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# LIFE CYCLE COST CONSIDERATIONS

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# THE SCHOOL ADMINISTRATION'S DILEMMA

- ▶ A primary duty of the school administration is the prudent expenditure and management of funds provided by the taxpayers.
- ▶ Guidelines for new construction and replacement equipment often were simple...get it done "fast and cheap"!
- ▶ The result...you often get what you pay for!

# WHAT IS "LIFE CYCLE COSTING"?

- ▶ Life cycle costing (LCC) seeks to find the lowest long term cost of ownership rather than simply the cheapest first cost.
- ▶ LCC seeks a balance between the financial, social and environmental impacts of a project.
- ▶ LCC compares the estimated costs and benefits of different options taking into account both initial costs as well as costs that will be incurred over the economic life

# LIFE CYCLE COSTS...A SIMPLE EXPLANATION

- ▶ You can pay me now, or you can pay me later...but later often costs much more!
- ▶ There is more than a little truth to the saying that one should not be “penny wise and pound foolish”.

# WHY ARE LIFE CYCLE COSTS IMPORTANT FOR SCHOOLS?

- ▶ Long term ownership...how long do you plan to operate your schools?
- ▶ Good indoor environmental quality has long term implications.
- ▶ Reluctance of taxpayers to pay for past mistakes.

# WHAT GOES INTO A LIFE CYCLE COST ANALYSIS?

- ▶ A life cycle cost analysis (LCCA) can be done using several different methods. One approach requires the following steps:
  - Specify the objectives and constraints of the analysis.
  - Identify options to achieve the objectives.
  - Specify various assumptions regarding discount rate, inflation rate, economic life, etc.
  - Identify and estimate relevant costs.
  - Convert costs into constant dollars and a common base.
  - Compare the total life cycle costs for each option and select the one with the minimum total costs and maximum benefits.
  - Analyze the results for sensitivity to the initial

# LONG TERM COST BENEFITS OF HIGH PERFORMANCE HVAC

School A vs. School B					
Actual Energy Performance Comparison					
Fuel Inflation Rate	3%	System Cost	Energy Use Btu/SF/YR	Energy Cost \$/SF/YR	Adjusted Annual Costs
School A System		\$ 1,019,660	<b>57766</b>	\$ <b>0.6354</b>	\$ <b>63,394</b>
School B System		\$ 1,019,660	<b>158608</b>	\$ <b>1.8484</b>	\$ <b>184,417</b>
Year		School A	School B	Annual Savings	Net Savings
1		\$ 63,394	\$ 184,417	\$ 121,022	\$ 121,023
2		\$ 64,979	\$ 189,027	\$ 124,048	\$ 245,070
3		\$ 66,604	\$ 193,753	\$ 127,149	\$ 372,219
4		\$ 68,269	\$ 198,597	\$ 130,328	\$ 502,547
5		\$ 69,976	\$ 203,562	\$ 133,586	\$ 636,133
6		\$ 71,725	\$ 208,651	\$ 136,926	\$ 773,058
7		\$ 73,518	\$ 213,867	\$ 140,349	\$ 913,407
8		\$ 75,356	\$ 219,214	\$ 143,857	\$ 1,057,265
9		\$ 77,240	\$ 224,694	\$ 147,454	\$ 1,204,718
10		\$ 79,171	\$ 230,311	\$ 151,140	\$ 1,355,859
11		\$ 81,150	\$ 236,069	\$ 154,919	\$ 1,510,777
12		\$ 83,179	\$ 241,971	\$ 158,792	\$ 1,669,569
13		\$ 85,259	\$ 248,020	\$ 162,761	\$ 1,832,330
14		\$ 87,390	\$ 254,220	\$ 166,830	\$ 1,999,161
15		\$ 89,575	\$ 260,576	\$ 171,001	\$ 2,170,162
16		\$ 91,814	\$ 267,090	\$ 175,276	\$ 2,345,438
17		\$ 94,109	\$ 273,768	\$ 179,658	\$ 2,525,096
18		\$ 96,462	\$ 280,612	\$ 184,150	\$ 2,709,246
19		\$ 98,874	\$ 287,627	\$ 188,753	\$ 2,897,999
20		\$ 101,346	\$ 294,818	\$ 193,472	\$ <b>3,091,472</b>



# LONG TERM COST BENEFITS OF HIGH PERFORMANCE HVAC

School A vs. School B					
Actual Energy Performance Comparison					
Fuel Inflation Rate	3%	System Cost	Energy Use Btu/SF/YR	Energy Cost \$/SF/YR	Adjusted Annual Costs
School A System		\$ 1,070,643	57766	\$ 0.6354	\$ 63,394
School B System		\$ 1,019,660	158608	\$ 1.8484	\$ 184,417
Year		Rockton System	School A System	Annual Savings	Net Savings
1		\$ 63,394	\$ 184,417	\$ 121,022	\$ 70,039
2		\$ 64,979	\$ 189,027	\$ 124,048	\$ 194,087
3		\$ 66,604	\$ 193,753	\$ 127,149	\$ 321,236
4		\$ 68,269	\$ 198,597	\$ 130,328	\$ 451,564
5		\$ 69,976	\$ 203,562	\$ 133,586	\$ 585,150
6		\$ 71,725	\$ 208,651	\$ 136,926	\$ 722,075
7		\$ 73,518	\$ 213,867	\$ 140,349	\$ 862,424
8		\$ 75,356	\$ 219,214	\$ 143,857	\$ 1,006,281
9		\$ 77,240	\$ 224,694	\$ 147,454	\$ 1,153,735
10		\$ 79,171	\$ 230,311	\$ 151,140	\$ 1,304,875
11		\$ 81,150	\$ 236,069	\$ 154,919	\$ 1,459,794
12		\$ 83,179	\$ 241,971	\$ 158,792	\$ 1,618,585
13		\$ 85,259	\$ 248,020	\$ 162,761	\$ 1,781,347
14		\$ 87,390	\$ 254,220	\$ 166,830	\$ 1,948,177
15		\$ 89,575	\$ 260,576	\$ 171,001	\$ 2,119,179
16		\$ 91,814	\$ 267,090	\$ 175,276	\$ 2,294,455
17		\$ 94,109	\$ 273,768	\$ 179,658	\$ 2,474,113
18		\$ 96,462	\$ 280,612	\$ 184,150	\$ 2,658,263
19		\$ 98,874	\$ 287,627	\$ 188,753	\$ 2,847,016
20		\$ 101,346	\$ 294,818	\$ 193,472	\$ 3,040,488

# LONG TERM COST BENEFITS OF HIGH PERFORMANCE HVAC

School A vs. School B					
Actual Energy Performance Comparison					
Fuel Inflation Rate	3%	System Cost	Energy Use Btu/SF/YR	Energy Cost \$/SF/YR	Adjusted Annual Costs
School A System		\$ 1,019,660	57766	\$ 0.6354	\$ 63,394
School B System		\$ 1,845,764	158608	\$ 1.8484	\$ 184,417
Year		Rockton System	School A System	Annual Savings	Net Savings
1		\$ 63,394	\$ 184,417	\$ 121,022	\$ 947,126
2		\$ 64,979	\$ 189,027	\$ 124,048	\$ 1,071,174
3		\$ 66,604	\$ 193,753	\$ 127,149	\$ 1,198,323
4		\$ 68,269	\$ 198,597	\$ 130,328	\$ 1,328,651
5		\$ 69,976	\$ 203,562	\$ 133,586	\$ 1,462,237
6		\$ 71,725	\$ 208,651	\$ 136,926	\$ 1,599,162
7		\$ 73,518	\$ 213,867	\$ 140,349	\$ 1,739,511
8		\$ 75,356	\$ 219,214	\$ 143,857	\$ 1,883,368
9		\$ 77,240	\$ 224,694	\$ 147,454	\$ 2,030,822
10		\$ 79,171	\$ 230,311	\$ 151,140	\$ 2,181,962
11		\$ 81,150	\$ 236,069	\$ 154,919	\$ 2,336,881
12		\$ 83,179	\$ 241,971	\$ 158,792	\$ 2,495,672
13		\$ 85,259	\$ 248,020	\$ 162,761	\$ 2,658,434
14		\$ 87,390	\$ 254,220	\$ 166,830	\$ 2,825,264
15		\$ 89,575	\$ 260,576	\$ 171,001	\$ 2,996,266
16		\$ 91,814	\$ 267,090	\$ 175,276	\$ 3,171,542
17		\$ 94,109	\$ 273,768	\$ 179,658	\$ 3,351,200
18		\$ 96,462	\$ 280,612	\$ 184,150	\$ 3,535,350
19		\$ 98,874	\$ 287,627	\$ 188,753	\$ 3,724,103
20		\$ 101,346	\$ 294,818	\$ 193,472	\$ 3,917,575

# LIFE CYCLE COSTS/BENEFITS FOR GREEN/SUSTAINABLE SCHOOLS

- ▶ Initial costs may increase 2-5%
  - Becoming less due to increased expertise by design professionals
- ▶ Benefits are both tangible and intangible
- ▶ Significantly lower energy costs (lighting and HVAC)
- ▶ IAQ benefits from high performance HVAC
  - Lower absentee rates
  - 10-30% lower respiratory diseases
  - 20-50% lower Sick Building Syndrome symptoms
- ▶ IEQ benefits from "daylighting"
  - 15-25% faster progress on math and reading tests
  - 7-18% higher test scores

# CONCLUSIONS

- ▶ Long term occupancy dictates that a life cycle approach be used for project analysis.
- ▶ “Cutting corners” may provide short term gains, but often results in long term pain!
- ▶ An initial investment in quality design and high performance materials/systems will provide long term returns (both tangible and intangible) far in excess of the first cost.