Appendix 1. Detailed Tables

(Combined RECS Data for 1997, 2001, and 2005 unless otherwise specified)

Table 1. Sample Sizes from Combined 1997/2001/2005 RECS Surveys for Heating by Structure Type

Part 1. Unweighted Sample Sizes

Primary Heating Fuel	Mobile Home	Single Family Detached	Single Family Attached	Apartment 2-4 Units	Apartment 5+ Units	Total
Unknown	7	25	2	0	22	56
Gas	314	5,171	846	654	867	7,852
LPG	176	603	17	6	10	812
Oil	30	1,082	98	109	220	1,539
Kerosene	53	75	3	5	5	141
Electric	305	1,233	230	270	939	2,977
Wood	34	313	7	5	2	361
Solar	0	2	0	2	0	4
District Steam	0	0	0	1	23	24
Coal	0	2	1	0	0	3
Electric Heat Pump	77	827	108	42	135	1,189
Other	2	19	0	0	14	35
No Heat	9	44	4	10	44	111
Total	1,007	9,396	1,316	1,104	2,281	15,104

Main Heating Equipment	Mobile Home	Single Family Detached	Single Family Attached	Apartment 2-4 Units	Apartment 5+ Units	Total
Radiators	0	1072	222	319	586	2199
Central air w/ducts	730	5721	769	483	905	8608
Heat pump	77	830	108	42	137	1194
Built-in electric	18	363	85	100	410	976
Built-in floor/wall pipeless furnace	27	325	59	53	94	558
Built-in gas/oil/kerosene heater	37	477	32	50	47	643
Wood/coal/coke heating stove	29	228	6	4	0	267
Fireplace	5	55	4	0	3	67
Portable electric	40	100	8	13	14	175
Portable kerosene	15	25	3	1	4	48
Cookstove used to cook&heat	6	19	4	17	8	54
Geothermal	0	3	0	0	0	3
Unknown	8	112	10	15	20	165
No Heating/NA	15	66	6	7	53	147
Total	1007	9396	1316	1104	2281	15104

Table 1. Sample Sizes from Combined 1997/2001/2005 RECS Surveys for Heating by Structure Type (continued)

Part 2. Percentage Distribution of Sample Sizes

Main Heating Fuel	Mobile Home	Single Family Detached	Single Family Attached	Apartment 2-4 Units	Apartment 5+ Units	Unweighted Sample Count	Weighted Sample Count
Unknown	0.7%	0.3%	0.2%	0.0%	1.0%	0.4%	0.2%
Gas	31.2%	55.0%	64.3%	59.2%	38.0%	52.0%	53.5%
LPG	17.5%	6.4%	1.3%	0.5%	0.4%	5.4%	4.9%
Oil	3.0%	11.5%	7.4%	9.9%	9.6%	10.2%	7.9%
Kerosene	5.3%	0.8%	0.2%	0.5%	0.2%	0.9%	0.8%
Electric	30.3%	13.1%	17.5%	24.5%	41.2%	19.7%	20.3%
Wood	3.4%	3.3%	0.5%	0.5%	0.1%	2.4%	2.2%
Solar	0.0%	0.0%	0.0%	0.2%	0.0%	0.0%	0.0%
District Steam	0.0%	0.0%	0.0%	0.1%	1.0%	0.2%	0.1%
Coal	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%
Heat Pump	7.6%	8.8%	8.2%	3.8%	6.0%	7.9%	9.1%
Other	0.2%	0.2%	0.0%	0.0%	0.6%	0.2%	0.2%
No Heating/NA	0.9%	0.5%	0.3%	0.9%	1.8%	0.7%	0.7%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Main Heating Equipment	Mobile Home	Single Family Detached	Single Family Attached	Apartment 2-4 Units	Apartment 5+ Units	Unweighted Sample Count	Weighted Sample Count
Radiator Hot Water	0.0%	11.4%	16.9%	28.9%	25.7%	14.6%	12.7%
Warm Air Ducts	72.5%	60.9%	58.4%	43.8%	39.7%	57.0%	59.3%
Heat Pump	7.6%	8.8%	8.2%	3.8%	6.0%	7.9%	9.1%
Electric Wall Units	1.8%	3.9%	6.5%	9.1%	18.0%	6.5%	5.8%
Pipeless Furnace	2.7%	3.5%	4.5%	4.8%	4.1%	3.7%	3.5%
Heater: Gas/Oil/Kero	3.7%	5.1%	2.4%	4.5%	2.1%	4.3%	3.7%
Heater: Stove Wood/Coal/Coke	2.9%	2.4%	0.5%	0.4%	0.0%	1.8%	1.6%
Fireplace	0.5%	0.6%	0.3%	0.0%	0.1%	0.4%	0.4%
Portable Electric Heater	4.0%	1.1%	0.6%	1.2%	0.6%	1.2%	1.2%
Portable Kero Heater	1.5%	0.3%	0.2%	0.1%	0.2%	0.3%	0.3%
Cooking Stove	0.6%	0.2%	0.3%	1.5%	0.4%	0.4%	0.3%
Heat Pump Geothermal	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Other	0.8%	1.2%	0.8%	1.4%	0.9%	1.1%	1.2%
No Heating/NA	1.5%	0.7%	0.5%	0.6%	2.3%	1.0%	0.8%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Table 2. Distribution of Bedroom Sizes by Structure Type for Common Main Heating Fuels

Part 1. All Bedroom Sizes for All Structure Types

BEDROOMS	Mobile Home	Single Family Detached	Single Family Attached	Apartment 2-4 Units	Apartment 5+ Units	Total
0	1	5	6	22	146	180
1	69	209	103	293	957	1,631
2	481	1,681	531	572	984	4,249
3	415	4,916	506	180	173	6,190
4	34	2,096	139	29	18	2,316
5	7	406	27	7	3	450
6	0	65	4	1	0	70
7	0	11	0	0	0	11
8	0	5	0	0	0	5
9	0	2	0	0	0	2
Total	1,007	9,396	1,316	1,104	2,281	15,104

In gray: cells with approximately 300 or more sample cases for combined 1997/2001/2005 surveys. Five bedroom single family detached structures are not included despite sample size because of large variation in size characteristics.

Table 2. Distribution of Bedroom Sizes by Structure Type for Common Main Heating Fuels (continued)

Part 2. Bedroom Sizes by Structure Type and Most Common Heating Fuels

Main Heating Fuel	Bedrooms	Structure Type					Total
		Mobile Home	Single Family Detached	Single Family Attached	Apartment 2-4 Units	Apartment 5+ Units	
Natural gas	0	0	3	2	6	62	73
	1	21	93	60	170	344	688
	2	175	880	329	309	369	2,062
	3	107	2,617	324	125	57	3,230
	4	3	1,206	95	23	6	1,333
	5	2	223	17	5	1	248
	6	0	37	2	0	0	39
	7	0	5	0	0	0	5
	8	0	1	0	0	0	1
	9	0	1	0	0	0	1
	Total	308	5,066	829	638	839	7,680
Fuel oil	0	0	0	0	2	15	17
	1	1	24	4	30	92	151
	2	16	202	18	49	82	367
	3	10	493	48	22	18	591
	4	1	258	14	3	5	281
	5	0	60	7	1	0	68
	6	0	13	2	1	0	16
	7	0	2	0	0	0	2
	8	0	2	0	0	0	2
	Total	28	1,054	93	108	212	1,495
Electric	0	1	1	4	9	41	56
	1	20	35	27	76	398	556
	2	127	219	112	150	403	1,011
	3	131	642	67	26	77	943
	4	12	189	8	2	6	217
	5	2	37	2	0	1	42
	6	0	2	0	0	0	2
	9	0	1	0	0	0	1
	Total	293	1,126	220	263	926	2,828
Heat Pump	0	0	0	0	1	10	11
	1	2	5	2	6	56	71
	2	19	86	48	31	55	239
	3	48	450	40	4	11	553
	4	5	175	10	0	1	191
	5	1	28	1	0	0	30
	6	0	5	0	0	0	5
	Total	75	749	101	42	133	1,100
Selected Fuel Types Total		704	7,995	1,243	1,051	2,110	13,103

Table 2. Distribution of Bedroom Sizes by Structure Type for Common Main Heating Fuels (continued)

Part 3. Common Bedroom Sizes and Heating Fuel Types for Structures with Less Than 10.5% Secondary Heat Source

Main Heating Fuel	Bedrooms	Structure Type					Total
		Mobile Home	Single Family Detached	Single Family Attached	Apartment 2-4 Units	Apartment 5+ Units	
Natural gas	1	21	0	60	170	344	595
	2	175	880	329	309	369	2,062
	3	107	2,617	324	125	57	3,230
	4	0	1,206	0	0	0	1,206
	Total	303	4,703	713	604	770	7,093
Fuel oil	1	1	0	4	30	92	127
	2	16	202	18	49	82	367
	3	10	493	48	22	18	591
	4	0	258	0	0	0	258
	Total	27	953	70	101	192	1,343
Electric	1	20	0	27	76	398	521
	2	127	219	112	150	403	1,011
	3	131	642	67	26	77	943
	4	0	189	0	0	0	189
	Total	278	1,050	206	252	878	2,664
Heat Pump	1	2	0	2	6	56	66
	2	19	86	48	31	55	239
	3	48	450	40	4	11	553
	4	0	175	0	0	0	175
	Total	69	711	90	41	122	1,033
Totals for Selected Fuel and Bedroom Types		399	6,367	873	746	1,084	9,469

Table 3. Space Heating: Predicted BTU Consumption by Survey Year

Type Heat and Number Bedrooms	Regression Coefficients [All Sizes]								Predictions at Selected HDD		
	Intercept	Sig	HDD	Sig	HDDxBED	Sig	#Cases	R^2	2,000	**4,000**	6,000
3 Bedroom Single Family											
Gas Heat											
All Years 1997-2001-2005	**11,353**	**0.0%**	**6.856**	**0.0%**	**1.572**	**0.0%**	**4,703**	**0.39**	**34,497**	**57,641**	**80,785**
RECS 1997	15,210	0.0%	6.640	0.0%	1.892	0.0%	1,809	0.40	39,842	64,474	89,106
RECS 2001	15,290	0.0%	4.377	0.0%	2.101	0.0%	1,515	0.39	36,650	58,010	79,370
RECS 2005	3,649	3.4%	8.438	0.0%	0.890	0.0%	1,373	0.44	25,865	48,081	70,297
Ratio: 2005/1997									65%	75%	79%
Electric Heat (both types)											
All Years 1997-2001-2005	**1,853**	**0.0%**	**2.266**	**0.0%**	**0.572**	**0.0%**	**1,755**	**0.45**	**9,817**	**17,781**	**25,745**
RECS 1997	3,711	0.0%	2.381	0.0%	0.627	0.0%	705	0.46	12,235	20,759	29,283
RECS 2001	1,233	5.1%	2.702	0.0%	0.706	0.0%	491	0.61	10,873	20,513	30,153
RECS 2005	2,061	0.0%	1.222	0.0%	0.290	0.0%	559	0.50	6,245	10,429	14,613
Ratio: 2005/1997									51%	50%	50%
2 Bedroom Apartment (5+ Units)											
Gas Heat											
All Years 1997-2001-2005	**522**	**75.2%**	**4.480**	**0.0%**	**0.894**	**0.0%**	**767**	**0.30**	**13,058**	**25,594**	**38,130**
RECS 1997	3,706	14.6%	3.615	0.0%	0.857	1.9%	267	0.29	14,364	25,022	35,680
RECS 2001	1,121	54.3%	3.703	0.0%	0.503	3.5%	266	0.33	10,539	19,957	29,375
RECS 2005	-665	86.2%	6.918	0.0%	0.548	17.9%	228	0.33	15,363	31,391	47,419
Ratio: 2005/1997									107%	125%	133%
Electric Heat (both types)											
All Years 1997-2001-2005	**1,609**	**0.0%**	**0.622**	**0.0%**	**0.479**	**0.0%**	**996**	**0.38**	**4,769**	**7,929**	**11,089**
RECS 1997	989	0.0%	0.435	0.0%	0.438	0.0%	432	0.44	3,611	6,233	8,855
RECS 2001	2,258	0.0%	0.432	5.8%	0.837	0.0%	292	0.46	6,470	10,682	14,894
RECS 2005	2,438	0.0%	1.073	0.0%	0.060	46.0%	266	0.37	4,824	7,210	9,596
Ratio: 2005/1997									134%	116%	108%
		Shaded cells: not significant using 5% criterion.									
	*	Regressions based on common bedroon sizes (2-4 bedrooms single family, 1-3 multifamily).									

Table 4. Space Heating: Predicted BTU Consumption using Microdata Regressions
(By Fuel and Structure Type , Merged 1997-2001-2005 RECS Data)

	Regression Coefficients [All Sizes]						Sample size		Bedrooms			
										BTUs/year (thousands)		
	Intercept	Sig	HDD	Sig	HDDxBED	Sig	(n)	R^2	Bedrooms	2,000	**4,000**	6,000
1. Gas Heating												
Mobile Home	6,081.4	0.03	9.454	0.00	-0.194	0.64	303	0.49	2	24,213	**42,345**	60,477
Single Family Detached	11,353.1	0.00	6.856	0.00	1.572	0.00	4,706	0.39	3	34,497	**57,640**	80,785
Single Family Attached	9,765.8	0.01	9.851	0.00	0.123	0.75	713	0.25	3	30,206	**50,646**	71,086
Apartment 2-4 Units	3,916.6	0.34	9.257	0.00	1.248	0.00	604	0.29	2	27,423	**50,929**	74,435
Apartment 5+ Units	521.7	0.75	4.480	0.00	0.894	0.00	770	0.30	2	13,058	**25,594**	38,130
2. Propane/LPG Heating*												
Mobile Home	---	---	---	---	---	---	---	---	2	24,213	42,345	60,477
Single Family Detached	---	---	Insufficient cases for regression analysis; engineering assumption is that same number of BTUs as natural gas required for similar structure.				---	---	3	34,497	57,640	80,785
Single Family Attached	---	---					---	---	3	30,206	50,646	71,086
Apartment 2-4 Units	---	---					---	---	2	27,423	50,929	74,435
Apartment 5+ Units	---	---	---	---	---	---	---	---	2	13,058	25,594	38,130
3. Electric Heating [Resistance only]												
Mobile Home	3,105.5	0.00	2.754	0.00	0.107	52.20%	278	0.43	2	9,042	14,978	20,914
Single Family Detached	2,486.6	0.00	2.260	0.00	0.546	0.00%	1,050	0.41	3	10,283	18,079	25,875
Single Family Attached	2,888.2	0.00	0.908	0.03	0.597	0.00%	206	0.32	3	8,286	13,684	19,082
Apartment 2-4 Units	2,561.0	0.00	0.174	0.00	0.159	16.50%	252	0.40	2	3,545	4,530	5,514
Apartment 5+ Units	1,874.1	0.00	0.576	0.00	0.485	0.00%	4,390	0.36	2	4,966	8,058	11,150
4. Heat Pump Heating*	*See text for derivation of heat pump factors applied to resistance heating*									*0.42*	*0.47*	*0.55*
Mobile Home	---	---	---	---	---	---	69	---	2	3,797	7,039	11,502
Single Family Detached	1,071.0	0.03	1.93	0.00	0.70	0.0%	708	0.55	3	4,319	8,497	14,231
Single Family Attached	---	Single family regression values were very similar to engineering estimates, which are shown					90	---	3	3,480	6,432	10,495
Apartment 2-4 Units	---						41	---	2	1,489	2,129	3,033
Apartment 5+ Units	---	---	---	---	---	---	122	---	2	2,086	3,787	6,133
5. Oil Heating (see text and Table 6)												

*Propane & heat pump heating consumption, except for single family detached heat pumps, are based on engineering relationships (SEE TEXT).

Table 5. Space Heating: Predicted Consumption Using Regression on Means

Regressions on Means						Predictions at Selected HDD and Number of Bedrooms			
Regression Coefficients							kBTUs/year		
	Intercept	BEDRM Coef.	n[1]	R^2	Mean HDD	# Bedrooms	2,000	**4,000**	6,000
1. Gas Heating									
Mobile Home	16,581.0	12,997.0	303	0.82	4,752	2	17,919	35,838	53,756
Single Family Detached	38,467.0	9,347.2	5,022	0.93	4,467	3	29,778	59,555	89,333
Single Family Attached	38,727.0	9,614.1	808	0.89	4,934	3	27,389	54,779	82,168
Apartment 2-4 Units	39,586.0	11,280.0	604	1.00	4,933	2	25,196	50,392	75,588
Apartment 5+ Units	24,951.0	1,604.5	832	0.75	4,562	2	12,345	24,691	37,036
All Gas Heated	25,220.0	12,730.0	7,637	0.99	4,578	3	27,702	55,404	83,106
2. Propane/LPG Heating									
Mobile Home	---	Propane heating assumed to use as many KBTUs as natural gas			---	2	17,919	35,838	53,756
Single Family Detached	---				---	3	29,778	59,555	89,333
Single Family Attached	---				---	3	27,389	54,779	82,168
Apartment 2-4 Units	---				---	2	25,196	50,392	75,588
Apartment 5+ Units	---				---	2	12,345	24,691	37,036
3. Electric Heating [Resistance and Heat Pump]									
Mobile Home	8,180.8	2,061.9	347	0.92	3,396	2	7,247	14,493	21,740
Single Family Detached	10,362.0	1,421.0	1,823	0.86	3,124	3	9,363	18,726	28,089
Single Family Attached	6,450.1	2,204.9	296	0.98	3,605	3	7,248	14,496	21,744
Apartment 2-4 Units	7,868.3	932.4	293	1.00	3,529	2	5,516	11,032	16,548
Apartment 5+ Units	4,479.2	1,554.4	1,051	0.85	3,445	2	4,405	8,810	13,216
All Electric Heated	5,166.6	2,549.0	3,917	0.98	3,306	2	6,210	12,419	18,629
4. Heat Pump Heating		*See text for derivation of heat pump factors*					*0.42*	*0.47*	*0.55*
Mobile Home	---	---	---	---	---	2	3,044	6,812	11,957
Single Family Detached	---	Heat pump values were calculated using engineering relationship to electric resistance heating (see text)			---	3	3,932	8,801	15,449
Single Family Attached	---				---	3	3,044	6,813	11,959
Apartment 2-4 Units	---				---	2	2,317	5,185	9,101
Apartment 5+ Units	---	---	---	---	---	2	1,850	4,141	7,269
5. Fuel Oil Heating									
Mobile Home	43,990.7	12,816.6	---	---	6,107	2	22,801	45,603	68,404
Single Family Detached	51,152.0	14,903.0	---	---	6,107	3	31,394	62,788	94,181
Single Family Attached	45,525.3	13,263.7	---	---	6,107	3	27,940	55,881	83,821
Apartment 2-4 Units	46,036.8	13,412.7	---	---	6,107	2	23,862	47,724	71,586
Apartment 5+ Units	26,087.5	7,600.5	---	---	6,107	2	13,522	27,043	40,565

Table 6. Space Heating: Heating Fuel and Delivery Method by Structure Type

Structure Type	Heating Equipment Summary:	Gas	Electric	LPG	Oil	Wood	Kero, Wood, Other	Total
All	Radiators	1,171	64	44	868	10	42	2,199
	Ducts	5,662	1,687	554	611	34	60	8,608
	Other	1,019	2,415	214	60	317	216	4,297
	Total	7,852	4,166	812	1,539	361	318	15,104
Mobile Home	Ducts	289	240	138	28	3	32	730
	Other	25	142	38	2	31	32	277
	Total	314	382	176	30	34	64	1,007
Single Family Detached	Radiators	463	19	38	542	8	2	1,072
	Ducts	4,063	719	397	492	31	19	5,721
	Other	645	1,322	168	48	274	121	2,603
	Total	5,171	2,060	603	1,082	313	142	9,396
Single Family Attached	Radiators	155	10	2	55	0	0	222
	Ducts	597	118	13	40	0	1	769
	Other	94	210	2	3	7	7	325
	Total	846	338	17	98	7	8	1,316
Apartment 2-4 Units	Radiators	219	12	2	82	1	3	319
	Ducts	317	139	0	26	0	1	483
	Other	118	161	4	1	4	14	302
	Total	654	312	6	109	5	18	1104
Apartment 5+ Units	Radiators	334	23	2	189	1	37	586
	Ducts	396	471	6	25	0	7	905
	Other	137	580	2	6	1	42	790
	Total	867	1,074	10	220	2	86	2,281

Table 7. Oil Heating: Regressions Using Microdata and Averages

Part 1. Microdata-based Estimates

	Regression Coefficients								Predictions at Selected HDDs and Number of Bedrooms			
					BEDx				Bed-	BTUs/year (thousands)		
	Constant	Sig	HDD	Sig	HDD	Sig	n	R^2	Rooms	2,000	4,000	6,000
Delivery Method												
All Units	43,054	0.00	0.091	0.93	2.61	0.00	1,436	0.19	3	58,896	74,738	90,580
Radiator Hot Water	26,784	0.00	2.760	0.06	2.91	0.00	847	0.25	3	49,758	72,732	95,706
Warm Air Ducts	54,315	0.00	-1.149	0.37	2.10	0.00	588	0.13	3	64,623	74,931	85,239
					Note: this is swamped by BEDxHDD coefficient							
RECS Surveys, All Units												
1997	44,517	0.00	-0.988	0.53	3.24	0.00	627	0.25	3	61,969	79,421	96,873
2001	43,004	0.00	-2.940	0.08	2.95	0.00	445	0.19	3	54,836	66,668	78,500
2005	63,922	0.00	0.358	0.84	1.63	0.00	362	0.11	3	74,436	84,950	95,464

By number of bedrooms using all units for 1997/2001/2005 RECS surveys except those with heat source accounting for 10.5% or more of heating consumption.

Part 2. Consumption Estimates based on Means (see text):

	Regression Coefficients						Predictions at Selected HDD and Number of Bedrooms			
		Bed-	Mean				Bed-	BTUs/year (thousands)		
	Constant	rooms	HDD	n	R^2		Rooms	2,000	4,000	6,000
Delivery Method										
All Units	44,762	15,238	5,911	1,437	0.99		3	30,613	61,226	91,838
Radiator Hot Water	43,043	17,738	5,757	848	0.95		3	33,440	66,880	100,320
Warm Air Ducts	42,297	13,847	6,132	589	0.96		3	27,344	54,689	82,033
Single Family Detached	**51,152**	**14,903**	**6,107**	**1,006**	**0.89**		**3**	**31,394**	**62,788**	**94,181**
Radiator Hot Water	70,706	11,894	6,004	529	0.75		3	35,439	70,878	106,317
Warm Air Ducts	53,627	11,707	6,223	477	0.98		3	28,523	57,045	85,568
Apartment 5+ Units	37,075	5,657	4,969	208	0.98		3	21,753	43,505	65,258
Radiator Hot Water	40,260	3,537	4,926	184	0.73		3	20,654	41,308	61,962
Warm Air Ducts	[Too few cases]									

Table 8. Heating Regression Factors by Structure Type Using Microdata and Means Methods

Heating Regressions by Structure Type	Intercept	HDD	HDDx BED	Sample Size	2 Bedrooms						3 Bedrooms					
					Predicted kBTUs			Ratio To Single Family Detached			Predicted kBTUs			Ratio To Single Family Detached		
					Heating Degree Days			Heating Degree Days			Heating Degree Days			Heating Degree Days		
					2,000	4,000	6,000	2,000	4,000	6,000	2,000	4,000	6,000	2,000	4,000	6,000
1a. Using Microdata, Gas Heating																
Mobile Home	6081.4	9.5	-0.2	281	24,215	**42,348**	60,481	0.77	**0.82**	0.85	23,827	**41,573**	59,318	0.69	0.72	0.73
Single Family Detached	11353.1	6.9	1.6	**4,705**	**31,353**	**51,352**	**71,351**	**1.00**	**1.00**	**1.00**	**34,496**	**57,640**	**80,783**	**1.00**	**1.00**	**1.00**
Single Family Attached	9765.8	9.9	0.1	712	29,959	**50,153**	70,346	0.96	**0.98**	0.99	30,205	**50,645**	71,085	0.88	0.88	0.88
Apartment 2-4 Units	3916.6	9.3	1.2	603	27,425	**50,934**	74,443	0.87	**0.99**	1.04	29,922	**55,928**	81,933	0.87	0.97	1.01
Apartment 5+ Units	521.7	4.5	0.9	769	13,058	**25,595**	38,132	0.42	**0.50**	0.53	14,847	**29,173**	43,498	0.43	0.51	0.54
1b. Using Microdata, Electric Heating																
Mobile Home	2,906	2.770	0.117	324	8,914	**14,922**	20,930	1.03	**0.96**	0.94	9,148	**15,390**	21,632	0.93	0.87	0.84
Single Family Detached	**1,853**	**2.266**	**0.572**	**1,757**	**8,673**	**15,493**	**22,313**	**1.00**	**1.00**	**1.00**	**9,817**	**17,781**	**25,745**	**1.00**	**1.00**	**1.00**
Single Family Attached	2,537	0.848	0.709	295	7,069	**11,601**	16,133	0.82	**0.75**	0.72	8,487	**14,437**	20,387	0.86	0.81	0.79
Apartment 2-4 Units	2,352	1.765	0.169	292	6,558	**10,764**	14,970	0.76	**0.69**	0.67	6,896	**11,440**	15,984	0.70	0.64	0.62
Apartment 5+ Units	1,609	0.622	0.479	998	4,769	**7,929**	11,089	0.55	**0.51**	0.50	5,727	**9,845**	13,963	0.58	0.55	0.54
1c. Using Microdata, Gas or Electric Heating																
Mobile Home								0.91	**0.90**	0.90				0.82	0.80	0.79
Single Family Detached								1.00	**1.00**	1.00				1.00	1.00	1.00
Single Family Attached								0.91	**0.91**	0.91				0.87	0.86	0.85
Apartment 2-4 Units								0.84	**0.89**	0.92				0.81	0.86	0.89
Apartment 5+ Units								0.49	**0.51**	0.51				0.52	0.53	0.54
2a. Using Means, Gas Heating																
Mobile Home	16,581	12,997	4,752	303	17,919	35,838	53,756	0.70	**0.70**	0.70	23,389	**46,778**	70,167	0.79	0.79	0.79
Single Family Detached	**38,467**	**9,347**	**4,467**	**5,022**	**25,593**	**51,185**	**76,778**	**1.00**	**1.00**	**1.00**	**29,778**	**59,555**	**89,333**	**1.00**	**1.00**	**1.00**
Single Family Attached	38,727	9,614	4,934	808	23,492	46,984	70,477	0.92	**0.92**	0.92	27,389	**54,779**	82,168	0.92	0.92	0.92
Apartment 2-4 Units	39,586	11,280	4,933	604	25,196	50,392	75,588	0.98	**0.98**	0.98	29,769	**59,539**	89,308	1.00	1.00	1.00
Apartment 5+ Units	24,951	1,605	4,562	832	12,345	24,691	37,036	0.48	**0.48**	0.48	13,049	**26,098**	39,147	0.44	0.44	0.44
2b. Using Means, Electric Heating																
Mobile Home	8,181	2,062	3,396	347	7,247	14,493	21,740	0.86	**0.86**	0.86	8,461	**16,922**	25,383	0.90	0.90	0.90
Single Family Detached	**10,362**	**1,421**	**3,124**	**1,823**	**8,453**	**16,907**	**25,360**	**1.00**	**1.00**	**1.00**	**9,363**	**18,726**	**28,089**	**1.00**	**1.00**	**1.00**
Single Family Attached	6,450	2,205	3,605	296	6,025	12,050	18,075	0.71	**0.71**	0.71	7,248	**14,496**	21,744	0.77	0.77	0.77
Apartment 2-4 Units	7,868	932	3,529	293	5,516	11,032	16,548	0.65	**0.65**	0.65	6,044	**12,089**	18,133	0.65	0.65	0.65
Apartment 5+ Units	4,479	1,554	3,445	1,051	4,405	8,810	13,216	0.52	**0.52**	0.52	5,308	**10,615**	15,923	0.57	0.57	0.57
2c. Using Means, Gas or Electric Heating																
Mobile Home								0.78	**0.78**	0.78				0.85	0.85	0.85
Single Family Detached								1.00	**1.00**	1.00				1.00	1.00	1.00
Single Family Attached								0.86	**0.86**	0.86				0.88	0.88	0.88
Apartment 2-4 Units								0.88	**0.88**	0.88				0.88	0.88	0.88
Apartment 5+ Units								0.50	**0.50**	0.50				0.51	0.51	0.51

Table 9. Air Conditioning Utilization Data and Regression Factors by Structure Type Using Micro-Data and Means Methods

Part 1. Unweighted Counts of Air Conditioning by Structure Type (1997/2001/2005 RECS Surveys)

Existence and Type Air Conditioning	Structure Type					Total
	Mobile Home	Single Family Detached	Single Family Attached	Apartment 2-4 Units	Apartment 5+ Units	
Central Air	44.7%	52.2%	43.0%	27.6%	38.3%	47.0%
1 Window AC	17.8%	11.3%	11.9%	22.8%	24.3%	14.6%
2 Window AC	8.2%	7.5%	9.1%	11.3%	7.4%	7.9%
3+ Window AC	2.2%	4.3%	4.6%	3.2%	1.6%	3.7%
Both Central & Window	1.1%	1.1%	0.7%	0.5%	0.5%	0.9%
Not Applicable/No Answer	26.0%	23.7%	30.7%	34.6%	28.0%	25.9%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Part 2. Weighted Counts of Air Conditioning by Structure Type (1997/2001/2005 RECS Surveys)

Existence and Type Air Conditioning	Structure Type					Total
	Mobile Home	Single Family Detached	Single Family Attached	Apartment 2-4 Units	Apartment 5+ Units	
Central Air	48.9%	58.2%	51.5%	33.0%	43.7%	53.0%
1 Window AC	17.1%	9.9%	10.4%	22.1%	22.7%	13.2%
2 Window AC	8.5%	6.8%	8.5%	12.0%	6.9%	7.4%
3+ Window AC	2.6%	4.0%	4.1%	3.7%	1.7%	3.6%
Both Central & Window	1.0%	1.1%	0.9%	0.4%	0.4%	0.9%
No Air Conditioning or No Response	22.1%	20.0%	24.6%	28.8%	24.5%	21.9%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Table 9. Air Conditioning (continued)

Part 3: Percent with Air Conditioning by Cooling Degree Days and Structure Type

Structure Type	Cooling Degree Days	Percent With AC	Cases	Structure Type	Cooling Degree Days	Percent With AC	Cases
Mobile Home	0-499	40%	186	Single Family Attached	0-499	30%	213
	500-999	72%	258		500-999	66%	436
	1,000-1,499	87%	188		1,000-1,499	84%	368
	1,500-1,999	83%	151		1,500-1,999	82%	153
	2,000-2,499	87%	69		2,000-2,499	82%	28
	2,500-2,999	98%	87		2,500-2,999	90%	41
	3,000-3,499	79%	19		3,000-3,499	81%	16
	3,500-3,999	77%	17		3,500-3,999	---	0
	4,000-4,999	70%	23		4,000-4,999	---	0
	5,000-5,999	100%	9		5,000-5,999	100%	9
Single Family Detached	0-499	36%	1,355	Apartment 2-4 Units	0-499	27%	149
	500-999	74%	2,863		500-999	57%	432
	1,000-1,499	85%	2,048		1,000-1,499	75%	240
	1,500-1,999	89%	1,308		1,500-1,999	87%	144
	2,000-2,499	88%	517		2,000-2,499	86%	22
	2,500-2,999	97%	621		2,500-2,999	98%	57
	3,000-3,499	94%	308		3,000-3,499	100%	26
	3,500-3,999	87%	159		3,500-3,999	67%	9
	4,000-4,999	86%	104		4,000-4,999	100%	7
Apartment 5+ Units	0-499	27%	331	Apartment 5+ Units (Cont)	3,000-3,499	93%	55
	500-999	70%	620		3,500-3,999	92%	36
	1,000-1,499	80%	623		4,000-4,999	91%	69
	1,500-1,999	83%	285		5,000-5,999	88%	32
	2,000-2,499	90%	96		**All/Average**	**72%**	**2,240**
	2,500-2,999	98%	93				

Note: Average CDD for all units is about 1,500.

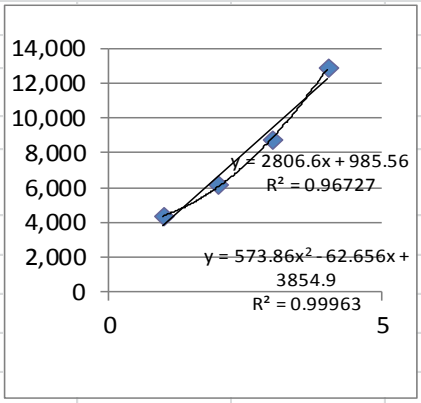
Table 9. Air Conditioning (continued)

Part 4. Regressions Using Microdata

Structure Type	Regression Coefficients								Predictions for Selected CDD'ss and Bedrooms			
										kBTUs/year (BTUs * 1,000)		
	Constant	Sig	CDD	Sig	BED* CDD	Sig	n	R^2	Bdrms	1,000	2,000	3,000
Mobile Home	889.85	0.00	-0.32	0.37	1.85	0.00	713	0.49	2	4,275	7,660	11,045
Single Family Detached	-8.86	0.94	0.46	0.02	1.58	0.00	6,667	0.50	3	5,181	10,371	15,561
Single Family Attached	456.22	0.83	0.68	0.44	1.08	0.00	777	0.42	3	4,363	8,270	12,177
Apartment 2-4 Units	-1,084.09	0.00	1.80	0.00	1.12	0.00	688	0.56	2	2,955	6,994	11,033
Apartment 5+ Units	-684.45	0.00	1.39	0.00	1.12	0.00	1,550	0.42	2	2,955	6,594	10,233
All Structure Types:												
All Survey Years	-109.42	0.22	0.53	0.00	1.55	0.00	10,395	0.51	3	5,075	10,259	15,443
1997 RECS	434.45	0.00	0.50	0.00	1.12	0.00	3,809	0.51	3	4,288	8,142	11,996
2001 RECS	465.29	0.00	-0.36	0.02	1.18	0.00	3,300	0.52	3	3,639	6,812	9,986
2005 RECS	-1,502.34	0.00	2.07	0.00	1.56	0.00	3,286	0.55	3	5,241	11,984	18,727

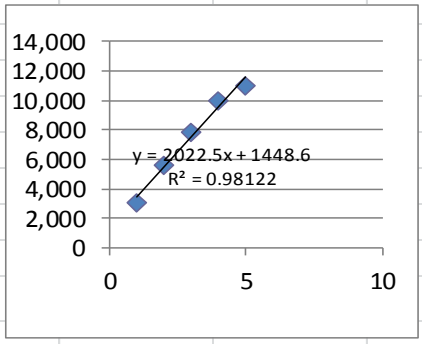
Part 5. Regressions Using Means

Structure Type	Bed-rooms	Mean BTU	Cases	Mean CDD
Mobile Home	0	581	1	416
	1	4,338	34	2,177
	2	6,108	355	1,500
	3	8,749	324	1,533
	4	12,814	26	1,772
	5	13,751	5	1,816
	Total	7,454	745	**1,555**



Best Trend Line: Polynomial pattern better

Structure Type	Bed-rooms	Mean BTU	Cases	Mean CDD
Single Family Detached	0	3,624	2	1,167
	1	3,088	134	1,233
	2	5,625	1,177	1,504
	3	7,861	3,872	1,531
	4	9,990	1,618	1,474
	5	11,017	304	1,453
	6	11,949	49	1,447
	7	27,753	8	1,598
	8	7,598	4	1,019
	9	10,135	1	453
	Total	8,068	7,169	**1,504**

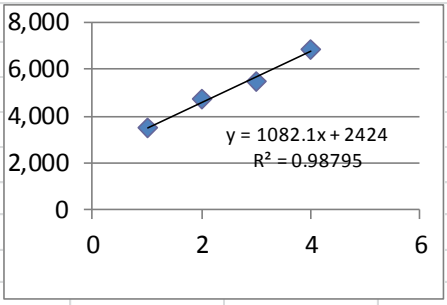


Best Trend Line: Linear pattern

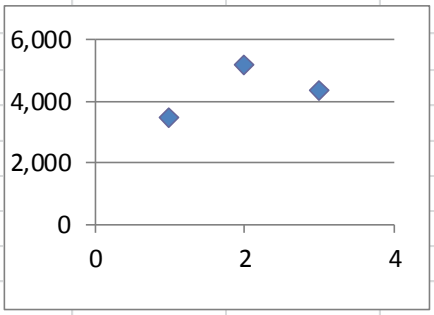
Table 9. Air Conditioning (continued)

Part 5. Regressions Using Means (continued)

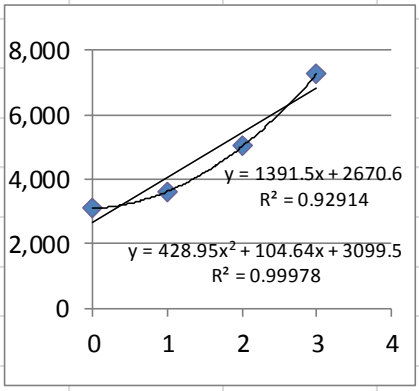
Structure Type	Bed-rooms	Mean BTU	Cases	Mean CDD	Best Trend Line
Single Family Attached	0	864	2	938	
	1	3,470	52	1,644	
	2	4,742	350	1,524	Linear Pattern
	3	5,471	375	1,281	
	4	6,834	108	1,182	
	5	6,524	22	974	
	6	16,001	3	1,580	
	Total	5,289	912	**1,376**	



Apartment 2-4 Units	0	4,718	7	1,854	
	1	3,487	180	1,617	
	2	5,194	383	1,473	No discernible pattern
	3	4,337	125	1,203	
	4	3,773	22	950	
	5	3,553	4	1,294	
	6	4,937	1	1,623	
	Total	4,562	722	**1,449**	



Apartment 5+ Units	0	3,110	77	1,587	
	1	3,601	691	1,654	
	2	5,057	738	1,622	
	3	7,263	121	1,615	Polynomial pattern best
	4	3,084	13	1,122	
	5	3,755	3	1,057	
	Total	4,498	1,643	**1,628**	



All Units	0	3,169	89	1,571	
	1	3,636	1091	1,612	
	2	5,384	3003	1,531	
	3	7,628	4817	1,505	
	4	9,714	1,787	1,452	Linear pattern
	5	10,613	338	1,421	
	6	12,046	53	1,458	
	7	27,753	8	1,598	
	8	7,598	4	1,019	
	9	10,135	1	453	
	Total	7,050	11,191	**1,511**	

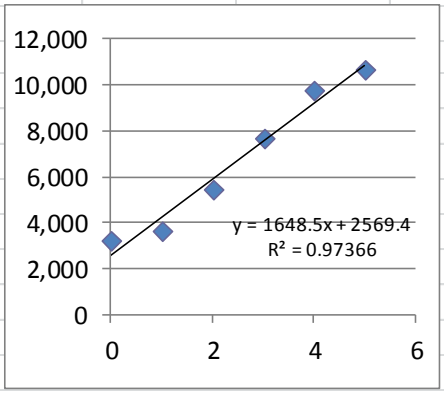


Table 9. Air Conditioning (continued)

Part 6: Regressions Using Means: Results

Structure Type	Regression Coefficients					Mean CDDs	Predictions at Selected CDD and Number of Bedrooms						
								kBTUs/year (x1,000)			kWh/Year		
	Con-stant	BED	BED^2	n	R^2		Bed-Rooms	1,000	2,000	3,000	1,000	2,000	3,000
Mobile Home	3,855	-62.66	573.86	739	1.00	1,555	2	3,875	7,749	11,624	1,135	2,271	3,406
Single Family Detached	1,449	2022.50	0	7,105	0.98	1,504	3	4,997	9,995	14,992	1,464	2,928	4,393
Single Family Attached	2,422	1083.20	0	885	0.99	1,376	3	4,122	8,244	12,366	1,208	2,415	3,623
Apartment 2-4 Units [3]	964	1,346	0	912	---	1,449	2	2,524	5,048	7,571	739	1,479	2,218
Apartment 5+ Units	3,100	104.64	428.95	1,627	1.00	1,449	2	3,468	6,935	10,403	1,016	2,032	3,048

Part 7: Comparing Regression Methods

Prediction Comparisons at Selected CDD and Number of Bedrooms										
Structure Type	Bedroom Values Shown	1: Microdata kBTUs/year at CDDs			2: Means kBTUs/year at CDDs			Microdata vs. Means		
		1,000	2,000	3,000	1,000	2,000	3,000	1,000	2,000	3,000
Mobile Home *	2	4,275	7,660	11,045	3,875	7,749	11,624	-9.4%	1.2%	5.2%
Single Family Detached	3	5,181	10,371	15,561	4,997	9,995	14,992	-3.5%	-3.6%	-3.7%
Single Family Attached	3	4,363	8,270	12,177	4,122	8,244	12,366	-5.5%	-.3%	1.5%
Apartment 2-4 Units **	2	2,955	6,994	11,033	2,524	5,048	7,571	-14.6%	-27.8%	-31.4%
Apartment 5+ Units	2	2,955	6,594	10,233	3,468	6,935	10,403	17.4%	5.2%	1.7%

* Mobile home coefficients non-sensical and not statistically significant.

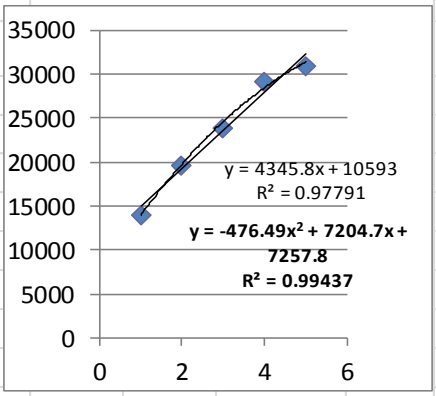
** For Apartment 2-4 Units, the pattern of means was based on a small sample and made little sense, so Single Family Detached coefficients were multiplied by the air conditioning bedroom ratio from multifamily/singlefamily ratio at 2,000 CDDs in Table 8, Part 3

Table 10. Water Heating

Part 1. Gas Water Heating

Bedrooms	Mean	Cases
0	11,948	93
1	14,086	772
2	19,759	2,051
3	23,988	3,190
4	29,249	1,335
5	31,070	250
6	42,342	41
7	49,098	5
9	72,772	1
Total	22,991	7,738

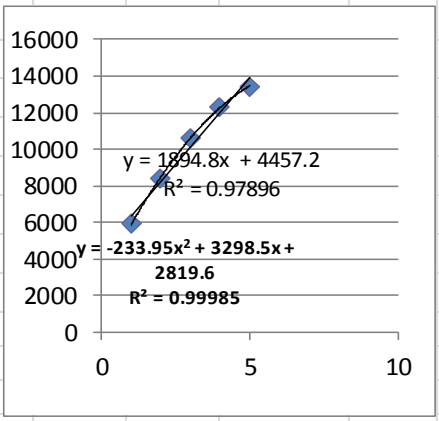
The polynomial line gives a slightly better fit.



Part 2. Electric Water Heating

Bedrooms	Mean	Cases
0	7,481	63
1	5,908	660
2	8,423	1,791
3	10,637	2,430
4	12,292	733
5	13,448	136
6	11,334	19
7	18,352	2
8	13,141	5
9	28,708	1
Total	9,673	5,840

The polynomial line gives a slightly better fit.



Part 3. Gas/Electric Ratios, by Bedrooms

	Mean BTUs			
Bedrooms	Gas	Electric	Ratio: Elec/Gas	
0	11,948	7,481	0.63	<---- can be ignored because the number
1	14,086	5,908	0.42	of cases is low
2	19,759	8,423	0.43	
3	23,988	10,637	0.44	<---- note inconsistency of 1-5 bedroom ratios
4	29,249	12,292	0.42	
5	31,070	13,448	0.43	
Total (0-9)*	22,991	9,673	0.42	

* Note: "Mean Total" is calculated by SPSS, and is weighted by the number of bedrooms

Conclude: According to GARD, these ratios are unexpectedly low.
PIH instructions used 0.55, and GARD recommends using that ratio

Table 10. Water Heating (continued)

Part 4. Adjustment for Local Climate

Estimated Inlet Water Temperature [IWT] = 74.3 - 0.003161 * HDD

Where HDD is the locality's average annual heating degree-days

Multiplier = (60 - IWT)/100 + 1

Thus, for every degree that IWT is under 60 degrees, water heating consumption increases 1%

Multiplier = 1 if HDD = 4,524

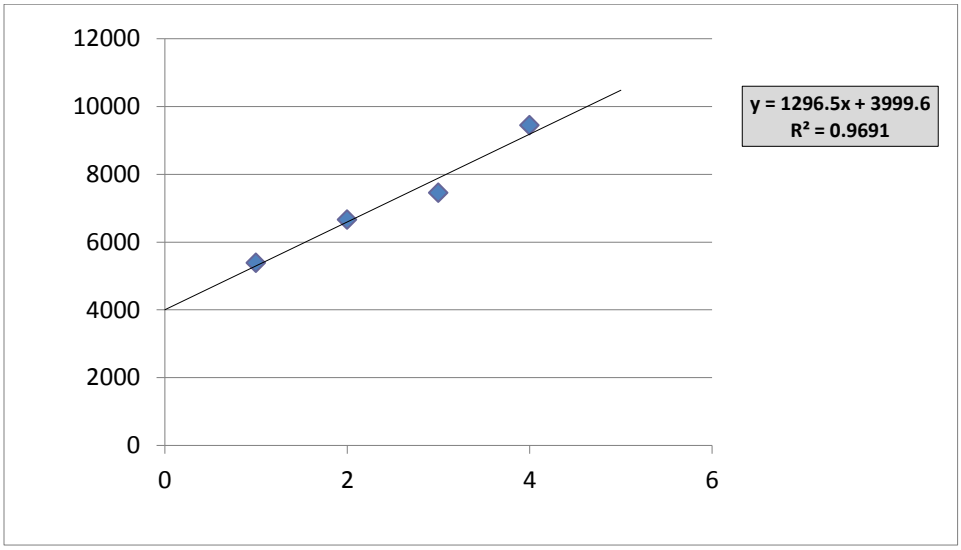
Part 5. Consumption and Cost by Fuel

Inlet Water Temperature	68.0	61.7	55.3
Multiplier	0.9202	0.9834	1.0467

				Estimated kBTUs			Estimated Therms/kWh			Estimated Cost		
	Con-	Coefficients		Heating Degree Days			Heating Degree Days			Heating Degree Days		
Bedrooms	stant	BED	BED^2	2,000	4,000	6,000	2,000	4,000	6,000	2,000	4,000	6,000
				Gas Water Heating						[At $1.20/therm]		
2	7,258	7,204.7	-476.5	18,185	19,434	20,683	182	194	207	$218	$233	$248
3				22,622	23,922	25,731	226	239	257	$271	$287	$309
4				26,183	27,982	29,780	262	280	298	$314	$336	$357
				Electric Water Heating						[At $0.12/kWh]		
2	2,820	3,298.5	-234.0	7,804	8,340	8,877	2,287	2,444	2,601	$274	$293	$312
3				9,763	10,434	11,105	2,861	3,057	3,254	$343	$367	$390
4				11,291	12,067	12,843	3,308	3,536	3,763	$397	$424	$452

Table 11. Cooking Fuel Use

Part 1. Average Natural Gas kBTU Consumption by Bedroom



Suggested Calculation Equations:

Natural Gas Cooking kBTUs = 1296.5 * Bedrooms + 3999.6

Electric Cooking kBTUs = 648.25 * Bedrooms + 1999.8

Part 2. Natural Gas Used for Cooking

Combined 1997, 2001, and 2005 RECS Surveys	Bedrooms	Mean kBTUs	Combined Sample Size (N)		Predicted Gas Consumption	Predicted Electric Consumption**
	0	5,010	64	*	4,000	2,000
	1	5,391	546		5,296	2,648
	2	6,664	1,151		6,593	3,296
	3	7,459	1,130		7,889	3,945
	4	9,448	382		9,186	4,593
	5	9,398	71	*	10,482	5,241
	6	18,065	14	*	11,779	5,889
	7	16,095	1	*	13,075	6,538
	* Too few cases for use				** Calculated as Gas * 0.5	

Table 12. Washer, Washer, Dryer, Freezer, Dishwasher, Pool, Hot Tub, Waterbed, and Large Acquarium Utilitization

Part 1: Washer, Dryer, Freezer, and Dishwasher

RECS Survey Year	Appliance	Structure Type					
		Mobile Home	Single Family Detached	Single Family Attached	Apartment 2-4 Units	Apartment 5+ Units	Total
1997	Clothes Washer	80%	94%	76%	41%	19%	76%
2001		86%	96%	89%	47%	21%	79%
2005		85%	96%	87%	55%	32%	82%
1997	Clothes Dryer (Electric)	72%	87%	65%	30%	14%	69%
2001		78%	91%	82%	43%	17%	74%
2005		78%	93%	78%	51%	27%	78%
1997	Separate Freezer	28%	46%	20%	11%	4%	34%
2001		31%	46%	28%	11%	5%	35%
2005		33%	42%	25%	10%	5%	32%
1997	Dishwasher	27%	54%	46%	17%	33%	46%
2001		37%	59%	59%	27%	40%	52%
2005		38%	65%	50%	33%	44%	57%

Part 2: Luxury Items--Pool, Waterbed, Hot Tub, Aquarium

RECS Survey Year		Structure Type					
		Mobile Home	Single Family Detached	Single Family Attached	Apartment 2-4 Units	Apartment 5+ Units	Total
1997	Luxury Items--Pool, Waterbed, Hot Tub, Aquarium [1]	11%	22%	10%	10%	6%	17%
2001		12%	21%	13%	9%	4%	16%
2005		7%	21%	6%	3%	3%	15%
Total		**10%**	**21%**	**10%**	**7%**	**5%**	**16%**

Note 1: "Aquarium" is defined as 20 gallons or more.

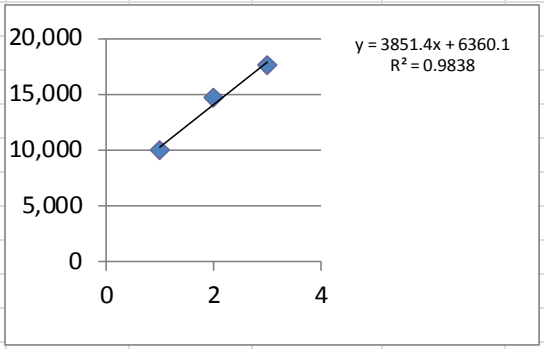
Table 13. Other Electric by Structure Type and Survey Year

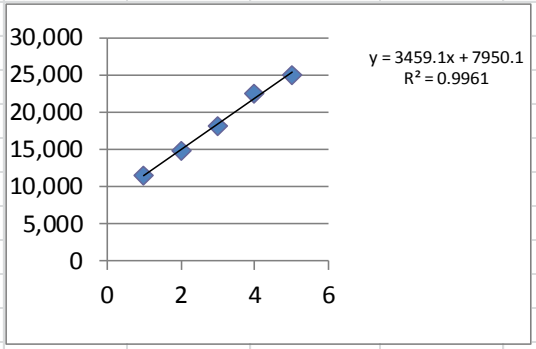
(Tables based on combined 1997/2001/2005 survey data unless otherwise indicated)

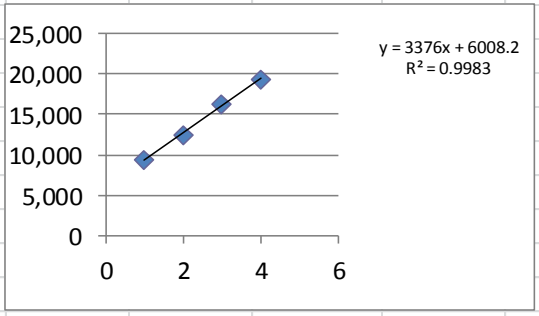
1. kBTUs for Other Electric, Excluding Luxury Items

	Excluding Dryer		Not Excluding Dryer	
Cases	Bedrooms	Mean BTUs	Bedrooms	Mean BTUs
		Mobile Home		
1	0	6,261	0	6,261
65	1	9,926	1	11,068
444	2	14,633	2	16,962
362	3	17,629	3	20,886
26	4	24,885	4	29,288
7	5	24,187	5	26,830
905	Total	15,853	Total	18,527
		Single Family Detached		
4	0	10,097	0	10,097
196	1	11,432	1	12,539
1,475	2	14,738	2	16,775
3,881	3	18,191	3	20,816
1,527	4	22,357	4	25,342
263	5	24,918	5	27,995
37	6	26,249	6	28,989
9	7	39,215	7	41,136
4	8	30,336	8	34,605
7,396	Total	18,491	Total	21,048
		Single Family Attached		
6	0	7,077	0	7,077
99	1	9,458	1	10,162
490	2	12,547	2	14,163
448	3	16,343	3	18,235
117	4	19,445	4	21,574
23	5	19,915	5	22,881
2	6	11,720	6	13,275
1,185	Total	14,519	Total	16,232

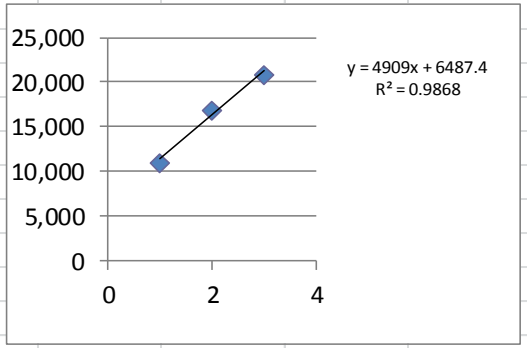
2. Also Excluding Electric Clothes Dryer

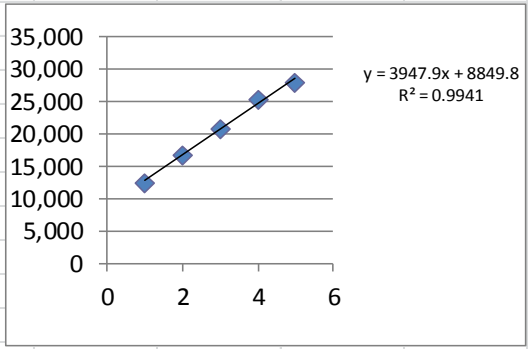






3. Not Excluding Electric Clothes Dryer





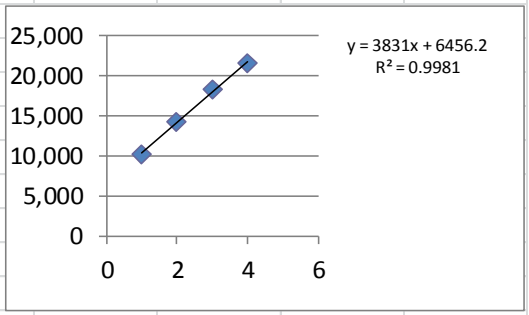


Table 13. Other Electric by Structure Type (continued)

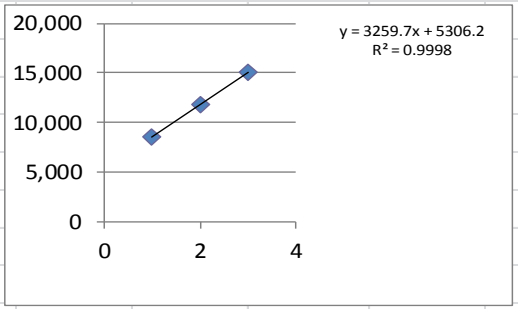
1. kBTUs for Other Electric, Excluding Luxury Items

Apartment 2-4 Units				
22	0	7,723	0	7,906
282	1	8,543	1	8,873
523	2	11,872	2	13,240
161	3	15,062	3	16,635
27	4	17,693	4	19,099
7	5	19,408	5	21,301
1,022	Total	11,572	Total	12,665

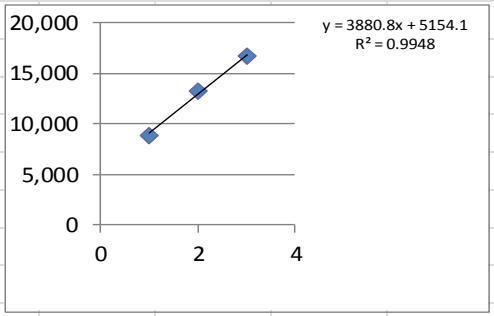
Apartment 5+ Units				
145	0	7,031	0	7,167
925	1	7,504	1	7,679
926	2	10,383	2	11,141
160	3	14,254	3	15,423
17	4	14,578	4	15,077
3	5	17,669	5	18,805
2,176	Total	9,263	Total	9,761

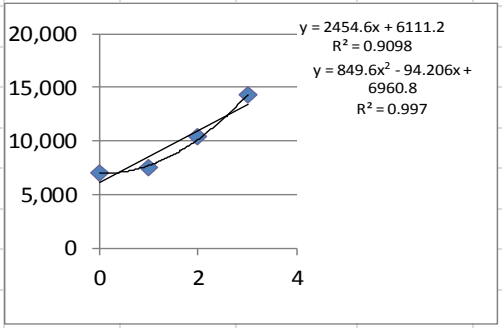
Total				
178	0	7,183	0	7,316
1,567	1	8,406	1	8,799
3,858	2	13,014	2	14,633
5,012	3	17,759	3	20,284
1,714	4	22,046	4	24,944
303	5	24,323	5	27,334
39	6	25,504	6	28,183
9	7	39,215	7	41,136
4	8	30,336	8	34,605
12,684	Total	15,791	Total	17,806

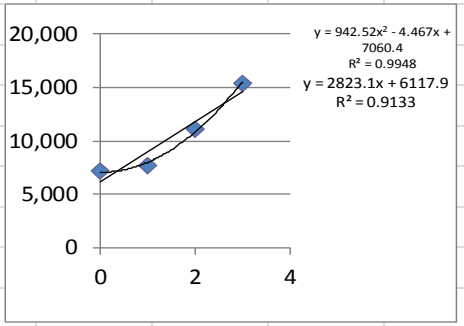
2. Also Excluding Electric Clothes Dryer

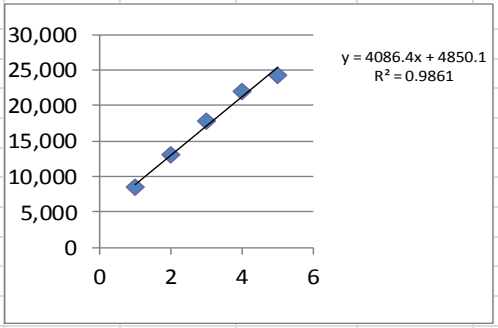


3. Not Excluding Electric Clothes Dryer

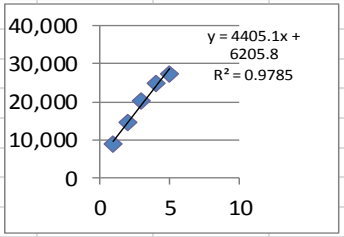




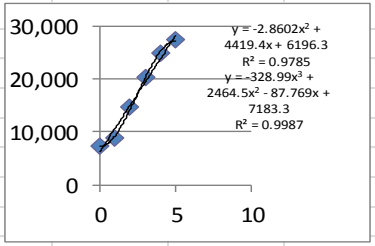




2a. Excluding 0-Bedrm Units, Linear Trend



2b. Including 0-Bedrm Units, Polynomial Trend



Order 2

Order 3

Table 13. Other Electric by Structure Type (continued)

Part 4. Regression-based kBTU Estimates for Other Electric By Number of Bedrooms and Structure Type, 1-4 Bedroom Units

	Bedrooms									
	Excluding Dryer					Including Dryer				
Structure Type	**1**	**2**	**3**	**4**	**Average**	**1**	**2**	**3**	**4**	**Average**
Mobile Home	10,212	14,063	17,914	21,766	15,989	11,396	16,305	21,214	26,123	18,760
Single Family Detached	**11,409**	**14,868**	**18,327**	**21,787**	**16,598**	**12,798**	**16,746**	**20,694**	**24,641**	**18,720**
Single Family Attached	9,384	12,760	16,136	19,512	14,448	10,287	14,118	17,949	21,780	16,034
Apartments 1-4 Units	8,566	11,826	15,085	18,345	13,455	9,035	12,916	16,797	20,677	14,856
Apartments 5+ Units	8,566	11,020	13,475	15,930	12,248	8,941	11,764	14,587	17,410	13,176
All Structure Types	8,937	13,023	17,109	21,196	15,066	10,611	15,016	19,421	23,826	17,218
As % of Single Family Detached										
Mobile Home	90%	95%	98%	100%	96%	89%	97%	103%	106%	**100%**
Single Family Detached [base]	100%	100%	100%	100%	100%	100%	100%	100%	100%	**100%**
Single Family Attached	82%	86%	88%	90%	87%	80%	84%	87%	88%	**86%**
Apartments 1-4 Units	75%	80%	82%	84%	81%	71%	77%	81%	84%	**79%**
Apartments 5+ Units	75%	74%	74%	73%	74%	70%	70%	70%	71%	**70%**

Part 5. Regression Values for 1-4 Bedrooms Plus Trended Estimates for Other Bedroom Sizes

	Bedrooms								
Structure Type	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Mobile Home	6,487.4	11,396.4	16,305.4	21,214.4	26,123.4	31,032.4	35,941.4	40,850.4	45,759.4
Single Family Detached	8,849.8	12,797.7	16,745.6	20,693.5	24,641.4	28,589.3	32,537.2	36,485.1	40,433.0
Single Family Attached	6,456.2	10,287.2	14,118.2	17,949.2	21,780.2	25,611.2	29,442.2	33,273.2	37,104.2
Apartments 1-4 Units	5,154.1	9,034.1	12,914.1	16,794.1	20,674.1	24,554.1	28,434.1	32,314.1	36,194.1
Apartments 5+ Units	6,117.9	8,941.0	11,764.1	14,587.2	17,410.3	20,233.4	23,056.5	25,879.6	28,702.7
All Structure Types	6,205.8	10,610.9	15,016.0	19,421.1	23,826.2	28,231.3	32,636.4	37,041.5	41,446.6

Table 13. Other Electric by Structure Type (continued)

Part 6. Bedroom Ratios Based on Regression and Trended Values

Structure Type	Bedrooms								
	0	1	2	3	4	5	6	7	8
Mobile Home	31%	54%	77%	100%	123%	146%	169%	193%	216%
Single Family Detached	43%	62%	81%	100%	119%	138%	157%	176%	195%
Single Family Attached	36%	57%	79%	100%	121%	143%	164%	185%	207%
Apartments 1-4 Units	31%	54%	77%	100%	123%	146%	169%	192%	216%
Apartments 5+ Units	42%	61%	81%	100%	119%	139%	158%	177%	197%
All Structure Types	32%	55%	77%	100%	123%	145%	168%	191%	213%

Part 7. Regression-Estimated BTUs for Other Electric By Survey Year

Survey	Bedrooms				
	1	2	3	4	5
RECS 1997	9,989	14,188	18,387	22,585	26,784
RECS 2001	9,633	14,435	19,238	24,040	28,843
RECS 2005	9,525	14,852	20,179	25,505	30,832
Combined Data Estimates	9,723	14,461	19,199	23,937	28,676
Combined vs. Annual Estimates					
RECS 1997	103%	98%	96%	94%	93%
RECS 2001	99%	100%	100%	100%	101%
RECS 2005	98%	103%	105%	107%	108%
1997 vs. Other Years					
RECS 1997	100%	100%	100%	100%	100%
RECS 2001	96%	102%	105%	106%	108%
RECS 2005	95%	105%	110%	113%	115%

Table 14. Alternative Structure Age Definitions and Related Sample Sizes

Part 1. Regroup Structure Ages by Time from Construction as of Survey Year

Variable AGE1		1997 RECS				2001 RECS				2005 RECS			
		Code	Range	Count	Percent	Code	Range	Count	Percent	Code	Range	Count	Percent
1	21+ years old	1	<1940	1174	19.9%	1	<1940	922	19.1%	1	<1940	640	14.6%
		2	1940-1949	550	9.3%	2	1940-1949	362	7.5%	2	1940-1949	281	6.4%
		3	1950-1959	772	13.1%	3	1950-1959	666	13.8%	3	1950-1959	514	11.7%
		4	1960-1969	877	14.9%	4	1960-1969	636	13.2%	4	1960-1969	489	11.2%
		5	1970-1976	780	13.2%	5	1970-1979	853	17.7%	5	1970-1979	751	17.1%
		6	1977-1979	365	6.2%	6	1980	128	2.7%	6	1980-1984	363	8.3%
2	11-20 years old	7	1980-1986	650	11.0%	7	1981-1989	649	13.5%	7	1985-1989	361	8.2%
		8	1987-1989	271	4.6%	8	1990	79	1.6%	8	1990-1994	305	7.0%
		9	1990	84	1.4%	9	1991-1995	279	5.8%	9	1995-1999	348	7.9%
3	10 years or newer	10	1991	59	1.0%	10	1996-1998	157	3.3%	10	2000-2002	173	3.9%
		11	1992	87	1.5%	11	1999	54	1.1%	11	2003	62	1.4%
		12	1993	32	0.5%	12	2000	31	0.6%	12	2004	65	1.5%
		13	1994	62	1.1%	13	2001	6	0.1%	13	2005	30	0.7%
		14	1995	74	1.3%	96	DK	0					
		15	1996	49	0.8%								
		16	1997	14	0.2%								

Part 2. Regroup RECS Age Data by Year of Construction

		Variable YEARMADE											
Variable AGE2		1997 RECS				2001 RECS				2005 RECS			
		Code	Range	Count	Percent	Code	Range	Count	Percent	Code	Range	Count	Percent
1	Pre-1950	1	<1940	1174	19.9%	1	<1940	922	19.1%	1	<1940	640	14.6%
		2	1940-1949	550	9.3%	2	1940-1949	362	7.5%	2	1940-1949	281	6.4%
2	1950-1969	3	1950-1959	772	13.1%	3	1950-1959	666	13.8%	3	1950-1959	514	11.7%
		4	1960-1969	877	14.9%	4	1960-1969	636	13.2%	4	1960-1969	489	11.2%
3	1970-1979	5	1970-1976	780	13.2%	5	1970-1979	853	17.7%	5	1970-1979	751	17.1%
		6	1977-1979	365	6.2%	6	1980	128	2.7%	6	1980-1984	363	8.3%
4	1980-2005 (Note different survey age definitions used)	7	1980-1986	650	11.0%	7	1981-1989	649	13.5%	7	1985-1989	361	8.2%
		8	1987-1989	271	4.6%	8	1990	79	1.6%	8	1990-1994	305	7.0%
		9	1990	84	1.4%	9	1991-1995	279	5.8%	9	1995-1999	348	7.9%
		10	1991	59	1.0%	10	1996-1998	157	3.3%	10	2000-2002	173	3.9%
		11	1992	87	1.5%	11	1999	54	1.1%	11	2003	62	1.4%
		12	1993	32	0.5%	12	2000	31	0.6%	12	2004	65	1.5%
		13	1994	62	1.1%	13	2001	6	0.1%	13	2005	30	0.7%
		14	1995	74	1.3%	96	DK	0					
		15	1996	49	0.8%								
		16	1997	14	0.2%								

Table 14. Alternative Structure Age Definitions and Related Sample Sizes (continued)

Part 3. RECS Residential Construction Sample Sizes Grouped by Time from Survey*

AGE1 Categories	RECS Survey Year			Total
	1997	2001	2005	
Built 21+ years before Survey Date	4,153	3,567	3,038	10,758
Built 11-20 Years Before Survey	1,015	728	666	2,409
Built Less Than 11 Years Before Survey	732	527	678	1,937
Total	5,900	4,822	4,382	15,104

* Note that categorizations are relative to year of survey.

Part 4. RECS Residential Construction Grouped by Year Built

AGE2 Categories	RECS Survey Year			Total
	1997	2001	2005	
Built Pre-1950	1,724	1,284	921	3,929
Built 1950-1969	1,649	1,302	1,003	3,954
Built 1970-1979	1,145	853	751	2,749
Built 1980-2005	1,382	1,383	1,707	4,472
Total	5,900	4,822	4,382	15,104

Table 15. Heating Predictions by Structure Type and Age – Microdata and Means Regression Methods

Part 1. Gas Heating Using Microdata Regressions

	Regression Coeffients								Estimates For Specified Bedrooms (2 or 3)						
					BEDx				Heating Degree Days			Ratio to All Cases/21+ Years			
Structure Type and Age	Intercept	Sig	HDD	Sig	HDD	Sig	Cases	R^2	2,000	4,000	6,000	2,000	4,000	6,000	All
1. All Structure Types (3 Bedrooms)															
All Ages	9,528	0.00	4.022	0.00	2.501	0.00	7,682	0.38	32,578	55,628	78,678	1.00	**1.00**	1.00	1.00
21+ Years Old	9,451	0.00	4.198	0.00	2.733	0.00	5,876	0.40	34,245	59,039	83,833	1.05	**1.06**	1.07	1.05
11-20 Years Old	6,506	0.00	1.244	0.11	2.934	0.00	940	0.41	26,598	46,690	66,782	0.82	**0.84**	0.85	0.82
Under 11 Years Old	11,448	0.00	1.709	0.01	2.131	0.00	860	0.41	27,652	43,856	60,060	0.85	**0.79**	0.76	0.85
2. Single Family Detached (3 Bedrooms)															
21+ Years Old	11,879	0.00	5.613	0.00	2.251	0.00	3,830	0.41	36,611	61,343	86,075	1.00	1.00	1.00	1.00
11-20 Years Old	7,800	0.01	0.784	0.59	3.130	0.00	593	0.39	28,148	48,496	68,844	0.77	0.79	0.80	0.79
Under 11 Years Old	10,877	0.00	2.386	0.02	2.043	0.00	643	0.44	27,907	44,937	61,967	0.76	0.73	0.72	0.74
3. Apartment 5+ Units (2 Bedrooms)															
21+ Years Old	408	0.82	4.650	0.00	1.006	0.00	692	0.32	13,732	27,056	40,380	1.00	1.00	1.00	1.00
11-20 Years Old	2,984	0.36	2.395	0.02	0.914	0.05	85	0.27	11,430	19,876	28,322	0.33	0.73	0.70	0.59
Under 11 Years Old	823	0.90	6.967	0.00	-0.841	0.12	59	0.31	11,393	21,963	32,533	0.33	0.81	0.81	0.65

= Not significant at 5% level

Too few cases; low R-sq; inconsistent coefficients (more bedrooms = less consumption); unexpected age relationship

Part 2. Gas Heating Using Regression Means

Structure Type and Age	Mean BTUs	Ratio to All/21+ Years	Cases
Part 2.2: Electric Heating			
1. All Structure Types (3 Bedrooms)			
All Ages	11,515	**1.00**	
21+ Years Old	12,386	**1.08**	2,144
11-20 Years Old	10,645	**0.92**	1,057
Under 11 Years Old	10,208	**0.89**	724
2. Single Family Detached (3 Bedrooms)			
21+ Years Old	15,773	1.00	1,045
11-20 Years Old	13,658	0.87	475
Under 11 Years Old	11,378	0.72	352
3. Apartment 5+ Units (2 Bedrooms)			
21+ Years Old	6,988	1.00	625
11-20 Years Old	5,447	0.78	281
Under 11 Years Old	5,599	0.80	153

	Electric Heat
All ages	**1.00**
21+ Years Old	**1.09**
11-20 Years Old	**0.94**
Under 11 Years Old	**0.85**

	Average: Gas and Electric Heat
All ages	**1.00**
21+ Years Old	**1.07**
11-20 Years Old	**0.89**
Under 11 Years Old	**0.83**

Table 15 Heating Predictions by Structure Type and Age Using Microdata and Regression Means (continued)

Part 3. Electric Heating Using Microdata Regressions

	Regression Coeffients								Estimates For Specified Bedrooms (2 or 3)						
					BEDx				Heating Degree Days			Ratio to All Cases/21+ Years			
Structure Type and Age	Intercept	Sig	HDD	Sig	HDD	Sig	Cases	R^2	2,000	4,000	6,000	2,000	4,000	6,000	All
1. All Structure Types (3 Bedrooms)															
All Ages	2,231	0.00	0.405	0.00	0.991	0.00	3,923	0.44	8,987	15,743	22,499	1.00	**1.00**	1.00	1.00
21+ Years Old	2,355	0.00	0.445	0.01	1.104	0.00	2,143	0.44	9,869	17,383	24,897	1.10	**1.10**	1.11	1.10
11-20 Years Old	1,795	0.00	0.230	0.12	1.015	0.00	1,055	0.55	8,345	14,895	21,445	0.93	**0.95**	0.95	0.94
Under 11 Years Old	3,170	0.00	0.010	0.96	0.790	0.00	723	0.39	7,930	12,690	17,450	0.88	**0.81**	0.78	0.82
2. Single Family Detached (3 Bedrooms)															
21+ Years Old	2,036	0.00	2.035	0.00	0.771	0.00	1,044	0.45	10,732	19,428	28,124	1.00	1.00	1.00	1.00
11-20 Years Old	1,873	0.00	1.687	0.00	0.678	0.00	474	0.58	9,315	16,757	24,199	0.87	0.86	0.86	0.86
Under 11 Years Old	2,298	0.00	1.135	0.00	0.589	0.00	351	0.44	8,102	13,906	19,710	0.75	0.72	0.70	0.72
3. Apartment 5+ Units (2 Bedrooms)															
21+ Years Old	1,856	0.00	0.845	0.00	0.426	0.00	624	0.38	6,102	10,348	14,594	1.00	1.00	1.00	1.00
11-20 Years Old	1,260	0.00	0.620	0.00	0.408	0.00	279	0.40	4,948	8,636	12,324	0.81	0.83	0.84	
Under 11 Years Old	1,102	0.05	0.896	0.00	0.167	0.03	152	0.41	3,896	6,690	9,484	0.64	0.65	0.65	

Part 4. Electric Heating, Using Means

	Regression Coeffients								Estimates For Specified Bedrooms (2 or 3)						
					BEDx				Heating Degree Days			Ratio to All Cases/21+ Years			
Structure Type and Age	Intercept	Sig	HDD	Sig	HDD	Sig	Cases	R^2	2,000	4,000	6,000	2,000	4,000	6,000	All
1. All Structure Types (3 Bedrooms)															
All Ages	2,231	0.00	0.405	0.00	0.991	0.00	3,923	0.44	8,987	15,743	22,499	1.00	**1.00**	1.00	1.00
21+ Years Old	2,355	0.00	0.445	0.01	1.104	0.00	2,143	0.44	9,869	17,383	24,897	1.10	**1.10**	1.11	1.10
11-20 Years Old	1,795	0.00	0.230	0.12	1.015	0.00	1,055	0.55	8,345	14,895	21,445	0.93	**0.95**	0.95	0.94
Under 11 Years Old	3,170	0.00	0.010	0.96	0.790	0.00	723	0.39	7,930	12,690	17,450	0.88	**0.81**	0.78	0.82
2. Single Family Detached (3 Bedrooms)															
21+ Years Old	2,036	0.00	2.035	0.00	0.771	0.00	1,044	0.45	10,732	19,428	28,124	1.00	1.00	1.00	1.00
11-20 Years Old	1,873	0.00	1.687	0.00	0.678	0.00	474	0.58	9,315	16,757	24,199	0.87	0.86	0.86	0.86
Under 11 Years Old	2,298	0.00	1.135	0.00	0.589	0.00	351	0.44	8,102	13,906	19,710	0.75	0.72	0.70	0.72
3. Apartment 5+ Units (2 Bedrooms)															
21+ Years Old	1,856	0.00	0.845	0.00	0.426	0.00	624	0.38	6,102	10,348	14,594	1.00	1.00	1.00	1.00
11-20 Years Old	1,260	0.00	0.620	0.00	0.408	0.00	279	0.40	4,948	8,636	12,324	0.81	0.83	0.84	
Under 11 Years Old	1,102	0.05	0.896	0.00	0.167	0.03	152	0.41	3,896	6,690	9,484	0.64	0.65	0.65	

Table 15. Heating Predictions by Structure Type and Age Using Microdata and Regression Means (continued)

Part 5. Single Family 3 Bedroom Fuel Consumption (kBTUs) by Year Built[1]

	Year Structure Built			
Primary Heating Fuel	**Pre-1950**	**1950-1969**	**1970-1979**	**1980 on**
Natural Gas				
Combined Surveys	77,949	59,374	50,175	45,527
1997 Survey	86,911	66,514	56,900	52,195
2005 Survey	61,705	49,981	44,312	40,435
Electric Resistance Heat				
Combined Surveys	25,298	18,688	20,980	15,223
1997 Survey	33,321	23,605	25,308	18,434
2005 Survey	12,465	10,059	10,644	11,616

[1] Sample sizes for residences built from 1970 to 1979 are too small to produce results at desired statistical levels, and should be considered to have larger confidence intervals than other estimates. Results are not provided for other structure types because sample sizes are inadequate to produced statistically reliable estimates.

Table 16. Air Conditioning Predictions by Structure Age and Type Using Microdata amd Means Methods

Part 1. Age of Air Conditioner by Age of Structure and Structure Type*

Structure Type and Age	Unweighted Sample Count						Unweighted Sample Percent			
	<2 Years Old	2-4 Years	5-9 Years	10-19 Years	20+ Years	Total	<10 Years	10-19 Years	20+ Years	Total
All										
21+ Years Old	412	549	847	801	597	3,206	**56%**	**25%**	**19%**	**100%**
11-20 Years Old	119	127	173	739	9	1,167	**36%**	**63%**	**1%**	**100%**
> 11 Years Old	200	301	572	28	8	1,109	**97%**	**3%**	**1%**	**100%**
Total	731	977	1,592	1,568	614	5,482	**60%**	**29%**	**11%**	**100%**
Single Family Detached										
21+ Years Old	372	518	786	750	441	2,867	**58%**	**26%**	**15%**	**100%**
11-20 Years Old	106	118	139	601	9	973	**37%**	**62%**	**1%**	**100%**
> 11 Years Old	193	266	513	24	7	1,003	**97%**	**2%**	**1%**	**100%**
Total	671	902	1,438	1,375	457	4,843	**62%**	**28%**	**9%**	**100%**
Apartments With 5+ Units										
21+ Years Old	40	31	61	51	156	339	**39%**	**15%**	**46%**	**100%**
11-20 Years Old	13	9	34	138	0	194	**29%**	**71%**	**0%**	**100%**
> 11 Years Old	7	35	59	4	1	106	**95%**	**4%**	**1%**	**100%**
Total	60	75	154	193	157	639	**45%**	**30%**	**25%**	**100%**

* Insufficient sample sizes to accurately categorize other structure types and cells with fewer than 30 cases.

Table 16. Air Conditioning Predictions by Structure Age and Type Using Microdata amd Means Methods (continued)

Part 2. Type and Number of Air Conditioning Equipment

Type AC	Structure Type					Total
	Mobile Home	Single Family Detached	Single Family Attached	Apartment 2-4 Units	Apartment 5+ Units	
Central Air	450	4,902	566	305	873	7,096
1 Window AC	179	1,061	157	252	555	2,204
2 Window AC	83	701	120	125	168	1,197
3+ Window AC	22	402	60	35	36	555
Both Central & Window	11	103	9	5	11	139
Not Applicable/No Answer	262	2,227	404	382	638	3,913
Total	1,007	9,396	1,316	1,104	2,281	15,104

Table 16. Air Conditioning Predictions by Structure Age and Type Using Microdata and Means Methods

(Combined 1997, 2001, & 2005 survey data)

Part 3. Regression Estimates for Air Conditioning

	Regression Coeffients (includes all units with any AC)								Estimates For Specified Bedrooms						
									Cooling Degree Days			Ratio to All Cases/21+ Years			
Structure Type and Age	Inter-cept	Sig	CDD	Sig	BEDxCDD	Sig	Cases	R^2	1,000	2,000	3,000	1,000	2,000	3,000	All
1. All Structure Types (3 Bedroom CDD estimates)									Unexpected, suspect results*						
All Ages	-170	0.06	0.752	0.00	1.478	0.00	11,190	0.51	5,016	10,202	15,388	1.00	**1.00**	1.00	1.00
21+ Years Old	-253	,013	1.417	0.00	1.127	0.00	7,561	0.46	4,545	9,343	14,141	0.91	**0.92**	0.92	0.91
11-20 Years Old	592	0.01	-0.417	0.03	1.895	0.00	1,988	0.57	5,860	11,128	16,396	1.17	**1.09**	1.07	1.17
Under 11 Years Old	77	0.77	-0.209	0.42	2.006	0.00	1,639	0.59	5,886	11,695	17,504	1.17	**1.15**	1.14	1.17
2. Single Family Detached (3 Bedrooms)										Three Bedroom Values					
All Ages	-45	0.71	0.695	0.00	1.500	0.00	7,169	0.50	5,150	10,345	15,540	1.03	**1.01**	1.01	1.03
21+ Years Old	-80	0.55	1.912	0.00	0.976	0.00	4,968	0.45	4,760	9,600	14,440	0.95	**0.94**	0.94	0.95
11-20 Years Old	500	0.14	-0.863	0.05	2.095	0.00	1,129	0.58	5,922	11,344	16,766	1.18	**1.11**	1.09	1.18
Under 11 Years Old	425	0.24	-1.185	0.01	2.229	0.00	1,072	0.57	5,927	11,429	16,931	1.18	**1.12**	1.10	1.18
3. Apartment 5+ Units (2 Bedrooms)										Two Bedroom Values					
All Ages	-678	0.00	1.676	0.00	0.958	0.00	1,643	0.42	3,872	8,422	12,972	0.77	**0.83**	0.84	0.77
21+ Years Old	-762	0.00	1.581	0.00	1.048	0.00	1,125	0.37	3,963	8,688	13,413	0.79	**0.85**	0.87	0.79
11-20 Years Old	-60	0.87	1.61	0.00	0.763	0.00	334	0.51	3,836	7,732	11,628	0.76	**0.76**	0.76	0.76
Under 11 Years Old	-1,633	0.00	2.59	0.00	0.844	0.00	184	..607	3,485	8,603	13,721	0.69	**0.84**	0.89	0.69

* These regression values include all cases with any type of air conditioning, as has been done in the past. These results are suspect, both because of a number of suspect regression values and the fact that newer units (known to have, on average, more efficient air conditioners) were not found to be more efficient than old units. Limited additonal research was done which indicated that the expected relationships do occur if tight defintions are applied to air conditioning (e.g., use central air in structures of similar size), but more research plus policy input on that research would be needed to set an alternative definitional standard.

Table 16. Air Conditioning Modeling Results (continued)

Part 4. Regressions Using Means

Structure Type	Regression Coefficients					Mean CDD	Predictions at Selected CDD and Number of Bedrooms						
	Con-stant	BED	BED^2	n	R^2		Bed-Rooms	kBTUs/year (x1,000)			kWh/Year		
								1,000	1,500	3,000	1,000	1,500	3,000
Mobile Home	3,855	-62.66	573.86	739	1.00	1,555	2	3,875	5,812	11,624	1,135	1,703	3,406
Single Family Detached	1,449	2022.50	0	7,105	0.98	1,504	3	4,997	7,496	14,992	1,464	2,196	4,393
Single Family Attached	2,422	1083.20	0	885	0.99	1,376	3	4,122	6,183	12,366	1,208	1,812	3,623
Apartment 2-4 Units [3]	964	1,346	0	912	---	1,449	2	2,523	3,785	7,569	739	1,109	2,218
Apartment 5+ Units	3,100	104.64	428.95	1,627	1.00	1,449	2	3,468	5,201	10,403	1,016	1,524	3,048

Part 5. Air Conditioning BTU Consumption Micro-Data and Simple Average Ratios

Structure Type and Age	Mean BTUs*	Ratio to All Cases	Cases	Average Ratio of Microdata & Means
1. All Structure Types		Unexpected results		
All Ages	7,050	**1.00**	11,191	**1.00**
21+ Years Old	6,124	**0.87**	7,562	**0.89**
11-20 Years Old	8,712	**1.24**	1,989	**1.16**
Under 11 Years Old	9,308	**1.32**	1,640	**1.23**
2. Single Family Detached				
All Ages (3 bedroom)	7,861	**1.00**	3,872	**1.00**
21+ Years Old	7,119	**0.91**	2,639	**0.92**
11-20 Years Old	9,077	**1.15**	643	**1.13**
Under 11 Years Old	8,983	**1.14**	590	**1.12**
3. Apartment 5+ Units				
All Ages (2 bedroom)	5,057	**1.00**	738	**1.00**
21+ Years Old	4,599	**0.91**	492	**0.96**
11-20 Years Old	6,096	**1.21**	151	**1.08**
Under 11 Years Old	5,774	**1.14**	95	**1.10**

* Simple average of BTU's used for cooling by all structures with any air conditioning equipment. The reason there are fewer cases shown for mean BTU values for 2-bedroom 5+ unit structures and 3-bedroom single family detached structures is that the micor-data values are based on regressions using all bedroom sizes while the BTU average values are based only on the respective bedroom sizes valued.

Table 17. Summary of Multi-Year Regressions and Other Values

Utility	1997/2001/2005 Regression Parameters			HUD HUSM Revised Regression Parameters							
	Constant	HDD	HDDxBdrms	Bedroom Coefficient	Constant	Adj. from Natural Gas	Added if >=3 Bdrms	Coeff for xDD	Coeff for xDD*Bdrms	Coeff for xDD squared	Coeff for Bdrms * xDD^2
1.1 Gas Heating											
Mobile Home	Gas heat values * .86			na	-1144.7	na	na	11.75380	0.373003	-0.000482	0.000000
Single Family Detached	11,353.1	6.85584	1.57194	na	5564.5	na	na	3.87028	4.074306	0.000000	-0.000193
Single Family Attached	9,765.8	9.85061	0.12307	na	20276.4	na	na	1.55103	2.477753	0.000000	0.000000
Apartment 2-4 Units	3,916.6	9.25744	1.24844	na	-9535.5	na	na	7.47292	5.667555	0.000000	-0.000406
Apartment 5+ Units	521.7	4.47964	0.89437	na	-3707.0	na	na	6.36576	0.575422	-0.000351	0.000000
1.2 LPG Heating											
Mobile Home	Insufficient cases for analysis -- actual energy use for propane and natural gas assumed to be the same. The DOE conversion factor is 1 therm = 1.0949 gallons of propane.,			Insufficient cases for analysis -- natural gas consumption converted into LPG equivalent units							
Single Family Detached											
Single Family Attached											
Apartment 2-4 Units											
Apartment 5+ Units											
1.3 Electric Resistance Heating											
Mobile Home	3,105.5	2.754	0.107	na	-360.4	na	na	4.91118	0.106173	-0.000170	0.000000
Single Family Detached	2,486.6	2.260	.546	na	160.5	na	na	3.05608	0.925467	-0.000172	0.000000
Single Family Attached	2,888.3	0.908	0.597	na	3429.3	na	na	0.95110	0.787405	0.000000	0.000000
Apartment 2-4 Units*	2,888.3	0.908	0.597	na	2344.3	na	na	1.14258	0.551677	0.000000	0.000000
Apartment 5+ Units	1,874.1	.576	.485	na	2071.9	na	na	0.74502	0.676854	0.000000	0.000000

* Single family attached used for 2-4 unit apartments.

1.4 Heat Pump Heating

Mobile Home	Apply method cited below	
Single Family Detached*	FactorH =constant of .412069 + (-.012766*typical low temp F) Resistance heat adj. factor =3.412 /(heat pump HSPF * (1- FactorH))	Electric heat estimates based on mix of resistance and heat pump equipment. Heat pump estimates use an SFPF of 6.7 as opposed to 7.8 used in recent Riley estimates.
Single Family Attached		
Apartment 2-4 Units		
Apartment 5+ Units		

***Regression not used but produces similar values only single family detached.**

1.5 Oil Heating (Regression on Means)	Multi-year Estimates			HUD HUSM Regression Parameters							
	Constant	BED	Mean HDD	Bedroom Coef	Constant	Adjustment from Natural Gas	Added if >=3Bdrm	Coeff for xDD	Coeff for xDD*Bdrms	Coeff for xDD squared	Coeff for Bdrms * xDD^2
Mobile Home	Single Family Detached * Str. Factor			na	960.8	na	na	11.06409	-1.077004	0.000013	0.000000
Single Family Detached	51,152.0	14,903.00	6,107.000	na	5564.5	na	na	3.87028	4.074306	0.000000	-0.000193
Single Family Attached	=(constant +BED*3bedrms)*local HDD/6107			na	2106.0	na	na	2.97520	3.353263	0.000000	0.000000
Apartment 2-4 Units				na	27473.6	na	na	1.15573	3.726906	0.000000	0.000000
Apartment 5+ Units				na	-3707.0	na	na	6.36576	0.575422	-0.000351	0.000000

Table 17. Summary of Multi-Year Regression and Other Values (continued)

	Revised Report Calculation Method				Current HUSM Calculation Method					
2: Air Conditioning	Constant	Beds	**BED^2**	Mean CDD	**Bedroom Coef**	**Constant**	**Adjustment from Natural Gas**	**Added if >=3Bdrm**	**Coeff for xDD**	**Coeff for xDD*Bdrms**
Mobile Home	Structure Type Factor used				na	na	na	na	0.13780	1.695300
Single Family Detache	1,449	2022.50	0.000	1,504	na	na	na	na	0.60520	1.546300
Single Family Attached	2,422	1083.20	0.000	1,376	na	na	na	na	-0.08000	1.675700
Apartment 2-4 Units	964	1,346	0.000	1,449	na	na	na	na	1.75110	0.908100
Apartment 5+ Units	Suspect estimates; 2-4 unit apt. values used				na	na	na	na	0.99250	1.080400

AC kBTUs = (constant + #bedrms *Beds + #bedrms * Beds*Beds) *Local CDD/Mean CDD

Efficiency values are set at 95% of 1-bedroom values and 2-4 unit apartments use single family attached regression factors rather than 2-4 unit apartment factors because of statistical concerns.

3: Water Heating	**Constant**	**BED**	**BED^2**	**Bedroom Coef**	**Constant**	**Adjustment from Natural Gas**
Gas	7,258.0	7,204.7	-476.5	4,359.0	7,815.0	na
Electric	2,820.0	3,298.5	-234.0	2,397.0	4,298.0	0.6
LPG (derived from NG	Use natural gas values			na	na	na
Fuel Oil*	na	na	na	4,794.0	8,597.0	1.1

4: Cooking	**Constant**	**BED**	**Bedroom Coef**	**Constant**	**Adjustment from Natural Gas**
Gas	3,999.6	1,296.50	1733.3	4473.8	na
Electric	1,999.8	648.25	866.6	2236.9	0.5
LPG*	Use natural gas value		= Natural Gas Values		

* Natural gas value

5: Other Electric	**Constant**	**BED**	**Bedroom Coef**	**Constant**	**Added if >=3bedrm**
Mobile Home	6,487.4	4,909.0	4345.8	7116.6	0
Single Family Detache	8,849.8	3,947.9	4192.6	9017.6	1536
Single Family Attached	6,456.2	3,831.0	3924.2	6388.5	1536
Apartment 2-4 Units	5,154.1	3,880.8	3678.4	5995.5	0
Apartment 5+ Units	6,117.9	2,823.1	3095.1	6401.1	0

Table 17. Summary of Multi-Year Regression and Other Values (continued)

Part 5. Miscellaneous Adjustments

6: Miscellaneous Adjustment Factors					Variable Names
6.0 Climate					
Heating degree days	4000		Assumed (approximate U.S. average)		HDDTot
Typical Low Temperature	14.9		Assumed (example is for Detroit)		LowTemp
Cooling Degree Days	1500		Assumed (approximate U.S. average)		CDDTot
6.1 LPG/Propane Factor	1.0949		Engineering relationship; source EIA/DOE		Factor.LPG
6.2 Cold water inlet temp.	61.66		Engineering relationship: = 74.3 - 0.003161*HDDTot		
Cold Water Temp Factor	0.97		Factor applied to water heating estimate		Factor.CWater
6.3 Heat Pump Factor					
Heat Pump HSPF	7.85		Heat pump efficiency ; range 6.6 to 9.1; used average		HSPF
Heat pump factor	0.56		Calculated from HSPF and Low Temperature		Factor.HHeat
6.4 Structure Type					
Mobile home	0.86				Factor.MH
Single family detached	1.00				Factor.SFD
Single family attached	0.89		From Table 7, average structure type		Factor.SFA
Apartment with 2-4 units	0.90		factors, gas or electric heating,		Factor.AP2
Apartment with 5 or more units	0.51		regression on microdata or on means		Factor.AP5
6.5 Age of Unit					
All ages	1.00		Average of gas & electric heating age		
21+ years old	1.07		factors; Report 6, Table 15, part 2.2.		Factor.Age21
11-20 years old	0.89		Applied to air conditioning as well as		Factor.Age11
1 to 10 years old	0.83		heating		Factor.Age10
6.6 Trending: Equipment					
	2012/2001	Factor			
Heating, gas or oil	1.04	0.962	Efficiency improvement of equipment		Factor.Trend.GHeat
Heating, Electric	1.00	1.000	from middle of RECS years (1997-2001-		Factor.Trend.EHeat
Heating, Heat Pump	1.22	0.820	2005) to 2012; "Factor" is multiplier		Factor.Trend.HHeat
Air Conditioning	1.21	0.826	applied to 1997-2001-2005 equations		Factor.Trend.AC
6.7 Energy Star	1.04	0.960	Calculated Energy Star factor		Factor.EnergyStar
6.8 Bedroom Adjustments					
All efficiency values based on 85-86 percent of 1-bedroom values					
Electric and heat pump heating for 0- and 1-bedroom mobile homes based on 5+ unit apartment					
bedroom relationships because this category had most units of this type and mobile home samples					
were too small or non-existent (0-bedroom units set at 64% or 3-bedroom value and 1-bedrooms set at 75.5 percent).					

Table 18. Multi-Year Regression vs. HUSM Comparison Model Values

Part 1. Comparative Model Values (shaded bedroom sizes are common for heating fuel type specified)

Utility	Revised Estimates						Comparison HUSM Model					
	Estimated Consumption in kBTUs per Year at 4,000 HDD, 1,500 CDD and Cold Water Temperature of 61.7											
1.1 Gas Heating	Bedrooms						Bedrooms					
	0	**1**	2	**3**	**4**	**5**	**0**	**1**	**2**	**3**	**4**	**5**
Mobile Home	32,942	38,755	44,163	49,570	54,978	60,385	35,685	39,650	41,140	42,635	44,127	45,619
Single Family Detached	38,305	45,064	51,352	57,640	63,928	70,215	30,828	34,254	47,462	60,670	73,878	87,086
Single Family Attached	42,211	49,661	50,153	50,645	51,137	51,630	32,752	36,392	46,303	56,214	66,125	76,036
Apartment 2-4 Units	39,049	45,940	50,934	55,928	60,921	65,915	32,752	36,392	46,303	56,214	66,125	76,036
Apartment 5+ Units	18,715	22,018	25,595	29,173	32,750	36,328	16,600	18,444	20,746	23,047	25,349	27,651
1.2 LPG Heat												
Mobile Home	32,942	38,755	44,163	49,570	54,978	60,385	35,685	39,650	41,140	42,635	44,127	45,619
Single Family Detached	38,305	45,064	51,352	57,640	63,928	70,215	30,828	34,254	47,462	60,670	73,878	87,086
Single Family Attached	42,211	49,661	50,153	50,645	51,137	51,630	32,752	36,392	46,303	56,214	66,125	76,036
Apartment 2-4 Units	39,049	45,940	50,934	55,928	60,921	65,915	32,752	36,392	46,303	56,214	66,125	76,036
Apartment 5+ Units	18,715	22,018	25,595	29,173	32,750	36,328	16,600	18,444	20,746	23,047	25,349	27,651
1.3 Electric Heat												
Mobile Home*	9,586	11,308	14,978	15,406	15,834	16,262	15,089	16,765	17,421	18,053	18,684	19,316
Single Family Detached	11,654	13,711	15,895	18,079	20,263	22,447	12,002	13,335	17,037	20,739	24,441	28,143
Single Family Attached	7,572	8,908	11,296	13,684	16,072	18,460	9,345	10,383	13,533	16,683	19,832	22,982
Apartment 2-4 Units	7,572	8,908	11,296	13,684	16,072	18,460	9,345	10,383	13,533	16,683	19,832	22,982
Apartment 5+ Units	5,201	6,119	8,060	10,002	11,943	13,885	6,983	7,759	10,467	13,174	15,882	18,589
1.4 Heat Pump Heat												
Mobile Home*	4,505	5,315	7,039	7,241	7,442	7,643	7,988	8,875	9,222	9,557	9,891	10,226
Single Family Detached	5,477	6,444	7,470	8,497	9,523	10,550	6,353	7,059	9,019	10,979	12,938	14,898
Single Family Attached	3,559	4,187	5,309	6,432	7,554	8,676	4,947	5,497	7,164	8,831	10,499	12,166
Apartment 2-4 Units	3,559	4,187	5,309	6,432	7,554	8,676	4,947	5,497	7,164	8,831	10,499	12,166
Apartment 5+ Units	2,444	2,876	3,788	4,701	5,613	6,526	3,697	4,108	5,541	6,974	8,407	9,841
1.5 Oil Heating												
Mobile Home	29,680	34,918	43,786	52,654	61,522	70,390	31,828	35,364	36,803	38,138	39,472	40,807
Single Family Detached	34,512	40,602	50,914	61,226	71,537	81,849	30,828	34,254	47,462	60,670	73,878	87,086
Single Family Attached	30,716	36,136	45,313	54,491	63,668	72,845	24,678	27,420	40,833	54,246	67,659	81,072
Apartment 2-4 Units	31,061	36,542	45,823	55,103	64,383	73,664	24,678	27,420	40,833	54,246	67,659	81,072
Apartment 5+ Units	17,601	20,707	25,966	31,225	36,484	41,743	16,600	18,444	20,746	23,047	25,349	27,651
2: Air Conditioning												
Mobile Home	2,531	2,977	4,712	6,447	8,181	9,916	2,337	2,750	5,293	7,836	10,379	12,921
Single Family Detached	2,943	3,462	5,479	7,496	9,513	11,530	2,743	3,227	5,547	7,866	10,186	12,505
Single Family Attached	3,248	3,821	5,002	6,183	7,364	8,544	2,035	2,394	4,907	7,421	9,934	12,448
Apartment 2-4 Units	2,033	2,391	3,785	5,178	6,571	7,965	3,390	3,989	5,351	6,713	8,075	9,437
Apartment 5+ Units	2,033	2,391	3,785	5,178	6,571	7,965	2,643	3,109	4,730	6,351	7,971	9,592
3: Water Heating												
Gas (therms)	11,888	13,986	19,761	24,171	28,453	30,525	10,772	11,969	16,255	20,541	24,826	29,112
Electric (therms)	4,867	5,726	8,253	10,324	11,940	13,100	5,924	6,582	8,939	11,296	13,652	16,009
LPG (therms)	11,888	13,986	19,761	24,171	28,453	30,525	10,772	11,969	16,255	20,541	24,826	29,112
Fuel Oil (therms)	14,266	16,783	23,714	29,005	34,143	36,630	11,849	13,166	17,881	22,595	27,309	32,023
4: Cooking												
Gas	4,502	5,296	6,593	7,889	9,186	10,482	5,897	6,207	7,940	9,674	11,407	13,140
Electric	2,251	2,648	3,296	3,945	4,593	5,241	2,948	3,104	3,970	4,837	5,703	6,570
LPG (therms)	4,502	5,296	6,593	7,889	9,186	10,482	5,897	6,207	7,940	9,674	11,407	13,140
5: Other Electric												
Mobile Home	9,687	11,396	16,305	21,214	26,123	31,032	10,889	11,462	15,808	20,154	24,500	28,846
Single Family Detached	10,878	12,798	16,746	20,694	24,641	28,589	12,550	13,210	17,403	23,131	27,324	31,517
Single Family Attached	8,744	10,287	14,118	17,949	21,780	25,611	9,797	10,313	14,237	19,697	23,621	27,546
Apartment 2-4 Units	7,680	9,035	12,916	16,797	20,677	24,558	9,797	10,313	14,237	19,697	23,621	27,546
Apartment 5+ Units	7,600	8,941	11,764	14,587	17,410	20,233	9,021	9,496	12,591	15,686	18,782	21,877

Shading indicates this utility use is significant for a given category.

* HUD HUSM model sets efficiencies at 90% of one-bedroom air conditioning values. It also uses the row house values for 2-4 unit structures rather than the GARD regression values.

Table 18. Multi-Year Regression vs. HUSM Comparison Model Values (continued)

Part 2. Total Fuel Consumption for Selected Heating Types: 2001(mid-point) RECS-based Estimates, Partly Trended 2001-2012 Values, and Fully Trended 2001-2012 Values

Primary Heating Fuel	Report Estimates						Comparison HUSM Model						Revised Report Model with Equipment Improvement Trending						Revised Report Model with Equipment and Building Evelope Improvement Trending					
	Bedrooms						Bedrooms						Bedrooms						Bedrooms					
Gas Used for Heat and Hot Water	**0**	**1**	**2**	**3**	**4**	**5**	0	1	2	3	4	5	0	1	2	3	4	5	0	1	2	3	4	5
Mobile Home	62,631	68,935	82,466	96,003	109,534	123,068	59,299	69,763	88,238	105,346	122,328	137,100	57,450	67,588	85,482	102,010	118,411	132,602	53,258	62,657	79,821	95,620	111,291	124,753
Single Family Detached	59,841	65,764	90,636	117,045	141,917	166,790	66,264	77,958	96,634	113,945	131,128	146,101	64,114	75,428	93,430	110,065	126,573	140,871	59,241	69,695	86,848	102,634	118,294	131,744
Single Family Attached	58,304	64,171	85,672	108,709	130,209	151,711	68,343	80,403	92,331	102,892	113,327	121,551	65,972	77,614	89,274	99,568	109,735	117,692	60,602	71,296	82,857	93,052	103,120	110,979
Apartment 2-4 Units	59,660	65,766	86,115	108,002	128,350	148,700	62,900	74,001	90,692	106,017	121,216	134,204	60,912	71,661	87,860	102,693	117,399	129,895	55,974	65,852	81,384	95,549	109,588	121,417
Apartment 5+ Units	41,984	46,123	58,292	70,462	82,631	94,801	42,487	49,984	64,202	77,053	89,777	100,292	41,311	48,601	62,383	74,799	87,087	97,166	38,911	45,778	59,069	70,994	82,793	92,381
All Electric, Resistance Heating																								
Mobile Home	37,187	40,663	51,431	62,176	72,917	83,662	28,921	34,056	47,544	57,335	66,671	75,551	28,390	33,431	46,554	55,981	64,953	73,469	27,064	31,867	44,459	53,775	62,636	71,042
Single Family Detached	36,167	39,458	52,896	67,870	81,306	94,744	32,593	38,344	49,668	60,537	70,950	80,908	31,975	37,617	48,518	58,963	68,952	78,486	30,367	35,726	46,278	56,376	66,017	75,204
Single Family Attached	30,049	32,775	45,586	59,934	72,743	85,554	26,682	31,391	41,966	52,085	61,749	70,957	26,000	30,588	40,915	50,787	60,203	69,163	24,913	29,310	39,289	48,812	57,880	66,493
Apartment 2-4 Units	31,405	34,371	46,030	59,226	70,884	82,544	24,402	28,709	39,546	49,928	59,854	69,325	23,976	28,207	38,751	48,840	58,474	67,652	22,927	26,973	37,163	46,898	56,177	65,000
Apartment 5+ Units	27,519	30,051	40,697	51,344	61,990	72,636	21,952	25,825	35,158	44,036	52,458	60,425	21,525	25,323	34,364	42,948	51,078	58,752	20,784	24,452	33,196	41,485	49,318	56,695
All Electric, Heat Pump Heating																								
Mobile Home	30,086	32,773	43,232	53,679	64,124	74,572	23,841	28,063	39,606	49,170	58,279	66,933	22,293	26,238	37,021	46,159	54,842	63,070	21,901	25,776	36,384	45,455	54,070	62,229
Single Family Detached	30,518	33,183	44,878	58,109	69,803	81,499	26,416	31,078	41,244	50,955	60,211	69,011	24,564	28,899	38,395	47,437	56,023	64,153	24,091	28,343	37,705	46,612	55,064	63,060
Single Family Attached	25,651	27,889	39,217	52,082	63,409	74,738	22,669	26,670	35,979	44,832	53,231	61,173	21,172	24,908	33,710	42,057	49,949	57,385	20,823	24,498	33,185	41,417	49,194	56,515
Apartment 2-4 Units	27,007	29,484	39,661	51,375	61,550	71,728	20,389	23,987	33,559	42,675	51,335	59,541	19,159	22,540	31,558	40,121	48,228	55,880	18,848	22,175	31,071	39,512	47,498	55,028
Apartment 5+ Units	24,233	26,399	35,771	45,144	54,515	63,888	19,195	22,582	30,886	38,735	46,128	53,066	18,210	21,424	29,220	36,561	43,447	49,878	17,977	21,149	28,839	36,073	42,852	49,175

Table 18. Multi-Year Regression vs. HUSM Comparison Model Values (continued)

Part 3. Revised Estimates as a Percentage of Current Model Total Fuel Consumption for Selected Heating Types

Primary Heating Fuel	Revised Estimates as % of Current HUSM Model						Revised Estimates with 2001-2012 Equipment Trending as % of HUSM Model						Revised Estimates with Equipment and Structural Trending as % of HUSM Model					
	Bedrooms						Bedrooms						Bedrooms					
Gas Used for Heat and Hot Water	**0**	**1**	**2**	**3**	**4**	**5**	0	1	2	3	4	5	0	1	2	3	4	5
Mobile Home	95%	101%	107%	110%	112%	111%	92%	98%	104%	106%	108%	108%	85%	91%	97%	100%	102%	101%
Single Family Detached	111%	119%	107%	97%	92%	88%	107%	115%	103%	94%	89%	84%	99%	106%	96%	88%	83%	79%
Single Family Attached	117%	125%	108%	95%	87%	80%	113%	121%	104%	92%	84%	78%	104%	111%	97%	86%	79%	73%
Apartment 2-4 Units	105%	113%	105%	98%	94%	90%	102%	109%	102%	95%	91%	87%	94%	100%	95%	88%	85%	82%
Apartment 5+ Units	101%	108%	110%	109%	109%	106%	98%	105%	107%	106%	105%	102%	93%	99%	101%	101%	100%	97%
All Electric, Resistance Heating																		
Mobile Home	78%	84%	92%	92%	91%	90%	76%	82%	91%	90%	89%	88%	73%	78%	86%	86%	86%	85%
Single Family Detached	90%	97%	94%	89%	87%	85%	88%	95%	92%	87%	85%	83%	84%	91%	87%	83%	81%	79%
Single Family Attached	89%	96%	92%	87%	85%	83%	87%	93%	90%	85%	83%	81%	83%	89%	86%	81%	80%	78%
Apartment 2-4 Units	78%	84%	86%	84%	84%	84%	76%	82%	84%	82%	82%	82%	73%	78%	81%	79%	79%	79%
Apartment 5+ Units	80%	86%	86%	86%	85%	83%	78%	84%	84%	84%	82%	81%	76%	81%	82%	81%	80%	78%
All Electric, Heat Pump Heating																		
Mobile Home	79%	86%	92%	92%	91%	90%	74%	80%	86%	86%	86%	85%	73%	79%	84%	85%	84%	83%
Single Family Detached	87%	94%	92%	88%	86%	85%	80%	87%	86%	82%	80%	79%	79%	85%	84%	80%	79%	77%
Single Family Attached	88%	96%	92%	86%	84%	82%	83%	89%	86%	81%	79%	77%	81%	88%	85%	80%	78%	76%
Apartment 2-4 Units	75%	81%	85%	83%	83%	83%	71%	76%	80%	78%	78%	78%	70%	75%	78%	77%	77%	77%
Apartment 5+ Units	79%	86%	86%	86%	85%	83%	75%	81%	82%	81%	80%	78%	74%	80%	81%	80%	79%	77%

Table 19. Department of Energy BTU Fuel Equivalency Estimates[2]

HEATING FUEL COMPARISON CALCULATOR

7/12/2012 *Version: HEAT-CALC-Vsn-D_1-09.xls*

This "calculator" can be used to compare residential heating fuel prices and costs. To use this calculator, enter information into the yellow-colored cells as necessary. The information in the green cells is calculated for you. **Scroll down and right to see all information on this page.** Detailed instructions are provided in the Instructions (click on tab at bottom of your screen). **Contact local suppliers for most accurate prices.** This calculator will not provide an estimate of the cost to heat your home.

Fuel Type	Fuel Unit	Fuel Price Per Unit (dollars)	Fuel Heat Content Per Unit (Btu)	Fuel Price Per Million Btu (dollars)	Heating Appliance Type	Type of Efficiency Rating [4]	Effiency Rating or Estimate[5]	Approx. Efficiency (%)	Fuel Cost Per Million Btu (dollars)
Fuel Oil (#2)	Gallon	3.93	138,690	$28.34	Furnace or Boiler	AFUE	78.0	78%	$36.33
Electricity	KiloWatt-hour	0.117	3,412	$34.32	Furnace or Boiler	Estimate	98.0	98%	$35.03
					Air-Source Heat Pump [6]	HSPF [6]	7.7	226%	$15.21
					Geothermal Heat Pump	COP	3.3	330%	$10.40
					Baseboard/Room Heater	Estimate	100.0	100%	$34.32
Natural Gas [1]	Therm [2]	$2.95	100,000	$29.52	Furnace or Boiler	AFUE	78.0	78%	$37.84
					Room Heater (Vented)	AFUE	65.0	65%	$45.41
					Room Heater (Unvented)	Estimate	100.0	100%	$29.52
Propane	Gallon	$2.85	91,333	$31.15	Furnace or Boiler	AFUE	78.0	78%	$39.94
					Room Heater (Vented)	AFUE	65.0	65%	$47.93
Wood [3]	Cord	$200.00	22,000,000	$9.09	Room Heater (Vented)	EPA	72.0	72%	$12.63
Pellets	Ton	$250.00	16,500,000	$15.15	Room Heater (Vented)	EPA	78.0	78%	$19.43
Corn (kernels) [3]	Ton	$200.00	14,000,000	$14.29	Room Heater (Vented)	EPA	78.0	78%	$18.32
Kerosene	Gallon	$4.29	135,000	$31.75	Room Heater (Vented)	Estimate	80.0	80%	$39.69
Coal (Anthracite)	Ton	$200.00	25,000,000	$8.00	Furnace/Boiler/Stove	Estimate	75.0	75%	$10.67

NOTES:

1 Natural gas is typically sold to residential customers in units of "therms," but may be sold in units of hundreds of cubic feet (ccf).

2 One therm = 100,000 Btu, and is equivalent to about 97.752 cubic feet (or 0.978 ccf), when there are 1,023 Btu/cf.
To convert prices in $/Mcf (1,000 cubic feet) to $/therm, divide the $/Mcf price price by 10.23 .

3 The heat content for a cord of wood varies by tree species and is greatly affected by moisture content; 20 million Btu per cord is a rough approximation.
The heat content of a unit (ton or bushel) of corn can also vary widely; see reference for Corn Burning Stoves in Efficiency Info tab/worksheet.

4 For definitions of Efficiency Ratings and referrals to where they can be obtained, click on the EFFICIENCY INFO tab below.
Some types of heaters do not have efficiency ratings; the ratings in the yellow cells are comparable estimates for new appliances with basic features.

5 The default values are the minimum efficiency standards set by the U.S. Department Energy. Estimated "ratings" are provided for heating equipment for which there are no DOE standards.

6 Air-Source Heat Pump Ratings: The actual heating efficiency and seasonal performance of a "conventional" air-source heat pump may vary significantly from its rated heating season performance factor (HSPF). Below is a procedure for determining an adjusted HSPF for your location *for an air-source heat pump that uses only electric resistance heating as the auxillary heat source* . There are so-called "dual-fuel" or "hybrid" heat pump systems that are basically a heat pump integrated with a forced-air combustion appliance that uses natural gas, fuel oil or propane. In general, these systems use the heat pump for heating until outside temperatures reach the low 40's/high 30's (F), then switch to the combustion appliance for heating. The adjustment below does not apply to those types of hybrid heat pump/combustion appliance heating systems.
See the Technical Note for Air Source Heat Pumps in the EFFICIENCY INFO tab below for details on how the adjusted HSPF is calculated.

[2] Source: www.**eia.gov/neic/experts/heatcalc.xls**