

San Francisco, California

Roller Shades

Typical Year (TMY3) HDD65 2737 / CDD65 96, Hot Year (2010) HDD65 2673 / CDD65 240

Tables 499-502 show the impact of shade screens on a typical house in San Francisco with different window orientations over a typical year. Tables 503-506 repeat this analysis for a hot year in San Francisco. The impact varies depending on the type of window glazing and whether the shade screens are in place all twelve months or only during the cooling season. For a house with windows equally distributed in the four orientations, Table 499 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 499 shows that shade screens reduce cooling energy use by 12-18 percent as compared to the unshaded house. The higher savings are for the more dense shade screens over windows with clear glazings, while the lower savings are for less dense shade screens over windows with Low-E glazings. Because shade screens block useful solar gain in winter, heating energy use increases when the shade screens remain in place 12 months a year. Using the shade screens only during the cooling season produces the largest net energy savings. The net energy savings are -0-0 percent in San Francisco when shade screens are used only during the cooling season from April through June, and from August through October, while the penalties are from -47 to -31 percent when they are deployed throughout the year.

Table 499 also shows that shade screens reduce peak electricity demand by 0-0 percent in San Francisco, with larger reductions for the clear glazings and smaller reductions for the Low-E glazing. Tables 500, 501, and 502 show results for houses in San Francisco where the windows predominantly face to the east, south, and west, respectively. The cooling energy savings are largest on west-facing shade screens, and the peak demand reductions largest on south facing shade screens. Tables 503-506 show the impact of shade screens on a particularly hot year (2010) in San Francisco. The main effect is to increase the cooling savings by 121 percent due to the hotter or longer summer.

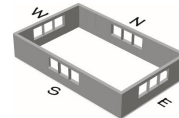


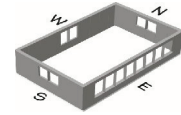
Table 499. Impact of shade screens on a house in San Francisco, California with equally distributed windows on a typical year

Window Type	Shade Screen	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		30.8			142				370			2.17		
	Black/Brown 25% Openness Factor	summer	31.0	-0.2	-2	120	22	3	15	370	0	0	2.17	0.00	0
		12 month	41.8	-11.0	-126	51	91	12	64	484	-114	-31	1.55	0.62	29
	Black/Brown 10% Openness Factor	summer	31.0	-0.3	-3	118	24	3	17	370	0	0	2.17	0.00	0
		12 month	44.4	-13.6	-156	40	102	13	72	513	-143	-39	1.46	0.71	33
	Black/Brown 10% Openness Factor, full basketweave	summer	31.0	-0.3	-3	118	24	3	17	370	0	0	2.17	0.00	0
		12 month	44.7	-13.9	-159	40	102	13	72	516	-146	-39	1.46	0.71	33
	Black 5% Openness Factor, full basketweave	summer	31.0	-0.3	-3	118	24	3	17	370	0	0	2.17	0.00	0
		12 month	45.2	-14.4	-165	38	104	14	73	522	-151	-41	1.45	0.72	33
White 5% Openness Factor, full basketweave	summer	31.1	-0.3	-3	117	25	3	18	370	0	0	2.17	0.00	0	
	12 month	46.1	-15.4	-176	33	109	14	77	532	-162	-44	1.38	0.80	37	
Double Clear	None		23.5			108				283			1.86		
	Black/Brown 25% Openness Factor	summer	23.7	-0.1	-1	95	13	2	12	283	0	0	1.86	0.00	0
		12 month	32.1	-8.6	-98	39	69	9	64	372	-89	-31	1.35	0.51	27
	Black/Brown 10% Openness Factor	summer	23.7	-0.2	-2	91	17	2	16	283	0	0	1.86	0.00	0
		12 month	34.2	-10.7	-122	31	77	10	71	395	-112	-40	1.27	0.58	31
	Black/Brown 10% Openness Factor, full basketweave	summer	23.7	-0.2	-2	91	17	2	16	283	0	0	1.86	0.00	0
		12 month	34.6	-11.1	-127	29	79	10	73	400	-117	-41	1.26	0.60	32
	Black 5% Openness Factor, full basketweave	summer	23.7	-0.2	-2	91	17	2	16	283	0	0	1.86	0.00	0
		12 month	34.9	-11.4	-130	29	79	10	73	403	-120	-42	1.26	0.60	32
White 5% Openness Factor, full basketweave	summer	23.7	-0.2	-2	90	18	2	17	283	0	0	1.86	0.00	0	
	12 month	35.4	-11.9	-136	26	82	11	76	408	-125	-44	1.20	0.66	36	
Double HiSol LowE	None		20.0			108				242			1.82		
	Black/Brown 25% Openness Factor	summer	20.1	-0.1	-1	92	16	2	15	241	1	0	1.81	0.00	0
		12 month	27.8	-7.8	-90	42	66	9	61	323	-81	-33	1.34	0.48	26
	Black/Brown 10% Openness Factor	summer	20.1	-0.1	-1	90	18	2	17	241	1	0	1.81	0.00	0
		12 month	29.4	-9.5	-108	33	75	10	69	341	-99	-41	1.26	0.55	30
	Black/Brown 10% Openness Factor, full basketweave	summer	20.1	-0.1	-1	91	17	2	16	242	1	0	1.81	0.00	0
		12 month	29.8	-9.8	-113	31	77	10	71	345	-103	-42	1.25	0.56	31
	Black 5% Openness Factor, full basketweave	summer	20.1	-0.1	-1	91	17	2	16	242	1	0	1.81	0.00	0
		12 month	30.1	-10.1	-115	30	78	10	72	348	-105	-43	1.25	0.57	31
White 5% Openness Factor, full basketweave	summer	20.1	-0.1	-2	90	18	2	17	242	1	0	1.81	0.00	0	
	12 month	30.8	-10.8	-124	26	82	11	76	355	-113	-47	1.18	0.63	35	

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

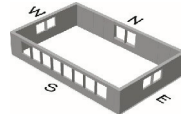
The costs shown here are annual costs for heating and cooling only and thus will be less than the total utility bill. Heating is assumed to be provided by a gas furnace and cooling by a central air-conditioner. Electricity costs used in the analysis are 13.0 cents per kWh and natural gas costs are \$11.79 per MBTU, which are the average costs in 2009 for the state of California according to the Energy Information Administration (see Appendix E for details).

Table 500. Impact of shade screens on a house in San Francisco, California with east-facing windows on a typical year



Window Type	Shade Screen	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		30.7			161				372			2.15		
	Black/Brown 25% Openness Factor	summer	30.9	-0.2	-2	136	25	3	16	371	1	0	2.11	0.04	2
		12 month	38.3	-7.6	-87	78	83	11	52	448	-76	-20	1.88	0.27	13
	Black/Brown 10% Openness Factor	summer	30.9	-0.2	-3	133	28	4	17	371	1	0	2.11	0.04	2
		12 month	40.3	-9.6	-110	64	97	13	60	469	-97	-26	1.72	0.43	20
	Black/Brown 10% Openness Factor, full basketweave	summer	30.9	-0.3	-3	132	29	4	18	371	1	0	2.11	0.04	2
		12 month	40.6	-9.9	-113	62	99	13	61	472	-100	-27	1.70	0.45	21
	Black 5% Openness Factor, full basketweave	summer	30.9	-0.3	-3	131	30	4	19	371	1	0	2.11	0.04	2
		12 month	41.0	-10.3	-118	60	101	13	63	477	-105	-28	1.68	0.48	22
	White 5% Openness Factor, full basketweave	summer	31.0	-0.3	-3	130	31	4	19	371	1	0	2.11	0.04	2
	12 month	41.6	-11.0	-125	56	105	14	65	483	-112	-30	1.64	0.51	24	
Double Clear	None		23.6			131				286			1.92		
	Black/Brown 25% Openness Factor	summer	23.7	-0.1	-1	113	18	2	14	285	1	0	1.86	0.06	3
		12 month	29.5	-6.0	-68	67	64	8	49	346	-60	-21	1.60	0.32	17
	Black/Brown 10% Openness Factor	summer	23.7	-0.2	-2	109	22	3	17	285	1	0	1.86	0.06	3
		12 month	31.1	-7.6	-86	54	77	10	59	363	-76	-27	1.48	0.44	23
	Black/Brown 10% Openness Factor, full basketweave	summer	23.7	-0.2	-2	109	22	3	17	286	1	0	1.86	0.06	3
		12 month	31.5	-8.0	-91	51	80	10	61	367	-81	-28	1.45	0.47	24
	Black 5% Openness Factor, full basketweave	summer	23.7	-0.2	-2	109	22	3	17	286	1	0	1.86	0.06	3
		12 month	31.7	-8.2	-94	50	81	11	62	369	-83	-29	1.43	0.49	25
	White 5% Openness Factor, full basketweave	summer	23.8	-0.2	-2	108	23	3	18	286	1	0	1.86	0.06	3
	12 month	32.0	-8.4	-96	46	85	11	65	372	-85	-30	1.42	0.50	26	
Double HiSol LowE	None		19.8			133				244			1.86		
	Black/Brown 25% Openness Factor	summer	19.9	-0.1	-1	114	19	2	14	243	1	0	1.82	0.05	2
		12 month	25.2	-5.4	-62	68	65	8	49	297	-53	-22	1.55	0.31	17
	Black/Brown 10% Openness Factor	summer	20.0	-0.1	-2	110	23	3	17	243	1	1	1.82	0.05	2
		12 month	26.5	-6.7	-76	57	76	10	57	310	-66	-27	1.46	0.40	22
	Black/Brown 10% Openness Factor, full basketweave	summer	20.0	-0.1	-2	110	23	3	17	243	1	1	1.82	0.05	2
		12 month	26.8	-7.0	-80	54	79	10	59	313	-69	-28	1.44	0.43	23
	Black 5% Openness Factor, full basketweave	summer	20.0	-0.2	-2	109	24	3	18	243	1	1	1.82	0.05	2
		12 month	27.0	-7.2	-82	53	80	10	60	316	-71	-29	1.42	0.44	24
	White 5% Openness Factor, full basketweave	summer	20.0	-0.2	-2	109	24	3	18	243	1	1	1.82	0.05	2
	12 month	27.4	-7.6	-87	49	84	11	63	320	-76	-31	1.39	0.48	26	

Table 501. Impact of shade screens on a house in San Francisco, California with south-facing windows on a typical year



Window Type	Shade Screen	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		27.2			192				336			2.43		
	Black/Brown 25% Openness Factor	summer	27.4	-0.2	-2	167	25	3	13	335	1	0	2.43	0.00	0
		12 month	40.7	-13.5	-154	46	146	19	76	471	-135	-40	1.33	1.11	46
	Black/Brown 10% Openness Factor	summer	27.4	-0.2	-3	163	29	4	15	335	1	0	2.43	0.00	0
		12 month	44.3	-17.1	-195	35	157	20	82	511	-175	-52	1.26	1.17	48
	Black/Brown 10% Openness Factor, full basketweave	summer	27.4	-0.2	-3	163	29	4	15	335	1	0	2.43	0.00	0
		12 month	44.6	-17.4	-199	36	156	20	81	515	-179	-53	1.28	1.15	47
	Black 5% Openness Factor, full basketweave	summer	27.4	-0.2	-3	163	29	4	15	335	1	0	2.43	0.00	0
		12 month	45.4	-18.2	-208	34	158	21	82	523	-187	-56	1.29	1.14	47
	White 5% Openness Factor, full basketweave	summer	27.4	-0.3	-3	161	31	4	16	335	1	0	2.43	0.00	0
	12 month	46.7	-19.5	-223	27	165	21	86	538	-202	-60	1.19	1.24	51	
Double Clear	None		20.3			142				251			2.08		
	Black/Brown 25% Openness Factor	summer	20.4	-0.1	-1	122	20	3	14	250	1	0	2.08	0.00	0
		12 month	31.2	-10.9	-125	38	104	14	73	362	-111	-44	1.19	0.90	43
	Black/Brown 10% Openness Factor	summer	20.4	-0.1	-1	120	22	3	15	249	1	1	2.08	0.00	0
		12 month	34.1	-13.8	-158	30	112	15	79	394	-143	-57	1.16	0.93	44
	Black/Brown 10% Openness Factor, full basketweave	summer	20.5	-0.1	-2	120	22	3	15	250	1	1	2.08	0.00	0
		12 month	34.7	-14.4	-165	29	113	15	80	401	-150	-60	1.16	0.93	44
	Black 5% Openness Factor, full basketweave	summer	20.4	-0.1	-1	120	22	3	15	249	1	1	2.08	0.00	0
		12 month	35.1	-14.8	-169	29	113	15	80	405	-154	-62	1.16	0.92	44
	White 5% Openness Factor, full basketweave	summer	20.5	-0.2	-2	119	23	3	16	250	1	0	2.08	0.00	0
	12 month	35.8	-15.4	-177	23	119	15	84	412	-161	-64	1.06	1.03	49	
Double HiSol LowE	None		16.8			137				210			1.97		
	Black/Brown 25% Openness Factor	summer	16.9	-0.1	-1	123	14	2	10	209	1	0	1.97	0.00	0
		12 month	26.8	-9.9	-113	42	95	12	69	311	-101	-48	1.17	0.79	40
	Black/Brown 10% Openness Factor	summer	16.9	-0.1	-1	121	16	2	12	209	1	0	1.97	0.00	0
		12 month	29.1	-12.2	-140	32	105	14	77	337	-126	-60	1.16	0.80	41
	Black/Brown 10% Openness Factor, full basketweave	summer	16.9	-0.1	-1	121	16	2	12	209	1	0	1.97	0.00	0
		12 month	29.6	-12.8	-146	31	106	14	77	342	-132	-63	1.17	0.80	41
	Black 5% Openness Factor, full basketweave	summer	16.9	-0.1	-1	120	17	2	12	209	1	1	1.97	0.00	0
		12 month	30.0	-13.1	-150	31	106	14	77	347	-136	-65	1.15	0.82	42
	White 5% Openness Factor, full basketweave	summer	17.0	-0.1	-1	119	18	2	13	210	1	0	2.02	-0.05	-3
	12 month	30.9	-14.1	-161	25	112	15	82	357	-147	-70	1.07	0.90	46	

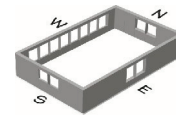


Table 502. Impact of shade screens on a house in San Francisco, California with west-facing windows on a typical year

Window Type	Shade Screen	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		32.9			180				399			3.01		
	Black/Brown 25% Openness Factor	summer	33.0	-0.1	-1	161	19	2	11	398	1	0	3.01	0.00	0
		12 month	40.0	-7.1	-81	77	103	13	57	467	-68	-17	1.81	1.20	40
	Black/Brown 10% Openness Factor	summer	33.0	-0.1	-2	158	22	3	12	398	1	0	3.01	0.00	0
		12 month	42.0	-9.1	-104	62	118	15	66	488	-88	-22	1.63	1.38	46
	Black/Brown 10% Openness Factor, full basketweave	summer	33.0	-0.1	-2	158	22	3	12	398	1	0	3.01	0.00	0
		12 month	42.2	-9.3	-106	61	119	15	66	490	-91	-23	1.63	1.39	46
	Black 5% Openness Factor, full basketweave	summer	33.0	-0.1	-2	157	23	3	13	398	1	0	3.01	0.00	0
	12 month	42.6	-9.7	-111	59	121	16	67	495	-95	-24	1.62	1.40	46	
White 5% Openness Factor, full basketweave	summer	33.0	-0.1	-2	156	24	3	13	398	1	0	3.01	0.00	0	
	12 month	43.3	-10.5	-120	54	126	16	70	503	-103	-26	1.54	1.47	49	
Double Clear	None		24.9			142				304			2.55		
	Black/Brown 25% Openness Factor	summer	25.0	-0.1	-1	126	16	2	11	302	2	0	2.55	0.00	0
		12 month	30.4	-5.5	-63	66	76	10	54	357	-53	-17	1.55	1.00	39
	Black/Brown 10% Openness Factor	summer	25.0	-0.1	-1	124	18	2	13	302	1	0	2.55	0.00	0
		12 month	31.9	-7.0	-80	53	89	12	63	372	-68	-23	1.43	1.12	44
	Black/Brown 10% Openness Factor, full basketweave	summer	25.0	-0.1	-1	124	18	2	13	302	2	1	2.55	0.00	0
		12 month	32.3	-7.4	-84	51	91	12	64	376	-72	-24	1.42	1.13	44
	Black 5% Openness Factor, full basketweave	summer	25.0	-0.1	-1	124	18	2	13	302	1	0	2.55	0.00	0
	12 month	32.5	-7.5	-86	49	93	12	65	378	-74	-24	1.42	1.13	44	
White 5% Openness Factor, full basketweave	summer	25.0	-0.1	-1	123	19	2	13	302	2	1	2.55	0.00	0	
	12 month	32.9	-7.9	-91	44	98	13	69	382	-78	-26	1.36	1.19	47	
Double HiSol LowE	None		21.1	0.0	0	141	12	2	9	260	1	0	2.49	0.00	0
	Black/Brown 25% Openness Factor	summer	21.1	0.0	0	129	12	2	9	259	1	0	2.49	0.00	0
		12 month	25.9	-4.8	-55	67	74	10	52	305	-45	-18	1.52	0.98	39
	Black/Brown 10% Openness Factor	summer	21.2	0.0	0	126	15	2	11	258	1	1	2.49	0.00	0
		12 month	27.1	-6.0	-69	56	85	11	60	318	-58	-22	1.39	1.11	44
	Black/Brown 10% Openness Factor, full basketweave	summer	21.2	-0.1	-1	126	15	2	11	258	1	1	2.49	0.00	0
		12 month	27.4	-6.3	-72	54	87	11	62	320	-60	-23	1.41	1.09	44
	Black 5% Openness Factor, full basketweave	summer	21.2	-0.1	-1	126	15	2	11	258	1	1	2.49	0.00	0
	12 month	27.6	-6.5	-74	53	88	11	62	322	-62	-24	1.41	1.09	44	
White 5% Openness Factor, full basketweave	summer	21.2	0.0	0	124	17	2	12	258	2	1	2.49	0.00	0	
	12 month	28.1	-7.0	-80	48	93	12	66	328	-68	-26	1.34	1.16	46	

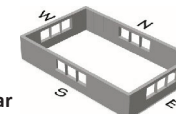


Table 503. Impact of shade screens on a house in San Francisco, California with equally distributed windows on a hot year

Window Type	Shade Screen	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		29.8			358				387			3.60		
	Black/Brown 25% Openness Factor	summer	29.9	-0.1	-1	271	87	11	24	377	10	3	3.01	0.59	16
		12 month	39.2	-9.4	-108	191	167	22	47	473	-86	-22	2.92	0.68	19
	Black/Brown 10% Openness Factor	summer	29.9	-0.1	-2	256	102	13	28	375	12	3	2.91	0.69	19
		12 month	41.4	-11.6	-133	167	191	25	53	495	-108	-28	2.79	0.81	23
	Black/Brown 10% Openness Factor, full basketweave	summer	29.9	-0.2	-2	254	104	14	29	375	12	3	2.91	0.69	19
		12 month	41.6	-11.9	-136	165	193	25	54	498	-111	-29	2.78	0.82	23
	Black 5% Openness Factor, full basketweave	summer	29.9	-0.2	-2	251	107	14	30	375	12	3	2.89	0.71	20
	12 month	42.0	-12.3	-141	160	198	26	55	502	-115	-30	2.76	0.85	23	
White 5% Openness Factor, full basketweave	summer	29.9	-0.2	-2	247	111	14	31	375	12	3	2.85	0.76	21	
	12 month	42.9	-13.2	-151	151	207	27	58	511	-124	-32	2.70	0.90	25	
Double Clear	None		23.0			300				302			3.12		
	Black/Brown 25% Openness Factor	summer	23.1	-0.1	-1	230	70	9	23	294	8	3	2.65	0.47	15
		12 month	30.3	-7.3	-83	166	134	17	45	368	-66	-22	2.58	0.54	17
	Black/Brown 10% Openness Factor	summer	23.1	-0.1	-1	217	83	11	28	293	10	3	2.58	0.55	17
		12 month	32.0	-9.0	-103	149	151	20	50	386	-83	-28	2.47	0.66	21
	Black/Brown 10% Openness Factor, full basketweave	summer	23.1	-0.1	-1	214	86	11	29	292	10	3	2.56	0.56	18
		12 month	32.4	-9.4	-107	144	156	20	52	389	-87	-29	2.44	0.68	22
	Black 5% Openness Factor, full basketweave	summer	23.1	-0.1	-1	213	87	11	29	292	10	3	2.55	0.57	18
	12 month	32.6	-9.6	-110	142	158	21	53	392	-89	-29	2.43	0.69	22	
White 5% Openness Factor, full basketweave	summer	23.1	-0.1	-1	211	89	12	30	292	10	3	2.52	0.60	19	
	12 month	33.1	-10.1	-115	138	162	21	54	396	-94	-31	2.40	0.73	23	
Double HiSol LowE	None		19.7			296				264			3.02		
	Black/Brown 25% Openness Factor	summer	19.8	0.0	0	229	67	9	23	256	8	3	2.56	0.46	15
		12 month	26.3	-6.6	-75	171	125	16	42	323	-59	-22	2.50	0.52	17
	Black/Brown 10% Openness Factor	summer	19.8	-0.1	-1	218	78	10	26	255	10	4	2.50	0.53	17
		12 month	27.7	-7.9	-91	149	147	19	50	336	-72	-27	2.40	0.62	20
	Black/Brown 10% Openness Factor, full basketweave	summer	19.8	-0.1	-1	215	81	11	27	254	10	4	2.49	0.54	18
		12 month	28.0	-8.3	-94	148	148	19	50	339	-75	-28	2.39	0.64	21
	Black 5% Openness Factor, full basketweave	summer	19.8	-0.1	-1	213	83	11	28	254	10	4	2.47	0.55	18
	12 month	28.2	-8.4	-97	145	151	20	51	341	-77	-29	2.37	0.65	22	
White 5% Openness Factor, full basketweave	summer	19.8	-0.1	-1	210	86	11	29	254	11	4	2.43	0.59	19	
	12 month	28.8	-9.1	-104	138	158	21	53	348	-84	-32	2.32	0.70	23	

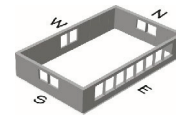


Table 504. Impact of shade screens on a house in San Francisco, California with east-facing windows on a hot year

Window Type	Shade Screen	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		28.8			421				384			3.36		
	Black/Brown 25% Openness Factor	summer	28.9	-0.1	-1	331	90	12	21	373	11	3	3.18	0.18	5
		12 month	35.7	-6.9	-79	244	177	23	42	440	-56	-15	3.11	0.25	7
	Black/Brown 10% Openness Factor	summer	28.9	-0.1	-1	315	106	14	25	371	12	3	3.14	0.22	7
		12 month	37.7	-8.9	-102	215	206	27	49	459	-75	-20	3.05	0.31	9
	Black/Brown 10% Openness Factor, full basketweave	summer	28.9	-0.1	-1	312	109	14	26	371	13	3	3.14	0.23	7
		12 month	38.0	-9.2	-106	209	212	28	50	462	-78	-20	3.03	0.33	10
	Black 5% Openness Factor, full basketweave	summer	28.9	-0.1	-2	308	113	15	27	371	13	3	3.13	0.23	7
12 month		38.4	-9.6	-110	203	218	28	52	465	-82	-21	3.02	0.34	10	
White 5% Openness Factor, full basketweave	summer	28.9	-0.2	-2	304	117	15	28	370	14	4	3.12	0.24	7	
	12 month	39.0	-10.2	-117	197	224	29	53	471	-88	-23	2.99	0.37	11	
Double Clear	None		22.3			346				300			3.00		
	Black/Brown 25% Openness Factor	summer	22.4	-0.1	-1	278	68	9	20	292	8	3	2.85	0.15	5
		12 month	27.7	-5.4	-62	220	126	16	36	346	-46	-15	2.80	0.20	7
	Black/Brown 10% Openness Factor	summer	22.4	-0.1	-1	262	84	11	24	290	10	3	2.81	0.19	6
		12 month	29.3	-7.0	-80	190	156	20	45	360	-60	-20	2.73	0.27	9
	Black/Brown 10% Openness Factor, full basketweave	summer	22.4	-0.1	-1	258	88	11	25	289	11	4	2.79	0.21	7
		12 month	29.7	-7.4	-85	183	163	21	47	364	-64	-21	2.70	0.30	10
	Black 5% Openness Factor, full basketweave	summer	22.4	-0.1	-1	255	91	12	26	289	11	4	2.79	0.21	7
12 month		29.9	-7.6	-87	179	167	22	48	365	-65	-22	2.69	0.31	10	
White 5% Openness Factor, full basketweave	summer	22.4	-0.1	-1	255	91	12	26	289	11	4	2.78	0.22	7	
	12 month	30.1	-7.8	-90	177	169	22	49	368	-68	-23	2.69	0.32	10	
Double HiSol LowE	None		19.0	0.0	0	340				261			2.90		
	Black/Brown 25% Openness Factor	summer	19.0	0.0	0	274	66	9	19	253	8	3	2.75	0.15	5
		12 month	23.9	-4.9	-56	216	124	16	36	301	-40	-15	2.70	0.20	7
	Black/Brown 10% Openness Factor	summer	19.0	0.0	0	262	78	10	23	252	10	4	2.72	0.19	6
		12 month	25.1	-6.1	-70	192	148	19	44	312	-51	-19	2.65	0.26	9
	Black/Brown 10% Openness Factor, full basketweave	summer	19.0	0.0	0	258	82	11	24	251	10	4	2.70	0.20	7
		12 month	25.4	-6.4	-74	189	151	20	44	315	-54	-21	2.63	0.28	10
	Black 5% Openness Factor, full basketweave	summer	19.0	0.0	0	256	84	11	25	251	10	4	2.70	0.21	7
12 month		25.6	-6.6	-76	184	156	20	46	317	-56	-21	2.62	0.29	10	
White 5% Openness Factor, full basketweave	summer	19.0	-0.1	-1	252	88	11	26	250	11	4	2.69	0.22	7	
	12 month	26.0	-7.0	-81	178	162	21	48	321	-59	-23	2.60	0.30	10	

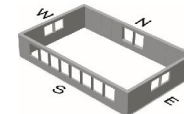


Table 505. Impact of shade screens on a house in San Francisco, California with south-facing windows on a hot year

Window Type	Shade Screen	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		28.5			475				388			4.31		
	Black/Brown 25% Openness Factor	summer	28.6	-0.1	-1	350	125	16	26	372	15	4	3.30	1.01	23
		12 month	40.3	-11.8	-135	207	268	35	56	487	-100	-26	2.79	1.51	35
	Black/Brown 10% Openness Factor	summer	28.6	-0.1	-1	331	144	19	30	370	17	4	3.30	1.01	23
		12 month	42.8	-14.3	-164	176	299	39	63	512	-125	-32	2.70	1.60	37
	Black/Brown 10% Openness Factor, full basketweave	summer	28.6	-0.1	-1	331	144	19	30	370	17	4	3.30	1.01	23
		12 month	42.9	-14.4	-165	174	301	39	63	514	-126	-33	2.71	1.59	37
	Black 5% Openness Factor, full basketweave	summer	28.6	-0.1	-1	326	149	19	31	370	18	5	3.30	1.01	23
12 month		43.4	-14.9	-171	168	307	40	65	518	-131	-34	2.70	1.61	37	
White 5% Openness Factor, full basketweave	summer	28.6	-0.2	-2	320	155	20	33	369	18	5	3.30	1.01	23	
	12 month	44.6	-16.2	-185	156	319	42	67	531	-143	-37	2.62	1.69	39	
Double Clear	None		21.8			381				299			3.67		
	Black/Brown 25% Openness Factor	summer	21.8	-0.1	-1	279	102	13	27	286	12	4	2.77	0.90	25
		12 month	30.9	-9.1	-104	184	197	26	52	377	-79	-26	2.51	1.16	32
	Black/Brown 10% Openness Factor	summer	21.9	-0.1	-1	265	116	15	30	284	14	5	2.77	0.90	25
		12 month	32.9	-11.1	-127	159	222	29	58	397	-98	-33	2.44	1.23	33
	Black/Brown 10% Openness Factor, full basketweave	summer	21.9	-0.1	-1	262	119	15	31	284	14	5	2.77	0.90	25
		12 month	33.3	-11.5	-132	155	226	29	59	401	-102	-34	2.44	1.23	34
	Black 5% Openness Factor, full basketweave	summer	21.9	-0.1	-1	259	122	16	32	284	15	5	2.77	0.90	25
12 month		33.5	-11.8	-134	152	229	30	60	403	-105	-35	2.43	1.24	34	
White 5% Openness Factor, full basketweave	summer	21.9	-0.1	-1	255	126	16	33	283	15	5	2.77	0.90	25	
	12 month	34.2	-12.5	-143	143	238	31	62	410	-112	-37	2.36	1.31	36	
Double HiSol LowE	None		18.3			374				258			3.54		
	Black/Brown 25% Openness Factor	summer	18.3	0.0	0	278	96	12	26	246	12	5	2.71	0.83	23
		12 month	26.6	-8.3	-95	182	192	25	51	328	-70	-27	2.45	1.09	31
	Black/Brown 10% Openness Factor	summer	18.3	0.0	-1	266	108	14	29	244	13	5	2.71	0.83	23
		12 month	28.2	-9.9	-113	164	210	27	56	344	-86	-33	2.39	1.15	32
	Black/Brown 10% Openness Factor, full basketweave	summer	18.3	-0.1	-1	263	111	14	30	244	14	5	2.70	0.83	24
		12 month	28.5	-10.2	-117	160	214	28	57	347	-89	-35	2.38	1.16	33
	Black 5% Openness Factor, full basketweave	summer	18.3	-0.1	-1	261	113	15	30	244	14	5	2.70	0.83	24
12 month		28.7	-10.5	-120	157	217	28	58	349	-91	-35	2.37	1.16	33	
White 5% Openness Factor, full basketweave	summer	18.3	-0.1	-1	255	119	15	32	243	15	6	2.70	0.83	24	
	12 month	29.7	-11.4	-130	146	228	30	61	358	-100	-39	2.30	1.23	35	

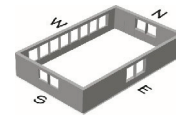


Table 506. Impact of shade screens on a house in San Francisco, California with west-facing windows on a hot year

Window Type	Shade Screen	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		31.7			411				416			5.17		
	Black/Brown 25% Openness Factor	summer	31.8	-0.1	-1	335	76	10	18	407	9	2	4.09	1.07	21
		12 month	38.4	-6.6	-76	240	171	22	42	470	-54	-13	3.41	1.76	34
	Black/Brown 10% Openness Factor	summer	31.8	-0.1	-1	324	87	11	21	406	10	2	4.09	1.07	21
		12 month	40.2	-8.4	-96	213	198	26	48	487	-71	-17	3.09	2.08	40
	Black/Brown 10% Openness Factor, full basketweave	summer	31.9	-0.1	-1	316	95	12	23	405	11	3	4.09	1.07	21
		12 month	40.4	-8.7	-99	209	202	26	49	489	-73	-17	3.08	2.09	40
	Black 5% Openness Factor, full basketweave	summer	31.8	-0.1	-1	314	97	13	24	405	11	3	4.09	1.07	21
		12 month	40.7	-9.0	-102	205	206	27	50	492	-76	-18	3.04	2.13	41
	White 5% Openness Factor, full basketweave	summer	31.9	-0.1	-1	310	101	13	25	405	12	3	4.09	1.07	21
	12 month	41.4	-9.7	-111	195	216	28	53	499	-83	-20	2.96	2.20	43	
Double Clear	None		24.3			343				323			4.38		
	Black/Brown 25% Openness Factor	summer	24.4	-0.1	-1	280	63	8	18	315	8	2	3.43	0.95	22
		12 month	29.4	-5.1	-58	214	129	17	38	364	-41	-13	2.94	1.44	33
	Black/Brown 10% Openness Factor	summer	24.4	-0.1	-1	268	75	10	22	314	9	3	3.43	0.95	22
		12 month	30.8	-6.5	-74	191	152	20	44	377	-54	-17	2.72	1.67	38
	Black/Brown 10% Openness Factor, full basketweave	summer	24.4	-0.1	-1	266	77	10	22	314	9	3	3.43	0.95	22
		12 month	31.1	-6.8	-78	185	158	21	46	380	-57	-18	2.69	1.70	39
	Black 5% Openness Factor, full basketweave	summer	24.4	-0.1	-1	264	79	10	23	313	9	3	3.43	0.95	22
		12 month	31.3	-6.9	-79	183	160	21	47	381	-59	-18	2.67	1.72	39
	White 5% Openness Factor, full basketweave	summer	24.4	-0.1	-1	263	80	10	23	313	9	3	3.43	0.95	22
	12 month	31.6	-7.3	-84	176	167	22	49	385	-62	-19	2.63	1.76	40	
Double HiSol LowE	None		20.7			341				281			4.27		
	Black/Brown 25% Openness Factor	summer	20.7	0.0	0	277	64	8	19	273	8	3	3.33	0.95	22
		12 month	25.2	-4.5	-52	214	127	17	37	316	-35	-13	2.83	1.44	34
	Black/Brown 10% Openness Factor	summer	20.7	0.0	0	267	74	10	22	272	9	3	3.33	0.95	22
		12 month	26.3	-5.6	-64	194	147	19	43	326	-45	-16	2.64	1.63	38
	Black/Brown 10% Openness Factor, full basketweave	summer	20.7	0.0	0	265	76	10	22	271	9	3	3.33	0.95	22
		12 month	26.5	-5.8	-67	190	151	20	44	328	-47	-17	2.61	1.66	39
	Black 5% Openness Factor, full basketweave	summer	20.7	0.0	0	264	77	10	23	271	10	3	3.33	0.95	22
		12 month	26.7	-6.0	-69	187	154	20	45	329	-49	-17	2.59	1.68	39
	White 5% Openness Factor, full basketweave	summer	20.7	0.0	0	261	80	10	23	271	10	4	3.33	0.95	22
	12 month	27.2	-6.5	-75	181	160	21	47	335	-54	-19	2.53	1.74	41	