

ENERGY SYSTEMS LABORATORY

Texas Engineering Experiment Station
Texas A&M University System

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College Station, Texas 77843-3581

August 31st, 2007

To: Code Officials, Energy Raters, Manufacturers, State Agency Officials, Stakeholders and Citizens of Texas

Subject: 15% Above-Code Energy Efficiency Measures for Residential Buildings in Texas

In the 79th Legislature (2005) the Energy Systems Laboratory was required to develop three alternative methods for achieving 15% above-code energy savings in new residential, commercial and industrial construction. The Laboratory has worked closely with code officials, energy raters, manufacturers, state officials and other stakeholders to develop cost effective energy efficiency measures.

In the pages that follow, 15% above-code measures for new residential buildings are presented for the 41 non-attainment and affected counties in Texas, separated by climate area. Each page contains a description of the individual measures and combined measures that achieve 15% above-code savings, which are based on the 2001 IECC. These measures include envelope, HVAC systems, and plant equipment. Annual energy savings, estimated costs, simple payback, and NO_x emissions reductions are provided for commercial buildings.

Sincerely,

Jeff S. Haberl, Ph.D., P.E.
Associate Director

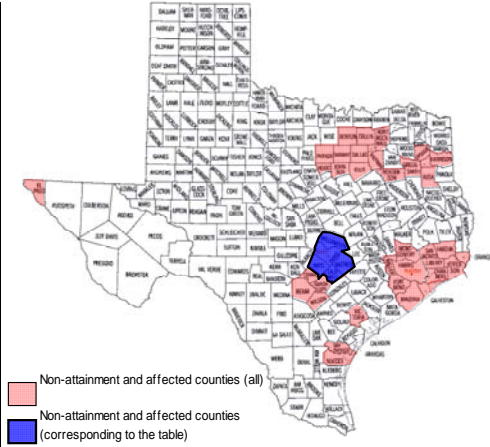
Charles C. Culp, Ph.D., P.E.
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Natural Gas Heating (Bastrop, Caldwell, Hays, Travis and Williamson Counties)

Description of Individual Measures

Individual Measures	Annual Energy Savings (%)	Annual Energy Savings (\$/year) ⁴	Estimated Cost (\$)	
			Marginal Cost ¹	New System Cost ²
A Domestic Hot Water Measures				
1 Tankless Gas Water Heater (without a Standing Pilot Light)	9.0%	\$73	\$1,000 - \$3,500	
2 Solar Domestic Hot Water System	16.9%	\$91		\$2,900 - \$5,200
3 Removal of Pilot Light from Domestic Hot Water System	5.3%	\$43	\$200 - \$600	
B Air Distribution System Measures				
4 Relocate HVAC Unit including Supply and Return Ducts in Conditioned Space	8.4%	\$216	\$1,000 - \$7,000	
5 Improved Duct Sealing (10% to 5% Duct Leakage)	4.1%	\$109		\$450 - \$650
C Envelope and Fenestration Measures				
6 Reduced Air Infiltration (0.46 to 0.35 Air-changes/hr)	2.3%	\$34		\$350 - \$1,500
7 Window Shading (None to 4 ft. Eaves on All Sides)	2.1%	\$139		\$3,100 - \$3,500
8 Window Shading and Redistribution (Equal Windows on All Four Sides with No Shading to 45% Windows on the South with 4ft. Eaves on All Four Sides)	4.0%	\$167		\$3,100 - \$3,500
9 Improved Windows (U-factor: 0.47 to 0.42 Btu/h-sf-F, SHGC: 0.4 to 0.33)	2.6%	\$104	\$800 - \$1,100	
D HVAC System Measures				
10 Air Conditioner (SEER 13 to SEER 15)	2.7%	\$98	\$900 - \$2,500	
11 Furnace (0.78 AFUE to 0.93 AFUE)	2.2%	\$18	\$600 - \$1,500	



Description of Combined Measures to Achieve 15% Above Code Savings

Combination of Measures ³	Combined Energy Savings (%)	Combined Energy Savings (\$/year)	Combined Estimated Cost (\$)		Combined Annual NO _x Emissions Savings (lbs/year)	Combined Ozone Season Period NO _x Emissions Savings (lbs/day)	Simple Estimated Payback (yrs)
			Marginal Cost ¹	New System Cost ²			
Combination 1							
1 Tankless Gas Water Heater (without a Standing Pilot Light)	17.4%	\$289	\$1,000 - \$3,500		2.83	0.016	6.9 - 36.4
4 Relocate HVAC Unit including Supply and Return Ducts in Conditioned Space			\$1,000 - \$7,000				
Combination 2							
2 Solar Domestic Hot Water System	21.0%	\$201		\$2,900 - \$5,200	1.10	0.010	16.7 - 29.2
5 Improved Duct Sealing (10% to 5% Duct Leakage)				\$450 - \$650			
Combination 3							
3 Removal of Pilot Light from Domestic Hot Water System	16.9%	\$393	\$200 - \$600		3.92	0.023	10.9 - 28.2
4 Relocate HVAC Unit including Supply and Return Ducts in Conditioned Space			\$1,000 - \$7,000				
8 Window Shading and Redistribution (Equal Windows on All Four Sides with No Shading to 45% Windows on the South with 4ft. Eaves on All Four Sides)				\$3,100 - \$3,500			

Note:

- Marginal cost = new system cost - original system cost
- New system cost = new system cost only
- See individual measures above for specific savings
 - * Energy Cost: Electricity cost = \$0.15/kWh
 - Natural gas cost = \$1.00/therm
- Savings depend on fuel mix used. See detailed writeup

(Building Description)

- * Building type: Residential
- * Gross area: 2,323 sq-ft.
- * Building dimension: 48.2ft x 48.2ft x 8ft (WxLxH)
- * Number of floors: 1
- * Floor-to-floor height: 8ft
- * Window-to-wall ratio: 18%

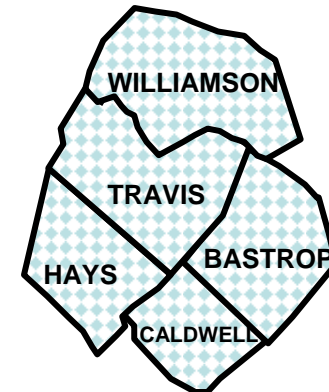


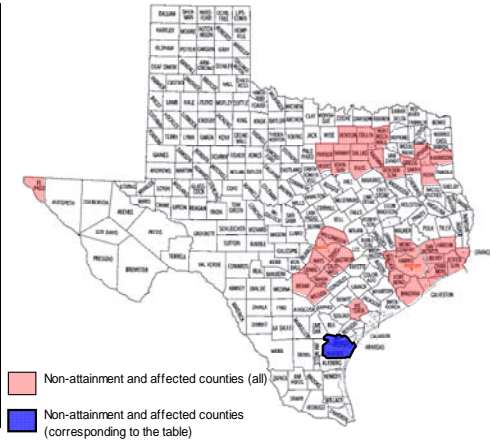
Table 1a: 15% Above Code Savings (Residential – Natural Gas Heating) for Bastrop, Caldwell, Hays, Travis and Williamson Counties



Natural Gas Heating (Nueces and San Patricio Counties)

Description of Individual Measures

Individual Measures	Annual Energy Savings (%)	Annual Energy Savings (\$/year) ⁴	Estimated Cost (\$)	
			Marginal Cost ¹	New System Cost ²
A Domestic Hot Water Measures				
1 Tankless Gas Water Heater (without a Standing Pilot Light)	9.0%	\$69	\$1,000 - \$3,500	
2 Solar Domestic Hot Water System	14.8%	\$67		\$2,900 - \$5,200
3 Removal of Pilot Light from Domestic Hot Water System	5.7%	\$43	\$200 - \$600	
B Air Distribution System Measures				
4 Relocate HVAC Unit including Supply and Return Ducts in Conditioned Space	9.3%	\$293	\$1,000 - \$7,000	
5 Improved Duct Sealing (10% to 5% Duct Leakage)	5.0%	\$160		\$450 - \$650
C Envelope and Fenestration Measures				
6 Reduced Air Infiltration (0.49 to 0.35 Air-changes/hr)	2.5%	\$58		\$350 - \$1,500
7 Window Shading (None to 4 ft. Eaves on All Sides)	3.8%	\$154		\$3,100 - \$3,500
8 Window Shading and Redistribution (Equal Windows on All Four Sides with No Shading to 45% Windows on the South with 4ft. Eaves on All Four Sides)	4.9%	\$175		\$3,100 - \$3,500
9 Improved Windows (U-factor: 0.47 to 0.42 Btu/h-sf-F, SHGC: 0.4 to 0.33)	3.3%	\$113	\$800 - \$1,100	
D HVAC System Measures				
10 Air Conditioner (SEER 13 to SEER 15)	3.6%	\$123	\$900 - \$2,500	
11 Furnace (0.78 AFUE to 0.93 AFUE)	0.6%	\$5	\$600 - \$1,500	



Description of Combined Measures to Achieve 15% Above Code Savings

Combination of Measures ³	Combined Energy Savings (%)	Combined Energy Savings (\$/year)	Combined Estimated Cost (\$)		Combined Annual NO _x Emissions Savings (lbs/year)	Combined Ozone Season Period NO _x Emissions Savings (lbs/day)	Simple Estimated Payback (yrs)
			Marginal Cost ¹	New System Cost ²			
Combination 1							
1 Tankless Gas Water Heater (without a Standing Pilot Light)	18.3%	\$362	\$1,000 - \$3,500		2.84	0.016	5.5 - 29.0
4 Relocate HVAC Unit including Supply and Return Ducts in Conditioned Space			\$1,000 - \$7,000				
Combination 2							
2 Solar Domestic Hot Water System	22.9%	\$329		\$2,900 - \$5,200	1.97	0.015	12.9 - 25.3
5 Improved Duct Sealing (10% to 5% Duct Leakage)				\$450 - \$650			
10 Air Conditioner (SEER 13 to SEER 15)				\$900 - \$2,500			
Combination 3							
3 Removal of Pilot Light from Domestic Hot Water System	16.8%	\$378	\$200 - \$600		2.93	0.018	4.1 - 24.1
4 Relocate HVAC Unit including Supply and Return Ducts in Conditioned Space			\$1,000 - \$7,000				
6 Reduced Air Infiltration (0.49 to 0.35 Air-changes/hr)				\$350 - \$1,500			

Note:

1. Marginal cost = new system cost - original system cost
2. New system cost = new system cost only
3. See individual measures above for specific savings
 - * Energy Cost: Electricity cost = \$0.15/kWh
 - Natural gas cost = \$1.00/therm
4. Savings depend on fuel mix used. See detailed writeup

(Building Description)

- * Building type: Residential
- * Gross area: 2,323 sq-ft.
- * Building dimension: 48.2ft x 48.2ft x 8ft (WxLxH)
- * Number of floors: 1
- * Floor-to-floor height: 8ft
- * Window-to-wall ratio: 18%



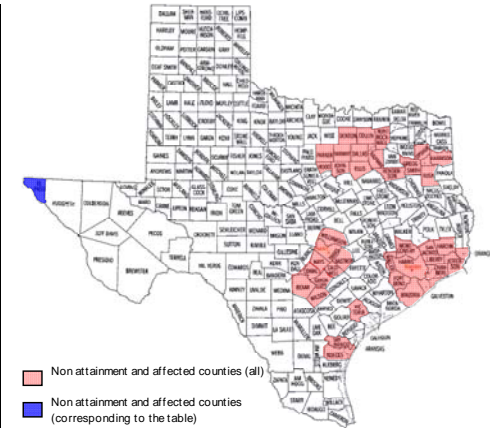
Table 2a: 15% Above Code Savings (Residential – Natural Gas Heating) for Nueces and San Patricio Counties



Natural Gas Heating (El Paso)

Description of Individual Measures

Individual Measures	Annual Energy Savings (%)	Annual Energy Savings (\$/year) ⁴	Estimated Cost (\$)	
			Marginal Cost ¹	New System Cost ²
A Domestic Hot Water Measures				
1 Tankless Gas Water Heater (without a Standing Pilot Light)	10.3%	\$79	\$1,000 - \$3,500	
2 Solar Domestic Hot Water System	23.0%	\$130		\$2,900 - \$5,200
3 Removal of Pilot Light from Domestic Hot Water System	5.7%	\$44	\$200 - \$600	
B Air Distribution System Measures				
4 Relocate HVAC Unit including Supply and Return Ducts in Conditioned Space	5.2%	\$104	\$1,000 - \$7,000	
5 Improved Duct Sealing (10% to 5% Duct Leakage)	2.3%	\$46		\$450 - \$650
C Envelope and Fenestration Measures				
6 Reduced Air Infiltration (0.43 to 0.35 Air-changes/hr)	1.4%	\$12		\$350 - \$1,500
7 Window Shading (None to 4 ft. Eaves on All Sides)	1.0%	\$121		\$3,100 - \$3,500
8 Window Shading and Redistribution (Equal Windows on All Four Sides with No Shading to 45% Windows on the South with 4ft. Eaves on All Four Sides)	4.2%	\$165		\$3,100 - \$3,500
9 Improved Windows (U-factor: 0.44 to 0.42 Btu/h-sf-F, SHGC: 0.4 to 0.33)	0.1%	\$75	\$800 - \$1,100	
D HVAC System Measures				
10 Air Conditioner (SEER 13 to SEER 15)	2.1%	\$72	\$900 - \$2,500	
11 Furnace (0.78 AFUE to 0.93 AFUE)	2.0%	\$15	\$600 - \$1,500	



Description of Combined Measures to Achieve 15% Above Code Savings

Combination of Measures ³	Combined Energy Savings (%)	Combined Energy Savings (\$/year)	Combined Estimated Cost (\$)		Combined Annual NO _x Emissions Savings (lbs/year)	Combined Ozone Season Period NO _x Emissions Savings (lbs/day)	Simple Estimated Payback (yrs)	
			Marginal Cost ¹	New System Cost ²				
Combination 1								
1 Tankless Gas Water Heater (without a Standing Pilot Light)	15.5%	\$183	\$1,000 - \$3,500		0.92	0.002	10.9 - 57.3	
4 Relocate HVAC Unit including Supply and Return Ducts in Conditioned Space			\$1,000 - \$7,000					
Combination 2								
2 Solar Domestic Hot Water System	23.0%	\$130		\$2,900 - \$5,200	0.00	0.005	25.7 - 44.9	
5 Improved Duct Sealing (10% to 5% Duct Leakage)				\$450 - \$650				
Combination 3								
3 Removal of Pilot Light from Domestic Hot Water System	17.1%	\$349	\$200 - \$600		0.62	0.001	15.9 - 43.3	
4 Relocate HVAC Unit including Supply and Return Ducts in Conditioned Space			\$1,000 - \$7,000					
6 Reduced Air Infiltration (0.43 to 0.35 Air-changes/hr)				\$350 - \$1,500				
8 Window Shading and Redistribution (Equal Windows on All Four Sides with No Shading to 45% Windows on the South with 4ft. Eaves on All Four Sides)				\$3,100 - \$3,500				
10 Air Conditioner (SEER 13 to SEER 15)			\$900 - \$2,500					

Note:

- Marginal cost = new system cost - original system cost
- New system cost = new system cost only
- See individual measures above for specific savings
 - * Energy Cost: Electricity cost = \$0.15/kWh
 - Natural gas cost = \$1.00/therm
- Savings depend on fuel mix used. See detailed writeup

(Building Description)

- * Building type: Residential
- * Gross area: 2,323 sq-ft.
- * Building dimension: 48.2ft x 48.2ft x 8ft (WxLxH)
- * Number of floors: 1
- * Floor-to-floor height: 8ft
- * Window-to-wall ratio: 18%



Table 3a: 15% Above Code Savings (Residential – Natural Gas Heating) for El Paso County

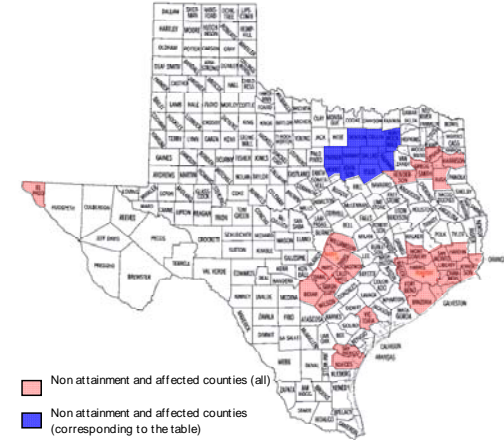


Natural Gas Heating (Collin, Dallas, Denton, Ellis, Hood, Hunt, Johnson, Kaufman, Parker, Rockwall and Tarrant Counties)

ESL-TR-07-08-02

Description of Individual Measures

Individual Measures	Annual Energy Savings (%)	Annual Energy Savings (\$/year) ⁴	Estimated Cost (\$)	
			Marginal Cost ¹	New System Cost ²
A Domestic Hot Water Measures				
1 Tankless Gas Water Heater (without a Standing Pilot Light)	8.8%	\$78	\$1,000 - \$3,500	
2 Solar Domestic Hot Water System	16.7%	\$100		\$2,900 - \$5,200
3 Removal of Pilot Light from Domestic Hot Water System	4.9%	\$43	\$200 - \$600	
B Air Distribution System Measures				
4 Relocate HVAC Unit including Supply and Return Ducts in Conditioned Space	9.0%	\$208	\$1,000 - \$7,000	
5 Improved Duct Sealing (10% to 5% Duct Leakage)	4.4%	\$105		\$450 - \$650
C Envelope and Fenestration Measures				
6 Reduced Air Infiltration (0.51 to 0.35 Air-changes/hr)	4.1%	\$54		\$350 - \$1,500
7 Window Shading (None to 4 ft. Eaves on All Sides)	0.3%	\$112		\$3,100 - \$3,500
8 Window Shading and Redistribution (Equal Windows on All Four Sides with No Shading to 45% Windows on the South with 4ft. Eaves on All Four Sides)	3.2%	\$155		\$3,100 - \$3,500
9 Improved Windows (U-factor: 0.47 to 0.42 Btu/h-sf-F, SHGC: 0.4 to 0.33)	1.6%	\$88	\$800 - \$1,100	
D HVAC System Measures				
10 Air Conditioner (SEER 13 to SEER 15)	2.2%	\$84	\$900 - \$2,500	
11 Furnace (0.78 AFUE to 0.93 AFUE)	3.4%	\$30	\$600 - \$1,500	



Description of Combined Measures to Achieve 15% Above Code Savings

Combination of Measures ³	Combined Energy Savings (%)	Combined Energy Savings (\$/year)	Combined Estimated Cost (\$)		Combined Annual NO _x Emissions Savings (lbs/year)	Combined Ozone Season Period NO _x Emissions Savings (lbs/day)	Simple Estimated Payback (yrs)
			Marginal Cost ¹	New System Cost ²			
Combination 1							
1 Tankless Gas Water Heater (without a Standing Pilot Light)	17.8%	\$286	\$1,000 - \$3,500		2.79	0.017	7.0 - 36.8
4 Relocate HVAC Unit including Supply and Return Ducts in Conditioned Space			\$1,000 - \$7,000				
Combination 2							
2 Solar Domestic Hot Water System	21.2%	\$205		\$2,900 - \$5,200	1.05	0.010	16.3 - 28.5
5 Improved Duct Sealing (10% to 5% Duct Leakage)				\$450 - \$650			
Combination 3							
3 Removal of Pilot Light from Domestic Hot Water System	17.1%	\$293	\$200 - \$600		2.87	0.018	5.3 - 31.1
4 Relocate HVAC Unit including Supply and Return Ducts in Conditioned Space			\$1,000 - \$7,000				
6 Reduced Air Infiltration (0.51 to 0.35 Air-changes/hr)				\$350 - \$1,500			

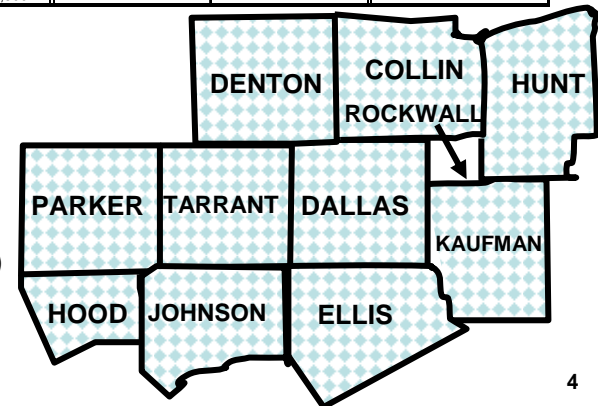
Note:

- Marginal cost = new system cost - original system cost
- New system cost = new system cost only
- See individual measures above for specific savings
 - * Energy Cost: Electricity cost = \$0.15/kWh
 - Natural gas cost = \$1.00/therm
- Savings depend on fuel mix used. See detailed writeup

(Building Description)

- * Building type: Residential
- * Gross area: 2,323 sq-ft.
- * Building dimension: 48.2ft x 48.2ft x 8ft (WxLxH)
- * Number of floors: 1
- * Floor-to-floor height: 8ft
- * Window-to-wall ratio: 18%

Table 4a: 15% Above Code Savings (Residential – Natural Gas Heating) for Collin, Dallas, Denton, Ellis, Hood, Hunt, Johnson, Kaufman, Parker, Rockwall and Tarrant Counties

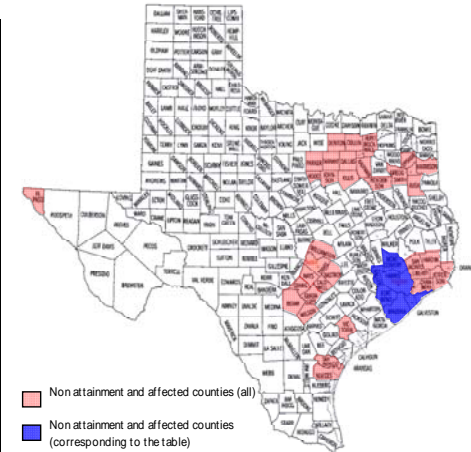


Natural Gas Heating (Brazoria, Fort Bend, Galveston, Harris, Montgomery and Waller Counties)

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Description of Individual Measures

Individual Measures	Annual Energy Savings (%)	Annual Energy Savings (\$/year) ⁴	Estimated Cost (\$)	
			Marginal Cost ¹	New System Cost ²
A Domestic Hot Water Measures				
1 Tankless Gas Water Heater (without a Standing Pilot Light)	9.3%	\$73	\$1,000 - \$3,500	
2 Solar Domestic Hot Water System	15.2%	\$74		\$2,900 - \$5,200
3 Removal of Pilot Light from Domestic Hot Water System	5.5%	\$43	\$200 - \$600	
B Air Distribution System Measures				
4 Relocate HVAC Unit including Supply and Return Ducts in Conditioned Space	8.5%	\$221	\$1,000 - \$7,000	
5 Improved Duct Sealing (10% to 5% Duct Leakage)	4.3%	\$117		\$450 - \$650
C Envelope and Fenestration Measures				
6 Reduced Air Infiltration (0.46 to 0.35 Air-changes/hr)	2.1%	\$35		\$350 - \$1,500
7 Window Shading (None to 4 ft. Eaves on All Sides)	2.1%	\$128		\$3,100 - \$3,500
8 Window Shading and Redistribution (Equal Windows on All Four Sides with No Shading to 45% Windows on the South with 4ft. Eaves on All Four Sides)	3.6%	\$152		\$3,100 - \$3,500
9 Improved Windows (U-factor: 0.47 to 0.42 Btu/h-sf-F, SHGC: 0.4 to 0.33)	2.6%	\$97	\$800 - \$1,100	
D HVAC System Measures				
10 Air Conditioner (SEER 13 to SEER 15)	2.7%	\$93	\$900 - \$2,500	
11 Furnace (0.78 AFUE to 0.93 AFUE)	1.9%	\$15	\$600 - \$1,500	



Description of Combined Measures to Achieve 15% Above Code Savings

Combination of Measures ³	Combined Energy Savings (%)	Combined Energy Savings (\$/year)	Combined Estimated Cost (\$)		Combined Annual NO _x Emissions Savings (lbs/year)	Combined Ozone Season Period NO _x Emissions Savings (lbs/day)	Simple Estimated Payback (yrs)
			Marginal Cost ¹	New System Cost ²			
Combination 1							
1 Tankless Gas Water Heater (without a Standing Pilot Light)	17.8%	\$295	\$1,000 - \$3,500		2.39	0.018	6.8 - 35.7
4 Relocate HVAC Unit including Supply and Return Ducts in Conditioned Space			\$1,000 - \$7,000				
Combination 2							
2 Solar Domestic Hot Water System	21.8%	\$269		\$2,900 - \$5,200	1.50	0.011	15.8 - 31.0
5 Improved Duct Sealing (10% to 5% Duct Leakage)				\$450 - \$650			
10 Air Conditioner (SEER 13 to SEER 15)			\$900 - \$2,500				
Combination 3							
3 Removal of Pilot Light from Domestic Hot Water System	16.8%	\$383	\$200 - \$600		2.99	0.025	11.2 - 29.0
4 Relocate HVAC Unit including Supply and Return Ducts in Conditioned Space			\$1,000 - \$7,000				
8 Window Shading and Redistribution (Equal Windows on All Four Sides with No Shading to 45% Windows on the South with 4ft. Eaves on All Four Sides)				\$3,100 - \$3,500			

Note:

1. Marginal cost = new system cost - original system cost
2. New system cost = new system cost only
3. See individual measures above for specific savings
 - * Energy Cost: Electricity cost = \$0.15/kWh
 - Natural gas cost = \$1.00/therm
4. Savings depend on fuel mix used. See detailed writeup

(Building Description)

- * Building type: Residential
- * Gross area: 2,323 sq-ft.
- * Building dimension: 48.2ft x 48.2ft x 8ft (WxLxH)
- * Number of floors: 1
- * Floor-to-floor height: 8ft
- * Window-to-wall ratio: 18%

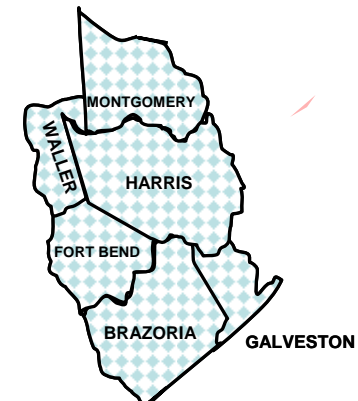


Table 5a: 15% Above Code Savings (Residential – Natural Gas Heating) for Brazoria, Fort Bend, Galveston, Harris, Montgomery and Waller Counties

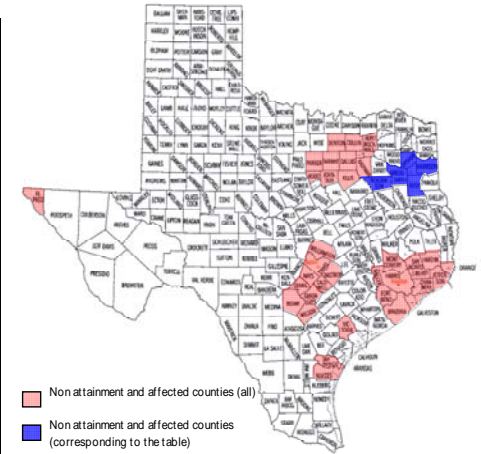


Natural Gas Heating (Gregg, Harrison, Henderson, Rusk, Smith and Upshur Counties)

ESL-TR-07-08-02

Description of Individual Measures

Individual Measures	Annual Energy Savings (%)	Annual Energy Savings (\$/year) ⁴	Estimated Cost (\$)	
			Marginal Cost ¹	New System Cost ²
A Domestic Hot Water Measures				
1 Tankless Gas Water Heater (without a Standing Pilot Light)	9.5%	\$76	\$1,000 - \$3,500	
2 Solar Domestic Hot Water System	16.7%	\$87		\$2,900 - \$5,200
3 Removal of Pilot Light from Domestic Hot Water System	5.4%	\$43	\$200 - \$600	
B Air Distribution System Measures				
4 Relocate HVAC Unit including Supply and Return Ducts in Conditioned Space	8.7%	\$225	\$1,000 - \$7,000	
5 Improved Duct Sealing (10% to 5% Duct Leakage)	4.4%	\$118		\$450 - \$650
C Envelope and Fenestration Measures				
6 Reduced Air Infiltration (0.51 to 0.35 Air-changes/hr)	2.7%	\$40		\$350 - \$1,500
7 Window Shading (None to 4 ft. Eaves on All Sides)	1.8%	\$129		\$3,100 - \$3,500
8 Window Shading and Redistribution (Equal Windows on All Four Sides with No Shading to 45% Windows on the South with 4ft. Eaves on All Four Sides)	3.9%	\$159		\$3,100 - \$3,500
9 Improved Windows (U-factor: 0.47 to 0.42 Btu/h-sf-F, SHGC: 0.4 to 0.33)	2.4%	\$95	\$800 - \$1,100	
D HVAC System Measures				
10 Air Conditioner (SEER 13 to SEER 15)	2.5%	\$89	\$900 - \$2,500	
11 Furnace (0.78 AFUE to 0.93 AFUE)	2.2%	\$17	\$600 - \$1,500	



Description of Combined Measures to Achieve 15% Above Code Savings

Combination of Measures ³	Combined Energy Savings (%)	Combined Energy Savings (\$/year)	Combined Estimated Cost (\$)		Combined Annual NO _x Emissions Savings (lbs/year)	Combined Ozone Season Period NO _x Emissions Savings (lbs/day)	Simple Estimated Payback (yrs)	
			Marginal Cost ¹	New System Cost ²				
Combination 1								
1 Tankless Gas Water Heater (without a Standing Pilot Light)	18.2%	\$301	\$1,000 - \$3,500		2.96	0.018	6.7 - 34.9	
4 Relocate HVAC Unit including Supply and Return Ducts in Conditioned Space			\$1,000 - \$7,000					
Combination 2								
2 Solar Domestic Hot Water System	21.1%	\$205		\$2,900 - \$5,200	1.19	0.011	16.3 - 28.5	
5 Improved Duct Sealing (10% to 5% Duct Leakage)				\$450 - \$650				
Combination 3								
3 Removal of Pilot Light from Domestic Hot Water System	19.2%	\$419	\$200 - \$600		4.20	0.025	11.1 - 30.1	
4 Relocate HVAC Unit including Supply and Return Ducts in Conditioned Space			\$1,000 - \$7,000					
6 Reduced Air Infiltration (0.51 to 0.35 Air-changes/hr)				\$350 - \$1,500				
8 Window Shading and Redistribution (Equal Windows on All Four Sides with No Shading to 45% Windows on the South with 4ft. Eaves on All Four Sides)				\$3,100 - \$3,500				

Note:

1. Marginal cost = new system cost - original system cost
2. New system cost = new system cost only
3. See individual measures above for specific savings
 - * Energy Cost: Electricity cost = \$0.15/kWh
 - Natural gas cost = \$1.00/therm
4. Savings depend on fuel mix used. See detailed writeup

(Building Description)

- * Building type: Residential
- * Gross area: 2,323 sq-ft.
- * Building dimension: 48.2ft x 48.2ft x 8ft (WxLxH)
- * Number of floors: 1
- * Floor-to-floor height: 8ft
- * Window-to-wall ratio: 18%

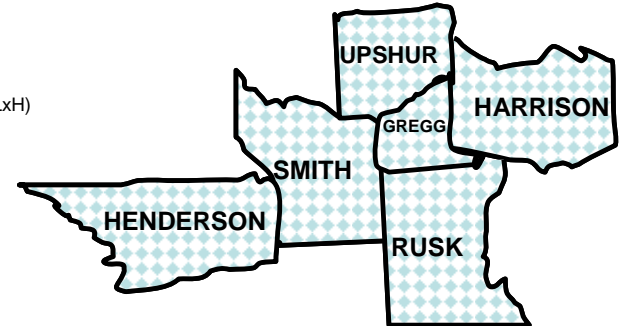


Table 6a: 15% Above Code Savings (Residential – Natural Gas Heating) for Gregg, Harrison, Henderson, Rusk, Smith and Upshur Counties

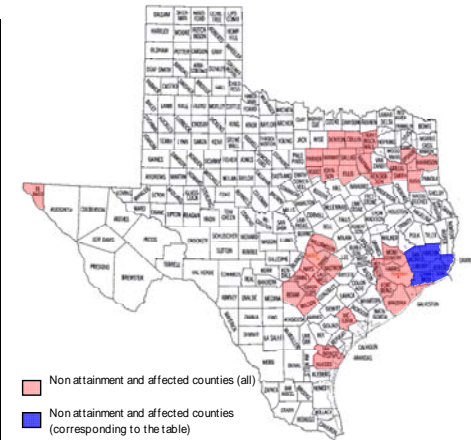


Natural Gas Heating (Chambers, Hardin, Jefferson, Liberty and Orange Counties)

ESL-TR-07-08-02

Description of Individual Measures

Individual Measures	Annual Energy Savings (%)	Annual Energy Savings (\$/year) ⁴	Estimated Cost (\$)	
			Marginal Cost ¹	New System Cost ²
A Domestic Hot Water Measures				
1 Tankless Gas Water Heater (without a Standing Pilot Light)	9.5%	\$74	\$1,000 - \$3,500	
2 Solar Domestic Hot Water System	15.9%	\$78		\$2,900 - \$5,200
3 Removal of Pilot Light from Domestic Hot Water System	5.6%	\$44	\$200 - \$600	
B Air Distribution System Measures				
4 Relocate HVAC Unit including Supply and Return Ducts in Conditioned Space	8.5%	\$232	\$1,000 - \$7,000	
5 Improved Duct Sealing (10% to 5% Duct Leakage)	4.4%	\$125		\$450 - \$650
C Envelope and Fenestration Measures				
6 Reduced Air Infiltration (0.45 to 0.35 Air-changes/hr)	2.3%	\$36		\$350 - \$1,500
7 Window Shading (None to 4 ft. Eaves on All Sides)	2.1%	\$129		\$3,100 - \$3,500
8 Window Shading and Redistribution (Equal Windows on All Four Sides with No Shading to 45% Windows on the South with 4ft. Eaves on All Four Sides)	3.9%	\$160		\$3,100 - \$3,500
9 Improved Windows (U-factor: 0.47 to 0.42 Btu/h-sf-F, SHGC: 0.4 to 0.33)	2.5%	\$96	\$800 - \$1,100	
D HVAC System Measures				
10 Air Conditioner (SEER 13 to SEER 15)	2.7%	\$93	\$900 - \$2,500	
11 Furnace (0.78 AFUE to 0.93 AFUE)	1.7%	\$14	\$600 - \$1,500	



Description of Combined Measures to Achieve 15% Above Code Savings

Combination of Measures ³	Combined Energy Savings (%)	Combined Energy Savings (\$/year)	Combined Estimated Cost (\$)		Combined Annual NO _x Emissions Savings (lbs/year)	Combined Ozone Season Period NO _x Emissions Savings (lbs/day)	Simple Estimated Payback (yrs)
			Marginal Cost ¹	New System Cost ²			
Combination 1							
1 Tankless Gas Water Heater (without a Standing Pilot Light)	18.0%	\$306	\$1,000 - \$3,500		0.85	0.002	6.5 - 34.3
4 Relocate HVAC Unit including Supply and Return Ducts in Conditioned Space			\$1,000 - \$7,000				
Combination 2							
2 Solar Domestic Hot Water System	22.6%	\$280		\$2,900 - \$5,200	0.07	0.004	15.2 - 29.8
5 Improved Duct Sealing (10% to 5% Duct Leakage)				\$450 - \$650			
10 Air Conditioner (SEER 13 to SEER 15)				\$900 - \$2,500			
Combination 3							
3 Removal of Pilot Light from Domestic Hot Water System	17.0%	\$397	\$200 - \$600		0.51	0.001	10.8 - 28.0
4 Relocate HVAC Unit including Supply and Return Ducts in Conditioned Space			\$1,000 - \$7,000				
8 Window Shading and Redistribution (Equal Windows on All Four Sides with No Shading to 45% Windows on the South with 4ft. Eaves on All Four Sides)				\$3,100 - \$3,500			

Note:

- Marginal cost = new system cost - original system cost
- New system cost = new system cost only
- See individual measures above for specific savings
 - * Energy Cost: Electricity cost = \$0.15/kWh
 - Natural gas cost = \$1.00/therm
- Savings depend on fuel mix used. See detailed writeup

(Building Description)

- * Building type: Residential
- * Gross area: 2,323 sq-ft.
- * Building dimension: 48.2ft x 48.2ft x 8ft (WxLxH)
- * Number of floors: 1
- * Floor-to-floor height: 8ft
- * Window-to-wall ratio: 18%

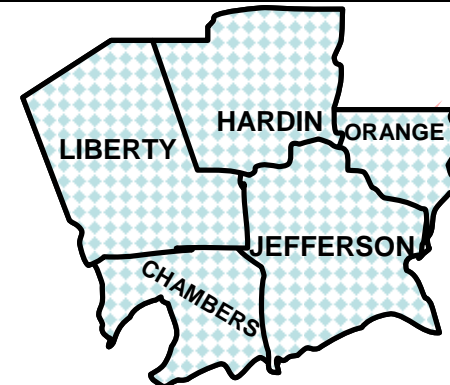


Table 7a: 15% Above Code Savings (Residential – Natural Gas Heating) for Chambers, Hardin, Jefferson, Liberty and Orange Counties

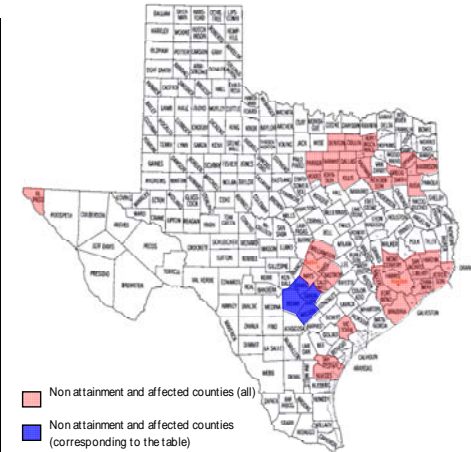


Natural Gas Heating (Bexar, Comal, Guadalupe and Wilson Counties)

ESL-TR-07-08-02

Description of Individual Measures

Individual Measures	Annual Energy Savings (%)	Annual Energy Savings (\$/year) ⁴	Estimated Cost (\$)	
			Marginal Cost ¹	New System Cost ²
A Domestic Hot Water Measures				
1 Tankless Gas Water Heater (without a Standing Pilot Light)	9.2%	\$73	\$1,000 - \$3,500	
2 Solar Domestic Hot Water System	17.4%	\$92		\$2,900 - \$5,200
3 Removal of Pilot Light from Domestic Hot Water System	5.5%	\$43	\$200 - \$600	
B Air Distribution System Measures				
4 Relocate HVAC Unit including Supply and Return Ducts in Conditioned Space	8.1%	\$212	\$1,000 - \$7,000	
5 Improved Duct Sealing (10% to 5% Duct Leakage)	4.0%	\$108		\$450 - \$650
C Envelope and Fenestration Measures				
6 Reduced Air Infiltration (0.47 to 0.35 Air-changes/hr)	2.3%	\$36		\$350 - \$1,500
7 Window Shading (None to 4 ft. Eaves on All Sides)	2.4%	\$140		\$3,100 - \$3,500
8 Window Shading and Redistribution (Equal Windows on All Four Sides with No Shading to 45% Windows on the South with 4ft. Eaves on All Four Sides)	4.0%	\$165		\$3,100 - \$3,500
9 Improved Windows (U-factor: 0.47 to 0.42 Btu/h-sq-ft, SHGC: 0.4 to 0.33)	2.8%	\$104	\$800 - \$1,100	
D HVAC System Measures				
10 Air Conditioner (SEER 13 to SEER 15)	2.8%	\$98	\$900 - \$2,500	
11 Furnace (0.78 AFUE to 0.93 AFUE)	1.9%	\$15	\$600 - \$1,500	



Description of Combined Measures to Achieve 15% Above Code Savings

Combination of Measures ³	Combined Energy Savings (%)	Combined Energy Savings (\$/year)	Combined Estimated Cost (\$)		Combined Annual NO _x Emissions Savings (lbs/year)	Combined Ozone Season Period NO _x Emissions Savings (lbs/day)	Simple Estimated Payback (yrs)
			Marginal Cost ¹	New System Cost ²			
Combination 1							
1 Tankless Gas Water Heater (without a Standing Pilot Light)	17.3%	\$285	\$1,000 - \$3,500		2.83	0.016	7.0 - 36.8
4 Relocate HVAC Unit including Supply and Return Ducts in Conditioned Space			\$1,000 - \$7,000				
Combination 2							
2 Solar Domestic Hot Water System	21.5%	\$201		\$2,900 - \$5,200	1.10	0.010	16.7 - 29.1
5 Improved Duct Sealing (10% to 5% Duct Leakage)				\$450 - \$650			
Combination 3							
3 Removal of Pilot Light from Domestic Hot Water System	16.7%	\$387	\$200 - \$600		3.91	0.022	11.1 - 28.7
4 Relocate HVAC Unit including Supply and Return Ducts in Conditioned Space			\$1,000 - \$7,000				
8 Window Shading and Redistribution (Equal Windows on All Four Sides with No Shading to 45% Windows on the South with 4ft. Eaves on All Four Sides)				\$3,100 - \$3,500			

Note:

1. Marginal cost = new system cost - original system cost
2. New system cost = new system cost only
3. See individual measures above for specific savings
 - * Energy Cost: Electricity cost = \$0.15/kWh
 - Natural gas cost = \$1.00/therm
4. Savings depend on fuel mix used. See detailed writeup

(Building Description)

- * Building type: Residential
- * Gross area: 2,323 sq-ft.
- * Building dimension: 48.2ft x 48.2ft x 8ft (WxLxH)
- * Number of floors: 1
- * Floor-to-floor height: 8ft
- * Window-to-wall ratio: 18%

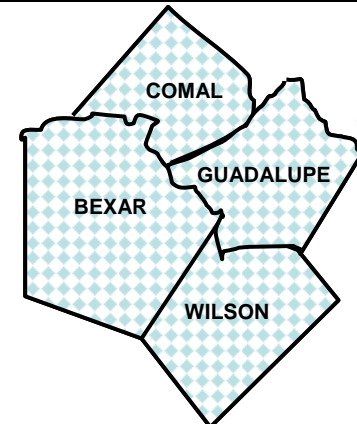


Table 8a: 15% Above Code Savings (Residential – Natural Gas Heating) for Bexar, Comal, Guadalupe and Wilson Counties

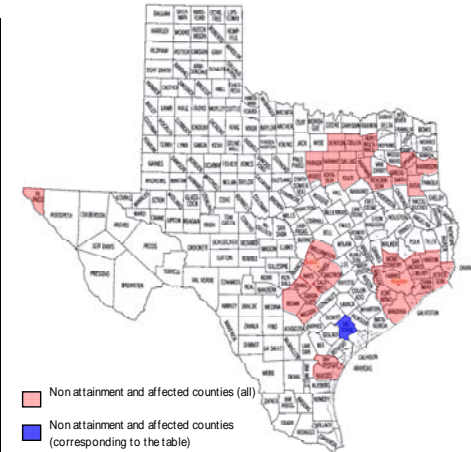


Natural Gas Heating (Victoria County)

ESL-TR-07-08-02

Description of Individual Measures

Individual Measures	Annual Energy Savings (%)	Annual Energy Savings (\$/year) ⁴	Estimated Cost (\$)	
			Marginal Cost ¹	New System Cost ²
A Domestic Hot Water Measures				
1 Tankless Gas Water Heater (without a Standing Pilot Light)	9.3%	\$71	\$1,000 - \$3,500	
2 Solar Domestic Hot Water System	15.9%	\$76		\$2,900 - \$5,200
3 Removal of Pilot Light from Domestic Hot Water System	5.7%	\$44	\$200 - \$600	
B Air Distribution System Measures				
4 Relocate HVAC Unit including Supply and Return Ducts in Conditioned Space	8.3%	\$237	\$1,000 - \$7,000	
5 Improved Duct Sealing (10% to 5% Duct Leakage)	4.3%	\$125		\$450 - \$650
C Envelope and Fenestration Measures				
6 Reduced Air Infiltration (0.49 to 0.35 Air-changes/hr)	2.5%	\$46		\$350 - \$1,500
7 Window Shading (None to 4 ft. Eaves on All Sides)	3.0%	\$143		\$3,100 - \$3,500
8 Window Shading and Redistribution (Equal Windows on All Four Sides with No Shading to 45% Windows on the South with 4ft. Eaves on All Four Sides)	4.3%	\$166		\$3,100 - \$3,500
9 Improved Windows (U-factor: 0.47 to 0.42 Btu/h-sf-F, SHGC: 0.4 to 0.33)	2.9%	\$105	\$800 - \$1,100	
D HVAC System Measures				
10 Air Conditioner (SEER 13 to SEER 15)	3.1%	\$104	\$900 - \$2,500	
11 Furnace (0.78 AFUE to 0.93 AFUE)	1.1%	\$9	\$600 - \$1,500	



Description of Combined Measures to Achieve 15% Above Code Savings

Combination of Measures ³	Combined Energy Savings (%)	Combined Energy Savings (\$/year)	Combined Estimated Cost (\$)		Combined Annual NO _x Emissions Savings (lbs/year)	Combined Ozone Season Period NO _x Emissions Savings (lbs/day)	Simple Estimated Payback (yrs)
			Marginal Cost ¹	New System Cost ²			
Combination 1							
1 Tankless Gas Water Heater (without a Standing Pilot Light)	17.6%	\$308	\$1,000 - \$3,500		2.44	0.015	6.5 - 34.1
4 Relocate HVAC Unit including Supply and Return Ducts in Conditioned Space			\$1,000 - \$7,000				
Combination 2							
2 Solar Domestic Hot Water System	23.0%	\$290		\$2,900 - \$5,200	1.60	0.014	14.6 - 28.8
5 Improved Duct Sealing (10% to 5% Duct Leakage)				\$450 - \$650			
10 Air Conditioner (SEER 13 to SEER 15)				\$900 - \$2,500			
Combination 3							
3 Removal of Pilot Light from Domestic Hot Water System	17.3%	\$410	\$200 - \$600		3.16	0.020	10.5 - 27.1
4 Relocate HVAC Unit including Supply and Return Ducts in Conditioned Space			\$1,000 - \$7,000				
8 Window Shading and Redistribution (Equal Windows on All Four Sides with No Shading to 45% Windows on the South with 4ft. Eaves on All Four Sides)				\$3,100 - \$3,500			

Note:

- Marginal cost = new system cost - original system cost
- New system cost = new system cost only
- See individual measures above for specific savings
 - * Energy Cost: Electricity cost = \$0.15/kWh
 - Natural gas cost = \$1.00/therm
- Savings depend on fuel mix used. See detailed writeup

(Building Description)

- * Building type: Residential
- * Gross area: 2,323 sq-ft.
- * Building dimension: 48.2ft x 48.2ft x 8ft (WxLxH)
- * Number of floors: 1
- * Floor-to-floor height: 8ft
- * Window-to-wall ratio: 18%



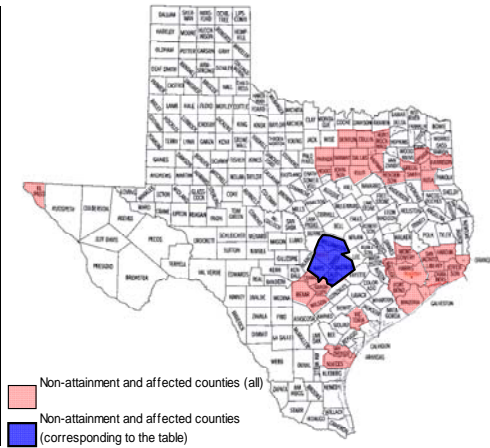
Table 9a: 15% Above Code Savings (Residential – Natural Gas Heating) for Victoria County



Electric Heating (Bastrop, Caldwell, Hays, Travis and Williamson Counties)

Description of Individual Measures

Individual Measures	Annual Energy Savings (%)	Annual Energy Savings (\$/year)	Estimated Cost (\$)	
			Marginal Cost ¹	New System Cost ²
A Domestic Hot Water Measures				
1 Tankless Electric Water Heater	1.5%	\$43	\$700 - \$1,400	
2 Solar Domestic Hot Water System	12.2%	\$350		\$2,900 - \$5,200
B Air Distribution System Measures				
4 Relocate HVAC Unit including Supply and Return Ducts in Conditioned Space	7.5%	\$216	\$1,000 - \$7,000	
5 Improved Duct Sealing (10% to 5% Duct Leakage)	4.5%	\$127		\$450 - \$650
C Envelope and Fenestration Measures				
6 Reduced Air Infiltration (0.46 to 0.35 Air-changes/hr)	1.7%	\$49		\$350 - \$1,500
7 Window Shading (None to 4 ft. Eaves on All Sides)	4.1%	\$117		\$3,100 - \$3,500
8 Window Shading and Redistribution (Equal Windows on All Four Sides with No Shading to 45% Windows on the South with 4ft. Eaves on All Four Sides)	5.6%	\$160		\$3,100 - \$3,500
9 Improved Windows (U-factor: 0.47 to 0.42 Btu/h-sf-F, SHGC: 0.4 to 0.33)	3.4%	\$98	\$800 - \$1,100	
D HVAC System Measures				
12 Air Conditioner with Heat Pump (SEER 13/7.7 HSPF to SEER 15/8.5 HSPF)	4.2%	\$119	\$1,500 - \$2,400	



Description of Combined Measures to Achieve 15% Above Code Savings

Combination of Measures ³	Combined Energy Savings (%)	Combined Energy Savings (\$/year)	Combined Estimated Cost (\$)		Combined Annual NO _x Emissions Savings (lbs/year)	Combined Ozone Season Period NO _x Emissions Savings (lbs/day)	Simple Estimated Payback (yrs)
			Marginal Cost ¹	New System Cost ²			
Combination 1							
2 Solar Domestic Hot Water System	16.7%	\$478		\$2,900 - \$5,200	1.29	0.018	7.0 - 12.2
5 Improved Duct Sealing (10% to 5% Duct Leakage)				\$450 - \$650			
Combination 2							
1 Tankless Electric Water Heater	16.1%	\$462	\$700 - \$1,400		4.68	0.026	13.6 - 30.9
4 Relocate HVAC Unit including Supply and Return Ducts in Conditioned Space			\$1,000 - \$7,000				
8 Window Shading and Redistribution (Equal Windows on All Four Sides with No Shading to 45% Windows on the South with 4ft. Eaves on All Four Sides)				\$3,100 - \$3,500			
12 Air Conditioner with Heat Pump (SEER 13/7.7 HSPF to SEER 15/8.5 HSPF)				\$1,500 - \$2,400			
Combination 3							
1 Tankless Electric Water Heater	15.8%	\$451	\$700 - \$1,400		4.56	0.024	14.5 - 20.1
5 Improved Duct Sealing (10% to 5% Duct Leakage)				\$450 - \$650			
8 Window Shading and Redistribution (Equal Windows on All Four Sides with No Shading to 45% Windows on the South with 4ft. Eaves on All Four Sides)				\$3,100 - \$3,500			
9 Improved Windows (U-factor: 0.47 to 0.42 Btu/h-sf-F, SHGC: 0.4 to 0.33)				\$800 - \$1,100			
12 Air Conditioner with Heat Pump (SEER 13/7.7 HSPF to SEER 15/8.5 HSPF)				\$1,500 - \$2,400			

Note:

1. Marginal cost = new system cost - original system cost
2. New system cost = new system cost only
3. See individual measures above for specific savings
 - * Energy Cost: Electricity cost = \$0.15/kWh
 - Natural gas cost = \$1.00/therm
4. Savings depend on fuel mix used. See detailed writeup

(Building Description)

- * Building type: Residential
- * Gross area: 2,323 sq-ft.
- * Building dimension: 48.2ft x 48.2ft x 8ft (WxLxH)
- * Number of floors: 1
- * Floor-to-floor height: 8ft
- * Window-to-wall ratio: 18%

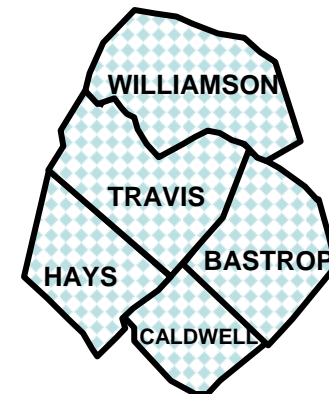


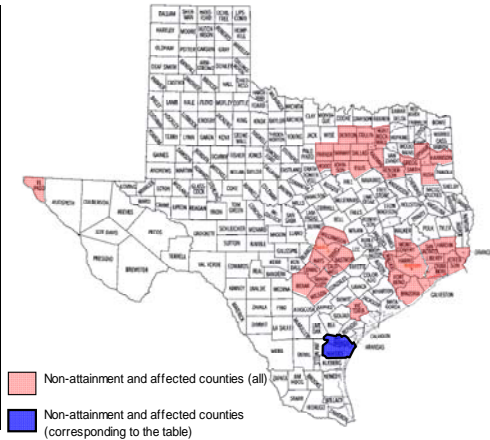
Table 1b: 15% Above Code Savings (Residential – Electric Heating) for Bastrop, Caldwell, Hays, Travis and Williamson Counties



Electric Heating (Nueces and San Patricio Counties)

Description of Individual Measures

Individual Measures	Annual Energy Savings (%)	Annual Energy Savings (\$/year)	Estimated Cost (\$)	
			Marginal Cost ¹	New System Cost ²
A Domestic Hot Water Measures				
1 Tankless Electric Water Heater	1.4%	\$40	\$700 - \$1,400	
2 Solar Domestic Hot Water System	10.2%	\$289		\$2,900 - \$5,200
B Air Distribution System Measures				
4 Relocate HVAC Unit including Supply and Return Ducts in Conditioned Space	10.6%	\$300	\$1,000 - \$7,000	
5 Improved Duct Sealing (10% to 5% Duct Leakage)	5.8%	\$165		\$450 - \$650
C Envelope and Fenestration Measures				
6 Reduced Air Infiltration (0.49 to 0.35 Air-changes/hr)	2.5%	\$70		\$350 - \$1,500
7 Window Shading (None to 4 ft. Eaves on All Sides)	5.0%	\$141		\$3,100 - \$3,500
8 Window Shading and Redistribution (Equal Windows on All Four Sides with No Shading to 45% Windows on the South with 4ft. Eaves on All Four Sides)	6.0%	\$169		\$3,100 - \$3,500
9 Improved Windows (U-factor: 0.47 to 0.42 Btu/h-sf-F, SHGC: 0.4 to 0.33)	3.9%	\$110	\$800 - \$1,100	
D HVAC System Measures				
12 Air Conditioner with Heat Pump (SEER 13/7.7 HSPF to SEER 15/8.5 HSPF)	4.6%	\$130	\$1,500 - \$2,400	



Description of Combined Measures to Achieve 15% Above Code Savings

Combination of Measures ³	Combined Energy Savings (%)	Combined Energy Savings (\$/year)	Combined Estimated Cost (\$)		Combined Annual NO _x Emissions Savings (lbs/year)	Combined Ozone Season Period NO _x Emissions Savings (lbs/day)	Simple Estimated Payback (yrs)
			Marginal Cost ¹	New System Cost ²			
Combination 1							
2 Solar Domestic Hot Water System	16.1%	\$453		\$2,900 - \$5,200	1.23	0.016	7.4 - 12.9
5 Improved Duct Sealing (10% to 5% Duct Leakage)				\$450 - \$650			
Combination 2							
1 Tankless Electric Water Heater	16.6%	\$468	\$700 - \$1,400		3.50	0.020	10.3 - 25.4
4 Relocate HVAC Unit including Supply and Return Ducts in Conditioned Space			\$1,000 - \$7,000				
8 Window Shading and Redistribution (Equal Windows on All Four Sides with No Shading to 45% Windows on the South with 4ft. Eaves on All Four Sides)				\$3,100 - \$3,500			
Combination 3							
1 Tankless Electric Water Heater	16.0%	\$452	\$700 - \$1,400		3.38	0.019	8.4 - 15.6
5 Improved Duct Sealing (10% to 5% Duct Leakage)				\$450 - \$650			
6 Reduced Air Infiltration (0.49 to 0.35 Air-changes/hr)				\$350 - \$1,500			
9 Improved Windows (U-factor: 0.47 to 0.42 Btu/h-sf-F, SHGC: 0.4 to 0.33)				\$800 - \$1,100			
12 Air Conditioner with Heat Pump (SEER 13/7.7 HSPF to SEER 15/8.5 HSPF)			\$1,500 - \$2,400				

Note:

- Marginal cost = new system cost - original system cost
- New system cost = new system cost only
- See individual measures above for specific savings
 - * Energy Cost: Electricity cost = \$0.15/kWh
 - Natural gas cost = \$1.00/therm
- Savings depend on fuel mix used. See detailed writeup

(Building Description)

- * Building type: Residential
- * Gross area: 2,323 sq-ft.
- * Building dimension: 48.2ft x 48.2ft x 8ft (WxLxH)
- * Number of floors: 1
- * Floor-to-floor height: 8ft
- * Window-to-wall ratio: 18%



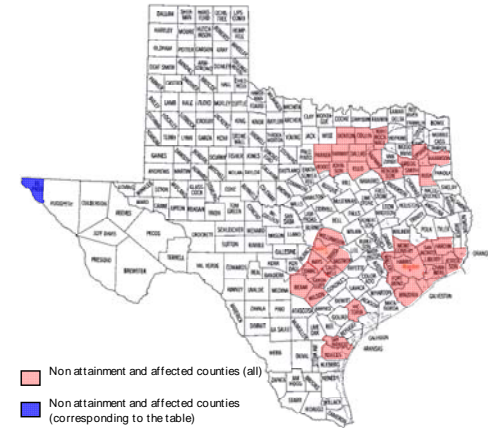
Table 2b: 15% Above Code Savings (Residential – Electric Heating) for Nueces and San Patricio Counties



Electric Heating (El Paso)

Description of Individual Measures

Individual Measures	Annual Energy Savings (%)	Annual Energy Savings (\$/year)	Estimated Cost (\$)	
			Marginal Cost ¹	New System Cost ²
A Domestic Hot Water Measures				
1 Tankless Electric Water Heater	1.7%	\$46	\$700 - \$1,400	
2 Solar Domestic Hot Water System	17.3%	\$460		\$2,900 - \$5,200
B Air Distribution System Measures				
4 Relocate HVAC Unit including Supply and Return Ducts in Conditioned Space	3.5%	\$93	\$1,000 - \$7,000	
5 Improved Duct Sealing (10% to 5% Duct Leakage)	2.3%	\$61		\$450 - \$650
C Envelope and Fenestration Measures				
6 Reduced Air Infiltration (0.43 to 0.35 Air-changes/hr)	0.9%	\$25		\$350 - \$1,500
7 Window Shading (None to 4 ft. Eaves on All Sides)	3.3%	\$88		\$3,100 - \$3,500
8 Window Shading and Redistribution (Equal Windows on All Four Sides with No Shading to 45% Windows on the South with 4ft. Eaves on All Four Sides)	5.6%	\$150		\$3,100 - \$3,500
9 Improved Windows (U-factor: 0.44 to 0.42 Btu/h-sf-F, SHGC: 0.4 to 0.33)	1.8%	\$47	\$800 - \$1,100	
D HVAC System Measures				
12 Air Conditioner with Heat Pump (SEER 13/7.7 HSPF to SEER 15/8.5 HSPF)	3.4%	\$90	\$1,500 - \$2,400	



Description of Combined Measures to Achieve 15% Above Code Savings

Combination of Measures ³	Combined Energy Savings (%)	Combined Energy Savings (\$/year)	Combined Estimated Cost (\$)		Combined Annual NO _x Emissions Savings (lbs/year)	Combined Ozone Season Period NO _x Emissions Savings (lbs/day)	Simple Estimated Payback (yrs)	
			Marginal Cost ¹	New System Cost ²				
Combination 1								
2 Solar Domestic Hot Water System	17.3%	\$460		\$2,900 - \$5,200	N/A	N/A	6.3 - 11.3	
Combination 2								
1 Tankless Electric Water Heater	13.6%	\$363	\$700 - \$1,400		N/A	N/A	20.5 - 46.5	
4 Relocate HVAC Unit including Supply and Return Ducts in Conditioned Space			\$1,000 - \$7,000					
6 Reduced Air Infiltration (0.43 to 0.35 Air-changes/hr)				\$350 - \$1,500				
8 Window Shading and Redistribution (Equal Windows on All Four Sides with No Shading to 45% Windows on the South with 4ft. Eaves on All Four Sides)				\$3,100 - \$3,500				
9 Improved Windows (U-factor: 0.44 to 0.42 Btu/h-sf-F, SHGC: 0.4 to 0.33)				\$800 - \$1,100				
12 Air Conditioner with Heat Pump (SEER 13/7.7 HSPF to SEER 15/8.5 HSPF)			\$1,500 - \$2,400					
Combination 3								
1 Tankless Electric Water Heater	13.0%	\$348	\$700 - \$1,400		N/A	N/A	19.8 - 30.3	
5 Improved Duct Sealing (10% to 5% Duct Leakage)				\$450 - \$650				
6 Reduced Air Infiltration (0.43 to 0.35 Air-changes/hr)				\$350 - \$1,500				
8 Window Shading and Redistribution (Equal Windows on All Four Sides with No Shading to 45% Windows on the South with 4ft. Eaves on All Four Sides)				\$3,100 - \$3,500				
9 Improved Windows (U-factor: 0.44 to 0.42 Btu/h-sf-F, SHGC: 0.4 to 0.33)				\$800 - \$1,100				
12 Air Conditioner with Heat Pump (SEER 13/7.7 HSPF to SEER 15/8.5 HSPF)			\$1,500 - \$2,400					

Note:

- Marginal cost = new system cost - original system cost
- New system cost = new system cost only
- See individual measures above for specific savings
 - * Energy Cost: Electricity cost = \$0.15/kWh
 - Natural gas cost = \$1.00/therm
- Savings depend on fuel mix used. See detailed writeup

(Building Description)

- * Building type: Residential
- * Gross area: 2,323 sq-ft.
- * Building dimension: 48.2ft x 48.2ft x 8ft (WxLxH)
- * Number of floors: 1
- * Floor-to-floor height: 8ft
- * Window-to-wall ratio: 18%



Table 3b: 15% Above Code Savings (Residential – Electric Heating) for El Paso County

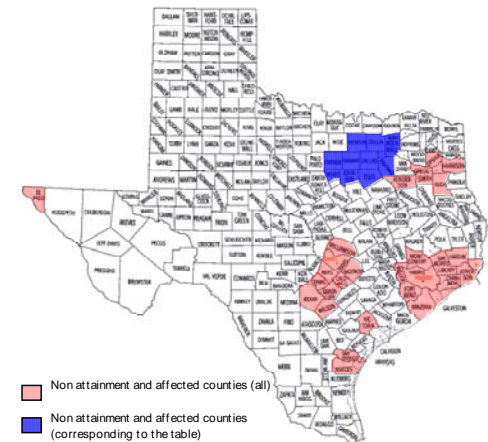


Electric Heating (Collin, Dallas, Denton, Ellis, Hood, Hunt, Johnson, Kaufman, Parker, Rockwall and Tarrant Counties)

ESL-TR-07-08-02

Description of Individual Measures

Individual Measures	Annual Energy Savings (%)	Annual Energy Savings (\$/year)	Estimated Cost (\$)	
			Marginal Cost ¹	New System Cost ²
A Domestic Hot Water Measures				
1 Tankless Electric Water Heater	1.5%	\$45	\$700 - \$1,400	
2 Solar Domestic Hot Water System	12.9%	\$376		\$2,900 - \$5,200
B Air Distribution System Measures				
4 Relocate HVAC Unit including Supply and Return Ducts in Conditioned Space	5.8%	\$171	\$1,000 - \$7,000	
5 Improved Duct Sealing (10% to 5% Duct Leakage)	4.4%	\$129		\$450 - \$650
C Envelope and Fenestration Measures				
6 Reduced Air Infiltration (0.51 to 0.35 Air-changes/hr)	2.6%	\$77		\$350 - \$1,500
7 Window Shading (None to 4 ft. Eaves on All Sides)	2.8%	\$82		\$3,100 - \$3,500
8 Window Shading and Redistribution (Equal Windows on All Four Sides with No Shading to 45% Windows on the South with 4ft. Eaves on All Four Sides)	4.9%	\$143		\$3,100 - \$3,500
9 Improved Windows (U-factor: 0.47 to 0.42 Btu/h-sf-F, SHGC: 0.4 to 0.33)	2.6%	\$76	\$800 - \$1,100	
D HVAC System Measures				
12 Air Conditioner with Heat Pump (SEER 13/7.7 HSPF to SEER 15/8.5 HSPF)	4.0%	\$117	\$1,500 - \$2,400	



Description of Combined Measures to Achieve 15% Above Code Savings

Combination of Measures ³	Combined Energy Savings (%)	Combined Energy Savings (\$/year)	Combined Estimated Cost (\$)		Combined Annual NO _x Emissions Savings (lbs/year)	Combined Ozone Season Period NO _x Emissions Savings (lbs/day)	Simple Estimated Payback (yrs)	
			Marginal Cost ¹	New System Cost ²				
Combination 1								
2 Solar Domestic Hot Water System	17.3%	\$505		\$2,900 - \$5,200	1.32	0.019	6.6 - 11.6	
5 Improved Duct Sealing (10% to 5% Duct Leakage)				\$450 - \$650				
Combination 2								
1 Tankless Electric Water Heater	15.0%	\$438	\$700 - \$1,400		4.47	0.030	14.4 - 32.6	
4 Relocate HVAC Unit including Supply and Return Ducts in Conditioned Space			\$1,000 - \$7,000					
8 Window Shading and Redistribution (Equal Windows on All Four Sides with No Shading to 45% Windows on the South with 4ft. Eaves on All Four Sides)				\$3,100 - \$3,500				
12 Air Conditioner with Heat Pump (SEER 13/7.7 HSPF to SEER 15/8.5 HSPF)				\$1,500 - \$2,400				
Combination 3								
1 Tankless Electric Water Heater	15.5%	\$452	\$700 - \$1,400		4.60	0.023	13.5 - 20.9	
5 Improved Duct Sealing (10% to 5% Duct Leakage)				\$450 - \$650				
6 Reduced Air Infiltration (0.51 to 0.35 Air-changes/hr)				\$350 - \$1,500				
8 Window Shading and Redistribution (Equal Windows on All Four Sides with No Shading to 45% Windows on the South with 4ft. Eaves on All Four Sides)				\$3,100 - \$3,500				
12 Air Conditioner with Heat Pump (SEER 13/7.7 HSPF to SEER 15/8.5 HSPF)			\$1,500 - \$2,400					

Note:

- Marginal cost = new system cost - original system cost
- New system cost = new system cost only
- See individual measures above for specific savings
 - * Energy Cost: Electricity cost = \$0.15/kWh
 - Natural gas cost = \$1.00/therm
- Savings depend on fuel mix used. See detailed writup

(Building Description)

- * Building type: Residential
- * Gross area: 2,323 sq-ft.
- * Building dimension: 48.2ft x 48.2ft x 8ft (WxLxH)
- * Number of floors: 1
- * Floor-to-floor height: 8ft
- * Window-to-wall ratio: 18%

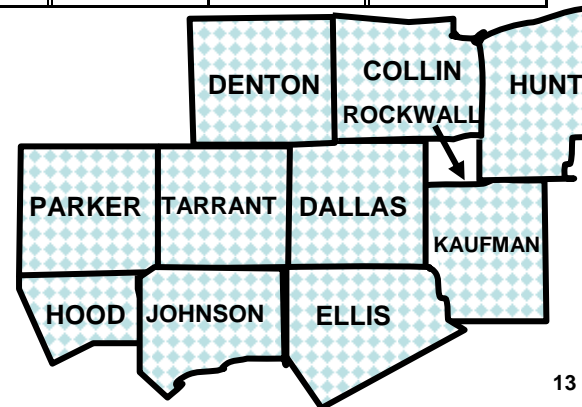


Table 4b: 15% Above Code Savings (Residential – Electric Heating) for Collin, Dallas, Denton, Ellis, Hood, Hunt, Johnson, Kaufman, Parker, Rockwall and Tarrant Counties

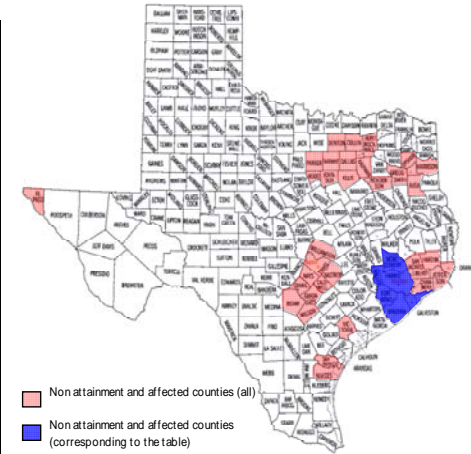


Electric Heating (Brazoria, Fort Bend, Galveston, Harris, Montgomery and Waller Counties)

ESL-TR-07-08-02

Description of Individual Measures

Individual Measures	Annual Energy Savings (%)	Annual Energy Savings (\$/year)	Estimated Cost (\$)	
			Marginal Cost ¹	New System Cost ²
A Domestic Hot Water Measures				
1 Tankless Electric Water Heater	1.5%	\$42	\$700 - \$1,400	
2 Solar Domestic Hot Water System	10.9%	\$304		\$2,900 - \$5,200
B Air Distribution System Measures				
4 Relocate HVAC Unit including Supply and Return Ducts in Conditioned Space	8.7%	\$242	\$1,000 - \$7,000	
5 Improved Duct Sealing (10% to 5% Duct Leakage)	4.8%	\$134		\$450 - \$650
C Envelope and Fenestration Measures				
6 Reduced Air Infiltration (0.46 to 0.35 Air-changes/hr)	1.8%	\$50		\$350 - \$1,500
7 Window Shading (None to 4 ft. Eaves on All Sides)	3.7%	\$103		\$3,100 - \$3,500
8 Window Shading and Redistribution (Equal Windows on All Four Sides with No Shading to 45% Windows on the South with 4ft. Eaves on All Four Sides)	5.0%	\$141		\$3,100 - \$3,500
9 Improved Windows (U-factor: 0.47 to 0.42 Btu/h-sf-F, SHGC: 0.4 to 0.33)	3.3%	\$92	\$800 - \$1,100	
D HVAC System Measures				
12 Air Conditioner with Heat Pump (SEER 13/7.7 HSPF to SEER 15/8.5 HSPF)	4.1%	\$114	\$1,500 - \$2,400	



Description of Combined Measures to Achieve 15% Above Code Savings

Combination of Measures ³	Combined Energy Savings (%)	Combined Energy Savings (\$/year)	Combined Estimated Cost (\$)		Combined Annual NO _x Savings (lbs/year)	Combined Ozone Season Period NO _x Emissions Savings (lbs/day)	Simple Estimated Payback (yrs)
			Marginal Cost ¹	New System Cost ²			
Combination 1							
2 Solar Domestic Hot Water System	15.7%	\$438		\$2,900 - \$5,200	1.01	0.020	7.6 - 13.4
5 Improved Duct Sealing (10% to 5% Duct Leakage)				\$450 - \$650			
Combination 2							
1 Tankless Electric Water Heater	15.4%	\$431		\$700 - \$1,400	3.26	0.029	9.3 - 27.6
4 Relocate HVAC Unit including Supply and Return Ducts in Conditioned Space				\$1,000 - \$7,000			
9 Improved Windows (U-factor: 0.47 to 0.42 Btu/h-sf-F, SHGC: 0.4 to 0.33)				\$800 - \$1,100			
12 Air Conditioner with Heat Pump (SEER 13/7.7 HSPF to SEER 15/8.5 HSPF)				\$1,500 - \$2,400			
Combination 3							
1 Tankless Electric Water Heater	15.1%	\$422		\$700 - \$1,400	3.19	0.026	14.5 - 22.4
5 Improved Duct Sealing (10% to 5% Duct Leakage)				\$450 - \$650			
6 Reduced Air Infiltration (0.46 to 0.35 Air-changes/hr)				\$350 - \$1,500			
8 Window Shading and Redistribution (Equal Windows on All Four Sides with No Shading to 45% Windows on the South with 4ft. Eaves on All Four Sides)				\$3,100 - \$3,500			
12 Air Conditioner with Heat Pump (SEER 13/7.7 HSPF to SEER 15/8.5 HSPF)				\$1,500 - \$2,400			

Note:

- Marginal cost = new system cost - original system cost
- New system cost = new system cost only
- See individual measures above for specific savings
 - * Energy Cost: Electricity cost = \$0.15/kWh
 - Natural gas cost = \$1.00/therm
- Savings depend on fuel mix used. See detailed writeup

(Building Description)

- * Building type: Residential
- * Gross area: 2,323 sq-ft.
- * Building dimension: 48.2ft x 48.2ft x 8ft (WxLxH)
- * Number of floors: 1
- * Floor-to-floor height: 8ft
- * Window-to-wall ratio: 18%

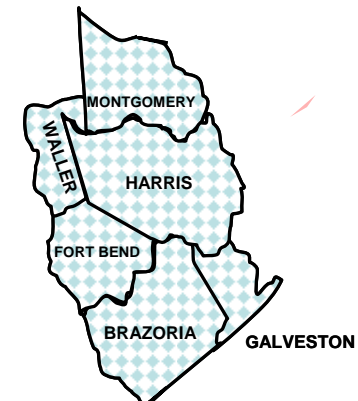


Table 5b: 15% Above Code Savings (Residential – Electric Heating) for Brazoria, Fort Bend, Galveston, Harris, Montgomery and Waller Counties

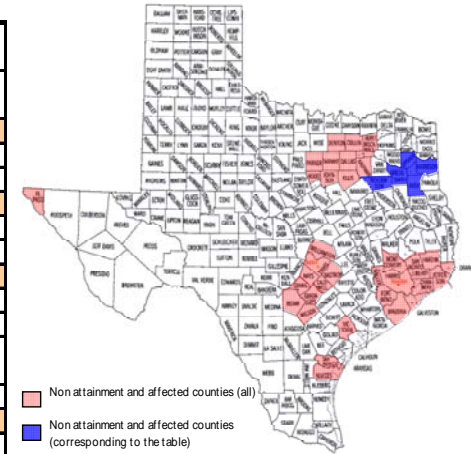


Electric Heating (Gregg, Harrison, Henderson, Rusk, Smith and Upshur Counties)

ESL-TR-07-08-02

Description of Individual Measures

Individual Measures	Annual Energy Savings (%)	Annual Energy Savings (\$/year)	Estimated Cost (\$)	
			Marginal Cost ¹	New System Cost ²
A Domestic Hot Water Measures				
1 Tankless Electric Water Heater	1.6%	\$44	\$700 - \$1,400	
2 Solar Domestic Hot Water System	12.4%	\$341		\$2,900 - \$5,200
B Air Distribution System Measures				
4 Relocate HVAC Unit including Supply and Return Ducts in Conditioned Space	6.9%	\$191	\$1,000 - \$7,000	
5 Improved Duct Sealing (10% to 5% Duct Leakage)	4.6%	\$128		\$450 - \$650
C Envelope and Fenestration Measures				
6 Reduced Air Infiltration (0.51 to 0.35 Air-changes/hr)	1.9%	\$52		\$350 - \$1,500
7 Window Shading (None to 4 ft. Eaves on All Sides)	4.0%	\$110		\$3,100 - \$3,500
8 Window Shading and Redistribution (Equal Windows on All Four Sides with No Shading to 45% Windows on the South with 4ft. Eaves on All Four Sides)	5.5%	\$150		\$3,100 - \$3,500
9 Improved Windows (U-factor: 0.47 to 0.42 Btu/h-sf-F, SHGC: 0.4 to 0.33)	3.3%	\$90	\$800 - \$1,100	
D HVAC System Measures				
12 Air Conditioner with Heat Pump (SEER 13/7.7 HSPF to SEER 15/8.5 HSPF)	3.9%	\$107	\$1,500 - \$2,400	



■ Non attainment and affected counties (all)
■ Non attainment and affected counties (corresponding to the table)

Description of Combined Measures to Achieve 15% Above Code Savings

Combination of Measures ³	Combined Energy Savings (%)	Combined Energy Savings (\$/year)	Combined Estimated Cost (\$)		Combined Annual NO _x Emissions Savings (lbs/year)	Combined Ozone Season Period NO _x Emissions Savings (lbs/day)	Simple Estimated Payback (yrs)
			Marginal Cost ¹	New System Cost ²			
Combination 1							
2 Solar Domestic Hot Water System	17.0%	\$470		\$2,900 - \$5,200	1.31	0.020	7.1 - 12.5
5 Improved Duct Sealing (10% to 5% Duct Leakage)				\$450 - \$650			
Combination 2							
1 Tankless Electric Water Heater	16.7%	\$461	\$700 - \$1,400		4.69	0.029	14.4 - 34.3
4 Relocate HVAC Unit including Supply and Return Ducts in Conditioned Space			\$1,000 - \$7,000				
6 Reduced Air Infiltration (0.51 to 0.35 Air-changes/hr)				\$350 - \$1,500			
8 Window Shading and Redistribution (Equal Windows on All Four Sides with No Shading to 45% Windows on the South with 4ft. Eaves on All Four Sides)				\$3,100 - \$3,500			
12 Air Conditioner with Heat Pump (SEER 13/7.7 HSPF to SEER 15/8.5 HSPF)				\$1,500 - \$2,400			
Combination 3							
1 Tankless Electric Water Heater	16.8%	\$464	\$700 - \$1,400		4.73	0.026	14.9 - 22.8
5 Improved Duct Sealing (10% to 5% Duct Leakage)				\$450 - \$650			
6 Reduced Air Infiltration (0.51 to 0.35 Air-changes/hr)				\$350 - \$1,500			
8 Window Shading and Redistribution (Equal Windows on All Four Sides with No Shading to 45% Windows on the South with 4ft. Eaves on All Four Sides)				\$3,100 - \$3,500			
9 Improved Windows (U-factor: 0.47 to 0.42 Btu/h-sf-F, SHGC: 0.4 to 0.33)				\$800 - \$1,100			
12 Air Conditioner with Heat Pump (SEER 13/7.7 HSPF to SEER 15/8.5 HSPF)			\$1,500 - \$2,400				

Note:

- Marginal cost = new system cost - original system cost
- New system cost = new system cost only
- See individual measures above for specific savings
 - * Energy Cost: Electricity cost = \$0.15/kWh
 - Natural gas cost = \$1.00/therm
- Savings depend on fuel mix used. See detailed writeup

(Building Description)

- * Building type: Residential
- * Gross area: 2,323 sq-ft.
- * Building dimension: 48.2ft x 48.2ft x 8ft (WxLxH)
- * Number of floors: 1
- * Floor-to-floor height: 8ft
- * Window-to-wall ratio: 18%

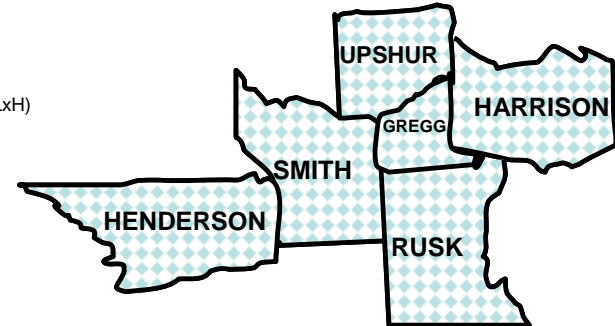


Table 6b: 15% Above Code Savings (Residential – Electric Heating) for Gregg, Harrison, Henderson, Rusk, Smith and Upshur Counties

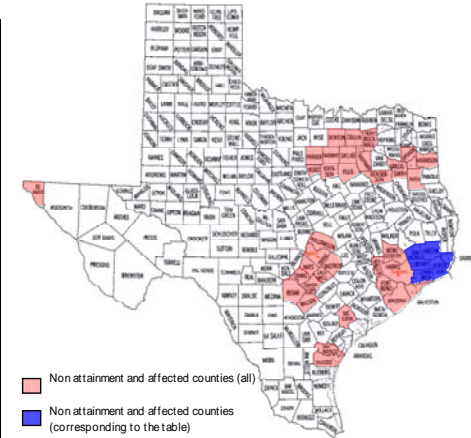


Electric Heating (Chambers, Hardin, Jefferson, Liberty and Orange Counties)

ESL-TR-07-08-02

Description of Individual Measures

Individual Measures	Annual Energy Savings (%)	Annual Energy Savings (\$/year)	Estimated Cost (\$)	
			Marginal Cost ¹	New System Cost ²
A Domestic Hot Water Measures				
1 Tankless Electric Water Heater	1.5%	\$43	\$700 - \$1,400	
2 Solar Domestic Hot Water System	11.4%	\$314		\$2,900 - \$5,200
B Air Distribution System Measures				
4 Relocate HVAC Unit including Supply and Return Ducts in Conditioned Space	9.1%	\$251	\$1,000 - \$7,000	
5 Improved Duct Sealing (10% to 5% Duct Leakage)	5.0%	\$139		\$450 - \$650
C Envelope and Fenestration Measures				
6 Reduced Air Infiltration (0.45 to 0.35 Air-changes/hr)	1.9%	\$53		\$350 - \$1,500
7 Window Shading (None to 4 ft. Eaves on All Sides)	3.8%	\$104		\$3,100 - \$3,500
8 Window Shading and Redistribution (Equal Windows on All Four Sides with No Shading to 45% Windows on the South with 4ft. Eaves on All Four Sides)	5.3%	\$147		\$3,100 - \$3,500
9 Improved Windows (U-factor: 0.47 to 0.42 Btu/h-sf-F, SHGC: 0.4 to 0.33)	3.3%	\$90	\$800 - \$1,100	
D HVAC System Measures				
12 Air Conditioner with Heat Pump (SEER 13/7.7 HSPF to SEER 15/8.5 HSPF)	4.1%	\$112	\$1,500 - \$2,400	



Description of Combined Measures to Achieve 15% Above Code Savings

Combination of Measures ³	Combined Energy Savings (%)	Combined Energy Savings (\$/year)	Combined Estimated Cost (\$)		Combined Annual NO _x Emissions Savings (lbs/year)	Combined Ozone Season Period NO _x Emissions Savings (lbs/day)	Simple Estimated Payback (yrs)
			Marginal Cost ¹	New System Cost ²			
Combination 1							
2 Solar Domestic Hot Water System	16.4%	\$453		\$2,900 - \$5,200	N/A	N/A	7.4 - 12.9
5 Improved Duct Sealing (10% to 5% Duct Leakage)				\$450 - \$650			
Combination 2							
1 Tankless Electric Water Heater	15.7%	\$434	\$700 - \$1,400		N/A	N/A	8.4 - 26.4
4 Relocate HVAC Unit including Supply and Return Ducts in Conditioned Space			\$1,000 - \$7,000				
9 Improved Windows (U-factor: 0.47 to 0.42 Btu/h-sf-F, SHGC: 0.4 to 0.33)				\$450 - \$650			
12 Air Conditioner with Heat Pump (SEER 13/7.7 HSPF to SEER 15/8.5 HSPF)				\$1,500 - \$2,400			
Combination 3							
1 Tankless Electric Water Heater	15.6%	\$431	\$700 - \$1,400		N/A	N/A	14.2 - 21.9
5 Improved Duct Sealing (10% to 5% Duct Leakage)				\$450 - \$650			
6 Reduced Air Infiltration (0.45 to 0.35 Air-changes/hr)				\$350 - \$1,500			
8 Window Shading and Redistribution (Equal Windows on All Four Sides with No Shading to 45% Windows on the South with 4ft. Eaves on All Four Sides)				\$3,100 - \$3,500			
12 Air Conditioner with Heat Pump (SEER 13/7.7 HSPF to SEER 15/8.5 HSPF)				\$1,500 - \$2,400			

Note:

- Marginal cost = new system cost - original system cost
- New system cost = new system cost only
- See individual measures above for specific savings
 - * Energy Cost: Electricity cost = \$0.15/kWh
 - Natural gas cost = \$1.00/therm
- Savings depend on fuel mix used. See detailed writeup

(Building Description)

- * Building type: Residential
- * Gross area: 2,323 sq-ft.
- * Building dimension: 48.2ft x 48.2ft x 8ft (WxLxH)
- * Number of floors: 1
- * Floor-to-floor height: 8ft
- * Window-to-wall ratio: 18%

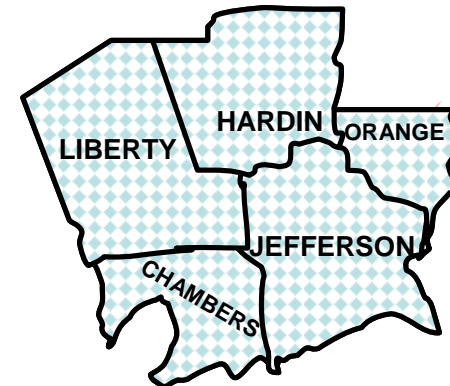


Table 7b: 15% Above Code Savings (Residential – Electric Heating) for Chambers, Hardin, Jefferson, Liberty and Orange Counties

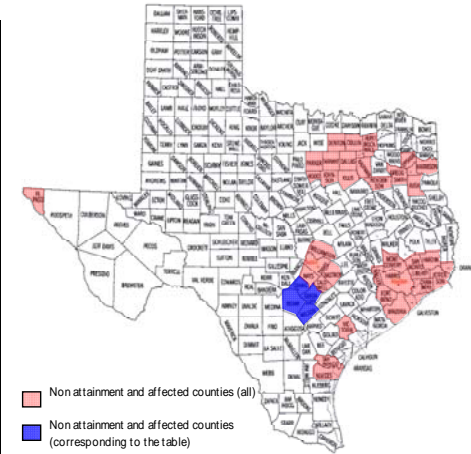


Electric Heating (Bexar, Comal, Guadalupe and Wilson Counties)

ESL-TR-07-08-02

Description of Individual Measures

Individual Measures	Annual Energy Savings (%)	Annual Energy Savings (\$/year)	Estimated Cost (\$)	
			Marginal Cost ¹	New System Cost ²
A Domestic Hot Water Measures				
1 Tankless Electric Water Heater	1.5%	\$43	\$700 - \$1,400	
2 Solar Domestic Hot Water System	12.5%	\$355		\$2,900 - \$5,200
B Air Distribution System Measures				
4 Relocate HVAC Unit including Supply and Return Ducts in Conditioned Space	8.3%	\$237	\$1,000 - \$7,000	
5 Improved Duct Sealing (10% to 5% Duct Leakage)	4.4%	\$126		\$450 - \$650
C Envelope and Fenestration Measures				
6 Reduced Air Infiltration (0.47 to 0.35 Air-changes/hr)	1.9%	\$53		\$350 - \$1,500
7 Window Shading (None to 4 ft. Eaves on All Sides)	4.0%	\$115		\$3,100 - \$3,500
8 Window Shading and Redistribution (Equal Windows on All Four Sides with No Shading to 45% Windows on the South with 4ft. Eaves on All Four Sides)	5.4%	\$155		\$3,100 - \$3,500
9 Improved Windows (U-factor: 0.47 to 0.42 Btu/h-sf-F, SHGC: 0.4 to 0.33)	3.4%	\$98	\$800 - \$1,100	
D HVAC System Measures				
12 Air Conditioner with Heat Pump (SEER 13/7.7 HSPF to SEER 15/8.5 HSPF)	4.2%	\$119	\$1,500 - \$2,400	



Description of Combined Measures to Achieve 15% Above Code Savings

Combination of Measures ³	Combined Energy Savings (%)	Combined Energy Savings (\$/year)	Combined Estimated Cost (\$)		Combined Annual NO _x Emissions Savings (lbs/year)	Combined Ozone Season Period NO _x Emissions Savings (lbs/day)	Simple Estimated Payback (yrs)
			Marginal Cost ¹	New System Cost ²			
Combination 1							
2 Solar Domestic Hot Water System	16.9%	\$481		\$2,900 - \$5,200	1.30	0.018	7.0 - 12.2
5 Improved Duct Sealing (10% to 5% Duct Leakage)				\$450 - \$650			
Combination 2							
4 Relocate HVAC Unit including Supply and Return Ducts in Conditioned Space	21.5%	\$201	\$1,000 - \$7,000		4.47	0.025	24.4 - 57.7
8 Window Shading and Redistribution (Equal Windows on All Four Sides with No Shading to 45% Windows on the South with 4ft. Eaves on All Four Sides)				\$3,100 - \$3,500			
12 Air Conditioner with Heat Pump (SEER 13/7.7 HSPF to SEER 15/8.5 HSPF)				\$800 - \$1,100			
Combination 3							
1 Tankless Electric Water Heater	16.7%	\$387	\$700 - \$1,400		4.48	0.022	15.8 - 24.4
5 Improved Duct Sealing (10% to 5% Duct Leakage)				\$450 - \$650			
6 Reduced Air Infiltration (0.47 to 0.35 Air-changes/hr)				\$350 - \$1,500			
8 Window Shading and Redistribution (Equal Windows on All Four Sides with No Shading to 45% Windows on the South with 4ft. Eaves on All Four Sides)				\$3,100 - \$3,500			
12 Air Conditioner with Heat Pump (SEER 13/7.7 HSPF to SEER 15/8.5 HSPF)			\$1,500 - \$2,400				

Note:

- Marginal cost = new system cost - original system cost
- New system cost = new system cost only
- See individual measures above for specific savings
 - * Energy Cost: Electricity cost = \$0.15/kWh
 - Natural gas cost = \$1.00/therm
- Savings depend on fuel mix used. See detailed writeup

(Building Description)

- * Building type: Residential
- * Gross area: 2,323 sq-ft.
- * Building dimension: 48.2ft x 48.2ft x 8ft (WxLxH)
- * Number of floors: 1
- * Floor-to-floor height: 8ft
- * Window-to-wall ratio: 18%

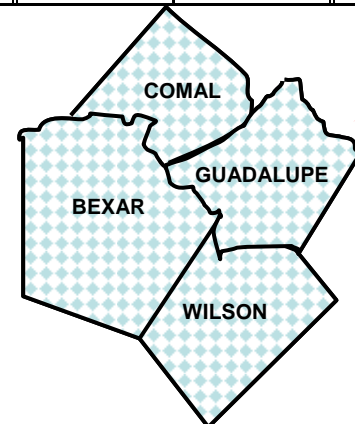


Table 8b: 15% Above Code Savings (Residential – Electric Heating) for Bexar, Comal, Guadalupe and Wilson Counties

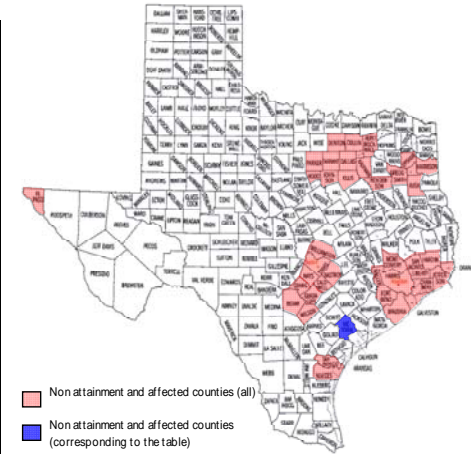


Electric Heating (Victoria County)

ESL-TR-07-08-02

Description of Individual Measures

Individual Measures	Annual Energy Savings (%)	Annual Energy Savings (\$/year)	Estimated Cost (\$)	
			Marginal Cost ¹	New System Cost ²
A Domestic Hot Water Measures				
1 Tankless Electric Water Heater	1.5%	\$41	\$700 - \$1,400	
2 Solar Domestic Hot Water System	11.3%	\$312		\$2,900 - \$5,200
B Air Distribution System Measures				
4 Relocate HVAC Unit including Supply and Return Ducts in Conditioned Space	9.1%	\$250	\$1,000 - \$7,000	
5 Improved Duct Sealing (10% to 5% Duct Leakage)	4.9%	\$135		\$450 - \$650
C Envelope and Fenestration Measures				
6 Reduced Air Infiltration (0.49 to 0.35 Air-changes/hr)	2.2%	\$60		\$350 - \$1,500
7 Window Shading (None to 4 ft. Eaves on All Sides)	4.5%	\$124		\$3,100 - \$3,500
8 Window Shading and Redistribution (Equal Windows on All Four Sides with No Shading to 45% Windows on the South with 4ft. Eaves on All Four Sides)	5.7%	\$158		\$3,100 - \$3,500
9 Improved Windows (U-factor: 0.47 to 0.42 Btu/h-sf-F, SHGC: 0.4 to 0.33)	3.7%	\$101	\$800 - \$1,100	
D HVAC System Measures				
12 Air Conditioner with Heat Pump (SEER 13/7.7 HSPF to SEER 15/8.5 HSPF)	4.2%	\$116	\$1,500 - \$2,400	



Description of Combined Measures to Achieve 15% Above Code Savings

Combination of Measures ³	Combined Energy Savings (%)	Combined Energy Savings (\$/year)	Combined Estimated Cost (\$)		Combined Annual NO _x Emissions Savings (lbs/year)	Combined Ozone Season Period NO _x Emissions Savings (lbs/day)	Simple Estimated Payback (yrs)
			Marginal Cost ¹	New System Cost ²			
Combination 1							
2 Solar Domestic Hot Water System	16.2%	\$447		\$2,900 - \$5,200	1.01	0.015	7.5 - 13.1
5 Improved Duct Sealing (10% to 5% Duct Leakage)				\$450 - \$650			
Combination 2							
1 Tankless Electric Water Heater	15.0%	\$414	\$700 - \$1,400		3.09	0.019	11.6 - 28.8
4 Relocate HVAC Unit including Supply and Return Ducts in Conditioned Space			\$1,000 - \$7,000				
8 Window Shading and Redistribution (Equal Windows on All Four Sides with No Shading to 45% Windows on the South with 4ft. Eaves on All Four Sides)				\$3,100 - \$3,500			
Combination 3							
1 Tankless Electric Water Heater	16.2%	\$447	\$700 - \$1,400		3.09	0.019	13.6 - 21.1
5 Improved Duct Sealing (10% to 5% Duct Leakage)				\$450 - \$650			
6 Reduced Air Infiltration (0.49 to 0.35 Air-changes/hr)				\$350 - \$1,500			
8 Window Shading and Redistribution (Equal Windows on All Four Sides with No Shading to 45% Windows on the South with 4ft. Eaves on All Four Sides)				\$3,100 - \$3,500			
12 Air Conditioner with Heat Pump (SEER 13/7.7 HSPF to SEER 15/8.5 HSPF)			\$1,500 - \$2,400				

Note:

- Marginal cost = new system cost - original system cost
- New system cost = new system cost only
- See individual measures above for specific savings
 - * Energy Cost: Electricity cost = \$0.15/kWh
 - Natural gas cost = \$1.00/therm
- Savings depend on fuel mix used. See detailed writeup

(Building Description)

- * Building type: Residential
- * Gross area: 2,323 sq-ft.
- * Building dimension: 48.2ft x 48.2ft x 8ft (WxLxH)
- * Number of floors: 1
- * Floor-to-floor height: 8ft
- * Window-to-wall ratio: 18%



Table 9b: 15% Above Code Savings (Residential – Electric Heating) for Victoria County

