

APPENDIX F: NATIONAL ENERGY SAVINGS AND NATIONAL NET PRESENT VALUE RESULTS

This appendix contains the complete set of national energy savings (NES) and national net present value (NPV) results for all the standard levels analyzed for central air conditioners and heat pumps. For details on the methodology used to calculate the NES and NPV refer to Chapter 7.

National energy savings are calculated by comparing the energy consumption associated with central air conditioners or heat pumps in a base case with that in a specified standards case. The following tables and figures show the results for each of the standards cases assessed in this analysis. For each standards case two tables are presented. The first table shows cumulative energy savings from the assumed effective date of the standard (2006) to the years 2010, 2020 and 2030. The second table shows net present values (including energy savings and equipment cost) from 2006 to 2030 discounted at 7% real to the year 1998. Benefit-to-cost ratios are also presented. The accompanying figure for each standard case shows the annual benefit-to-cost pattern of national savings and costs resulting from standards over time. The heavy line running just below the energy savings bars indicates the undiscounted net national consumer impact of standards over time. It is important to note that the net saving shown in each plot only captures a snapshot of each year. For example, the benefit of the energy savings from the equipment expenditure in year 2006 actually continues through the lifetime of the central air conditioner or heat pump bought in 2006.

The four sections that follow present the NES and NPV results for each of the following four primary product classes: split system central air conditioners, split system heat pumps, single package central air conditioners, and single package heat pumps. The NES and NPV results are based on the use of ARI manufacturer cost data. Only results are based on the NAECA *efficiency scenario* and the AEO2000 Reference Case are presented. In each section, results are presented for efficiency levels of 11 through 13 SEER and 18 SEER (i.e., “max tech”).

F.1 SPLIT SYSTEM CENTRAL AIR CONDITIONERS

Table F.1.1 Split A/C, 11 SEER: Energy Savings

	Energy Saving in Quads				
	Total	Elec	Gas	Oil	LPG
from 2006					
to 2010	0.07	0.07	0.00	0.00	0.00
to 2020	0.45	0.45	0.00	0.00	0.00
to 2030	1.04	1.04	0.00	0.00	0.00

Table F.1.2 Split A/C, 11 SEER: Costs and Net Present Value
CAC/HP Standards in 2006: 11 SEER

Cost and Net Present Values (in billion 1998\$)	
Cumulative for Split A/C Purchased from 2006 to 2030 Discounted at 7% to year 1998	
Total Operating Savings	3.20
Total Equipment Cost	3.39
Net Present Benefit	-0.19
Benefit/Cost Ratio	0.94

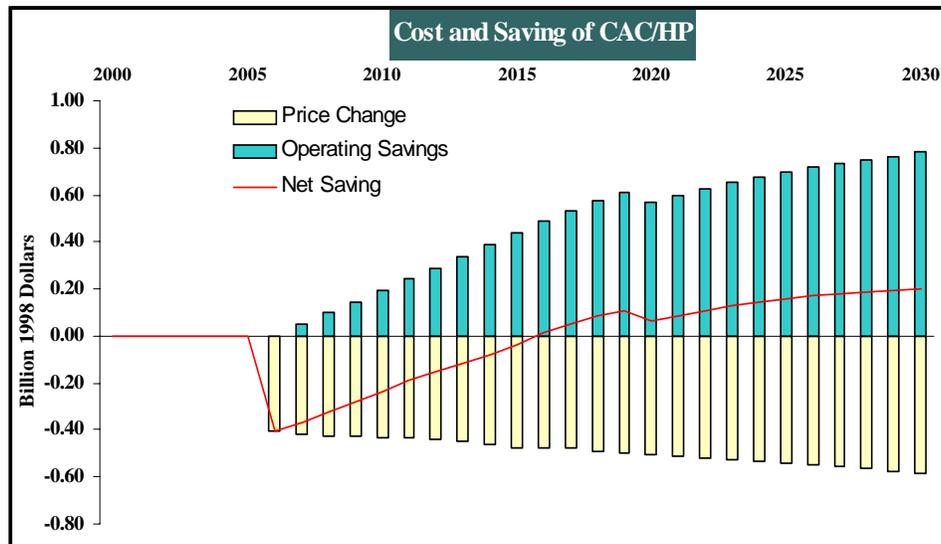


Figure F.1 Split A/C, 11 SEER: Annual Savings and Costs

Table F.2.1 Split A/C, 12 SEER: Energy Savings

	Energy Saving in Quads				
	Total	Elec	Gas	Oil	LPG
from 2006					
to 2010	0.11	0.11	0.00	0.00	0.00
to 2020	0.78	0.78	0.00	0.00	0.00
to 2030	1.83	1.83	0.00	0.00	0.00

Table F.2.2 Split A/C, 12 SEER: Costs and Net Present Value
CAC/HP Standards in 2006: 12 SEER

Cost and Net Present Values (in billion 1998\$)	
Cumulative for Split A/C Purchased from 2006 to 2030	
Discounted at 7% to year 1998	
Total Operating Savings	5.73
Total Equipment Cost	7.06
Net Present Benefit	-1.32
Benefit/Cost Ratio	0.81

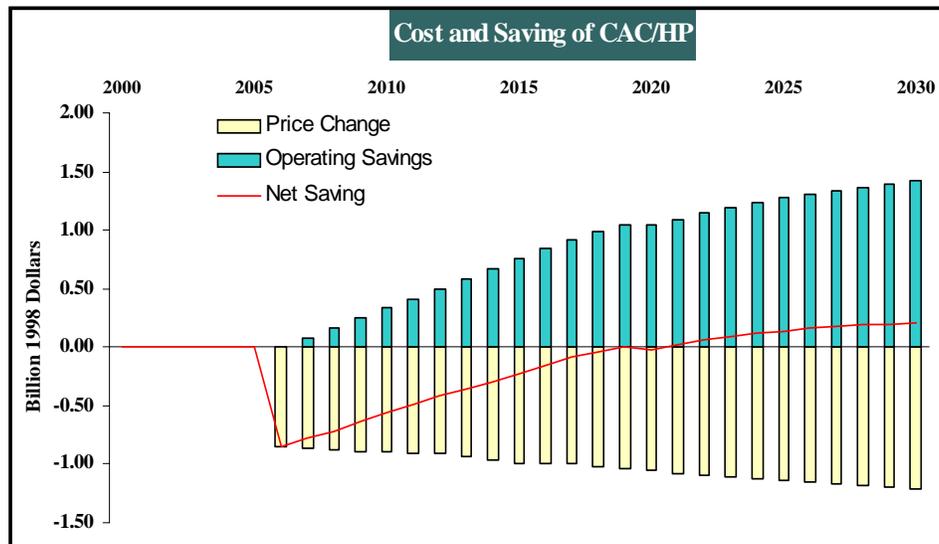


Figure F.2 Split A/C, 12 SEER: Annual Savings and Costs

Table F.3.1 Split A/C, 13 SEER: Energy Savings

	Energy Saving in Quads				
	Total	Elec	Gas	Oil	LPG
from 2006					
to 2010	0.16	0.16	0.00	0.00	0.00
to 2020	1.09	1.09	0.00	0.00	0.00
to 2030	2.57	2.57	0.00	0.00	0.00

Table F.3.2 Split A/C, 13 SEER: Costs and Net Present Value
CAC/HP Standards in 2006: 13 SEER

Cost and Net Present Values (in billion 1998\$)	
Cumulative for Split A/C Purchased from 2006 to 2030	
Discounted at 7% to year 1998	
Total Operating Savings	7.96
Total Equipment Cost	12.29
Net Present Benefit	-4.33
Benefit/Cost Ratio	0.65

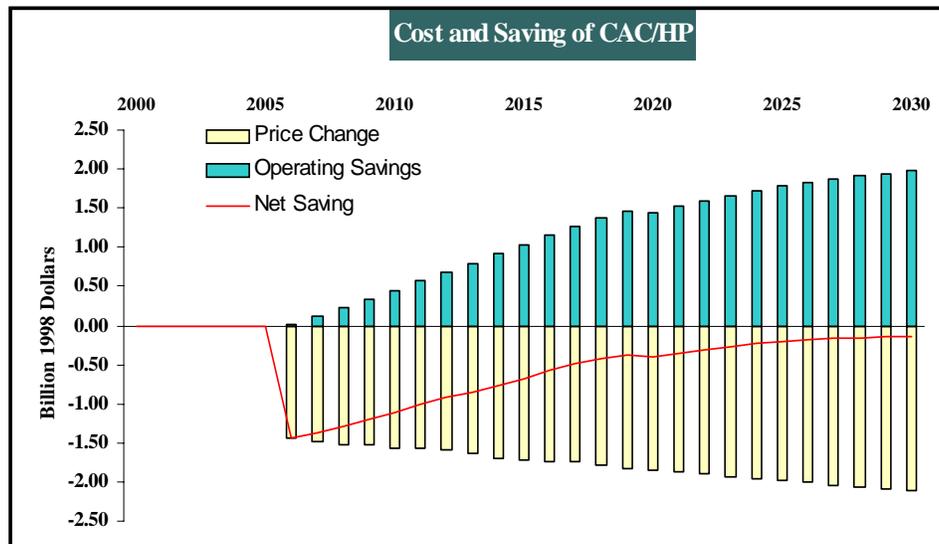


Figure F.3 Split A/C, 13 SEER: Annual Savings and Costs

Table F.4.1 Split A/C, 18 SEER: Energy Savings

	Energy Saving in Quads				
	Total	Elec	Gas	Oil	LPG
from 2006					
to 2010	0.28	0.28	0.00	0.00	0.00
to 2020	1.98	1.98	0.00	0.00	0.00
to 2030	4.82	4.82	0.00	0.00	0.00

Table F.4.2 Split A/C, 18 SEER: Costs and Net Present Value
CAC/HP Standards in 2006: 18 SEER

Cost and Net Present Values (in billion 1998\$)	
Cumulative for Split A/C Purchased from 2006 to 2030 Discounted at 7% to year 1998	
Total Operating Savings	9.40
Total Equipment Cost	25.10
Net Present Benefit	-15.69
Benefit/Cost Ratio	0.37

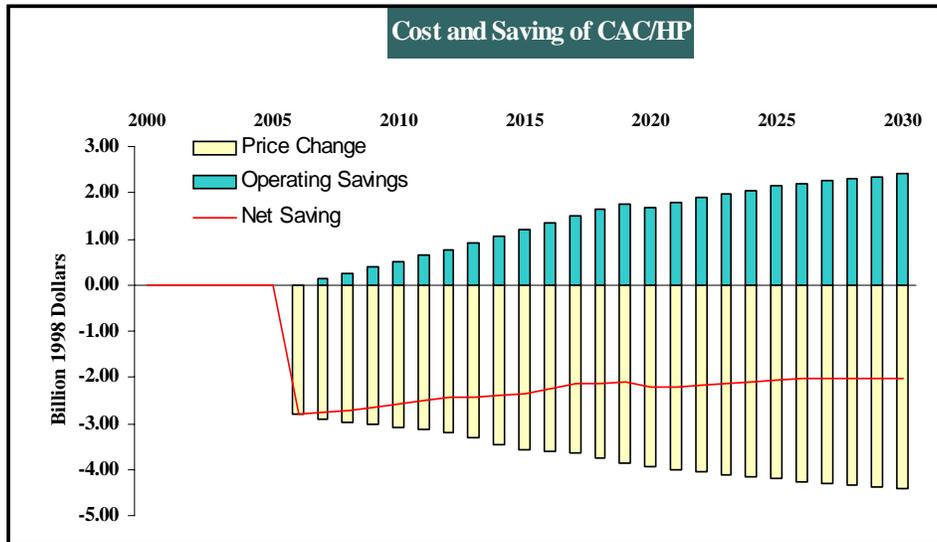


Figure F.4 Split A/C, 18 SEER: Annual Savings and Costs

F.2 SPLIT SYSTEM HEAT PUMPS

Table F.5.1 Split HP, 11 SEER: Energy Savings

	Energy Saving in Quads				
	Total	Elec	Gas	Oil	LPG
from 2006					
to 2010	0.03	0.03	0.00	0.00	0.00
to 2020	0.19	0.19	0.00	0.00	0.00
to 2030	0.45	0.45	0.00	0.00	0.00

Table F.5.2 Split HP, 11 SEER: Costs and Net Present Value
CAC/HP Standards in 2006: 11 SEER

Cost and Net Present Values (in billion 1998\$)	
Cumulative for Split H/P Purchased from 2006 to 2030	
Discounted at 7% to year 1998	
Total Operating Savings	1.18
Total Equipment Cost	0.75
Net Present Benefit	0.43
Benefit/Cost Ratio	1.57

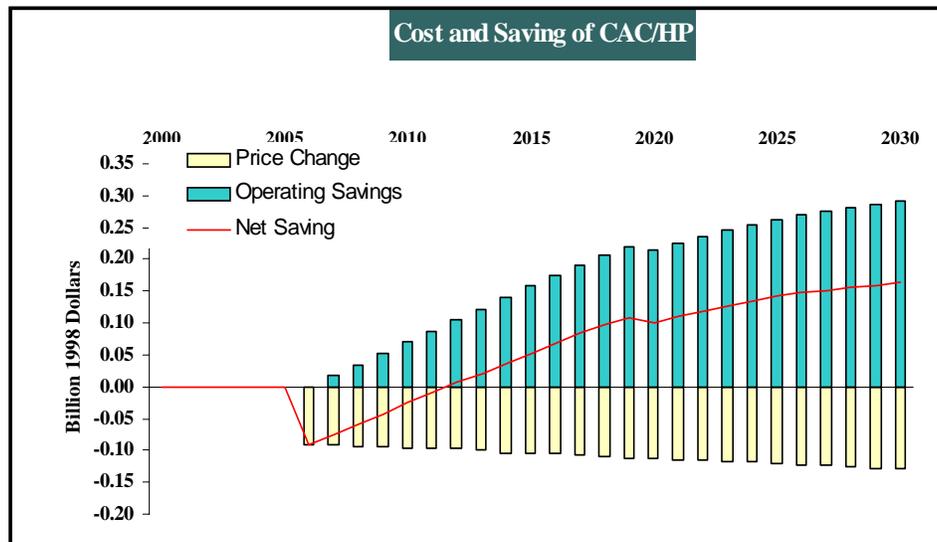


Figure F.5 Split HP, 11 SEER: Annual Savings and Costs

Table F.6.1 Split HP, 12 SEER: Energy Savings

	Energy Saving in Quads				
	Total	Elec	Gas	Oil	LPG
from 2006					
to 2010	0.05	0.05	0.00	0.00	0.00
to 2020	0.35	0.35	0.00	0.00	0.00
to 2030	0.81	0.81	0.00	0.00	0.00

Table F.6.2 Split HP, 12 SEER: Costs and Net Present Value
CAC/HP Standards in 2006: 12 SEER

Cost and Net Present Values (in billion 1998\$)	
Cumulative for Split H/P Purchased from 2006 to 2030 Discounted at 7% to year 1998	
Total Operating Savings	2.17
Total Equipment Cost	1.70
Net Present Benefit	0.46
 Benefit/Cost Ratio	 1.27

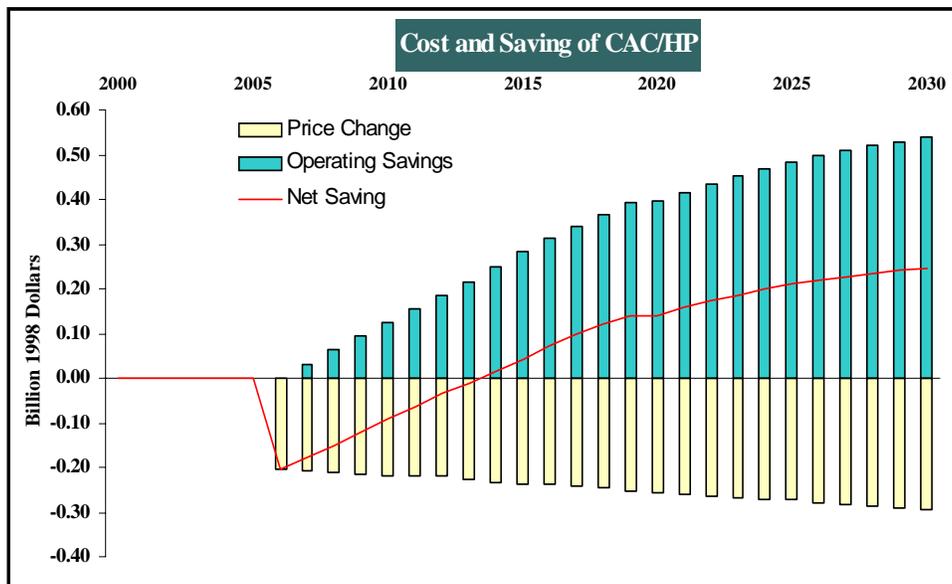


Figure F.6 Split HP, 12 SEER: Annual Savings and Costs

Table F.7.1 Split HP, 13 SEER: Energy Savings

	Energy Saving in Quads				
	Total	Elec	Gas	Oil	LPG
from 2006					
to 2010	0.08	0.08	0.00	0.00	0.00
to 2020	0.52	0.52	0.00	0.00	0.00
to 2030	1.23	1.23	0.00	0.00	0.00

Table F.7.2 Split HP, 13 SEER: Costs and Net Present Value
CAC/HP Standards in 2006: 13 SEER

Cost and Net Present Values (in billion 1998\$)	
Cumulative for Split H/P Purchased from 2006 to 2030 Discounted at 7% to year 1998	
Total Operating Savings	3.25
Total Equipment Cost	3.34
Net Present Benefit	-0.09
Benefit/Cost Ratio	0.97

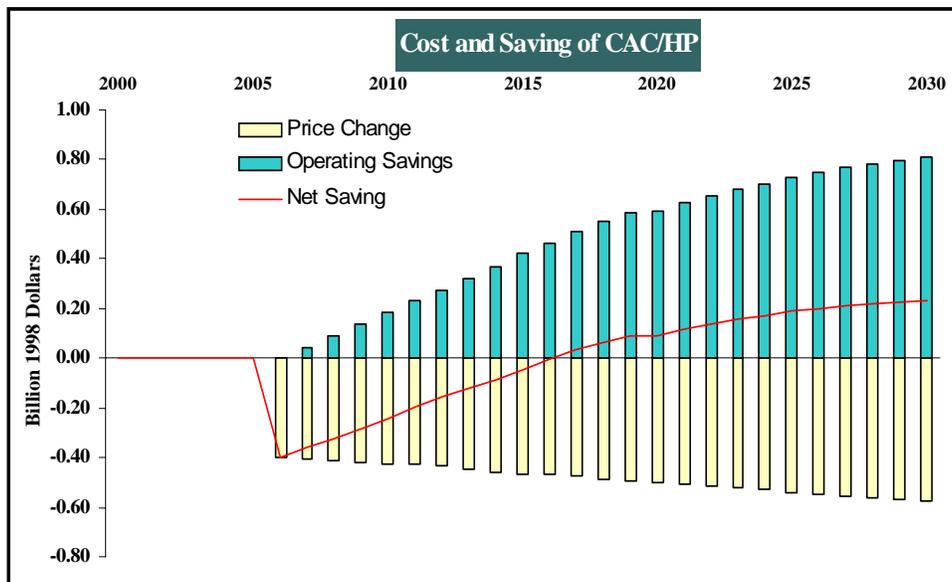


Figure F.7 Split HP, 13 SEER: Annual Savings and Costs

Table F.8.1 Split HP, 18 SEER: Energy Savings

	Energy Saving in Quads				
	Total	Elec	Gas	Oil	LPG
from 2006					
to 2010	0.15	0.15	0.00	0.00	0.00
to 2020	1.04	1.04	0.00	0.00	0.00
to 2030	2.52	2.52	0.00	0.00	0.00

Table F.8.2 Split HP, 18 SEER: Costs and Net Present Value
CAC/HP Standards in 2006: 18 SEER

Cost and Net Present Values (in billion 1998\$)	
Cumulative for Split H/P Purchased from 2006 to 2030 Discounted at 7% to year 1998	
Total Operating Savings	4.67
Total Equipment Cost	8.15
Net Present Benefit	-3.48
 Benefit/Cost Ratio	 0.57

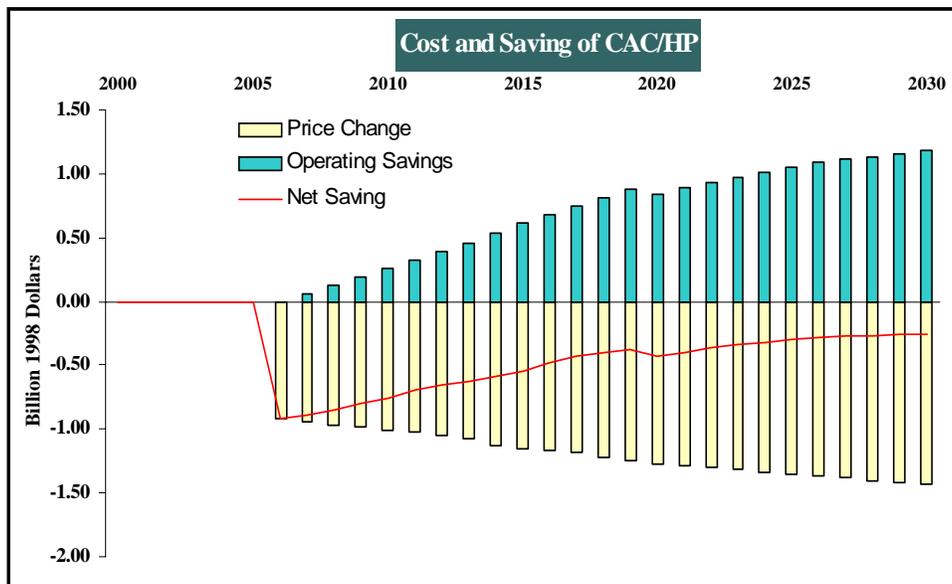


Figure F.8 Split HP, 18 SEER: Annual Savings and Costs

F.3 SINGLE PACKAGE SYSTEM CENTRAL AIR CONDITIONERS

Table F.9.1 Pack. A/C, 11 SEER: Energy Savings

	Energy Saving in Quads				
	Total	Elec	Gas	Oil	LPG
from 2006					
to 2010	0.01	0.01	0.00	0.00	0.00
to 2020	0.06	0.06	0.00	0.00	0.00
to 2030	0.13	0.13	0.00	0.00	0.00

Table F.9.2 Pack. A/C, 11 SEER: Costs and Net Present Value
CAC/HP Standards in 2006: 11 SEER

Cost and Net Present Values (in billion 1998\$)	
Cumulative for Package A/C Purchased from 2006 to 2030 Discounted at 7% to year 1998	
Total Operating Savings	0.41
Total Equipment Cost	0.57
Net Present Benefit	-0.16
 Benefit/Cost Ratio	 0.72

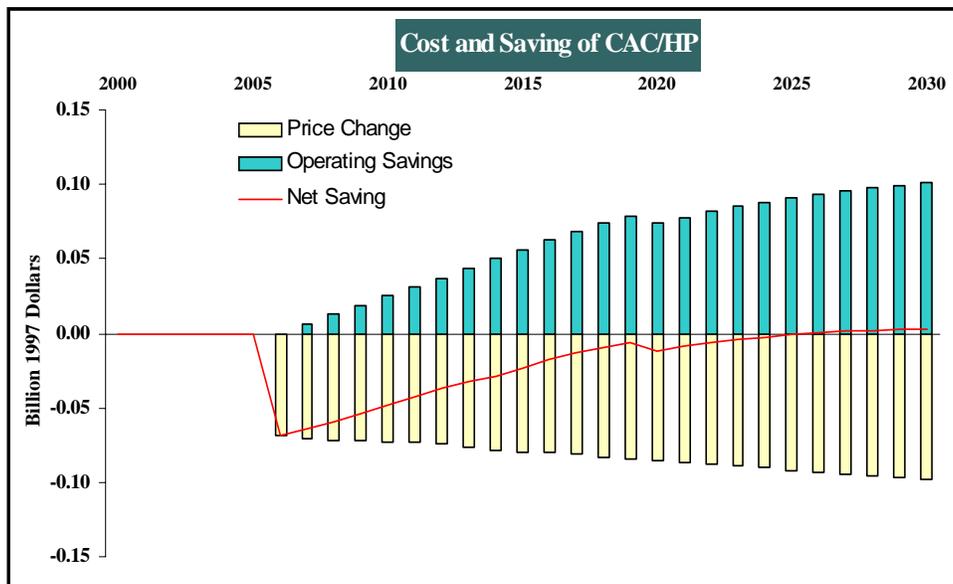


Figure F.9 Package A/C, 11 SEER: Annual Savings and Costs

Table F.10.1 Pack. A/C, 12 SEER: Energy Savings

	Energy Saving in Quads				
	Total	Elec	Gas	Oil	LPG
from 2006					
to 2010	0.01	0.01	0.00	0.00	0.00
to 2020	0.10	0.10	0.00	0.00	0.00
to 2030	0.23	0.23	0.00	0.00	0.00

Table F.10.2 Pack. A/C 12 SEER: Costs and Net Present Value
CAC/HP Standards in 2006: 12 SEER

Cost and Net Present Values (in billion 1998\$)	
Cumulative for Package A/C Purchased from 2006 to 2030 Discounted at 7% to year 1998	
Total Operating Savings	0.71
Total Equipment Cost	0.90
Net Present Benefit	-0.19
Benefit/Cost Ratio	0.79

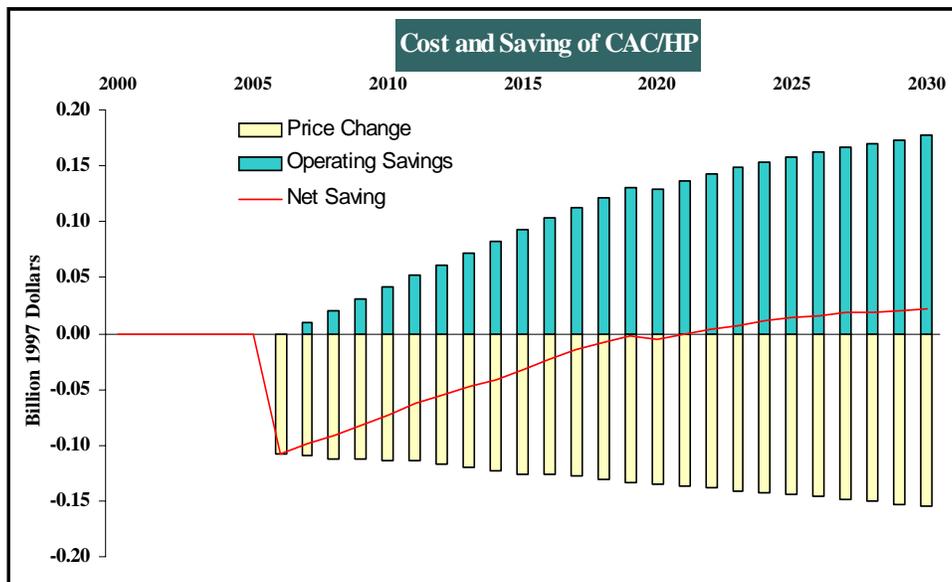


Figure 10.1 Package A/C, 12 SEER: Annual Savings and Costs

Table F.11.1 Pack. A/C, 13 SEER: Energy Savings

	Energy Saving in Quads				
	Total	Elec	Gas	Oil	LPG
from 2006					
to 2010	0.02	0.02	0.00	0.00	0.00
to 2020	0.13	0.13	0.00	0.00	0.00
to 2030	0.31	0.31	0.00	0.00	0.00

Table F.11.2 Pack. A/C, 13 SEER: Costs and Net Present Value
CAC/HP Standards in 2006: 13 SEER

Cost and Net Present Values (in billion 1998\$)	
Cumulative for Package A/C Purchased from 2006 to 2030 Discounted at 7% to year 1998	
Total Operating Savings	0.95
Total Equipment Cost	1.81
Net Present Benefit	-0.85
Benefit/Cost Ratio	0.53

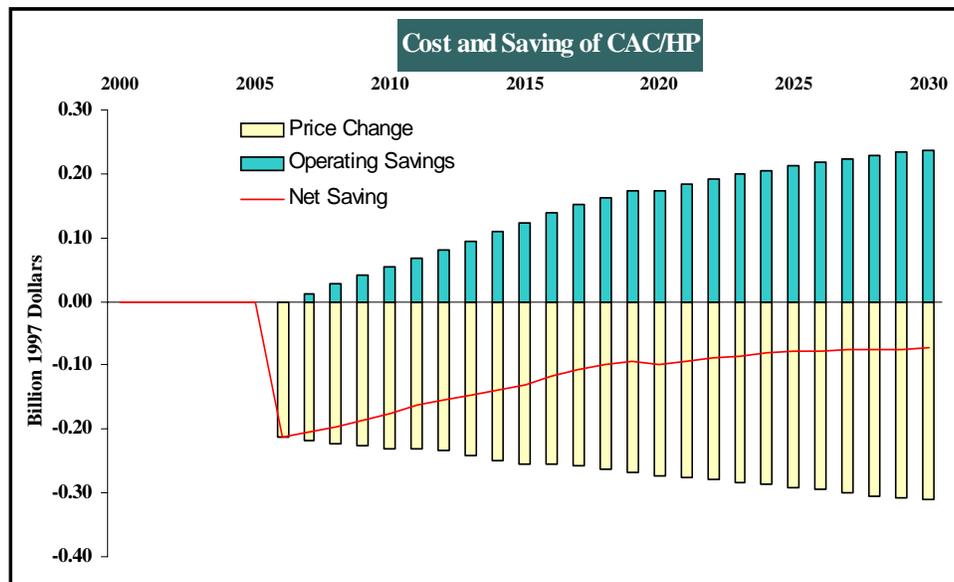


Figure F.11 Package A/C, 13 SEER: Annual Savings and Costs

Table F.12.1 Pack. A/C, 18 SEER: Energy Savings

	Energy Saving in Quads				
	Total	Elec	Gas	Oil	LPG
from 2006					
to 2010	0.03	0.03	0.00	0.00	0.00
to 2020	0.23	0.23	0.00	0.00	0.00
to 2030	0.56	0.56	0.00	0.00	0.00

Table F.12.2 Pack. A/C, 18 SEER: Costs and Net Present Value
CAC/HP Standards in 2006: 18 SEER

Cost and Net Present Values (in billion 1998\$)	
Cumulative for Package A/C Purchased from 2006 to 2030 Discounted at 7% to year 1998	
Total Operating Savings	1.02
Total Equipment Cost	3.21
Net Present Benefit	-2.20
Benefit/Cost Ratio	0.32

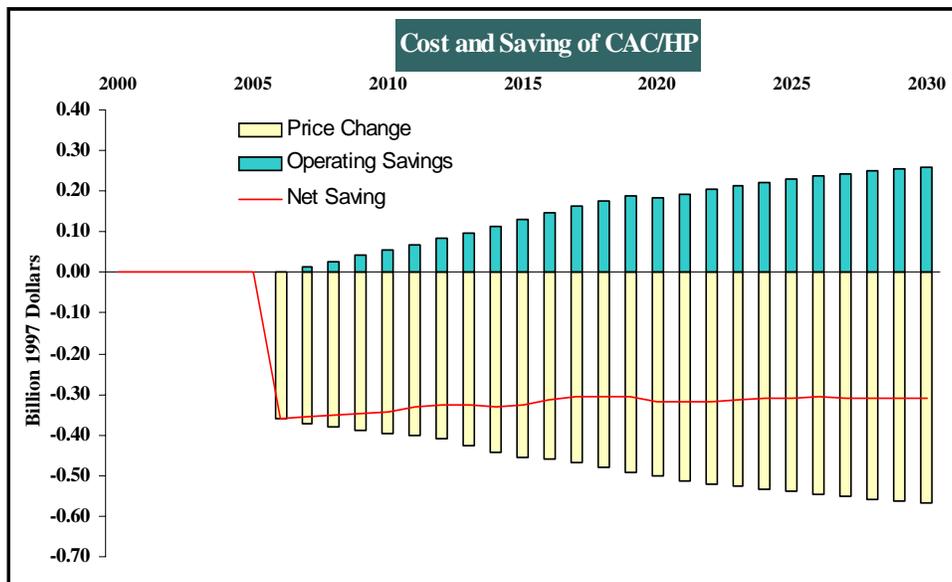


Figure F.12 Package A/C, 18 SEER: Annual Savings and Costs

F.4 SINGLE PACKAGE SYSTEM HEAT PUMPS

Table F.13.1 Pack. HP, 11 SEER: Energy Savings

	Energy Saving in Quads				
	Total	Elec	Gas	Oil	LPG
from 2006					
to 2010	0.00	0.00	0.00	0.00	0.00
to 2020	0.03	0.03	0.00	0.00	0.00
to 2030	0.07	0.07	0.00	0.00	0.00

Figure F.13.2 Pack. HP, 11 SEER: Costs and Net Present Value
CAC/HP Standards in 2006: 11 SEER

Cost and Net Present Values (in billion 1998\$)	
Cumulative for Package H/P Purchased from 2006 to 2030 Discounted at 7% to year 1998	
Total Operating Savings	0.18
Total Equipment Cost	0.16
Net Present Benefit	0.03
Benefit/Cost Ratio	1.17

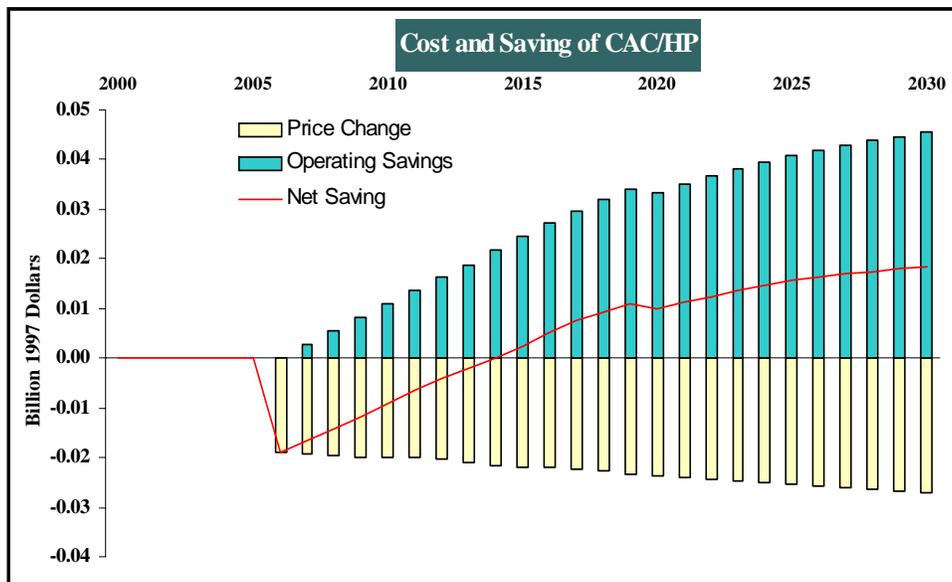


Figure F.13 Package HP, 11 SEER: Annual Savings and Costs

Table F.14.1 Pack. HP, 12 SEER: Energy Savings

	Energy Saving in Quads				
	Total	Elec	Gas	Oil	LPG
from 2006					
to 2010	0.01	0.01	0.00	0.00	0.00
to 2020	0.05	0.05	0.00	0.00	0.00
to 2030	0.12	0.12	0.00	0.00	0.00

Table F.14.2 Pack. HP, 12 SEER: Costs and Net Present Value
CAC/HP Standards in 2006: 12 SEER

Cost and Net Present Values (in billion 1998\$)	
Cumulative for Package H/P Purchased from 2006 to 2030 Discounted at 7% to year 1998	
Total Operating Savings	0.33
Total Equipment Cost	0.30
Net Present Benefit	0.03
Benefit/Cost Ratio	1.09

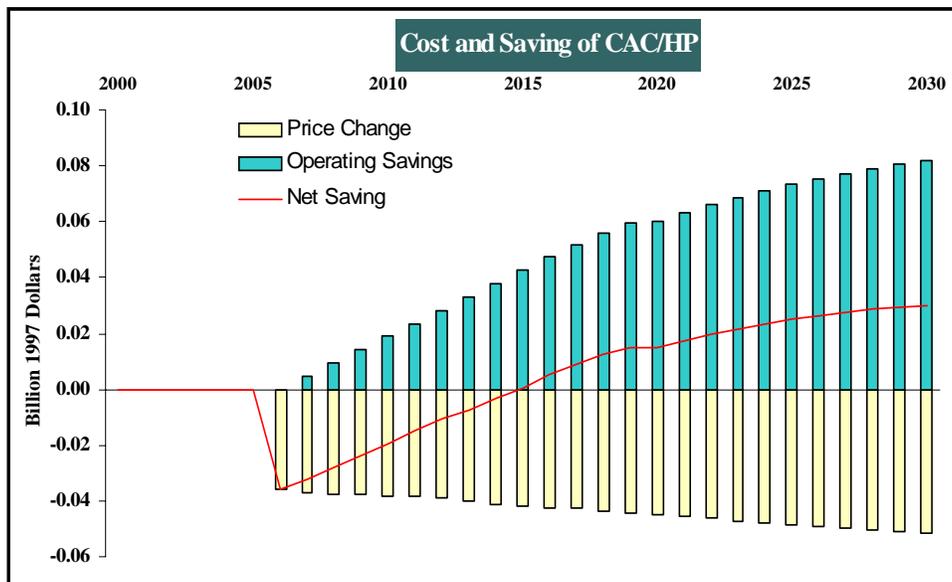


Figure F.14 Package HP, 12 SEER: Annual Costs and Savings

Table F.15.1 Pack. HP, 13 SEER: Energy Savings

	Energy Saving in Quads				
	Total	Elec	Gas	Oil	LPG
from 2006					
to 2010	0.01	0.01	0.00	0.00	0.00
to 2020	0.08	0.08	0.00	0.00	0.00
to 2030	0.18	0.18	0.00	0.00	0.00

Table F.15.2 Pack. HP, 13 SEER: Costs and Net Present Value
CAC/HP Standards in 2006: 13 SEER

Cost and Net Present Values (in billion 1998\$)	
Cumulative for Package H/P Purchased from 2006 to 2030 Discounted at 7% to year 1998	
Total Operating Savings	0.48
Total Equipment Cost	0.68
Net Present Benefit	-0.20
Benefit/Cost Ratio	0.71

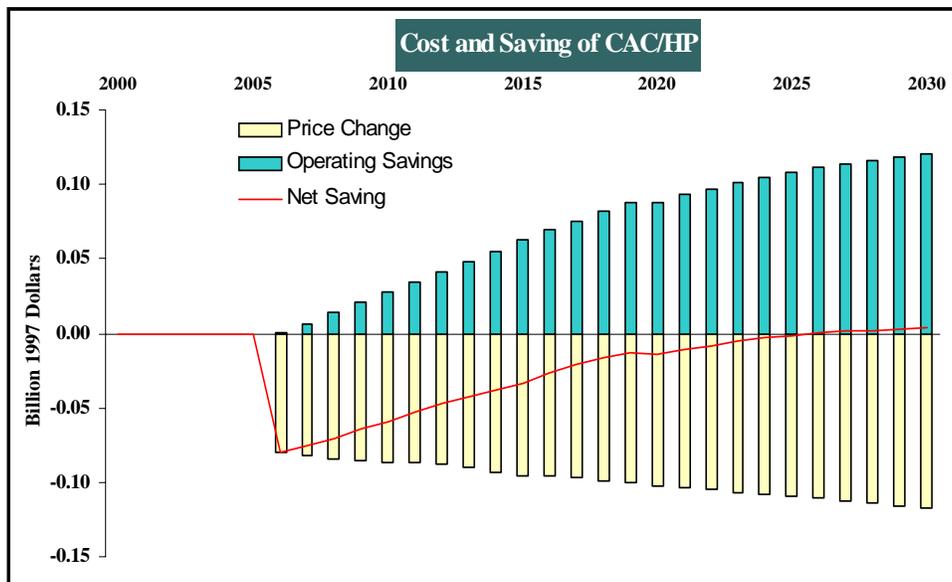


Figure F.15 Package HP, 13 SEER: Annual Costs and Savings

Table F.16.1 Pack. HP, 18 SEER: Energy Savings

	Energy Saving in Quads				
	Total	Elec	Gas	Oil	LPG
from 2006					
to 2010	0.02	0.02	0.00	0.00	0.00
to 2020	0.15	0.15	0.00	0.00	0.00
to 2030	0.36	0.36	0.00	0.00	0.00

Table F.16.2 Pack. HP, 18 SEER: Costs and Net Present Value
CAC/HP Standards in 2006: 18 SEER

Cost and Net Present Values (in billion 1998\$)	
Cumulative for Package H/P Purchased from 2006 to 2030	
Discounted at 7% to year 1998	
Total Operating Savings	0.65
Total Equipment Cost	1.21
Net Present Benefit	-0.56
Benefit/Cost Ratio	0.54

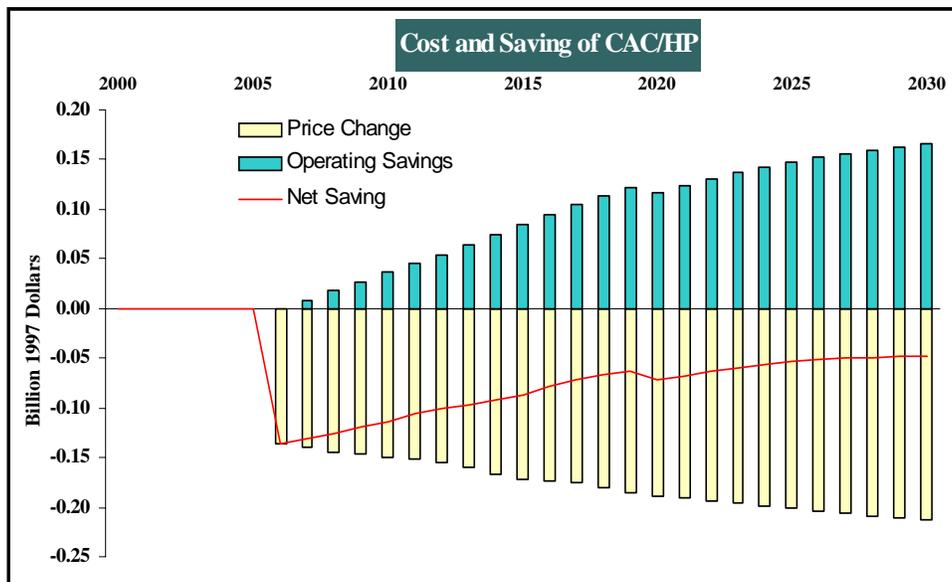


Figure F.16 Package HP, 18 SEER: Annual Savings and Costs