

Chicago, Illinois

Typical Year (TMY3) HDD65 6397 / CDD65 830, Hot Year (2005) HDD65 6120 / CDD65 1148

Tables 161-164 show the impact of awnings on a typical house in Chicago with different window orientations over a typical year. Tables 165-168 repeat this analysis for a hot year in Chicago. 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 161 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 161 shows that awnings reduce cooling energy use by 41-57 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 2 to 3 percent in Chicago when awnings are used only during the cooling season from April through September, while the penalties are from -7 to -3 percent when they are deployed throughout the year.

Table 161 also shows that awnings reduce peak electricity demand by 18-26 percent in Chicago, with larger reductions for the clear glazings and smaller reductions for the Low-E glazing. Tables 162, 163, and 164 show results for houses in Chicago 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 165-168 show the impact of awnings on a particularly hot year (2005) in Chicago. The main effect is to increase the cooling savings by 74 percent due to the hotter or longer summer.

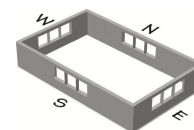


Table 161. Impact of awnings on a house in Chicago, Illinois with equally distributed windows on a typical year

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		108.4			1462				1309			3.88		
	Black Awning	summer	111.3	-2.9	-32	751	711	65	49	1275	33	3	2.99	0.90	23
		12 month	119.4	-11.0	-120	750	712	65	49	1363	-55	-4	2.99	0.90	23
	Linen Awning	summer	110.8	-2.4	-26	835	627	57	43	1278	31	2	3.11	0.77	20
		12 month	117.8	-9.5	-103	835	627	57	43	1354	-46	-3	3.11	0.77	20
	Black Awning	summer	112.2	-3.8	-41	633	829	76	57	1274	34	3	2.84	1.05	27
		12 month	122.7	-14.3	-155	633	829	76	57	1388	-79	-6	2.84	1.05	27
	Linen Awning	summer	111.5	-3.1	-33	744	718	66	49	1276	32	2	3.00	0.89	23
		12 month	120.2	-11.8	-128	744	718	66	49	1371	-63	-5	3.00	0.89	23
Double Clear	None		89.1			1206				1076			3.31		
	Black Awning	summer	91.5	-2.4	-26	647	559	51	46	1051	25	2	2.60	0.71	21
		12 month	98.3	-9.2	-99	647	559	51	46	1124	-48	-4	2.60	0.71	21
	Linen Awning	summer	91.1	-2.0	-22	715	491	45	41	1053	23	2	2.70	0.61	18
		12 month	97.0	-7.9	-85	715	491	45	41	1117	-41	-4	2.70	0.61	18
	Black Awning	summer	92.2	-3.1	-33	554	652	60	54	1050	26	2	2.48	0.83	25
		12 month	100.9	-11.8	-128	554	652	60	54	1145	-68	-6	2.48	0.83	25
	Linen Awning	summer	91.6	-2.5	-27	644	562	51	47	1052	25	2	2.60	0.70	21
		12 month	98.9	-9.8	-106	644	562	51	47	1131	-55	-5	2.60	0.70	21
Double HiSol LowE	None		81.3			1176				989			3.16		
	Black Awning	summer	83.5	-2.2	-24	632	544	50	46	964	25	3	2.48	0.69	22
		12 month	90.2	-8.9	-96	632	544	50	46	1036	-47	-5	2.48	0.69	22
	Linen Awning	summer	83.2	-1.9	-20	698	478	44	41	966	23	2	2.58	0.59	19
		12 month	89.0	-7.6	-83	698	478	44	41	1028	-39	-4	2.58	0.59	19
	Black Awning	summer	84.2	-2.9	-32	538	638	58	54	962	27	3	2.36	0.80	25
		12 month	92.7	-11.4	-124	538	638	58	54	1055	-66	-7	2.36	0.80	25
	Linen Awning	summer	83.7	-2.3	-25	630	546	50	46	965	24	2	2.48	0.68	21
		12 month	90.8	-9.5	-103	630	546	50	46	1042	-53	-5	2.48	0.68	21

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 9.1 cents per kWh and natural gas costs are \$11.18 per MBTU, which are the average costs in 2009 for the state of Illinois according to the Energy Information Administration (see Appendix E for details).

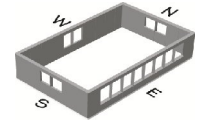


Table 162. Impact of awnings on a house in Chicago, Illinois with east-facing windows on a typical year

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		102.9			1406				1244			3.44		
	Black Awning	summer	105.7	-2.9	-31	675	731	67	52	1208	36	3	2.73	0.71	21
	90°	12 month	111.4	-8.5	-92	675	731	67	52	1269	-25	-2	2.73	0.71	21
	Linen Awning	summer	105.2	-2.4	-25	767	639	58	45	1211	33	3	2.81	0.63	18
	90°	12 month	110.2	-7.3	-79	767	639	58	45	1264	-20	-2	2.81	0.63	18
	Black Awning	summer	107.0	-4.1	-45	547	859	78	61	1210	34	3	2.59	0.85	25
	165°	12 month	114.3	-11.4	-124	547	859	78	61	1289	-45	-4	2.59	0.85	25
	Linen Awning	summer	106.1	-3.2	-35	660	746	68	53	1211	33	3	2.71	0.73	21
165°	12 month	112.2	-9.3	-101	660	746	68	53	1277	-33	-3	2.71	0.73	21	
Double Clear	None		87.7			1175				1059			2.90		
	Black Awning	summer	90.1	-2.4	-26	591	584	53	50	1031	28	3	2.43	0.48	16
	90°	12 month	94.8	-7.1	-77	591	584	53	50	1082	-24	-2	2.43	0.48	16
	Linen Awning	summer	89.7	-2.0	-21	666	509	46	43	1034	25	2	2.49	0.41	14
	90°	12 month	93.8	-6.1	-66	666	509	46	43	1078	-20	-2	2.49	0.41	14
	Black Awning	summer	91.1	-3.4	-37	489	686	63	58	1033	26	2	2.32	0.59	20
	165°	12 month	97.2	-9.4	-102	489	686	63	58	1098	-40	-4	2.32	0.59	20
	Linen Awning	summer	90.4	-2.7	-29	581	594	54	51	1034	25	2	2.41	0.49	17
165°	12 month	95.5	-7.8	-84	581	594	54	51	1089	-30	-3	2.41	0.49	17	
Double HiSol LowE	None		81.6			1143				989			2.79		
	Black Awning	summer	83.8	-2.3	-25	577	566	52	50	962	27	3	2.33	0.46	16
	90°	12 month	88.5	-6.9	-75	577	566	52	50	1012	-23	-2	2.33	0.46	16
	Linen Awning	summer	83.5	-1.9	-20	647	496	45	43	964	25	3	2.39	0.40	14
	90°	12 month	87.5	-5.9	-64	647	496	45	43	1008	-19	-2	2.39	0.40	14
	Black Awning	summer	84.8	-3.2	-35	478	665	61	58	963	26	3	2.23	0.56	20
	165°	12 month	90.8	-9.2	-99	478	665	61	58	1028	-39	-4	2.23	0.56	20
	Linen Awning	summer	84.1	-2.5	-27	566	577	53	50	964	25	3	2.32	0.47	17
165°	12 month	89.1	-7.5	-82	566	577	53	50	1018	-29	-3	2.32	0.47	17	

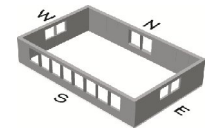


Table 163. Impact of awnings on a house in Chicago, Illinois with south-facing windows on a typical year

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		95.5			1188				1144			3.34		
	Black Awning	summer	98.1	-2.6	-28	624	564	51	47	1121	23	2	2.71	0.62	19
	90°	12 month	110.9	-15.3	-166	616	572	52	48	1258	-114	-10	2.71	0.62	19
	Linen Awning	summer	97.7	-2.1	-23	694	494	45	42	1122	22	2	2.80	0.54	16
	90°	12 month	108.6	-13.1	-142	686	502	46	42	1240	-96	-8	2.80	0.54	16
	Black Awning	summer	98.5	-3.0	-33	573	615	56	52	1121	24	2	2.61	0.73	22
	165°	12 month	115.3	-19.8	-215	566	622	57	52	1302	-158	-14	2.61	0.73	22
	Linen Awning	summer	97.9	-2.4	-26	655	533	49	45	1122	23	2	2.72	0.62	19
165°	12 month	111.7	-16.2	-176	648	540	49	45	1271	-127	-11	2.72	0.62	19	
Double Clear	None		81.2			967				969			2.86		
	Black Awning	summer	83.3	-2.1	-23	542	425	39	44	953	16	2	2.38	0.48	17
	90°	12 month	94.0	-12.8	-138	540	427	39	44	1068	-99	-10	2.38	0.48	17
	Linen Awning	summer	82.9	-1.8	-19	595	372	34	38	954	15	2	2.45	0.42	15
	90°	12 month	92.1	-10.9	-118	592	375	34	39	1053	-84	-9	2.45	0.42	15
	Black Awning	summer	83.6	-2.4	-26	501	466	43	48	953	16	2	2.29	0.57	20
	165°	12 month	97.5	-16.3	-177	499	468	43	48	1102	-134	-14	2.29	0.57	20
	Linen Awning	summer	83.2	-2.0	-21	562	405	37	42	953	16	2	2.38	0.48	17
165°	12 month	94.6	-13.4	-146	560	407	37	42	1077	-108	-11	2.38	0.48	17	
Double HiSol LowE	None		75.2			917				900			2.70		
	Black Awning	summer	77.3	-2.0	-22	519	398	36	43	885	14	2	2.24	0.46	17
	90°	12 month	87.5	-12.3	-133	517	400	37	44	996	-97	-11	2.24	0.46	17
	Linen Awning	summer	76.9	-1.7	-18	568	349	32	38	886	14	2	2.31	0.39	15
	90°	12 month	85.7	-10.5	-114	566	351	32	38	981	-82	-9	2.31	0.39	15
	Black Awning	summer	77.6	-2.3	-25	479	438	40	48	885	15	2	2.16	0.54	20
	165°	12 month	90.9	-15.7	-170	478	439	40	48	1029	-130	-14	2.16	0.54	20
	Linen Awning	summer	77.1	-1.9	-20	538	379	35	41	886	14	2	2.24	0.46	17
165°	12 month	88.1	-12.9	-140	536	381	35	42	1005	-105	-12	2.24	0.46	17	

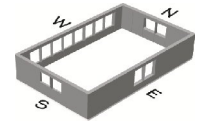


Table 164. Impact of awnings on a house in Chicago, Illinois with west-facing windows on a typical year

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		106.0			1364				1274			4.14		
	Black Awning	summer	108.5	-2.5	-27	673	691	63	51	1237	36	3	2.70	1.44	35
	90°	12 month	113.8	-7.8	-84	673	691	63	51	1295	-21	-2	2.70	1.44	35
	Linen Awning	summer	108.0	-2.0	-22	761	603	55	44	1241	33	3	2.90	1.24	30
	90°	12 month	112.7	-6.7	-72	761	603	55	44	1291	-17	-1	2.90	1.24	30
	Black Awning	summer	109.4	-3.4	-37	546	818	75	60	1236	38	3	2.58	1.56	38
	165°	12 month	116.2	-10.2	-111	546	818	75	60	1310	-36	-3	2.58	1.56	38
	Linen Awning	summer	108.7	-2.7	-29	658	706	64	52	1238	35	3	2.78	1.36	33
165°	12 month	114.4	-8.4	-91	658	706	64	52	1301	-27	-2	2.78	1.36	33	
Double Clear	None		89.4			1117				1071			3.55		
	Black Awning	summer	91.5	-2.1	-23	581	536	49	48	1045	26	2	2.39	1.16	33
	90°	12 month	95.9	-6.5	-71	581	536	49	48	1093	-22	-2	2.39	1.16	33
	Linen Awning	summer	91.1	-1.7	-19	650	467	43	42	1047	24	2	2.54	1.01	28
	90°	12 month	95.0	-5.6	-61	650	467	43	42	1089	-18	-2	2.54	1.01	28
	Black Awning	summer	92.2	-2.8	-30	484	633	58	57	1044	27	3	2.27	1.28	36
	165°	12 month	97.9	-8.5	-92	484	633	58	57	1106	-35	-3	2.27	1.28	36
	Linen Awning	summer	91.6	-2.2	-24	572	545	50	49	1046	25	2	2.46	1.09	31
165°	12 month	96.4	-7.0	-76	572	545	50	49	1098	-26	-2	2.46	1.09	31	
Double HiSol LowE	None		82.9			1088				999			3.42		
	Black Awning	summer	84.9	-2.0	-21	565	523	48	48	972	26	3	2.29	1.13	33
	90°	12 month	89.3	-6.3	-69	565	523	48	48	1020	-21	-2	2.29	1.13	33
	Linen Awning	summer	84.6	-1.6	-18	634	454	41	42	975	24	2	2.44	0.98	29
	90°	12 month	88.4	-5.4	-59	634	454	41	42	1016	-18	-2	2.44	0.98	29
	Black Awning	summer	85.6	-2.7	-29	470	618	56	57	971	28	3	2.18	1.25	36
	165°	12 month	91.2	-8.3	-90	470	618	56	57	1032	-33	-3	2.18	1.25	36
	Linen Awning	summer	85.0	-2.1	-23	556	532	49	49	973	26	3	2.36	1.06	31
165°	12 month	89.8	-6.8	-74	556	532	49	49	1024	-25	-3	2.36	1.06	31	

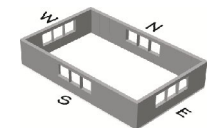


Table 165. Impact of awnings on a house in Chicago, Illinois with equally distributed windows on a hot year

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		101.3			2078				1289			4.67		
	Black Awning	summer	105.0	-3.7	-40	1271	807	74	39	1255	34	3	3.82	0.85	18
	90°	12 month	111.7	-10.3	-112	1251	827	76	40	1325	-37	-3	3.82	0.85	18
	Linen Awning	summer	104.4	-3.1	-34	1379	699	64	34	1258	30	2	3.94	0.73	16
	90°	12 month	110.2	-8.9	-96	1361	717	65	35	1319	-31	-2	3.94	0.73	16
	Black Awning	summer	106.2	-4.8	-52	1102	976	89	47	1252	37	3	3.63	1.04	22
	165°	12 month	114.9	-13.5	-147	1079	999	91	48	1344	-56	-4	3.63	1.04	22
	Linen Awning	summer	105.3	-3.9	-43	1249	829	76	40	1255	33	3	3.80	0.87	19
165°	12 month	112.5	-11.2	-121	1228	850	78	41	1332	-44	-3	3.80	0.87	19	
Double Clear	None		83.3			1765				1065			4.02		
	Black Awning	summer	86.4	-3.1	-34	1127	638	58	36	1040	25	2	3.33	0.69	17
	90°	12 month	92.0	-8.6	-94	1112	653	60	37	1099	-34	-3	3.33	0.69	17
	Linen Awning	summer	86.0	-2.6	-29	1214	551	50	31	1043	22	2	3.43	0.59	15
	90°	12 month	90.8	-7.4	-81	1201	564	51	32	1094	-29	-3	3.43	0.59	15
	Black Awning	summer	87.3	-4.0	-43	994	771	70	44	1038	27	3	3.18	0.84	21
	165°	12 month	94.5	-11.2	-121	977	788	72	45	1114	-50	-5	3.18	0.84	21
	Linen Awning	summer	86.6	-3.3	-36	1108	657	60	37	1041	24	2	3.32	0.70	18
165°	12 month	92.7	-9.3	-101	1094	671	61	38	1105	-40	-4	3.32	0.70	18	
Double HiSol LowE	None		76.0			1718				981			3.84		
	Black Awning	summer	79.0	-3.0	-32	1097	621	57	36	956	24	2	3.18	0.67	17
	90°	12 month	84.4	-8.4	-91	1084	634	58	37	1014	-33	-3	3.18	0.67	17
	Linen Awning	summer	78.5	-2.5	-27	1183	535	49	31	959	22	2	3.27	0.57	15
	90°	12 month	83.2	-7.2	-78	1171	547	50	32	1009	-28	-3	3.27	0.57	15
	Black Awning	summer	79.8	-3.8	-42	968	750	68	44	954	27	3	3.03	0.82	21
	165°	12 month	86.9	-10.9	-118	951	767	70	45	1029	-48	-5	3.03	0.82	21
	Linen Awning	summer	79.1	-3.2	-34	1080	638	58	37	957	24	2	3.16	0.68	18
165°	12 month	85.0	-9.0	-98	1066	652	60	38	1019	-39	-4	3.16	0.68	18	

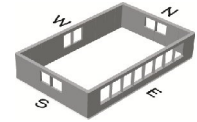


Table 166. Impact of awnings on a house in Chicago, Illinois with east-facing windows on a hot year

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		95.7			1914				1213			3.56		
	Black Awning 90°	summer	99.3	-3.6	-39	1134	780	71	41	1180	33	3	3.32	0.24	7
		12 month	104.1	-8.4	-91	1120	794	72	41	1231	-19	-2	3.32	0.24	7
	Linen Awning 90°	summer	98.7	-3.0	-32	1236	678	62	35	1183	30	2	3.35	0.21	6
		12 month	102.9	-7.2	-78	1224	690	63	36	1228	-15	-1	3.35	0.21	6
	Black Awning 165°	summer	100.9	-5.1	-56	953	961	88	50	1181	32	3	3.27	0.29	8
		12 month	107.3	-11.6	-126	935	979	89	51	1249	-37	-3	3.27	0.29	8
	Linen Awning 165°	summer	99.8	-4.1	-44	1096	818	75	43	1183	30	2	3.32	0.25	7
		12 month	105.2	-9.5	-103	1081	833	76	44	1240	-27	-2	3.32	0.25	7
Double Clear	None		81.5			1632				1033			3.17		
	Black Awning 90°	summer	84.5	-3.1	-33	1014	618	56	38	1009	23	2	2.97	0.20	6
		12 month	88.6	-7.1	-77	1003	629	57	39	1052	-19	-2	2.97	0.20	6
	Linen Awning 90°	summer	84.0	-2.6	-28	1097	535	49	33	1012	21	2	2.99	0.17	5
		12 month	87.6	-6.1	-66	1087	545	50	33	1049	-16	-2	2.99	0.17	5
	Black Awning 165°	summer	85.8	-4.3	-47	873	759	69	47	1010	23	2	2.93	0.24	8
		12 month	91.2	-9.7	-105	858	774	71	47	1067	-34	-3	2.93	0.24	8
	Linen Awning 165°	summer	85.0	-3.5	-38	985	647	59	40	1011	22	2	2.96	0.20	6
		12 month	89.4	-8.0	-86	973	659	60	40	1059	-26	-3	2.96	0.20	6
Double HiSol LowE	None		75.7			1588				966			3.04		
	Black Awning 90°	summer	78.6	-2.9	-32	990	598	55	38	943	23	2	2.85	0.20	6
		12 month	82.6	-6.9	-75	979	609	56	38	985	-19	-2	2.85	0.20	6
	Linen Awning 90°	summer	78.1	-2.5	-27	1068	520	47	33	945	21	2	2.87	0.17	6
		12 month	81.6	-5.9	-64	1059	529	48	33	981	-16	-2	2.87	0.17	6
	Black Awning 165°	summer	79.8	-4.1	-45	852	736	67	46	943	22	2	2.81	0.24	8
		12 month	85.0	-9.4	-102	838	750	68	47	999	-33	-3	2.81	0.24	8
	Linen Awning 165°	summer	79.0	-3.3	-36	962	626	57	39	944	21	2	2.84	0.20	7
		12 month	83.4	-7.7	-84	951	637	58	40	991	-26	-3	2.84	0.20	7

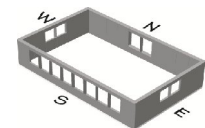


Table 167. Impact of awnings on a house in Chicago, Illinois with south-facing windows on a hot year

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		90.8			1673				1137			3.66		
	Black Awning 90°	summer	94.1	-3.3	-36	1062	611	56	37	1118	20	2	3.19	0.47	13
		12 month	103.9	-13.1	-142	1012	661	60	40	1219	-82	-7	3.19	0.47	13
	Linen Awning 90°	summer	93.6	-2.8	-30	1144	529	48	32	1119	18	2	3.25	0.41	11
		12 month	102.0	-11.1	-121	1097	576	53	34	1206	-68	-6	3.25	0.41	11
	Black Awning 165°	summer	94.6	-3.8	-41	992	681	62	41	1117	21	2	3.16	0.50	14
		12 month	107.5	-16.7	-181	942	731	67	44	1252	-114	-10	3.16	0.50	14
	Linen Awning 165°	summer	93.9	-3.1	-34	1091	582	53	35	1118	20	2	3.23	0.43	12
		12 month	104.5	-13.7	-148	1045	628	57	38	1228	-91	-8	3.23	0.43	12
Double Clear	None		77.3			1408				967			3.07		
	Black Awning 90°	summer	80.2	-2.8	-30	946	462	42	33	956	12	1	2.77	0.30	10
		12 month	88.3	-10.9	-119	912	496	45	35	1041	-73	-8	2.77	0.30	10
	Linen Awning 90°	summer	79.7	-2.4	-26	1006	402	37	29	956	11	1	2.80	0.27	9
		12 month	86.7	-9.4	-101	976	432	39	31	1029	-62	-6	2.80	0.27	9
	Black Awning 165°	summer	80.6	-3.2	-35	892	516	47	37	955	12	1	2.74	0.33	11
		12 month	91.1	-13.8	-149	857	551	50	39	1066	-99	-10	2.74	0.33	11
	Linen Awning 165°	summer	80.0	-2.7	-29	967	441	40	31	956	12	1	2.78	0.29	10
		12 month	88.7	-11.4	-123	936	472	43	34	1048	-80	-8	2.78	0.29	10
Double HiSol LowE	None		71.7			1370				903			2.92		
	Black Awning 90°	summer	74.5	-2.7	-29	922	448	41	33	892	11	1	2.65	0.27	9
		12 month	82.3	-10.5	-114	891	479	44	35	974	-71	-8	2.65	0.27	9
	Linen Awning 90°	summer	74.0	-2.3	-25	982	388	35	28	892	11	1	2.68	0.24	8
		12 month	80.8	-9.0	-98	953	417	38	30	963	-60	-7	2.68	0.24	8
	Black Awning 165°	summer	74.9	-3.1	-34	871	499	46	36	891	12	1	2.62	0.30	10
		12 month	85.0	-13.3	-144	839	531	48	39	999	-96	-11	2.62	0.30	10
	Linen Awning 165°	summer	74.3	-2.6	-28	943	427	39	31	892	11	1	2.66	0.26	9
		12 month	82.7	-11.0	-119	915	455	42	33	980	-77	-9	2.66	0.26	9

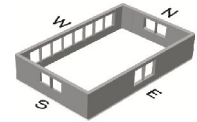


Table 168. Impact of awnings on a house in Chicago, Illinois with west-facing windows on a hot year

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		98.8			2046				1258			5.90		
	Black Awning	summer	101.9	-3.1	-34	1211	835	76	41	1215	43	3	3.90	2.00	34
	90°	12 month	106.5	-7.7	-84	1195	851	78	42	1264	-6	0	3.90	2.00	34
	Linen Awning	summer	101.4	-2.6	-28	1323	723	66	35	1220	38	3	4.18	1.72	29
	90°	12 month	105.4	-6.6	-72	1309	737	67	36	1262	-5	0	4.18	1.72	29
	Black Awning	summer	103.1	-4.3	-47	1003	1043	95	51	1209	49	4	3.41	2.49	42
	165°	12 month	109.2	-10.4	-113	984	1062	97	52	1274	-16	-1	3.41	2.49	42
	Linen Awning	summer	102.2	-3.5	-38	1163	883	81	43	1215	43	3	3.82	2.08	35
165°	12 month	107.4	-8.6	-93	1146	900	82	44	1269	-11	-1	3.82	2.08	35	
Double Clear	None		83.4			1737				1063			5.03		
	Black Awning	summer	86.0	-2.6	-29	1078	659	60	38	1031	32	3	3.40	1.63	32
	90°	12 month	89.8	-6.5	-70	1067	670	61	39	1072	-9	-1	3.40	1.63	32
	Linen Awning	summer	85.6	-2.2	-24	1166	571	52	33	1035	28	3	3.63	1.39	28
	90°	12 month	89.0	-5.6	-61	1157	580	53	33	1070	-8	-1	3.63	1.39	28
	Black Awning	summer	87.0	-3.6	-39	915	822	75	47	1026	36	3	3.02	2.01	40
	165°	12 month	92.0	-8.7	-94	902	835	76	48	1080	-18	-2	3.02	2.01	40
	Linen Awning	summer	86.3	-2.9	-32	1041	696	64	40	1031	32	3	3.35	1.68	33
165°	12 month	90.5	-7.2	-78	1029	708	65	41	1076	-13	-1	3.35	1.68	33	
Double HiSol LowE	None		77.2			1688				992			4.83		
	Black Awning	summer	79.8	-2.6	-28	1052	636	58	38	961	30	3	3.26	1.57	33
	90°	12 month	83.6	-6.4	-69	1043	645	59	38	1002	-10	-1	3.26	1.57	33
	Linen Awning	summer	79.4	-2.2	-24	1136	552	50	33	965	27	3	3.49	1.34	28
	90°	12 month	82.7	-5.5	-59	1128	560	51	33	1000	-8	-1	3.49	1.34	28
	Black Awning	summer	80.7	-3.5	-38	892	796	73	47	957	35	4	2.89	1.95	40
	165°	12 month	85.7	-8.5	-92	880	808	74	48	1010	-18	-2	2.89	1.95	40
	Linen Awning	summer	80.1	-2.8	-31	1016	672	61	40	961	31	3	3.21	1.62	34
165°	12 month	84.3	-7.0	-76	1005	683	62	40	1006	-14	-1	3.21	1.62	34	