APPENDIX 8.4. LCC AND PBP RESULTS USING ALTERNATIVE ENERGY PRICE SCENARIOS

TABLE OF CONTENTS

8.4.1 INTRODUCTION 8.4-1
8.4.2 LCC AND PBP RESULTS USING AEO 2003 HIGH GROWTH PRICE SCENARIO 8.4-3
8.4.3 LCC AND PBP RESULTS USING AEO 2003 LOW GROWTH PRICE SCENARIO 8.4-16

LIST OF TABLES

Table 8.4.2.1 LCC and PBP Results for Non-Weatherized Gas Furnaces (High Growth) . 8.4-3
Table 8.4.2.2 LCC and PBP Results for Weatherized Gas Furnaces (High Growth) 8.4-6
Table 8.4.2.3 LCC and PBP Results for Mobile Home Furnaces (High Growth) 8.4-8
Table 8.4.2.4 LCC and PBP Results for Oil Furnaces (High Growth) 8.4-10
Table 8.4.2.5 LCC and PBP Results for Gas Boilers (High Growth) 8.4-12
Table 8.4.2.6 LCC and PBP Results for Oil Boilers (High Growth) 8.4-14
Table 8.4.3.1 LCC and PBP Results for Non-Weatherized Gas Furnaces (Low Growth) 8.4-16
Table 8.4.3.2 LCC and PBP for Weatherized Furnaces (Low Growth) 8.4-19
Table 8.4.3.3 LCC and PBP Results for Mobile Home Furnaces (Low Growth) 8.4-21
Table 8.4.3.4 LCC and PBP Results for Oil Furnaces (Low Growth) 8.4-23
Table 8.4.3.5 LCC and PBP Results for Oil Boilers (Low Growth) 8.4-25

LIST OF FIGURES

Figure 8.4.1.1 Residential Natural Gas Price Forecast (AEO 2003) 8.4-1
Figure 8.4.1.2 Residential Electricity Price Forecast (AEO 2003) 8.4-2
Figure 8.4.1.3 Residential Oil Fuel Price Forecast (AEO 2003) 8.4-2
Figure 8.4.2.1 National LCC Savings Results for Non-Weatherized Gas Furnaces (High Growth) 8.4-5
Figure 8.4.2.2 National LCC Savings Results for Weatherized Furnaces (High Growth) . . 8.4-7
Figure 8.4.2.3 National LCC Savings Results for Mobile Home Furnaces (High Growth) . 8.4-9
Figure 8.4.2.4 National LCC Savings Results for Oil Furnaces (High Growth) 8.4-11
Figure 8.4.2.5 National LCC Savings Results for Gas Boilers (High Growth) 8.4-13
Figure 8.4.2.6 National LCC Savings Results for Oil Boilers (High Growth) 8.4-15
Figure 8.4.3.1 National LCC Savings Results for Non-Weatherized Gas Furnaces (Low Growth) 8.4-18
Figure 8.4.3.2 National LCC Savings Results for Weatherized Furnaces (Low Growth) . 8.4-20
Figure 8.4.3.3 National LCC Savings Results for Mobile Home Furnaces (Low Growth) 8.4-22

Figure 8.4.3.4 National LCC Savings Results for Oil Furnaces (Low Growth) 8.4-24
Figure 8.4.3.5 National LCC Savings Result for Oil Boilers (Low Growth) 8.4-26
Figure 8.4.3.6 National LCC Savings Results for Gas Boilers (Low Growth) 8.4-28

APPENDIX 8.4. LCC AND PBP RESULTS USING ALTERNATIVE ENERGY PRICE SCENARIOS

8.4.1 INTRODUCTION

This appendix presents life-cycle cost (LCC) and payback results using alternative energy price scenarios from EIA's *AEO2003*.[1] The Department based the payback periods on the calculation methodology used in Chapter 8: Life-Cycle Cost and Payback Period Analysis.

Figures 8.4.1.1, 8.4.1.2 and 8.4.1.3 show the price forecasts from *AEO 003* for natural gas, oil, and electricity for the three economic growth cases considered by EIA. For natural gas, the price in the High Economic Growth case is considerably higher than in the Reference case in 2012. The decline in 2018-2020 is due to the fact that initial gas flows from the Alaskan pipeline occur earlier in the High Economic Growth case than in the Reference case. The price in this case rises much faster than in the Reference case after 2020 due to higher economic growth causing greater demand for gas.[a]

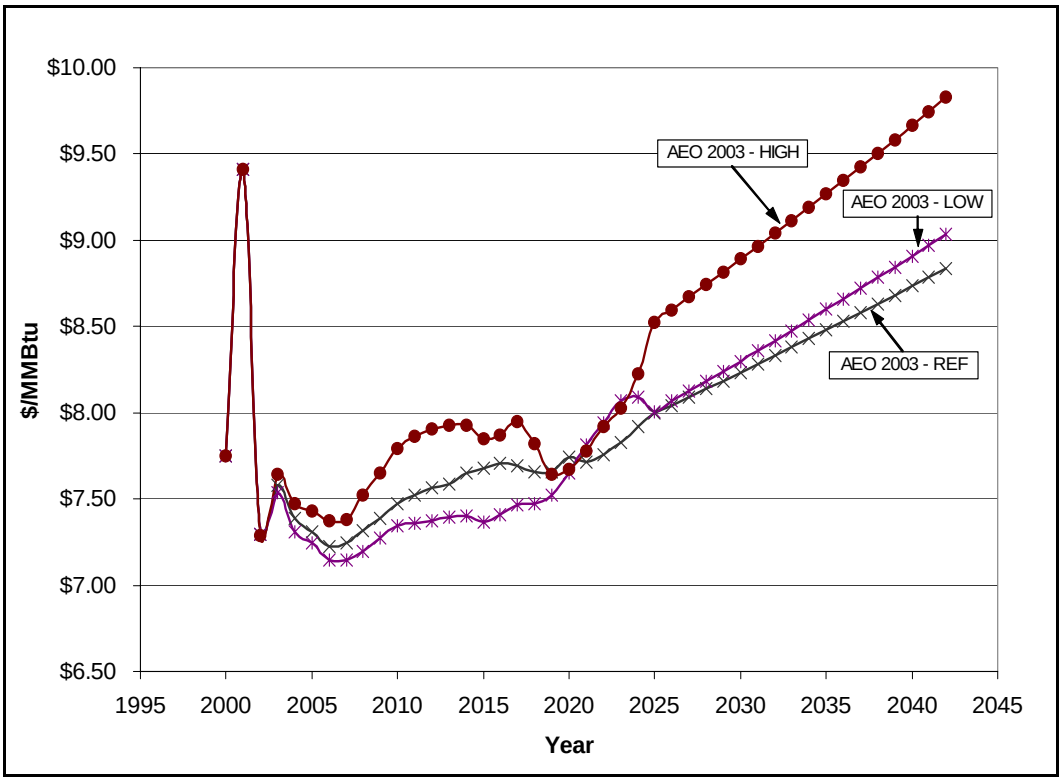

Figure 8.4.1.1 Residential Natural Gas Price Forecast (AEO 2003)

[a] After 2025, the price in the Low Economic Growth case is higher than in the Reference case. This results from DOE's use of the average annual growth rate in the 2010-2025 period to project post-2025 prices. In the Low case, Alaskan gas flows occur later in time, so the price of gas rises significantly in the 2015-2025 period despite the lower economic growth in this case.

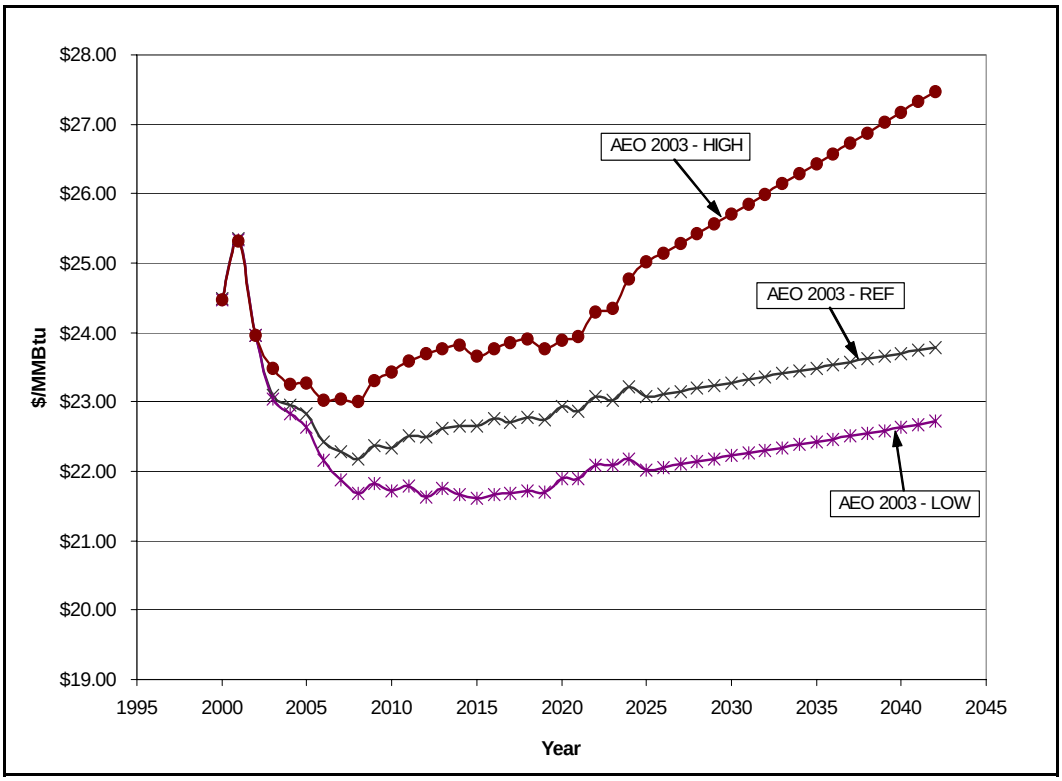

Figure 8.4.1.2 Residential Electricity Price Forecast (AEO 2003)

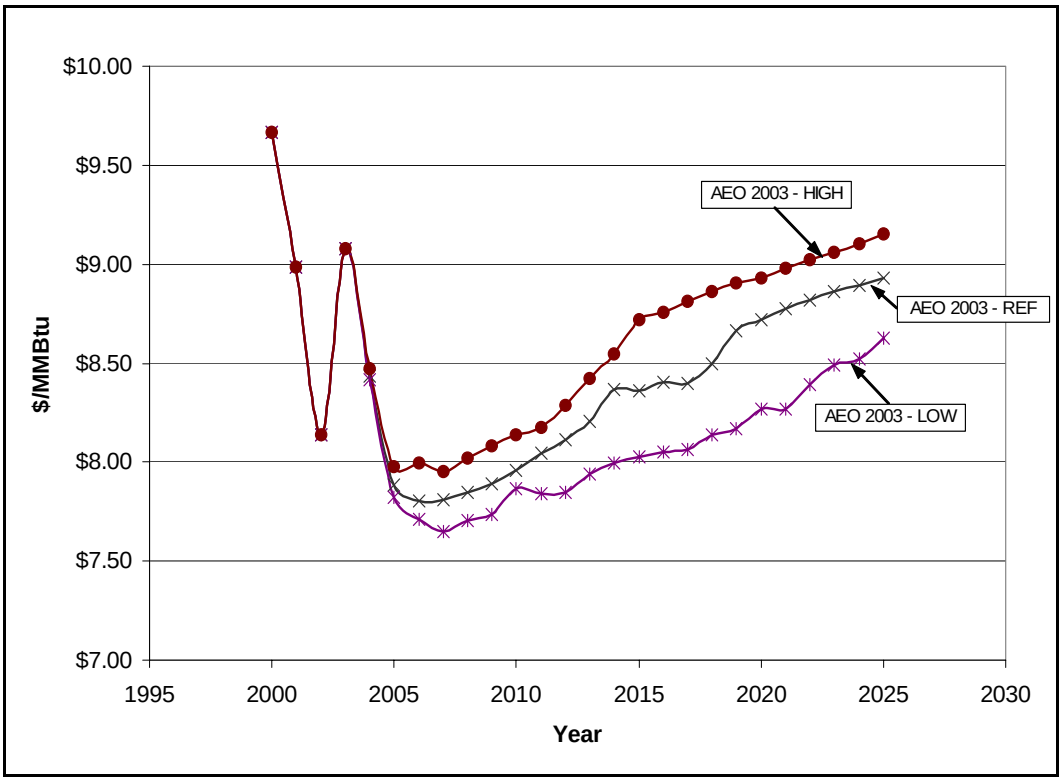

Figure 8.4.1.3 Residential Oil Fuel Price Forecast (AEO 2003)

8.4.2 LCC AND PBP RESULTS USING AEO 2003 HIGH GROWTH PRICE SCENARIO

Table 8.4.2.1 LCC and PBP Results for Non-Weatherized Gas Furnaces (High Growth)

	LCC					Payback	
Design Option: AFUE/Electricity	**Average**	**Average Savings**	**Net Cost**	**No Impact***	**Net Benefit**	**Median**	**Average***
	$	**$**	**%**	**%**	**%**	**years**	**years**
78%	$10,264						
80%	$10,087	$0	0%	99%	1%	2.1	34.7
80% PSC+	$10,075	$8	15%	27%	58%	5.3	5.1
80% ECM	$10,155	-$51	58%	27%	16%	21.8	31.7
80% BC/ECM+	$10,098	-$9	48%	27%	25%	16.3	24.6
80% 2-stage mod.	$10,006	$44	33%	27%	40%	8.3	13.2
80% 2-mod. ECM	$10,071	-$2	45%	27%	28%	14.6	20.0
80% 2-stage mod. BC/ECM+	$10,054	$15	43%	27%	30%	13.6	19.9
81% 8% Cat. III	$10,078	-$1	32%	27%	42%	8.5	26.7
81% PSC+	$10,066	$8	29%	26%	45%	7.7	20.3
81% ECM	$10,147	-$53	50%	26%	24%	16.9	24.9
81% BC/ECM+	$10,089	-$10	43%	26%	31%	14.0	21.8
81% 2-stage Mod, no Cat. III	$9,964	$68	28%	26%	46%	7.4	16.4
81% 2-stage Mod ECM	$10,068	-$7	43%	26%	31%	13.7	20.2
81% 2-stage Mod BC/ECM+	$10,051	$11	41%	26%	33%	13.0	19.6
82%	$10,455	-$287	69%	26%	4%	25.1	77.5
82% PSC+	$10,443	-$278	69%	26%	5%	25.2	74.6
82% ECM	$10,524	-$339	70%	26%	4%	45.6	92.8
82% BC/ECM+	$10,467	-$297	67%	26%	7%	32.6	76.1
82% 2-stage Mod	$10,385	-$249	64%	26%	10%	17.7	52.2
82% 2-stage Mod ECM	$10,488	-$295	66%	26%	8%	33.1	78.4
82% 2-stage Mod BC/ECM+	$10,430	-$277	64%	26%	10%	29.2	67.7
83%	$10,682	-$462	73%	26%	1%	59.7	119.7
90% Baseline Cond.	$10,179	-$134	54%	26%	19%	17.0	41.4
90% PSC+	$10,168	-$124	56%	15%	29%	13.7	36.8
90% ECM	$10,260	-$199	64%	15%	20%	20.3	45.0

90% BC/ECM+	$10,205	-$148	61%	15%	24%	18.0	40.2
91% 2-stage Mod ECM	$10,145	-$108	57%	15%	28%	15.7	40.5
91% 2-stage BC/ECM+	$10,120	-$82	55%	15%	29%	15.3	36.1
91% Step Mod ECM	$10,363	-$294	65%	15%	19%	21.0	51.7
91% Step Mod BC/ECM+	$10,351	-$278	65%	15%	20%	20.4	45.7
92%Incr. HX Area	$10,181	-$143	58%	15%	26%	15.3	38.8
92% PSC+	$10,170	-$132	61%	2%	37%	12.6	34.5
92% ECM	$10,263	-$223	74%	2%	24%	20.3	45.3
92% BC/ECM+	$10,208	-$167	71%	2%	28%	18.1	38.4
93% 2-stage Mod ECM	$10,154	-$115	64%	2%	34%	15.0	38.3
93% 2-stage Mod BC/ECM+	$10,129	-$90	64%	2%	35%	15.0	35.4
93% Step Mod ECM	$10,374	-$333	76%	2%	23%	20.6	49.8
93% Step Mod BC/ECM+	$10,361	-$319	76%	2%	23%	20.3	45.0
96% Step Mod ECM	$10,958	-$907	88%	2%	10%	30.7	82.8
96% Step Mod BC/ECM+	$10,967	-$917	90%	0%	10%	31.4	84.2

* “No impact” means that the base case furnace assigned to the household has greater efficiency than the level indicated, so the household is not affected.

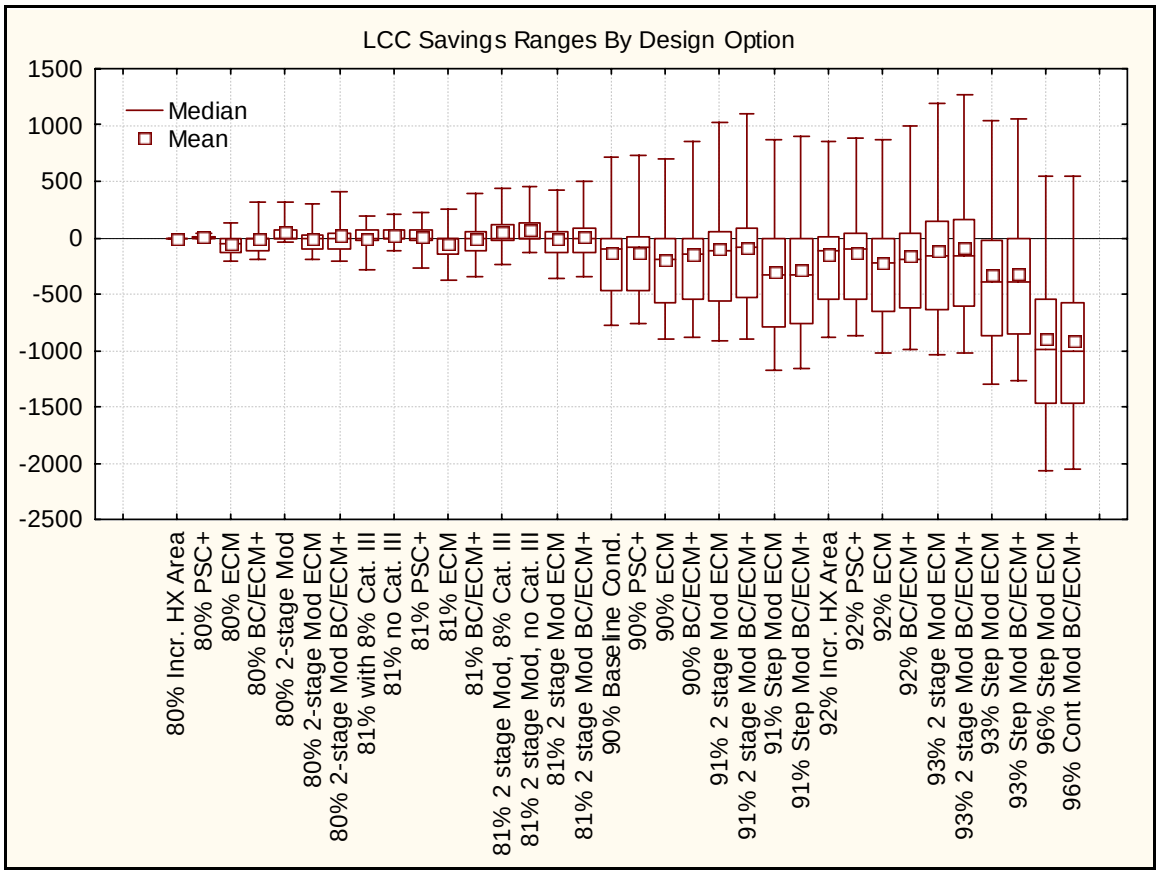

Figure 8.4.2.1 National LCC Savings Results for Non-Weatherized Gas Furnaces (High Growth)

Table 8.4.2.2 LCC and PBP Results for Weatherized Gas Furnaces (High Growth)

	LCC					Payback	
Design Option: AFUE/Electricity	**Average**	**Average Savings**	**Net Cost**	**No Impact***	**Net Benefit**	**Median**	**Average***
78% Baseline	$8,716						
80% Incr. HX Area	$8,625	$2	0%	98%	2%	1.1	1.4
80% Improved Insulation	$8,621	$4	25%	46%	29%	9.0	8.1
80% PSC+	$8,607	$11	6%	46%	48%	3.2	3.9
80% ECM	$8,688	-$32	42%	46%	13%	18.2	25.0
80% Improved Heat Xfer	$8,635	-$4	52%	46%	2%	2.7	3.4
81% Incr. HX Area	$8,584	$24	2%	46%	52%	1.9	2.5
81% Improved Insulation	$8,580	$27	19%	20%	61%	5.0	6.2
81% PSC+	$8,566	$38	4%	20%	76%	2.7	3.2
81% ECM	$8,647	-$27	55%	20%	25%	15.2	20.0
81% Improved Heat Xfer	$8,590	$19	32%	20%	48%	3.7	4.9
82% Incr. HX Area	$8,544	$55	3%	20%	78%	2.0	2.8
82% Improved Insulation	$8,541	$59	18%	0%	82%	4.2	5.4
82% PSC+	$8,527	$73	3%	0%	97%	2.5	3.1
82% ECM	$8,608	-$8	62%	0%	38%	13.4	17.4
82% Improved Heat Xfer	$8,546	$54	24%	0%	76%	2.4	3.3
83% Incr. HX Area	$8,510	$90	6%	0%	94%	2.8	3.8
83% Improved Insulation	$8,507	$93	11%	0%	89%	3.8	5.2
83% PSC+	$8,493	$107	3%	0%	97%	2.8	3.5
83% ECM	$8,574	$26	54%	0%	46%	11.7	14.2
83% Improved Heat Xfer	$8,507	$92	4%	0%	96%	2.3	3.2

* "No impact" means that the base case furnace assigned to the household has greater efficiency than the level indicated, so the household is not affected.

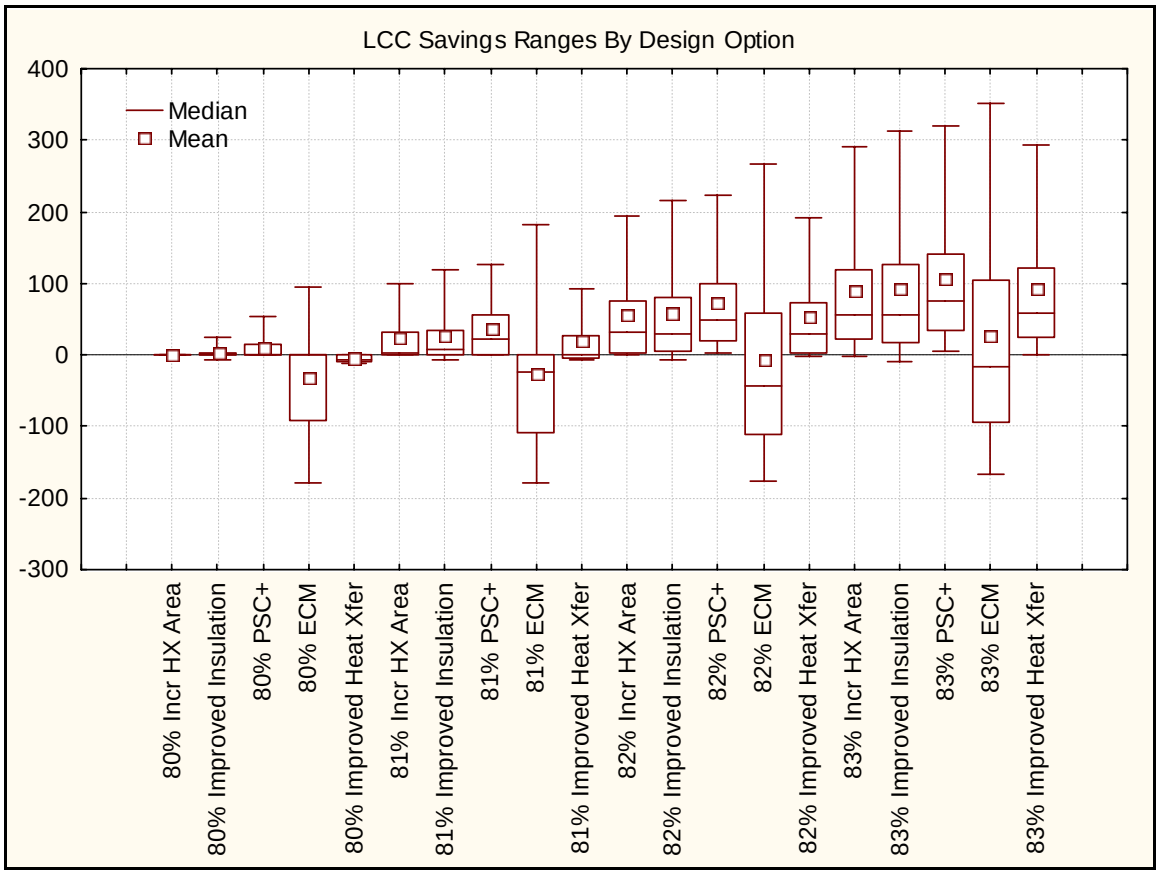

Figure 8.4.2.2 National LCC Savings Results for Weatherized Furnaces (High Growth)

Table 8.4.2.3 LCC and PBP Results for Mobile Home Furnaces (High Growth)

	LCC					Payback	
Design Option: AFUE/Electricity	**Average LCC**	**Average Savings**	**Net Cost**	**No Impact***	**Net Benefit**	**Median**	**Average***
75% Baseline	$8,149						
80%	$7,704	$67	1%	85%	14%	2.3	4.4
80% ECM	$7,780	-$5	65%	5%	30%	19.0	35.6
80% 2-stage modulation	$7,938	-$156	79%	5%	16%	25.2	60.8
81%	$7,650	$118	9%	5%	86%	4.2	6.1
81% ECM	$7,726	$46	54%	5%	41%	14.8	20.4
81% 2-stage modulation	$7,888	-$109	74%	5%	21%	24.3	59.0
82%	$7,605	$160	13%	5%	82%	4.9	7.3
82% ECM	$7,680	$89	45%	5%	50%	12.7	16.6
82% 2-stage modulation	$7,846	-$69	69%	5%	26%	22.2	55.0
90%	$7,555	$207	45%	5%	50%	12.1	21.8

* "No impact" means that the base case furnace assigned to the household has greater efficiency than the level indicated, so the household is not affected.

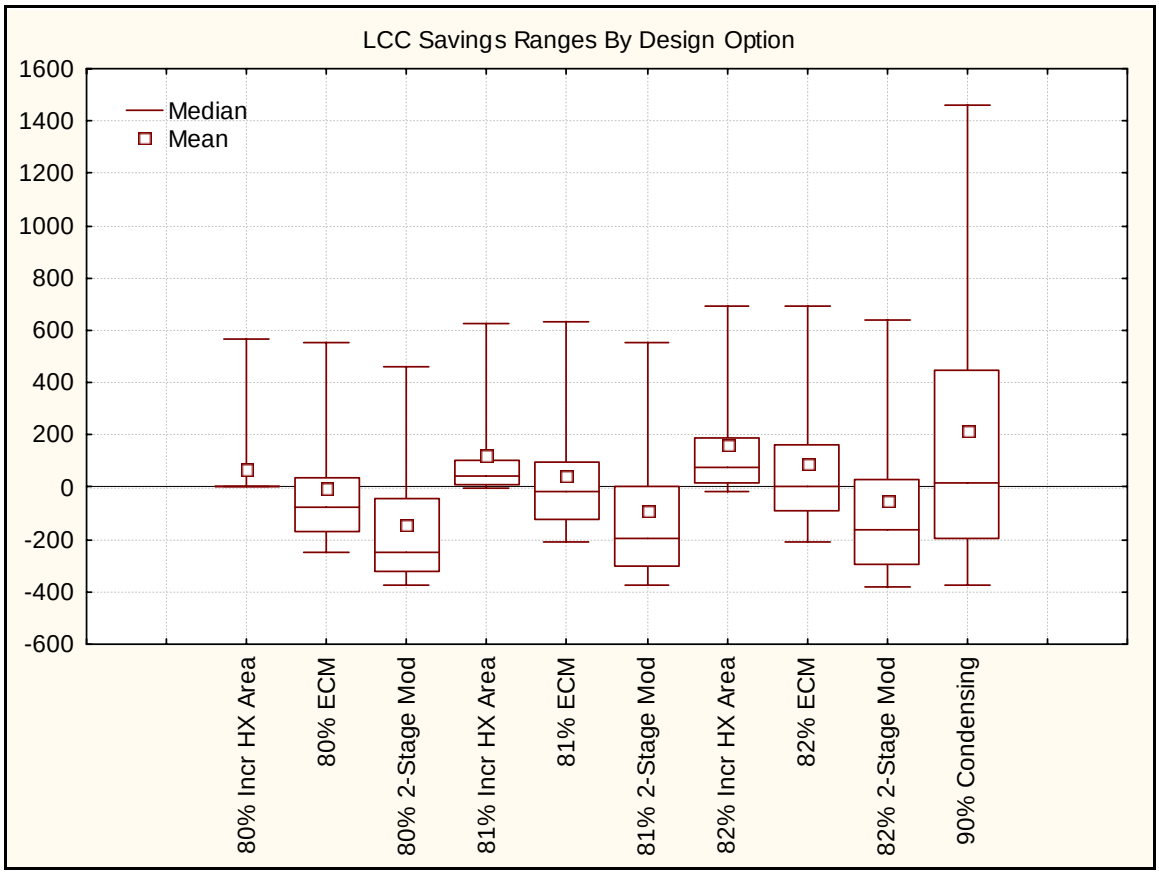

Figure 8.4.2.3 National LCC Savings Results for Mobile Home Furnaces (High Growth)

Table 8.4.2.4 LCC and PBP Results for Oil Furnaces (High Growth)

	LCC					Payback	
Design Option: AFUE/Electricity	**Average**	**Average Savings**	**Net Cost**	**No Impact***	**Net Benefit**	**Median**	**Average***
78% AFUE - Baseline	$16,584						
80% AFUE- Incr. HX Area	$16,281	$12	0%	96%	4%	0.2	0.2
81% AFUE- Incr. HX Area	$16,138	$98	2%	39%	59%	0.4	0.5
81% AFUE Atom Burner 2-stage Mod.	$16,258	$13	42%	30%	28%	11.5	19.1
81% AFUE Interrupted Ignition	$16,160	$82	12%	30%	58%	2.7	4.8
81% AFUE ECM	$16,313	-$24	49%	30%	21%	13.7	21.6
82% AFUE- Incr. HX Area	$15,997	$196	2%	30%	68%	0.3	0.4
82% AFUE Atom Burner 2-stage Mod.	$16,123	$98	34%	22%	43%	8.4	13.7
82% AFUE Interrupted Ignition	$16,019	$179	10%	22%	68%	1.6	3.5
82%AFUE ECM	$16,171	$62	37%	22%	40%	8.8	16.0
83% AFUE- Incr. HX Area	$15,860	$302	3%	22%	75%	0.3	0.4
83% AFUE Atom Burner 2-stage Mod.	$15,991	$190	30%	15%	55%	6.7	11.2
83% AFUE Interrupted Ignition	$15,882	$284	10%	15%	75%	1.3	2.9
83%AFUE ECM	$16,033	$154	31%	15%	54%	6.8	14.3
84% AFUE- Incr. HX Area	$16,331	-$98	56%	15%	29%	13.3	20.3
84% AFUE Atom Burner 2-stage Mod.	$16,467	-$225	69%	7%	23%	16.0	24.8
84% AFUE Interrupted Ignition	$16,352	-$119	65%	7%	28%	14.1	20.7
84%AFUE ECM	$16,504	-$259	73%	7%	20%	17.0	31.4
85% AFUE- Incr. HX Area	$16,205	$17	47%	7%	45%	9.7	13.5
85% AFUE Atom Burner 2-stage Mod.	$16,346	-$124	68%	0%	32%	13.5	19.9
85% AFUE Interrupted Ignition	$16,227	-$4	56%	0%	44%	10.5	14.6
85%AFUE ECM	$16,378	-$155	70%	0%	30%	14.1	26.1

* "No impact" means that the base case furnace assigned to the household has greater efficiency than the level indicated, so the household is not affected.

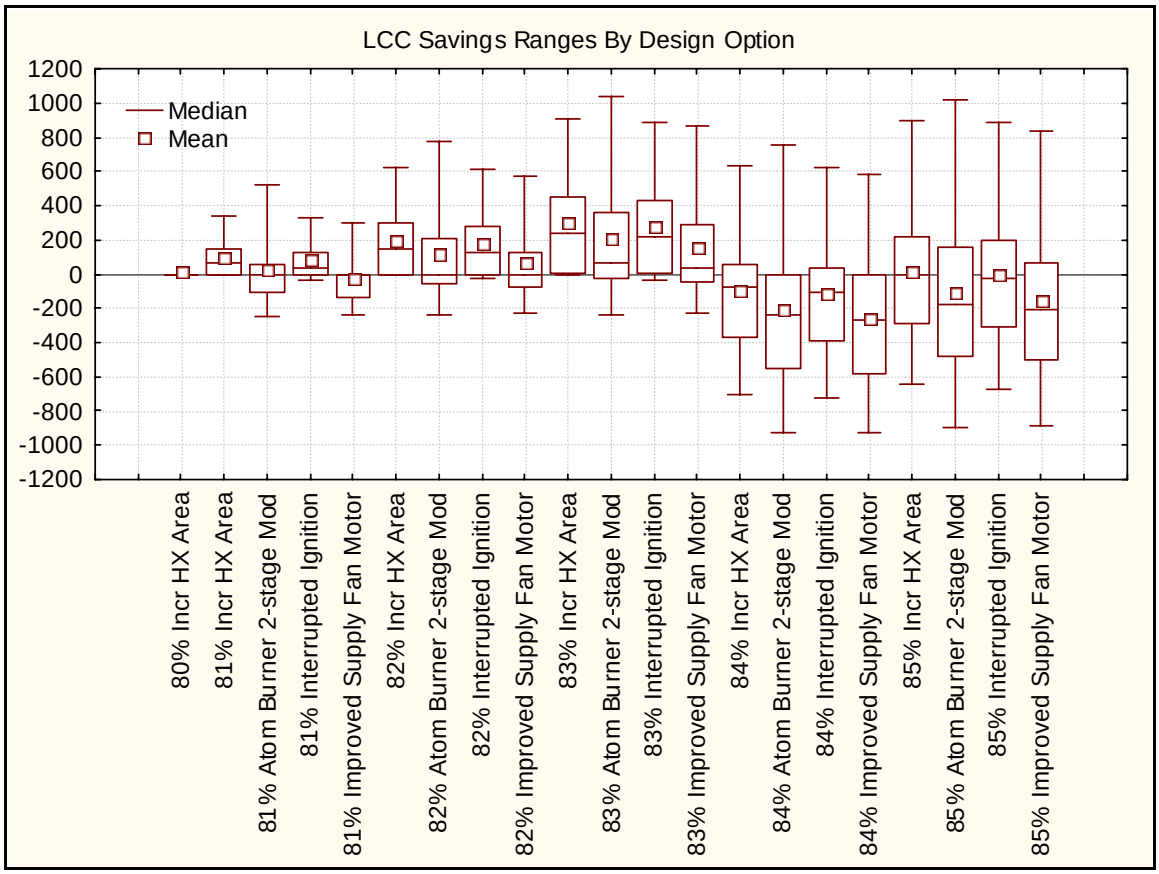

Figure 8.4.2.4 National LCC Savings Results for Oil Furnaces (High Growth)

Table 8.4.2.5 LCC and PBP Results for Gas Boilers (High Growth)

	LCC					Payback	
Design Option: AFUE/Electricity	**Average LCC**	**Average Savings**	**Net Cost**	**No Impact***	**Net Benefit**	**Median**	**Average***
80% Baseline	$10,876						
81%	$10,601	$96	0%	65%	35%	2.1	2.3
81% 2-stage modulation	$10,837	-$37	38%	44%	18%	9.6	14.4
81% Imp Circ Pump	$10,848	-$43	40%	44%	17%	14.5	53.6
82%	$10,542	$130	3%	44%	54%	2.4	3.1
82% 2-stage modulation	$10,777	-$36	48%	30%	22%	8.9	18.8
82% Imp Circ Pump	$10,789	-$44	50%	30%	20%	18.3	41.3
83%	$10,480	$173	4%	30%	66%	2.4	3.2
83% 2-stage modulation	$10,716	-$28	58%	15%	27%	9.4	22.3
83% Imp Circ Pump	$10,728	-$37	60%	15%	25%	17.0	38.1
84%	$10,421	$224	6%	15%	79%	2.4	3.3
84% 2-stage modulation	$10,656	$2	61%	6%	33%	10.0	21.9
84% Imp Circ Pump	$10,669	-$9	62%	6%	32%	14.4	30.2
88%	$10,954	-$276	66%	6%	28%	16.8	28.7
91%	$11,027	-$346	73%	3%	24%	18.1	39.7
99%	$11,492	-$811	84%	0%	16%	20.5	41.6

* "No impact" means that the base case furnace assigned to the household has greater efficiency than the level indicated, so the household is not affected.

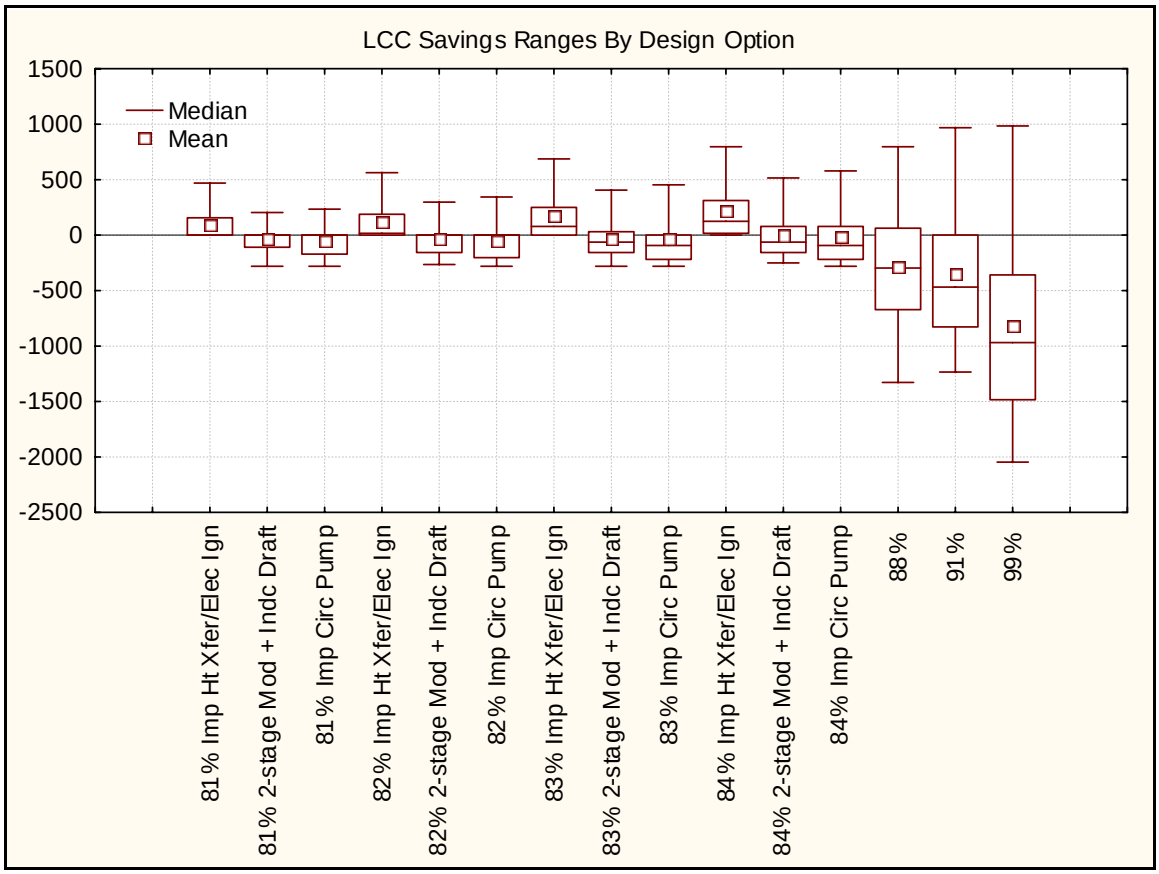

Figure 8.4.2.5 National LCC Savings Results for Gas Boilers (High Growth)

Table 8.4.2.6 LCC and PBP Results for Oil Boilers (High Growth)

	LCC					Payback	
Design Option: AFUE/Electricity	**Average**	**Average Savings**	**Net Cost**	**No Impact***	**Net Benefit**	**Median**	**Average***
80%	$15,210						
81%	$15,088	$6	0%	95%	5%	0.6	0.8
81% Atomized Burner	$15,491	-$36	11%	89%	0%	70.5	105.0
81% Inter Ign	$15,090	$6	4%	89%	7%	5.7	9.0
81% Imp Circ Pump	$15,309	-$17	10%	89%	1%	37.5	60.2
82%	$14,969	$19	0%	89%	11%	0.6	0.8
82% Atomized Burner	$15,373	-$46	16%	84%	0%	33.6	61.0
82% Inter Ign	$14,971	$19	4%	84%	12%	3.3	6.4
82% Imp Circ Pump	$15,190	-$16	13%	84%	3%	20.3	42.2
83%	$14,853	$38	0%	84%	16%	0.6	0.8
83% Atomized Burner	$15,257	-$121	37%	61%	2%	23.3	44.8
83% Inter Ign	$14,855	$37	16%	61%	24%	7.5	9.5
83% Imp Circ Pump	$15,075	-$50	33%	61%	7%	49.9	63.8
84%	$14,740	$82	0%	61%	39%	0.7	0.8
84% Atomized Burner	$15,144	-$172	58%	37%	5%	25.9	55.3
84% Inter Ign	$14,742	$80	16%	37%	47%	3.7	7.1
84% Imp Circ Pump	$14,962	-$57	51%	37%	12%	23.2	47.1
86%	$15,241	-$227	51%	37%	11%	22.4	30.9
86% Atomized Burner	$15,645	-$603	91%	7%	2%	53.7	102.2
86% Inter Ign	$15,243	-$229	71%	7%	22%	17.0	24.2
86% Imp Circ Pump	$15,463	-$433	87%	7%	6%	39.9	56.8
90%	$15,541	-$505	80%	7%	13%	19.0	23.1
95%	$15,828	-$791	87%	0%	13%	18.6	22.5

* "No impact" means that the base case furnace assigned to the household has greater efficiency than the level indicated, so the household is not affected.

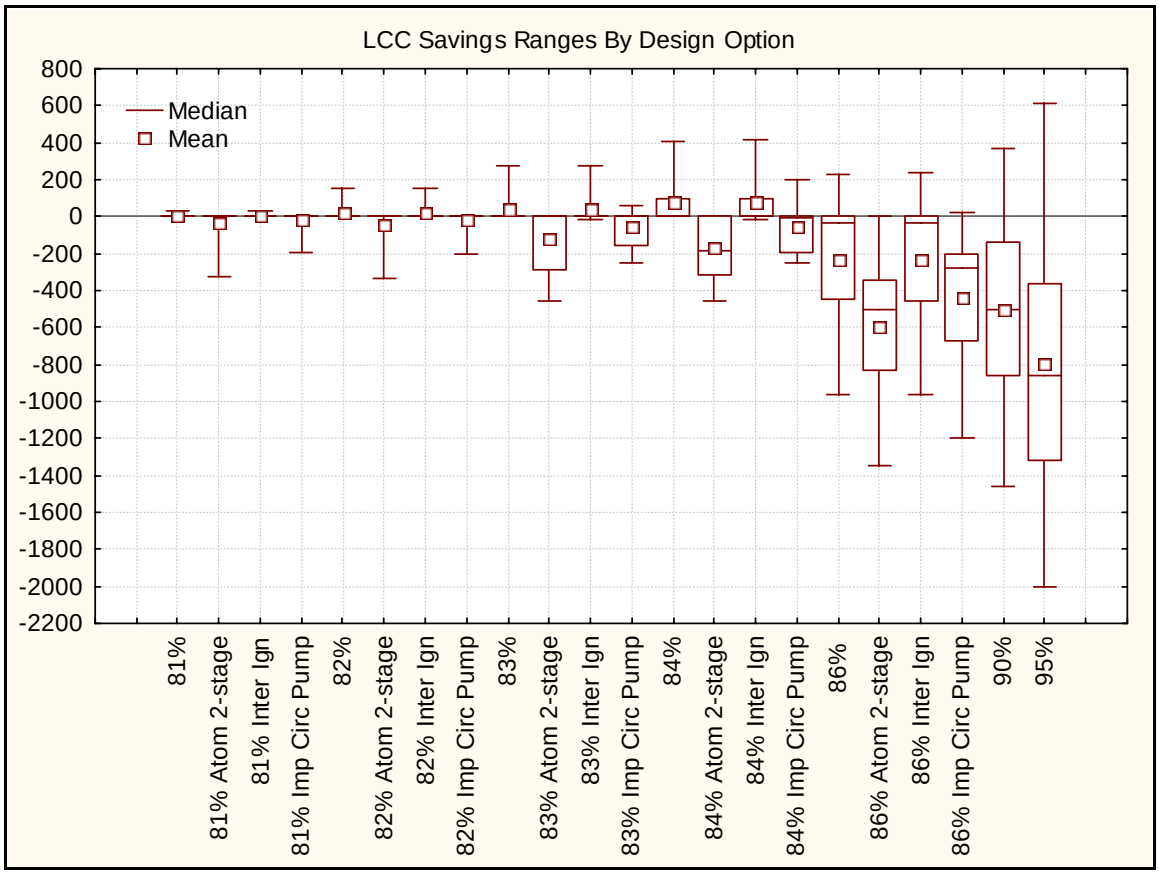

Figure 8.4.2.6 National LCC Savings Results for Oil Boilers (High Growth)

8.4.3 LCC AND PBP RESULTS USING AEO 2003 LOW GROWTH PRICE SCENARIO

Table 8.4.3.1 LCC and PBP Results for Non-Weatherized Gas Furnaces (Low Growth)

	LCC					Payback	
Design Option: AFUE/Electricity	**Average**	**Average Savings**	**Net Cost**	**No Impact***	**Net Benefit**	**Median**	**Average***
	$	**$**	**%**	**%**	**%**	**years**	**years**
78%	$9,855						
80%	$9,687	$0	0%	99%	1%	2.1	38.5
80% PSC+	$9,678	$7	18%	27%	55%	5.4	5.4
80% ECM	$9,774	-$65	61%	27%	12%	24.1	35.2
80% BC/ECM+	$9,726	-$29	53%	27%	21%	18.0	27.5
80% 2-stage mod.	$9,612	$41	33%	27%	40%	8.7	13.7
80% 2-mod. ECM	$9,699	-$21	49%	27%	24%	16.1	21.9
80% 2-stage mod. BC/ECM+	$9,689	-$9	47%	27%	26%	14.9	21.8
81% 8% Cat. III	$9,683	-$4	32%	27%	41%	9.2	28.3
81% PSC+	$9,673	$3	30%	26%	43%	8.3	21.9
81% ECM	$9,770	-$69	53%	26%	21%	18.5	27.3
81% BC/ECM+	$9,722	-$33	47%	26%	27%	15.4	23.9
81% 2-stage Mod, no Cat. III	$9,574	$62	29%	26%	45%	7.8	17.3
81% 2-stage Mod ECM	$9,701	-$29	46%	26%	28%	14.9	21.9
81% 2-stage Mod BC/ECM+	$9,690	-$16	44%	26%	30%	14.3	21.3
82%	$10,064	-$293	70%	26%	4%	28.7	86.4
82% PSC+	$10,055	-$286	69%	26%	4%	29.2	85.3
82% ECM	$10,151	-$358	71%	26%	3%	51.4	109.2
82% BC/ECM+	$10,104	-$322	68%	26%	6%	36.6	83.4
82% 2-stage Mod	$9,998	-$258	65%	26%	9%	19.3	59.8
82% 2-stage Mod ECM	$10,084	-$319	67%	26%	6%	36.1	84.9
82% 2-stage Mod BC/ECM+	$10,073	-$306	66%	26%	7%	32.4	73.9
83%	$10,296	-$470	73%	26%	1%	66.4	120.5
90% Baseline Cond.	$9,820	-$161	56%	26%	18%	18.5	42.5
90% PSC+	$9,811	-$152	58%	15%	27%	14.8	38.0
90% ECM	$9,917	-$239	67%	15%	18%	22.4	48.8
90% BC/ECM+	$9,871	-$196	64%	15%	20%	19.9	44.1

91% 2-stage Mod ECM	$9,811	-$156	59%	15%	25%	17.1	41.0
91% 2-stage BC/ECM+	$9,794	-$137	59%	15%	26%	16.8	39.6
91% Step Mod ECM	$10,032	-$344	67%	15%	17%	22.9	53.8
91% Step Mod BC/ECM+	$10,027	-$334	67%	15%	17%	22.4	50.5
92%Incr. HX Area	$9,829	-$174	60%	15%	24%	16.6	41.0
92% PSC+	$9,820	-$166	64%	2%	34%	13.6	37.1
92% ECM	$9,927	-$271	77%	2%	21%	22.1	47.5
92% BC/ECM+	$9,880	-$224	74%	2%	24%	19.9	41.3
93% 2-stage Mod ECM	$9,827	-$173	68%	2%	31%	16.3	40.4
93% 2-stage Mod BC/ECM+	$9,809	-$154	67%	2%	31%	16.3	36.2
93% Step Mod ECM	$10,050	-$392	78%	2%	20%	22.4	51.7
93% Step Mod BC/ECM+	$10,043	-$384	79%	2%	20%	22.2	47.2
96% Step Mod ECM	$10,642	-$976	90%	2%	8%	33.4	92.2
96% Step Mod BC/ECM+	$10,658	-$992	92%	0%	9%	34.2	87.0

* “No impact” means that the base case furnace assigned to the household has greater efficiency than the level indicated, so the household is not affected.

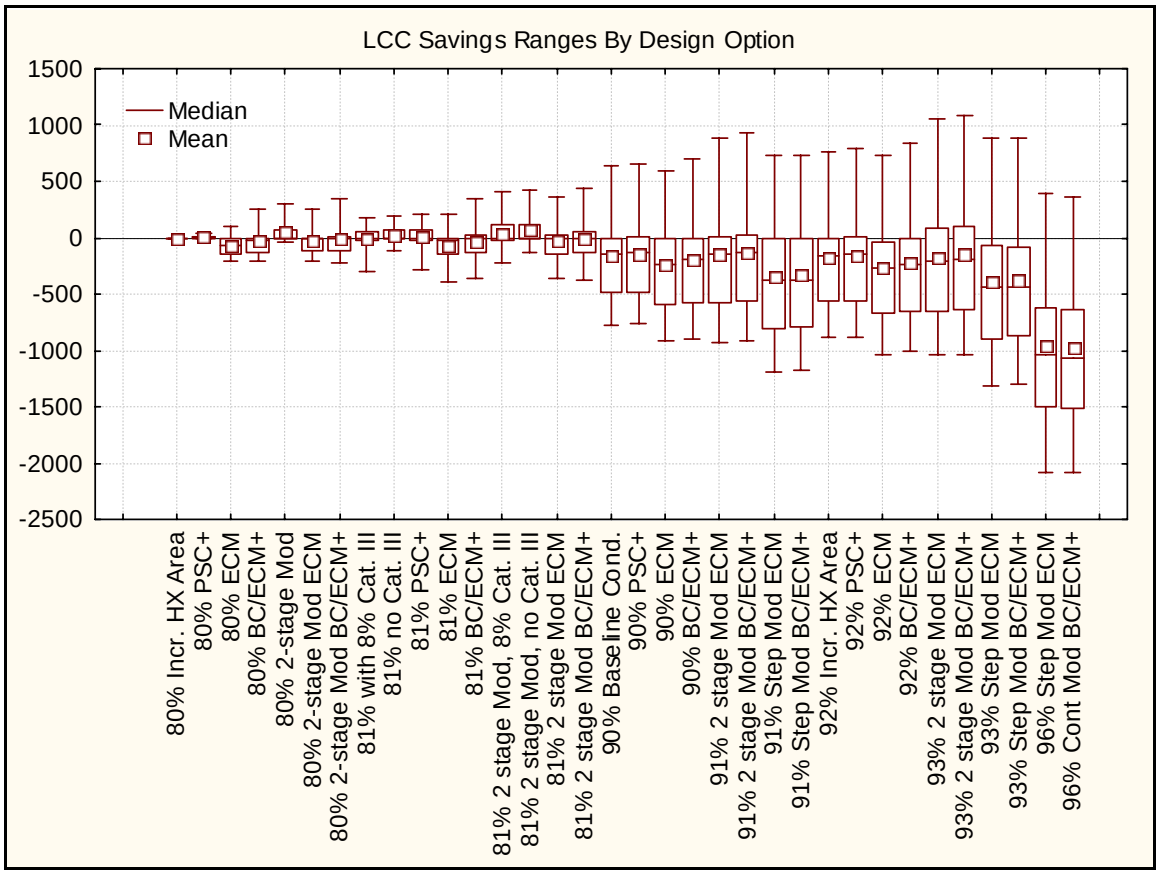

Figure 8.4.3.1 National LCC Savings Results for Non-Weatherized Gas Furnaces (Low Growth)

Table 8.4.3.2 LCC and PBP for Weatherized Furnaces (Low Growth)

	LCC					Payback	
Design Option: AFUE/Electricity	**Average**	**Average Savings**	**Net Cost**	**No Impact***	**Net Benefit**	**Median**	**Average***
78% Baseline	$8,468						
80% Incr. HX Area	$8,381	$2	0%	98%	2%	1.1	1.5
80% Improved Insulation	$8,378	$3	27%	46%	27%	9.1	8.2
80% PSC+	$8,366	$10	7%	46%	47%	3.5	4.1
80% ECM	$8,461	-$41	44%	46%	10%	20.1	27.9
80% Improved Heat Xfer	$8,391	-$4	52%	46%	2%	2.9	3.8
81% Incr. HX Area	$8,343	$22	2%	46%	52%	2.1	2.7
81% Improved Insulation	$8,340	$25	20%	20%	60%	5.3	6.5
81% PSC+	$8,328	$35	5%	20%	75%	2.8	3.4
81% ECM	$8,423	-$41	60%	20%	20%	16.7	22.0
81% Improved Heat Xfer	$8,349	$18	32%	20%	48%	3.9	5.2
82% Incr. HX Area	$8,306	$52	3%	20%	77%	2.2	3.0
82% Improved Insulation	$8,303	$55	19%	0%	81%	4.4	5.7
82% PSC+	$8,291	$67	4%	0%	96%	2.7	3.3
82% ECM	$8,385	-$28	67%	0%	33%	14.7	19.0
82% Improved Heat Xfer	$8,307	$51	24%	0%	76%	2.6	3.5
83% Incr. HX Area	$8,274	$84	7%	0%	93%	3.0	4.0
83% Improved Insulation	$8,271	$87	12%	0%	88%	4.0	5.6
83% PSC+	$8,259	$99	4%	0%	96%	3.0	3.7
83% ECM	$8,353	$4	60%	0%	40%	12.7	15.5
83% Improved Heat Xfer	$8,271	$87	4%	0%	96%	2.5	3.4

* "No impact" means that the base case furnace assigned to the household has greater efficiency than the level indicated, so the household is not affected.

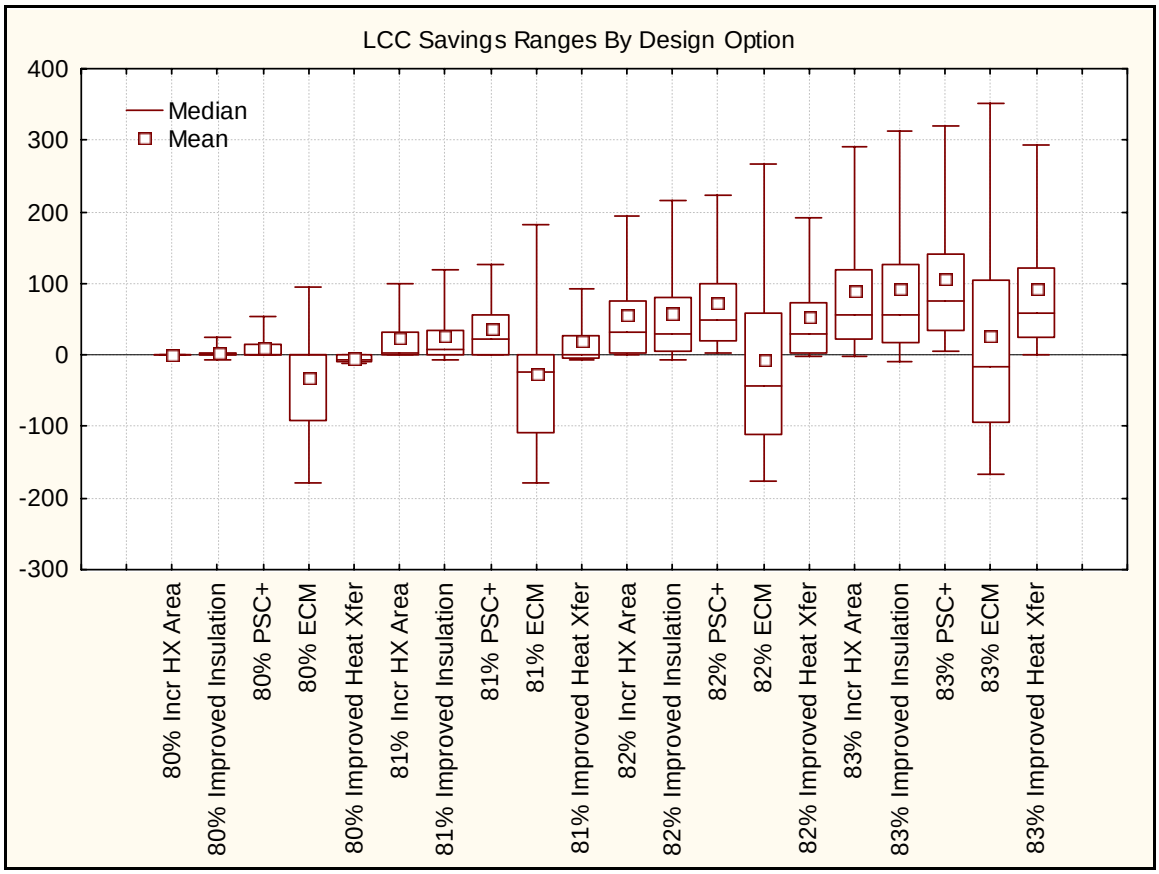

Figure 8.4.3.2 National LCC Savings Results for Weatherized Furnaces (Low Growth)

Table 8.4.3.3 LCC and PBP Results for Mobile Home Furnaces (Low Growth)

	LCC					Payback	
Design Option: AFUE/Electricity	**Average LCC**	**Average Savings**	**Net Cost**	**No Impact***	**Net Benefit**	**Median**	**Average***
75% Baseline	$7,759						
80%	$7,342	$62	2%	85%	13%	2.4	5.4
80% ECM	$7,443	-$35	70%	5%	25%	21.3	38.1
80% 2-stage modulation	$7,580	-$165	80%	5%	15%	25.5	62.6
81%	$7,292	$110	10%	5%	85%	4.5	6.4
81% ECM	$7,392	$13	61%	5%	34%	16.3	22.3
81% 2-stage modulation	$7,553	-$120	75%	5%	20%	25.3	62.1
82%	$7,250	$150	15%	5%	80%	5.3	7.8
82% ECM	$7,349	$54	51%	5%	44%	13.8	18.2
82% 2-stage modulation	$7,495	-$83	70%	5%	25%	23.0	57.5
90%	$7,222	$176	47%	5%	48%	13.0	24.1

* "No impact" means that the base case furnace assigned to the household has greater efficiency than the level indicated, so the household is not affected.

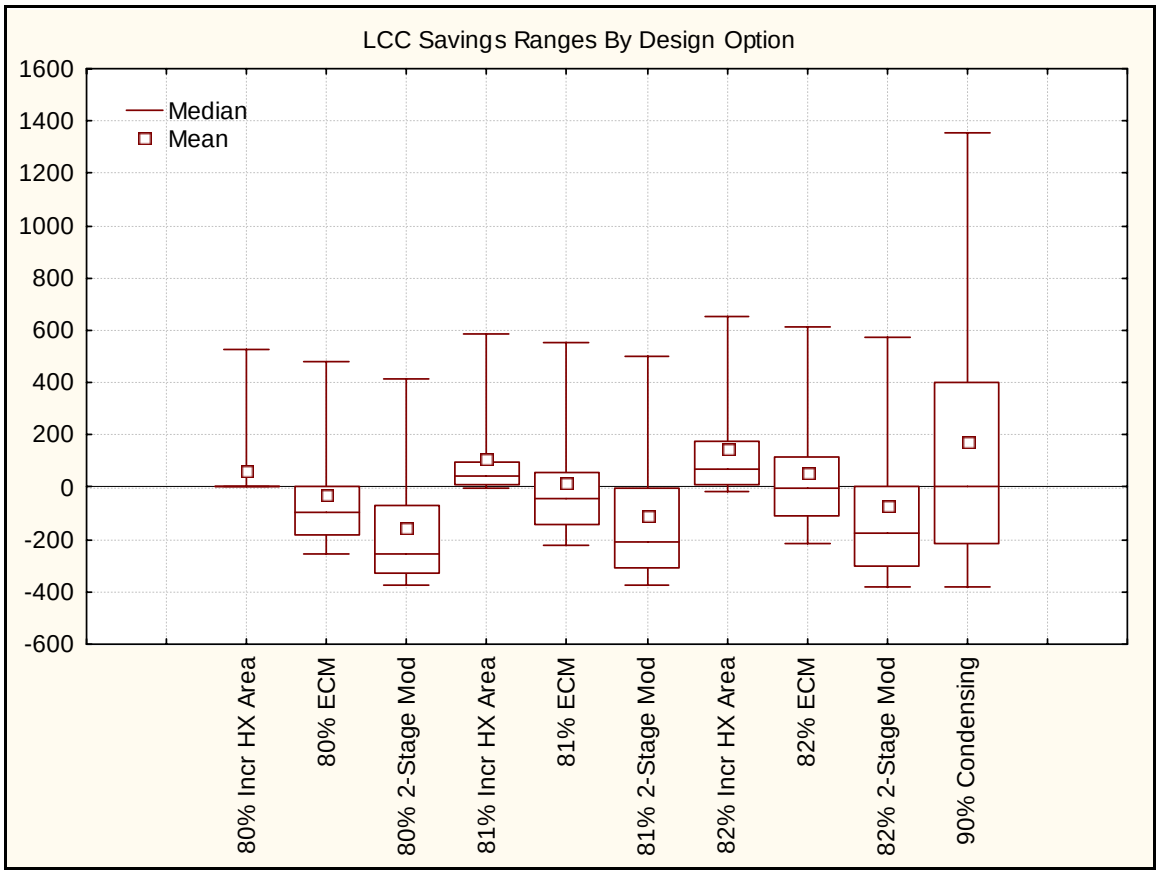

Figure 8.4.3.3 National LCC Savings Results for Mobile Home Furnaces (Low Growth)

Table 8.4.3.4 LCC and PBP Results for Oil Furnaces (Low Growth)

	LCC					Payback	
Design Option: AFUE/Electricity	**Average**	**Average Savings**	**Net Cost**	**No Impact**	**Net Benefit**	**Median**	**Average**
78% Baseline	$15,611						
80% Incr. HX Area	$15,331	$11	0%	96%	4%	0.2	0.2
81% Incr. HX Area	$15,200	$91	2%	39%	59%	0.4	0.5
81% Atom Burner 2-stage Mod.	$15,332	-$2	44%	30%	26%	12.3	20.0
81% Interrupted Ignition	$15,224	$74	13%	30%	57%	2.9	5.2
81% ECM	$15,389	-$41	52%	30%	18%	15.2	23.9
82% Incr. HX Area	$15,070	$182	2%	30%	68%	0.3	0.4
82% Atom Burner 2-stage Mod.	$15,207	$76	37%	22%	40%	8.9	14.1
82% Interrupted Ignition	$15,043	$164	10%	22%	67%	1.7	3.5
82% ECM	$15,258	$36	41%	22%	36%	9.6	18.0
83% Incr. HX Area	$14,943	$280	2%	22%	75%	0.3	0.4
83% Atom Burner 2-stage Mod.	$15,085	$159	33%	15%	52%	7.1	11.9
83% Interrupted Ignition	$14,967	$260	10%	15%	75%	1.4	3.1
83% ECM	$15,131	$120	35%	15%	50%	7.4	14.9
84% Incr. HX Area	$15,425	-$129	60%	15%	26%	14.1	21.5
84% Atom Burner 2-stage Mod.	$15,571	-$265	72%	7%	20%	16.8	26.0
84% AFUE Interrupted Ignition	$15,448	-$151	68%	7%	24%	15.0	21.9
84% ECM	$15,612	-$302	76%	7%	17%	18.5	33.4
85% Incr. HX Area	$15,309	-$22	51%	7%	42%	10.4	14.3
85% Atom Burner 2-stage Mod.	$15,461	-$173	71%	0%	29%	14.2	20.8
85% Interrupted Ignition	$15,333	-$46	60%	0%	40%	11.2	15.5
85% ECM	$15,496	-$209	75%	0%	25%	15.4	28.5

* "No impact" means that the base case furnace assigned to the household has greater efficiency than the level indicated, so the household is not affected.

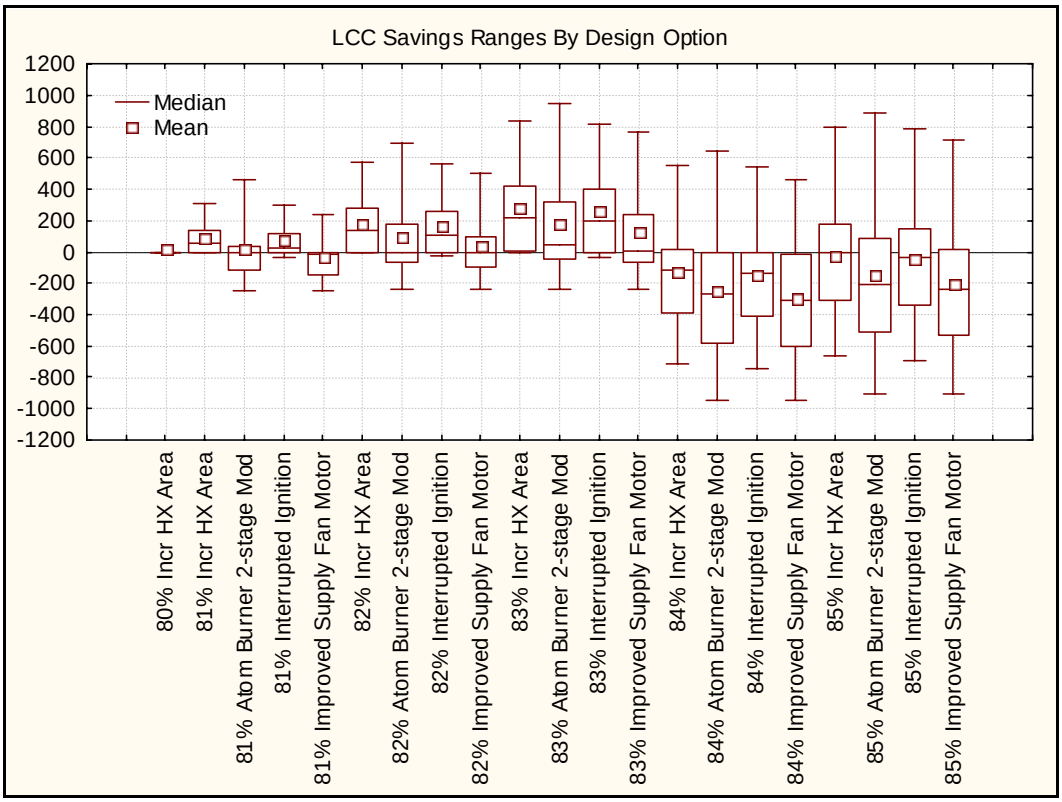

Figure 8.4.3.4 National LCC Savings Results for Oil Furnaces (Low Growth)

Table 8.4.3.5 LCC and PBP Results for Oil Boilers (Low Growth)

	LCC					Payback	
Design Option: AFUE/Electricity	**Average**	**Average Savings**	**Net Cost**	**No Impact***	**Net Benefit**	**Median**	**Average***
80%	$14,454						
81%	$14,341	$6	0%	95%	5%	0.7	0.8
81% Atomized Burner	$14,729	-$35	11%	89%	0%	73.0	107.1
81% Inter Ign	$14,346	$5	4%	89%	7%	6.0	9.6
81% Imp Circ Pump	$14,566	-$18	10%	89%	1%	40.4	67.9
82%	$14,231	$18	0%	89%	11%	0.7	0.8
82% Atomized Burner	$14,620	-$45	16%	84%	0%	36.8	67.8
82% Inter Ign	$14,236	$17	4%	84%	12%	3.5	6.9
82% Imp Circ Pump	$14,456	-$18	13%	84%	3%	21.9	46.6
83%	$14,124	$35	0%	84%	16%	0.7	0.8
83% Atomized Burner	$14,513	-$118	38%	61%	2%	24.1	46.3
83% Inter Ign	$14,129	$33	17%	61%	22%	8.0	10.4
83% Imp Circ Pump	$14,349	-$54	33%	61%	6%	54.6	71.7
84%	$14,019	$76	0%	61%	39%	0.7	0.9
84% Atomized Burner	$14,409	-$169	58%	37%	4%	28.2	60.1
84% Inter Ign	$14,025	$72	18%	37%	45%	3.9	7.7
84% Imp Circ Pump	$14,245	-$66	52%	37%	11%	24.9	52.3
86%	$14,536	-$243	53%	37%	10%	23.7	32.8
86% Atomized Burner	$14,927	-$606	91%	7%	2%	54.4	99.7
86% Inter Ign	$14,542	-$248	75%	7%	18%	18.0	25.8
86% Imp Circ Pump	$14,762	-$453	88%	7%	5%	42.6	61.8
90%	$14,874	-$556	83%	7%	10%	20.2	24.6
95%	$15,195	-$877	89%	0%	11%	19.7	23.8

* "No impact" means that the base case furnace assigned to the household has greater efficiency than the level indicated, so the household is not affected.

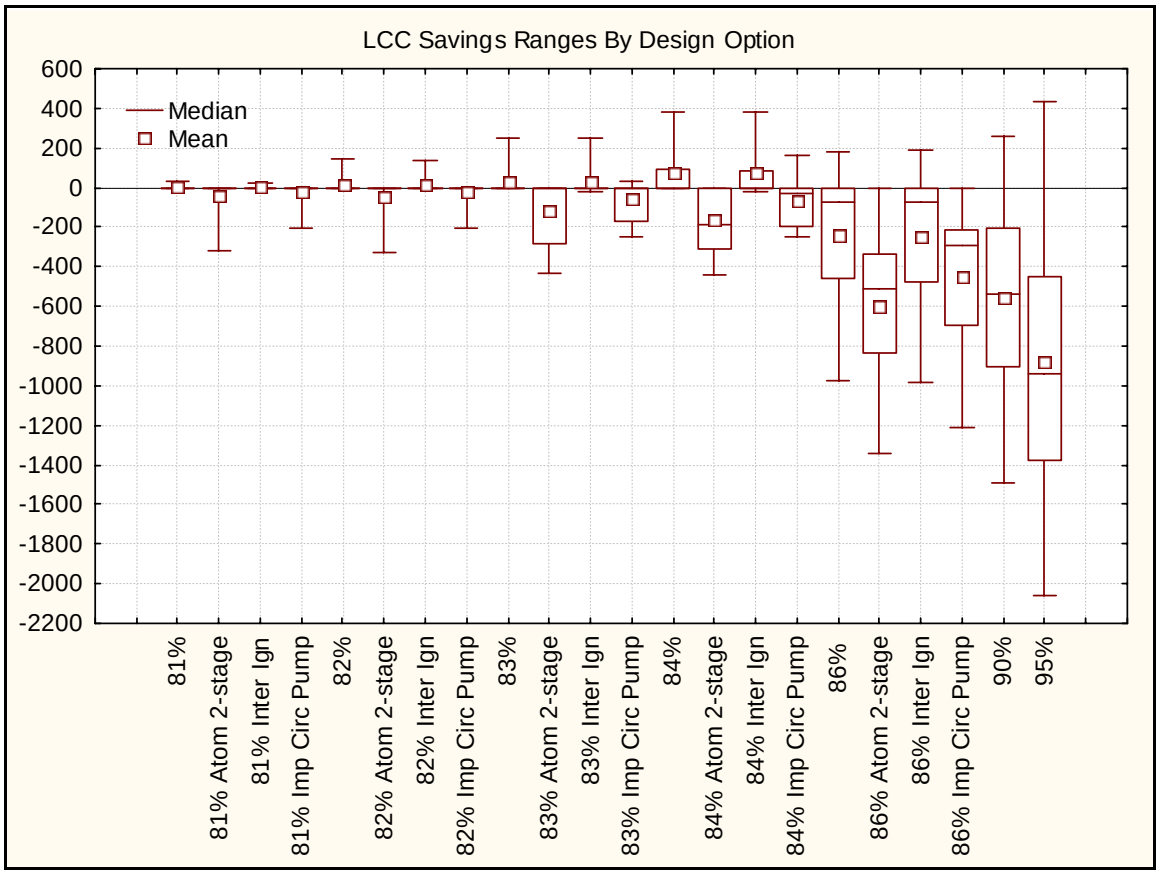

Figure 8.4.3.5 National LCC Savings Result for Oil Boilers (Low Growth)

Table 8.4.3.6 LCC and PBP Results for Gas Boilers (Low Growth)

	LCC					Payback	
Design Option: AFUE/Electricity	**Average LCC**	**Average Savings**	**Net Cost**	**No Impact***	**Net Benefit**	**Median**	**Average***
80% Baseline	$10,536						
81%	$10,276	$91	0%	65%	35%	2.2	2.5
81% 2-stage modulation	$10,409	-$35	38%	44%	18%	10.1	14.7
81% Imp Circ Pump	$10,527	-$50	41%	44%	16%	15.5	57.2
82%	$10,221	$123	3%	44%	53%	2.6	3.3
82% 2-stage modulation	$10,354	-$35	49%	30%	22%	9.7	21.1
82% Imp Circ Pump	$10,472	-$54	51%	30%	19%	19.6	44.0
83%	$10,163	$163	5%	30%	66%	2.6	3.4
83% 2-stage modulation	$10,298	-$29	59%	15%	26%	10.2	24.0
83% Imp Circ Pump	$10,414	-$50	62%	15%	24%	18.3	40.8
84%	$10,107	$211	6%	15%	79%	2.6	3.5
84% 2-stage modulation	$10,243	-$2	62%	6%	32%	10.7	22.9
84% Imp Circ Pump	$10,358	-$26	64%	6%	30%	15.5	32.5
88%	$10,653	-$301	67%	6%	27%	18.0	30.5
91%	$10,739	-$384	75%	3%	22%	20.1	46.3
99%	$11,226	-$870	86%	0%	14%	22.4	48.6

* "No impact" means that the base case furnace assigned to the household has greater efficiency than the level indicated, so the household is not affected.

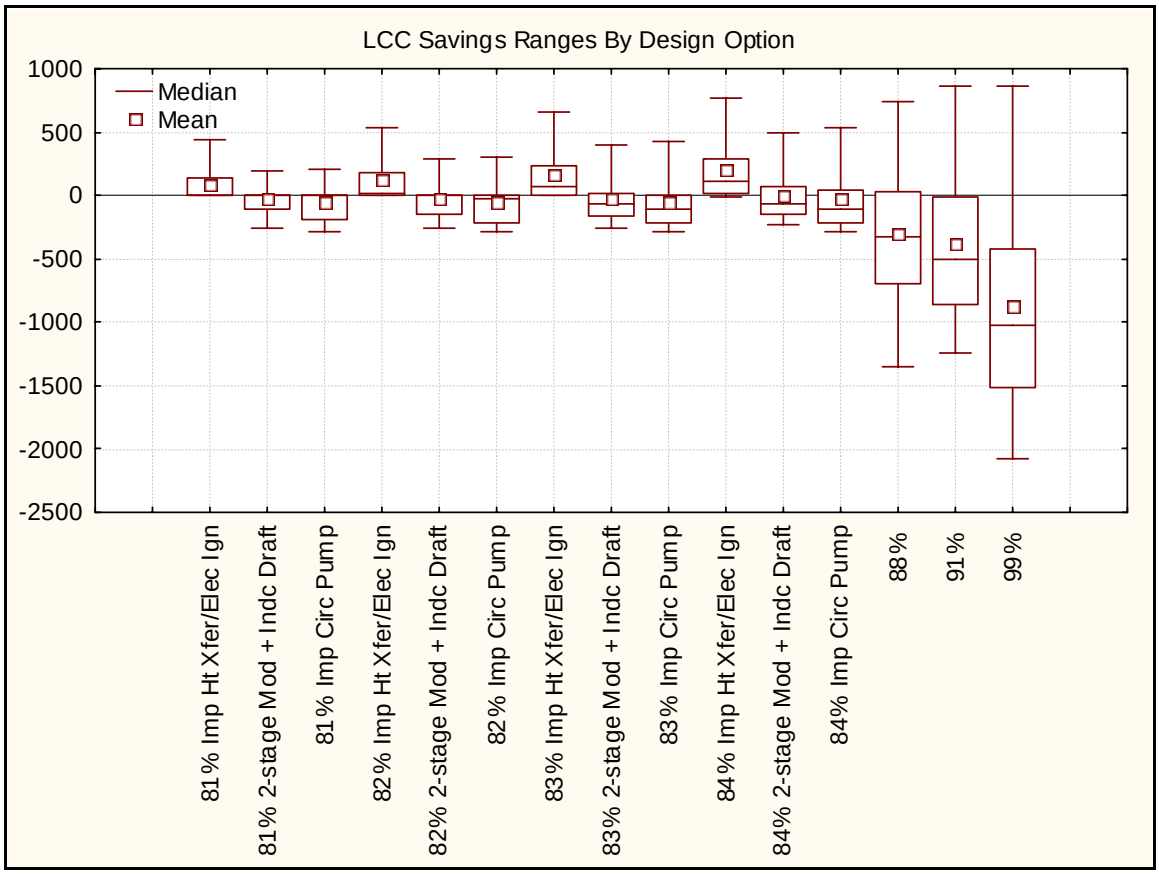

Figure 8.4.3.6 National LCC Savings Results for Gas Boilers (Low Growth)

REFERENCES

1. U.S. Department of Energy - Energy Information Administration, *Annual Energy Outlook 2003: With Projections Through 2025*, January, 2003. Washington, DC. Report No. DOE/EIA-0383(2003). <http://www.eia.doe.gov/oiaf/aeo>