

"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:

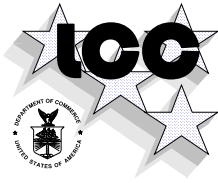
- Added 5 year construction period prior to occupancy (see General Data tab).
- Added occupancy/use factor multiplier by year (see General Data tab).
- **FY 2004 rates** - discount rates and DOE fuel price projections updated to FY 2004 rates.

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

by M.S. Addison and Associates, Tempe, AZ marlin.addison@doe2.com

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)
(1 through 4, see map below, 5=U.S. average)

Analysis Sector 2 (Commercial)
(1=Residential; 2=Commercial; 3=Industrial)

Second Fuel Type 1 (Natural Gas)
(0=None, 1=N.Gas; 2=LPG, 3=Dist Oil; 4=Resid Oil; 5=Coal)

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%

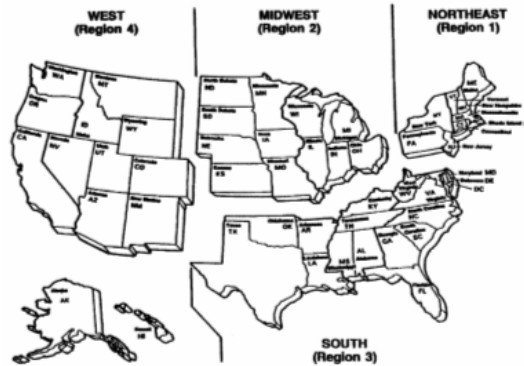
* "nominal" assumes 1.75% general inflation

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

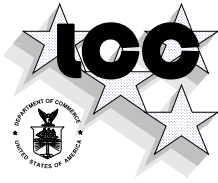
Year #	Occ/Use Multiplier
1	100%
2	100%
3	100%
4	100%
5	100%
6	100%
7	100%
8	100%
9	100%
10	100%
11	100%
12	100%
13	100%
14	100%
15	100%
16	100%
17	100%
18	100%
19	100%
20	100%
21	100%
22	100%
23	100%
24	100%
25	100%



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 \$						
Life-Cycle COSTS														
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
Alt 9 Viracon - SolarBan 2000 *		\$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												
Life-Cycle SAVINGS (negative entries indicate increased costs)														
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
Alt 9 Viracon - SolarBan 2000 *		(\$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			

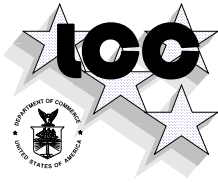
Analysis Assumptions:

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)

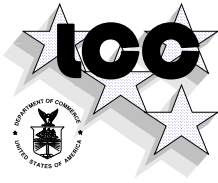
The difference in savings between the least LCC case and the shortest Simple Payback case is automatically displayed here (i.e., savings due to the least LCC case minus the savings due to the shortest Simple Payback case)

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



January 2000:

- **2nd 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

AT 1 Single Pane Azurite		FEMP Fiscal Year: 1999		Disc. Rate: 3.1%		DOE Region: Midwest								
				Years of Analysis: 25		Analysis Sector: Commercial								
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	Constant \$	Discounted Total Costs PV \$	
0	\$74,880	\$74,880	\$630,000			\$25,380			\$0	\$0	0	\$74,880		
1	\$0	\$0	\$630,000	-1.09%	\$604,412	\$25,380	0.41%	\$24,718	\$0	\$0	1	\$629,130		
2	\$0	\$0	\$630,000	-1.05%	\$576,571	\$25,380	-0.20%	\$23,926	\$0	\$0	2	\$604,496		
3	\$0	\$0	\$630,000	-1.03%	\$549,436	\$25,380	-0.20%	\$23,159	\$0	\$0	3	\$571,595		
4	\$0	\$0	\$630,000	-0.90%	\$531,394	\$25,380	0.00%	\$22,462	\$0	\$0	4	\$553,857		
5	\$0	\$0	\$630,000	-0.05%	\$515,149	\$25,380	-0.41%	\$21,698	\$0	\$0	5	\$536,847		
6	\$0	\$0	\$630,000	-0.02%	\$498,548	\$25,380	0.00%	\$21,045	\$0	\$0	6	\$517,594		
7	\$0	\$0	\$630,000	-0.35%	\$480,864	\$25,380	0.21%	\$20,455	\$0	\$0	7	\$501,318		
8	\$0	\$0	\$630,000	-0.31%	\$464,941	\$25,380	-0.41%	\$19,758	\$0	\$0	8	\$484,699		
9	\$0	\$0	\$630,000	-0.03%	\$448,122	\$25,380	-0.41%	\$19,085	\$0	\$0	9	\$469,207		
10	\$0	\$0	\$630,000	-0.03%	\$432,353	\$25,380	-0.41%	\$18,434	\$0	\$0	10	\$454,788		
11	\$0	\$0	\$630,000	-0.08%	\$416,460	\$25,380	-0.42%	\$17,806	\$0	\$0	11	\$441,266		
12	\$0	\$0	\$630,000	-1.19%	\$399,188	\$25,380	-0.21%	\$17,234	\$0	\$0	12	\$428,422		
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%	\$359,701	\$25,380	-0.21%	\$16,112	\$0	\$0	14	\$375,813		
15	\$0	\$0	\$630,000	-1.58%	\$343,370	\$25,380	-0.21%	\$15,594	\$0	\$0	15	\$359,864		
16	\$0	\$0	\$630,000	-1.15%	\$329,224	\$25,380	0.21%	\$15,157	\$0	\$0	16	\$344,581		
17	\$0	\$0	\$630,000	-1.39%	\$314,877	\$25,380	0.21%	\$14,733	\$0	\$0	17	\$329,610		
18	\$0	\$0	\$630,000	-1.00%	\$302,353	\$25,380	0.21%	\$14,320	\$0	\$0	18	\$316,673		
19	\$0	\$0	\$630,000	-0.80%	\$290,821	\$25,380	0.00%	\$13,899	\$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%	\$268,018	\$25,380	-0.21%	\$13,012	\$0	\$0	21	\$281,030		
22	\$0	\$0	\$630,000	-0.31%	\$259,164	\$25,380	0.21%	\$12,647	\$0	\$0	22	\$271,811		
23	\$0	\$0	\$630,000	0.00%	\$251,372	\$25,380	0.42%	\$12,318	\$0	\$0	23	\$263,890		
24	\$0	\$0	\$630,000	0.00%	\$243,814	\$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	

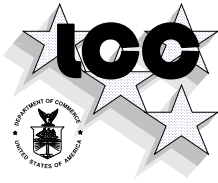
New Version

AT 1 Single Pane Azurite		FEMP Fiscal Year: 1999		Disc. Rate: 3.1%		DOE Region: West										
				Years of Analysis: 25		Analysis Sector: Commercial										
NON-ANNUAL RECURRING COSTS			ELECTRIC COSTS			NATURAL GAS COSTS			ANNUAL RECURRING COSTS			TOTAL COSTS				
Year	Investment-Related Costs (e.g., first cost, replacement, residual)		Operations-Related Costs (e.g., nonannual maintenance)		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	Constant \$	Discounted Total Costs PV \$	
	Description of Cost	Constant \$	Discounted PV \$	Description of Cost												Constant \$
0	First Cost	\$74,880	\$74,880	n/a	n/a	\$630,000					\$0	\$0	0	\$74,880		
1	\$0	\$0	\$0	\$0	\$0	\$630,000	-1.30%	\$603,125	\$25,380	1.09%	\$24,688	\$0	\$0	1	\$628,010	
2	\$0	\$0	\$0	\$0	\$0	\$630,000	-1.46%	\$574,472	\$25,380	0.36%	\$24,223	\$0	\$0	2	\$600,655	
3	\$0	\$0	\$0	\$0	\$0	\$630,000	-2.29%	\$546,347	\$25,380	0.18%	\$23,536	\$0	\$0	3	\$569,883	
4	\$0	\$0	\$0	\$0	\$0	\$630,000	-0.44%	\$527,598	\$25,380	0.71%	\$22,999	\$0	\$0	4	\$550,598	
5	\$0	\$0	\$0	\$0	\$0	\$630,000	-0.10%	\$511,228	\$25,380	0.18%	\$22,340	\$0	\$0	5	\$533,567	
6	\$0	\$0	\$0	\$0	\$0	\$630,000	-0.10%	\$495,370	\$25,380	0.35%	\$21,744	\$0	\$0	6	\$517,114	
7	\$0	\$0	\$0	\$0	\$0	\$630,000	0.34%	\$482,125	\$25,380	0.53%	\$21,202	\$0	\$0	7	\$503,328	
8	\$0	\$0	\$0	Overhaul	\$0	\$630,000	-0.59%	\$464,898	\$25,380	-0.35%	\$20,498	\$0	\$0	8	\$485,377	
9	\$0	\$0	\$0	\$0	\$0	\$630,000	-0.49%	\$448,687	\$25,380	-0.89%	\$19,702	\$0	\$0	9	\$468,368	
10	\$0	\$0	\$0	\$0	\$0	\$630,000	-0.45%	\$433,289	\$25,380	-1.06%	\$18,906	\$0	\$0	10	\$452,165	
11	\$0	\$0	\$0	\$0	\$0	\$630,000	-0.65%	\$417,518	\$25,380	-1.08%	\$18,140	\$0	\$0	11	\$435,658	
12	\$0	\$0	\$0	\$0	\$0	\$630,000	-1.30%	\$399,689	\$25,380	-1.45%	\$17,340	\$0	\$0	12	\$417,039	
13	\$0	\$0	\$0	\$0	\$0	\$630,000	-0.61%	\$385,325	\$25,380	-1.29%	\$16,602	\$0	\$0	13	\$401,927	
14	\$0	\$0	\$0	\$0	\$0	\$630,000	-0.36%	\$372,405	\$25,380	-1.30%	\$15,899	\$0	\$0	14	\$388,298	
15	Replace	\$0	\$0	\$0	\$0	\$630,000	0.15%	\$361,762	\$25,380	-1.13%	\$15,241	\$0	\$0	15	\$377,003	
16	\$0	\$0	\$0	\$0	\$0	\$630,000	-0.36%	\$348,630	\$25,380	-0.57%	\$14,638	\$0	\$0	16	\$364,328	
17	\$0	\$0	\$0	\$0	\$0	\$630,000	-0.51%	\$337,379	\$25,380	-0.38%	\$14,201	\$0	\$0	17	\$351,581	
18	\$0	\$0	\$0	\$0	\$0	\$630,000	-0.02%	\$328,212	\$25,380	0.00%	\$13,774	\$0	\$0	18	\$338,985	
19	\$0	\$0	\$0	\$0	\$0	\$630,000	0.21%	\$318,088	\$25,380	0.00%	\$13,340	\$0	\$0	19	\$329,448	
20	\$0	\$0	\$0	Overhaul	\$0	\$630,000	-0.98%	\$303,570	\$25,380	0.19%	\$12,983	\$0	\$0	20	\$316,553	
21	\$0	\$0	\$0	\$0	\$0	\$630,000	-0.94%	\$291,673	\$25,380	0.19%	\$12,617	\$0	\$0	21	\$304,230	
22	\$0	\$0	\$0	\$0	\$0	\$630,000	-0.21%	\$282,307	\$25,380	0.38%	\$12,285	\$0	\$0	22	\$294,599	
23	\$0	\$0	\$0	\$0	\$0	\$630,000	0.00%	\$273,818	\$25,380	0.38%	\$11,961	\$0	\$0	23	\$285,779	
24	\$0	\$0	\$0	\$0	\$0	\$630,000	0.00%	\$265,585	\$25,380	0.38%	\$11,645	\$0	\$0	24	\$277,230	
25	Residual	\$0	\$0	\$0	\$0	\$630,000	0.00%	\$257,590	\$25,380	0.38%	\$11,338	\$0	\$0	25	\$268,938	
		\$74,880	\$74,880	\$0	\$0	\$15,750,000		\$10,028,602	\$634,500		\$432,100	\$0	\$0		\$10,535,642	

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	AI RR
Life-Cycle COSTS													
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 Azurilite		\$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 Azurilite		\$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 Azurilite		\$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
Life-Cycle SAVINGS (negative entries indicate increased costs)													
Alt 1 Single Pane Azurilite		(\$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 Azurilite		(\$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 Azurilite		(\$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

