

**APPENDIX 6B. DETAILED LIFE-CYCLE COST AND PAYBACK PERIOD  
ANALYSIS RESULTS**

**TABLE OF CONTENTS**

6B.1	INTRODUCTION .....	6B-1
6B.2	LIFE-CYCLE COST AND PAYBACK PERIOD RESULTS .....	6B-2
6B.2.1	Life-Cycle Cost Results for Air-Cooled < 65,000 Btu/h .....	6B-2
6B.2.2	Life-Cycle Cost Results for Air-Cooled ≥ 65,000 Btu/h and < 240,000 Btu/h .....	6B-4
6B.2.3	Life-Cycle Cost Results for Air-Cooled ≥ 240,000 Btu/h and < 760,000 Btu/h .....	6B-6
6B.2.4	Life-Cycle Cost Results for Water-Cooled < 65,000 Btu/h .....	6B-8
6B.2.5	Life-Cycle Cost Results for Water-Cooled ≥ 65,000 Btu/h and < 240,000 Btu/h .....	6B-10
6B.2.6	Life-Cycle Cost Results for Water-Cooled ≥ 240,000 Btu/h and < 760,000 Btu/h .....	6B-12
6B.2.7	Life-Cycle Cost Results for Water-Cooled with Fluid Economizer < 65,000 Btu/h .....	6B-14
6B.2.8	Life-Cycle Cost Results for Water-Cooled with Fluid Economizer ≥ 65,000 Btu/h and < 240,000 Btu/h .....	6B-16
6B.2.9	Life-Cycle Cost Results for Water-Cooled with Fluid Economizer ≥ 240,000 Btu/h and < 760,000 Btu/h .....	6B-18
6B.2.10	Life-Cycle Cost Results for Glycol-Cooled < 65,000 Btu/h .....	6B-20
6B.2.11	Life-Cycle Cost Results for Glycol-Cooled ≥ 65,000 Btu/h and < 240,000 Btu/h .....	6B-22
6B.2.12	Life-Cycle Cost Results for Glycol-Cooled ≥ 240,000 Btu/h and < 760,000 Btu/h .....	6B-24
6B.2.13	Life-Cycle Cost Results for Glycol-Cooled with Fluid Economizer < 65,000 Btu/h .....	6B-26
6B.2.14	Life-Cycle Cost Results for Glycol-Cooled with Fluid Economizer ≥ 65,000 Btu/h and < 240,000 Btu/h .....	6B-28
6B.2.15	Life-Cycle Cost Results for Glycol-Cooled with Fluid Economizer ≥ 240,000 Btu/h and < 760,000 Btu/h .....	6B-30

**LIST OF TABLES**

Table 6B.2.1	LCC Results for Air-Cooled < 65,000 Btu/h* .....	6B-2
Table 6B.2.2	LCC Results for Air-Cooled ≥ 65,000 Btu/h and < 240,000 Btu/h .....	6B-4
Table 6B.2.3	LCC Results for Air-Cooled ≥ 240,000 Btu/h and < 760,000 Btu/h .....	6B-6
Table 6B.2.4	LCC Results for Water-Cooled < 65,000 Btu/h* .....	6B-8
Table 6B.2.5	LCC Results for Water-Cooled ≥ 65,000 Btu/h and < 240,000 Btu/h* .....	6B-10
Table 6B.2.6	LCC Results for Water-Cooled ≥ 240,000 Btu/h and < 760,000 Btu/h* .....	6B-12
Table 6B.2.7	LCC Results for Water-Cooled with Fluid Economizer < 65,000 Btu/h* .....	6B-14
Table 6B.2.8	LCC Results for Water-Cooled with Fluid Economizer ≥ 65,000 Btu/h and < 240,000 Btu/h* .....	6B-16
Table 6B.2.9	LCC Results for Water-Cooled with Fluid Economizer ≥ 240,000 Btu/h and < 760,000 Btu/h* .....	6B-18
Table 6B.2.10	LCC Results for Glycol-Cooled < 65,000 Btu/h* .....	6B-20

Table 6B.2.11 LCC Results for Glycol-Cooled $\geq 65,000$ Btu/h and $< 240,000$ Btu/h*	6B-22
Table 6B.2.12 LCC Results for Glycol-Cooled $\geq 240,000$ Btu/h and $< 760,000$ Btu/h*	6B-24
Table 6B.2.13 LCC Results for Glycol-Cooled with Fluid Economizer $< 65,000$ Btu/h*	6B-26
Table 6B.2.14 LCC Results for Glycol-Cooled with Fluid Economizer $\geq 65,000$ Btu/h and $< 240,000$ Btu/h*	6B-28
Table 6B.2.15 LCC Results for Glycol-Cooled with Fluid Economizer $\geq 240,000$ Btu/h and $< 760,000$ Btu/h*	6B-30

## LIST OF FIGURES

Figure 6B.2.1 LCC Results for Air-Cooled $< 65,000$ Btu/h	6B-2
Figure 6B.2.2 PBP Results for Air-Cooled $< 65,000$ Btu/h	6B-3
Figure 6B.2.3 LCC Results for Air-Cooled $\geq 65,000$ Btu/h and $< 240,000$ Btu/h	6B-4
Figure 6B.2.4 PBP Results for Air-Cooled $\geq 65,000$ Btu/h and $< 240,000$ Btu/h	6B-5
Figure 6B.2.5 LCC Results for Air-Cooled $\geq 240,000$ Btu/h and $< 760,000$ Btu/h	6B-6
Figure 6B.2.6 PBP Results for Air-Cooled $\geq 240,000$ Btu/h and $< 760,000$ Btu/h	6B-7
Figure 6B.2.7 LCC Results for Water-Cooled $< 65,000$ Btu/h	6B-8
Figure 6B.2.8 PBP Results for Water-Cooled $< 65,000$ Btu/h	6B-9
Figure 6B.2.9 LCC Results for Water-Cooled $\geq 65,000$ Btu/h and $< 240,000$ Btu/h	6B-10
Figure 6B.2.10 PBP Results for Water-Cooled $\geq 65,000$ Btu/h and $< 240,000$ Btu/h	6B-11
Figure 6B.2.11 LCC Results for Water-Cooled $\geq 240,000$ Btu/h and $< 760,000$ Btu/h	6B-12
Figure 6B.2.12 PBP Results for Water-Cooled $\geq 240,000$ Btu/h and $< 760,000$ Btu/h	6B-13
Figure 6B.2.13 LCC Results for Water-Cooled with Fluid Economizer $< 65,000$ Btu/h	6B-14
Figure 6B.2.14 PBP Results for Water-Cooled with Fluid Economizer $< 65,000$ Btu/h	6B-15
Figure 6B.2.15 LCC Results for Water-Cooled with Fluid Economizer $\geq 65,000$ Btu/h and $< 240,000$ Btu/h	6B-16
Figure 6B.2.16 PBP Results for Water-Cooled with Fluid Economizer $\geq 65,000$ Btu/h and $< 240,000$ Btu/h	6B-17
Figure 6B.2.17 LCC Results for Water-Cooled with Fluid Economizer $\geq 240,000$ Btu/h and $< 760,000$ Btu/h	6B-18
Figure 6B.2.18 PBP Results for Water-Cooled with Fluid Economizer $\geq 240,000$ Btu/h and $< 760,000$ Btu/h	6B-19
Figure 6B.2.19 LCC Results for Glycol-Cooled $< 65,000$ Btu/h	6B-20
Figure 6B.2.20 PBP Results for Glycol-Cooled $< 65,000$ Btu/h	6B-21
Figure 6B.2.21 LCC Results for Glycol-Cooled $\geq 65,000$ Btu/h and $< 240,000$ Btu/h	6B-22
Figure 6B.2.22 PBP Results for Glycol-Cooled $\geq 65,000$ Btu/h and $< 240,000$ Btu/h	6B-23
Figure 6B.2.23 LCC Results for Glycol-Cooled $\geq 240,000$ Btu/h and $< 760,000$ Btu/h	6B-24
Figure 6B.2.24 PBP Results for Glycol-Cooled $\geq 240,000$ Btu/h and $< 760,000$ Btu/h	6B-25
Figure 6B.2.25 LCC Results for Glycol-Cooled with Fluid Economizer $< 65,000$ Btu/h	6B-26
Figure 6B.2.26 PBP Results for Glycol-Cooled with Fluid Economizer $< 65,000$ Btu/h	6B-27
Figure 6B.2.27 LCC Results for Glycol-Cooled with Fluid Economizer $\geq 65,000$ Btu/h and $< 240,000$ Btu/h	6B-28
Figure 6B.2.28 PBP Results for Glycol-Cooled with Fluid Economizer $\geq 65,000$ Btu/h and $< 240,000$ Btu/h	6B-29
Figure 6B.2.29 LCC Results for Glycol-Cooled with Fluid Economizer $\geq 240,000$ Btu/h and $< 760,000$ Btu/h	6B-30

Figure 6B.2.30 PBP Results for Glycol-Cooled with Fluid Economizer  $\geq 240,000$  Btu/h and  
< 760,000 Btu/h .....6B-31

## **APPENDIX 6B. DETAILED LIFE-CYCLE COST AND PAYBACK PERIOD ANALYSIS RESULTS**

### **6B.1 INTRODUCTION**

This appendix contains detailed output from the life-cycle cost (LCC) analysis for computer room air conditioning (CRAC) equipment as developed using the LCC spreadsheet. LCCs, LCC savings, and payback periods (PBPs) are presented for each of the 15 equipment classes at each efficiency level. See chapter 6 of the technical support document for an explanation of the LCC spreadsheet.

LCC savings output obtained from the LCC analysis are in the form of distributions. LCC savings distributions were generated by performing 5,000 separate simulations using the LCC spreadsheet, and allowing the spreadsheet to select values for numerous inputs given probability distributions for each input. Given the results of the LCC model simulations, for each equipment class, the U.S. Department of Energy (DOE) calculated summary statistics at each efficiency level. These include average values for LCC, product installation costs and operating costs; average LCC savings; the percentage of customers who: (1) receive benefits in the form of lower LCC results; (2) are not affected by the standards; or (3) experience a cost in the form of increased LCC from equipment ownership; and finally, median payback periods for the efficiency investments. Results of the LCC and accompanying PBP analyses are shown in the tables in this appendix.

Also included in this appendix are two graphical presentations for the results of each equipment classes. One plots LCC savings distributions while the other plots PBP results. The figures illustrate the mean and median values on the plot using red and blue markers, respectively. The mean and median values are surrounded by rectangular boxes used to represent the 25th and 75th percentile values. The lower edge of the elongated rectangle represents the 25th percentile, which means that 25 percent of the customers will experience LCC savings or PBPs below the value represented by the bottom of the rectangle if the standard were set at the level in question. The upper edge of the elongated rectangle represents the 75th percentile. Finally, each of the rectangles includes two “tails,” or two vertical black lines, extending downward to represent the 5th percentile (lower end) and upward to represent the 95th percentile (upper end).

The remainder of this appendix presents the tabular and graphical results for the 15 equipment classes analyzed for the CRAC equipment rulemaking.

## 6B.2 LIFE-CYCLE COST AND PAYBACK PERIOD RESULTS

### 6B.2.1 Life-Cycle Cost Results for Air-Cooled < 65,000 Btu/h

Table 6B.2.1 LCC Results for Air-Cooled < 65,000 Btu/h\*

Efficiency Level	Life-Cycle Cost 2011\$			Life-Cycle Cost Savings				Payback Period years
	Installed Cost	Discounted Operating Cost	LCC	Average Savings 2011\$	% of Consumers that Experience			Median
					Net Cost	No Impact	Net Benefit	
Baseline (ASHRAE)	12,003	33,563	45,566					
1	13,491	31,554	45,045	584	2	89	9	8.6
2	15,239	29,905	45,144	122	18	68	14	10.3
3	17,295	28,548	45,842	(648)	67	23	10	12.2
4	19,711	27,436	47,147	(1,828)	91	5	4	14.6

\* Values in parentheses are negative values.

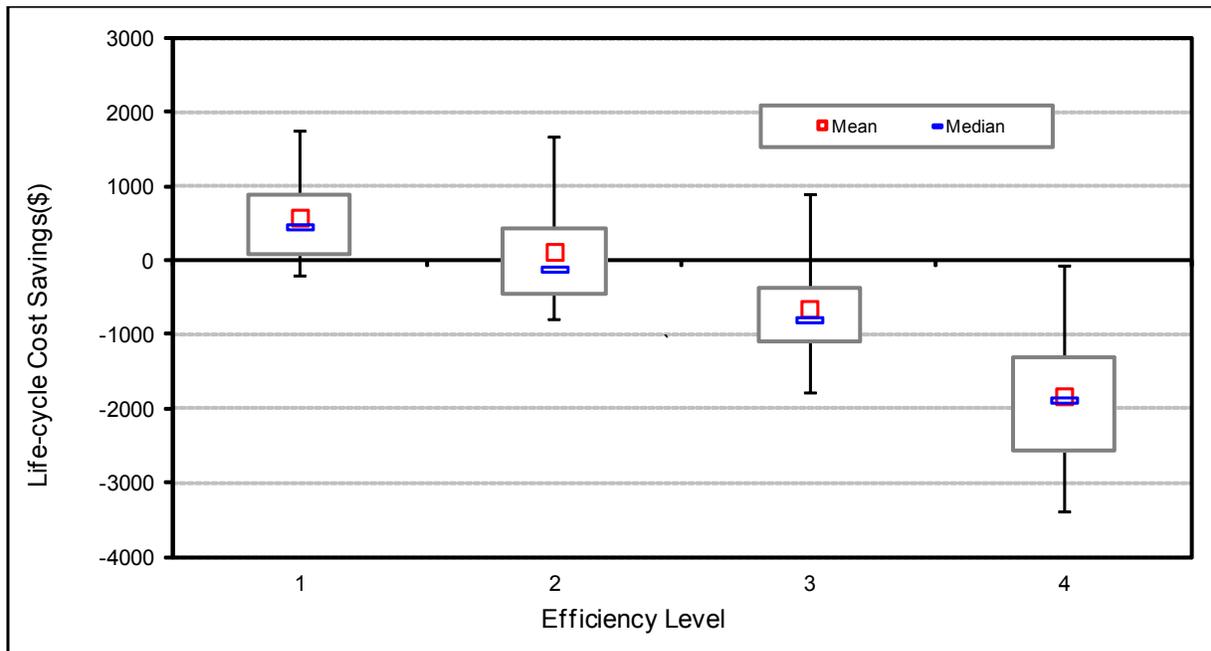
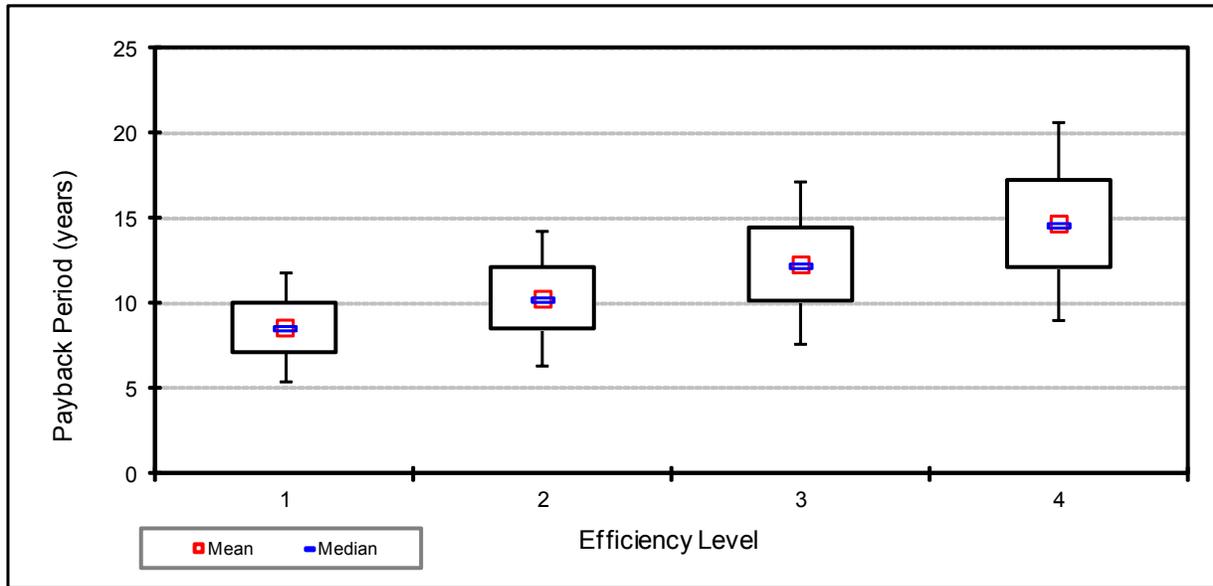


Figure 6B.2.1 LCC Results for Air-Cooled < 65,000 Btu/h

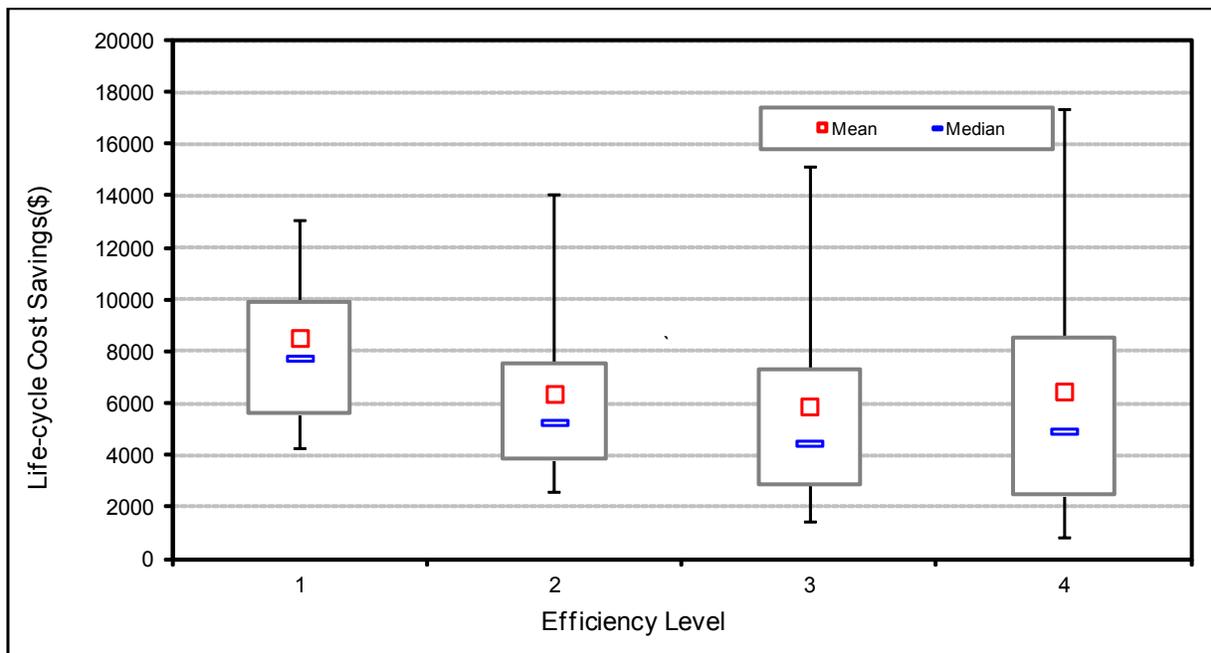


**Figure 6B.2.2 PBP Results for Air-Cooled < 65,000 Btu/h**

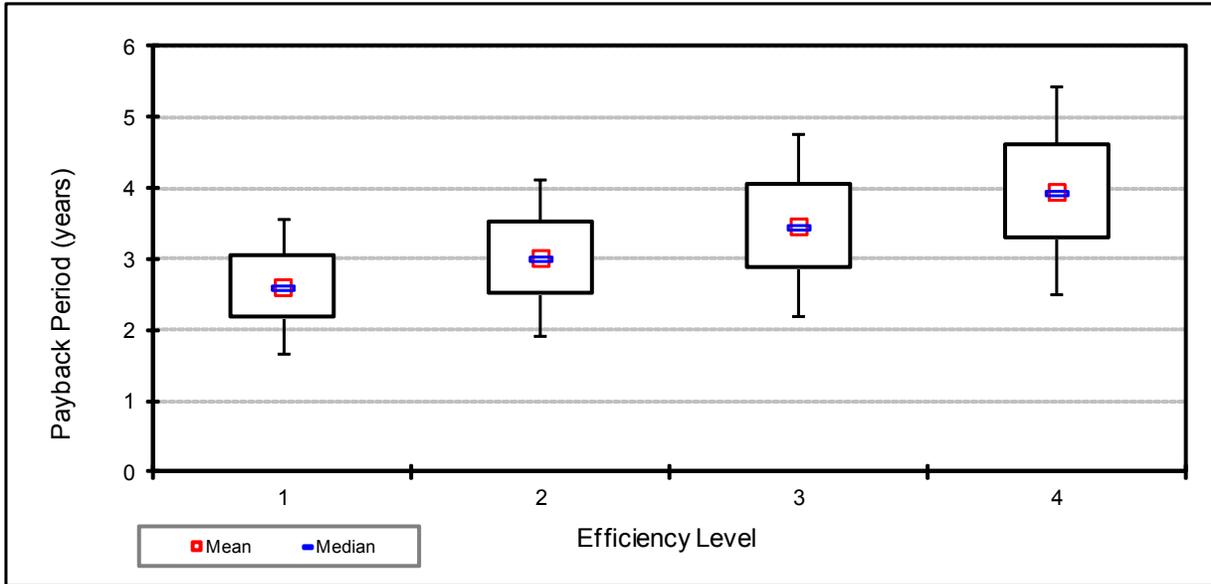
**6B.2.2 Life-Cycle Cost Results for Air-Cooled  $\geq 65,000$  Btu/h and  $< 240,000$  Btu/h**

**Table 6B.2.2 LCC Results for Air-Cooled  $\geq 65,000$  Btu/h and  $< 240,000$  Btu/h**

Efficiency Level	Life-Cycle Cost 2011\$			Life-Cycle Cost Savings				Payback Period years
	Installed Cost	Discounted Operating Cost	LCC	Average Savings 2011\$	% of Consumers that Experience			Median
					Net Cost	No Impact	Net Benefit	
Baseline (ASHRAE)	38,943	118,114	157,057					
1	41,179	108,190	149,369	8,535	0	98	2	2.6
2	43,588	100,283	143,871	6,378	0	78	22	3.0
3	46,185	93,872	140,057	5,894	0	33	67	3.5
4	48,984	88,606	137,590	6,474	0	2	98	3.9



**Figure 6B.2.3 LCC Results for Air-Cooled  $\geq 65,000$  Btu/h and  $< 240,000$  Btu/h**

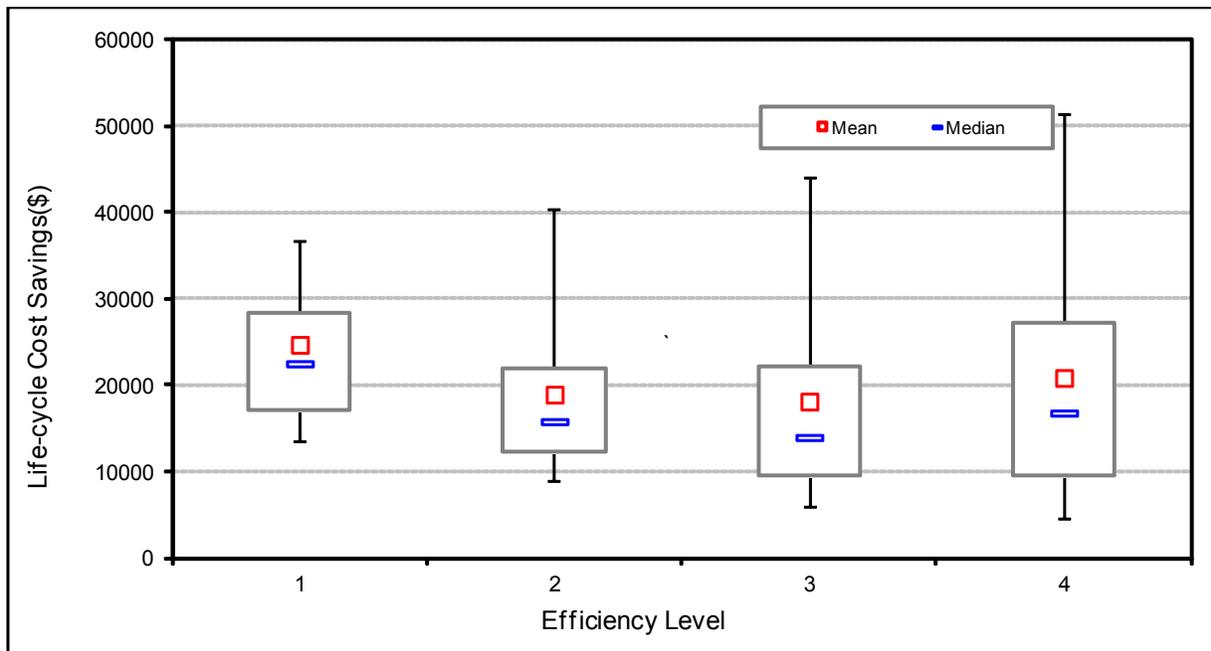


**Figure 6B.2.4 PBP Results for Air-Cooled  $\geq 65,000$  Btu/h and  $< 240,000$  Btu/h**

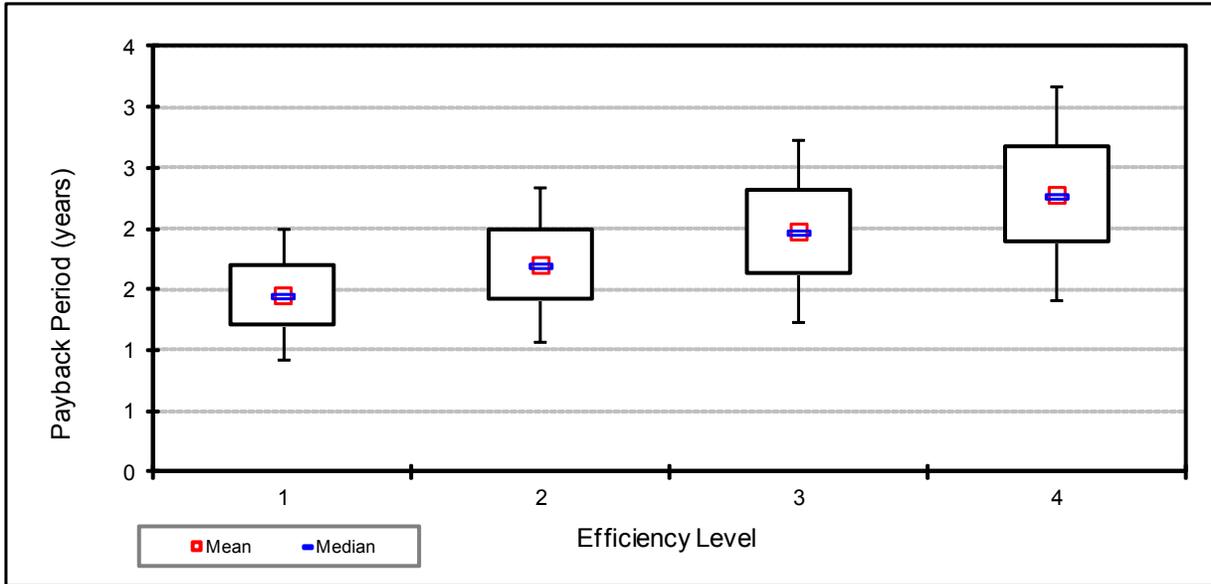
**6B.2.3 Life-Cycle Cost Results for Air-Cooled  $\geq 240,000$  Btu/h and  $< 760,000$  Btu/h**

**Table 6B.2.3 LCC Results for Air-Cooled  $\geq 240,000$  Btu/h and  $< 760,000$  Btu/h**

Efficiency Level	Life-Cycle Cost <i>2011\$</i>			Life-Cycle Cost Savings			Payback Period <i>years</i>	
	Installed Cost	Discounted Operating Cost	LCC	Average Savings <i>2011\$</i>	% of Consumers that Experience			Median
					Net Cost	No Impact	Net Benefit	
Baseline (ASHRAE)	56,633	288,343	344,977					
1	59,852	262,649	322,501	24,709	0	98	2	
2	63,322	242,741	306,063	18,947	0	78	22	
3	67,061	227,026	294,087	18,146	0	33	67	
4	71,092	214,460	285,553	20,871	0	2	98	



**Figure 6B.2.5 LCC Results for Air-Cooled  $\geq 240,000$  Btu/h and  $< 760,000$  Btu/h**



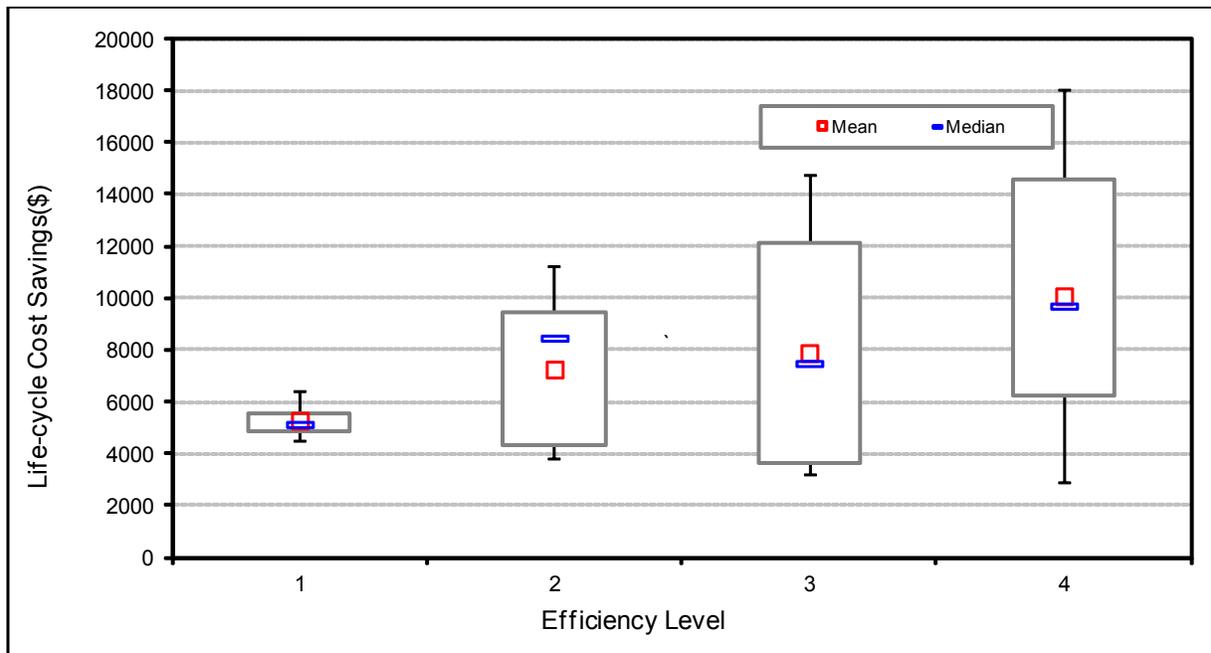
**Figure 6B.2.6 PBP Results for Air-Cooled  $\geq 240,000$  Btu/h and  $< 760,000$  Btu/h**

### 6B.2.4 Life-Cycle Cost Results for Water-Cooled < 65,000 Btu/h

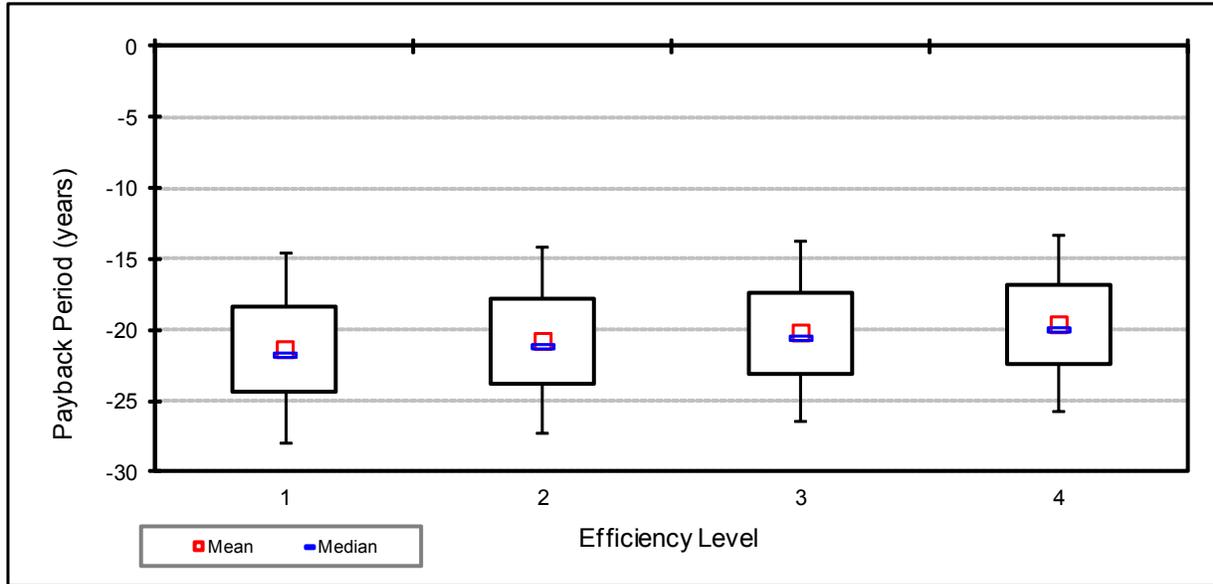
**Table 6B.2.4 LCC Results for Water-Cooled < 65,000 Btu/h\***

Efficiency Level	Life-Cycle Cost <i>2011\$</i>			Life-Cycle Cost Savings			Payback Period <i>years</i>	
	Installed Cost	Discounted Operating Cost	LCC	Average Savings <i>2011\$</i>	% of Consumers that Experience			Median
					Net Cost	No Impact	Net Benefit	
Baseline (ASHRAE)	23,716	30,844	54,560					
1	20,284	29,008	49,292	5,286	0	72	28	
2	17,504	27,426	44,930	7,264	0	49	51	
3	15,253	26,051	41,303	7,896	0	13	87	
4	13,429	24,845	38,274	10,089	0	3	97	

\* Values in parentheses are negative values.



**Figure 6B.2.7 LCC Results for Water-Cooled < 65,000 Btu/h**



**Figure 6B.2.8 PBP Results for Water-Cooled < 65,000 Btu/h**

### 6B.2.5 Life-Cycle Cost Results for Water-Cooled $\geq 65,000$ Btu/h and $< 240,000$ Btu/h

Table 6B.2.5 LCC Results for Water-Cooled  $\geq 65,000$  Btu/h and  $< 240,000$  Btu/h\*

Efficiency Level	Life-Cycle Cost 2011\$			Life-Cycle Cost Savings			Payback Period years	
	Installed Cost	Discounted Operating Cost	LCC	Average Savings 2011\$	% of Consumers that Experience			Median
					Net Cost	No Impact	Net Benefit	
Baseline (ASHRAE)	22,767	106,535	129,302					
1	28,390	101,751	130,141	(774)	21	72	7	14.2
2	35,948	98,421	134,370	(4,582)	56	42	2	19.9
3	46,106	96,571	142,677	(11,622)	80	20	0	29.3
4	59,759	96,331	156,090	(23,097)	96	4	0	47.0

\* Values in parentheses are negative values.

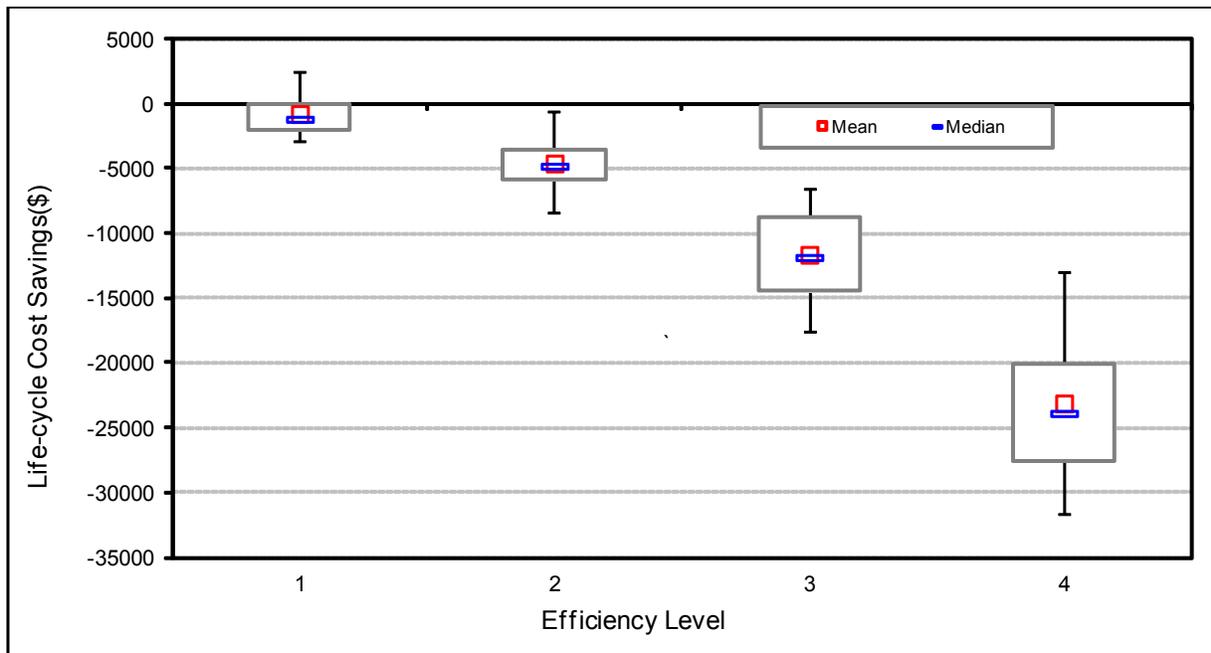
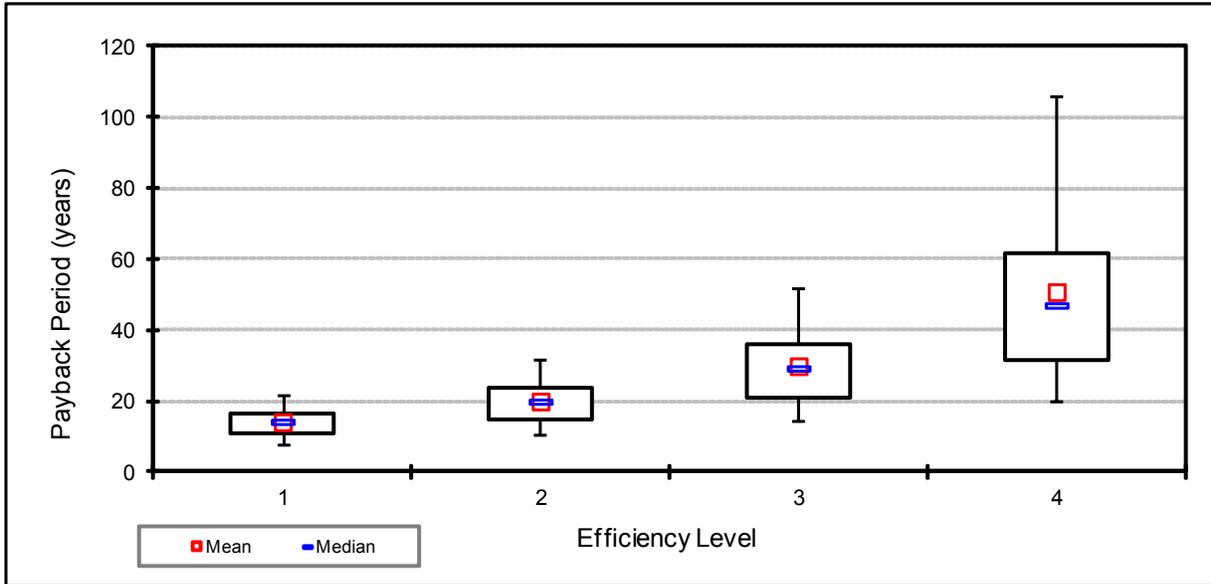


Figure 6B.2.9 LCC Results for Water-Cooled  $\geq 65,000$  Btu/h and  $< 240,000$  Btu/h



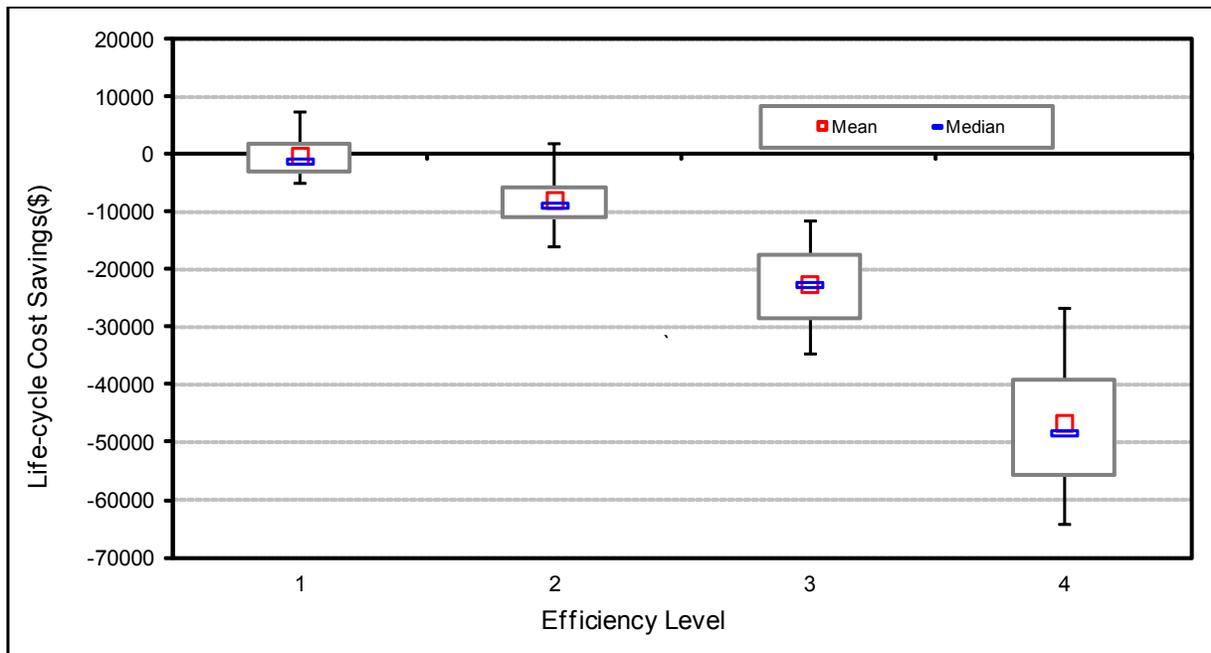
**Figure 6B.2.10 PBP Results for Water-Cooled  $\geq 65,000$  Btu/h and  $< 240,000$  Btu/h**

**6B.2.6 Life-Cycle Cost Results for Water-Cooled  $\geq 240,000$  Btu/h and  $< 760,000$  Btu/h**

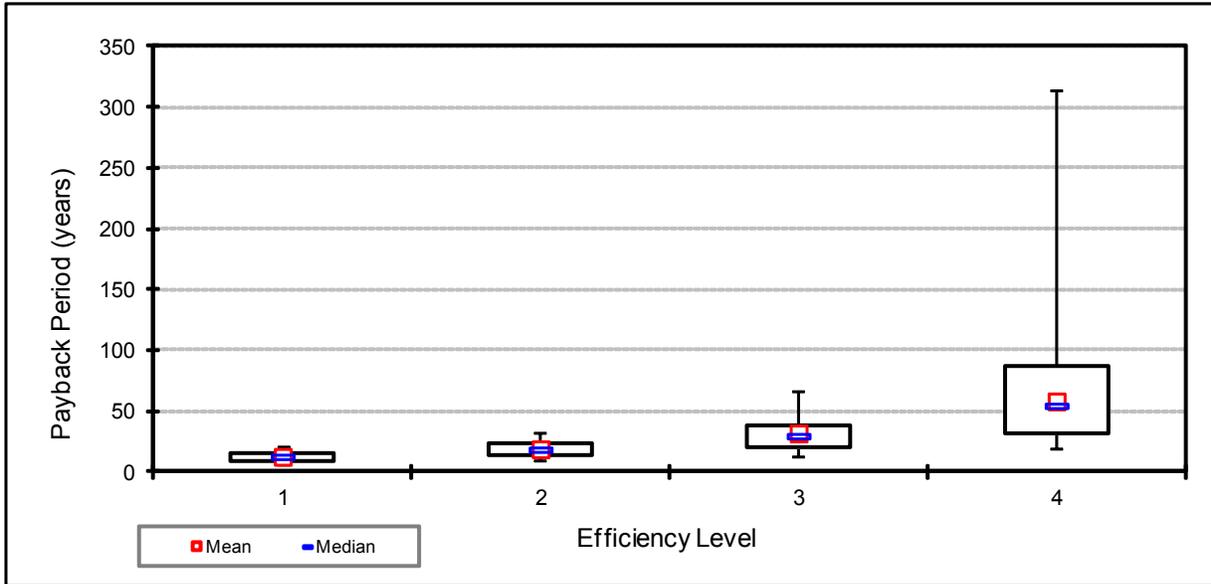
**Table 6B.2.6 LCC Results for Water-Cooled  $\geq 240,000$  Btu/h and  $< 760,000$  Btu/h\***

Efficiency Level	Life-Cycle Cost <i>2011\$</i>			Life-Cycle Cost Savings			Payback Period <i>years</i>	
	Installed Cost	Discounted Operating Cost	LCC	Average Savings <i>2011\$</i>	% of Consumers that Experience			Median
					Net Cost	No Impact	Net Benefit	
Baseline (ASHRAE)	42,240	240,877	283,117					
1	52,910	230,552	283,462	(196)	17	72	11	
2	67,250	224,068	291,318	(7,906)	54	42	4	
3	86,522	221,566	308,088	(22,491)	79	20	1	
4	112,423	223,494	335,917	(46,570)	96	4	0	

\* Values in parentheses are negative values.



**Figure 6B.2.11 LCC Results for Water-Cooled  $\geq 240,000$  Btu/h and  $< 760,000$  Btu/h**



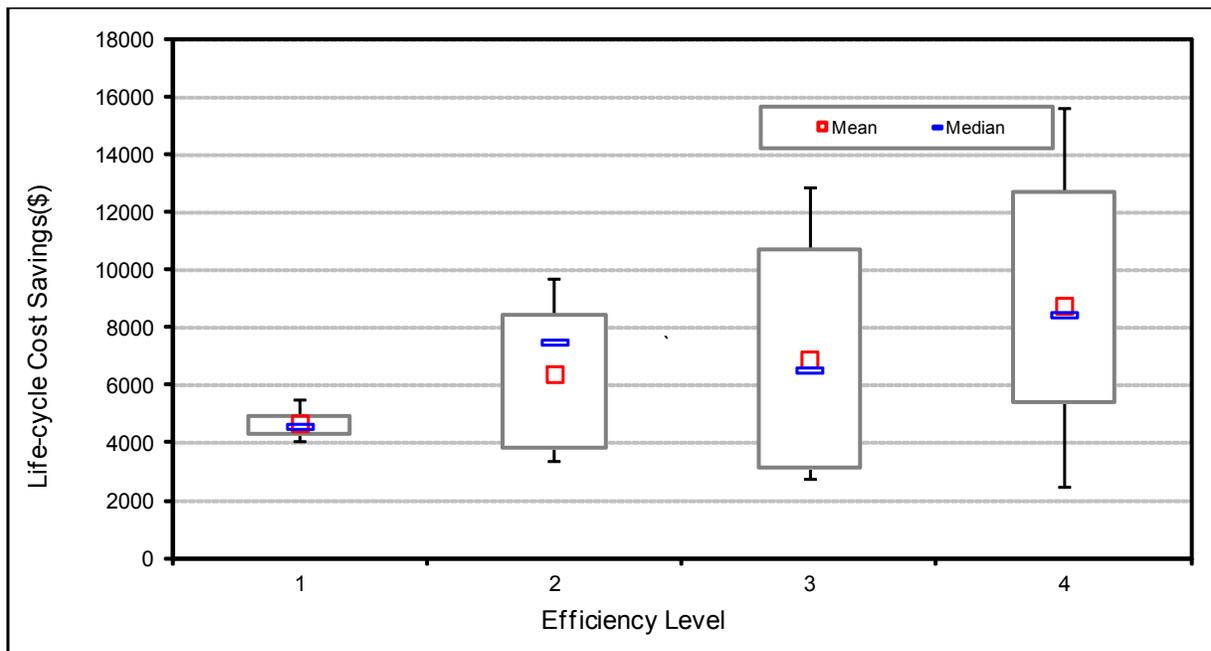
**Figure 6B.2.12 PBP Results for Water-Cooled  $\geq 240,000$  Btu/h and  $< 760,000$  Btu/h**

### 6B.2.7 Life-Cycle Cost Results for Water-Cooled with Fluid Economizer < 65,000 Btu/h

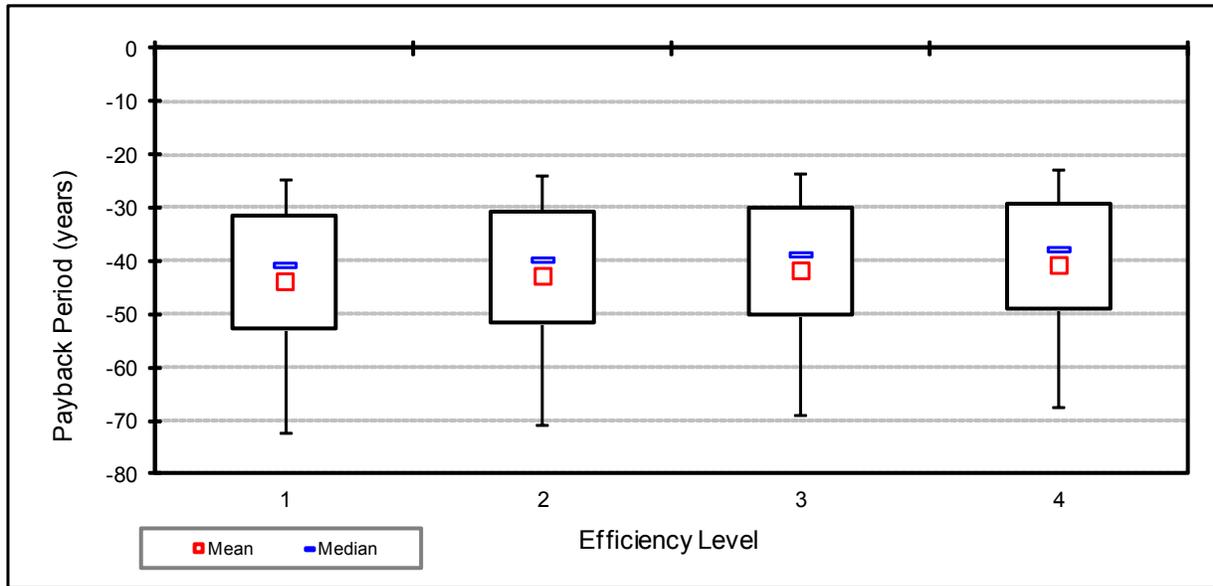
**Table 6B.2.7 LCC Results for Water-Cooled with Fluid Economizer < 65,000 Btu/h\***

Efficiency Level	Life-Cycle Cost 2011\$			Life-Cycle Cost Savings			Payback Period years	
	Installed Cost	Discounted Operating Cost	LCC	Average Savings 2011\$	% of Consumers that Experience			Median
					Net Cost	No Impact	Net Benefit	
Baseline (ASHRAE)	25,025	21,485	46,510					
1	21,393	20,449	41,842	4,686	0	72	28	
2	18,451	19,563	38,015	6,400	0	49	51	
3	16,069	18,798	34,867	6,908	0	13	87	
4	14,139	18,132	32,272	8,772	0	3	97	

\* Values in parentheses are negative values.



**Figure 6B.2.13 LCC Results for Water-Cooled with Fluid Economizer < 65,000 Btu/h**



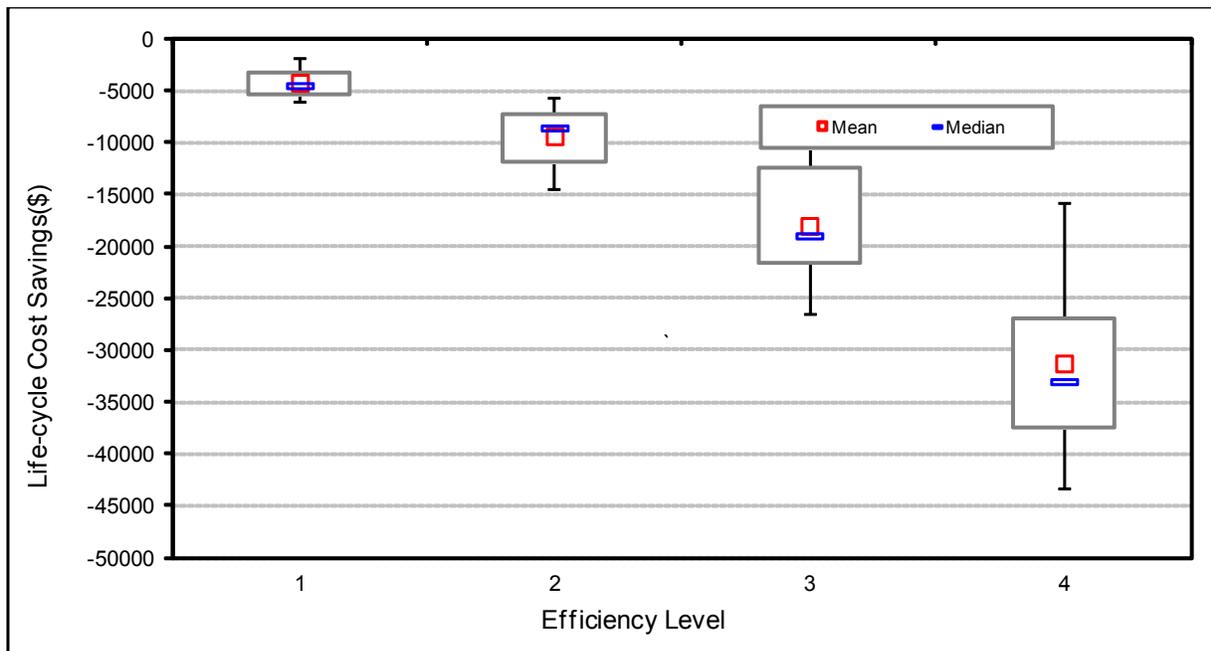
**Figure 6B.2.14 PBP Results for Water-Cooled with Fluid Economizer < 65,000 Btu/h**

**6B.2.8 Life-Cycle Cost Results for Water-Cooled with Fluid Economizer  $\geq 65,000$  Btu/h and  $< 240,000$  Btu/h**

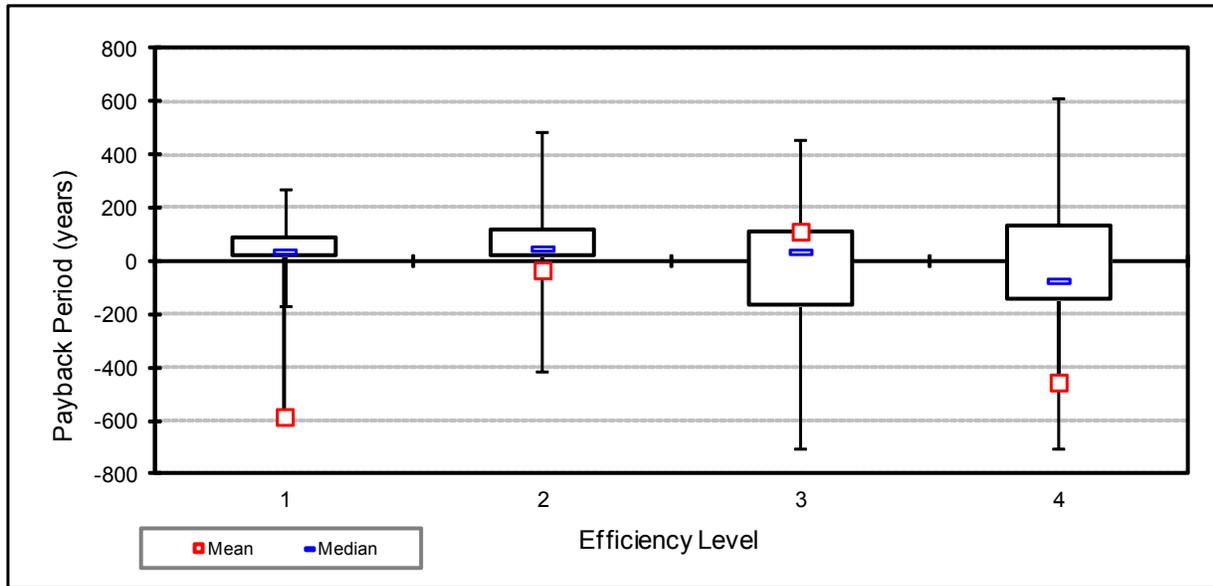
**Table 6B.2.8 LCC Results for Water-Cooled with Fluid Economizer  $\geq 65,000$  Btu/h and  $< 240,000$  Btu/h\***

Efficiency Level	Life-Cycle Cost 2011\$			Life-Cycle Cost Savings			Payback Period years	
	Installed Cost	Discounted Operating Cost	LCC	Average Savings 2011\$	% of Consumers that Experience			Median
					Net Cost	No Impact	Net Benefit	
Baseline (ASHRAE)	23,952	71,670	95,622					
1	29,903	69,964	99,867	(4,179)	28	72	0	36.8
2	37,901	69,297	107,198	(9,336)	58	42	0	48.1
3	48,651	69,771	118,421	(17,987)	80	20	0	35.8
4	63,099	71,578	134,677	(31,244)	96	4	0	(73.0)

\* Values in parentheses are negative values.



**Figure 6B.2.15 LCC Results for Water-Cooled with Fluid Economizer  $\geq 65,000$  Btu/h and  $< 240,000$  Btu/h**



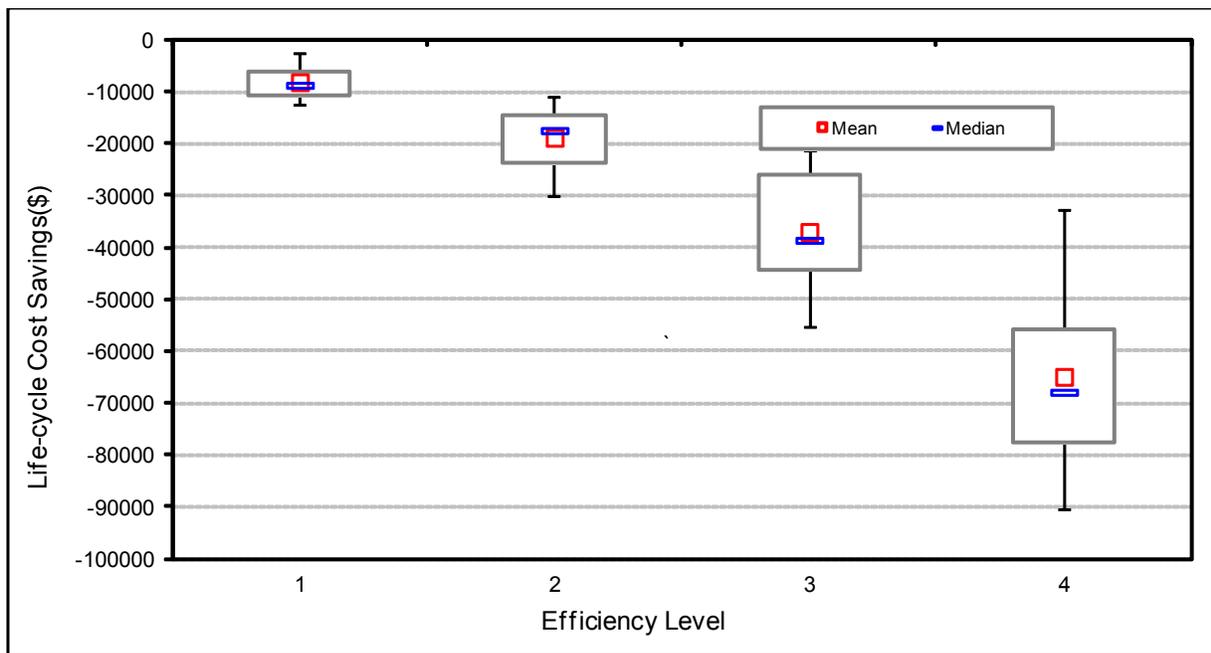
**Figure 6B.2.16 PBP Results for Water-Cooled with Fluid Economizer  $\geq 65,000$  Btu/h and  $< 240,000$  Btu/h**

**6B.2.9 Life-Cycle Cost Results for Water-Cooled with Fluid Economizer  $\geq 240,000$  Btu/h and  $< 760,000$  Btu/h**

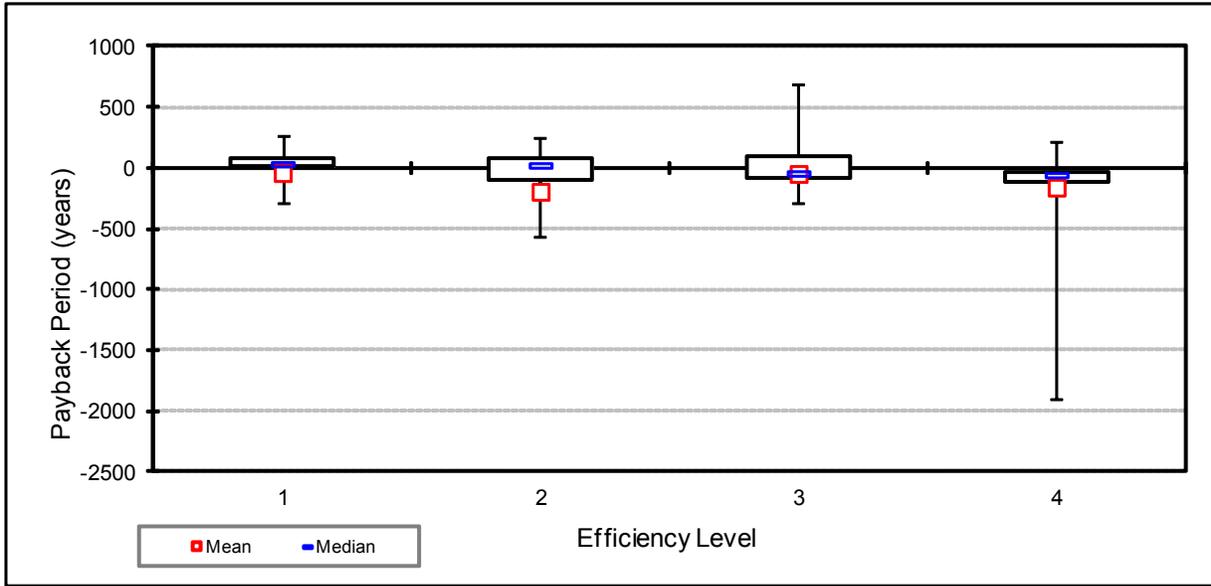
**Table 6B.2.9 LCC Results for Water-Cooled with Fluid Economizer  $\geq 240,000$  Btu/h and  $< 760,000$  Btu/h\***

Efficiency Level	Life-Cycle Cost 2011\$			Life-Cycle Cost Savings			Payback Period years	
	Installed Cost	Discounted Operating Cost	LCC	Average Savings 2011\$	% of Consumers that Experience			Median
					Net Cost	No Impact	Net Benefit	
Baseline (ASHRAE)	44,489	161,303	205,792					
1	55,781	158,228	214,009	(8,064)	28	72	0	32.3
2	70,956	157,979	228,935	(18,795)	58	42	0	22.6
3	91,351	160,896	252,247	(36,931)	80	20	0	(43.7)
4	118,760	167,577	286,337	(64,864)	96	4	0	(57.2)

Values in parentheses are negative values



**Figure 6B.2.17 LCC Results for Water-Cooled with Fluid Economizer  $\geq 240,000$  Btu/h and  $< 760,000$  Btu/h**



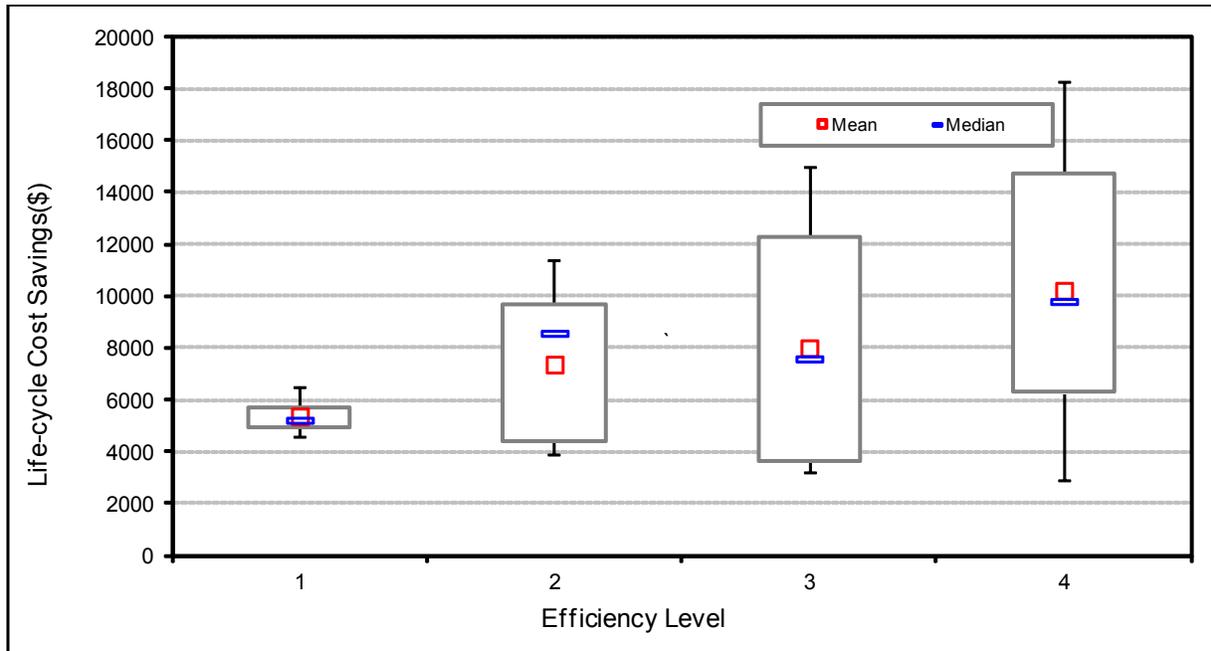
**Figure 6B.2.18 PBP Results for Water-Cooled with Fluid Economizer  $\geq 240,000$  Btu/h and  $< 760,000$  Btu/h**

**6B.2.10 Life-Cycle Cost Results for Glycol-Cooled < 65,000 Btu/h**

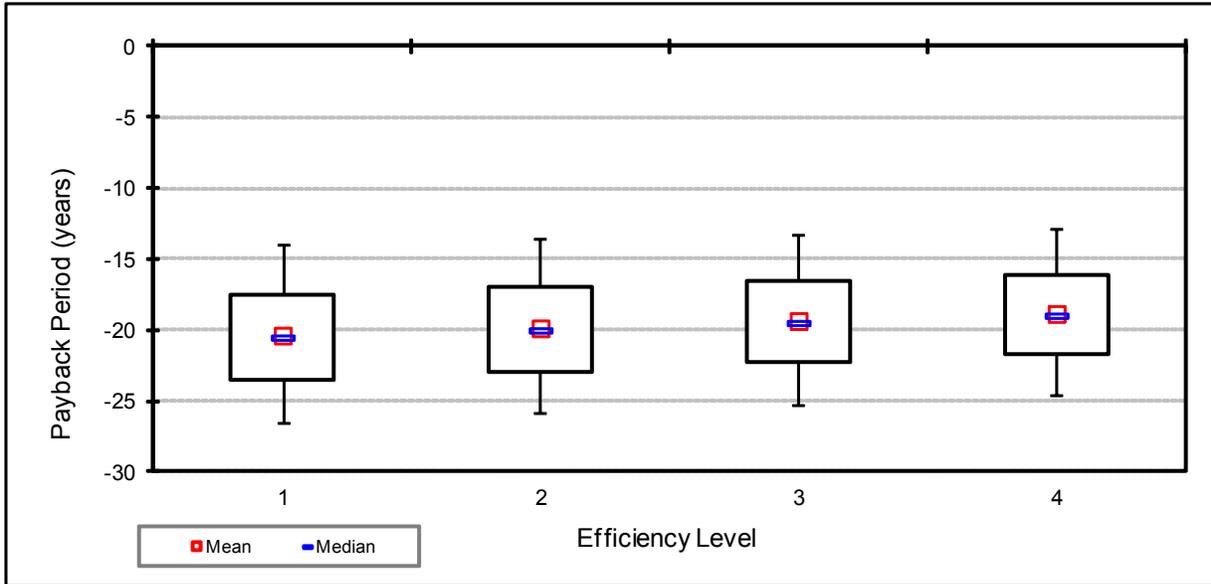
**Table 6B.2.10 LCC Results for Glycol-Cooled < 65,000 Btu/h\***

Efficiency Level	Life-Cycle Cost <i>2011\$</i>			Life-Cycle Cost Savings			Payback Period <i>years</i>	
	Installed Cost	Discounted Operating Cost	LCC	Average Savings <i>2011\$</i>	% of Consumers that Experience			Median
					Net Cost	No Impact	Net Benefit	
Baseline (ASHRAE)	23,764	31,335	55,099					
1	20,332	29,414	49,746	5,372	0	72	28	
2	17,552	27,768	45,321	7,375	0	49	51	
3	15,301	26,345	41,646	8,009	0	13	87	
4	13,477	25,104	38,581	10,226	0	3	97	

\* Values in parentheses are negative values.



**Figure 6B.2.19 LCC Results for Glycol-Cooled < 65,000 Btu/h**



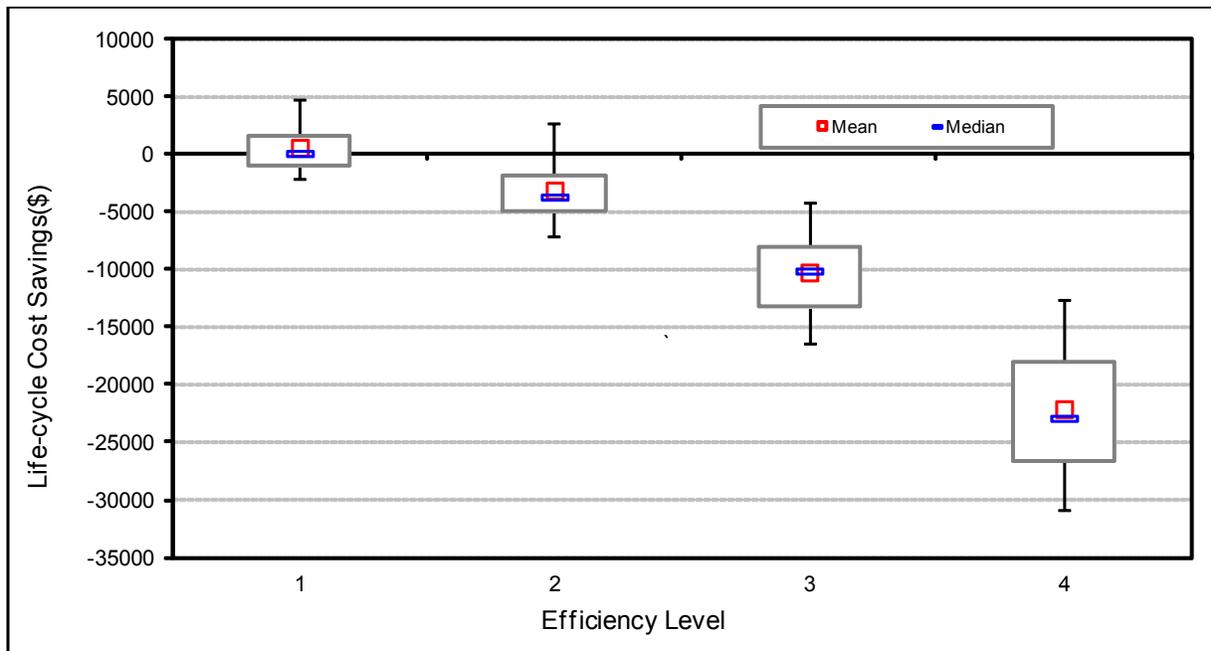
**Figure 6B.2.20 PBP Results for Glycol-Cooled < 65,000 Btu/h**

**6B.2.11 Life-Cycle Cost Results for Glycol-Cooled  $\geq 65,000$  Btu/h and  $< 240,000$  Btu/h**

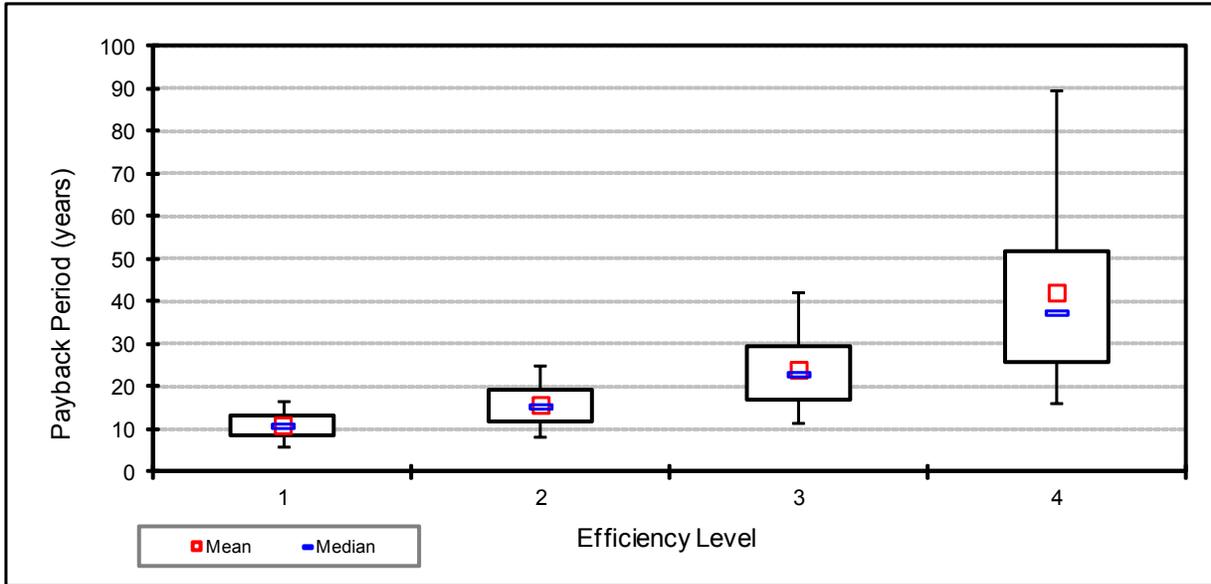
**Table 6B.2.11 LCC Results for Glycol-Cooled  $\geq 65,000$  Btu/h and  $< 240,000$  Btu/h\***

Efficiency Level	Life-Cycle Cost 2011\$			Life-Cycle Cost Savings			Payback Period years	
	Installed Cost	Discounted Operating Cost	LCC	Average Savings 2011\$	% of Consumers that Experience			Median
					Net Cost	No Impact	Net Benefit	
Baseline (ASHRAE)	22,857	118,862	141,719					
1	28,473	112,743	141,215	588	14	72	14	
2	36,020	108,621	144,642	(3,117)	51	42	7	
3	46,164	106,463	152,626	(10,236)	79	20	1	
4	59,795	106,392	166,188	(22,091)	96	4	0	

\* Values in parentheses are negative values.



**Figure 6B.2.21 LCC Results for Glycol-Cooled  $\geq 65,000$  Btu/h and  $< 240,000$  Btu/h**



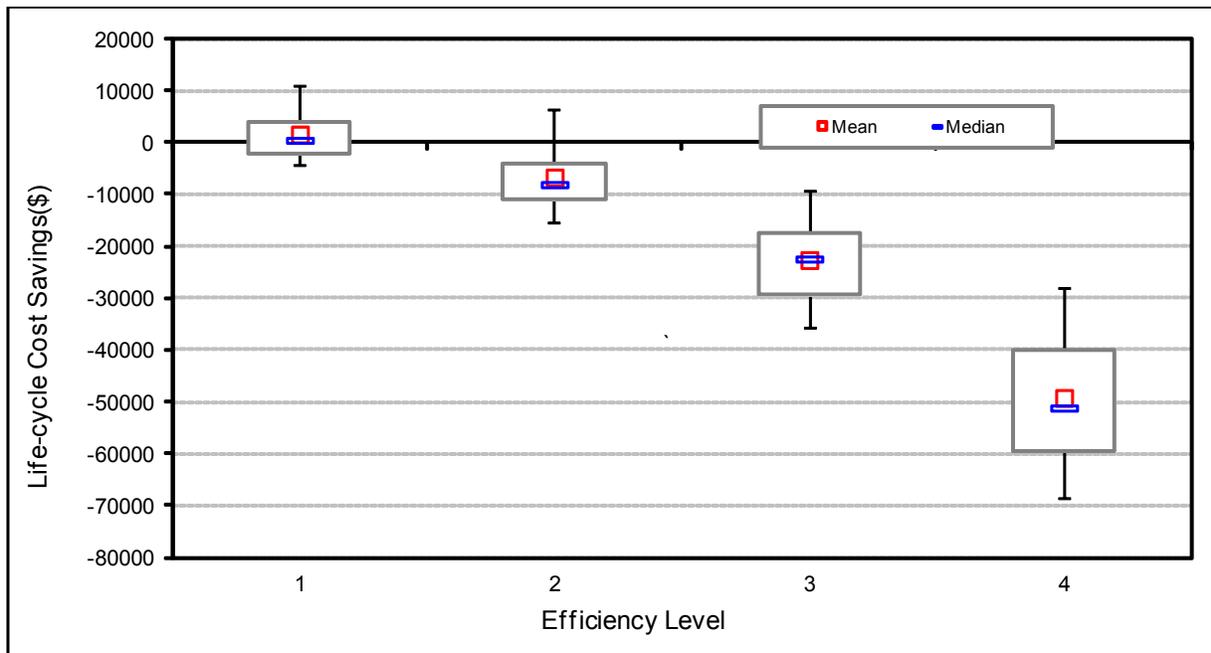
**Figure 6B.2.22 PBP Results for Glycol-Cooled  $\geq 65,000$  Btu/h and  $< 240,000$  Btu/h**

**6B.2.12 Life-Cycle Cost Results for Glycol-Cooled  $\geq 240,000$  Btu/h and  $< 760,000$  Btu/h**

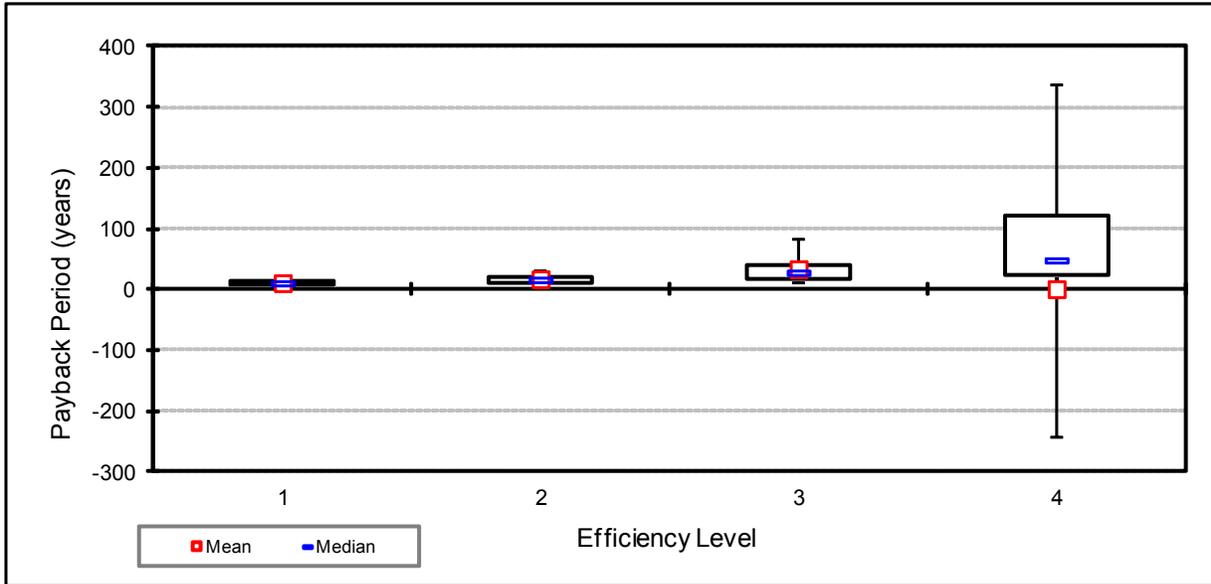
**Table 6B.2.12 LCC Results for Glycol-Cooled  $\geq 240,000$  Btu/h and  $< 760,000$  Btu/h\***

Efficiency Level	Life-Cycle Cost <i>2011\$</i>			Life-Cycle Cost Savings			Payback Period <i>years</i>	
	Installed Cost	Discounted Operating Cost	LCC	Average Savings <i>2011\$</i>	% of Consumers that Experience			Median
					Net Cost	No Impact	Net Benefit	
Baseline (ASHRAE)	42,419	268,376	310,795					
1	53,089	256,260	309,349	1,633	13	72	15	
2	67,430	249,398	316,828	(6,637)	51	42	7	
3	86,702	247,905	334,607	(22,582)	79	20	1	
4	112,602	252,346	364,948	(49,159)	96	4	0	

\* Values in parentheses are negative values.



**Figure 6B.2.23 LCC Results for Glycol-Cooled  $\geq 240,000$  Btu/h and  $< 760,000$  Btu/h**



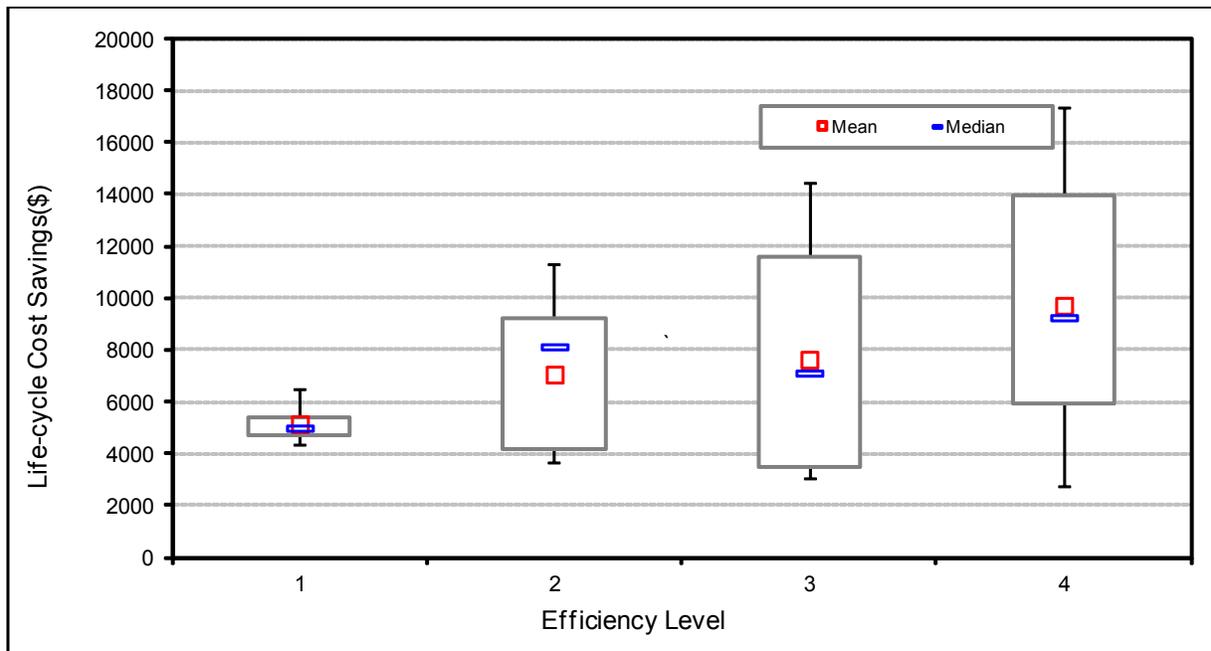
**Figure 6B.2.24 PBP Results for Glycol-Cooled  $\geq 240,000$  Btu/h and  $< 760,000$  Btu/h**

### 6B.2.13 Life-Cycle Cost Results for Glycol-Cooled with Fluid Economizer < 65,000 Btu/h

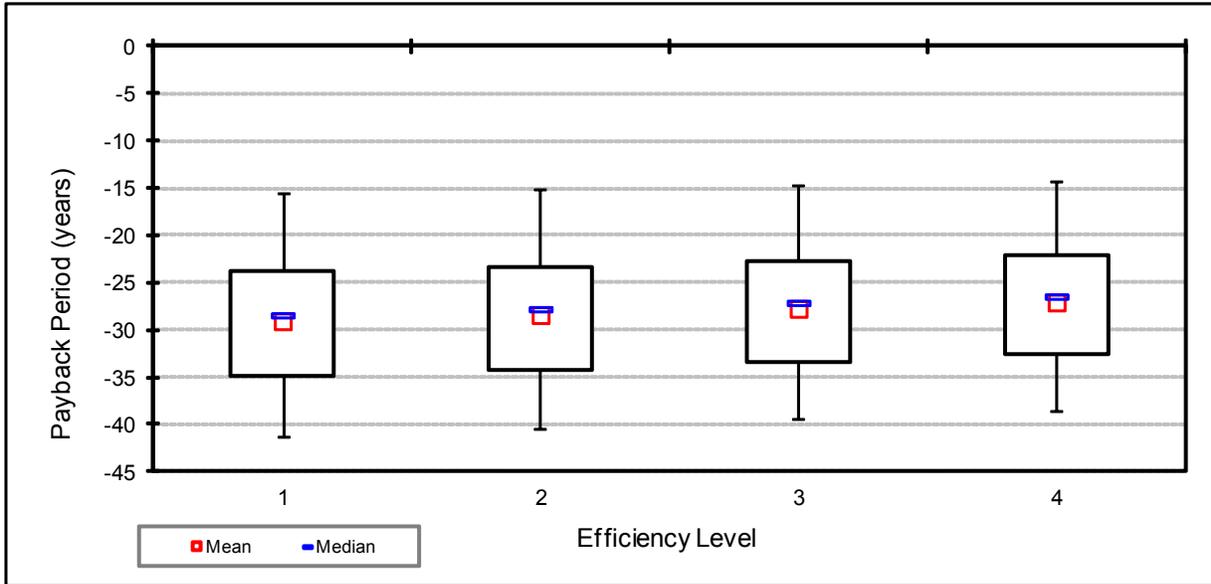
**Table 6B.2.13 LCC Results for Glycol-Cooled with Fluid Economizer < 65,000 Btu/h\***

Efficiency Level	Life-Cycle Cost 2011\$			Life-Cycle Cost Savings			Payback Period years	
	Installed Cost	Discounted Operating Cost	LCC	Average Savings 2011\$	% of Consumers that Experience			Median
					Net Cost	No Impact	Net Benefit	
Baseline (ASHRAE)	25,073	26,615	51,689					
1	21,441	25,108	46,550	5,162	0	72	28	
2	18,500	23,823	42,323	7,064	0	49	51	
3	16,117	22,716	38,833	7,640	0	13	87	
4	14,187	21,755	35,942	9,722	0	3	97	

\* Values in parentheses are negative values.



**Figure 6B.2.25 LCC Results for Glycol-Cooled with Fluid Economizer < 65,000 Btu/h**



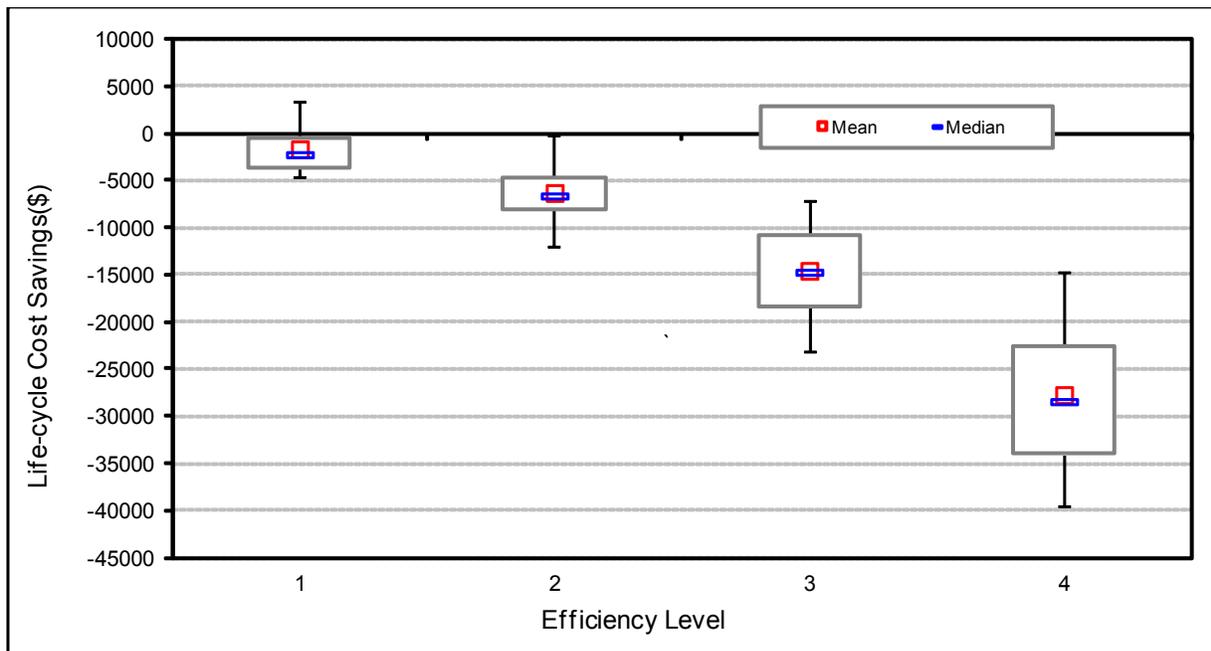
**Figure 6B.2.26 PBP Results for Glycol-Cooled with Fluid Economizer < 65,000 Btu/h**

**6B.2.14 Life-Cycle Cost Results for Glycol-Cooled with Fluid Economizer  $\geq 65,000$  Btu/h and  $< 240,000$  Btu/h**

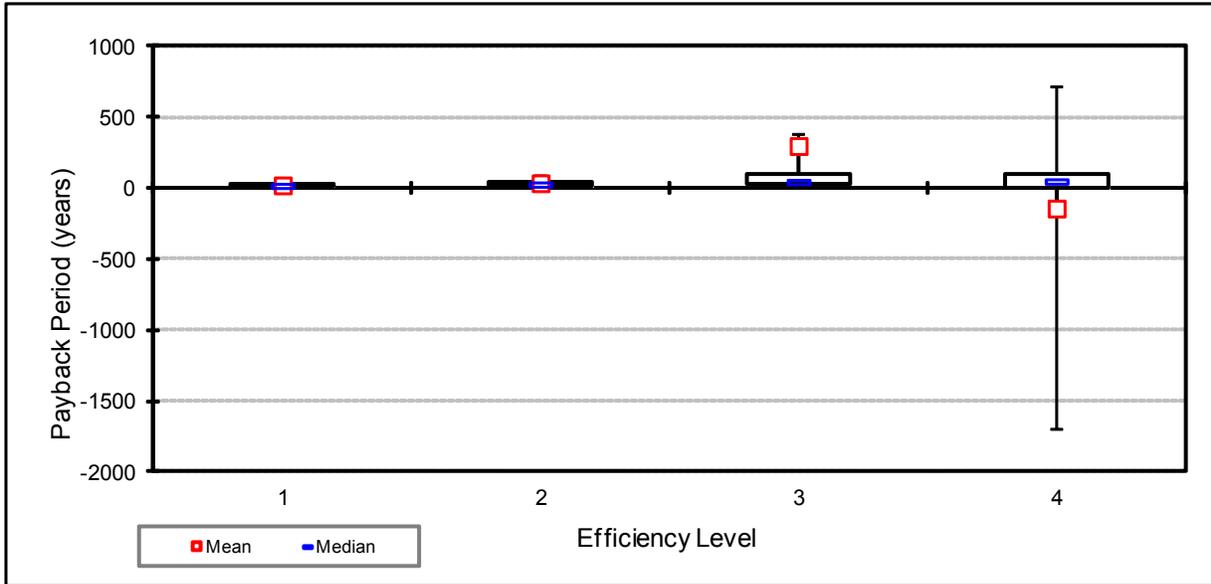
**Table 6B.2.14 LCC Results for Glycol-Cooled with Fluid Economizer  $\geq 65,000$  Btu/h and  $< 240,000$  Btu/h\***

Efficiency Level	Life-Cycle Cost 2011\$			Life-Cycle Cost Savings			Payback Period years	
	Installed Cost	Discounted Operating Cost	LCC	Average Savings 2011\$	% of Consumers that Experience			Median
					Net Cost	No Impact	Net Benefit	
Baseline (ASHRAE)	24,041	99,288	123,328					
1	29,984	95,100	125,083	(1,652)	23	72	5	18.0
2	37,971	92,626	130,597	(6,282)	55	42	3	27.3
3	48,705	91,890	140,595	(14,548)	79	20	1	45.3
4	63,131	93,060	156,191	(27,719)	96	4	0	49.5

\* Values in parentheses are negative values.



**Figure 6B.2.27 LCC Results for Glycol-Cooled with Fluid Economizer  $\geq 65,000$  Btu/h and  $< 240,000$  Btu/h**



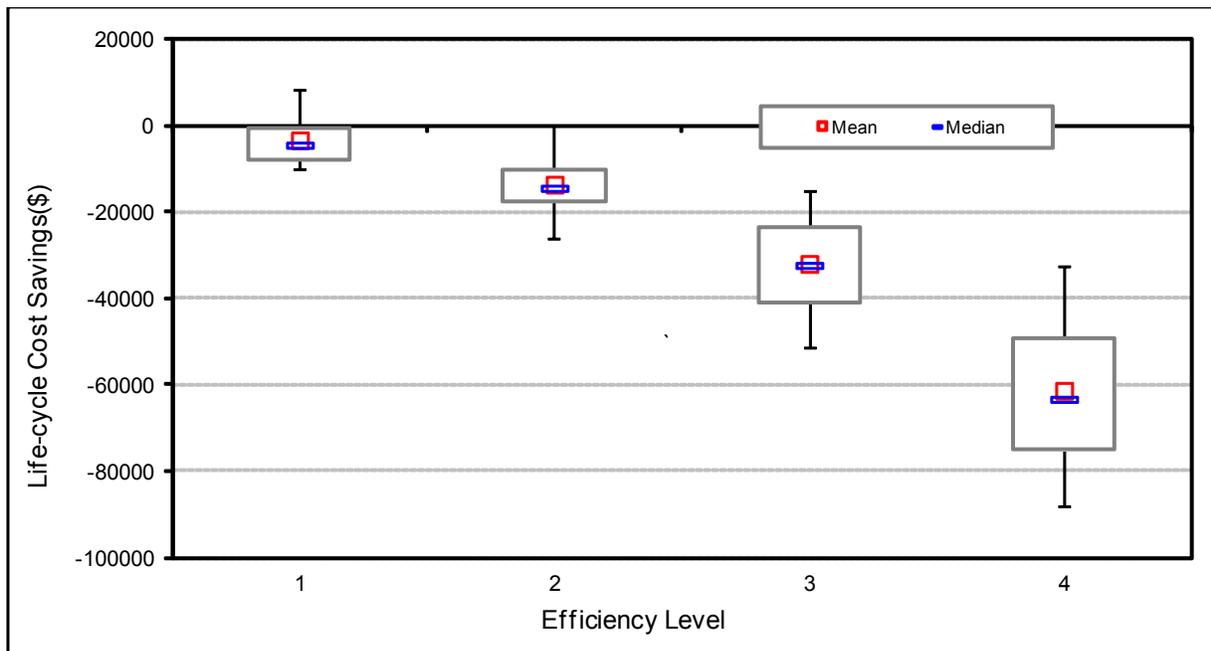
**Figure 6B.2.28 PBP Results for Glycol-Cooled with Fluid Economizer  $\geq 65,000$  Btu/h and  $< 240,000$  Btu/h**

**6B.2.15 Life-Cycle Cost Results for Glycol-Cooled with Fluid Economizer  $\geq 240,000$  Btu/h and  $< 760,000$  Btu/h**

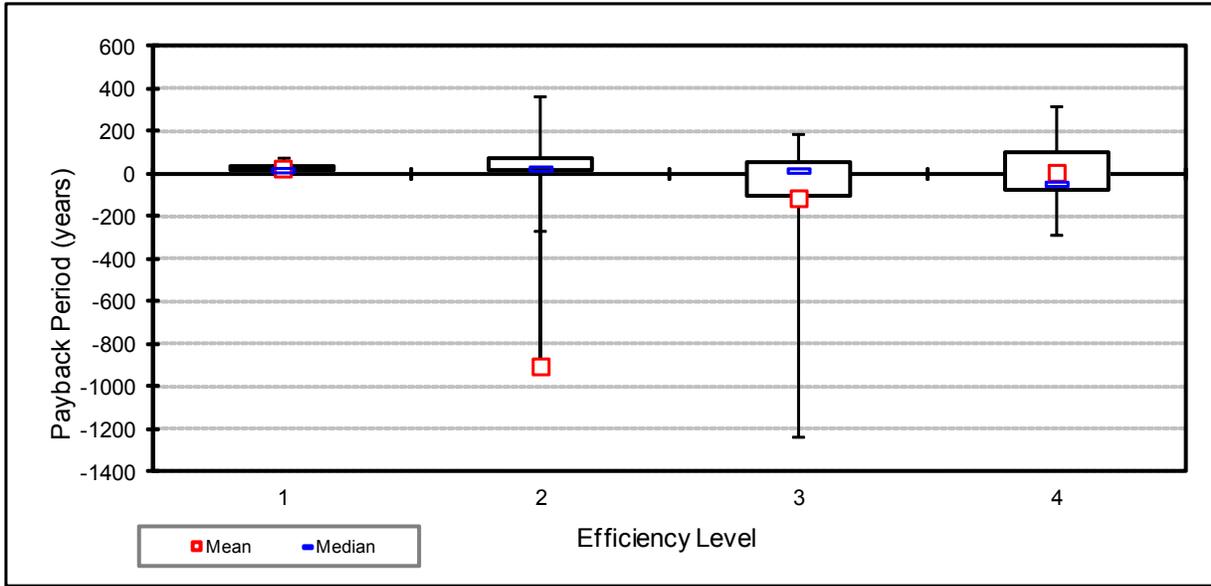
**Table 6B.2.15 LCC Results for Glycol-Cooled with Fluid Economizer  $\geq 240,000$  Btu/h and  $< 760,000$  Btu/h\***

Efficiency Level	Life-Cycle Cost 2011\$			Life-Cycle Cost Savings			Payback Period years	
	Installed Cost	Discounted Operating Cost	LCC	Average Savings 2011\$	% of Consumers that Experience			Median
					Net Cost	No Impact	Net Benefit	
Baseline (ASHRAE)	44,668	224,664	269,332					
1	55,960	216,938	272,898	(3,338)	22	72	6	19.4
2	71,136	213,811	284,947	(13,598)	55	42	3	26.8
3	91,530	215,533	307,063	(31,974)	79	20	1	17.6
4	118,939	222,769	341,709	(61,294)	96	4	0	(45.0)

\* Values in parentheses are negative values.



**Figure 6B.2.29 LCC Results for Glycol-Cooled with Fluid Economizer  $\geq 240,000$  Btu/h and  $< 760,000$  Btu/h**



**Figure 6B.2.30 PBP Results for Glycol-Cooled with Fluid Economizer  $\geq 240,000$  Btu/h and  $< 760,000$  Btu/h**