	0	0	0	0	0	0	0	0
SCURRY	0	0	0	0	0	0	0	0
SHACKELFORD	0	0	0	0	0	0	0	0
SOMERVELL	0	0	0	0	0	0	0	0
STARR	0	0	0	0	0	0	0	0
STEPHENS	0	0	0	0	0	0	0	0
STERLING	0	0	0	0	0	0	0	0
STONEWALL	0	0	0	0	0	0	0	0
SUTTON	0	0	0	0	0	0	0	0
TAYLOR	186169	182349	77	69	1688571	1644329	5762	2296
TERRELL	0	0	0	0	0	0	0	0
THROCKMORTON	0	0	0	0	0	0	0	0
TITUS	0	0	0	0	255031	248349	870	347
TOM GREEN	155506	152315	64	58	40268	39213	137	55
UPTON	0	0	0	0	563752	548981	1924	767
UVALDE	0	0	0	0	0	0	0	0
VAL VERDE	70087	68649	29	26	218789	213057	747	297
VAN ZANDT	0	0	0	0	758380	738510	2588	1031
WARD	0	0	0	0	0	0	0	0
WASHINGTON	0	0	0	0	0	0	0	0
WEBB	43804	42906	18	16	801333	780337	2734	1090
WHARTON	61326	60068	25	23	0	0	0	0
WICHITA	64611	63286	27	24	0	0	0	0
WILBARGER	0	0	0	0	9396	9150	32	13
WILLACY	0	0	0	0	233554	227435	797	318
WINKLER	0	0	0	0	0	0	0	0
WISE	19712	19308	8	7	1339582	1304483	4571	1821
YOUNG	0	0	0	0	51006	49670	174	69
ZAPATA	108416	106191	45	40	0	0	0	0
ZAVALA	0	0	0	0	0	0	0	0
Total	76171431	74608592	31300	28286	229405364	223394743	782763	311909

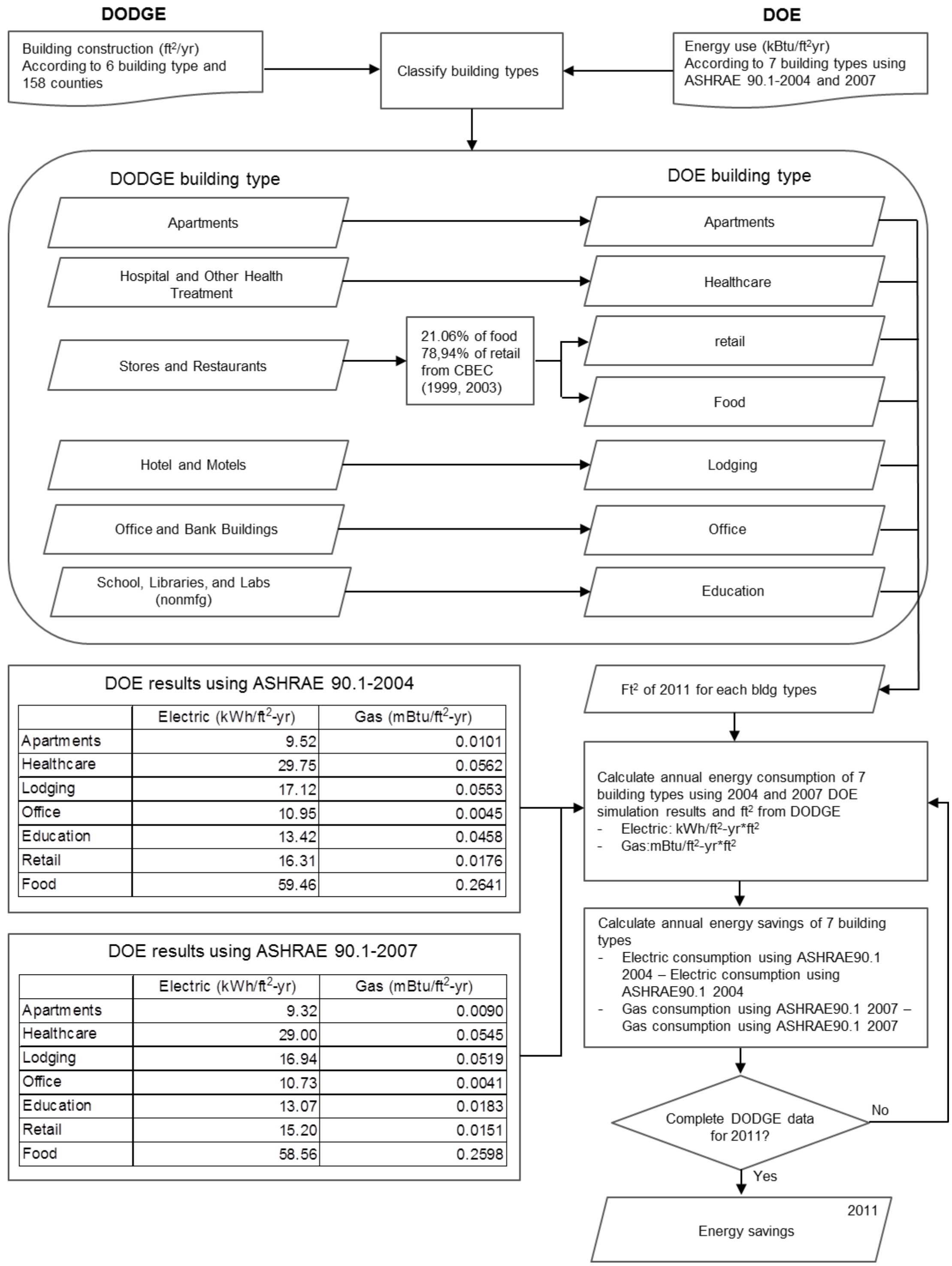
Table 54 show the annual energy use calculated for new construction, by building type, for ASHRAE Standard 90.1-2004 and ASHRAE Standard 90.1-2007. Table 55 shows the county-wide annual electricity and natural gas savings by building type[79] [80].

In the next calculation step, CM Zones were assigned to each county as shown in Table 56[81]. In the case where more than one provider was shown in a county, a percentage of electricity use was allocated. In Table 57, the total electricity savings by CM Zones is shown for 2011 for all estimated new commercial construction. Table 57 shows the calculated annual NOx emissions reductions from electricity using the 2010 eGRID table for Texas.

Table 58 shows the transformation of the annual county-wide electricity and natural gas savings, along with the associated 2011 NOx emissions reductions with 7% T&D losses. Figure 70 shows the bar chart of the annual electricity savings for 2011. Figure 71 presents the NOx emissions reductions from the electricity and natural gas savings using the 2010 eGRID for Texas.

Using the 2010 eGRID, the total NOx reductions from electricity and natural gas savings from new commercial construction in 2011 are calculated to be 34.27 tons NOx/year which represents 7.05 tons NOx/year from electricity savings and 27.22 tons NOx/year from natural gas savings.

[79] In this table (-) values are savings, (+) values are increased energy use.
[80] In a similar fashion as the proceeding table, in this table (-) values are savings, (+) values are increased energy use.
[81] Of a total of 202 counties listed in Table 49, the annual electricity savings in 138 counties (i.e., 6,480 MWh), including 8 non-attainment and affected non-ERCOT counties (i.e, 17.16 % of total savings in 138 counties), are not reported in Table 50 since the corresponding providers could not be assigned for these 138 counties.



DOE results using ASHRAE 90.1-2004

	Electric (kWh/ft^2-yr)	Gas (mBtu/ft^2-yr)
Apartments	9.52	0.0101
Healthcare	29.75	0.0562
Lodging	17.12	0.0553
Office	10.95	0.0045
Education	13.42	0.0458
Retail	16.31	0.0176
Food	59.46	0.2641

DOE results using ASHRAE 90.1-2007

	Electric (kWh/ft^2-yr)	Gas (mBtu/ft^2-yr)
Apartments	9.32	0.0090
Healthcare	29.00	0.0545
Lodging	16.94	0.0519
Office	10.73	0.0041
Education	13.07	0.0183
Retail	15.20	0.0151
Food	58.56	0.2598

Figure 68: Analysis Method for Calculating the 2011 Energy and Emissions Savings from Commercial Buildings

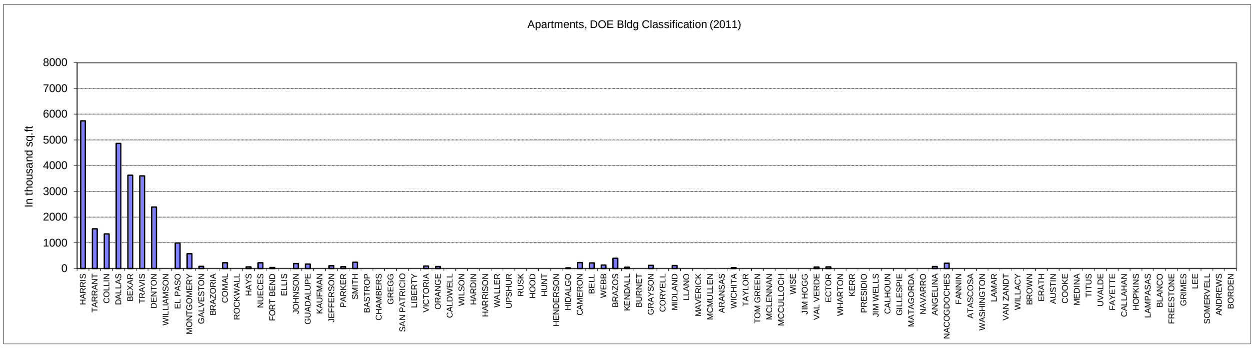
Table 50: Commercial Building Descriptions from USDOE Report and Dodge (2011)

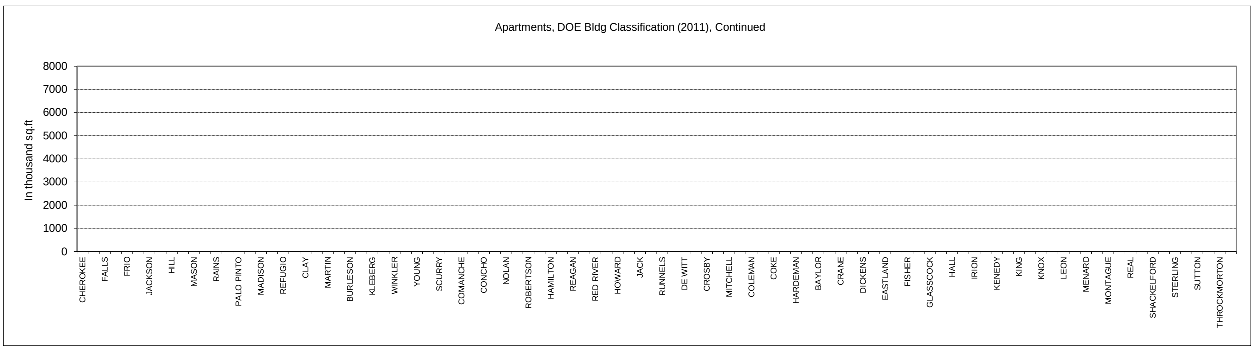
No	DOE Bldg Types	Dodge Bldg Types
1	Apartments	Apartments
2	Healthcare	Hospitals and Other Health treatment
3	Lodging	Hotels and Motels
4	Office	Office and Bank Buildings
5	Education	School, Libraries, and Labs (nonmfg)
6	Retail	Stores and Restraunts
7	Food	Stores and Restraunts

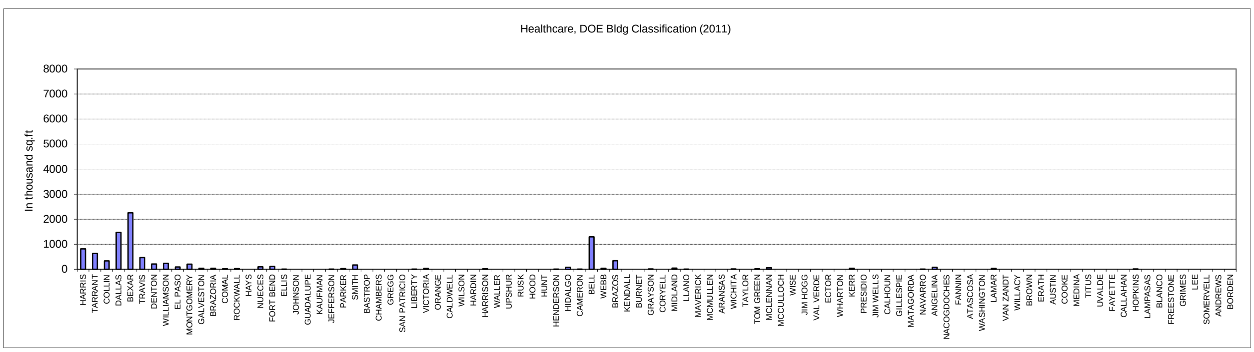
Table 51: Floor Area from CBECS (1999, 2003) database for Retail and Food Type Commercial Buildings

		CBECS (1999)		CBECS (2003)	
		All (million square feet)	South (million square feet)	All (million square feet)	South (million square feet)
Food	Food Sales	994	392	1,255	487
	Food Service	1,851	676	1,654	764
Retail	Retail (Other Than Mall)	4,766	1,566	4,317	1,844
	Enclosed and Strip Malls	5,631	2,513	6,875	3,251

	South		All	
	Food %	Retail %	Food %	Retail %
CBECS (1999)	20.75	79.25	21.48	78.52
CBECS (2003)	19.71	80.29	20.63	79.37
Average	20.23	79.77	21.06	78.94







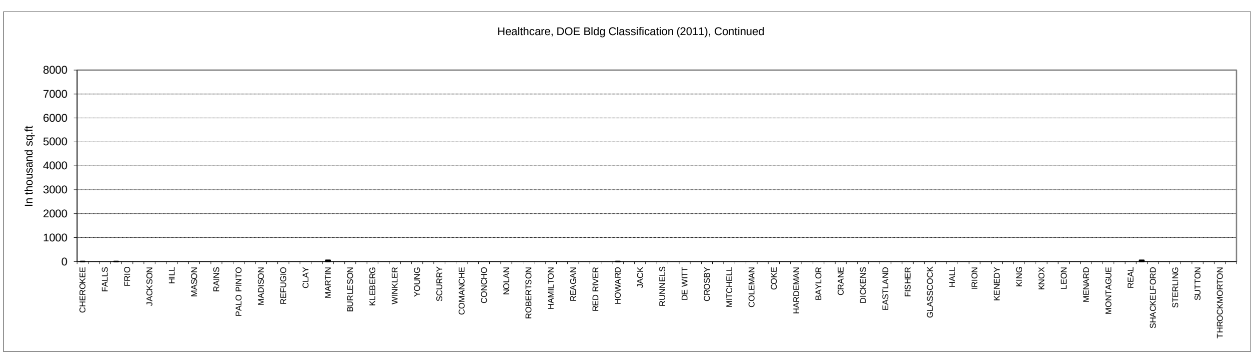
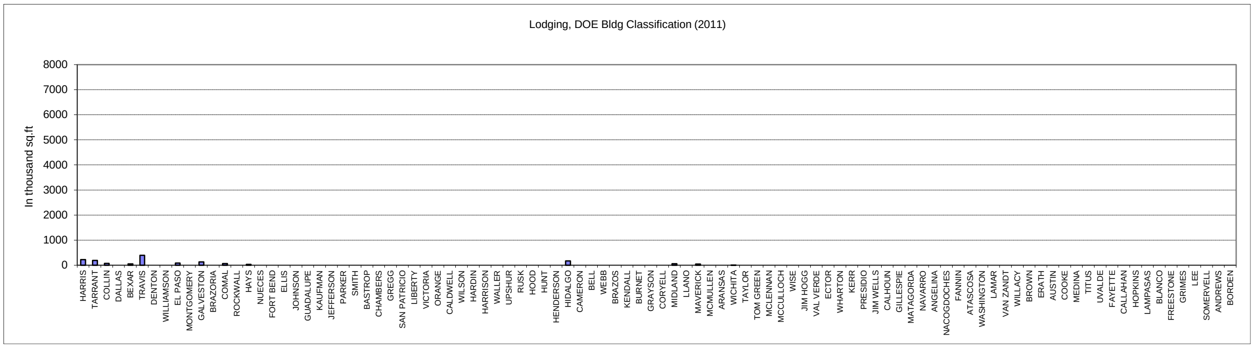
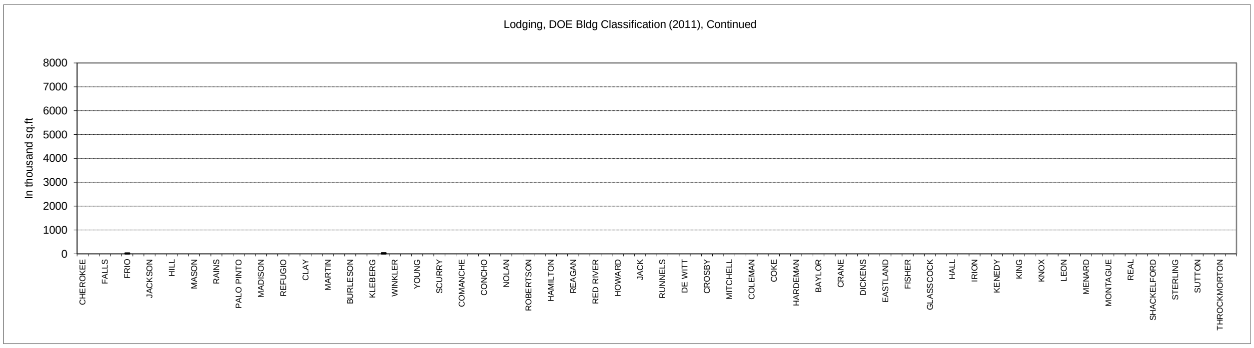
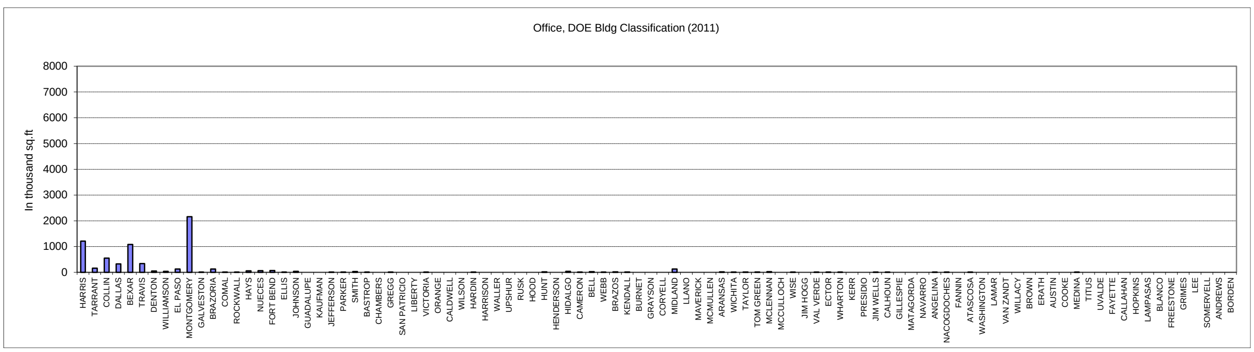


Figure 69: 2011 New Commercial Building Constructions (sq. ft. x 1000) (Dodge 2011)







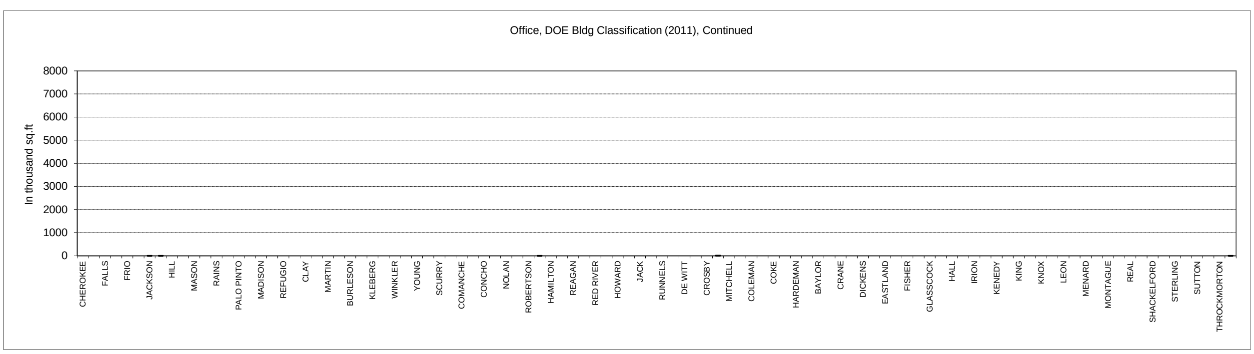


Figure 69: 2011 New Commercial Building Constructions (sq. ft. x 1000) (Dodge 2011) (Continued)

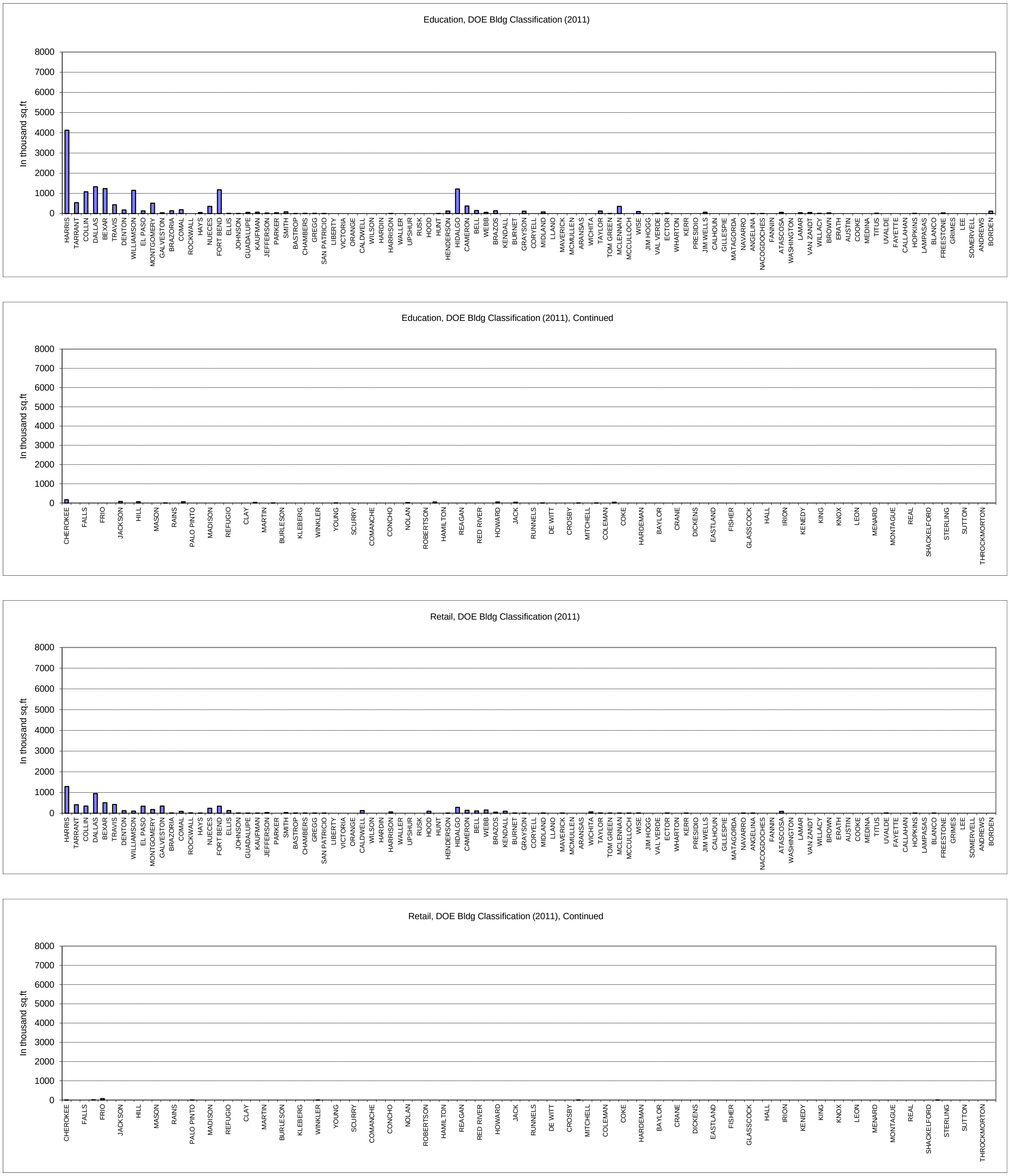
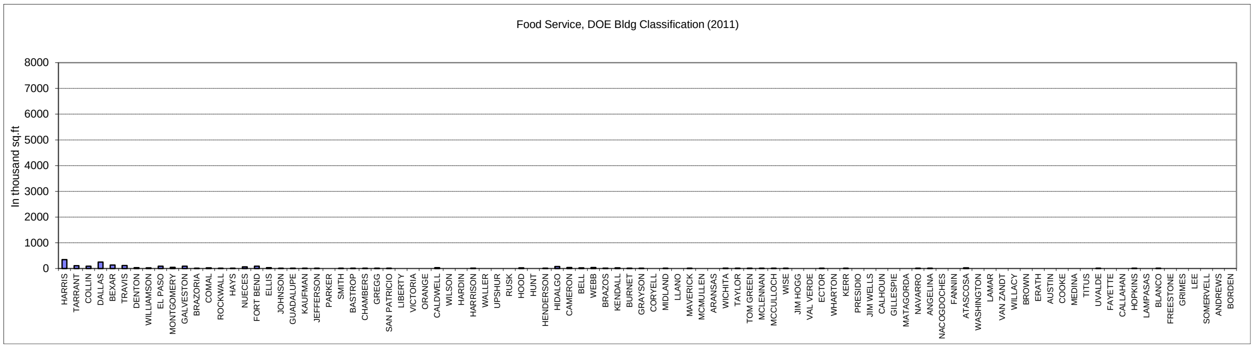


Figure 69: 2011 New Commercial Building Constructions (sq. ft. x 1000) (Dodge 2011) (Continued)



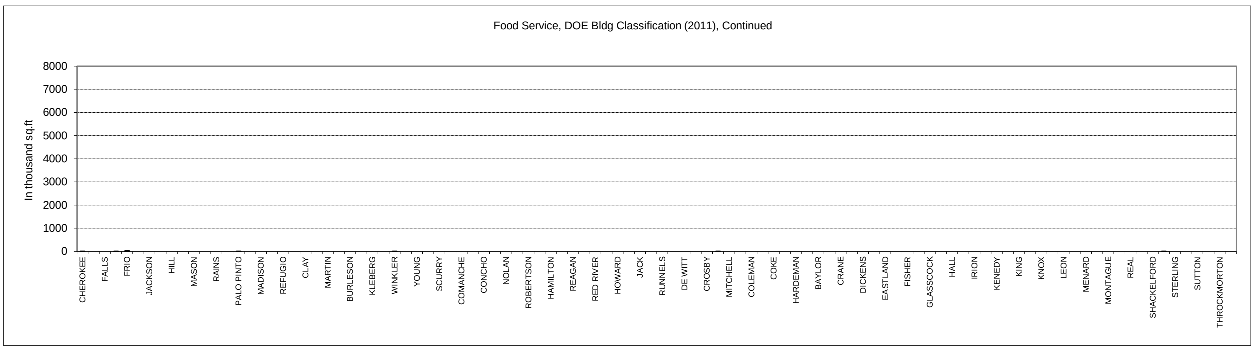


Figure 69: 2011 New Commercial Building Constructions (sq. ft. x 1000) (Dodge 2011) (Continued)

Table 52: Energy Use of ASHRAE Standard 90.1-2004 and 90.1-2007 Code-Compliant Apartment, Healthcare, and Lodging Building Types

	Apartments				Healthcare				Lodging			
Non-attainment Counties	**Electricity (kWh/yr), DOE**		**Gas (mBtu/yr), DOE**		**Electricity (kWh/yr), DOE**		**Gas (mBtu/yr), DOE**		**Electricity (kWh/yr), DOE**		**Gas (mBtu/yr), DOE**	
	2004 (Annual)	**2007 (Annual)**	**2004 (Annual)**	**2007 (Annual)**	**2004 (Annual)**	**2007 (Annual)**	**2004 (Annual)**	**2007 (Annual)**	**2004 (Annual)**	**2007 (Annual)**	**2004 (Annual)**	**2007 (Annual)**
Brazoria	0	0	0	0	1279109	1246974	2414	2344	0	0	0	0
Chambers	0	0	0	0	0	0	0	0	0	0	0	0
Collin	12805160	12529357	13578	12100	9985977	9735097	18850	18296	1232306	1219645	3978	3737
Dallas	46339174	45341100	49138	43786	43718766	42620413	82524	80099	0	0	0	0
Denton	22748114	22258155	24122	21495	6193269	6037674	11690	11347	0	0	0	0
El Paso	9437186	9233924	10007	8917	2840813	2769442	5362	5205	1427421	1412756	4608	4328
Fort Bend	388612	380242	412	367	3367330	3282732	6356	6169	0	0	0	0
Galveston	790560	773532	838	747	1154173	1125177	2179	2115	2245535	2222464	7249	6809
Hardin	0	0	0	0	0	0	0	0	0	0	0	0
Harris	54680054	53502330	57982	51667	24344722	23733106	45953	44603	3873206	3833412	12503	11745
Jefferson	1047730	1025163	1111	990	124936	121797	236	229	0	0	0	0
Liberty	0	0	0	0	187404	182696	354	343	0	0	0	0
Montgomery	5526297	5407269	5860	5222	6035611	5883978	11393	11058	0	0	0	0
Orange	761985	745573	808	720	0	0	0	0	0	0	0	0
Tarrant	14704408	14387698	15592	13894	18740439	18269620	35375	34335	3241649	3208344	10464	9830
Waller	0	0	0	0	0	0	0	0	0	0	0	0
	Apartments				**Healthcare**				**Lodging**			
Affected Counties	**Electricity (kWh/yr), DOE**		**Gas (mBtu/yr), DOE**		**Electricity (kWh/yr), DOE**		**Gas (mBtu/yr), DOE**		**Electricity (kWh/yr), DOE**		**Gas (mBtu/yr), DOE**	
	2004 (Annual)	**2007 (Annual)**	**2004 (Annual)**	**2007 (Annual)**	**2004 (Annual)**	**2007 (Annual)**	**2004 (Annual)**	**2007 (Annual)**	**2004 (Annual)**	**2007 (Annual)**	**2004 (Annual)**	**2007 (Annual)**
Bastrop	0	0	0	0	0	0	0	0	0	0	0	0
Bexar	34514117	33770736	36598	32612	67150263	65463237	126753	123028	936210	926592	3022	2839
Caldwell	0	0	0	0	0	0	0	0	0	0	0	0
Comal	2162133	2115564	2293	2043	553289	539389	1044	1014	1174114	1162051	3790	3560
Ellis	0	0	0	0	77341	75398	146	142	0	0	0	0
Gregg	0	0	0	0	0	0	0	0	0	0	0	0
Guadalupe	1676367	1640261	1778	1584	0	0	0	0	0	0	0	0
Harrison	0	0	0	0	565188	550989	1067	1036	0	0	0	0
Hays	603873	590867	640	571	0	0	0	0	588768	582719	1901	1785
Henderson	0	0	0	0	297467	289994	562	545	0	0	0	0
Hood	0	0	0	0	0	0	0	0	0	0	0	0
Hunt	0	0	0	0	0	0	0	0	0	0	0	0
Johnson	1819240	1780056	1929	1719	0	0	0	0	0	0	0	0
Kaufman	0	0	0	0	0	0	0	0	0	0	0	0
Nueces	2142131	2095993	2271	2024	2876509	2804242	5430	5270	0	0	0	0
Parker	707694	692451	750	669	871579	849682	1645	1597	0	0	0	0
Rockwall	0	0	0	0	755567	736585	1426	1384	0	0	0	0
Rusk	0	0	0	0	0	0	0	0	0	0	0	0
San Patricio	0	0	0	0	0	0	0	0	0	0	0	0
Smith	2348819	2298229	2491	2219	5205677	5074894	9826	9538	0	0	0	0
Travis	34295999	33557316	36367	32406	13841152	13493419	26127	25359	6736605	6667393	21746	20428
Upshur	0	0	0	0	0	0	0	0	0	0	0	0
Victoria	952481	931966	1010	900	987591	962780	1864	1809	0	0	0	0
Williamson	0	0	0	0	7094595	6916356	13392	12998	0	0	0	0
Wilson	0	0	0	0	0	0	0	0	0	0	0	0

Table 52: Energy Use of ASHRAE Standard 90.1-2004 and 90.1-2007 Code-Compliant Apartment, Healthcare, and Lodging Building Types (Continued)

Other ERCOT Counties	Apartments				Healthcare				Lodging			
	Electricity (kWh/yr), DOE		Gas (mBtu/yr), DOE		Electricity (kWh/yr), DOE		Gas (mBtu/yr), DOE		Electricity (kWh/yr), DOE		Gas (mBtu/yr), DOE	
	2004 (Annual)	2007 (Annual)	2004 (Annual)	2007 (Annual)	2004 (Annual)	2007 (Annual)	2004 (Annual)	2007 (Annual)	2004 (Annual)	2007 (Annual)	2004 (Annual)	2007 (Annual)
ANDERSON	0	0	0	0	0	0	0	0	0	0	0	0
ANDREWS	0	0	0	0	0	0	0	0	0	0	0	0
ANGELINA	761985	745573	808	720	2349992	2290952	4436	4306	0	0	0	0
ARANSAS	0	0	0	0	0	0	0	0	0	0	0	0
ARCHER	0	0	0	0	0	0	0	0	0	0	0	0
ATASCOSA	0	0	0	0	0	0	0	0	0	0	0	0
AUSTIN	0	0	0	0	0	0	0	0	0	0	0	0
BANDERA	0	0	0	0	0	0	0	0	0	0	0	0
BAYLOR	0	0	0	0	0	0	0	0	0	0	0	0
BEE	0	0	0	0	0	0	0	0	0	0	0	0
BELL	2074505	2029823	2200	1960	38581506	37612217	72827	70687	0	0	0	0
BLANCO	0	0	0	0	0	0	0	0	0	0	0	0
BORDEN	0	0	0	0	0	0	0	0	0	0	0	0
BOSQUE	0	0	0	0	0	0	0	0	0	0	0	0
BRAZOS	3783256	3701771	4012	3575	10113887	9859795	19091	18530	0	0	0	0
BREWSTER	0	0	0	0	0	0	0	0	753076	745339	2431	2284
BRISCOE	0	0	0	0	0	0	0	0	0	0	0	0
BROOKS	0	0	0	0	0	0	0	0	0	0	0	0
BROWN	0	0	0	0	0	0	0	0	0	0	0	0
BURLESON	0	0	0	0	0	0	0	0	0	0	0	0
BURNET	0	0	0	0	0	0	0	0	0	0	0	0
CALHOUN	0	0	0	0	0	0	0	0	0	0	0	0
CALLAHAN	0	0	0	0	0	0	0	0	0	0	0	0
CAMERON	2187850	2140727	2320	2067	47595	46399	90	87	0	0	0	0
CHEROKEE	0	0	0	0	297467	289994	562	545	0	0	0	0
CHILDRESS	0	0	0	0	0	0	0	0	0	0	0	0
CLAY	0	0	0	0	0	0	0	0	0	0	0	0
COKE	0	0	0	0	0	0	0	0	0	0	0	0
COLEMAN	0	0	0	0	0	0	0	0	0	0	0	0
COLORADO	0	0	0	0	303417	295794	573	556	0	0	0	0
COMANCHE	0	0	0	0	0	0	0	0	0	0	0	0
CONCHO	0	0	0	0	0	0	0	0	0	0	0	0
COOKE	0	0	0	0	0	0	0	0	0	0	0	0
CORYELL	0	0	0	0	0	0	0	0	0	0	0	0
COTTLE	0	0	0	0	0	0	0	0	0	0	0	0
CRANE	0	0	0	0	0	0	0	0	0	0	0	0
CROCKETT	0	0	0	0	0	0	0	0	0	0	0	0
CROSBY	0	0	0	0	0	0	0	0	0	0	0	0
CULBERSON	0	0	0	0	0	0	0	0	0	0	0	0
DAWSON	0	0	0	0	0	0	0	0	0	0	0	0
DE WITT	0	0	0	0	0	0	0	0	0	0	0	0
DELTA	0	0	0	0	0	0	0	0	0	0	0	0
DICKENS	0	0	0	0	0	0	0	0	0	0	0	0
DIMMIT	0	0	0	0	0	0	0	0	0	0	0	0
DUVAL	0	0	0	0	0	0	0	0	0	0	0	0
EASTLAND	0	0	0	0	0	0	0	0	0	0	0	0
ECTOR	622923	609506	661	589	0	0	0	0	0	0	0	0
EDWARDS	0	0	0	0	0	0	0	0	0	0	0	0
ERATH	0	0	0	0	0	0	0	0	0	0	0	0
FALLS	0	0	0	0	0	0	0	0	0	0	0	0
FANNIN	0	0	0	0	0	0	0	0	0	0	0	0
FAYETTE	0	0	0	0	0	0	0	0	0	0	0	0
FISHER	0	0	0	0	0	0	0	0	0	0	0	0
FOARD	0	0	0	0	0	0	0	0	0	0	0	0
FRANKLIN	0	0	0	0	0	0	0	0	0	0	0	0
FREESTONE	0	0	0	0	0	0	0	0	0	0	0	0
FRIO	0	0	0	0	0	0	0	0	667499	660641	2155	2024
GILLESPIE	0	0	0	0	0	0	0	0	0	0	0	0
GLASSCOCK	0	0	0	0	0	0	0	0	0	0	0	0
GOLIAD	0	0	0	0	0	0	0	0	0	0	0	0
GONZALES	0	0	0	0	0	0	0	0	0	0	0	0
GRAYSON	1190602	1164958	1263	1125	348037	339293	657	638	0	0	0	0
GRIMES	0	0	0	0	0	0	0	0	0	0	0	0
HALL	0	0	0	0	0	0	0	0	0	0	0	0
HAMILTON	0	0	0	0	0	0	0	0	0	0	0	0
HARDEMAN	0	0	0	0	0	0	0	0	0	0	0	0
HASKELL	0	0	0	0	0	0	0	0	0	0	0	0
HIDALGO	254313	248835	270	240	2466004	2404050	4655	4518	2960957	2930536	9558	8979
HILL	0	0	0	0	0	0	0	0	0	0	0	0
HOPKINS	0	0	0	0	461074	449491	870	845	0	0	0	0
HOUSTON	0	0	0	0	0	0	0	0	0	0	0	0
HOWARD	0	0	0	0	32721	31899	62	60	0	0	0	0
HUDSPETH	0	0	0	0	0	0	0	0	0	0	0	0
IRION	0	0	0	0	0	0	0	0	0	0	0	0
JACK	0	0	0	0	0	0	0	0	0	0	0	0
JACKSON	0	0	0	0	0	0	0	0	0	0	0	0
JEFF DAVIS	0	0	0	0	0	0	0	0	0	0	0	0
JIM HOGG	0	0	0	0	0	0	0	0	0	0	0	0

Table 52: Energy Use of ASHRAE Standard 90.1-2004 and 90.1-2007 Code-Compliant Apartment, Healthcare, and Lodging Building Types (Continued)

Other ERCOT Counties	Apartments				Healthcare				Lodging			
	Electricity (kWh/yr), DOE		Gas (mBtu/yr), DOE		Electricity (kWh/yr), DOE		Gas (mBtu/yr), DOE		Electricity (kWh/yr), DOE		Gas (mBtu/yr), DOE	
	2004 (Annual)	2007 (Annual)	2004 (Annual)	2007 (Annual)	2004 (Annual)	2007 (Annual)	2004 (Annual)	2007 (Annual)	2004 (Annual)	2007 (Annual)	2004 (Annual)	2007 (Annual)
JIM WELLS	0	0	0	0	0	0	0	0	0	0	0	0
JONES	0	0	0	0	0	0	0	0	0	0	0	0
KARNES	0	0	0	0	0	0	0	0	0	0	0	0
KENDALL	476241	465983	505	450	0	0	0	0	0	0	0	0
KENEDY	0	0	0	0	0	0	0	0	0	0	0	0
KENT	0	0	0	0	0	0	0	0	0	0	0	0
KERR	0	0	0	0	1189869	1159976	2246	2180	0	0	0	0
KIMBLE	0	0	0	0	0	0	0	0	0	0	0	0
KING	0	0	0	0	0	0	0	0	0	0	0	0
KINNEY	0	0	0	0	0	0	0	0	0	0	0	0
KLEBERG	0	0	0	0	0	0	0	0	0	0	0	0
KNOX	0	0	0	0	0	0	0	0	0	0	0	0
LA SALLE	0	0	0	0	0	0	0	0	0	0	0	0
LAMAR	0	0	0	0	922149	898981	1741	1690	0	0	0	0
LAMPASAS	0	0	0	0	0	0	0	0	0	0	0	0
LAVACA	0	0	0	0	0	0	0	0	0	0	0	0
LEE	0	0	0	0	0	0	0	0	0	0	0	0
LEON	0	0	0	0	0	0	0	0	0	0	0	0
LIMESTONE	0	0	0	0	0	0	0	0	0	0	0	0
LIVE OAK	0	0	0	0	0	0	0	0	0	0	0	0
LLANO	0	0	0	0	267721	260995	505	491	0	0	0	0
LOVING	0	0	0	0	0	0	0	0	0	0	0	0
MADISON	0	0	0	0	0	0	0	0	0	0	0	0
MARTIN	0	0	0	0	1820500	1774763	3436	3335	0	0	0	0
MASON	0	0	0	0	0	0	0	0	0	0	0	0
MATAGORDA	0	0	0	0	0	0	0	0	0	0	0	0
MAVERICK	0	0	0	0	0	0	0	0	842076	833424	2718	2553
MCCULLOCH	0	0	0	0	0	0	0	0	0	0	0	0
MCLENNAN	0	0	0	0	1784804	1739964	3369	3270	0	0	0	0
MCMULLEN	0	0	0	0	0	0	0	0	0	0	0	0
MEDINA	0	0	0	0	0	0	0	0	0	0	0	0
MENARD	0	0	0	0	0	0	0	0	0	0	0	0
MIDLAND	1109641	1085741	1177	1049	1401071	1365872	2645	2567	1064575	1053638	3437	3228
MILAM	0	0	0	0	0	0	0	0	0	0	0	0
MILLS	0	0	0	0	0	0	0	0	0	0	0	0
MITCHELL	0	0	0	0	0	0	0	0	0	0	0	0
MONTAGUE	0	0	0	0	0	0	0	0	0	0	0	0
MOTLEY	0	0	0	0	0	0	0	0	0	0	0	0
NACOGDOCHES	1943062	1901212	2060	1836	0	0	0	0	0	0	0	0
NAVARRO	0	0	0	0	285569	278394	539	523	0	0	0	0
NOLAN	0	0	0	0	0	0	0	0	0	0	0	0
PALO PINTO	0	0	0	0	0	0	0	0	0	0	0	0
PECOS	0	0	0	0	0	0	0	0	0	0	0	0
PRESIDIO	0	0	0	0	0	0	0	0	0	0	0	0
RAINS	0	0	0	0	0	0	0	0	0	0	0	0
REAGAN	0	0	0	0	0	0	0	0	0	0	0	0
REAL	0	0	0	0	0	0	0	0	0	0	0	0
RED RIVER	0	0	0	0	0	0	0	0	0	0	0	0
REEVES	0	0	0	0	0	0	0	0	0	0	0	0
REFUGIO	0	0	0	0	0	0	0	0	0	0	0	0
ROBERTSON	0	0	0	0	0	0	0	0	0	0	0	0
RUNNELS	0	0	0	0	0	0	0	0	0	0	0	0
SAN SABA	0	0	0	0	0	0	0	0	0	0	0	0
SCHLEICHER	0	0	0	0	1749108	1705165	3302	3205	0	0	0	0
SCURRY	0	0	0	0	0	0	0	0	0	0	0	0
SHACKELFORD	0	0	0	0	0	0	0	0	0	0	0	0
SOMERVELL	0	0	0	0	0	0	0	0	0	0	0	0
STARR	0	0	0	0	0	0	0	0	0	0	0	0
STEPHENS	0	0	0	0	0	0	0	0	0	0	0	0
STERLING	0	0	0	0	0	0	0	0	0	0	0	0
STONEWALL	0	0	0	0	0	0	0	0	0	0	0	0
SUTTON	0	0	0	0	0	0	0	0	0	0	0	0
TAYLOR	0	0	0	0	0	0	0	0	0	0	0	0
TERRELL	0	0	0	0	0	0	0	0	0	0	0	0
THROCKMORTON	0	0	0	0	0	0	0	0	0	0	0	0
TITUS	0	0	0	0	0	0	0	0	0	0	0	0
TOM GREEN	0	0	0	0	538416	524889	1016	986	0	0	0	0
UPTON	0	0	0	0	0	0	0	0	0	0	0	0
UVALDE	0	0	0	0	0	0	0	0	0	0	0	0
VAL VERDE	573394	561044	608	542	0	0	0	0	0	0	0	0
VAN ZANDT	0	0	0	0	0	0	0	0	0	0	0	0
WARD	0	0	0	0	0	0	0	0	0	0	0	0
WASHINGTON	0	0	0	0	0	0	0	0	0	0	0	0
WEBB	1268705	1241379	1345	1199	1267211	1235374	2392	2322	0	0	0	0
WHARTON	0	0	0	0	0	0	0	0	0	0	0	0
WICHITA	320034	313141	339	302	461074	449491	870	845	22250	22021	72	67
WILBARGER	0	0	0	0	0	0	0	0	0	0	0	0
WILLACY	0	0	0	0	0	0	0	0	0	0	0	0
WINKLER	0	0	0	0	0	0	0	0	0	0	0	0
WISE	0	0	0	0	0	0	0	0	0	0	0	0
YOUNG	0	0	0	0	0	0	0	0	0	0	0	0
ZAPATA	0	0	0	0	0	0	0	0	0	0	0	0
ZAVALA	0	0	0	0	0	0	0	0	0	0	0	0
Total	267018645	261267474	283143	252306	284937957	277779417	537850	522045	27766246	27480977	89632	84197

Table 53: Energy Use of ASHRAE Standard 90.1-2004 and 90.1-2007 Code-Compliant Office and Education Building Types

Non-attainment Counties	**Office**				**Education**			
	Electricity (kWh/yr), DOE		**Gas (mBtu/yr), DOE**		**Electricity (kWh/yr), DOE**		**Gas (mBtu/yr), DOE**	
	2004 (Annual)	**2007 (Annual)**	**2004 (Annual)**	**2007 (Annual)**	**2004 (Annual)**	**2007 (Annual)**	**2004 (Annual)**	**2007 (Annual)**
Brazoria	1423642	1394433	585	529	1903333	1853464	6494	2588
Chambers	0	0	0	0	216105	210443	737	294
Collin	6063621	5939211	2492	2252	14453522	14074827	49317	19652
Dallas	3620432	3546150	1488	1344	17798449	17332114	60731	24200
Denton	600120	587807	247	223	2382522	2320098	8130	3239
El Paso	1437879	1408377	591	534	1773134	1726676	6050	2411
Fort Bend	788479	772301	324	293	15811895	15397610	53952	21499
Galveston	93084	91174	38	35	559725	545060	1910	761
Hardin	37234	36470	15	14	0	0	0	0
Harris	13278202	13005768	5456	4931	55398008	53946532	189026	75321
Jefferson	102940	100828	42	38	387915	377751	1324	527
Liberty	0	0	0	0	0	0	0	0
Montgomery	23631366	23146512	9711	8775	6893879	6713253	23523	9373
Orange	0	0	0	0	0	0	0	0
Tarrant	1781743	1745186	732	662	7226761	7037413	24659	9826
Waller	0	0	0	0	0	0	0	0
Affected Counties	**Office**				**Education**			
	Electricity (kWh/yr), DOE		**Gas (mBtu/yr), DOE**		**Electricity (kWh/yr), DOE**		**Gas (mBtu/yr), DOE**	
	2004 (Annual)	**2007 (Annual)**	**2004 (Annual)**	**2007 (Annual)**	**2004 (Annual)**	**2007 (Annual)**	**2004 (Annual)**	**2007 (Annual)**
Bastrop	61326	60068	25	23	64429	62741	220	88
Bexar	11834848	11592027	4863	4395	16554168	16120435	56485	22508
Caldwell	0	0	0	0	0	0	0	0
Comal	98560	96538	41	37	2603996	2535769	8885	3541
Ellis	96370	94392	40	36	191944	186915	655	261
Gregg	14236	13944	6	5	161072	156852	550	219
Guadalupe	0	0	0	0	765092	745046	2611	1040
Harrison	0	0	0	0	13423	13071	46	18
Hays	654875	641439	269	243	748985	729360	2556	1018
Henderson	0	0	0	0	1661725	1618187	5670	2259
Hood	0	0	0	0	0	0	0	0
Hunt	219022	214528	90	81	26845	26142	92	37
Johnson	458851	449436	189	170	67113	65355	229	91
Kaufman	0	0	0	0	880527	857456	3004	1197
Nueces	737009	721887	303	274	4747595	4623204	16199	6455
Parker	82133	80448	34	31	544960	530682	1859	741
Rockwall	49280	48269	20	18	0	0	0	0
Rusk	0	0	0	0	0	0	0	0
San Patricio	0	0	0	0	134227	130710	458	183
Smith	395335	387223	162	147	1187906	1156781	4053	1615
Travis	3706945	3630889	1523	1377	5850938	5697638	19964	7955
Upshur	0	0	0	0	0	0	0	0
Victoria	54755	53632	23	20	0	0	0	0
Williamson	429283	420475	176	159	15417269	15013323	52606	20962
Wilson	0	0	0	0	0	0	0	0

Table 53: Energy Use of ASHRAE Standard 90.1-2004 and 90.1-2007 Code-Compliant Office and Education Building Types (Continued)

Other ERCOT Counties	Office				Education			
	Electricity (kWh/yr), DOE		Gas (mBtu/yr), DOE		Electricity (kWh/yr), DOE		Gas (mBtu/yr), DOE	
	2004 (Annual)	2007 (Annual)	2004 (Annual)	2007 (Annual)	2004 (Annual)	2007 (Annual)	2004 (Annual)	2007 (Annual)
ANDERSON	15332	15017	6	6	0	0	0	0
ANDREWS	0	0	0	0	0	0	0	0
ANGELINA	32853	32179	14	12	34899	33985	119	47
ARANSAS	251875	246707	104	94	0	0	0	0
ARCHER	0	0	0	0	0	0	0	0
ATASCOSA	7666	7508	3	3	845628	823471	2885	1150
AUSTIN	0	0	0	0	0	0	0	0
BANDERA	0	0	0	0	0	0	0	0
BAYLOR	0	0	0	0	0	0	0	0
BEE	0	0	0	0	536906	522839	1832	730
BELL	286919	281032	118	107	2030849	1977639	6930	2761
BLANCO	0	0	0	0	0	0	0	0
BORDEN	0	0	0	0	1583874	1542375	5404	2154
BOSQUE	0	0	0	0	0	0	0	0
BRAZOS	226688	222037	93	84	1845616	1797259	6298	2509
BREWSTER	0	0	0	0	0	0	0	0
BRISCOE	0	0	0	0	0	0	0	0
BROOKS	0	0	0	0	0	0	0	0
BROWN	0	0	0	0	476504	464020	1626	648
BURLESON	0	0	0	0	0	0	0	0
BURNET	0	0	0	0	0	0	0	0
CALHOUN	82133	80448	34	31	0	0	0	0
CALLAHAN	0	0	0	0	0	0	0	0
CAMERON	21902	21453	9	8	4997257	4866324	17051	6794
CHEROKEE	0	0	0	0	2355677	2293956	8038	3203
CHILDRESS	0	0	0	0	0	0	0	0
CLAY	0	0	0	0	0	0	0	0
COKE	0	0	0	0	0	0	0	0
COLEMAN	0	0	0	0	0	0	0	0
COLORADO	0	0	0	0	0	0	0	0
COMANCHE	0	0	0	0	0	0	0	0
CONCHO	0	0	0	0	0	0	0	0
COOKE	0	0	0	0	0	0	0	0
CORYELL	0	0	0	0	0	0	0	0
COTTLE	0	0	0	0	0	0	0	0
CRANE	0	0	0	0	0	0	0	0
CROCKETT	0	0	0	0	0	0	0	0
CROSBY	0	0	0	0	0	0	0	0
CULBERSON	0	0	0	0	0	0	0	0
DAWSON	229973	225255	95	85	68456	66662	234	93
DE WITT	0	0	0	0	0	0	0	0
DELTA	0	0	0	0	0	0	0	0
DICKENS	0	0	0	0	0	0	0	0
DIMMIT	0	0	0	0	0	0	0	0
DUVAL	0	0	0	0	0	0	0	0
EASTLAND	0	0	0	0	0	0	0	0
ECTOR	68992	67576	28	26	402680	392129	1374	548
EDWARDS	0	0	0	0	0	0	0	0
ERATH	0	0	0	0	0	0	0	0
FALLS	0	0	0	0	0	0	0	0
FANNIN	0	0	0	0	0	0	0	0
FAYETTE	0	0	0	0	0	0	0	0
FISHER	0	0	0	0	0	0	0	0
FOARD	0	0	0	0	0	0	0	0
FRANKLIN	0	0	0	0	0	0	0	0
FREESTONE	0	0	0	0	461740	449642	1576	628
FRIO	0	0	0	0	0	0	0	0
GILLESPIE	0	0	0	0	0	0	0	0
GLASSCOCK	0	0	0	0	0	0	0	0
GOLIAD	0	0	0	0	0	0	0	0
GONZALES	0	0	0	0	134227	130710	458	183
GRAYSON	0	0	0	0	1597297	1555446	5450	2172
GRIMES	0	0	0	0	0	0	0	0
HALL	0	0	0	0	0	0	0	0
HAMILTON	0	0	0	0	0	0	0	0
HARDEMAN	0	0	0	0	0	0	0	0
HASKELL	0	0	0	0	0	0	0	0
HIDALGO	468707	459090	193	174	16315245	15887771	55670	22183
HILL	0	0	0	0	938244	913661	3201	1276
HOPKINS	0	0	0	0	167783	163387	573	228
HOUSTON	0	0	0	0	0	0	0	0
HOWARD	0	0	0	0	805360	784259	2748	1095
HUDSPETH	0	0	0	0	0	0	0	0
IRION	0	0	0	0	0	0	0	0
JACK	0	0	0	0	558383	543753	1905	759
JACKSON	37234	36470	15	14	1159718	1129332	3957	1577
JEFF DAVIS	0	0	0	0	0	0	0	0
JIM HOGG	0	0	0	0	0	0	0	0

Table 53: Energy Use of ASHRAE Standard 90.1-2004 and 90.1-2007 Code-Compliant Office and Education Building Types (Continued)

Other ERCOT Counties	Office				Education			
	Electricity (kWh/yr), DOE		Gas (mBtu/yr), DOE		Electricity (kWh/yr), DOE		Gas (mBtu/yr), DOE	
	2004 (Annual)	2007 (Annual)	2004 (Annual)	2007 (Annual)	2004 (Annual)	2007 (Annual)	2004 (Annual)	2007 (Annual)
JIM WELLS	21902	21453	9	8	900661	877062	3073	1225
JONES	0	0	0	0	0	0	0	0
KARNES	0	0	0	0	0	0	0	0
KENDALL	173027	169477	71	64	0	0	0	0
KENEDY	0	0	0	0	0	0	0	0
KENT	0	0	0	0	0	0	0	0
KERR	0	0	0	0	0	0	0	0
KIMBLE	0	0	0	0	0	0	0	0
KING	0	0	0	0	0	0	0	0
KINNEY	0	0	0	0	0	0	0	0
KLEBERG	0	0	0	0	0	0	0	0
KNOX	0	0	0	0	0	0	0	0
LA SALLE	0	0	0	0	0	0	0	0
LAMAR	0	0	0	0	561067	546367	1914	763
LAMPASAS	0	0	0	0	0	0	0	0
LAVACA	0	0	0	0	926164	901897	3160	1259
LEE	0	0	0	0	0	0	0	0
LEON	0	0	0	0	0	0	0	0
LIMESTONE	0	0	0	0	0	0	0	0
LIVE OAK	29568	28961	12	11	778514	758117	2656	1059
LLANO	0	0	0	0	0	0	0	0
LOVING	0	0	0	0	0	0	0	0
MADISON	0	0	0	0	0	0	0	0
MARTIN	0	0	0	0	0	0	0	0
MASON	0	0	0	0	0	0	0	0
MATAGORDA	0	0	0	0	0	0	0	0
MAVERICK	0	0	0	0	0	0	0	0
MCCULLOCH	0	0	0	0	0	0	0	0
MCLENNAN	277063	271378	114	103	4734173	4610133	16154	6437
MCMULLEN	0	0	0	0	0	0	0	0
MEDINA	41614	40760	17	15	0	0	0	0
MENARD	0	0	0	0	0	0	0	0
MIDLAND	1388599	1360108	571	516	1099316	1070513	3751	1495
MILAM	0	0	0	0	0	0	0	0
MILLS	0	0	0	0	0	0	0	0
MITCHELL	0	0	0	0	0	0	0	0
MONTAGUE	0	0	0	0	0	0	0	0
MOTLEY	0	0	0	0	0	0	0	0
NACOGDOCHES	48185	47196	20	18	97985	95418	334	133
NAVARRO	0	0	0	0	0	0	0	0
NOLAN	0	0	0	0	362412	352916	1237	493
PALO PINTO	0	0	0	0	0	0	0	0
PECOS	0	0	0	0	107381	104568	366	146
PRESIDIO	0	0	0	0	0	0	0	0
RAINS	0	0	0	0	0	0	0	0
REAGAN	0	0	0	0	0	0	0	0
REAL	0	0	0	0	0	0	0	0
RED RIVER	0	0	0	0	0	0	0	0
REEVES	0	0	0	0	134227	130710	458	183
REFUGIO	0	0	0	0	0	0	0	0
ROBERTSON	0	0	0	0	0	0	0	0
RUNNELS	0	0	0	0	0	0	0	0
SAN SABA	0	0	0	0	0	0	0	0
SCHLEICHER	0	0	0	0	0	0	0	0
SCURRY	0	0	0	0	0	0	0	0
SHACKELFORD	0	0	0	0	0	0	0	0
SOMERVELL	0	0	0	0	0	0	0	0
STARR	0	0	0	0	0	0	0	0
STEPHENS	0	0	0	0	0	0	0	0
STERLING	0	0	0	0	0	0	0	0
STONEWALL	0	0	0	0	0	0	0	0
SUTTON	0	0	0	0	0	0	0	0
TAYLOR	186169	182349	77	69	1688571	1644329	5762	2296
TERRELL	0	0	0	0	0	0	0	0
THROCKMORTON	0	0	0	0	0	0	0	0
TITUS	0	0	0	0	255031	248349	870	347
TOM GREEN	155506	152315	64	58	40268	39213	137	55
UPTON	0	0	0	0	563752	548981	1924	767
UVALDE	0	0	0	0	0	0	0	0
VAL VERDE	70087	68649	29	26	218789	213057	747	297
VAN ZANDT	0	0	0	0	758380	738510	2588	1031
WARD	0	0	0	0	0	0	0	0
WASHINGTON	0	0	0	0	0	0	0	0
WEBB	43804	42906	18	16	801333	780337	2734	1090
WHARTON	61326	60068	25	23	0	0	0	0
WICHITA	64611	63286	27	24	0	0	0	0
WILBARGER	0	0	0	0	9396	9150	32	13
WILLACY	0	0	0	0	233554	227435	797	318
WINKLER	0	0	0	0	0	0	0	0
WISE	19712	19308	8	7	1339582	1304483	4571	1821
YOUNG	0	0	0	0	51006	49670	174	69
ZAPATA	108416	106191	45	40	0	0	0	0
ZAVALA	0	0	0	0	0	0	0	0
Total	76171431	74608592	31300	28286	229405364	223394743	782763	311909

Table 54: Energy Use of ASHRAE Standard 90.1-2004 and 90.1-2007 Code-Compliant Retail and Food Service Building Types

Non-attainment Counties	**Retail**				**Food Service**			
	Electricity (kWh/yr), DOE		**Gas (mBtu/yr), DOE**		**Electricity (kWh/yr), DOE**		**Gas (mBtu/yr), DOE**	
	2004 (Annual)	**2007 (Annual)**	**2004 (Annual)**	**2007 (Annual)**	**2004 (Annual)**	**2007 (Annual)**	**2004 (Annual)**	**2007 (Annual)**
Brazoria	280667	261502	302	260	273005	268834	1213	1193
Chambers	136471	127153	147	126	132745	130717	590	580
Collin	5628797	5244441	6057	5211	5475121	5391470	24317	23916
Dallas	15481767	14424612	16659	14334	15059088	14829008	66882	65781
Denton	2035482	1896492	2190	1885	1979910	1949660	8793	8649
El Paso	5521938	5144878	5942	5112	5371179	5289116	23855	23462
Fort Bend	5596611	5214452	6022	5182	5443813	5360640	24178	23780
Galveston	5610773	5227647	6038	5195	5457589	5374205	24239	23840
Hardin	0	0	0	0	0	0	0	0
Harris	21056491	19618671	22658	19495	20481611	20168684	90966	89467
Jefferson	504686	470224	543	467	490907	483407	2180	2144
Liberty	0	0	0	0	0	0	0	0
Montgomery	2961170	2758969	3186	2742	2880324	2836318	12792	12582
Orange	0	0	0	0	0	0	0	0
Tarrant	6698681	6241269	7208	6202	6515795	6416243	28939	28462
Waller	0	0	0	0	0	0	0	0

Affected Counties	**Retail**				**Food Service**			
	Electricity (kWh/yr), DOE		**Gas (mBtu/yr), DOE**		**Electricity (kWh/yr), DOE**		**Gas (mBtu/yr), DOE**	
	2004 (Annual)	**2007 (Annual)**	**2004 (Annual)**	**2007 (Annual)**	**2004 (Annual)**	**2007 (Annual)**	**2004 (Annual)**	**2007 (Annual)**
Bastrop	190545	177534	205	176	185343	182511	823	810
Bexar	8295137	7728713	8926	7680	8068665	7945389	35836	35245
Caldwell	2059944	1919283	2217	1907	2003704	1973090	8899	8753
Comal	1457410	1357893	1568	1349	1417621	1395961	6296	6192
Ellis	2058657	1918083	2215	1906	2002452	1971857	8894	8747
Gregg	92697	86368	100	86	90167	88789	400	394
Guadalupe	48924	45583	53	45	47588	46861	211	208
Harrison	1040272	969238	1119	963	1011870	996411	4494	4420
Hays	173808	161940	187	161	169063	166480	751	738
Henderson	29612	27590	32	27	28803	28363	128	126
Hood	1593882	1485045	1715	1476	1550366	1526679	6886	6772
Hunt	0	0	0	0	0	0	0	0
Johnson	251056	233913	270	232	244201	240470	1085	1067
Kaufman	96560	89966	104	89	93924	92489	417	410
Nueces	3858533	3595057	4152	3572	3753188	3695845	16669	16395
Parker	0	0	0	0	0	0	0	0
Rockwall	307704	286693	331	285	299303	294730	1329	1307
Rusk	0	0	0	0	0	0	0	0
San Patricio	99135	92365	107	92	96428	94955	428	421
Smith	551035	513408	593	510	535991	527802	2381	2341
Travis	6929137	6455988	7456	6415	6739959	6636983	29934	29441
Upshur	0	0	0	0	0	0	0	0
Victoria	0	0	0	0	0	0	0	0
Williamson	1709754	1593005	1840	1583	1663074	1637665	7386	7265
Wilson	0	0	0	0	0	0	0	0

Table 54: Energy Use of ASHRAE Standard 90.1-2004 and 90.1-2007 Code-Compliant Retail and Food Service Building Types (Continued)

Other ERCOT Counties	Retail				Food Service			
	Electricity (kWh/yr), DOE		Gas (mBtu/yr), DOE		Electricity (kWh/yr), DOE		Gas (mBtu/yr), DOE	
	2004 (Annual)	2007 (Annual)	2004 (Annual)	2007 (Annual)	2004 (Annual)	2007 (Annual)	2004 (Annual)	2007 (Annual)
ANDERSON	0	0	0	0	0	0	0	0
ANDREWS	0	0	0	0	0	0	0	0
ANGELINA	30899	28789	33	29	30056	29596	133	131
ARANSAS	0	0	0	0	0	0	0	0
ARCHER	0	0	0	0	0	0	0	0
ATASCOSA	1506334	1403476	1621	1395	1465209	1442822	6507	6400
AUSTIN	0	0	0	0	0	0	0	0
BANDERA	0	0	0	0	0	0	0	0
BAYLOR	0	0	0	0	0	0	0	0
BEE	0	0	0	0	0	0	0	0
BELL	1758677	1638588	1892	1628	1710662	1684526	7598	7472
BLANCO	57936	53980	62	54	56354	55493	250	246
BORDEN	0	0	0	0	0	0	0	0
BOSQUE	0	0	0	0	0	0	0	0
BRAZOS	885776	825292	953	820	861593	848429	3827	3764
BREWSTER	0	0	0	0	0	0	0	0
BRISCOE	0	0	0	0	0	0	0	0
BROOKS	0	0	0	0	0	0	0	0
BROWN	0	0	0	0	0	0	0	0
BURLESON	0	0	0	0	0	0	0	0
BURNET	178958	166738	193	166	174072	171412	773	760
CALHOUN	0	0	0	0	0	0	0	0
CALLAHAN	0	0	0	0	0	0	0	0
CAMERON	2338037	2178386	2516	2165	2274204	2239458	10100	9934
CHEROKEE	63086	58778	68	58	61363	60426	273	268
CHILDRESS	0	0	0	0	0	0	0	0
CLAY	0	0	0	0	0	0	0	0
COKE	0	0	0	0	0	0	0	0
COLEMAN	0	0	0	0	0	0	0	0
COLORADO	245906	229114	265	228	239192	235538	1062	1045
COMANCHE	0	0	0	0	0	0	0	0
CONCHO	0	0	0	0	0	0	0	0
COOKE	0	0	0	0	0	0	0	0
CORYELL	0	0	0	0	0	0	0	0
COTTLE	0	0	0	0	0	0	0	0
CRANE	0	0	0	0	0	0	0	0
CROCKETT	0	0	0	0	0	0	0	0
CROSBY	0	0	0	0	0	0	0	0
CULBERSON	0	0	0	0	0	0	0	0
DAWSON	61798	57578	66	57	60111	59193	267	263
DE WITT	0	0	0	0	0	0	0	0
DELTA	0	0	0	0	0	0	0	0
DICKENS	0	0	0	0	0	0	0	0
DIMMIT	0	0	0	0	0	0	0	0
DUVAL	0	0	0	0	0	0	0	0
EASTLAND	0	0	0	0	0	0	0	0
ECTOR	205994	191928	222	191	200370	197309	890	875
EDWARDS	0	0	0	0	0	0	0	0
ERATH	0	0	0	0	0	0	0	0
FALLS	0	0	0	0	0	0	0	0
FANNIN	0	0	0	0	0	0	0	0
FAYETTE	0	0	0	0	0	0	0	0
FISHER	0	0	0	0	0	0	0	0
FOARD	0	0	0	0	0	0	0	0
FRANKLIN	0	0	0	0	0	0	0	0
FREESTONE	0	0	0	0	0	0	0	0
FRIO	1287465	1199552	1385	1192	1252315	1233182	5562	5470
GILLESPIE	0	0	0	0	0	0	0	0
GLASSCOCK	0	0	0	0	0	0	0	0
GOLIAD	0	0	0	0	0	0	0	0
GONZALES	0	0	0	0	0	0	0	0
GRAYSON	66948	62377	72	62	65120	64125	289	284
GRIMES	0	0	0	0	0	0	0	0
HALL	0	0	0	0	0	0	0	0
HAMILTON	0	0	0	0	0	0	0	0
HARDEMAN	0	0	0	0	0	0	0	0
HASKELL	0	0	0	0	0	0	0	0
HIDALGO	4588525	4275203	4938	4248	4463251	4395059	19823	19496
HILL	0	0	0	0	0	0	0	0
HOPKINS	109435	101962	118	101	106447	104820	473	465
HOUSTON	0	0	0	0	0	0	0	0
HOWARD	0	0	0	0	0	0	0	0
HUDSPETH	0	0	0	0	0	0	0	0
IRION	0	0	0	0	0	0	0	0
JACK	0	0	0	0	0	0	0	0
JACKSON	0	0	0	0	0	0	0	0
JEFF DAVIS	0	0	0	0	0	0	0	0
JIM HOGG	0	0	0	0	0	0	0	0

Table 54: Energy Use of ASHRAE Standard 90.1-2004 and 90.1-2007 Code-Compliant Retail and Food Service Building Types (Continued)

Other ERCOT Counties	Retail				Food Service			
	Electricity (kWh/yr), DOE		Gas (mBtu/yr), DOE		Electricity (kWh/yr), DOE		Gas (mBtu/yr), DOE	
	2004 (Annual)	2007 (Annual)	2004 (Annual)	2007 (Annual)	2004 (Annual)	2007 (Annual)	2004 (Annual)	2007 (Annual)
JIM WELLS	0	0	0	0	0	0	0	0
JONES	0	0	0	0	0	0	0	0
KARNES	0	0	0	0	0	0	0	0
KENDALL	1555258	1449059	1674	1440	1512796	1489683	6719	6608
KENEDY	0	0	0	0	0	0	0	0
KENT	0	0	0	0	0	0	0	0
KERR	119734	111558	129	111	116465	114686	517	509
KIMBLE	0	0	0	0	0	0	0	0
KING	0	0	0	0	0	0	0	0
KINNEY	0	0	0	0	0	0	0	0
KLEBERG	0	0	0	0	0	0	0	0
KNOX	0	0	0	0	0	0	0	0
LA SALLE	0	0	0	0	0	0	0	0
LAMAR	0	0	0	0	0	0	0	0
LAMPASAS	0	0	0	0	0	0	0	0
LAVACA	0	0	0	0	0	0	0	0
LEE	0	0	0	0	0	0	0	0
LEON	0	0	0	0	0	0	0	0
LIMESTONE	0	0	0	0	0	0	0	0
LIVE OAK	0	0	0	0	0	0	0	0
LLANO	0	0	0	0	0	0	0	0
LOVING	0	0	0	0	0	0	0	0
MADISON	0	0	0	0	0	0	0	0
MARTIN	0	0	0	0	0	0	0	0
MASON	0	0	0	0	0	0	0	0
MATAGORDA	0	0	0	0	0	0	0	0
MAVERICK	61798	57578	66	57	60111	59193	267	263
MCCULLOCH	38624	35987	42	36	37569	36995	167	164
MCLENNAN	93985	87567	101	87	91419	90022	406	399
MCMULLEN	0	0	0	0	0	0	0	0
MEDINA	0	0	0	0	0	0	0	0
MENARD	0	0	0	0	0	0	0	0
MIDLAND	220157	205123	237	204	214146	210874	951	935
MILAM	0	0	0	0	0	0	0	0
MILLS	0	0	0	0	0	0	0	0
MITCHELL	0	0	0	0	0	0	0	0
MONTAGUE	0	0	0	0	0	0	0	0
MOTLEY	0	0	0	0	0	0	0	0
NACOGDOCHES	0	0	0	0	0	0	0	0
NAVARRO	57936	53980	62	54	56354	55493	250	246
NOLAN	0	0	0	0	0	0	0	0
PALO PINTO	73386	68374	79	68	71382	70291	317	312
PECOS	0	0	0	0	0	0	0	0
PRESIDIO	0	0	0	0	0	0	0	0
RAINS	0	0	0	0	0	0	0	0
REAGAN	0	0	0	0	0	0	0	0
REAL	0	0	0	0	0	0	0	0
RED RIVER	0	0	0	0	0	0	0	0
REEVES	0	0	0	0	0	0	0	0
REFUGIO	0	0	0	0	0	0	0	0
ROBERTSON	0	0	0	0	0	0	0	0
RUNNELS	0	0	0	0	0	0	0	0
SAN SABA	0	0	0	0	0	0	0	0
SCHLEICHER	0	0	0	0	0	0	0	0
SCURRY	0	0	0	0	0	0	0	0
SHACKELFORD	0	0	0	0	0	0	0	0
SOMERVELL	0	0	0	0	0	0	0	0
STARR	61798	57578	66	57	60111	59193	267	263
STEPHENS	0	0	0	0	0	0	0	0
STERLING	0	0	0	0	0	0	0	0
STONEWALL	0	0	0	0	0	0	0	0
SUTTON	0	0	0	0	0	0	0	0
TAYLOR	242043	225516	260	224	235435	231838	1046	1028
TERRELL	0	0	0	0	0	0	0	0
THROCKMORTON	0	0	0	0	0	0	0	0
TITUS	0	0	0	0	0	0	0	0
TOM GREEN	140334	130751	151	130	136502	134417	606	596
UPTON	0	0	0	0	0	0	0	0
UVALDE	180245	167937	194	167	175324	172645	779	766
VAL VERDE	0	0	0	0	0	0	0	0
VAN ZANDT	0	0	0	0	0	0	0	0
WARD	0	0	0	0	0	0	0	0
WASHINGTON	0	0	0	0	0	0	0	0
WEBB	2559481	2384709	2754	2370	2489602	2451565	11057	10875
WHARTON	0	0	0	0	0	0	0	0
WICHITA	1022247	952444	1100	946	994338	979146	4416	4343
WILBARGER	0	0	0	0	0	0	0	0
WILLACY	0	0	0	0	0	0	0	0
WINKLER	105572	98363	114	98	102690	101121	456	449
WISE	191832	178733	206	178	186595	183744	829	815
YOUNG	0	0	0	0	0	0	0	0
ZAPATA	0	0	0	0	0	0	0	0
ZAVALA	0	0	0	0	0	0	0	0
Total	122467538	114104975	131783	113386	119123957	117303926	529069	520355

Table 55: Calculated the ASHRAE Standard 90.1-2004 and 2007 Annual Electricity and Natural Gas Savings. A decrease in energy use is negative (i.e., savings); a positive value represents an energy use increase (+)

Counties	Apartments		Healthcare		Lodging		Office		Education		Retail		Food Service		Total		Total*1.07 (T&D loss) for eGrid	
	kWh/yr	mBtu/yr	kWh/yr	mBtu/yr	kWh/yr	mBtu/yr	kWh/yr	mBtu/yr	kWh/yr	mBtu/yr	kWh/yr	mBtu/yr	kWh/yr	mBtu/yr	kWh/yr	mBtu/yr	MWh/yr	Therm/yr
Non-attainment Counties																		
(square feet in thousands)																		
Brazoria	0	0	-32135	-71	0	0	-29209	-56	-49869	-3907	-19165	-42	-4171	-20	-134550	-4096	144	43827
Chambers	0	0	0	0	0	0	0	0	-5662	-444	-9319	-21	-2028	-10	-17009	-474	18	5069
Collin	-275803	-1479	-250879	-554	-12661	-241	-124410	-240	-378695	-29666	-384356	-846	-83651	-401	-1510456	-33426	1616	357656
Dallas	-998075	-5352	-1098353	-2425	0	0	-74282	-143	-466335	-36531	-1057156	-2326	-230080	-1102	-3924280	-47878	4199	512300
Denton	-489959	-2627	-155594	-344	0	0	-12313	-24	-62424	-4890	-138991	-306	-30250	-145	-889532	-8335	952	89186
El Paso	-203262	-1090	-71370	-158	-14665	-279	-29502	-57	-46458	-3639	-377060	-830	-82063	-393	-824380	-6446	882	68967
Fort Bend	-8370	-45	-84598	-187	0	0	-16178	-31	-414285	-32454	-382158	-841	-83173	-398	-988763	-33956	1058	363326
Galveston	-17027	-91	-28996	-64	-23071	-440	-1910	-4	-14665	-1149	-383126	-843	-83384	-399	-552179	-2989	591	31987
Hardin	0	0	0	0	0	0	-764	-1	0	0	0	0	0	0	-764	-1	1	16
Harris	-1177724	-6315	-611616	-1350	-39793	-758	-272434	-525	-1451476	-113704	-1437820	-3163	-312928	-1498	-5303791	-127315	5675	1362265
Jefferson	-22566	-121	-3139	-7	0	0	-2112	-4	-10164	-796	-34462	-76	-7500	-36	-79943	-1040	86	11127
Liberty	0	0	-4708	-10	0	0	0	0	0	0	0	0	0	0	-4708	-10	5	111
Montgomery	-119028	-638	-151634	-335	0	0	-484854	-935	-180626	-14150	-202200	-445	-44007	-211	-1182348	-16713	1265	178832
Orange	-16412	-88	0	0	0	0	0	0	0	0	0	0	0	0	-16412	-88	18	942
Tarrant	-316710	-1698	-470819	-1040	-33305	-634	-36557	-71	-189347	-14833	-457412	-1006	-99551	-477	-1603702	-19759	1716	211416
Waller	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Affected Counties																		
(square feet in thousands)																		
Bastrop	0	0	0	0	0	0	-1258	-2	-1688	-132	-13011	-29	-2832	-14	-18789	-177	20	1892
Bexar	-743381	-3986	-1687026	-3725	-9619	-183	-242820	-468	-433734	-33977	-566424	-1246	-123277	-590	-3806281	-44176	4073	472683
Caldwell	0	0	0	0	0	0	0	0	0	0	-140661	-309	-30614	-147	-171275	-456	183	4879
Comal	-46569	-250	-13900	-31	-12063	-230	-2022	-4	-68227	-5345	-99518	-219	-21659	-104	-263958	-6181	282	66141
Ellis	0	0	-1943	-4	0	0	-1977	-4	-5029	-394	-140573	-309	-30594	-146	-180117	-858	193	9179
Gregg	0	0	0	0	0	0	-292	-1	-4220	-331	-6330	-14	-1378	-7	-12220	-352	13	3763
Guadalupe	-36106	-194	0	0	0	0	0	0	-20046	-1570	-3341	-7	-727	-3	-60220	-1775	64	18990
Harrison	0	0	-14199	-31	0	0	0	0	-352	-28	-71034	-156	-15460	-74	-101045	-289	108	3094
Hays	-13007	-70	0	0	-6049	-115	-13436	-26	-19624	-1537	-11868	-26	-2583	-12	-66567	-1787	71	19117
Henderson	0	0	-7473	-17	0	0	0	0	-43539	-3411	-2022	-4	-440	-2	-53474	-3434	57	36741
Hood	0	0	0	0	0	0	0	0	0	0	-108836	-239	-23687	-113	-132524	-353	142	3775
Hunt	0	0	0	0	0	0	-4494	-9	-703	-55	0	0	0	0	-5197	-64	6	682
Johnson	-39184	-210	0	0	0	0	-9414	-18	-1758	-138	-17143	-38	-3731	-18	-71231	-422	76	4511
Kaufman	0	0	0	0	0	0	0	0	-23071	-1807	-6593	-15	-1435	-7	-31099	-1829	33	19567
Nueces	-46138	-247	-72267	-160	0	0	-15121	-29	-124391	-9744	-263476	-580	-57343	-275	-578736	-11035	619	118072
Parker	-15243	-82	-21897	-48	0	0	-1685	-3	-14278	-1119	0	0	0	0	-53103	-1252	57	13395
Rockwall	0	0	-18982	-42	0	0	-1011	-2	0	0	-21011	-46	-4573	-22	-45577	-112	49	1198
Rusk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
San Patricio	0	0	0	0	0	0	0	0	-3517	-276	-6769	-15	-1473	-7	-11759	-297	13	3183
Smith	-50590	-271	-130783	-289	0	0	-8111	-16	-31124	-2438	-37627	-83	-8189	-39	-266424	-3136	285	33553
Travis	-738683	-3961	-347733	-768	-69212	-1319	-76057	-147	-153300	-12009	-473149	-1041	-102976	-493	-1961110	-19737	2098	211183
Upshur	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Victoria	-20515	-110	-24811	-55	0	0	-1123	-2	0	0	0	0	0	0	-46450	-167	50	1786
Williamson	0	0	-178239	-394	0	0	-8808	-17	-403946	-31644	-116749	-257	-25409	-122	-733150	-32433	784	347032
Wilson	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 55: Calculated the ASHRAE Standard 90.1-2004 and 2007 Annual Electricity and Natural Gas Savings. A decrease in energy use is negative (i.e., savings); a positive value represents an energy use increase (+) (Continued)

Counties	Apartments		Healthcare		Lodging		Office		Education		Retail		Food Service		Total		Total*1.07 (T&D loss) for eGrid	
	kWh/yr	mBtu/yr	kWh/yr	mBtu/yr	kWh/yr	mBtu/yr	kWh/yr	mBtu/yr	kWh/yr	mBtu/yr	kWh/yr	mBtu/yr	kWh/yr	mBtu/yr	kWh/yr	mBtu/yr	MWh/yr	Therm/yr
Other ERCOT Counties																		
(square feet in thousands)																		
ANDERSON	0	0	0	0	0	0	-315	-1	0	0	0	0	0	0	-315	-1	0	6
ANDREWS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ANGELINA	-16412	-88	-59039	-130	0	0	-674	-1	-914	-72	-2110	-5	-459	-2	-79609	-298	85	3190
ARANSAS	0	0	0	0	0	0	-5168	-10	0	0	0	0	0	0	-5168	-10	6	107
ARCHER	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ATASCOSA	0	0	0	0	0	0	-157	0	-22156	-1736	-102858	-226	-22386	-107	-147558	-2069	158	22143
AUSTIN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BANDERA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BAYLOR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BEE	0	0	0	0	0	0	0	0	-14067	-1102	0	0	0	0	-14067	-1102	15	11791
BELL	-44682	-240	-969289	-2140	0	0	-5887	-11	-53210	-4168	-120089	-264	-26136	-125	-1219293	-6949	1305	74350
BLANCO	0	0	0	0	0	0	0	0	0	0	-3956	-9	-861	-4	-4817	-13	5	137
BORDEN	0	0	0	0	0	0	0	0	-41499	-3251	0	0	0	0	-41499	-3251	44	34785
BOSQUE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BRAZOS	-81486	-437	-254093	-561	0	0	-4651	-9	-48357	-3788	-60484	-133	-13164	-63	-462234	-4991	495	53405
BREWSTER	0	0	0	0	-7737	-147	0	0	0	0	0	0	0	0	-7737	-147	8	1577
BRISCOE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BROOKS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BROWN	0	0	0	0	0	0	0	0	-12485	-978	0	0	0	0	-12485	-978	13	10465
BURLESON	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BURNET	0	0	0	0	0	0	0	0	0	0	-12220	-27	-2660	-13	-14879	-40	16	424
CALHOUN	0	0	0	0	0	0	-1685	-3	0	0	0	0	0	0	-1685	-3	2	35
CALLAHAN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CAMERON	-47123	-253	-1196	-3	0	0	-449	-1	-130932	-10257	-159650	-351	-34746	-166	-374097	-11031	400	118028
CHEROKEE	0	0	-7473	-17	0	0	0	0	-61721	-4835	-4308	-9	-938	-4	-74439	-4865	80	52061
CHILDRESS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CLAY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COKE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COLEMAN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COLORADO	0	0	-7623	-17	0	0	0	0	0	0	-16791	-37	-3654	-17	-28069	-71	30	763
COMANCHE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CONCHO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COOKE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CORYELL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COTTLE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CRANE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CROCKETT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CROSBY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CULBERSON	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DAWSON	0	0	0	0	0	0	-4718	-9	-1794	-141	-4220	-9	-918	-4	-11650	-163	12	1747
DE WITT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DELTA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DICKENS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DIMMIT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DUVAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
EASTLAND	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ECTOR	-13417	-72	0	0	0	0	-1416	-3	-10551	-827	-14066	-31	-3061	-15	-42510	-947	45	10130
EDWARDS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ERATH	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FALLS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FANNIN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FAYETTE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FISHER	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FOARD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FRANKLIN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 55: Calculated the ASHRAE Standard 90.1-2004 and 2007 Annual Electricity and Natural Gas Savings. A decrease in energy use is negative (i.e., savings); a positive value represents an energy use increase (+) (Continued)

Counties	Apartments		Healthcare		Lodging		Office		Education		Retail		Food Service		Total		Total*1.07 (T&D loss) for eGrid	
	kWh/yr	mBtu/yr	kWh/yr	mBtu/yr	kWh/yr	mBtu/yr	kWh/yr	mBtu/yr	kWh/yr	mBtu/yr	kWh/yr	mBtu/yr	kWh/yr	mBtu/yr	kWh/yr	mBtu/yr	MWh/yr	Therm/yr
Other ERCOT Counties																		
(square feet in thousands)																		
FREESTONE	0	0	0	0	0	0	0	0	-12098	-948	0	0	0	0	-12098	-948	13	10141
FRIO	0	0	0	0	-6858	-131	0	0	0	0	-87913	-193	-19133	-92	-113904	-416	122	4448
GILLESPIE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GLASSCOCK	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GOLIAD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GONZALES	0	0	0	0	0	0	0	0	-3517	-276	0	0	0	0	-3517	-276	4	2948
GRAYSON	-25644	-138	-8744	-19	0	0	0	0	-41851	-3278	-4571	-10	-995	-5	-81805	-3450	88	36916
GRIMES	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HALL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HAMILTON	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HARDEMAN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HASKELL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HIDALGO	-5478	-29	-61954	-137	-30421	-580	-9617	-19	-427474	-33487	-313322	-689	-68192	-327	-916456	-35267	981	377358
HILL	0	0	0	0	0	0	0	0	-24583	-1926	0	0	0	0	-24583	-1926	26	20605
HOPKINS	0	0	-11584	-26	0	0	0	0	-4396	-344	-7473	-16	-1626	-8	-25079	-394	27	4218
HOUSTON	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HOWARD	0	0	-822	-2	0	0	0	0	-21101	-1653	0	0	0	0	-21923	-1655	23	17707
HUDSPETH	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IRION	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
JACK	0	0	0	0	0	0	0	0	-14630	-1146	0	0	0	0	-14630	-1146	16	12263
JACKSON	0	0	0	0	0	0	-764	-1	-30386	-2380	0	0	0	0	-31150	-2382	33	25485
JEFF DAVIS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
JIM HOGG	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
JIM WELLS	0	0	0	0	0	0	-449	-1	-23598	-1849	0	0	0	0	-24047	-1849	26	19789
JONES	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
KARNES	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
KENDALL	-10257	-55	0	0	0	0	-3550	-7	0	0	-106199	-234	-23113	-111	-143120	-406	153	4346
KENEDY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
KENT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
KERR	0	0	-29893	-66	0	0	0	0	0	0	-8176	-18	-1779	-9	-39849	-93	43	990
KIMBLE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
KING	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
KINNEY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
KLEBERG	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
KNOX	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LA SALLE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LAMAR	0	0	-23167	-51	0	0	0	0	-14700	-1152	0	0	0	0	-37868	-1203	41	12869
LAMPASAS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LAVACA	0	0	0	0	0	0	0	0	-24266	-1901	0	0	0	0	-24266	-1901	26	20340
LEE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LEON	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LIMESTONE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LIVE OAK	0	0	0	0	0	0	-607	-1	-20398	-1598	0	0	0	0	-21004	-1599	22	17110
LLANO	0	0	-6726	-15	0	0	0	0	0	0	0	0	0	0	-6726	-15	7	159
LOVING	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MADISON	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MARTIN	0	0	-45737	-101	0	0	0	0	0	0	0	0	0	0	-45737	-101	49	1080
MASON	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MATAGORDA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MAVERICK	0	0	0	0	-8651	-165	0	0	0	0	-4220	-9	-918	-4	-13790	-179	15	1910
MCCULLOCH	0	0	0	0	0	0	0	0	0	0	-2637	-6	-574	-3	-3211	-9	3	91
MCLENNAN	0	0	-44840	-99	0	0	-5685	-11	-124039	-9717	-6418	-14	-1397	-7	-182378	-9848	195	105370
MCMULLEN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MEDINA	0	0	0	0	0	0	-854	-2	0	0	0	0	0	0	-854	-2	1	18
MENARD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MIDLAND	-23900	-128	-35199	-78	-10937	-208	-28490	-55	-28803	-2256	-15033	-33	-3272	-16	-145635	-2774	156	29685
MILAM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MILLS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MITCHELL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MONTAGUE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MOTLEY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 55: Calculated the ASHRAE Standard 90.1-2004 and 2007 Annual Electricity and Natural Gas Savings. A decrease in energy use is negative (i.e., savings); a positive value represents an energy use increase (+) (Continued)

Counties	Apartments		Healthcare		Lodging		Office		Education		Retail		Food Service		Total		Total*1.07 (T&D loss) for eGrid	
	kWh/yr	mBtu/yr	kWh/yr	mBtu/yr	kWh/yr	mBtu/yr	kWh/yr	mBtu/yr	kWh/yr	mBtu/yr	kWh/yr	mBtu/yr	kWh/yr	mBtu/yr	kWh/yr	mBtu/yr	MWh/yr	Therm/yr
Other ERCOT Counties																		
(square feet in thousands)																		
NACOGDOCHES	-41851	-224	0	0	0	0	-989	-2	-2567	-201	0	0	0	0	-45406	-427	49	4573
NAVARRO	0	0	-7174	-16	0	0	0	0	0	0	-3956	-9	-861	-4	-11991	-29	13	307
NOLAN	0	0	0	0	0	0	0	0	-9496	-744	0	0	0	0	-9496	-744	10	7959
PALO PINTO	0	0	0	0	0	0	0	0	0	0	-5011	-11	-1091	-5	-6102	-16	7	174
PECOS	0	0	0	0	0	0	0	0	-2813	-220	0	0	0	0	-2813	-220	3	2358
PRESIDIO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RAINS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
REAGAN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
REAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RED RIVER	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
REEVES	0	0	0	0	0	0	0	0	-3517	-276	0	0	0	0	-3517	-276	4	2948
REFUGIO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ROBERTSON	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RUNNELS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SAN SABA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SCHLEICHER	0	0	-43943	-97	0	0	0	0	0	0	0	0	0	0	-43943	-97	47	1038
SCURRY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SHACKELFORD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SOMERVELL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
STARR	0	0	0	0	0	0	0	0	0	0	-4220	-9	-918	-4	-5138	-14	5	146
STEPHENS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
STERLING	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
STONEWALL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SUTTON	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TAYLOR	0	0	0	0	0	0	-3820	-7	-44242	-3466	-16528	-36	-3597	-17	-68186	-3527	73	37736
TERRELL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
THROCKMORTON	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TITUS	0	0	0	0	0	0	0	0	-6682	-523	0	0	0	0	-6682	-523	7	5601
TOM GREEN	0	0	-13527	-30	0	0	-3191	-6	-1055	-83	-9583	-21	-2086	-10	-29440	-150	32	1602
UPTON	0	0	0	0	0	0	0	0	-14771	-1157	0	0	0	0	-14771	-1157	16	12381
UVALDE	0	0	0	0	0	0	0	0	0	0	-12308	-27	-2679	-13	-14987	-40	16	427
VAL VERDE	-12350	-66	0	0	0	0	-1438	-3	-5732	-449	0	0	0	0	-19520	-518	21	5543
VAN ZANDT	0	0	0	0	0	0	0	0	-19870	-1557	0	0	0	0	-19870	-1557	21	16655
WARD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WASHINGTON	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WEBB	-27326	-147	-31836	-70	0	0	-899	-2	-20996	-1645	-174771	-384	-38037	-182	-293865	-2430	314	26000
WHARTON	0	0	0	0	0	0	-1258	-2	0	0	0	0	0	0	-1258	-2	1	26
WICHITA	-6893	-37	-11584	-26	-229	-4	-1326	-3	0	0	-69803	-154	-15192	-73	-105026	-296	112	3165
WILBARGER	0	0	0	0	0	0	0	0	-246	-19	0	0	0	0	-246	-19	0	206
WILLACY	0	0	0	0	0	0	0	0	-6119	-479	0	0	0	0	-6119	-479	7	5129
WINKLER	0	0	0	0	0	0	0	0	0	0	-7209	-16	-1569	-8	-8778	-23	9	250
WISE	0	0	0	0	0	0	-404	-1	-35098	-2749	-13099	-29	-2851	-14	-51453	-2793	55	29882
YOUNG	0	0	0	0	0	0	0	0	-1336	-105	0	0	0	0	-1336	-105	1	1120
ZAPATA	0	0	0	0	0	0	-2224	-4	0	0	0	0	0	0	-2224	-4	2	46
ZAVALA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	-5751171	-30837	-7158540	-15805	-285270	-5435	-1562839	-3014	-6010621	-470854	-8362563	-18397	-1820031	-8714	-30951035	-553057	33118	5917709

Table 56: Totalized Annual Electricity Savings from the ASHRAE Standard 90.1-2007 by CM Zones for Commercial Buildings[82]

CM Zones	Total Electricity Savings by CM Zones (MWh) 2011-TRY 2008
H	9,722.11
N	8,164.58
W	720.32
S	8,031.49
Total	26,638.50

[82] Of a total of 202 counties listed in Table 49, the annual electricity savings in 138 counties (i.e., 6,480 MWh), including 8 non-attainment and affected non-ERCOT counties (i.e, 17.16 % of total savings in 138 counties), are not reported in Table 50 since the corresponding providers could not be assigned for these 138 counties.

Table 57: 2011 Annual NOx Reductions from the ASHRAE Standard 90.1-2007 by CM Zones for Commercial Buildings by County using 2010 eGRID

Area	County	H	NOx Reductions (lbs)	N	NOx Reductions (lbs)	W	NOx Reductions (lbs/year)	S	NOx Reductions (lbs)	Total Nox Reductions (lbs)	Total Nox Reductions (Tons)
Houston-Galveston Area	Brazoria	0.0562032	546.4136437	0.0000071	0.0582180	0.0000003	0.0002481	0.0005265	4.2289163	550.7010260	0.2753505
	Chambers	0.0204500	198.8171935	0.0000026	0.0211831	0.0000001	0.0000903	0.0001916	1.5387267	200.3771936	0.1001886
	Fort Bend	0.0313463	304.7523829	0.0000040	0.0324700	0.0000002	0.0001384	0.0002937	2.3586020	307.1435933	0.1535718
	Galveston	0.0226620	220.3221149	0.0000029	0.0234744	0.0000001	0.0001000	0.0002123	1.7051620	222.0508513	0.1110254
	Harris	0.1486911	1445.5913831	0.0000189	0.1540214	0.0000009	0.0006563	0.0013930	11.1880168	1456.9340776	0.7284670
Dallas/ Fort Worth Area	Collin	0.0012932	12.5723214	0.0079329	64.7690418	0.0003832	0.2760074	0.0000809	0.6500259	78.2673965	0.0391337
	Dallas	0.0024826	24.1361909	0.0152295	124.3428244	0.0007356	0.5298757	0.0001554	1.2479119	150.2568028	0.0751284
	Denton	0.0001267	1.2314368	0.0007770	6.3440140	0.0000375	0.0270344	0.0000079	0.0636689	7.6661542	0.0038331
	Tarrant	0.0004742	4.6100559	0.0029089	23.7497033	0.0001405	0.1012072	0.0000297	0.2383534	28.6993198	0.0143497
	Ellis	0.0029920	29.0884759	0.0183544	149.8555956	0.0008865	0.6385960	0.0001873	1.5039596	181.0866271	0.0905433
	Johnson	0.0007256	7.0543524	0.0044512	36.3420271	0.0002150	0.1548682	0.0000454	0.3647307	43.9159784	0.0219580
	Kaufman	0.0059718	58.0589641	0.0366343	299.1033517	0.0017695	1.2746018	0.0003738	3.0018188	361.4387365	0.1807194
	Parker	0.0000012	0.0119535	0.0000075	0.0615812	0.0000004	0.0002624	0.0000001	0.0006180	0.0744152	0.0000372
	Henderson	0.0006908	6.7158022	0.0042376	34.5979120	0.0002047	0.1474359	0.0000432	0.3472267	41.8083767	0.0209042
	Hood	0.0050771	49.3600792	0.0311454	254.2891581	0.0015044	1.0836302	0.0003178	2.5520609	307.2849284	0.1536425
	Hunt	0.0088463	86.0050455	0.0047066	38.4277210	0.0002273	0.1637562	0.0652823	524.3139639	648.9104867	0.3244552
San Antonio Area	Bexar	0.0138906	135.0459832	0.0009368	7.6486931	0.0000452	0.0325942	0.1109355	890.9774568	1033.7047273	0.5168524
	Guadalupe	0.0032029	31.1388393	0.0002160	1.7636321	0.0000104	0.0075156	0.0255795	205.4411630	238.3511500	0.1191756
Austin Area	Bastrop	0.0033782	32.8434634	0.0002278	1.8601780	0.0000110	0.0079270	0.0269798	216.6875666	251.3991350	0.1256996
	Hays	0.0008331	8.0997700	0.0000562	0.4587523	0.0000027	0.0019549	0.0066537	53.4389271	61.9994043	0.0309997
	Travis	0.0051785	50.3462864	0.0003493	2.8514976	0.0000169	0.0121514	0.0413577	332.1639424	385.3738777	0.1926869
	Rusk	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
Corpus Christi Area	Nueces	0.0128578	125.0047313	0.0008672	7.0799797	0.0000419	0.0301707	0.1026870	824.7294360	956.8443176	0.4784222
	San Patricio	0.0015100	14.6799345	0.0001018	0.8314376	0.0000049	0.0035431	0.0120591	96.8521268	112.3670420	0.0561835
Victoria Area	Victoria	0.0021192	20.6026646	0.0001429	1.1668874	0.0000069	0.0049726	0.0169244	135.9278465	157.7023710	0.0788512
Other ERCOT counties	Andrews	0.0000037	0.0364020	0.0000230	0.1875326	0.0039003	2.8094427	0.0000002	0.0018821	3.0352594	0.0015176
	Bosque	0.0022204	21.5872062	0.0136212	111.2111768	0.0006579	0.4739163	0.0001390	1.1161219	134.3884212	0.0671942
	Brazos	0.0024089	23.4193694	0.0112305	91.6924703	0.0005425	0.3907391	0.0047829	38.4138737	153.9164525	0.0769582
	Calhoun	0.0009466	9.2027818	0.0000638	0.5212243	0.0000031	0.0022212	0.0075598	60.7161422	70.4423695	0.0352212
	Cameron	0.0063536	61.7706921	0.0004285	3.4985496	0.0000207	0.0149088	0.0507425	407.5374393	472.8215897	0.2364108
	Cherokee	0.0027392	26.6303674	0.0168033	137.1921160	0.0008116	0.5846317	0.0001714	1.3768681	165.7839833	0.0828920
	Coke	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
	Ector	0.0019215	18.6811150	0.0006604	5.3915222	0.0911346	65.6460254	0.0146527	117.6828543	207.4015170	0.1037008
	Fannin	0.0000041	0.0394223	0.0000249	0.2030927	0.0000012	0.0008655	0.0000003	0.0020383	0.2454188	0.0001227
	Fayette	0.0051867	50.4256869	0.0103217	84.2721735	0.0004986	0.3591182	0.0283993	228.0886830	363.1456616	0.1815728
	Freestone	0.0047643	46.3194235	0.0292268	238.6245608	0.0014117	1.0168769	0.0002982	2.3948501	288.3557113	0.1441779
	Frio	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
	Grimes	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
	Hidalgo	0.0053716	52.2230453	0.0003623	2.9577929	0.0000175	0.0126044	0.0428994	344.5460205	399.7394631	0.1998697
	Howard	0.0002411	2.3441734	0.0007641	6.2383140	0.1283942	92.4847740	0.0009490	7.6218102	108.6890716	0.0543445
	Jack	0.0030783	29.9276995	0.0188839	154.1790381	0.0009121	0.6570200	0.0001927	1.5473499	186.3111075	0.0931556
	Lamar	0.0040001	38.8898164	0.0245388	200.3493278	0.0011853	0.8537705	0.0002504	2.0107176	242.1036323	0.1210518
	Limestone	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
	Llano	0.0040314	39.1941734	0.0002719	2.2198676	0.0000131	0.0094598	0.0321966	258.5869204	300.0104212	0.1500052
	McLennan	0.0056576	55.0040234	0.0347066	283.3651614	0.0016764	1.2075349	0.0003541	2.8438694	342.4205891	0.1712103
	Milam	0.0012686	12.3335288	0.0000856	0.6985426	0.0000041	0.0029768	0.0101316	81.3715138	94.4065619	0.0472033
	Mitchell	0.0000311	0.3026373	0.0001910	1.5591018	0.0324260	23.3570453	0.0000019	0.0156472	25.2344316	0.0126172
	Nolan	0.0000293	0.2844237	0.0001795	1.4652705	0.0304745	21.9513501	0.0000018	0.0147055	23.7157499	0.0118579
	Palo Pinto	0.0036129	35.1253839	0.0221635	180.9560370	0.0010705	0.7711277	0.0002261	1.8160854	218.6686341	0.1093343
	Pecos	0.0000020	0.0191520	0.0000121	0.0986655	0.0020520	1.4781166	0.0000001	0.0009902	1.5969243	0.0007985
	Robertson	0.0039506	38.4079127	0.0055755	45.5214115	0.0002693	0.1939854	0.0246170	197.7107997	281.8341093	0.1409171
	Titus	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000	0.0000000
	Upton	0.0000025	0.0247276	0.0000156	0.1273896	0.0026494	1.9084350	0.0000002	0.0012785	2.0618307	0.0010309
	Ward	0.0001995	1.9397472	0.0012239	9.9930288	0.2078335	149.7064693	0.0000125	0.1002906	161.7395360	0.0808698
	Webb	0.0042017	40.8496408	0.0002834	2.3136295	0.0000137	0.0098593	0.0335565	269.5090086	312.6821382	0.1563411
	Wharton	0.0021095	20.5089175	0.0001423	1.1615778	0.0000069	0.0049500	0.0168474	135.3093425	156.9847878	0.0784924
	Wichita	0.0000121	0.1177752	0.0000743	0.6067447	0.0126190	9.0896979	0.0000008	0.0060893	9.8203072	0.0049102
	Wilbarger	0.0179710	174.7161117	0.1102430	900.0879602	0.0053249	3.8356431	0.0011247	9.0333357	1087.6730507	0.5438365
	Wise	0.0010202	9.9183071	0.0062583	51.0963111	0.0003023	0.2177423	0.0000638	0.5128056	61.7451661	0.0308726
	Young	0.0071054	69.0794883	0.0435880	355.8779731	0.0021054	1.5165417	0.0004447	3.5716123	430.0456153	0.2150228
	Total	**0.4414501**	**4291.82622**	**0.4812863**	**3929.500919**	**0.5345786**	**385.0671877**	**0.6829349**	**5484.983174**	**14091.3775012**	**7.0456888**

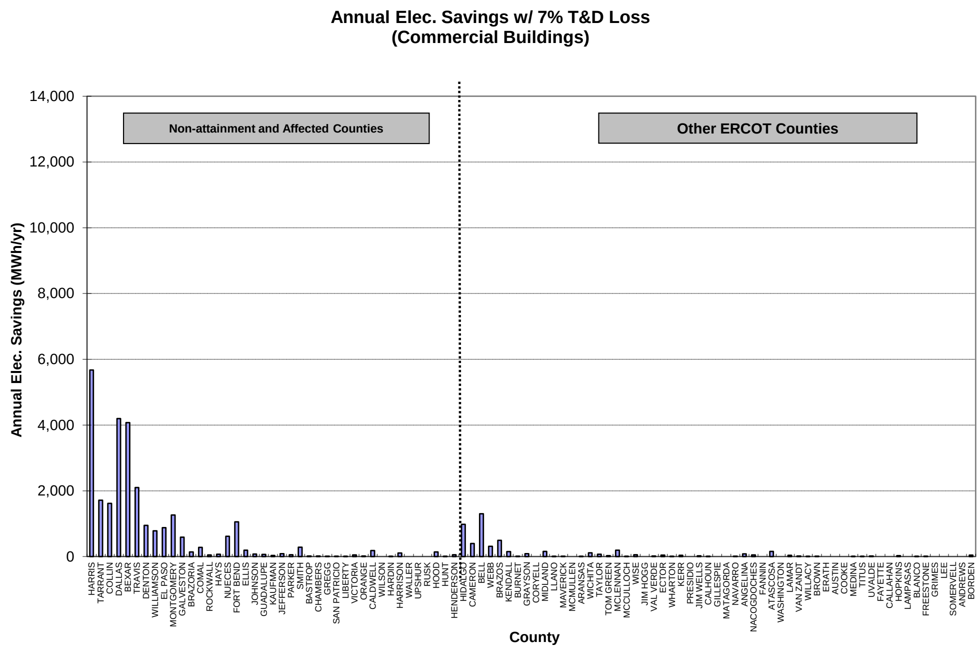
Energy Savings by PCA (MWh)		9,722.11		8,164.58		720.32		8,031.49	

Table 58: 2011 Annual NOx Reductions from the ASHRAE Standard 90.1-2007 for Commercial Buildings by County using 2010 eGRID (w/7% T&D)

	Electricity Savings and Resultant NOx Reductions (Commercial)		Total Natural Gas Savings and Resultant NOx Reductions (Commercial)		Total Nox Reductions
County	Total Annual Electricity Savings per County w/ 7% T&D Loss (MWh/County)	Annual Nox Reductions (Tons)	Total Annual N.G. Savings (Therm/County)	Annual Nox Reductions (Tons)	Annual Nox Reductions (Tons)
HARRIS	5,675.06	0.73	1,362,265.42	6.27	6.99
TARRANT	1,715.96	0.01	211,416.18	0.97	0.99
COLLIN	1,616.19	0.04	357,656.09	1.65	1.68
DALLAS	4,198.98	0.08	512,299.61	2.36	2.43
BEXAR	4,072.72	0.52	472,682.97	2.17	2.69
TRAVIS	2,098.39	0.19	211,183.21	0.97	1.16
DENTON	951.80	0.00	89,185.99	0.41	0.41
WILLIAMSON	784.47		347,032.46	1.60	1.60
EL PASO	882.09		68,967.08	0.32	0.32
MONTGOMERY	1,265.11		178,832.39	0.82	0.82
GALVESTON	590.83	0.11	31,987.11	0.15	0.26
BRAZORIA	143.97	0.28	43,827.27	0.20	0.48
COMAL	282.44		66,141.36	0.30	0.30
ROCKWALL	48.77		1,198.17	0.01	0.01
HAYS	71.23	0.03	19,117.26	0.09	0.12
NUECES	619.25	0.48	118,071.61	0.54	1.02
FORT BEND	1,057.98	0.15	363,326.16	1.67	1.82
ELLIS	192.73	0.09	9,178.52	0.04	0.13
JOHNSON	76.22	0.02	4,510.95	0.02	0.04
GUADALUPE	64.44	0.12	18,990.15	0.09	0.21
KAUFMAN	33.28	0.18	19,566.62	0.09	0.27
JEFFERSON	85.54		11,127.18	0.05	0.05
PARKER	56.82	0.00	13,394.85	0.06	0.06
SMITH	285.07		33,553.21	0.15	0.15
BASTROP	20.10	0.13	1,892.28	0.01	0.13
CHAMBERS	18.20	0.10	5,069.30	0.02	0.12
GREGG	13.08		3,763.02	0.02	0.02
SAN PATRICIO	12.58	0.06	3,182.67	0.01	0.07
LIBERTY	5.04		111.23	0.00	0.00
VICTORIA	49.70	0.08	1,786.33	0.01	0.09
ORANGE	17.56		941.60	0.00	0.00
CALDWELL	183.26		4,879.44	0.02	0.02
WILSON	0.00		0.00	0.00	0.00
HARDIN	0.82		15.76	0.00	0.00
HARRISON	108.12		3,094.35	0.01	0.01
WALLER	0.00		0.00	0.00	0.00
UPSHUR	0.00		0.00	0.00	0.00
RUSK	0.00	0.00	0.00	0.00	0.00
HOOD	141.80	0.15	3,775.47	0.02	0.17
HUNT	5.56	0.32	682.30	0.00	0.33
HENDERSON	57.22	0.02	36,741.07	0.17	0.19
HIDALGO	980.61	0.20	377,357.61	1.74	1.94
CAMERON	400.28	0.24	118,027.71	0.54	0.78
BELL	1,304.64		74,350.31	0.34	0.34
WEBB	314.44	0.16	25,999.78	0.12	0.28
BRAZOS	494.59	0.08	53,404.82	0.25	0.32
KENDALL	153.14		4,345.74	0.02	0.02
BURNET	15.92		423.90	0.00	0.00
GRAYSON	87.53		36,915.81	0.17	0.17
CORYELL	0.00		0.00	0.00	0.00
MIDLAND	155.83		29,684.63	0.14	0.14
LLANO	7.20	0.15	158.90	0.00	0.15
MAVERICK	14.75		1,909.96	0.01	0.01
MCMULLEN	0.00		0.00	0.00	0.00
ARANSAS	5.53		106.64	0.00	0.00
WICHITA	112.38	0.00	3,164.50	0.01	0.02
TAYLOR	72.96		37,736.11	0.17	0.17
TOM GREEN	31.50		1,602.16	0.01	0.01
MCLENNAN	195.14	0.17	105,369.90	0.48	0.66
MCCULLOCH	3.44		91.49	0.00	0.00
WISE	55.05	0.03	29,882.29	0.14	0.17
JIM HOGG	0.00		0.00	0.00	0.00
VAL VERDE	20.89		5,543.22	0.03	0.03
ECTOR	45.49	0.10	10,130.46	0.05	0.15
WHARTON	1.35	0.08	25.97	0.00	0.08
KERR	42.64		989.82	0.00	0.00
PRESIDIO	0.00		0.00	0.00	0.00
JIM WELLS	25.73		19,789.35	0.09	0.09
CALHOUN	1.80	0.04	34.78	0.00	0.04
GILLESPIE	0.00		0.00	0.00	0.00
MATAGORDA	0.00		0.00	0.00	0.00
NAVARRO	12.83		306.72	0.00	0.00
ANGELINA	85.18		3,189.89	0.01	0.01
NACOGDOCHES	48.58		4,573.41	0.02	0.02
FANNIN	0.00	0.00	0.00	0.00	0.00
ATASCOSA	157.89		22,142.79	0.10	0.10
WASHINGTON	0.00		0.00	0.00	0.00
LAMAR	40.52	0.12	12,869.32	0.06	0.18
VAN ZANDT	21.26		16,655.35	0.08	0.08
WILLACY	6.55		5,129.26	0.02	0.02
BROWN	13.36		10,464.87	0.05	0.05
ERATH	0.00		0.00	0.00	0.00
AUSTIN	0.00		0.00	0.00	0.00
COOKE	0.00		0.00	0.00	0.00
MEDINA	0.91		17.62	0.00	0.00
TITUS	7.15	0.00	5,600.92	0.03	0.03
UVALDE	16.04		426.95	0.00	0.00
FAYETTE	0.00	0.18	0.00	0.00	0.18
CALLAHAN	0.00		0.00	0.00	0.00
HOPKINS	26.83		4,217.69	0.02	0.02
LAMPASAS	0.00		0.00	0.00	0.00
BLANCO	5.15		137.23	0.00	0.00
FREESTONE	12.94	0.14	10,140.60	0.05	0.19
GRIMES	0.00	0.00	0.00	0.00	0.00
LEE	0.00		0.00	0.00	0.00
SOMERVELL	0.00		0.00	0.00	0.00
ANDREWS	0.00	0.00	0.00	0.00	0.00
BORDEN	44.40		34,784.63	0.16	0.16

Table 58: 2011 Annual NOx Reductions from the ASHRAE Standard 90.1-2007 for Commercial Buildings by County using 2010 eGRID (w/7% T&D) (Continued)

	Electricity Savings and Resultant NOx Reductions (Commercial)		Total Natural Gas Savings and Resultant NOx Reductions (Commercial)		Total Nox Reductions
County	Total Annual Electricity Savings per County w/ 7% T&D Loss (MWh/County)	Annual Nox Reductions (Tons)	Total Annual N.G. Savings (Therm/County)	Annual Nox Reductions (Tons)	Annual Nox Reductions (Tons)
CHEROKEE	79.65	0.08	52,060.75	0.24	0.32
DIMMIT	0.00		0.00	0.00	0.00
FALLS	0.00		0.00	0.00	0.00
COLORADO	30.03		762.56	0.00	0.00
FRIO	121.88	0.00	4,447.60	0.02	0.02
MILAM	0.00	0.05	0.00	0.00	0.05
JACKSON	33.33		25,485.19	0.12	0.12
ANDERSON	0.34		6.49	0.00	0.00
HILL	26.30		20,605.47	0.09	0.09
CULBERSON	0.00		0.00	0.00	0.00
MASON	0.00		0.00	0.00	0.00
PECOS	3.01	0.00	2,358.28	0.01	0.01
RAINS	0.00		0.00	0.00	0.00
LAVACA	25.96		20,340.17	0.09	0.09
PALO PINTO	6.53	0.11	173.83	0.00	0.11
KIMBLE	0.00		0.00	0.00	0.00
MADISON	0.00		0.00	0.00	0.00
ARCHER	0.00		0.00	0.00	0.00
REFUGIO	0.00		0.00	0.00	0.00
LIMESTONE	0.00	0.00	0.00	0.00	0.00
CLAY	0.00		0.00	0.00	0.00
BEE	15.05		11,791.40	0.05	0.05
MARTIN	48.94		1,080.49	0.00	0.00
GONZALES	3.76		2,947.85	0.01	0.01
BURLESON	0.00		0.00	0.00	0.00
KARNES	0.00		0.00	0.00	0.00
KLEBERG	0.00		0.00	0.00	0.00
BREWSTER	8.28		1,577.18	0.01	0.01
WINKLER	9.39		250.07	0.00	0.00
FRANKLIN	0.00		0.00	0.00	0.00
YOUNG	1.43	0.22	1,120.18	0.01	0.22
HOUSTON	0.00		0.00	0.00	0.00
SCURRY	0.00		0.00	0.00	0.00
BOSQUE	0.00	0.07	0.00	0.00	0.07
COMANCHE	0.00		0.00	0.00	0.00
BRISCOE	0.00		0.00	0.00	0.00
CONCHO	0.00		0.00	0.00	0.00
ZAVALA	0.00		0.00	0.00	0.00
NOLAN	10.16	0.01	7,959.20	0.04	0.05
BROOKS	0.00		0.00	0.00	0.00
ROBERTSON	0.00	0.14	0.00	0.00	0.14
LIVE OAK	22.47		17,110.05	0.08	0.08
HAMILTON	0.00		0.00	0.00	0.00
JONES	0.00		0.00	0.00	0.00
REAGAN	0.00		0.00	0.00	0.00
WARD	0.00	0.08	0.00	0.00	0.08
RED RIVER	0.00		0.00	0.00	0.00
HASKELL	0.00		0.00	0.00	0.00
HOWARD	23.46	0.05	17,706.52	0.08	0.14
SAN SABA	0.00		0.00	0.00	0.00
JACK	15.65	0.09	12,263.06	0.06	0.15
STEPHENS	0.00		0.00	0.00	0.00
RUNNELS	0.00		0.00	0.00	0.00
REEVES	3.76		2,947.85	0.01	0.01
DE WITT	0.00		0.00	0.00	0.00
CHILDRESS	0.00		0.00	0.00	0.00
CROSBY	0.00		0.00	0.00	0.00
DAWSON	12.47		1,747.16	0.01	0.01
MITCHELL	0.00	0.01	0.00	0.00	0.01
WILBARGER	0.26	0.54	206.35	0.00	0.54
COLEMAN	0.00		0.00	0.00	0.00
UPTON	15.80	0.00	12,380.97	0.06	0.06
COKE	0.00	0.00	0.00	0.00	0.00
CROCKETT	0.00		0.00	0.00	0.00
HARDEMAN	0.00		0.00	0.00	0.00
BANDERA	0.00		0.00	0.00	0.00
BAYLOR	0.00		0.00	0.00	0.00
COTTLE	0.00		0.00	0.00	0.00
CRANE	0.00		0.00	0.00	0.00
DELTA	0.00		0.00	0.00	0.00
DICKENS	0.00		0.00	0.00	0.00
DUVAL	0.00		0.00	0.00	0.00
EASTLAND	0.00		0.00	0.00	0.00
EDWARDS	0.00		0.00	0.00	0.00
FISHER	0.00		0.00	0.00	0.00
FOARD	0.00		0.00	0.00	0.00
GLASSCOCK	0.00		0.00	0.00	0.00
GOLIAD	0.00		0.00	0.00	0.00
HALL	0.00		0.00	0.00	0.00
HUDSPETH	0.00		0.00	0.00	0.00
IRION	0.00		0.00	0.00	0.00
JEFF DAVIS	0.00		0.00	0.00	0.00
KENEDY	0.00		0.00	0.00	0.00
KENT	0.00		0.00	0.00	0.00
KING	0.00		0.00	0.00	0.00
KINNEY	0.00		0.00	0.00	0.00
KNOX	0.00		0.00	0.00	0.00
LA SALLE	0.00		0.00	0.00	0.00
LEON	0.00		0.00	0.00	0.00
LOVING	0.00		0.00	0.00	0.00
MENARD	0.00		0.00	0.00	0.00
MILLS	0.00		0.00	0.00	0.00
MONTAGUE	0.00		0.00	0.00	0.00
MOTLEY	0.00		0.00	0.00	0.00
REAL	0.00		0.00	0.00	0.00
SCHLEICHER	47.02		1,038.11	0.00	0.00
SHACKELFORD	0.00		0.00	0.00	0.00
STARR	5.50		146.38	0.00	0.00
STERLING	0.00		0.00	0.00	0.00
STONEWALL	0.00		0.00	0.00	0.00
SUTTON	0.00		0.00	0.00	0.00
TERRELL	0.00		0.00	0.00	0.00
THROCKMORTO	0.00		0.00	0.00	0.00
ZAPATA	2.38		45.90	0.00	0.00
TOTAL	**33,117.61**	**7.05**	**5,917,708.83**	**27.22**	**34.27**



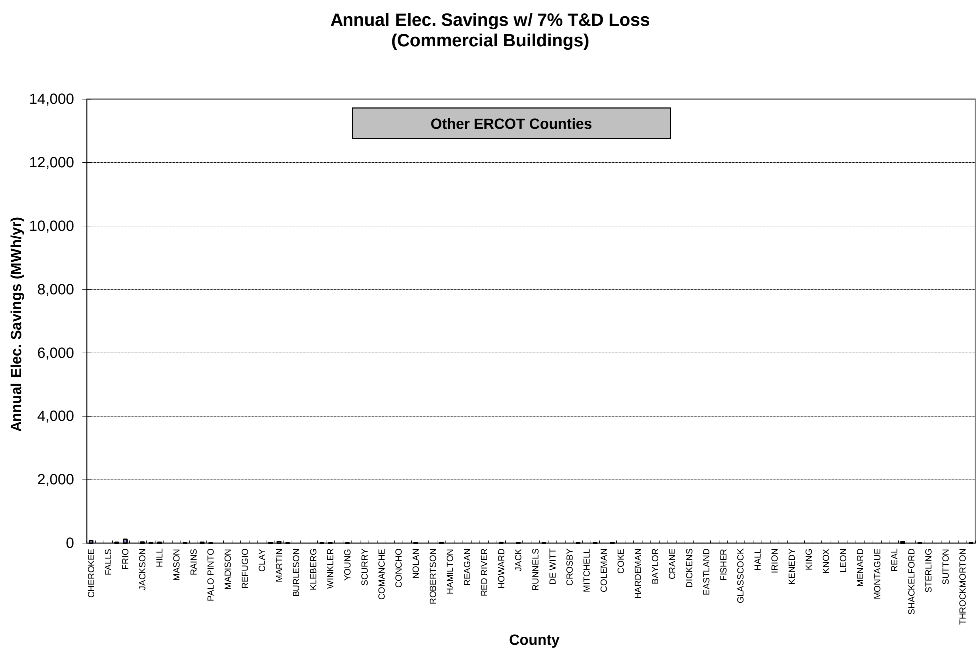
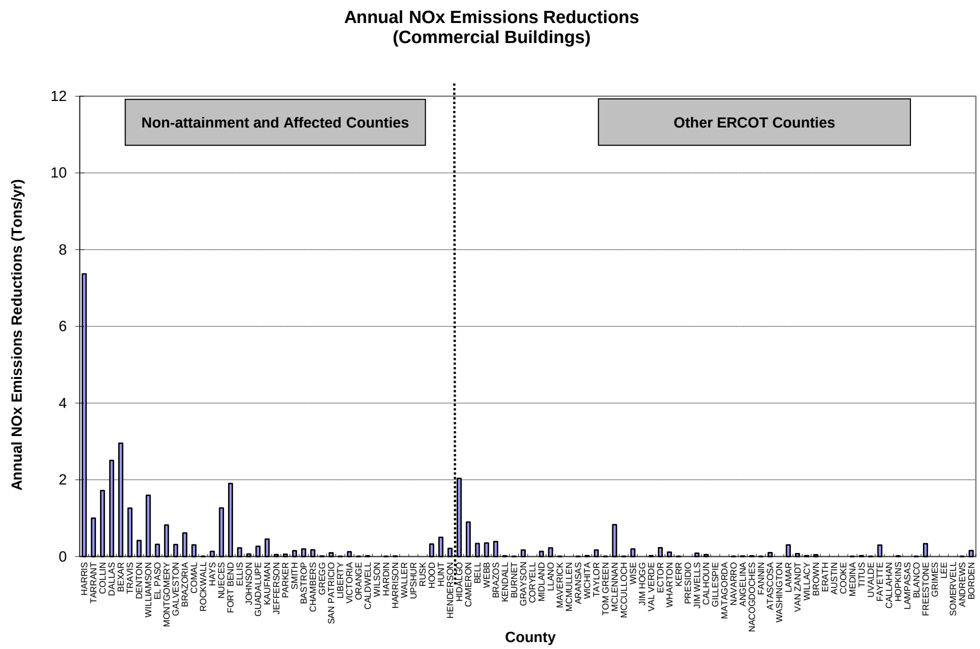


Figure 70: 2011 Annual Electricity Reductions from the ASHRAE Standard 90.1-2007 for Commercial Buildings with 7% T&D Losses



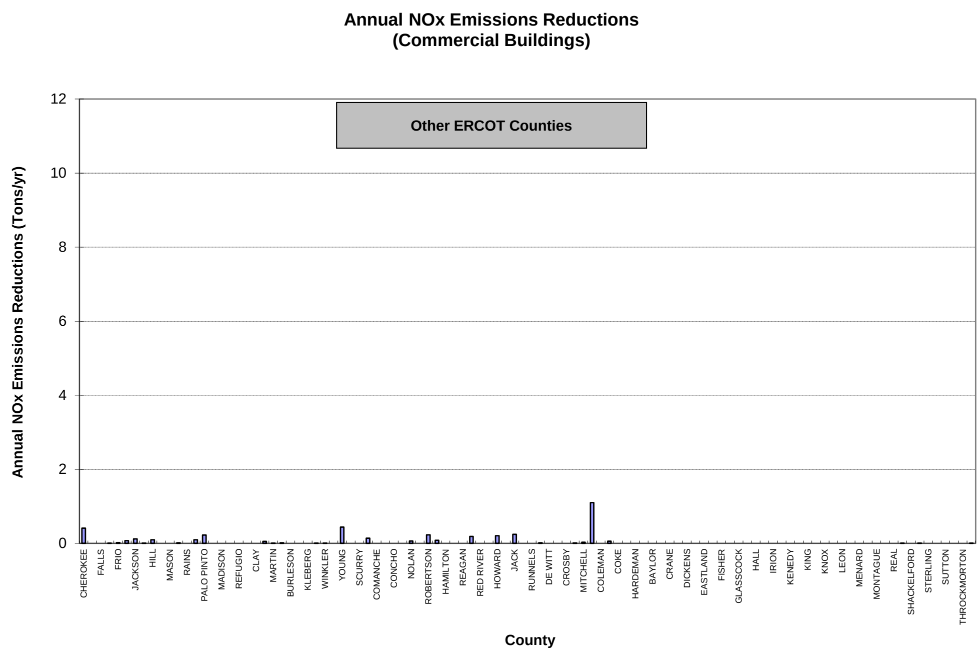


Figure 71: 2011 Annual NOx Reductions from Electricity Savings from the ASHRAE Standard 90.1-2007 for Commercial Buildings by County using 2010 eGRID with 7% T&D Losses

7.1.5 2011 Results for New Residential (Single-family and Multi-family) and Commercial Construction Using 2010 eGRID

Figure 72 shows the bar chart and Figure 73 shows the spatial distribution of the 2011 annual electricity savings, and Figure 74 shows the bar chart and Figure 75 shows the spatial distribution of the 2011 annual NOx savings for new residential and commercial construction, respectively. As shown in Table 59, the total annual electricity savings in 2011 were calculated to be 173,524.18 MWh/yr [1] which includes 49,361.19 MWh/yr (i.e., 28.45%) for single-family residential, 91,045.38 MWh/yr (i.e., 52.47%) for multi-family residential, and 33,117.61 MWh/yr (i.e., 19.09%) for new commercial buildings. Natural gas savings were calculated to be 786,823.51 MMBtu (7,868,235.16 therms) for new residential and commercial construction.

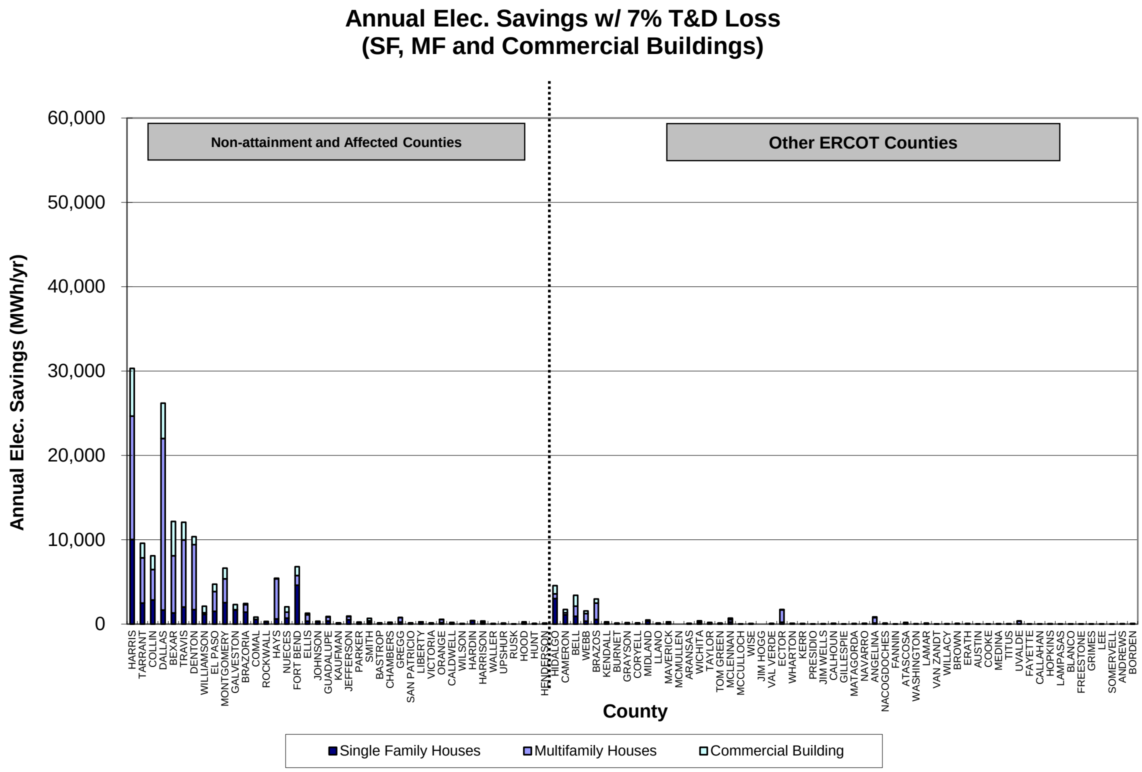
Using the 2010 eGRID, the total NOx reductions from electricity and natural gas savings from new residential (single-family and multi-family) and commercial construction in 2011 were calculated to be 74.31 tons NOx/year which represents 38.12 tons NOx/year from electricity savings and 36.19 tons NOx/year from natural gas savings.

Table 59: 2011 Annual NOx Reductions from Electricity and Natural Gas Savings Due to the 2006 IECC for Single-family and Multi-family Residences and the ASHRAE Standard 90.1-2007 for Commercial Buildings by County (using 2010 eGRID)

	Electricity Savings and Resultant NOx Reductions (Single Family Houses)		Electricity Savings and Resultant NOx Reductions (Multifamily Houses)		Electricity Savings and Resultant NOx Reductions (Commercial Buildings)		Total Electricity Savings and Resultant NOx Reductions (SF, MF and Commecial Buildings)		Total Natural Gas Savings and Resultant NOx Reductions (Single and Multi-Family Houses)		Total Natural Gas Savings and Resultant NOx Reductions (SF, MF and Commecial Buildings)		Total Nox Reductions
County	Total Annual Electricity Savings per County w/ 7% T&D Loss (MWh/County)	Annual Nox Reductions (Tons)	Total Annual Electricity Savings per County w/ 7% T&D Loss (MWh/County)	Annual Nox Reductions (Tons)	Total Annual Electricity Savings per County w/ 7% T&D Loss (MWh/County)	Annual Nox Reductions (Tons)	Total Annual Electricity Savings per County w/ 7% T&D Loss (MWh/County)	Annual Nox Reductions (Tons)	Total Annual N.G. Savings (Therm/County)	Annual Nox Reductions (Tons)	Total Annual N.G. Savings (Therm/County)	Annual Nox Reductions (Tons)	Annual Nox Reductions (Tons)
HARRIS	10,010.83	1.51	14,634.15	1.83	5,675.06	0.73	30,320.04	4.07	49,190.14	0.23	1,411,455.56	6.49	10.56
TARRANT	2,473.12	0.02	5,384.46	0.05	1,715.96	0.01	9,573.54	0.09	181,183.70	0.83	392,599.88	1.81	1.89
COLLIN	2,847.43	0.05	3,617.39	0.15	1,616.19	0.04	8,081.01	0.23	169,269.57	0.78	526,925.66	2.42	2.66
DALLAS	1,655.83	0.09	20,337.89	0.28	4,198.98	0.08	26,192.70	0.45	363,702.69	1.67	876,002.30	4.03	4.48
BEXAR	1,321.30	0.65	6,767.68	1.32	4,072.72	0.52	12,161.70	2.49	114,332.76	0.53	587,015.73	2.70	5.19
TRAVIS	2,024.96	0.24	7,942.13	0.49	2,098.39	0.19	12,065.47	0.93	180,844.64	0.83	392,027.85	1.80	2.73
DENTON	1,698.35	0.00	7,704.97	0.01	951.80	0.00	10,355.12	0.02	179,519.97	0.83	268,705.95	1.24	1.26
WILLIAMSON	1,138.58		196.22		784.47	0.00	2,119.27	0.00	45,585.72	0.21	392,618.18	1.81	1.81
EL PASO	1,515.15		2,329.85		882.09	0.00	4,727.08	0.00	167,086.79	0.77	236,053.87	1.09	1.09
MONTGOMERY	2,519.16		2,851.21		1,265.11	0.00	6,635.47	0.00	13,772.95	0.06	192,605.34	0.89	0.89
GALVESTON	1,642.39	0.23	70.15	0.28	590.83	0.11	2,303.37	0.62	12,182.55	0.06	44,169.66	0.20	0.82
BRAZORIA	1,407.25	0.57	886.19	0.69	143.97	0.28	2,437.41	1.54	9,076.63	0.04	52,903.90	0.24	1.78
COMAL	549.73		0.00		282.44	0.00	832.17	0.00	17,552.56	0.08	83,693.92	0.38	0.38
ROCKWALL	266.22		0.00		48.77	0.00	314.99	0.00	11,036.23	0.05	12,234.40	0.06	0.06
HAYS	612.66	0.04	4,754.34	0.08	71.23	0.03	5,438.22	0.15	85,611.65	0.39	104,728.91	0.48	0.63
NUECES	695.28	0.60	719.91	1.22	619.25	0.48	2,034.43	2.31	3,356.67	0.02	121,428.29	0.56	2.87
FORT BEND	4,605.69	0.32	1,146.12	0.39	1,057.98	0.15	6,809.78	0.86	32,002.15	0.15	395,328.31	1.82	2.68
ELLIS	324.21	0.11	775.04	0.34	192.73	0.09	1,291.97	0.54	24,753.83	0.11	33,932.35	0.16	0.70
JOHNSON	267.49	0.03	0.00	0.08	76.22	0.02	343.70	0.13	11,160.07	0.05	15,671.02	0.07	0.20
GUADALUPE	350.07	0.15	472.85	0.31	64.44	0.12	887.36	0.57	16,218.32	0.07	35,208.47	0.16	0.74
KAUFMAN	98.46	0.22	13.73	0.68	33.28	0.18	145.46	1.08	4,275.94	0.02	23,842.56	0.11	1.19
JEFFERSON	499.14		366.23		85.54	0.00	950.90	0.00	2,986.70	0.01	14,113.89	0.06	0.06
PARKER	182.66	0.00	0.00	0.00	56.82	0.00	239.48	0.00	7,572.31	0.03	20,967.16	0.10	0.10
SMITH	199.43		188.01		285.07	0.00	672.51	0.00	1,055.19	0.00	34,608.40	0.16	0.16
BASTROP	105.36	0.16	0.00	0.32	20.10	0.13	125.47	0.61	1,485.29	0.01	3,377.57	0.02	0.62
CHAMBERS	184.92	0.21	0.00	0.25	18.20	0.10	203.12	0.56	1,410.84	0.01	6,480.14	0.03	0.59
GREGG	242.40		519.89		13.08	0.00	775.37	0.00	241.37	0.00	4,004.40	0.02	0.02
SAN PATRICIO	112.08	0.07	0.00	0.14	12.58	0.06	124.66	0.27	616.26	0.00	3,798.93	0.02	0.29
LIBERTY	227.77		18.88		5.04	0.00	251.69	0.00	1,644.60	0.01	1,755.83	0.01	0.01
VICTORIA	78.96	0.10	0.00	0.20	49.70	0.08	128.67	0.38	580.94	0.00	2,367.27	0.01	0.39
ORANGE	172.69		366.73		17.56	0.00	556.98	0.00	420.80	0.00	1,362.40	0.01	0.01
CALDWELL	7.37		0.00		183.26	0.00	190.64	0.00	279.79	0.00	5,159.22	0.02	0.02
WILSON	6.49		53.73		0.00	0.00	60.23	0.00	780.12	0.00	780.12	0.00	0.00
HARDIN	381.46		0.00		0.82	0.00	382.28	0.00	2,950.93	0.01	2,966.70	0.01	0.01
HARRISON	50.81		195.50		108.12	0.00	354.43	0.00	(261.22)	(0.00)	2,833.13	0.01	0.01
WALLER	4.51		75.16		0.00	0.00	79.66	0.00	(92.87)	(0.00)	(92.87)	(0.00)	(0.00)
UPSHUR	14.02		102.90		0.00	0.00	116.93	0.00	1,683.73	0.01	1,683.73	0.01	0.01
RUSK	6.64	0.00	0.00	0.00	0.00	0.00	6.64	0.00	62.66	0.00	62.66	0.00	0.00
HOOD	62.52	0.19	54.39	0.58	141.80	0.15	258.71	0.92	3,396.38	0.02	7,171.84	0.03	0.96
HUNT	22.61	0.41	20.54	0.86	5.56	0.32	48.71	1.59	1,224.40	0.01	1,906.70	0.01	1.60
HENDERSON	60.37	0.03	0.00	0.08	57.22	0.02	117.58	0.13	511.38	0.00	37,252.46	0.17	0.30
HIDALGO	3,008.86	0.25	559.02	0.51	980.61	0.20	4,548.49	0.96	12,713.15	0.06	390,070.77	1.79	2.76
CAMERON	1,080.97	0.30	253.55	0.61	400.28	0.24	1,734.80	1.14	4,552.21	0.02	122,579.92	0.56	1.70
BELL	925.04		1,190.92		1,304.64	0.00	3,420.61	0.00	65,580.92	0.30	139,931.23	0.64	0.64
WEBB	347.34	0.20	881.75	0.40	314.44	0.16	1,543.52	0.75	7,300.65	0.03	33,300.43	0.15	0.91
BRAZOS	541.69	0.10	1,937.60	0.26	494.59	0.08	2,973.87	0.44	739.76	0.00	54,144.58	0.25	0.69
KENDALL	109.40		0.00		153.14	0.00	262.54	0.00	3,484.42	0.02	7,830.16	0.04	0.04
BURNET	83.66		0.00		15.92	0.00	99.58	0.00	3,159.92	0.01	3,583.82	0.02	0.02
GRAYSON	40.05		47.93		87.53	0.00	175.51	0.00	2,333.05	0.01	39,248.86	0.18	0.18
CORYELL	92.17		43.99		0.00	0.00	136.16	0.00	5,318.93	0.02	5,318.93	0.02	0.02
MIDLAND	331.43		0.00		155.83	0.00	487.25	0.00	16,790.18	0.08	46,474.81	0.21	0.21
LLANO	92.27	0.19	0.00	0.38	7.20	0.15	99.46	0.72	3,485.21	0.02	3,644.10	0.02	0.74
MAVERICK	35.82		195.32		14.75	0.00	245.90	0.00	685.26	0.00	2,595.22	0.01	0.01
MCMULLEN	0.00		0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ARANSAS	69.43		0.00		5.53	0.00	74.96	0.00	381.75	0.00	488.40	0.00	0.00
WICHITA	72.37	0.01	193.19	0.02	112.38	0.00	377.94	0.03	7,647.35	0.04	10,811.85	0.05	0.08
TAYLOR	92.49		21.99		72.96	0.00	187.44	0.00	4,923.81	0.02	42,659.92	0.20	0.20
TOM GREEN	93.70		0.00		31.50	0.00	125.20	0.00	4,017.63	0.02	5,619.80	0.03	0.03
MCLENNAN	247.84	0.21	257.67	0.65	195.14	0.17	700.65	1.03	16,571.12	0.08	121,941.02	0.56	1.59
MCCULLOCH	0.00		0.00		3.44	0.00	3.44	0.00	0.00	0.00	91.49	0.00	0.00
WISE	14.90	0.04	0.00	0.12	55.05	0.03	69.95	0.19	617.60	0.00	30,499.89	0.14	0.33
JIM HOGG	0.00		0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
VAL VERDE	25.43		16.12		20.89	0.00	62.44	0.00	983.82	0.00	6,527.04	0.03	0.03
ECTOR	206.60	0.13	1,480.54	0.33	45.49	0.10	1,732.62	0.56	34,855.61	0.16	44,986.07	0.21	0.77
WHARTON	59.94	0.10	0.00	0.20	1.35	0.08	61.28	0.38	440.96	0.00	466.92	0.00	0.38
KERR	25.22		0.00		42.64	0.00	67.86	0.00	952.62	0.00	1,942.44	0.01	0.01
PRESIDIO	1.29		0.00		0.00	0.00	1.29	0.00	55.42	0.00	55.42	0.00	0.00
JIM WELLS	22.81		0.00		25.73	0.00	48.54	0.00	125.43	0.00	19,914.78	0.09	0.09
CALHOUN	61.84	0.04	0.00	0.09	1.80	0.04	63.64	0.17	454.95	0.00	489.73	0.00	0.17
GILLESPIE	20.30		0.00		0.00	0.00	20.30	0.00	766.75	0.00	766.75	0.00	0.00
MATAGORDA	59.94		0.00		0.00	0.00	59.94	0.00	440.96	0.00	440.96	0.00	0.00
NAVARRO	43.27		34.56		12.83	0.00	90.67	0.00	2,723.70	0.01	3,030.43	0.01	0.01
ANGELINA	113.89		648.00		85.18	0.00	847.07	0.00	(910.09)	(0.00)	2,279.80	0.01	0.01
NACOGDOCHES	47.45		31.50		48.58	0.00	127.54	0.00	351.13	0.00	4,924.54	0.02	0.02
FANNIN	3.88	0.00	0.00	0.00	0.00	0.00	3.88	0.00	159.83	0.00	159.83	0.00	0.00
ATASCOSA	35.17		5.36		157.89	0.00	198.42	0.00	1,201.65	0.01	23,344.44	0.11	0.11
WASHINGTON	50.47		0.00		0.00	0.00	50.47	0.00	371.78	0.00	371.78	0.00	0.00
LAMAR	26.74	0.15	44.62	0.46	40.52	0.12	111.87	0.73	884.31	0.00	13,753.63	0.06	0.79
VAN ZANDT	5.83		0.00		21.26	0.00	27.09	0.00	241.67	0.00	16,897.02	0.08	0.08
WILLACY	19.50		0.00		6.55	0.00	26.05	0.00	83.45	0.00	5,212.71	0.02	0.02
BROWN	35.97		0.00		13.36	0.00	49.33	0.00	1,796.26	0.01	12,261.13	0.06	0.06
ERATH	22.35		43.97		0.00	0.00	66.32	0.00	1,809.82	0.01	1,809.82	0.01	0.01
AUSTIN	15.32		0.00		0.00	0.00	15.32	0.00	112.86	0.00	112.86	0.00	0.00
COOKE	9.69		0.00		0.00	0.00	9.69	0.00	399.57	0.00	399.57	0.00	0.00
MEDINA	11.90		0.00		0.91	0.00	12.82	0.00	380.08	0.00	397.69	0.00	0.00
TITUS	6.68	0.00	0.00	0.00	7.15	0.00	13.83	0.00	63.12	0.00	5,664.03	0.03	0.03
UVALDE	11.36		335.83		16.04	0.00	363.23	0.00	3,942.81	0.02	4,369.76	0.02	0.02
FAYETTE	6.31	0.23	0.00	0.53	0.00	0.18	6.31	0.93	46.47	0.00	46.47	0.00	0.93
CALLAHAN	2.48		0.00		0.00	0.00	2.48	0.00	122.71	0.00	122.71	0.00	0.00
HOPKINS	5.83		20.59		26.83	0.00	53.26	0.00	533.29	0.00	4,750.97	0.02	0.02
LAMPASAS	2.81		0.00		0.00	0.00	2.81	0.00	0.00	0.00	140.33	0.00	0.00
BLANCO	1.23		0.00		5.15	0.00	6.38	0.00	46.47	0.00	183.70	0.00	0.00
FREESTONE	5.62	0.18	0.00	0.54	12.94	0.14	18.56	0.87	280.67	0.00	10,421.27	0.05	0.91
GRIMES	11.72	0.00	0.00	0.00	0.00	0.00	11.72	0.00	86.31	0.00	86.31	0.00	0.00
LEE	4.30		0.00		0.00	0.00	4.30	0.00	163.21	0.00	163.21	0.00	0.00
SOMERVELL	5.16		0.00		0.00	0.00	5.16	0.00	215.13	0.00	215.13	0.00	0.00
ANDREWS	36.89	0.00	0.00	0.01	0.00	0.00	36.89	0.01	1,869.04	0.01	1,869.04	0.01	0.02
BORDEN	23.46		0.00		44.40	0.00	67.87	0.00	679.55	0.00	35,464.18	0.16	0.16

Table 59: 2011 Annual NOx Reductions from Electricity and Natural Gas Savings Due to the 2006 IECC for Single-family and Multi-family Residences and the ASHRAE Standard 90.1-2007 for Commercial Buildings by County (using 2010 eGRID) (Continued)

	Electricity Savings and Resultant NOx Reductions (Single Family Houses)		Electricity Savings and Resultant NOx Reductions (Multifamily Houses)		Electricity Savings and Resultant NOx Reductions (Commercial Buildings)		Total Electricity Savings and Resultant NOx Reductions (SF, MF and Commecial Buildings)		Total Natural Gas Savings and Resultant NOx Reductions (Single and Multi-Family Houses)		Total Natural Gas Savings and Resultant NOx Reductions (SF, MF and Commecial Buildings)		Total Nox Reductions
County	Total Annual Electricity Savings per County w/ 7% T&D Loss (MWh/County)	Annual Nox Reductions (Tons)	Total Annual Electricity Savings per County w/ 7% T&D Loss (MWh/County)	Annual Nox Reductions (Tons)	Total Annual Electricity Savings per County w/ 7% T&D Loss (MWh/County)	Annual Nox Reductions (Tons)	Total Annual Electricity Savings per County w/ 7% T&D Loss (MWh/County)	Annual Nox Reductions (Tons)	Total Annual N.G. Savings (Therm/County)	Annual Nox Reductions (Tons)	Total Annual N.G. Savings (Therm/County)	Annual Nox Reductions (Tons)	Annual Nox Reductions (Tons)
CHEROKEE	64.54	0.10	13.50	0.31	79.65	0.08	157.69	0.50	567.38	0.00	52,628.13	0.24	0.74
DIMMIT	2.71		0.00		0.00	0.00	2.71	0.00	61.50	0.00	61.50	0.00	0.00
FALLS	1.12		0.00		0.00	0.00	1.12	0.00	56.13	0.00	56.13	0.00	0.00
COLORADO	7.21		0.00		30.03	0.00	37.24	0.00	53.11	0.00	815.68	0.00	0.00
FRIO	5.86	0.00	0.00	0.00	121.88	0.00	127.74	0.00	190.68	0.00	4,638.28	0.02	0.02
MILAM	0.50	0.06	0.00	0.12	0.00	0.05	0.50	0.23	16.86	0.00	16.86	0.00	0.23
JACKSON	7.61		0.00		33.33	0.00	40.94	0.00	55.99	0.00	25,541.18	0.12	0.12
ANDERSON	12.34		0.00		0.34	0.00	12.67	0.00	116.37	0.00	122.86	0.00	0.00
HILL	3.37		0.00		26.30	0.00	29.68	0.00	168.40	0.00	20,773.87	0.10	0.10
CULBERSON	0.45		0.00		0.00	0.00	0.45	0.00	33.96	0.00	33.96	0.00	0.00
MASON	3.69		0.00		0.00	0.00	3.69	0.00	139.41	0.00	139.41	0.00	0.00
PECOS	3.88	0.00	0.00	0.00	3.01	0.00	6.89	0.01	166.25	0.00	2,524.53	0.01	0.02
RAINS	1.30		0.00		0.00	0.00	1.30	0.00	53.70	0.00	53.70	0.00	0.00
LAVACA	16.18		0.00		25.96	0.00	42.14	0.00	125.69	0.00	20,465.85	0.09	0.09
PALO PINTO	4.97	0.13	0.00	0.41	6.53	0.11	11.49	0.66	245.43	0.00	419.26	0.00	0.66
KIMBLE	0.65		0.00		0.00	0.00	0.65	0.00	27.71	0.00	27.71	0.00	0.00
MADISON	14.42		0.00		0.00	0.00	14.42	0.00	106.22	0.00	106.22	0.00	0.00
ARCHER	5.87		0.00		0.00	0.00	5.87	0.00	335.35	0.00	335.35	0.00	0.00
REFUGIO	1.90		0.00		0.00	0.00	1.90	0.00	14.00	0.00	14.00	0.00	0.00
LIMESTONE	14.61	0.00	0.00	0.00	0.00	0.00	14.61	0.00	729.73	0.00	729.73	0.00	0.00
CLAY	0.65		0.00		0.00	0.00	0.65	0.00	37.26	0.00	37.26	0.00	0.00
BEE	8.56		0.00		15.05	0.00	23.61	0.00	62.99	0.00	11,854.39	0.05	0.05
MARTIN	1.23		0.00		48.94	0.00	50.17	0.00	62.30	0.00	1,142.79	0.01	0.01
GONZALES	0.54		0.00		3.76	0.00	4.30	0.00	17.28	0.00	2,965.13	0.01	0.01
BURLESON	9.91		0.00		0.00	0.00	9.91	0.00	73.03	0.00	73.03	0.00	0.00
KARNES	12.48		0.00		0.00	0.00	12.48	0.00	409.93	0.00	409.93	0.00	0.00
KLEBERG	17.21		64.11		0.00	0.00	81.32	0.00	60.12	0.00	60.12	0.00	0.00
BREWSTER	9.69		7.24		8.28	0.00	25.21	0.00	520.07	0.00	2,097.25	0.01	0.01
WINKLER	0.61		0.00		9.39	0.00	10.01	0.00	31.15	0.00	281.22	0.00	0.00
FRANKLIN	1.30		0.00		0.00	0.00	1.30	0.00	53.70	0.00	53.70	0.00	0.00
YOUNG	3.10	0.26	0.00	0.81	1.43	0.22	4.53	1.29	153.39	0.00	1,273.58	0.01	1.30
HOUSTON	5.69		0.00		0.00	0.00	5.69	0.00	53.71	0.00	53.71	0.00	0.00
SCURRY	60.51		150.31		0.00	0.00	210.82	0.00	5,249.61	0.02	5,249.61	0.02	0.02
BOSQUE	1.69	0.08	0.00	0.25	0.00	0.07	1.69	0.40	84.20	0.00	84.20	0.00	0.40
COMANCHE	0.00		0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BRISCOE	4.13		0.00		0.00	0.00	4.13	0.00	416.53	0.00	416.53	0.00	0.00
CONCHO	0.65		0.00		0.00	0.00	0.65	0.00	27.71	0.00	27.71	0.00	0.00
ZAVALA	3.26		0.00		0.00	0.00	3.26	0.00	73.80	0.00	73.80	0.00	0.00
NOLAN	0.00	0.01	0.00	0.05	10.16	0.01	10.16	0.08	0.00	0.00	7,959.20	0.04	0.12
BROOKS	0.00		0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ROBERTSON	6.31	0.18	0.00	0.39	0.00	0.14	6.31	0.71	46.47	0.00	46.47	0.00	0.71
LIVE OAK	1.98		0.00		22.47	0.00	24.46	0.00	10.91	0.00	17,120.96	0.08	0.08
HAMILTON	0.56		0.00		0.00	0.00	0.56	0.00	28.07	0.00	28.07	0.00	0.00
JONES	0.00		0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
REAGAN	2.42		0.00		0.00	0.00	2.42	0.00	125.41	0.00	125.41	0.00	0.00
WARD	7.38	0.09	0.00	0.36	0.00	0.08	7.38	0.54	373.81	0.00	373.81	0.00	0.54
RED RIVER	5.73		0.00		0.00	0.00	5.73	0.00	54.10	0.00	54.10	0.00	0.00
HASKELL	1.24		0.00		0.00	0.00	1.24	0.00	61.36	0.00	61.36	0.00	0.00
HOWARD	3.07	0.06	0.00	0.24	23.46	0.05	26.53	0.35	155.75	0.00	17,862.27	0.08	0.43
SAN SABA	0.00		0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
JACK	3.72	0.11	0.00	0.35	15.65	0.09	19.38	0.56	184.07	0.00	12,447.13	0.06	0.62
STEPHENS	1.24		0.00		0.00	0.00	1.24	0.00	61.36	0.00	61.36	0.00	0.00
RUNNELS	1.29		0.00		0.00	0.00	1.29	0.00	55.42	0.00	55.42	0.00	0.00
REEVES	0.61		0.00		3.76	0.00	4.38	0.00	31.15	0.00	2,979.00	0.01	0.01
DE WITT	3.81		0.00		0.00	0.00	3.81	0.00	28.00	0.00	28.00	0.00	0.00
CHILDRESS	0.00		0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CROSBY	7.41		0.00		0.00	0.00	7.41	0.00	214.60	0.00	214.60	0.00	0.00
DAWSON	2.52		0.00		12.47	0.00	14.99	0.00	73.06	0.00	1,820.22	0.01	0.01
MITCHELL	0.00	0.01	0.00	0.06	0.00	0.01	0.00	0.08	0.00	0.00	0.00	0.00	0.08
WILBARGER	0.00	0.67	0.00	2.05	0.26	0.54	0.26	3.26	0.00	0.00	206.35	0.00	3.26
COLEMAN	0.62		0.00		0.00	0.00	0.62	0.00	30.87	0.00	30.87	0.00	0.00
UPTON	0.61	0.00	0.00	0.00	15.80	0.00	16.41	0.01	31.35	0.00	12,412.32	0.06	0.06
COKE	1.29	0.00	0.00	0.00	0.00	0.00	1.29	0.00	55.77	0.00	55.77	0.00	0.00
CROCKETT	12.28		0.00		0.00	0.00	12.28	0.00	526.45	0.00	526.45	0.00	0.00
HARDEMAN	0.00		0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BANDERA	0.54		0.00		0.00	0.00	0.54	0.00	17.08	0.00	17.08	0.00	0.00
BAYLOR	0.00		0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
COTTLE	0.00		0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CRANE	0.00		0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
DELTA	1.30		0.00		0.00	0.00	1.30	0.00	53.70	0.00	53.70	0.00	0.00
DICKENS	0.00		0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
DUVAL	0.00		0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EASTLAND	1.24		0.00		0.00	0.00	1.24	0.00	61.36	0.00	61.36	0.00	0.00
EDWARDS	0.00		0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FISHER	0.00		0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FOARD	0.00		0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GLASSCOCK	0.00		0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GOLIAD	0.00		0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
HALL	0.00		0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
HUDSPETH	0.00		0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
IRION	0.00		0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
JEFF DAVIS	0.00		0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
KENEDY	0.00		0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
KENT	0.00		0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
KING	0.00		0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
KINNEY	0.00		0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
KNOX	0.00		0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LA SALLE	3.26		0.00		0.00	0.00	3.26	0.00	73.80	0.00	73.80	0.00	0.00
LEON	0.00		0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LOVING	0.00		0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MENARD	0.00		0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MILLS	0.00		0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MONTAGUE	0.65		0.00		0.00	0.00	0.65	0.00	26.64	0.00	26.64	0.00	0.00
MOTLEY	0.00		0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
REAL	0.00		0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SCHLEICHER	1.29		0.00		47.02	0.00	48.31	0.00	55.42	0.00	1,093.53	0.01	0.01
SHACKELFORD	0.00		0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
STARR	0.00		0.00		5.50	0.00	5.50	0.00	0.00	0.00	146.38	0.00	0.00
STERLING	0.00		0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
STONEWALL	0.00		0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SUTTON	0.00		0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TERRELL	0.00		0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
THROCKMORTON	0.00		0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ZAPATA	0.00		0.00		2.38	0.00	2.38	0.00	0.00	0.00	45.90	0.00	0.00
TOTAL	**49,361.19**	**9.89**	**91,045.38**	**21.18**	**33,117.61**	**7.05**	**173,524.18**	**38.12**	**1,950,386.00**	**8.97**	**7,868,235.16**	**36.19**	**74.31**



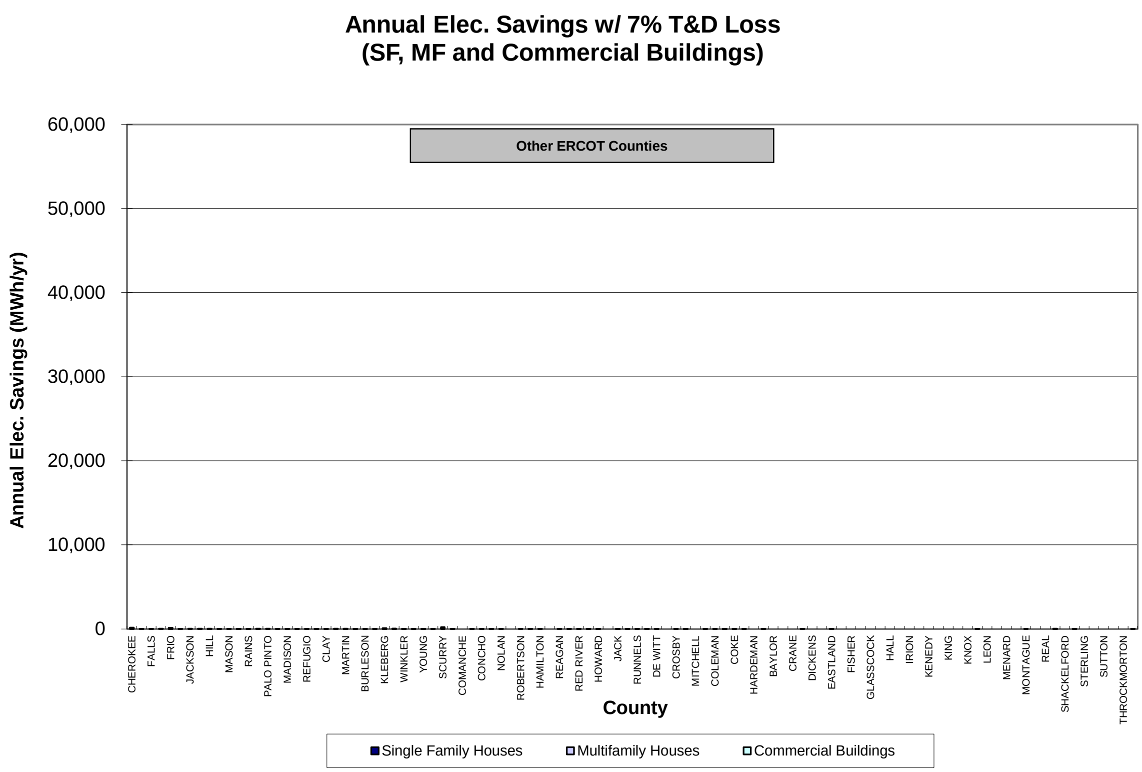


Figure 72: 2011 Annual Electricity Reductions from the 2006 IECC for Single-family and Multi-family Residences and the ASHRAE Standard 90.1-2007 for Commercial Buildings by County

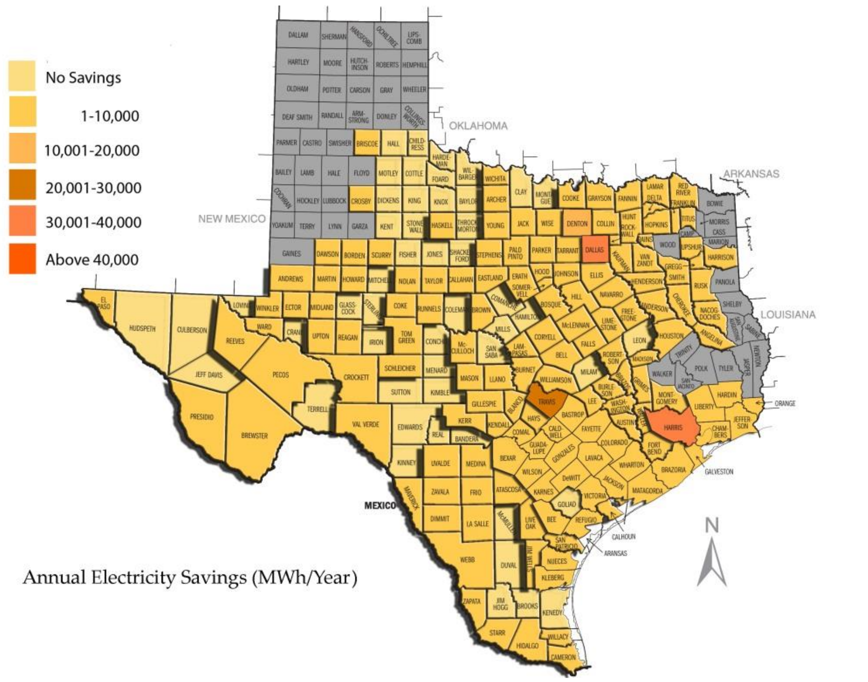
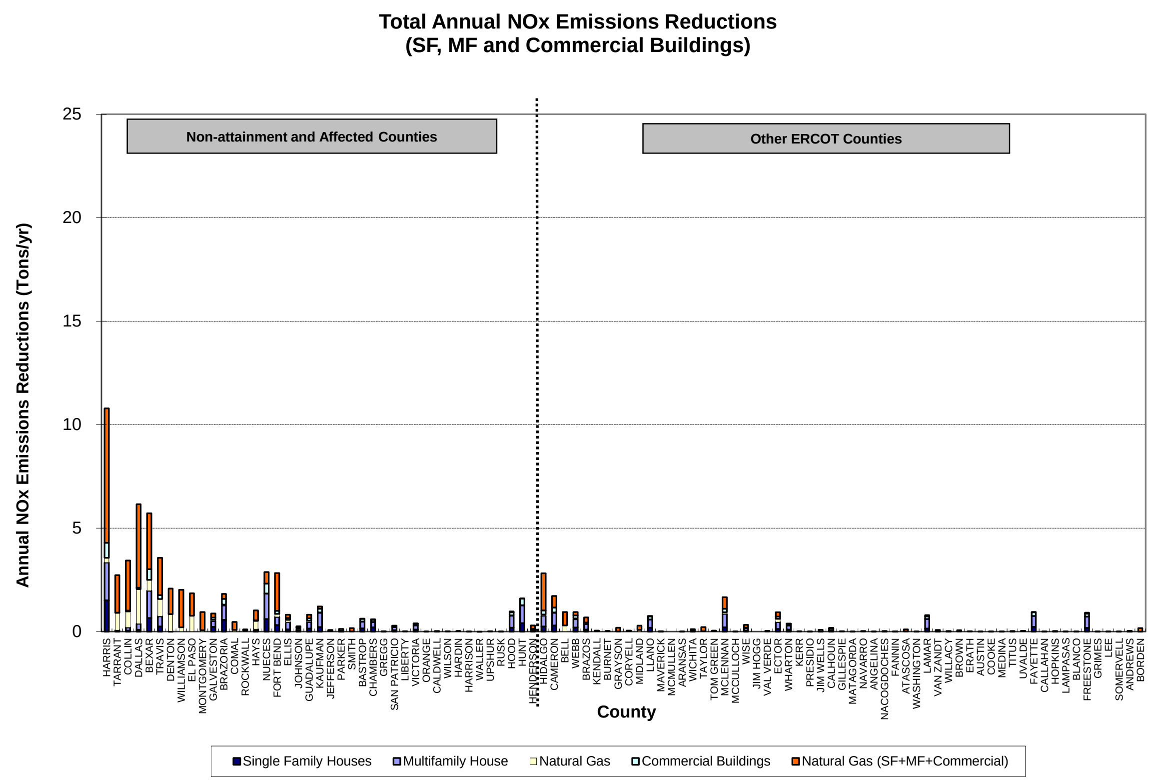


Figure 73: 2011 Annual Electricity Reductions from the 2006 IECC for Single-family and Multi-family Residences and the ASHRAE Standard 90.1-2007 for Commercial Buildings by County



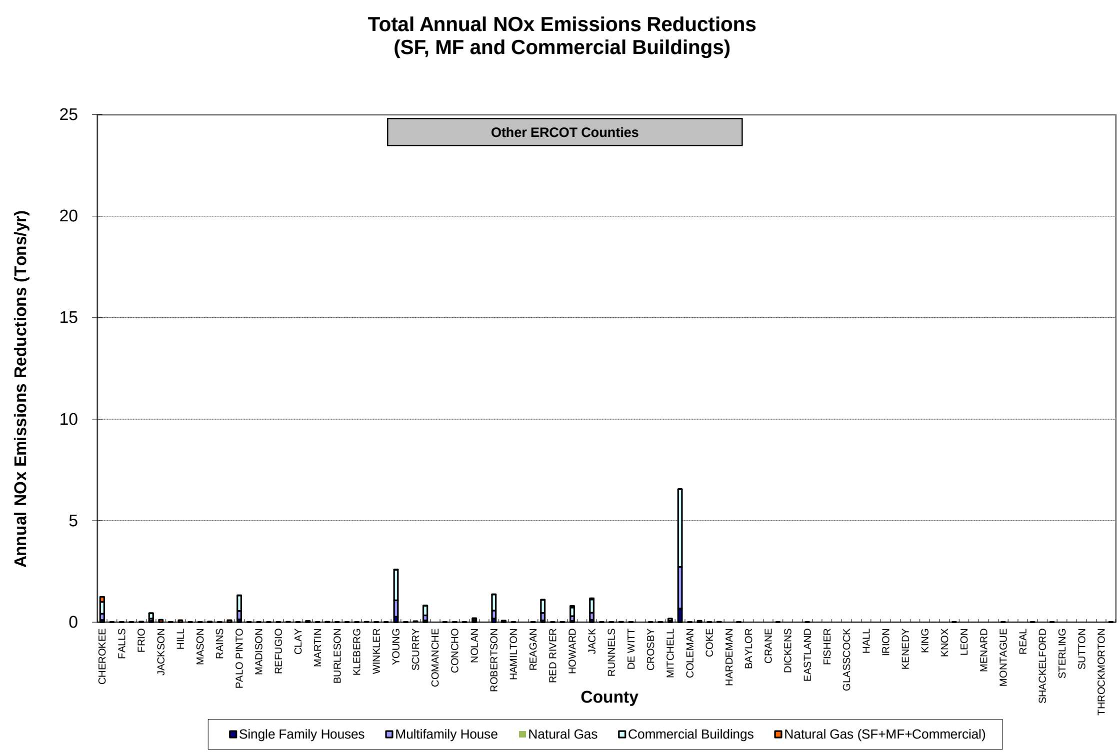


Figure 74: 2011 Annual NOx Reductions from Electricity and Natural Gas Savings Due to the 2006 IECC for Single-family and Multi-family Residences and the ASHRAE Standard 90.1-2007 for Commercial Buildings by County (using 2010 eGRID)

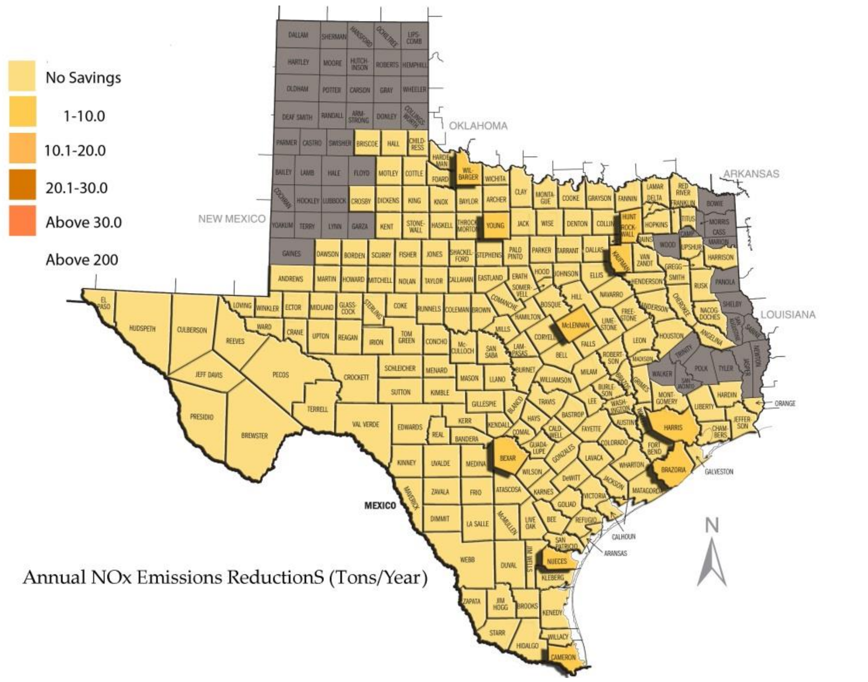


Figure 75: 2011 Annual NOx Reductions from Electricity and Natural Gas Savings Due to the 2006 IECC for Single-family and Multi-family Residences and the ASHRAE Standard 90.1-2007 for Commercial Buildings by County (using 2010 eGRID)

8 Verification of the IC3 software, AIM program and: eCALC calculator.

As part of the analysis effort, verification and validation efforts are carried out for each of the major analysis areas of the TERP activities., which could comprise on-site inspections, weather files update and calibrated simulations Next most siginificant activites complete in the solar Test Bench are reported, which record the weather that isuse to validat and develop calibrated simulations.

8.1 Solar Test Bench

This section introduces the activities that were carried out to adjust, maintain and retrofit the STB during the calendar year of 2011. Several new sensors were purchased and installed on the STB, as additions or to replace older sensors. STB website was changed and improved according to the new instruments specifications.

8.1.1 Solar Test Bench Setup

The 2011 status of the STB setup, which in general has been kept as in the previous year and described in detail in the previous annual report[83] is presented, including the updated instrument list. Figure 76 shows a global overview of the STB operation, the schematic diagram includes three main clusters, one at roof of Langford Architecture Center Building A, another at the mechanical room and other in an ESL office. The structure that withholds all of the sensors and instruments is located on the roof of Architecture building. The outputs of the sensors attached to the structure are sent by corresponding wires to the mechanical room, where the data logger sub-assembly is located. The collected data is downloaded at ESL and the pertinent data descriptive and QC plots are displayed on a webpage.

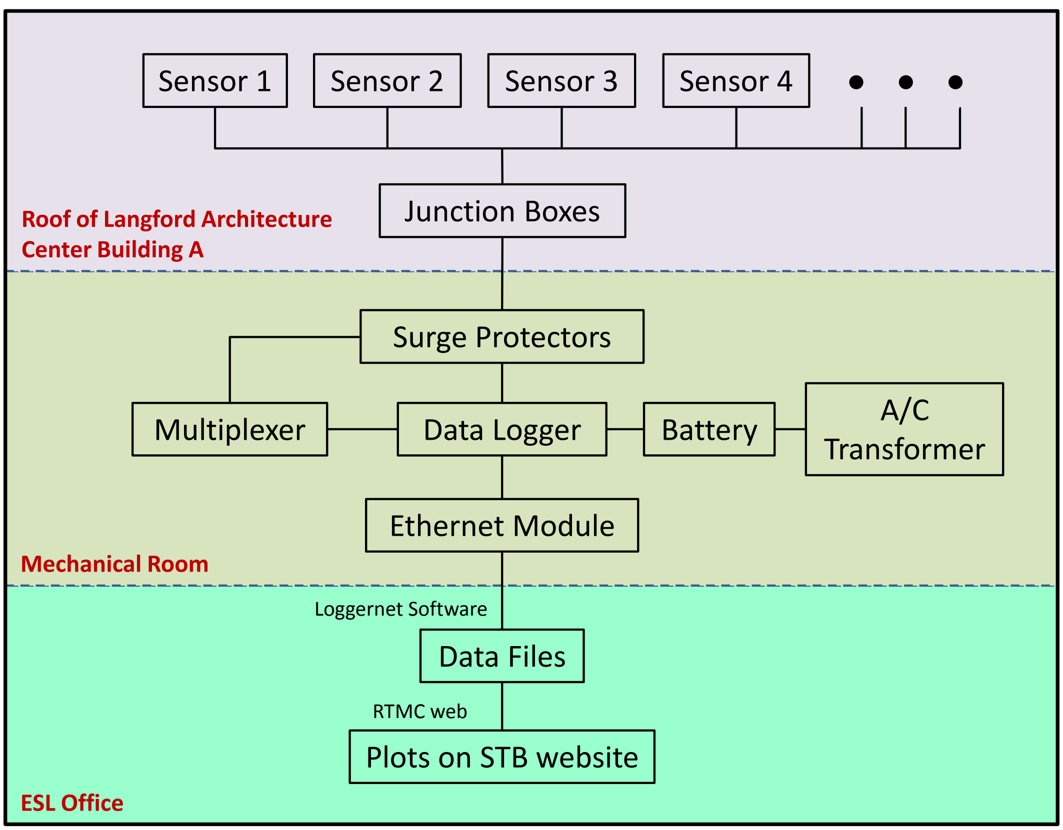


Figure 76. Overview of the schematic diagram of STB setup

8.1.1.1 The Roof Cluster:

The solar test bench at the roof of Langford Architecture Center Building A is the physical structure holding all the solar and metereological instruments. The bench provides the necessary power supply and lightening protection, and allows the organization of the cables through junction boxes. The junction boxes contain the switches that join the cables that send the signals to the data logger sub-assembly inside the mechanical room. The cluster on the roof consists of the following:

- Bench structure for instruments
- Meteorological and Solar Radiation sensors and devices
- Signal wires and power cables
- Junction boxes

Figure 77 shows a whole view of the Solar Test Bench (STB) as it was at the end of 2011. The installed sensors are listed in **Error! Reference source not found.**, which includes the name, make, model and serial umber along with the multiplier, offset and units related to each one.

Figure 77. Solar Test Bench at the roof of Langford Architecture Center Building A

Table 60. List of the sensors updated to the end of 2011

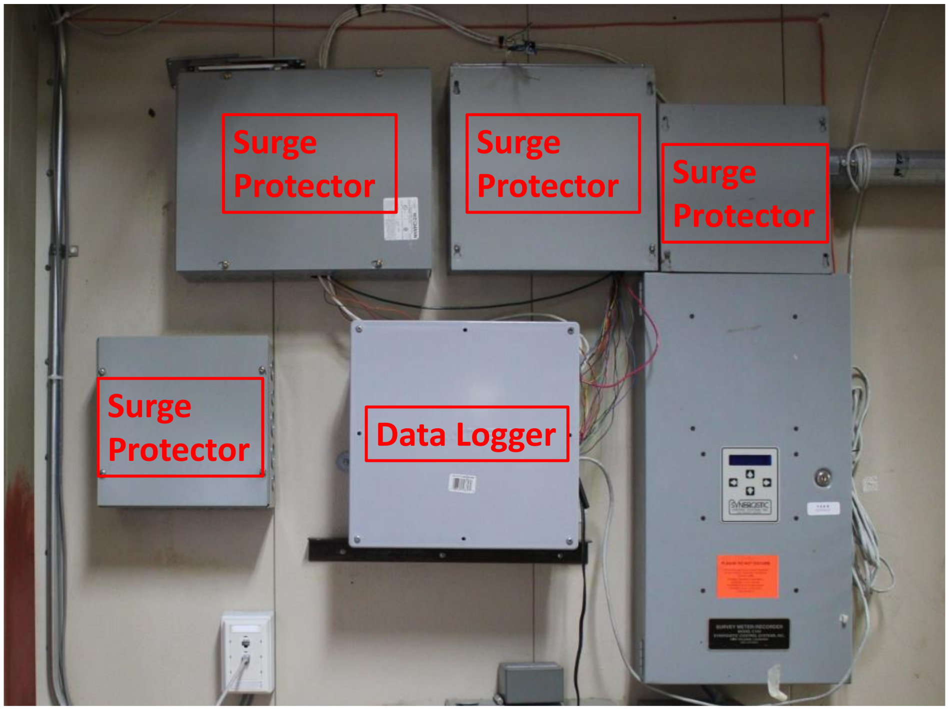
Index Number	Sensor Name	Make	Model	Serial Number	Multiplier	Offset	Unit
1	TOA/RH[1]	Vaisala	HMP45A	D2430006	0.18	-40	° F
					0.10	NA	%
2	TOA/RH[2]	Vaisala	HMP155A	G3220004	0.18	-40	° F
					0.10	NA	%
3	WS/WD[1]	Met One	034B	H4735	1.79	0.629	MPH
					712.00	NA	Degree
4	WS/WD[2]	Met One	034B	M5048	1.79	0.629	MPH
					712.00	NA	Degree
5	LICOR[1]	Licor	Li-cor	PY24908	72.59	NA	W/m^2
6	LICOR[3]	Licor	Li-cor	PY15L25	75.59	NA	W/m^2
7	LICOR[4]	Licor	Li-cor	PY49745	75.03	NA	W/m^2
8	PSP[1]	Eppley	PSP	13673F3	125.63	NA	W/m^2
9	PSP[2]	Eppley	PSP	16881F3	103.09	NA	W/m^2
10	NIP[1]	Eppley	NIP	14851E6	118.06	NA	W/m^2
11	NIP[2]	Eppley	NIP	16620E6	117.79	NA	W/m^2
12	BW[1]	Eppley	8-48	20226	96.99	NA	W/m^2
13	BW[2]	Eppley	8-48	33886	98.62	NA	W/m^2
14	CO2	Telaire	NA	NA	0.97	-123	PPM

8.1.1.2 The Mechanical Room Cluster

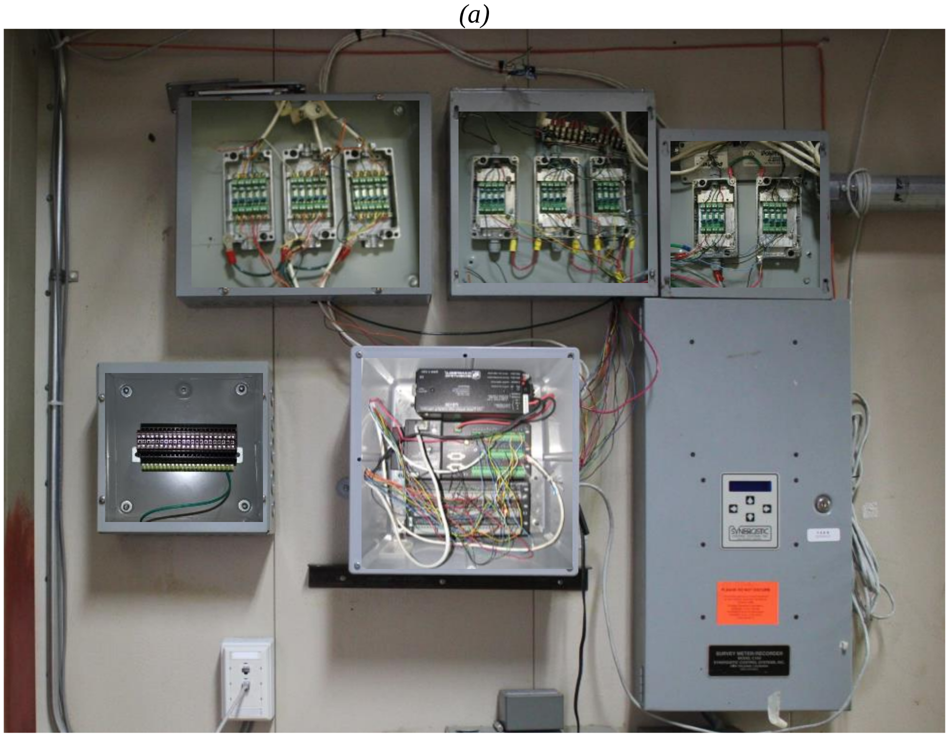
In the mechanical room, the data logger sub-assembly is installed and consists of the following devices/components:

- Surge protectors – Poly Phaser IX-5DC24 and Campbell Scientific SVP48
- Data logger – Campbell Scientific CR1000
- Battery Backup – Campbell Scientific PS100
- Multiplexer – Campbell Scientific AM16/32B
- Ethernet Module – Campbell Scientific NL115

The sensors wiring pass through surge protectors before enter into the data logger. The data logger is powered and battery backed-up by a PS100 power supply. There is a multiplexer connected to the data logger to extend more ports for logging data from more sensors than the actual capacity of data logger alone. The Ethernet module enables communication between the mechanical room cluster and the ESL cluster. The setting of the mechanical room cluster is shown in Figure 78.



(a)



(b)

Figure 78. Instruments/equipment boxes in mechanical room: (a) all boxes are covered; (b) all boxes are opened.

8.1.1.3 The Energy Systems Lab Cluster

The collected data is downloaded to the computer in ESL office automatically as schedule by using the LoggerNet software[84], and the data is stored in a central location and saved in the local drive of the computer. RTMC Pro[85] software is used to access and manage the instantaneous downloaded data which is used to generate different types of plots. Real-time plots are posted on the web pages through RTMC Web[86] software.

8.2 2011 Year Summary of Activities

8.2.1 Data Backup

The data backup process is mainly done to ensure no data lost:

- Windows batch files (*.bat) are created to copy one file from the main location to backup locations. Six windows batch files are used for copying one day, one week and all data to local drive and shared drive, respectively.
- This windows batch file is scheduled to be executed at planned frequency (once in a week/once in 15 mins etc) using loggernet task scheduler.

Every time, a particular windows batch file is executed that copying a specific file from a corresponding location to an assigned location. For instance, backup of 1 day data from the local drive (C:\) to a shared drive (X:\) is shown below.

```
@echo off
:: variables
set drive=x:\Datalogger manuals\Data Backup\last1day
set year=%date:~10,4%
set month=%date:~4,2%
set day=%date:~7,2%
set backupcmd=xcopy /s /c /d /e /h /i /r /k /y
%backupcmd% "C:\Campbellsci\backup\last1day\current
logger_last1day.dat" "%drive%\%year%\%month%\%day%\"
```

"@echo" off is to prevent any of the commands in the batch file from being displayed, just the information needed. "Date:~xx,x" is used to obtain the year, month and day from the current date string in the computer. The first number is the start digital, and the second digital is the number of the digital. "xcopy" is to copy files from one directory to another directory.

The schedule execution is setup in the *Task Master* in Loggernet software (see Figure 79). After entering into *Task Master*, add the tasks and set the base date/time and the execution frequency, as shown in Figure 80.

Table 61 lists all the 6 tasks and their corresponding information.

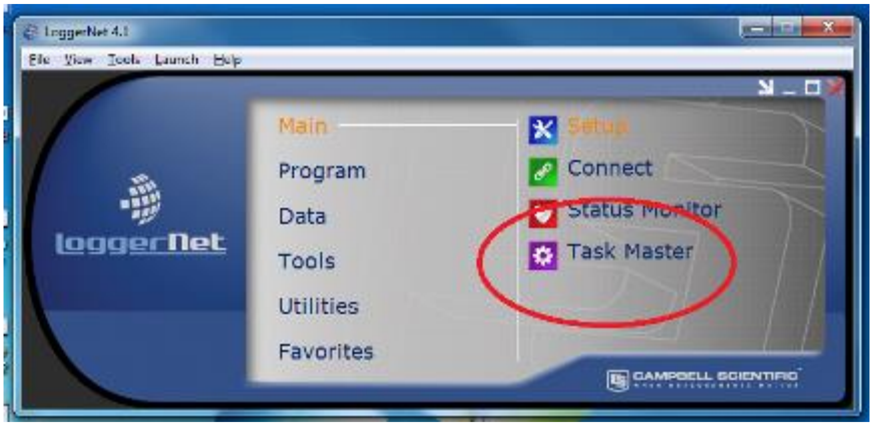


Figure 79. Loggernet software display of the Main window

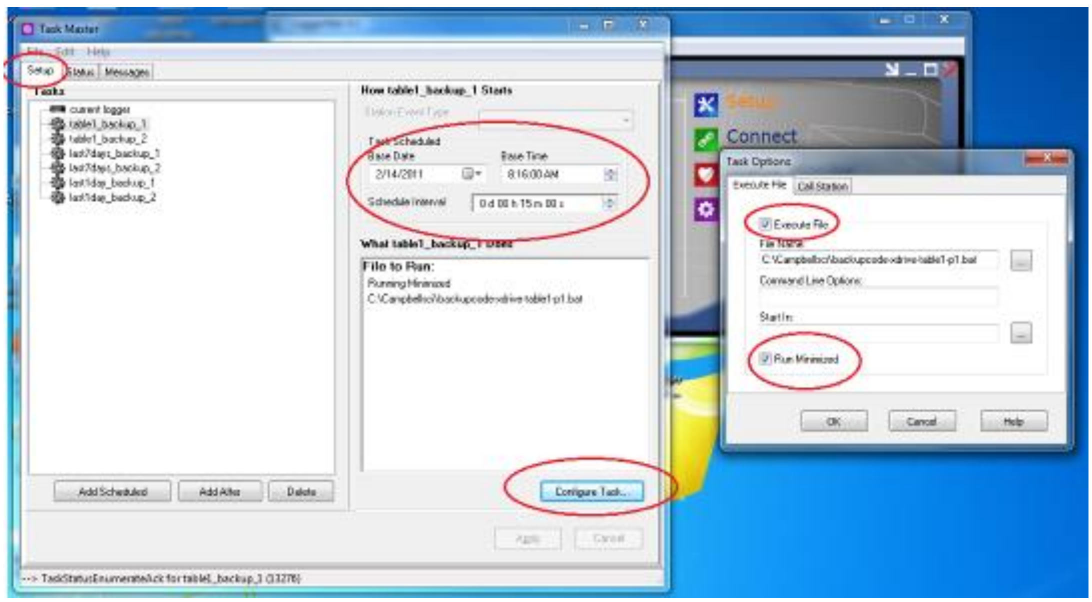


Figure 80. Pop-up window for the schedule setup in Task Master

Table 61. List of the backup files

Task	Task Name in loggernet taskmaster	Name of Batch File	Data File Backedup	Backup Destination
1	table1_backup_1	backupcode-xdrive-table1-p1	table1	Local drive
2	table1_backup_2	backupcode-xdrive-table1-p2	table1	Shared drive
3	last7days_backup_1	backupcode-xdrive-last7days-p1	last7days	Local drive
4	last7days_backup_2	backupcode-xdrive-last7days-p2	last7days	Shared drive
5	last1day_backup_1	backupcode-xdrive-last1day-p1	last1day	Local drive
6	last1day_backup_2	backupcode-xdrive-last1day-p2	last1day	Shared drive

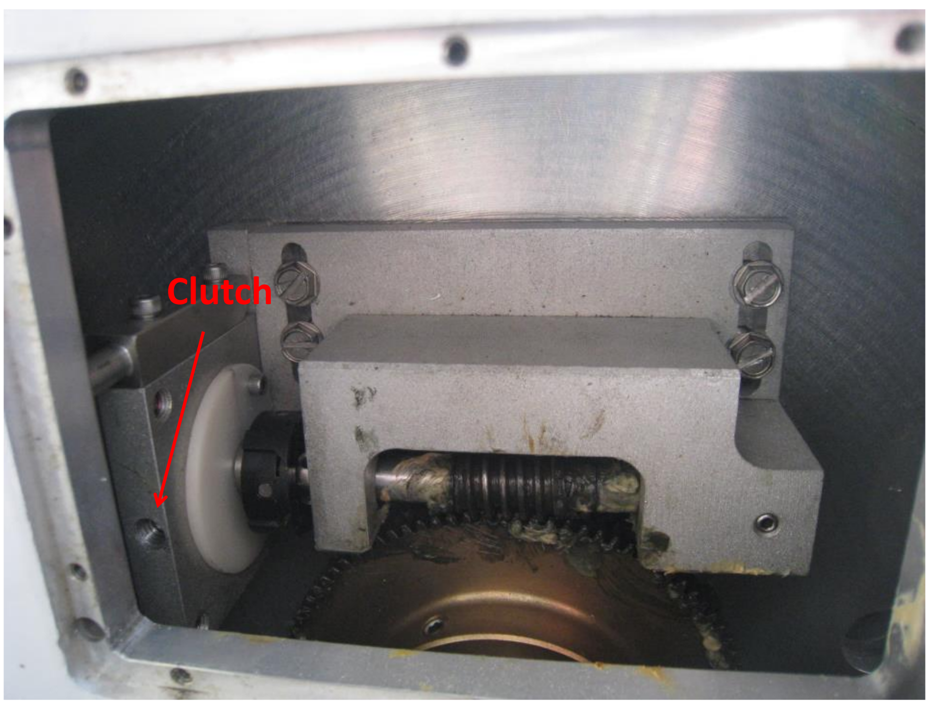
8.2.2 Tracker Problem and its Solution

The solar tracker currently installed on the STB is a model SMT-3 made by Eppley Lab, and its picture is shown in Figure 81. This tracker is programmed to track the sun's position with two axes of freedom. Since the late days of August 2011, during which the voltage of the power supply of Langford Architecture Center Building A is low, the tracker didn't follow the sun correctly and it has to be restarted as this happened. Yet, after the power supply of this building was repaired in September, the tracker could not operate properly. During October, the tracker even failed to reach the correct azimuth when it was set up and could not be aligned. Also, some intermittently sound was heard while the azimuth motor rotates.

Figure 81. Solar tracker SMT-3 installed in the ESL Solar Test Bench

It was found that the reason for the problem is that the clutch was loose for the azimuth motor and that led it to be out of step. The tracker was fixed by using a 1/8'' Allen key to clockwise rotate the clutch, which is pointed out in Figure 82. The top picture shows the gate for the motor at the bottom of the tracker, and the bottom picture shows where to adjust the clutch. The clutch should neither be fastened too tight nor too loose. If it's too tight, the tracker cannot move at all. If it's too loose, the motor is still out of step. Without the experience, the clutch needs to be adjusted several times until the motor can rotate smoothly with no discontinuous sound. The tracker was finally fixed on November 23rd of 2011 and has been working normally afterwards.

(a)

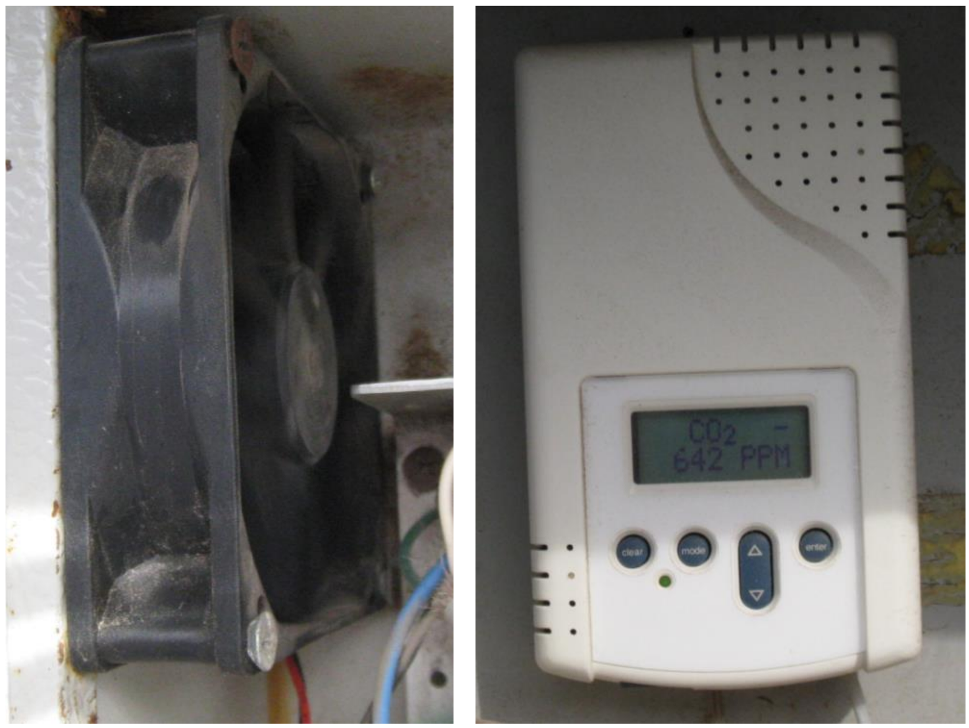


(b)

Figure 82. (a) The bottom of the solar tracker; (b) the view of the opened tracker.

8.2.3 Additional Sensors and Update

A Telaire CO_2 sensor was added to the STB, the sensor is set in a box for protection, and a small fan blows air for ventilation and air circulation aiming to keep the condition inside and outside the box identical. Power (110 VAC) through a circuit board is supplied to the sensor and the fan. The output signal of the sensor is delivered through the circuit board, junction box and surge protector to the data logger in the mechanical room.



(*a*) (*b*)

Figure 83. (a) Small fan for ventilation; (b) Telaire CO2 sensor.

In addition, the replaced sensors during the 2011 calendar year were one wind set and one temperature/relative humidity sensor. The new wind set is the same model as the previous installed sensor, Met One 034B, which both provides wind speed and wind direction measurements. The new temperature/relative humidity sensor is the model HMP155 (see Figure 84) produced by Vaisala. The previous model HMP 45 has been discontinued, and the HMP 155 is a new generation of products with some improvements, such as higher accuracy and wider measurement ranges.

Figure 84. Temperature and relative humidity sensor HMP 155

8.2.4 Surge Protector Installation

All the outputs from the meteorological and radiation sensors pass through surge protectors into the data logger. The surge protectors provide the function to protect the data logger from sudden high voltage into data logger and avoid device damage. The previous surge protector is IX-5DC24 – Poly Phaser make, which can have provision for up to 5 conductors per unit, there are a total of 35 conductors. All the installed surge protectors are used already and if more sensors are installed in the future then more surge protectors will be needed. Thinking ahead in this sense, a different kind of surge voltage protector, Campbell Scientific model SVP48, has been purchased. This surge protector consists of 22 conductors, and is shown in Figure 85.

Figure 85. Campbell Scientific SVP48 surge voltage protector

8.2.5 Second PSP Installation Update

Precision Spectral Pyranometer (PSP) is used to measure global solar radiation, and two of these are installed on the Solar Test Bench, which are shown in Figure 86. PSP[1] is at higher location than PSP[2], and PSP[2] has higher possibility to be affected by the surrounding. Figure 87 shows the comparison of the measured solar radiation recorded by the PSP[1] and the PSP[2]; PSP[1] has always recorded higher solar radiation than PSP[2], and the difference peak at noon of every clear day, with a corresponding value around 80 W/m^2.

In order to exclude surrounding effects, it was planned to install the PSP[2] at the same height and conditions as PSP[1] and a new support for holding it is needed. As proposed, one metal pipe, two half slots, four pipe clamps and one flat plate disc are the basic materials, which were made by the personnel of the machine shop of mechanical engineering department; including sawing the half slots, drill holes on the disc matching the PSP's and solder the pipe with the disc. Parts were assembled and installed on STB, as shown in Figure 88, and the PSP will installed and verified with the PSP[1].

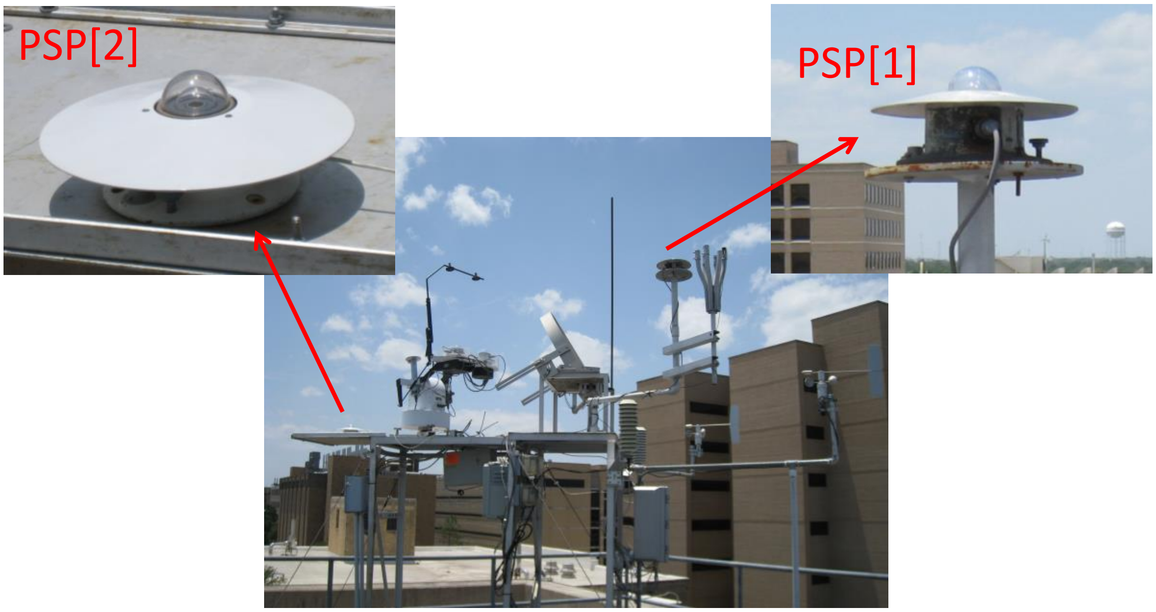


Figure 86. Two PSPs on Solar Test Bench

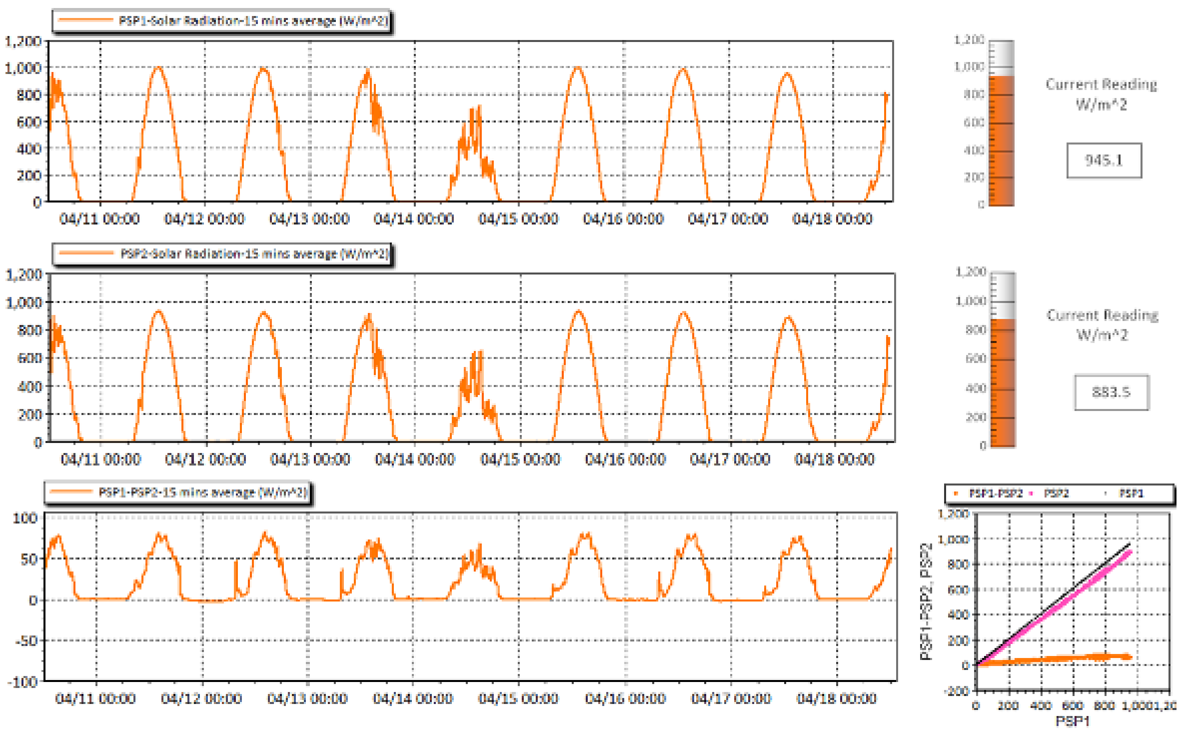


Figure 87. Comparison of the reading between PSP[1] and PSP[2]

Figure 88. Holding seat structure installed for PSP

8.3 Solar test Bench Website

The following figures show the screens developed using RTMC pro and hosted using RTMC web for weekly measurements.

- Figure 89 shows all weather conditions: temperature, relative humidity, wind speed and solar radiation.
- Figure 90 shows the global solar radiation measured from three LICOR sensors.
- Figure 91 shows the global solar radiation measured from two PSP instruments and their comparison.
- Figure 92 shows the normal incidence solar radiation measured from two NIP devices and their comparison.
- Figure 93 shows the diffuse solar radiation measured from two BW pyranometers and their comparison.

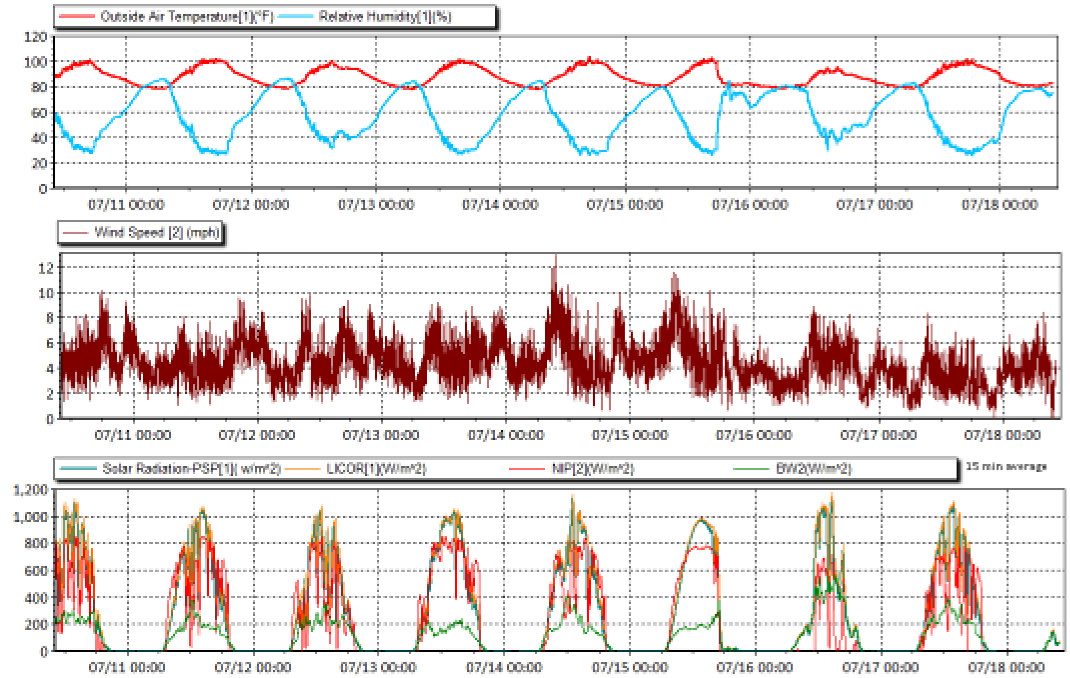


Figure 89. Weekly plot for temperature, relative humidity, wind speed and solar radiation

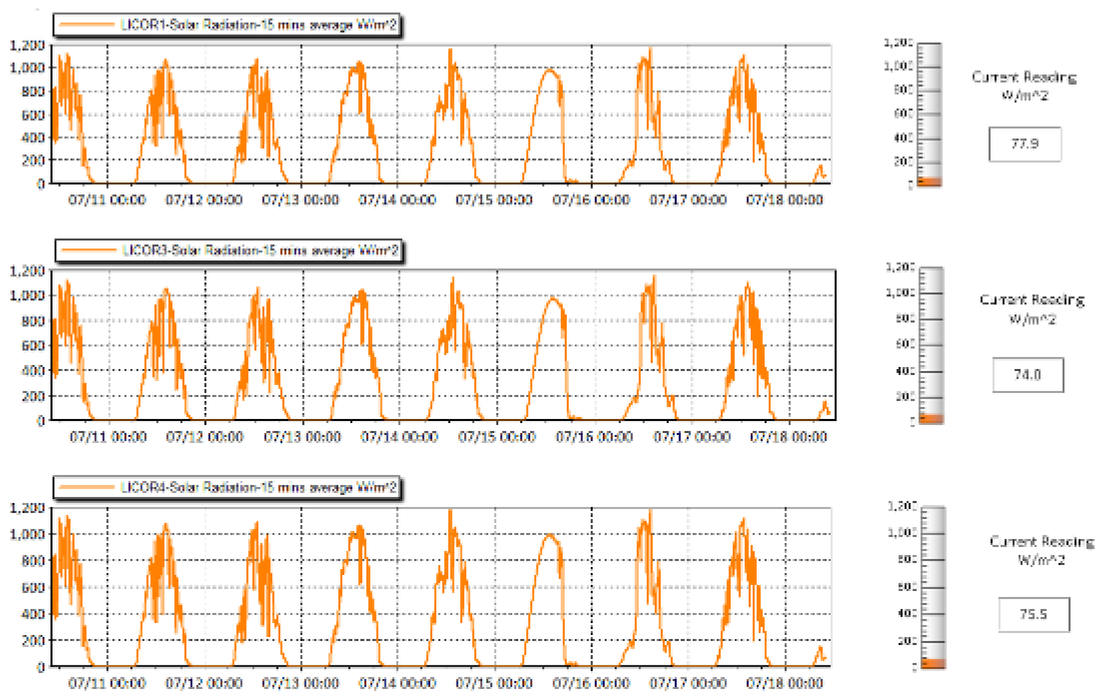


Figure 90. Global solar radiation (LICOR[1], LICOR[3] and LICOR[4])

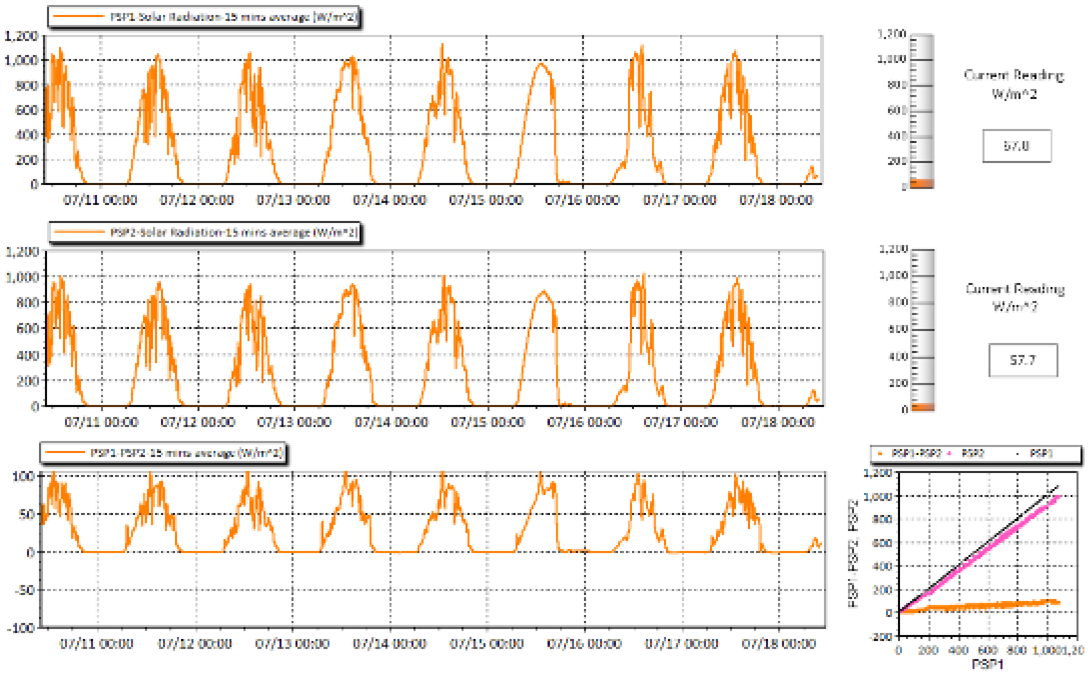


Figure 91. Global solar radiation (PSP[1] and PSP[2])

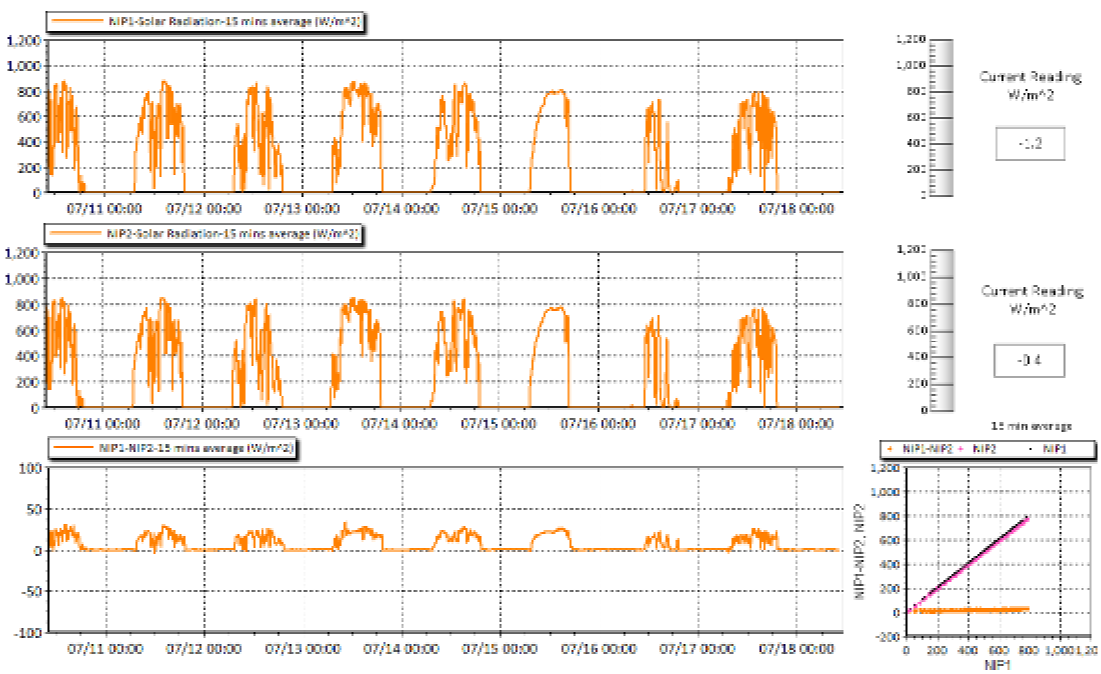


Figure 92. Normal incidence solar radiation (NIP[1] and NIP[2])

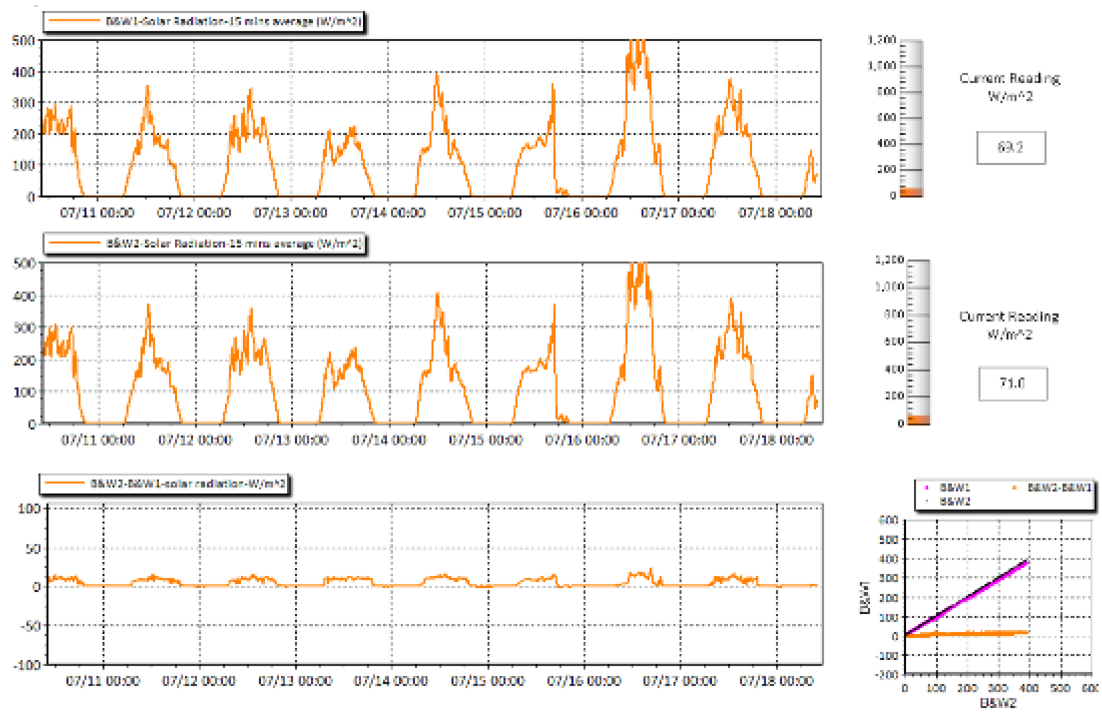


Figure 93. Diffuse solar radiation (BW[1] and BW[2])

8.4 Summary

- The STB system scheme and the list the sensors are updated.
- New sensors were added or replace old ones.
- The data files are backed up as schedule.
- The solar tracker has been fixed.
- New devices and structure were prepared for further sensor installation and cable connections.
- The results on STB website are shown for weekly measurements.

8.5 Future Goals

- Install a new PSP located on the new structure and compare with the existed two PSPs.
- Clean and paint the whole Solar Test Bench structure.
- Organize the wirings in the mechanical room.
- Calibrate sensors.
- Install Multi-Pyranometer Array to calculate normal incident solar radiation.

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