

Washington, DC

Awnings

Typical Year (TMY3) HDD65 4920 / CDD65 1112, Hot Year (2010) HDD65 4511 / CDD65 1590

Tables 115-118 show the impact of awnings on a typical house in Washington with different window orientations over a typical year. Tables 119-122 repeat this analysis for a hot year in Washington. The impact varies depending on the type of window glazing and whether the awnings are in place all twelve months or only during the cooling season. For a house with windows equally distributed in the four orientations, Table 115 shows the annual heating and cooling energy use as well as the peak electricity demand for each combination of glazing and shading condition. The table also shows the impact on the total cost for heating and cooling. In all cases, the net and percent savings are in reference to a house with no shading.

Table 115 shows that awnings reduce cooling energy use by 32-48 percent as compared to the unshaded house. The higher savings are for awnings at 165 degrees over windows with clear glazings, while the lower savings are for awnings at 90 degrees over windows with Low-E glazings. Because awnings block useful solar gain in winter, heating energy use increases when the awnings remain in place 12 months a year. Using the awnings only during the cooling season produces the largest net energy savings. The net energy savings are from 4 to 5 percent in Washington when awnings are used only during the cooling season from April through October, while the penalties are from -6 to -3 percent when they are deployed throughout the year.

Table 115 also shows that awnings reduce peak electricity demand by 16-25 percent in Washington, with larger reductions for the clear glazings and smaller reductions for the Low-E glazing. Tables 116, 117, and 118 show results for houses in Washington where the windows predominantly face to the east, south, and west, respectively. Both the cooling energy savings and the peak demand reductions are largest on west-facing awnings. Tables 119-122 show the impact of awnings on a particularly hot year (2010) in Washington. The main effect is to increase the cooling savings by 68 percent due to the hotter or longer summer.

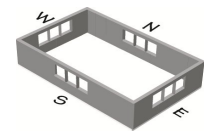


Table 115. Impact of awnings on a house in Washington, DC with equally distributed windows on a typical year

Window Type	Awning	Operation	Heating			Cooling				Heat+Cool			Peak Cooling		
			Energy (MBtu)	Savings (MBtu)	Savings (\$)	Cool (kWh)	Savings (kWh)	Savings (\$)	Savings (%)	Cost (\$)	Savings (\$)	Savings (%)	Peak (kW)	Savings (kW)	Savings (%)
Single Clear	None		77.0			2149				1554			4.47		
	Black Awning	summer	79.8	-2.8	-46	1281	868	116	40	1484	70	4	3.51	0.96	21
		12 month	87.3	-10.2	-168	1277	872	116	41	1606	-52	-3	3.51	0.96	21
	Linen Awning	summer	79.3	-2.3	-38	1397	752	100	35	1491	62	4	3.65	0.83	18
		12 month	85.8	-8.8	-144	1394	755	101	35	1598	-44	-3	3.65	0.83	18
	Black Awning	summer	80.6	-3.6	-59	1125	1024	137	48	1476	78	5	3.34	1.14	25
		12 month	90.3	-13.2	-218	1122	1027	137	48	1635	-81	-5	3.34	1.14	25
	Linen Awning	summer	79.9	-2.8	-47	1271	878	117	41	1483	70	5	3.51	0.97	22
	12 month	87.9	-10.9	-179	1267	882	118	41	1616	-62	-4	3.51	0.97	22	
Double Clear	None		64.1			1840				1301			3.84		
	Black Awning	summer	66.5	-2.4	-39	1157	683	91	37	1248	52	4	3.08	0.75	20
		12 month	72.7	-8.6	-141	1155	685	91	37	1350	-50	-4	3.08	0.75	20
	Linen Awning	summer	66.1	-2.0	-33	1249	591	79	32	1254	46	4	3.19	0.64	17
		12 month	71.5	-7.4	-122	1247	593	79	32	1343	-43	-3	3.19	0.65	17
	Black Awning	summer	67.1	-3.0	-49	1032	808	108	44	1242	59	5	2.94	0.89	23
		12 month	75.2	-11.0	-181	1031	809	108	44	1374	-73	-6	2.94	0.89	23
	Linen Awning	summer	66.5	-2.4	-39	1148	692	92	38	1248	53	4	3.08	0.76	20
	12 month	73.3	-9.1	-150	1146	694	93	38	1358	-57	-4	3.08	0.76	20	
Double HiSol LowE	None		58.5			1809				1203			3.68		
	Black Awning	summer	60.7	-2.3	-37	1138	671	90	37	1151	52	4	2.96	0.72	20
		12 month	66.8	-8.4	-138	1137	672	90	37	1251	-48	-4	2.96	0.72	20
	Linen Awning	summer	60.3	-1.9	-31	1228	581	78	32	1157	47	4	3.05	0.62	17
		12 month	65.7	-7.2	-119	1226	583	78	32	1244	-41	-3	3.05	0.62	17
	Black Awning	summer	61.3	-2.9	-47	1015	794	106	44	1144	59	5	2.83	0.85	23
		12 month	69.2	-10.7	-177	1014	795	106	44	1274	-71	-6	2.83	0.85	23
	Linen Awning	summer	60.8	-2.3	-38	1128	681	91	38	1150	53	4	2.95	0.73	20
	12 month	67.4	-8.9	-146	1126	683	91	38	1258	-55	-5	2.95	0.73	20	

Window Type	Frame	U-factor	SHGC
Single Clear	Aluminum	1.16	0.77
Double Clear	Wood/vinyl	0.49	0.56
Double HiSol LowE	Wood/vinyl	0.37	0.53

The costs shown here are annual costs for heating and cooling only and thus will be less than the total utility bill. Heating is assumed to be provided by a gas furnace and cooling by a central air-conditioner. Electricity costs used in the analysis are 13.4 cents per kWh and natural gas costs are \$16.96 per MBTU, which are the average costs in 2009 for the state of DC according to the Energy Information Administration (see Appendix E for details).

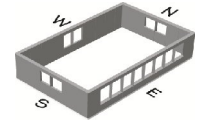


Table 116. Impact of awnings on a house in Washington, DC with east-facing windows on a typical year

Window Type	Awning	Operation	Heating			Cooling				Heat+Cool			Peak Cooling		
			Energy (MBtu)	Savings (MBtu)	Savings (\$)	Cool (kWh)	Savings (kWh)	Savings (\$)	Savings (%)	Cost (\$)	Savings (\$)	Savings (%)	Peak (kW)	Savings (kW)	Savings (%)
Single Clear	None		77.1			2268				1571			4.43		
	Black Awning	summer	80.1	-3.0	-50	1260	1008	135	44	1486	85	5	3.43	0.99	22
	90°	12 month	86.8	-9.7	-159	1258	1010	135	45	1595	-25	-2	3.43	0.99	22
	Linen Awning	summer	79.6	-2.5	-41	1399	869	116	38	1496	75	5	3.57	0.86	19
	90°	12 month	85.4	-8.3	-136	1397	871	116	38	1591	-20	-1	3.57	0.86	19
	Black Awning	summer	81.4	-4.4	-72	1072	1196	160	53	1482	88	6	3.24	1.19	27
	165°	12 month	90.1	-13.0	-215	1071	1197	160	53	1625	-55	-3	3.24	1.19	27
	Linen Awning	summer	80.5	-3.4	-56	1246	1022	136	45	1490	81	5	3.42	1.01	23
165°	12 month	87.7	-10.7	-176	1244	1024	137	45	1609	-39	-2	3.42	1.01	23	
Double Clear	None		64.5			1966				1324			3.82		
	Black Awning	summer	67.2	-2.7	-44	1147	819	109	42	1258	66	5	3.04	0.78	21
	90°	12 month	72.9	-8.4	-138	1146	820	109	42	1353	-29	-2	3.04	0.78	21
	Linen Awning	summer	66.8	-2.2	-37	1255	711	95	36	1266	58	4	3.15	0.67	18
	90°	12 month	71.8	-7.2	-119	1254	712	95	36	1348	-24	-2	3.15	0.67	18
	Black Awning	summer	68.2	-3.7	-61	990	976	130	50	1254	69	5	2.88	0.94	25
	165°	12 month	75.7	-11.2	-184	989	977	130	50	1378	-54	-4	2.88	0.94	25
	Linen Awning	summer	67.5	-2.9	-48	1135	831	111	42	1261	63	5	3.02	0.80	21
165°	12 month	73.7	-9.2	-152	1134	832	111	42	1364	-40	-3	3.02	0.80	21	
Double HiSol LowE	None		58.6			1917				1220			3.65		
	Black Awning	summer	61.1	-2.6	-42	1126	791	106	41	1156	63	5	2.90	0.75	21
	90°	12 month	66.8	-8.2	-135	1126	791	106	41	1250	-30	-2	2.90	0.75	21
	Linen Awning	summer	60.7	-2.1	-35	1234	683	91	36	1163	56	5	3.00	0.65	18
	90°	12 month	65.7	-7.1	-116	1233	684	91	36	1245	-25	-2	3.00	0.65	18
	Black Awning	summer	62.1	-3.5	-58	972	945	126	49	1152	68	6	2.76	0.89	24
	165°	12 month	69.5	-10.9	-180	972	945	126	49	1273	-54	-4	2.76	0.89	24
	Linen Awning	summer	61.4	-2.8	-46	1113	804	107	42	1158	61	5	2.88	0.77	21
165°	12 month	67.6	-9.0	-148	1113	804	107	42	1260	-41	-3	2.88	0.77	21	

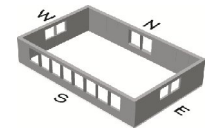


Table 117. Impact of awnings on a house in Washington, DC with south-facing windows on a typical year

Window Type	Awning	Operation	Heating			Cooling				Heat+Cool			Peak Cooling		
			Energy (MBtu)	Savings (MBtu)	Savings (\$)	Cool (kWh)	Savings (kWh)	Savings (\$)	Savings (%)	Cost (\$)	Savings (\$)	Savings (%)	Peak (kW)	Savings (kW)	Savings (%)
Single Clear	None		69.9			2113				1432			4.33		
	Black Awning	summer	73.2	-3.3	-54	1224	889	119	42	1367	65	5	3.45	0.88	20
	90°	12 month	85.5	-15.6	-257	1224	889	119	42	1570	-138	-10	3.45	0.88	20
	Linen Awning	summer	72.5	-2.6	-43	1336	777	104	37	1371	61	4	3.57	0.76	18
	90°	12 month	83.1	-13.2	-216	1336	777	104	37	1545	-113	-8	3.57	0.76	18
	Black Awning	summer	73.8	-3.8	-63	1110	1003	134	47	1362	71	5	3.28	1.05	24
	165°	12 month	90.2	-20.3	-334	1110	1003	134	47	1632	-200	-14	3.28	1.05	24
	Linen Awning	summer	72.9	-2.9	-48	1245	868	116	41	1365	68	5	3.43	0.89	21
165°	12 month	86.3	-16.4	-270	1245	868	116	41	1586	-154	-11	3.43	0.89	21	
Double Clear	None		58.5			1815				1205			3.75		
	Black Awning	summer	61.4	-2.8	-47	1119	696	93	38	1159	46	4	3.05	0.70	19
	90°	12 month	72.0	-13.4	-221	1119	696	93	38	1333	-128	-11	3.05	0.70	19
	Linen Awning	summer	60.8	-2.3	-38	1207	608	81	33	1162	43	4	3.15	0.60	16
	90°	12 month	69.9	-11.4	-187	1207	608	81	33	1311	-106	-9	3.15	0.60	16
	Black Awning	summer	61.8	-3.3	-54	1022	793	106	44	1154	51	4	2.92	0.84	22
	165°	12 month	75.7	-17.2	-283	1022	793	106	44	1382	-177	-15	2.92	0.84	22
	Linen Awning	summer	61.1	-2.6	-43	1130	685	91	38	1156	49	4	3.04	0.72	19
165°	12 month	72.6	-14.0	-231	1130	685	91	38	1344	-139	-12	3.04	0.72	19	
Double HiSol LowE	None		53.0			1760				1106			3.57		
	Black Awning	summer	55.7	-2.7	-45	1096	664	89	38	1062	44	4	2.90	0.68	19
	90°	12 month	65.9	-13.0	-213	1096	664	89	38	1231	-125	-11	2.90	0.68	19
	Linen Awning	summer	55.1	-2.2	-36	1180	580	77	33	1065	41	4	2.99	0.58	16
	90°	12 month	64.0	-11.0	-181	1180	580	77	33	1210	-104	-9	2.99	0.58	16
	Black Awning	summer	56.2	-3.2	-53	1000	760	101	43	1057	49	4	2.78	0.79	22
	165°	12 month	69.6	-16.6	-274	1000	760	101	43	1279	-172	-16	2.78	0.79	22
	Linen Awning	summer	55.5	-2.5	-41	1105	655	87	37	1060	46	4	2.89	0.69	19
165°	12 month	66.5	-13.6	-223	1105	655	87	37	1242	-136	-12	2.89	0.69	19	

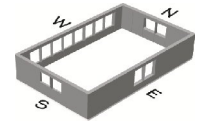


Table 118. Impact of awnings on a house in Washington, DC with west-facing windows on a typical year

Window Type	Awning	Operation	Heating			Cooling				Heat+Cool			Peak Cooling		
			Energy (MBtu)	Savings (MBtu)	Savings (\$)	Cool (kWh)	Savings (kWh)	Savings (\$)	Savings (%)	Cost (\$)	Savings (\$)	Savings (%)	Peak (kW)	Savings (kW)	Savings (%)
Single Clear	None		79.9			2370				1630			5.36		
	Black Awning	summer	82.3	-2.4	-40	1300	1070	143	45	1528	103	6	3.57	1.79	33
	90°	12 month	88.8	-8.9	-146	1296	1074	143	45	1633	-3	0	3.57	1.79	33
	Linen Awning	summer	81.9	-2.0	-33	1442	928	124	39	1540	91	6	3.83	1.54	29
	90°	12 month	87.5	-7.6	-125	1438	932	124	39	1631	-1	0	3.83	1.54	29
	Black Awning	summer	83.2	-3.3	-55	1089	1281	171	54	1514	116	7	3.29	2.08	39
	165°	12 month	91.6	-11.8	-193	1084	1286	172	54	1652	-22	-1	3.29	2.08	39
	Linen Awning	summer	82.5	-2.6	-43	1273	1097	146	46	1527	104	6	3.56	1.80	34
165°	12 month	89.5	-9.7	-159	1268	1102	147	46	1642	-12	-1	3.56	1.80	34	
Double Clear	None		66.3			2032				1362			4.62		
	Black Awning	summer	68.4	-2.1	-35	1173	859	115	42	1282	80	6	3.15	1.47	32
	90°	12 month	74.0	-7.7	-127	1170	862	115	42	1374	-12	-1	3.15	1.47	32
	Linen Awning	summer	68.1	-1.8	-29	1287	745	99	37	1292	71	5	3.37	1.26	27
	90°	12 month	72.9	-6.6	-109	1285	747	100	37	1371	-9	-1	3.37	1.26	27
	Black Awning	summer	69.2	-2.8	-47	1001	1031	138	51	1271	91	7	2.90	1.72	37
	165°	12 month	76.4	-10.1	-166	998	1034	138	51	1391	-28	-2	2.90	1.72	37
	Linen Awning	summer	68.6	-2.3	-37	1150	882	118	43	1282	81	6	3.16	1.46	32
165°	12 month	74.7	-8.3	-137	1147	885	118	44	1381	-19	-1	3.16	1.46	32	
Double HiSol LowE	None		60.1			1959				1251			4.41		
	Black Awning	summer	62.2	-2.0	-34	1139	820	109	42	1175	76	6	3.00	1.41	32
	90°	12 month	67.7	-7.6	-124	1136	823	110	42	1265	-14	-1	3.00	1.41	32
	Linen Awning	summer	61.8	-1.7	-28	1247	712	95	36	1184	67	5	3.21	1.21	27
	90°	12 month	66.6	-6.5	-107	1244	715	95	36	1262	-11	-1	3.21	1.21	27
	Black Awning	summer	62.9	-2.7	-45	974	985	131	50	1164	87	7	2.74	1.67	38
	165°	12 month	70.0	-9.9	-163	972	987	132	50	1282	-31	-2	2.74	1.67	38
	Linen Awning	summer	62.3	-2.2	-36	1117	842	112	43	1174	77	6	3.00	1.41	32
165°	12 month	68.3	-8.2	-134	1114	845	113	43	1272	-22	-2	3.00	1.41	32	

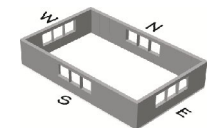


Table 119. Impact of awnings on a house in Washington, DC with equally distributed windows on a hot year

Window Type	Awning	Operation	Heating			Cooling				Heat+Cool			Peak Cooling		
			Energy (MBtu)	Savings (MBtu)	Savings (\$)	Cool (kWh)	Savings (kWh)	Savings (\$)	Savings (%)	Cost (\$)	Savings (\$)	Savings (%)	Peak (kW)	Savings (kW)	Savings (%)
Single Clear	None		71.4			3214				1604			4.29		
	Black Awning	summer	73.2	-1.8	-30	2128	1086	145	34	1489	115	7	3.50	0.79	18
	90°	12 month	80.8	-9.4	-155	2128	1086	145	34	1614	-10	-1	3.50	0.79	18
	Linen Awning	summer	72.9	-1.5	-25	2271	943	126	29	1502	101	6	3.61	0.68	16
	90°	12 month	79.5	-8.1	-133	2271	943	126	29	1611	-7	0	3.61	0.68	16
	Black Awning	summer	73.9	-2.5	-42	1911	1303	174	41	1471	132	8	3.37	0.92	21
	165°	12 month	84.0	-12.6	-208	1911	1303	174	41	1638	-34	-2	3.37	0.92	21
	Linen Awning	summer	73.4	-2.0	-32	2100	1114	149	35	1487	116	7	3.51	0.78	18
165°	12 month	81.8	-10.4	-171	2100	1114	149	35	1625	-22	-1	3.51	0.78	18	
Double Clear	None		59.3			2782				1348			3.77		
	Black Awning	summer	60.8	-1.5	-25	1925	857	114	31	1258	90	7	3.14	0.63	17
	90°	12 month	67.2	-7.9	-129	1925	857	114	31	1363	-15	-1	3.14	0.63	17
	Linen Awning	summer	60.6	-1.2	-20	2040	742	99	27	1269	79	6	3.23	0.54	14
	90°	12 month	66.1	-6.8	-111	2040	742	99	27	1360	-12	-1	3.23	0.54	14
	Black Awning	summer	61.4	-2.0	-34	1754	1028	137	37	1244	104	8	3.02	0.75	20
	165°	12 month	69.8	-10.5	-172	1754	1028	137	37	1382	-35	-3	3.02	0.75	20
	Linen Awning	summer	60.9	-1.6	-26	1903	879	117	32	1257	91	7	3.14	0.63	17
165°	12 month	68.0	-8.6	-142	1903	879	117	32	1372	-24	-2	3.14	0.63	17	
Double HiSol LowE	None		54.1			2699				1251			3.63		
	Black Awning	summer	55.5	-1.4	-23	1880	819	109	30	1164	86	7	3.02	0.61	17
	90°	12 month	61.8	-7.6	-126	1880	819	109	30	1267	-16	-1	3.02	0.61	17
	Linen Awning	summer	55.3	-1.2	-19	1990	709	95	26	1175	75	6	3.11	0.52	14
	90°	12 month	60.7	-6.6	-108	1990	709	95	26	1264	-14	-1	3.11	0.52	14
	Black Awning	summer	56.0	-1.9	-32	1711	988	132	37	1150	100	8	2.90	0.73	20
	165°	12 month	64.3	-10.1	-167	1711	988	132	37	1285	-35	-3	2.90	0.73	20
	Linen Awning	summer	55.6	-1.5	-25	1859	840	112	31	1163	87	7	3.02	0.61	17
165°	12 month	62.5	-8.4	-137	1859	840	112	31	1276	-25	-2	3.02	0.61	17	

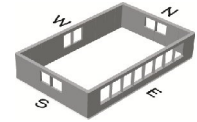


Table 120. Impact of awnings on a house in Washington, DC with east-facing windows on a hot year

Window Type	Awning	Operation	Heating			Cooling				Heat+Cool			Peak Cooling		
			Energy (MBtu)	Savings (MBtu)	Savings (\$)	Cool (kWh)	Savings (kWh)	Savings (\$)	Savings (%)	Cost (\$)	Savings (\$)	Savings (%)	Peak (kW)	Savings (kW)	Savings (%)
Single Clear	None		71.3			3433				1630			4.70		
	Black Awning 90°	summer	73.2	-2.0	-32	2159	1274	170	37	1493	138	8	3.44	1.26	27
		12 month	80.3	-9.0	-149	2158	1275	170	37	1609	22	1	3.44	1.26	27
	Linen Awning 90°	summer	72.8	-1.6	-26	2330	1103	147	32	1509	121	7	3.51	1.19	25
		12 month	79.0	-7.7	-127	2328	1105	148	32	1610	20	1	3.51	1.19	25
	Black Awning 165°	summer	74.4	-3.2	-52	1872	1561	208	45	1474	156	10	3.35	1.35	29
		12 month	84.1	-12.9	-212	1870	1563	209	46	1633	-3	0	3.35	1.35	29
	Linen Awning 165°	summer	73.7	-2.4	-40	2102	1331	178	39	1492	138	8	3.45	1.26	27
		12 month	81.7	-10.5	-172	2100	1333	178	39	1624	6	0	3.45	1.26	27
	Double Clear	None		59.5			2993				1379			3.99	
Black Awning 90°		summer	61.2	-1.7	-28	1965	1028	137	34	1269	110	8	3.12	0.87	22
		12 month	67.3	-7.8	-128	1965	1028	137	34	1370	9	1	3.12	0.87	22
Linen Awning 90°		summer	60.9	-1.4	-23	2104	889	119	30	1283	96	7	3.18	0.81	20
		12 month	66.2	-6.7	-110	2104	889	119	30	1370	9	1	3.18	0.81	20
Black Awning 165°		summer	62.2	-2.6	-43	1729	1264	169	42	1254	125	9	3.04	0.95	24
		12 month	70.5	-11.0	-180	1728	1265	169	42	1390	-11	-1	3.04	0.95	24
Linen Awning 165°		summer	61.6	-2.0	-33	1918	1075	144	36	1269	110	8	3.12	0.87	22
		12 month	68.5	-8.9	-147	1918	1075	144	36	1383	-4	0	3.12	0.87	22
Double HiSol LowE		None		54.0			2905				1277			3.82	
	Black Awning 90°	summer	55.6	-1.6	-26	1916	989	132	34	1171	106	8	3.00	0.83	22
		12 month	61.6	-7.6	-125	1916	989	132	34	1270	7	1	3.00	0.83	22
	Linen Awning 90°	summer	55.4	-1.3	-21	2050	855	114	29	1184	93	7	3.05	0.77	20
		12 month	60.6	-6.5	-107	2049	856	114	29	1270	7	1	3.05	0.77	20
	Black Awning 165°	summer	56.5	-2.5	-41	1685	1220	163	42	1155	122	10	2.92	0.91	24
		12 month	64.7	-10.6	-175	1684	1221	163	42	1289	-12	-1	2.92	0.91	24
	Linen Awning 165°	summer	56.0	-1.9	-31	1872	1033	138	36	1170	107	8	2.99	0.83	22
		12 month	62.8	-8.7	-143	1871	1034	138	36	1282	-5	0	2.99	0.83	22

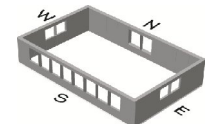


Table 121. Impact of awnings on a house in Washington, DC with south-facing windows on a hot year

Window Type	Awning	Operation	Heating			Cooling				Heat+Cool			Peak Cooling		
			Energy (MBtu)	Savings (MBtu)	Savings (\$)	Cool (kWh)	Savings (kWh)	Savings (\$)	Savings (%)	Cost (\$)	Savings (\$)	Savings (%)	Peak (kW)	Savings (kW)	Savings (%)
Single Clear	None		65.7			3158				1502			4.48		
	Black Awning 90°	summer	67.7	-2.1	-34	2023	1135	152	36	1384	118	8	3.38	1.11	25
		12 month	79.7	-14.0	-231	2023	1135	152	36	1581	-79	-5	3.38	1.11	25
	Linen Awning 90°	summer	67.3	-1.6	-27	2165	993	133	31	1396	106	7	3.44	1.05	23
		12 month	77.4	-11.8	-194	2165	993	133	31	1563	-61	-4	3.44	1.05	23
	Black Awning 165°	summer	68.2	-2.5	-41	1882	1276	170	40	1372	129	9	3.32	1.16	26
		12 month	84.4	-18.7	-308	1882	1276	170	40	1639	-138	-9	3.32	1.16	26
	Linen Awning 165°	summer	67.5	-1.9	-31	2058	1100	147	35	1386	116	8	3.38	1.10	25
		12 month	80.7	-15.1	-248	2058	1100	147	35	1603	-101	-7	3.38	1.10	25
	Double Clear	None		55.0			2746				1271			3.77	
Black Awning 90°		summer	56.7	-1.8	-29	1850	896	120	33	1180	91	7	3.06	0.71	19
		12 month	67.0	-12.0	-197	1850	896	120	33	1349	-78	-6	3.06	0.71	19
Linen Awning 90°		summer	56.4	-1.4	-23	1963	783	105	29	1190	82	6	3.11	0.66	17
		12 month	65.1	-10.1	-167	1963	783	105	29	1333	-62	-5	3.11	0.66	17
Black Awning 165°		summer	57.1	-2.1	-35	1730	1016	136	37	1171	100	8	2.99	0.78	21
		12 month	70.8	-15.8	-260	1730	1016	136	37	1395	-124	-10	2.99	0.78	21
Linen Awning 165°		summer	56.6	-1.6	-27	1871	875	117	32	1181	90	7	3.05	0.72	19
		12 month	67.8	-12.8	-211	1871	875	117	32	1365	-94	-7	3.05	0.72	19
Double HiSol LowE		None		49.8			2664				1176			3.59	
	Black Awning 90°	summer	51.5	-1.6	-27	1805	859	115	32	1088	88	7	2.94	0.66	18
		12 month	61.3	-11.5	-189	1805	859	115	32	1250	-74	-6	2.94	0.66	18
	Linen Awning 90°	summer	51.1	-1.3	-22	1913	751	100	28	1097	79	7	2.99	0.61	17
		12 month	59.6	-9.7	-160	1913	751	100	28	1235	-60	-5	2.99	0.61	17
	Black Awning 165°	summer	51.9	-2.0	-33	1685	979	131	37	1078	98	8	2.86	0.73	20
		12 month	65.0	-15.2	-250	1685	979	131	37	1295	-119	-10	2.86	0.73	20
	Linen Awning 165°	summer	51.4	-1.5	-25	1824	840	112	32	1089	87	7	2.93	0.66	18
		12 month	62.1	-12.3	-202	1824	840	112	32	1266	-90	-8	2.93	0.66	18

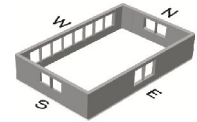


Table 122. Impact of awnings on a house in Washington, DC with west-facing windows on a hot year

Window Type	Awning	Operation	Heating			Cooling				Heat+Cool			Peak Cooling		
			Energy (MBtu)	Savings (MBtu)	Savings (\$)	Cool (kWh)	Savings (kWh)	Savings (\$)	Savings (%)	Cost (\$)	Savings (\$)	Savings (%)	Peak (kW)	Savings (kW)	Savings (%)
Single Clear	None		74.6			3580				1705			6.06		
	Black Awning	summer	76.3	-1.7	-28	2216	1364	182	38	1550	154	9	3.82	2.24	37
	90°	12 month	82.8	-8.2	-135	2208	1372	183	38	1656	48	3	3.82	2.24	37
	Linen Awning	summer	76.0	-1.4	-23	2392	1188	159	33	1569	135	8	4.14	1.92	32
	90°	12 month	81.6	-7.1	-116	2384	1196	160	33	1661	44	3	4.14	1.92	32
	Black Awning	summer	77.2	-2.6	-43	1898	1682	225	47	1523	182	11	3.37	2.69	44
	165°	12 month	86.0	-11.4	-188	1890	1690	226	47	1667	38	2	3.37	2.69	44
	Linen Awning	summer	76.5	-2.0	-32	2141	1439	192	40	1545	160	9	3.73	2.33	38
165°	12 month	83.9	-9.3	-153	2133	1447	193	40	1664	41	2	3.73	2.33	38	
Double Clear	None		61.6			3101				1428			5.17		
	Black Awning	summer	63.0	-1.4	-23	1997	1104	147	36	1303	125	9	3.36	1.81	35
	90°	12 month	68.7	-7.0	-116	1995	1106	148	36	1396	32	2	3.36	1.81	35
	Linen Awning	summer	62.8	-1.2	-19	2142	959	128	31	1319	109	8	3.61	1.56	30
	90°	12 month	67.7	-6.1	-100	2140	961	128	31	1399	29	2	3.61	1.56	30
	Black Awning	summer	63.7	-2.1	-35	1742	1359	181	44	1281	147	10	3.00	2.17	42
	165°	12 month	71.4	-9.7	-160	1740	1361	182	44	1406	21	2	3.00	2.17	42
	Linen Awning	summer	63.2	-1.6	-26	1940	1161	155	37	1299	129	9	3.30	1.88	36
165°	12 month	69.6	-7.9	-131	1939	1162	155	37	1403	25	2	3.30	1.88	36	
Double HiSol LowE	None		55.9			3011				1321			4.96		
	Black Awning	summer	57.2	-1.3	-21	1948	1063	142	35	1201	121	9	3.22	1.73	35
	90°	12 month	62.7	-6.9	-113	1947	1064	142	35	1292	29	2	3.22	1.73	35
	Linen Awning	summer	56.9	-1.1	-18	2088	923	123	31	1215	106	8	3.47	1.49	30
	90°	12 month	61.8	-5.9	-97	2087	924	123	31	1295	26	2	3.47	1.49	30
	Black Awning	summer	57.8	-2.0	-32	1699	1312	175	44	1178	143	11	2.88	2.08	42
	165°	12 month	65.3	-9.4	-155	1698	1313	175	44	1301	20	2	2.88	2.08	42
	Linen Awning	summer	57.4	-1.5	-24	1895	1116	149	37	1196	125	9	3.16	1.79	36
165°	12 month	63.6	-7.7	-127	1894	1117	149	37	1299	22	2	3.16	1.79	36	