

# **"User Friendly" Building life-Cycle Costing**

**a spreadsheet  
implementation of  
BICC**

## **Enhancements to "User-Friendly LCC" spreadsheet 2015**

### **2015:**

- **FY 2015 rates** - discount rates and DOE fuel price projections updated to FY 2015 rates.
- 'General Data' sheet is updated to allow input for two separate discount rates: 1) one discount rate for operations-related costs, e.g., energy, annually recurring O&M costs, and non-annual maintenance costs; 2) a separate discount rate for capital costs, e.g., equipment purchases and replacements. Note that the FEMP LCC procedures allow for only one discount rate. If a FEMP analysis is desired, set both discount rates to the same value, e.g., 3.0%.
- A custom macro function originally added in 2010 has been removed (see below), thus allowing the file to be saved in XLSX format. If desired, users must now accomplish the same function by manually hiding any unused rows in both the COSTS and SAVINGS portion of the results table see the ('Results Summary' worksheet). This will also automatically hide the corresponding line(s) from the graph and the 'Graph' worksheet.

### **2011 – 2014:**

- **Current rates** - discount rates & DOE fuel price projections updated to current yr rates.

### **2010:**

- **FY 2010 rates** - discount rates and DOE fuel price projections updated to FY 2010 rates.
- Graph data format changed and a custom function added to allow users to hide unused rows on the 'Results Summary' sheet. This also automatically hides unused lines on the graph ('Graph' sheet). Depending on your security settings, upon opening the custom function may cause users to be prompted to 'Enable Macros'

### **2005 – 2009:**

- **Current rates** - discount rates & DOE fuel price projections updated to current yr rates.

### **2004:**

- Added 5 year construction period prior to occupancy (see General Data tab).
- Added occupancy/use factor multiplier by year (see General Data tab).
- **FY 2004 rates** - discount rates and DOE fuel price projections updated to FY 2004 rates.

### **2001 – 2003:**

- **Current rates** - discount rates & DOE fuel price projections updated to current yr rates.

### **2000:**

- **LCC vs Simple Payback & Undiscounted LCC** - the least LCC case and least Simple Payback case are now automatically identified. Also, undiscounted LCC results are reported as an estimate of net operating budget, in today's dollars, required or saved by each alternative.



Enhancements, 1 April 2004:

USER-FRIENDLY BUILDING LIFE-CYCLE COST ANALYSIS

updated: 1 April 2004

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User input fields are indicated in blue.

IMPORTANT NOTE: This spreadsheet should be updated (replaced) every April, after DOE releases updated energy price escalation factors. Visit <http://www.doe2.com> to download the current copy.

Basic Data, this analysis

DOE/FEMP Fiscal Year	2004
Year Analysis Performed	2004
Year Project comes "On-Line"	2004
Real Discount Rate for this Analysis	3.0%
Number of Analysis Years	25
Number of Project Service Years	25
DOE Fuel Price Escalation Region	4 (West)
Analysis Sector	2 (Commercial)
Second Fuel Type	1 (Natural Gas)
Uniform Electric Price Escalation Rate	(to use DOE escalation rates, which vary by year, leave this entry empty)
Uniform Natural Gas Price Escalation Rate	(to use DOE escalation rates, which vary by year, leave this entry empty)

FY 2004 Federal Discount Rates:

	real	nominal*
DOE/FEMP	3.0%	4.8%
OMB 3-year	1.6%	3.4%
5-year	2.1%	3.9%
7-year	2.4%	4.2%
10-year	2.8%	4.6%
30-year	3.5%	5.3%

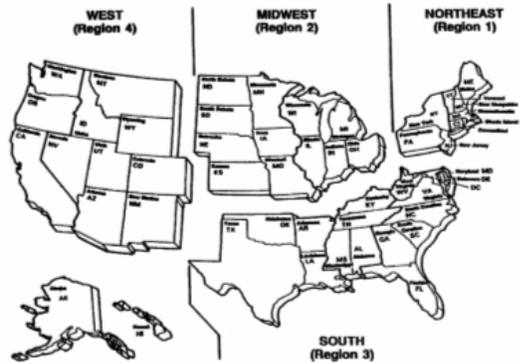
\* "nominal" assumes 1.75% general inflation

Convert:

Nominal-to-Real:	4.8%	Nominal Discount Rate
	1.75%	General Inflation Rate
	3.0%	Real Discount Rate

Real-to-Nominal:	3.0%	Real Discount Rate
	1.75%	General Inflation Rate
	4.8%	Nominal Discount Rate

Year #	Occ/Use Multiplier
1	100%
2	100%
3	100%
4	100%
5	100%
6	100%
7	100%
8	100%
9	100%
10	100%
11	100%
12	100%
13	100%
14	100%
15	100%
16	100%
17	100%
18	100%
19	100%
20	100%
21	100%
22	100%
23	100%
24	100%
25	100%



Source: U.S. Bureau of the Census

Occupancy/Use factor multiplier

Year Analysis Performed vs Year Project comes "On-Line" permits users to define a (up to 5 year) design/construction phase before utility cash flow begins.



Enhancements, 1 April 2000:

New Version

Life-Cycle Costs Summary  
Glazing Selection Example Analysis

Case	Description	One-Time Costs		Total Utility			Maintenance		Total Undisc LCC PV \$	Total LCC PV \$	Net Savings NS	Simple Payback yrs	Discont'd Payback yrs	Saving to Invest Ratio SIR
		1st year \$	LCC PV \$	1st year \$	Undisc LCC PV \$	LCC PV \$	1st year \$	LCC PV \$						
<b>Life-Cycle COSTS</b>														
Base Single Clear		\$54,300	\$54,300	\$681,630	\$15,500,535	\$10,388,984	\$0	\$0	\$15,554,835	\$10,443,284	n/a	n/a	n/a	n/a
Alt 1 Single Pane Azurite **		\$74,880	\$74,880	\$655,380	\$14,907,633	\$9,991,471	\$0	\$0	\$14,982,513	\$10,066,351	n/a	n/a	n/a	n/a
Alt 2 Calif Series - Water White Crystal		\$482,040	\$482,040	\$645,720	\$14,690,295	\$9,845,727	\$0	\$0	\$15,172,335	\$10,327,767	n/a	n/a	n/a	n/a
Alt 3 Calif Series - Sea Foam Low-E Clear		\$383,760	\$383,760	\$639,220	\$14,536,487	\$9,742,834	\$0	\$0	\$14,920,247	\$10,126,594	n/a	n/a	n/a	n/a
Alt 4 Calif Series - Tahoe Blue		\$332,280	\$332,280	\$639,140	\$14,543,797	\$9,747,438	\$0	\$0	\$14,876,077	\$10,079,718	n/a	n/a	n/a	n/a
Alt 5 Viracon - VE1-55 - Low-E Clear		\$169,650	\$169,650	\$642,060	\$14,586,513	\$9,776,836	\$0	\$0	\$14,756,163	\$9,946,486	n/a	n/a	n/a	n/a
Alt 6 Viracon - VE1-85 - Low-E Clear		\$174,330	\$174,330	\$662,150	\$15,041,278	\$10,081,702	\$0	\$0	\$15,215,608	\$10,256,032	n/a	n/a	n/a	n/a
Alt 7 Viracon - VE7-55 - Low-E Azurite		\$256,470	\$256,470	\$626,930	\$14,247,408	\$9,549,395	\$0	\$0	\$14,503,878	\$9,805,865	n/a	n/a	n/a	n/a
Alt 8 Viracon - VE7-85 - Low-E Azurite		\$245,540	\$245,540	\$636,780	\$14,468,027	\$9,697,371	\$0	\$0	\$14,713,567	\$9,942,911	n/a	n/a	n/a	n/a
<b>Alt 9 Viracon - SolarBan 2000 *</b>		\$224,660	\$224,660	\$628,370	\$14,281,816	\$9,572,403	\$0	\$0	\$14,506,476	\$9,797,063	n/a	n/a	n/a	n/a
		* alternative with least life-cycle cost												
		** alternative with most rapid simple payback												
<b>Life-Cycle SAVINGS (negative entries indicate increased costs)</b>														
Alt 1 Single Pane Azurite **		(\$20,580)	(\$20,580)	\$26,250	\$592,902	\$397,514	\$0	\$0	\$572,322	\$376,934	\$376,934	0.8	0.8	19.3
Alt 2 Calif Series - Water White Crystal		(\$427,740)	(\$427,740)	\$35,910	\$810,241	\$543,257	\$0	\$0	\$382,501	\$115,517	\$115,517	11.9	17.4	1.3
Alt 3 Calif Series - Sea Foam Low-E Clear		(\$329,460)	(\$329,460)	\$42,410	\$964,048	\$646,150	\$0	\$0	\$634,588	\$316,690	\$316,690	7.8	10.0	2.0
Alt 4 Calif Series - Tahoe Blue		(\$277,980)	(\$277,980)	\$42,490	\$956,738	\$641,546	\$0	\$0	\$678,758	\$363,566	\$363,566	6.5	8.2	2.3
Alt 5 Viracon - VE1-55 - Low-E Clear		(\$115,350)	(\$115,350)	\$39,570	\$914,022	\$612,149	\$0	\$0	\$798,672	\$496,799	\$496,799	2.9	3.2	5.3
Alt 6 Viracon - VE1-85 - Low-E Clear		(\$120,030)	(\$120,030)	\$19,480	\$459,257	\$307,282	\$0	\$0	\$339,227	\$187,252	\$187,252	6.2	7.3	2.6
Alt 7 Viracon - VE7-55 - Low-E Azurite		(\$202,170)	(\$202,170)	\$54,700	\$1,253,127	\$839,589	\$0	\$0	\$1,050,957	\$637,419	\$637,419	3.7	4.2	4.2
Alt 8 Viracon - VE7-85 - Low-E Azurite		(\$191,240)	(\$191,240)	\$44,850	\$1,032,509	\$691,614	\$0	\$0	\$841,269	\$500,374	\$500,374	4.3	4.9	3.6
<b>Alt 9 Viracon - SolarBan 2000 *</b>		(\$170,360)	(\$170,360)	\$53,260	\$1,218,719	\$816,582	\$0	\$0	\$1,048,359	\$646,222	\$646,222	3.2	3.6	4.8
		* LCC Choice												
		** Simple Payback choice												
LCC choice minus Simple Payback choice		(\$149,780)	(\$149,780)	\$27,010	\$625,817	\$419,068	\$0	\$0	\$476,037	\$269,288	\$269,288			

Analysis Assumptions:

DOE/FEMP Fiscal Year	2000
Real Discount Rate for this Analysis	3.4%
Number of Analysis Years	25
DOE Fuel Price Escalation Region	4 (West)
Analysis Sector	2 (Commercial)

LCC Choice (Least LCC) and Simple Payback Choice (Least SP) are automatically marked (Least LCC case labeled in Bold font)

The difference in savings between the least LCC case and the shortest Simple Payback case is automatically displayed here (i.e., savings due to the least LCC case minus the savings due to the shortest Simple Payback case)

Undiscounted LCC added (useful for making future utility budget projections)



### January 2000:

- **2<sup>nd</sup> fuel type** - the *User-Friendly LCC* spreadsheet permits only two energy types in any analysis. Previously, this was limited to electricity and natural gas. Now, *ANY* non-electric fuel can be selected as the second fuel type.
- **Savings-to-Investment Ratio (SIR)** - Savings-to-Investment Ratio (SIR), is now calculated and reported on the "Results Summary" sheet. Note that this required the non-annual recurring costs to be subdivided into two cost categories: Investment-related costs and Operations-related costs. This distinction follows the FEMP convention in the BLCC training materials and permits *User-Friendly LCC* to report Savings-to-Investment Ratio (SIR).
- **Adjusted Internal Rate of Return (AIRR)** - Adjusted Internal Rate of Return (AIRR), is also now reported on the "Results Summary" sheet.
- **Discounted Payback** - *User-Friendly LCC* has always reported Simple Payback. With this release, Discounted Payback is also reported on the "Results Summary" sheet. Simple Payback, of course, is calculated as: initial investment divided by first year energy savings. Discounted Payback is more comprehensive. Discounted Payback reports year-by-year investment-related costs divided by year-by-year operations-related savings. In effect, Discounted Payback tracks all costs and savings until the sum of the additional savings equals the sum of the additional costs. This point in time when the operations-related savings accumulate to the point where they equal the investment-related costs is the Discounted Payback. It is essentially the same as Simple Payback, except that all costs and savings used in the calculation are appropriately discounted. See the next item for an example.
- **Net Savings Graph** - a graph has been added that tracks the cumulative net savings of all project alternatives, over the life of the proposed project (25 years max). This graph is useful to illustrate the shortcoming of Simple Payback to select projects. The Net Savings are illustrated as a negative quantity in year zero. The project alternative having the largest Net Savings at the end of the analysis period is the LCC best choice. (Note that the point at which the Net Savings line crosses the X-axis is the Discounted Payback.)



# Enhancements

## Previous Version

NON-ANNUALLY RECURRING COSTS		ELECTRIC COSTS			NATURAL GAS COSTS			ANNUALLY RECURRING COSTS		TOTAL COSTS		
Year	Constant \$	Discounted PV \$	Annual Recurring Electric Constant \$	Electric Differential Escalation %	Discounted Electric w/Fuel Esc. PV \$	Annual Recurring Nat Gas Constant \$	Nat Gas Differential Escalation %	Discounted Nat Gas w/Fuel Esc. PV \$	Annual Recurring Maintenance Constant \$	Discounted Annual Maintenance PV \$	Year	Discounted Total Costs PV \$
0	\$74,880	\$74,880	\$630,000	-1.00%	\$604,412	\$25,380	0.41%	\$24,718	\$0	\$0	0	\$74,880
1	\$0	\$0	\$630,000	-1.00%	\$604,412	\$25,380	0.41%	\$24,718	\$0	\$0	1	\$629,130
2	\$0	\$0	\$630,000	-1.00%	\$576,571	\$25,380	-0.20%	\$23,926	\$0	\$0	2	\$604,496
3	\$0	\$0	\$630,000	-1.00%	\$548,436	\$25,380	-0.20%	\$23,159	\$0	\$0	3	\$571,595
4	\$0	\$0	\$630,000	-0.90%	\$521,394	\$25,380	0.00%	\$22,462	\$0	\$0	4	\$538,857
5	\$0	\$0	\$630,000	-0.05%	\$515,149	\$25,380	-0.41%	\$21,698	\$0	\$0	5	\$506,847
6	\$0	\$0	\$630,000	-0.62%	\$488,548	\$25,380	0.00%	\$21,045	\$0	\$0	6	\$475,594
7	\$0	\$0	\$630,000	-0.95%	\$460,864	\$25,380	0.21%	\$20,455	\$0	\$0	7	\$445,318
8	\$0	\$0	\$630,000	-0.31%	\$464,941	\$25,380	-0.41%	\$19,758	\$0	\$0	8	\$414,699
9	\$0	\$0	\$630,000	-0.63%	\$448,122	\$25,380	-0.41%	\$19,085	\$0	\$0	9	\$384,207
10	\$0	\$0	\$630,000	-0.93%	\$432,353	\$25,380	-0.41%	\$18,434	\$0	\$0	10	\$407,788
11	\$0	\$0	\$630,000	-0.88%	\$416,460	\$25,380	-0.42%	\$17,806	\$0	\$0	11	\$434,266
12	\$0	\$0	\$630,000	-1.98%	\$399,188	\$25,380	-0.21%	\$17,234	\$0	\$0	12	\$446,422
13	\$0	\$0	\$630,000	-2.54%	\$377,343	\$25,380	-0.42%	\$16,646	\$0	\$0	13	\$389,990
14	\$0	\$0	\$630,000	-1.72%	\$389,701	\$25,380	-0.21%	\$16,112	\$0	\$0	14	\$375,813
15	\$0	\$0	\$630,000	-1.58%	\$383,370	\$25,380	-0.21%	\$15,594	\$0	\$0	15	\$359,864
16	\$0	\$0	\$630,000	-1.95%	\$369,224	\$25,380	0.21%	\$15,157	\$0	\$0	16	\$344,581
17	\$0	\$0	\$630,000	-1.39%	\$344,877	\$25,380	0.21%	\$14,733	\$0	\$0	17	\$329,610
18	\$0	\$0	\$630,000	-1.00%	\$362,353	\$25,380	0.21%	\$14,320	\$0	\$0	18	\$316,673
19	\$0	\$0	\$630,000	-0.80%	\$290,821	\$25,380	0.00%	\$13,889	\$0	\$0	19	\$304,710
20	\$0	\$0	\$630,000	-0.86%	\$279,371	\$25,380	-0.21%	\$13,443	\$0	\$0	20	\$292,814
21	\$0	\$0	\$630,000	-1.09%	\$288,018	\$25,380	-0.21%	\$13,012	\$0	\$0	21	\$281,030
22	\$0	\$0	\$630,000	-0.31%	\$289,164	\$25,380	0.21%	\$12,647	\$0	\$0	22	\$271,811
23	\$0	\$0	\$630,000	0.00%	\$281,372	\$25,380	0.42%	\$12,318	\$0	\$0	23	\$263,890
24	\$0	\$0	\$630,000	0.00%	\$268,814	\$25,380	0.42%	\$11,998	\$0	\$0	24	\$256,611
25	\$0	\$0	\$630,000	0.00%	\$236,483	\$25,380	0.42%	\$11,686	\$0	\$0	25	\$248,168
	\$74,880	\$74,880	\$15,750,000		\$9,770,351	\$634,500		\$431,335	\$0	\$0		\$10,276,566

## New Version

NON-ANNUAL RECURRING COSTS		ELECTRIC COSTS			NATURAL GAS COSTS			ANNUAL RECURRING COSTS		TOTAL COSTS		COSTS		CUMULATIVE SAVINGS		Payback	
Year	Description of Cost	Constant \$	Discounted PV \$	Annual Recurring Electric Constant \$	Electric Differential Escalation %	Discounted Electric w/Fuel Esc. PV \$	Annual Recurring Nat Gas Constant \$	Nat Gas Differential Escalation %	Discounted Nat Gas w/Fuel Esc. PV \$	Annual Recurring Maintenance Constant \$	Discounted Annual Maintenance PV \$	Year	Discounted Total Costs PV \$	Discounted Cumulative Costs PV \$	Discounted Cumulative Savings PV \$	Discounted Payback yrs	
																	0
1		\$0	\$0	\$630,000	-1.30%	\$574,472	\$25,380	0.36%	\$24,223	\$0	\$0	1	\$628,010	\$702,890	\$4,540	0.8	
2		\$0	\$0	\$630,000	-1.46%	\$546,422	\$25,380	0.36%	\$23,758	\$0	\$0	2	\$600,655	\$1,303,585	\$28,566		
3		\$0	\$0	\$630,000	-2.29%	\$518,372	\$25,380	0.18%	\$23,303	\$0	\$0	3	\$569,888	\$1,873,488	\$51,327		
4		\$0	\$0	\$630,000	-0.44%	\$527,598	\$25,380	0.71%	\$22,999	\$0	\$0	4	\$550,598	\$2,424,052	\$73,308		
5		\$0	\$0	\$630,000	-0.10%	\$511,228	\$25,380	0.18%	\$22,740	\$0	\$0	5	\$533,567	\$2,957,619	\$94,608		
6		\$0	\$0	\$630,000	-0.10%	\$495,370	\$25,380	0.35%	\$22,474	\$0	\$0	6	\$517,114	\$3,474,738	\$115,239		
7		\$0	\$0	\$630,000	0.34%	\$482,125	\$25,380	0.53%	\$22,202	\$0	\$0	7	\$503,328	\$3,978,061	\$135,323		
8		\$0	\$0	\$630,000	-0.59%	\$464,898	\$25,380	-0.35%	\$22,048	\$0	\$0	8	\$485,377	\$4,463,438	\$154,689		
9		\$0	\$0	\$630,000	-0.49%	\$446,687	\$25,380	-0.88%	\$19,702	\$0	\$0	9	\$468,368	\$4,931,827	\$173,391		
10		\$0	\$0	\$630,000	-0.45%	\$433,289	\$25,380	-1.06%	\$18,906	\$0	\$0	10	\$452,165	\$5,383,992	\$191,430		
11		\$0	\$0	\$630,000	-0.65%	\$417,518	\$25,380	-1.08%	\$18,140	\$0	\$0	11	\$435,658	\$5,819,650	\$208,823		
12		\$0	\$0	\$630,000	-1.30%	\$399,689	\$25,380	-1.45%	\$17,340	\$0	\$0	12	\$417,039	\$6,236,690	\$225,475		
13		\$0	\$0	\$630,000	-0.61%	\$385,325	\$25,380	-1.29%	\$16,602	\$0	\$0	13	\$401,927	\$6,638,616	\$241,527		
14		\$0	\$0	\$630,000	-0.36%	\$372,405	\$25,380	-1.30%	\$15,899	\$0	\$0	14	\$388,298	\$7,028,915	\$257,042		
15	Replace	\$0	\$0	\$630,000	0.15%	\$361,762	\$25,380	-1.13%	\$15,241	\$0	\$0	15	\$377,003	\$7,403,917	\$272,114		
16		\$0	\$0	\$630,000	-0.36%	\$348,630	\$25,380	-0.57%	\$14,638	\$0	\$0	16	\$364,328	\$7,768,245	\$286,680		
17		\$0	\$0	\$630,000	-0.51%	\$337,379	\$25,380	-0.38%	\$14,201	\$0	\$0	17	\$351,581	\$8,118,826	\$300,736		
18		\$0	\$0	\$630,000	-0.92%	\$325,212	\$25,380	0.00%	\$13,774	\$0	\$0	18	\$338,985	\$8,458,812	\$314,285		
19		\$0	\$0	\$630,000	0.21%	\$311,088	\$25,380	0.00%	\$13,340	\$0	\$0	19	\$329,448	\$8,788,280	\$327,454		
20	Overhaul	\$0	\$0	\$630,000	-0.98%	\$303,570	\$25,380	0.19%	\$12,983	\$0	\$0	20	\$316,553	\$9,104,813	\$340,101		
21		\$0	\$0	\$630,000	-0.94%	\$291,673	\$25,380	0.19%	\$12,617	\$0	\$0	21	\$304,290	\$9,408,104	\$352,232		
22		\$0	\$0	\$630,000	-0.21%	\$282,307	\$25,380	0.38%	\$12,285	\$0	\$0	22	\$294,599	\$9,703,655	\$364,013		
23		\$0	\$0	\$630,000	0.00%	\$273,818	\$25,380	0.38%	\$11,961	\$0	\$0	23	\$285,779	\$9,989,434	\$375,420		
24	Residual	\$0	\$0	\$630,000	0.00%	\$265,585	\$25,380	0.38%	\$11,645	\$0	\$0	24	\$277,230	\$10,266,704	\$386,488		
25		\$0	\$0	\$630,000	0.00%	\$257,590	\$25,380	0.38%	\$11,338	\$0	\$0	25	\$268,938	\$10,535,642	\$397,215		
		\$74,880	\$74,880	\$0	\$0	\$15,750,000	\$10,028,602	\$634,500	\$432,100	\$0	\$0		\$10,535,642	\$10,535,642	\$397,215	0.8	

Now permits ANY second fuel type (e.g., fuel oil, coal, none, etc.)

Investment-related vs Operations-related costs (permits SIR calculation)

Cumulative costs and savings (permits Discounted Payback)



## New Results Summary Table

### Life-Cycle Costs Summary Glazing Selection Example Analysis

Case	Description	One-Time Costs		Total Utility Costs		Maintenance		Total LCC	Net Savings	Simple Payback	Discnt'd Payback	Saving-to-Invest Ratio	Adjusted Internal Rate-of-Return
		1st year	LCC	1st year	LCC	1st year	LCC						
		\$	PV \$	\$	PV \$	\$	PV \$	PV \$	NS	yrs	yrs	SIR	AIRR
<b>Life-Cycle COSTS</b>													
Base Single Clear		\$54,300	\$54,300	\$681,630	\$10,878,556	\$0	\$0	\$10,932,856	n/a	n/a	n/a	n/a	n/a
Alt 1 Single Pane Azurlite		\$74,880	\$74,880	\$655,380	\$10,460,762	\$0	\$0	\$10,535,642	n/a	n/a	n/a	n/a	n/a
Alt 2 Calif Series - Water White Crystal		\$482,040	\$482,040	\$645,720	\$10,307,255	\$0	\$0	\$10,789,295	n/a	n/a	n/a	n/a	n/a
Alt 3 Calif Series - Sea Foam Low-E Clear		\$383,760	\$383,760	\$639,220	\$10,201,814	\$0	\$0	\$10,585,574	n/a	n/a	n/a	n/a	n/a
Alt 4 Calif Series - Tahoe Blue		\$332,280	\$332,280	\$639,140	\$10,203,131	\$0	\$0	\$10,535,411	n/a	n/a	n/a	n/a	n/a
Alt 5 Viracon - VE1-55 - Low-E Clear		\$169,650	\$169,650	\$642,060	\$10,243,006	\$0	\$0	\$10,412,656	n/a	n/a	n/a	n/a	n/a
Alt 6 Viracon - VE1-85 - Low-E Clear		\$174,330	\$174,330	\$662,150	\$10,563,041	\$0	\$0	\$10,737,371	n/a	n/a	n/a	n/a	n/a
Alt 7 Viracon - VE7-55 - Low-E Azurlite		\$256,470	\$256,470	\$626,930	\$10,002,944	\$0	\$0	\$10,259,414	n/a	n/a	n/a	n/a	n/a
Alt 8 Viracon - VE7-85 - Low-E Azurlite		\$245,540	\$245,540	\$636,780	\$10,159,188	\$0	\$0	\$10,404,728	n/a	n/a	n/a	n/a	n/a
Alt 9 Viracon - SolarBan 2000		\$224,660	\$224,660	\$628,370	\$10,026,398	\$0	\$0	\$10,251,058	n/a	n/a	n/a	n/a	n/a
<b>Life-Cycle SAVINGS (negative entries indicate increased costs)</b>													
Alt 1 Single Pane Azurlite		(\$20,580)	(\$20,580)	\$26,250	\$417,795	\$0	\$0	\$397,215	\$397,215	0.8	0.8	20.3	16.3%
Alt 2 Calif Series - Water White Crystal		(\$427,740)	(\$427,740)	\$35,910	\$571,302	\$0	\$0	\$143,562	\$143,562	11.9	16.4	1.3	4.3%
Alt 3 Calif Series - Sea Foam Low-E Clear		(\$329,460)	(\$329,460)	\$42,410	\$676,742	\$0	\$0	\$347,282	\$347,282	7.8	9.5	2.1	6.1%
Alt 4 Calif Series - Tahoe Blue		(\$277,980)	(\$277,980)	\$42,490	\$675,426	\$0	\$0	\$397,446	\$397,446	6.5	7.8	2.4	6.8%
Alt 5 Viracon - VE1-55 - Low-E Clear		(\$115,350)	(\$115,350)	\$39,570	\$635,551	\$0	\$0	\$520,201	\$520,201	2.9	3.2	5.5	10.4%
Alt 6 Viracon - VE1-85 - Low-E Clear		(\$120,030)	(\$120,030)	\$19,480	\$315,515	\$0	\$0	\$195,485	\$195,485	6.2	7.2	2.6	7.2%
Alt 7 Viracon - VE7-55 - Low-E Azurlite		(\$202,170)	(\$202,170)	\$54,700	\$875,612	\$0	\$0	\$673,442	\$673,442	3.7	4.1	4.3	9.3%
Alt 8 Viracon - VE7-85 - Low-E Azurlite		(\$191,240)	(\$191,240)	\$44,850	\$719,368	\$0	\$0	\$528,128	\$528,128	4.3	4.8	3.8	8.7%
Alt 9 Viracon - SolarBan 2000		(\$170,360)	(\$170,360)	\$53,260	\$852,158	\$0	\$0	\$681,798	\$681,798	3.2	3.5	5.0	10.0%

Discounted Payback,  
Savings-to-Investment Ratio (SIR),  
Adjusted IRR  
are added

## New Cumulative Life-Cycle (Net Savings) Graph

