

## APPENDIX 10B. NATIONAL EQUIPMENT AND OPERATING COSTS

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## APPENDIX 10B. NATIONAL EQUIPMENT AND OPERATING COSTS

### 10B.1 INTRODUCTION

In this appendix, the Department presents the components of the net present value (NPV), namely, the present value of the equipment (or total installed costs) and the present value of the operating costs for each of the four appliance products. The present value of equipment costs is also termed the cumulative national equipment costs while the present value of operating costs is also termed the cumulative national operating costs.

As presented in Chapter 10, National Impact Analysis, the NPV is described by the equation:

$$NPV = PVS - PVC$$

where:

*PVS* = Present value of operating cost savings (including energy, water, repair, and maintenance costs) and

*PVC* = Present value of increased total installed costs (including equipment and installation).

The *PVS* and *PVC* are determined according to the following expressions:

$$PVS = \sum OCS_y \times DF_y$$

$$PVC = \sum TIC_y \times DF_y$$

where:

*OCS* = Total annual operating cost savings each year summed over vintages of the product stock,

*TIC* = Total annual installed cost increases each year summed over vintages of the product stock,

*DF* = Discount factor in each year, and

*y* = Year in the forecast (i.e., 2012 to 2042).

*PVS* and *PVC* are determined for each year from the effective date of the standard to the year when units purchased in 2042 retire.

The present value of operating costs and the present value of equipment costs (or total installed costs) are the components comprising the *PVS* and *PVC*, respectively. The *PVS* is

determined by taking the difference between the present value of operating costs for the base case and the present value of operating costs for the standards case. The *PVC* is determined by taking the difference between the present value of equipment costs for the base case and the present value of equipment costs for the standards case.

## **10B.2 RESULTS**

For following sections provide tables showing the present value of operating costs (also known as the cumulative national operating costs) and the present value of equipment costs (also known as the cumulative national equipment costs) each of the four appliance products. For each product, two sets of results are presented; one based on a seven-percent and another based on a three-percent discount rate.

In the tables provided in the following sections, the national operating and equipment costs are presented for the base case (i.e., without standards) and each standard level analyzed. Differences between the base case and standards cases are also presented. The difference in the national equipment costs represents the *PVC* or present value of equipment cost increases while the difference in the national operating costs represents the *PVS* or present value of operating cost savings. The difference between the base case and standards case total national equipment and operating costs represents the *NPV*.

### **10B.2.1 Dishwashers**

Tables 10B.2.1 and 10B.2.2 present the national equipment and operating costs, *PVC*, *PVS*, and *NPV* for standard-sized dishwashers at real discount rates of seven- and three-percent, respectively.

As detailed in Chapter 9, shipments projections under the standards cases were determined to be lower than those in the base case projection due to the higher installed cost of the more efficient equipment. Typically, DOE would use the standards case shipments projection and, in turn, the standards case equipment stock, to determine the *NPV* to avoid the inclusion of savings due to displaced shipments. But because DOE explicitly accounted for the energy and water consumption of the displaced shipments, DOE maintained the use of the base case shipments to determine the annual energy consumption in the base case. Thus, the base case values shown in Tables 10B.2.1 and 10B.2.2 do not vary with the standards case.

**Table 10B.2.1 Dishwashers: Cumulative National Equipment and Operating Costs with NPV from 2012–2042, Seven-Percent Discount Rate (billion 2006\$)**

<b>Standard Level</b>	<b>Equipment</b>	<b>Operating</b>	<b>Total</b>
Base Case	66.71	42.55	109.26
Standard Level 1	66.75	42.13	108.88
Difference*	-0.04	0.42	<b><i>0.38</i></b>
Base Case	66.71	42.55	109.26
Standard Level 2	67.02	40.95	107.97
Difference*	-0.31	1.60	<b><i>1.29</i></b>
Base Case	66.71	42.55	109.26
Standard Level 3	67.75	39.78	107.53
Difference*	-1.04	2.77	<b><i>1.73</i></b>
Base Case	66.71	42.55	109.26
Standard Level 4	69.61	38.76	108.37
Difference*	-2.90	3.79	<b><i>0.90</i></b>
Base Case	66.71	42.55	109.26
Standard Level 5	74.19	37.82	112.01
Difference*	-7.48	4.74	<b><i>-2.75</i></b>
Base Case	66.71	42.55	109.26
Standard Level 6	80.37	36.14	116.51
Difference*	-13.66	6.41	<b><i>-7.25</i></b>
Base Case	66.71	42.55	109.26
Standard Level 7	85.76	30.78	116.54
Difference*	-19.05	11.78	<b><i>-7.28</i></b>

\* Equipment Cost Difference represents the *PVC*; Operating Cost Difference represents the *PVC*; *NPV* is represented by the bold and italicized values.

**Table 10B.2.2 Dishwashers: Cumulative National Equipment and Operating Costs with NPV from 2012–2042, Three-Percent Discount Rate (billion 2006\$)**

<b>Standard Level</b>	<b>Equipment</b>	<b>Operating</b>	<b>Total</b>
Base Case	129.17	91.57	220.74
Standard Level 1	129.25	90.55	219.80
Difference*	-0.08	1.02	<b><i>0.94</i></b>
Base Case	129.17	91.57	220.74
Standard Level 2	129.78	87.67	217.45
Difference*	-0.60	3.90	<b><i>3.29</i></b>
Base Case	129.17	91.57	220.74
Standard Level 3	131.18	84.85	216.02
Difference*	-2.00	6.72	<b><i>4.72</i></b>
Base Case	129.17	91.57	220.74
Standard Level 4	134.74	82.39	217.13
Difference*	-5.56	9.18	<b><i>3.61</i></b>
Base Case	129.17	91.57	220.74
Standard Level 5	143.50	80.18	223.68
Difference*	-14.32	11.39	<b><i>-2.94</i></b>
Base Case	129.17	91.57	220.74
Standard Level 6	155.28	76.24	231.51
Difference*	-26.10	15.33	<b><i>-10.77</i></b>
Base Case	129.17	91.57	220.74
Standard Level 7	165.56	63.34	228.90
Difference*	-36.39	28.23	<b><i>-8.16</i></b>

\* Equipment Cost Difference represents the *PVC*; Operating Cost Difference represents the *PVC*; *NPV* is represented by the bold and italicized values.

### 10B.2.2 Dehumidifiers

Tables 10B.2.3 and 10B.2.4 present the national equipment and operating costs, *PVC*, *PVS*, and *NPV* for dehumidifiers at real discount rates of seven- and three-percent, respectively. Each table shows the costs, *PVC*, *PVS*, and *NPV* for each of the six product classes as well as the totals for all products classes.

All base case values were determined with shipments projections established under the standards case. As detailed in Chapter 9, shipments projections under the standards cases were determined to be lower than those in the base case projection due to the higher installed cost of the more efficient equipment. As a result, DOE used the standards case shipments projection and, in turn, the standards case equipment stock, to determine the *NPV* to avoid the inclusion of savings due to displaced shipments. Thus, the base case values shown in Tables 10B.2.3 and 10B.2.4 vary with the standards case.

**Table 10B.2.3 Dehumidifiers: Cumulative National Equipment and Operating Costs with NPV from 2012–2042, Seven-Percent Discount Rate (billion 2006\$)**

Std Level	≤ 25.00 pint/day			25.01-35.00 pints/d			35.01-45.00 pints/d			45.01-54.00 pints/d			54.01-74.99 pints/d			≥ 75.00 pints/d			ALL CLASSES		
	Equip	Oper	Total	Equip	Oper	Total	Equip	Oper	Total	Equip	Oper	Total	Equip	Oper	Total	Equip	Oper	Total	Equip	Oper	Total
Base Case	0.35	0.85	1.20	0.82	2.65	3.47	0.98	3.25	4.22	0.88	3.38	4.26	1.00	4.31	5.31	0.05	0.16	0.21	4.07	14.60	18.67
Std Level 1	0.35	0.83	1.19	0.83	2.62	3.45	0.99	3.22	4.21	0.89	3.36	4.25	1.01	4.27	5.28	0.05	0.16	0.21	4.12	14.47	18.59
Difference*	0.00	0.02	<b>0.02</b>	-0.01	0.02	<b>0.02</b>	-0.01	0.03	<b>0.01</b>	-0.01	0.03	<b>0.01</b>	-0.01	0.03	<b>0.02</b>	0.00	0.00	<b>0.00</b>	-0.05	0.13	<b>0.08</b>
Base Case	0.35	0.85	1.20	0.82	2.64	3.46	0.97	3.22	4.19	0.87	3.36	4.23	1.00	4.30	5.30	0.05	0.16	0.21	4.05	14.53	18.58
Std Level 2	0.36	0.80	1.15	0.83	2.57	3.40	1.02	3.14	4.16	0.92	3.28	4.20	1.02	4.23	5.25	0.05	0.16	0.20	4.20	14.17	18.37
Difference*	-0.01	0.05	<b>0.05</b>	-0.02	0.07	<b>0.06</b>	-0.06	0.08	<b>0.03</b>	-0.05	0.08	<b>0.03</b>	-0.02	0.07	<b>0.05</b>	0.00	0.00	<b>0.00</b>	-0.15	0.36	<b>0.21</b>
Base Case	0.35	0.85	1.19	0.81	2.62	3.43	0.96	3.20	4.15	0.86	3.33	4.19	0.99	4.28	5.27	0.05	0.16	0.21	4.01	14.43	18.44
Std Level 3	0.36	0.78	1.14	0.85	2.51	3.36	1.05	3.06	4.12	0.95	3.20	4.15	1.04	4.12	5.16	0.05	0.15	0.20	4.31	13.82	18.13
Difference*	-0.02	0.07	<b>0.05</b>	-0.04	0.12	<b>0.07</b>	-0.10	0.13	<b>0.04</b>	-0.09	0.13	<b>0.04</b>	-0.05	0.15	<b>0.10</b>	0.00	0.01	<b>0.00</b>	-0.30	0.61	<b>0.31</b>
Base Case	0.34	0.84	1.18	0.80	2.60	3.40	0.94	3.16	4.11	0.85	3.30	4.15	0.97	4.21	5.18	0.05	0.16	0.20	3.95	14.27	18.22
Std Level 4	0.38	0.76	1.13	0.89	2.44	3.33	1.09	2.98	4.08	0.98	3.12	4.11	1.10	3.97	5.07	0.05	0.15	0.20	4.49	13.42	17.91
Difference*	-0.04	0.08	<b>0.04</b>	-0.09	0.16	<b>0.07</b>	-0.15	0.18	<b>0.03</b>	-0.13	0.18	<b>0.04</b>	-0.13	0.24	<b>0.11</b>	-0.01	0.01	<b>0.00</b>	-0.54	0.85	<b>0.31</b>
Base Case	0.34	0.83	1.16	0.79	2.57	3.35	0.86	2.96	3.82	0.78	3.08	3.86	0.95	4.15	5.10	0.04	0.15	0.20	3.76	13.74	17.50
Std Level 5	0.40	0.71	1.11	0.93	2.35	3.27	1.31	2.51	3.82	1.18	2.48	3.66	1.16	3.75	4.91	0.05	0.14	0.19	5.03	11.94	16.96
Difference*	-0.06	0.11	<b>0.05</b>	-0.14	0.22	<b>0.08</b>	-0.45	0.45	<b>0.00</b>	-0.40	0.61	<b>0.21</b>	-0.21	0.40	<b>0.19</b>	-0.01	0.01	<b>0.00</b>	-1.27	1.80	<b>0.54</b>

\* Equipment Cost Difference represents the *PVC*; Operating Cost Difference represents the *PVC*; *NPV* is represented by the bold and italicized values.

**Table 10B.2.4 Dehumidifiers: Cumulative National Equipment and Operating Costs with NPV from 2012–2042, Three-Percent Discount Rate (billion 2006\$)**

Std Level	≤ 25.00 pint/day			25.01-35.00 pints/d			35.01-45.00 pints/d			45.01-54.00 pints/d			54.01-74.99 pints/d			≥ 75.00 pints/d			ALL CLASSES		
	Equip	Oper	Total	Equip	Oper	Total	Equip	Oper	Total	Equip	Oper	Total	Equip	Oper	Total	Equip	Oper	Total	Equip	Oper	Total
Base Case	0.69	1.86	2.55	1.63	5.76	7.39	1.94	7.07	9.01	1.75	7.35	9.11	1.99	9.37	11.36	0.09	0.35	0.44	8.11	31.75	39.86
Std Level 1	0.70	1.81	2.51	1.64	5.70	7.35	1.97	7.00	8.97	1.78	7.29	9.07	2.02	9.28	11.30	0.09	0.34	0.44	8.20	31.44	39.63
Difference*	-0.01	0.04	<b>0.04</b>	-0.01	0.06	<b>0.04</b>	-0.03	0.06	<b>0.04</b>	-0.02	0.06	<b>0.04</b>	-0.02	0.08	<b>0.06</b>	0.00	0.01	<b>0.00</b>	-0.09	0.32	<b>0.22</b>
Base Case	0.69	1.85	2.54	1.63	5.75	7.37	1.92	7.00	8.92	1.73	7.29	9.02	1.99	9.35	11.34	0.09	0.35	0.44	8.05	31.58	39.64
Std Level 2	0.71	1.72	2.43	1.66	5.57	7.23	2.04	6.80	8.83	1.83	7.09	8.93	2.03	9.19	11.22	0.09	0.34	0.43	8.36	30.71	39.06
Difference*	-0.01	0.13	<b>0.11</b>	-0.03	0.18	<b>0.14</b>	-0.11	0.20	<b>0.09</b>	-0.10	0.19	<b>0.09</b>	-0.04	0.16	<b>0.12</b>	0.00	0.01	<b>0.01</b>	-0.30	0.87	<b>0.57</b>
Base Case	0.69	1.84	2.52	1.61	5.70	7.31	1.90	6.93	8.84	1.71	7.22	8.93	1.98	9.29	11.27	0.09	0.35	0.44	7.98	31.33	39.31
Std Level 3	0.72	1.67	2.40	1.70	5.42	7.12	2.10	6.61	8.71	1.89	6.91	8.79	2.07	8.92	10.99	0.10	0.33	0.43	8.58	29.86	38.44
Difference*	-0.04	0.16	<b>0.13</b>	-0.09	0.29	<b>0.20</b>	-0.19	0.32	<b>0.13</b>	-0.18	0.31	<b>0.14</b>	-0.10	0.37	<b>0.27</b>	0.00	0.01	<b>0.01</b>	-0.60	1.47	<b>0.87</b>
Base Case	0.68	1.82	2.49	1.59	5.64	7.23	1.88	6.86	8.73	1.69	7.14	8.83	1.93	9.13	11.06	0.09	0.34	0.43	7.86	30.91	38.77
Std Level 4	0.75	1.62	2.37	1.76	5.25	7.02	2.17	6.42	8.59	1.95	6.71	8.67	2.19	8.55	10.74	0.10	0.32	0.42	8.93	28.88	37.81
Difference*	-0.07	0.20	<b>0.12</b>	-0.17	0.39	<b>0.21</b>	-0.29	0.43	<b>0.14</b>	-0.26	0.42	<b>0.16</b>	-0.26	0.58	<b>0.32</b>	-0.01	0.02	<b>0.01</b>	-1.08	2.04	<b>0.96</b>
Base Case	0.67	1.79	2.46	1.56	5.55	7.12	1.71	6.34	8.05	1.54	6.61	8.15	1.89	8.97	10.86	0.09	0.33	0.42	7.46	29.59	37.06
Std Level 5	0.79	1.52	2.31	1.84	5.03	6.87	2.60	5.27	7.86	2.34	5.15	7.49	2.31	8.01	10.31	0.11	0.30	0.41	9.97	25.27	35.24
Difference*	-0.12	0.27	<b>0.15</b>	-0.28	0.53	<b>0.25</b>	-0.88	1.08	<b>0.19</b>	-0.80	1.46	<b>0.66</b>	-0.41	0.96	<b>0.55</b>	-0.02	0.03	<b>0.01</b>	-2.51	4.32	<b>1.81</b>

\* Equipment Cost Difference represents the *PVC*; Operating Cost Difference represents the *PVC*; *NPV* is represented by the bold and italicized values.



### 10B.2.3 Cooking Products

Tables 10B.2.5–10B.2.20 present the national equipment and operating costs, *PVC*, *PVS*, and *NPV* for cooking products at real discount rates of seven- and three-percent, respectively.

#### 10B.2.3.1 Cooktops

Tables 10B.2.5–10B.2.10 present the national equipment and operating costs, *PVC*, *PVS*, and *NPV* for cooktops. In the case of electric and gas cooktops, because the housing market is fully saturated (i.e., all households have cooktops either in the form of ranges or stand-alone units), DOE assumed that standards would neither impact shipments nor cause shifts in electric and gas cooktop market shares. Therefore, DOE’s standards case shipments for electric and gas cooktops were identical to its base case shipments. Typically, DOE would use the standards case shipments projection and, in turn, the standards case equipment stock, to determine the *NPV* to avoid the inclusion of savings due to displaced shipments. But because DOE assumed no drop in shipments due to standards, DOE maintained the use of the base case shipments to determine the annual energy consumption in the base case. Thus, the base case values shown in Tables 10B.2.5–10B.2.10 do not vary with the standards case.

Tables 10B.2.5 and 10B.2.6 show the costs, *PVC*, *PVS*, and *NPV* for electric coil cooktops at real discount rates of seven- and three-percent respectively.

**Table 10B.2.5 Electric Coil Cooktops: Cumulative National Equipment and Operating Costs with NPV from 2012–2042, Seven-Percent Discount Rate (billion 2006\$)**

Standard Level	Equipment	Operating	Total
Base Case	6.67	5.16	11.83
Standard Level 1	6.75	5.03	11.78
Difference*	-0.09	0.14	<b><i>0.05</i></b>

\* Equipment Cost Difference represents the *PVC*; Operating Cost Difference represents the *PVC*; *NPV* is represented by the bold and italicized values.

**Table 10B.2.6 Electric Coil Cooktops: Cumulative National Equipment and Operating Costs with NPV from 2012–2042, Three-Percent Discount Rate (billion 2006\$)**

Standard Level	Equipment	Operating	Total
Base Case	12.77	11.13	23.90
Standard Level 1	12.93	10.78	23.72
Difference*	-0.17	0.35	<b><i>0.18</i></b>

\* Equipment Cost Difference represents the *PVC*; Operating Cost Difference represents the *PVC*; *NPV* is represented by the bold and italicized values.

Tables 10B.2.7 and 10B.2.8 show the costs, *PVC*, *PVS*, and *NPV* for electric smooth cooktops at real discount rates of seven- and three-percent respectively.

**Table 10B.2.7 Electric Smooth Cooktops: Cumulative National Equipment and Operating Costs with NPV from 2012–2042, Seven-Percent Discount Rate (billion 2006\$)**

<b>Standard Level</b>	<b>Equipment</b>	<b>Operating</b>	<b>Total</b>
Base Case	9.02	5.99	15.01
Standard Level 1	16.55	5.94	22.94
Difference*	-7.53	0.06	<b><i>-7.48</i></b>

\* Equipment Cost Difference represents the *PVC*; Operating Cost Difference represents the *PVC*; *NPV* is represented by the bold and italicized values.

**Table 10B.2.8 Electric Smooth Cooktops: Cumulative National Equipment and Operating Costs with NPV from 2012–2042, Three-Percent Discount Rate (billion 2006\$)**

<b>Standard Level</b>	<b>Equipment</b>	<b>Operating</b>	<b>Total</b>
Base Case	17.27	13.00	30.27
Standard Level 1	31.69	12.86	44.55
Difference*	-14.42	0.14	<b><i>-14.28</i></b>

\* Equipment Cost Difference represents the *PVC*; Operating Cost Difference represents the *PVC*; *NPV* is represented by the bold and italicized values.

Tables 10B.2.9 and 10B.2.10 show the costs, *PVC*, *PVS*, and *NPV* for gas cooktops at real discount rates of seven- and three-percent respectively.

**Table 10B.2.9 Gas Cooktops: Cumulative National Equipment and Operating Costs with NPV from 2012–2042, Seven-Percent Discount Rate (billion 2006\$)**

<b>Standard Level</b>	<b>Equipment</b>	<b>Operating</b>	<b>Total</b>
Base Case	12.36	6.66	19.02
Standard Level 1	12.40	6.33	18.73
Difference*	-0.04	0.33	<b><i>0.29</i></b>
Base Case	12.36	6.66	19.02
Standard Level 2	13.53	6.14	19.67
Difference*	-1.17	0.52	<b><i>-0.65</i></b>

\* Equipment Cost Difference represents the *PVC*; Operating Cost Difference represents the *PVC*; *NPV* is represented by the bold and italicized values.

**Table 10B.2.10 Gas Cooktops: Cumulative National Equipment and Operating Costs with NPV from 2012–2042, Three-Percent Discount Rate (billion 2006\$)**

<b>Standard Level</b>	<b>Equipment</b>	<b>Operating</b>	<b>Total</b>
Base Case	23.48	14.19	37.68
Standard Level 1	23.55	13.46	37.01
Difference*	-0.07	0.74	<b><i>0.67</i></b>
Base Case	23.48	14.19	37.68
Standard Level 2	25.69	12.97	38.66
Difference*	-2.20	1.23	<b><i>-0.98</i></b>

\* Equipment Cost Difference represents the *PVC*; Operating Cost Difference represents the *PVC*; *NPV* is represented by the bold and italicized values.

### 10B.2.3.2 Ovens

Tables 10B.2.11–10B.2.18 present the national equipment and operating costs, *PVC*, *PVS*, and *NPV* for ovens. In the case of electric and gas ovens, because the housing market is fully saturated (i.e., all households have ovens either in the form of ranges or stand-alone units), DOE assumed that standards would neither impact shipments nor cause shifts in electric and gas oven market shares. Therefore, DOE’s standards case shipments for electric and gas ovens were identical to its base case shipments. Typically, DOE would use the standards case shipments projection and, in turn, the standards case equipment stock, to determine the *NPV* to avoid the inclusion of savings due to displaced shipments. But because DOE assumed no drop in shipments due to standards, DOE maintained the use of the base case shipments to determine the annual energy consumption in the base case. Thus, the base case values shown in Tables 10B.2.11–10B.2.18 do not vary with the standards case.

Tables 10B.2.11 and 10B.2.12 show the costs, *PVC*, *PVS*, and *NPV* for electric standard ovens at real discount rates of seven- and three-percent respectively.

**Table 10B.2.11 Electric Standard Ovens: Cumulative National Equipment and Operating Costs with NPV from 2012–2042, Seven-Percent Discount Rate (billion 2006\$)**

Standard Level	Equipment	Operating	Total
Base Case	6.00	3.96	9.95
Standard Level 1	6.03	3.86	9.90
Difference*	-0.04	0.09	<b><i>0.06</i></b>
Base Case	6.00	3.96	9.95
Standard Level 2	6.11	3.77	9.88
Difference*	-0.11	0.18	<b><i>0.08</i></b>
Base Case	6.00	3.96	9.95
Standard Level 3	6.19	3.74	9.93
Difference*	-0.19	0.22	<b><i>0.03</i></b>
Base Case	6.00	3.96	9.95
Standard Level 4	7.07	3.70	10.77
Difference*	-1.07	0.26	<b><i>-0.81</i></b>
Base Case	6.00	3.96	9.95
Standard Level 5	7.14	3.69	10.84
Difference*	-1.15	0.26	<b><i>-0.88</i></b>

\* Equipment Cost Difference represents the *PVC*; Operating Cost Difference represents the *PVC*; *NPV* is represented by the bold and italicized values.

**Table 10B.2.12 Electric Standard Ovens: Cumulative National Equipment and Operating Costs with NPV from 2012–2042, Three-Percent Discount Rate (billion 2006\$)**

Standard Level	Equipment	Operating	Total
Base Case	11.49	8.46	19.94
Standard Level 1	11.56	8.22	19.77
Difference*	-0.07	0.24	<b><i>0.17</i></b>
Base Case	11.49	8.46	19.94
Standard Level 2	11.69	7.98	19.68
Difference*	-0.21	0.47	<b><i>0.27</i></b>
Base Case	11.49	8.46	19.94
Standard Level 3	11.85	7.90	19.75
Difference*	-0.36	0.55	<b><i>0.19</i></b>
Base Case	11.49	8.46	19.94
Standard Level 4	13.53	7.80	21.33
Difference*	-2.04	0.66	<b><i>-1.39</i></b>
Base Case	11.49	8.46	19.94
Standard Level 5	13.68	7.78	21.47
Difference*	-2.19	0.67	<b><i>-1.52</i></b>

\* Equipment Cost Difference represents the *PVC*; Operating Cost Difference represents the *PVC*; *NPV* is represented by the bold and italicized values.

Tables 10B.2.13 and 10B.2.14 show the costs, *PVC*, *PVS*, and *NPV* for electric self-cleaning ovens at real discount rates of seven- and three-percent respectively.

**Table 10B.2.13 Electric Self-Cleaning Ovens: Cumulative National Equipment and Operating Costs with NPV from 2012–2042, Seven-Percent Discount Rate (billion 2006\$)**

<b>Standard Level</b>	<b>Equipment</b>	<b>Operating</b>	<b>Total</b>
Base Case	21.93	12.00	33.93
Standard Level 1	22.23	11.98	34.21
Difference*	-0.30	0.02	<b><i>-0.28</i></b>
Base Case	21.93	12.00	33.93
Standard Level 2	24.95	11.86	36.80
Difference*	-3.02	0.14	<b><i>-2.87</i></b>

\* Equipment Cost Difference represents the *PVC*; Operating Cost Difference represents the *PVC*; *NPV* is represented by the bold and italicized values.

**Table 10B.2.14 Electric Self-Cleaning Ovens: Cumulative National Equipment and Operating Costs with NPV from 2012–2042, Three-Percent Discount Rate (billion 2006\$)**

<b>Standard Level</b>	<b>Equipment</b>	<b>Operating</b>	<b>Total</b>
Base Case	42.00	26.10	68.10
Standard Level 1	42.58	26.05	68.63
Difference*	-0.57	0.05	<b><i>-0.53</i></b>
Base Case	42.00	26.10	68.10
Standard Level 2	47.78	25.74	73.52
Difference*	-5.78	0.36	<b><i>-5.41</i></b>

\* Equipment Cost Difference represents the *PVC*; Operating Cost Difference represents the *PVC*; *NPV* is represented by the bold and italicized values.

Tables 10B.2.15 and 10B.2.16 show the costs, *PVC*, *PVS*, and *NPV* for gas standard ovens at real discount rates of seven- and three-percent respectively.

**Table 10B.2.15 Gas Standard Ovens: Cumulative National Equipment and Operating Costs with NPV from 2012–2042, Seven-Percent Discount Rate (billion 2006\$)**

<b>Standard Level</b>	<b>Equipment</b>	<b>Operating</b>	<b>Total</b>
Base Case	6.57	3.58	10.14
Standard Level 1	6.61	3.44	10.05
Difference*	-0.04	0.14	<b><i>0.10</i></b>
Base Case	6.57	3.58	10.14
Standard Level 2	6.69	3.34	10.03
Difference*	-0.12	0.23	<b><i>0.11</i></b>
Base Case	6.57	3.58	10.14
Standard Level 3	6.71	3.33	10.04
Difference*	-0.14	0.25	<b><i>0.11</i></b>
Base Case	6.57	3.58	10.14
Standard Level 4	7.20	3.28	10.47
Difference*	-0.63	0.30	<b><i>-0.33</i></b>
Base Case	6.57	3.58	10.14
Standard Level 5	7.23	3.27	10.50
Difference*	-0.66	0.30	<b><i>-0.36</i></b>
Base Case	6.57	3.58	10.14
Standard Level 6	7.31	3.26	10.57
Difference*	-0.74	0.32	<b><i>-0.42</i></b>
Base Case	6.57	3.58	10.14
Standard Level 1a	6.67	3.12	9.80
Difference*	-0.11	0.45	<b><i>0.35</i></b>

\* Equipment Cost Difference represents the *PVC*; Operating Cost Difference represents the *PVC*; *NPV* is represented by the bold and italicized values.

**Table 10B.2.16 Gas Standard Ovens: Cumulative National Equipment and Operating Costs with NPV from 2012–2042, Three-Percent Discount Rate (billion 2006\$)**

<b>Standard Level</b>	<b>Equipment</b>	<b>Operating</b>	<b>Total</b>
Base Case	12.48	7.54	20.03
Standard Level 1	12.55	7.24	19.79
Difference*	-0.07	0.31	<b><i>0.24</i></b>
Base Case	12.48	7.54	20.03
Standard Level 2	12.70	6.98	19.68
Difference*	-0.22	0.56	<b><i>0.34</i></b>
Base Case	12.48	7.54	20.03
Standard Level 3	12.75	6.94	19.69
Difference*	-0.26	0.60	<b><i>0.34</i></b>
Base Case	12.48	7.54	20.03
Standard Level 4	13.66	6.82	20.48
Difference*	-1.18	0.73	<b><i>-0.45</i></b>
Base Case	12.48	7.54	20.03
Standard Level 5	13.73	6.80	20.53
Difference*	-1.25	0.75	<b><i>-0.50</i></b>
Base Case	12.48	7.54	20.03
Standard Level 6	13.88	6.77	20.65
Difference*	-1.40	0.77	<b><i>-0.62</i></b>
Base Case	12.48	7.54	20.03
Standard Level 1a	12.67	6.44	19.11
Difference*	-0.19	1.11	<b><i>0.92</i></b>

\* Equipment Cost Difference represents the *PVC*; Operating Cost Difference represents the *PVC*; *NPV* is represented by the bold and italicized values.

Tables 10B.2.17 and 10B.2.18 show the costs, *PVC*, *PVS*, and *NPV* for gas self-cleaning ovens at real discount rates of seven- and three-percent respectively.

**Table 10B.2.17 Gas Self-Cleaning Ovens: Cumulative National Equipment and Operating Costs with NPV from 2012–2042, Seven-Percent Discount Rate (billion 2006\$)**

Standard Level	Equipment	Operating	Total
Base Case	9.74	5.22	14.96
Standard Level 1	10.03	4.94	14.97
Difference*	-0.30	0.29	<b><i>-0.01</i></b>
Base Case	9.74	5.22	14.96
Standard Level 2	10.15	4.93	15.08
Difference*	-0.41	0.29	<b><i>-0.12</i></b>
Base Case	9.74	5.22	14.96
Standard Level 3	10.18	4.92	15.10
Difference*	-0.45	0.31	<b><i>-0.14</i></b>

\* Equipment Cost Difference represents the *PVC*; Operating Cost Difference represents the *PVC*; *NPV* is represented by the bold and italicized values.

**Table 10B.2.18 Gas Self-Cleaning Ovens: Cumulative National Equipment and Operating Costs with NPV from 2012–2042, Three-Percent Discount Rate (billion 2006\$)**

Standard Level	Equipment	Operating	Total
Base Case	18.49	11.40	29.90
Standard Level 1	19.05	10.66	29.72
Difference*	-0.56	0.74	<b><i>0.18</i></b>
Base Case	18.49	11.40	29.90
Standard Level 2	19.28	10.64	29.92
Difference*	-0.78	0.76	<b><i>-0.02</i></b>
Base Case	18.49	11.40	29.90
Standard Level 3	19.34	10.61	29.95
Difference*	-0.85	0.80	<b><i>-0.05</i></b>

\* Equipment Cost Difference represents the *PVC*; Operating Cost Difference represents the *PVC*; *NPV* is represented by the bold and italicized values.

### 10B.2.3.3 Microwave Ovens

Tables 10B.2.19–10B.2.20 present the national equipment and operating costs, *PVC*, *PVS*, and *NPV* for microwave ovens at real discount rates of seven- and three-percent respectively.

All base case values were determined with shipments projections established under the standards case. As detailed in Chapter 9, shipments projections under the standards cases were determined to be lower than those in the base case projection due to the higher installed cost of the more efficient equipment. As a result, the standards case shipments projection and, in turn, the standards case equipment stock, were used to determine the *NPV* to avoid the inclusion of



savings due to displaced shipments. Thus, the base case values shown in Tables 10B.2.19 and 10B.2.20 vary with the standards case.

**Table 10B.2.19 Microwave Ovens: Cumulative National Equipment and Operating Costs with NPV from 2012–2042, Seven-Percent Discount Rate (billion 2006\$)**

Standard Level	Equipment	Operating	Total
Base Case	36.35	17.53	53.88
Standard Level 1	38.44	16.85	55.28
Difference*	-2.09	0.69	<b><i>-1.40</i></b>
Base Case	35.71	17.29	53.00
Standard Level 2	39.94	16.57	56.52
Difference*	-4.24	0.72	<b><i>-3.52</i></b>
Base Case	34.71	16.91	51.62
Standard Level 3	42.17	16.02	58.19
Difference*	-7.46	0.89	<b><i>-6.58</i></b>
Base Case	33.46	16.43	49.89
Standard Level 4	44.76	15.48	60.24
Difference*	-11.30	0.95	<b><i>-10.35</i></b>

\* Equipment Cost Difference represents the *PVC*; Operating Cost Difference represents the *PVC*; *NPV* is represented by the bold and italicized values.

**Table 10B.2.20 Microwave Ovens: Cumulative National Equipment and Operating Costs with NPV from 2012–2042, Three-Percent Discount Rate (billion 2006\$)**

Standard Level	Equipment	Operating	Total
Base Case	69.59	35.48	105.06
Standard Level 1	73.58	33.96	107.54
Difference*	-3.99	1.52	<b><i>-2.48</i></b>
Base Case	68.26	34.89	103.14
Standard Level 2	76.35	33.30	109.66
Difference*	-8.10	1.58	<b><i>-6.51</i></b>
Base Case	66.20	33.98	100.18
Standard Level 3	80.43	32.03	112.46
Difference*	-14.23	1.95	<b><i>-12.28</i></b>
Base Case	63.63	32.85	96.48
Standard Level 4	85.13	30.75	115.88
Difference*	-21.49	2.09	<b><i>-19.40</i></b>

\* Equipment Cost Difference represents the *PVC*; Operating Cost Difference represents the *PVC*; *NPV* is represented by the bold and italicized values.

#### 10B.2.4 Commercial Clothes Washers

Tables 10B.2.21 and 10B.2.22 present the national equipment and operating costs, *PVC*, *PVS*, and *NPV* for standard-sized dishwashers at real discount rates of seven- and three-percent, respectively.

As detailed in Chapter 9, shipments projections under the standards cases were determined to be lower than those in the base case projection due to the higher installed cost of the more efficient equipment. Typically, DOE would use the standards case shipments projection and, in turn, the standards case equipment stock, to determine the *NPV* to avoid the inclusion of savings due to displaced shipments. But because DOE assumed that any drop in shipments caused by standards would result in the purchase of used machines, DOE maintained the use of the base case shipments to determine the annual energy consumption in the base case. Thus, the base case values shown in Tables 10B.2.21 and 10B.2.22 do not vary with the standards case.

**Table 10B.2.21 Commercial Clothes Washers: Cumulative National Equipment and Operating Costs with NPV from 2012–2042, Seven-Percent Discount Rate (billion 2006\$)**

<b>Standard Level</b>	<b>Equipment</b>	<b>Operating</b>	<b>Total</b>
Base Case	2.21	9.70	11.91
Standard Level 1	2.46	9.41	11.87
Difference*	-0.25	0.29	<b><i>0.04</i></b>
Base Case	2.21	9.70	11.91
Standard Level 2	3.20	8.80	12.00
Difference*	-0.99	0.90	<b><i>-0.09</i></b>
Base Case	2.21	9.70	11.91
Standard Level 3	3.20	8.48	11.68
Difference*	-0.99	1.22	<b><i>0.23</i></b>
Base Case	2.21	9.70	11.91
Standard Level 4	3.20	8.21	11.42
Difference*	-0.99	1.49	<b><i>0.49</i></b>
Base Case	2.21	9.70	11.91
Standard Level 5	3.20	7.30	10.50
Difference*	-0.99	2.40	<b><i>1.41</i></b>
Base Case	2.21	9.70	11.91
Standard Level 6	3.20	6.94	10.14
Difference*	-0.99	2.77	<b><i>1.77</i></b>

\* Equipment Cost Difference represents the *PVC*; Operating Cost Difference represents the *PVC*; *NPV* is represented by the bold and italicized values.

**Table 10B.2.22 Commercial Clothes Washers: Cumulative National Equipment and Operating Costs with NPV from 2012–2042, Three-Percent Discount Rate (billion 2006\$)**

<b>Standard Level</b>	<b>Equipment</b>	<b>Operating</b>	<b>Total</b>
Base Case	4.30	21.04	25.33
Standard Level 1	4.78	20.35	25.13
Difference*	-0.48	0.69	<b><i>0.20</i></b>
Base Case	4.30	21.04	25.33
Standard Level 2	6.24	18.87	25.12
Difference*	-1.95	2.16	<b><i>0.22</i></b>
Base Case	4.30	21.04	25.33
Standard Level 3	6.24	18.10	24.34
Difference*	-1.95	2.94	<b><i>0.99</i></b>
Base Case	4.30	21.04	25.33
Standard Level 4	6.24	17.46	23.70
Difference*	-1.95	3.58	<b><i>1.64</i></b>
Base Case	4.30	21.04	25.33
Standard Level 5	6.24	15.22	21.46
Difference*	-1.95	5.82	<b><i>3.87</i></b>
Base Case	4.30	21.04	25.33
Standard Level 6	6.24	14.35	20.59
Difference*	-1.95	6.69	<b><i>4.74</i></b>

\* Equipment Cost Difference represents the *PVC*; Operating Cost Difference represents the *PVC*; *NPV* is represented by the bold and italicized values.