

Sustainable, Energy
Efficient Buildings



LIFE-CYCLE COST ANALYSIS

WHY LCCA?

- ❑ Dictated by legislation for state facilities 20,000 GSF and larger by NCGS 143, Article 3B, Part 1.
- ❑ Basis for decision-making for application of potential design alternatives for meeting energy and water performance goals of NCGS 143, Article 8C, Part 1.

WHAT IS LCCA?

- ❑ **First cost.**
- ❑ **Operating and maintenance cost over the economic life.**
- ❑ **Salvage value (usually \$0 for building components).**
- ❑ ***Use of a consistent methodology to compute and compare.***

LIFE-CYCLE COST ANALYSIS

- ❑ **STEP 1**: Select design alternatives to evaluate.
- ❑ **STEP 2**: Compute the first cost associated with each alternative.
- ❑ **STEP 3**: Establish the economic life, in years, for each alternative.
- ❑ **STEP 4**: Determine the annual energy cost and maintenance cost for each alternative.
- ❑ **STEP 5**: Using the SCO calculation method, compute the life-cycle cost of each alternative over a common economic period.



**CAPITAL
COST**

Elements of Capital Cost

- Construction cost

 - Material

 - Labor

 - Special equipment and/or rigging

 - Demolition

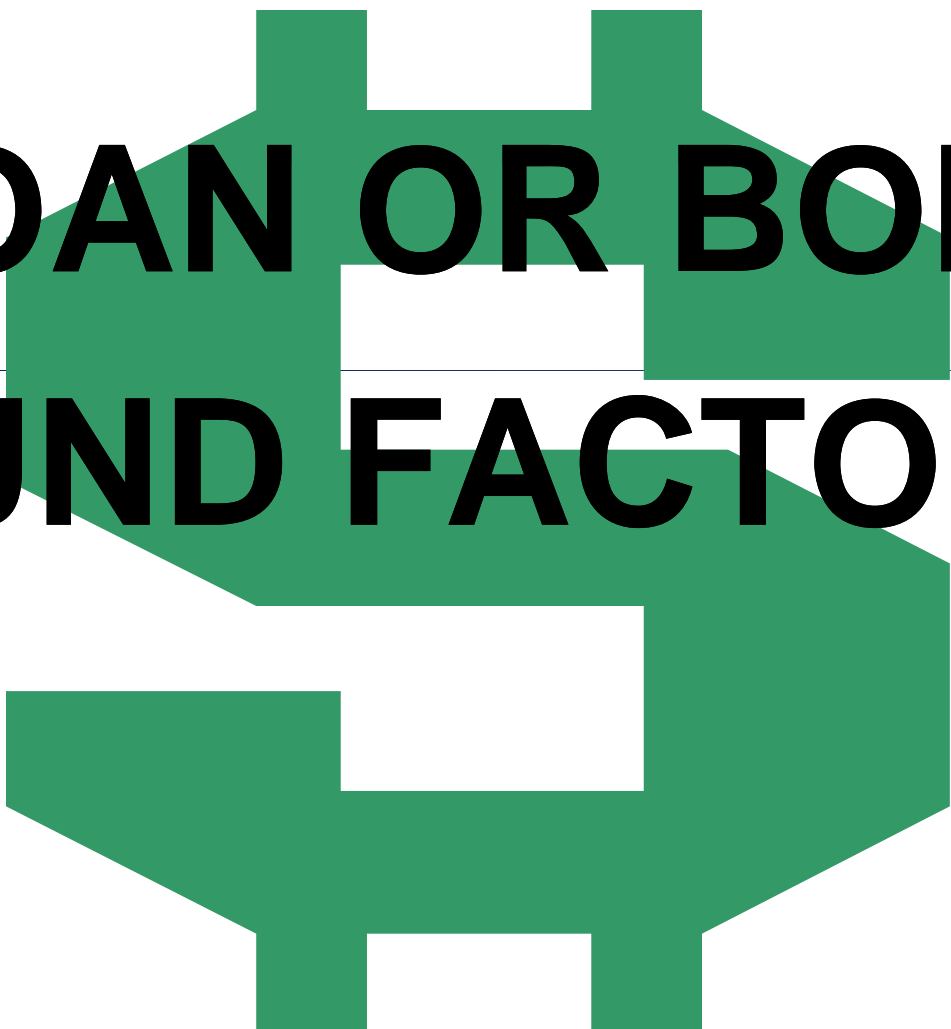
 - Contractor overhead and profit

 - Special consultants and/or design fees

Elements of Capital Cost

(cont.)

- ❑ Additional mechanical, structural, or electrical requirements associated with architectural alternative.
-
- ❑ Additional architectural, structural, or electrical requirements associated with mechanical alternatives.



LOAN OR BOND FUND FACTORS

Loan or Bond Fund Elements

- ❑ Percent of capital cost borrowed

- ❑ Interest rate
- ❑ Loan/Bond period



**ANNUAL
ENERGY AND WATER
COST**

Energy Cost Elements

1. Non-Thermal or "Base" Loads

- Lighting
- Domestic hot water heating

- Process loads are not included

2. Thermal or "HVAC" Loads

- Heating/cooling energy to offset heat losses and gains
- Ventilation air heating and cooling
- HVAC fan/pump energy consumption

Water Cost Elements

1. Indoor Water Consumption

- Plumbing fixtures
- HVAC
- Water recovery/capture

2. Outdoor Water Consumption

- Landscape irrigation



ANNUAL UNIFORM MAINTENANCE COST

Maintenance Cost Factors

- ❑ Owner's resources and/or capabilities...*lack of resources leads to deferred maintenance and reduced performance life that increase maintenance costs!*
- ❑ Quality of design
- ❑ Quality of construction

Design to Minimize Maintenance

-
1. How can it be reached?
 2. How can it be cleaned?
 2. How long will it last?
 3. How can it be replaced?



**NON-UNIFORM
REPAIR OR
REPLACEMENT
COST**

Non-Uniform Maintenance Cost

- ❑ Maintenance and repair costs that occur at regular, but multi-year intervals...caulking, painting, chiller testing, etc.
- ❑ Replacement cost required by elements having short economic lives.

ECONOMIC LIFE

**Time at which
maintenance
costs exceed
replacement
costs.**



GENERAL INFLATION



Annual inflation factor posted on SCO website each April.

COMPUTE LIFE CYCLE COST

LIFE CYCLE COST ANALYSIS
FOR STATE FACILITIES

STATE CONSTRUCTION OFFICE
N.C. DEPT. OF ADMINISTRATION
RALEIGH, NORTH CAROLINA

GENERAL DATA

PROJECT NAME _____
PROJECT ID _____
AGENCY _____

DESIGN ALTERNATIVE


ID NUMBER _____
TITLE _____
DESCRIPTION _____

ANALYSIS PERFORMED BY

NAME _____
DATE _____

**Use LCCA-1.0
spreadsheets
posted on the
SCO website.**

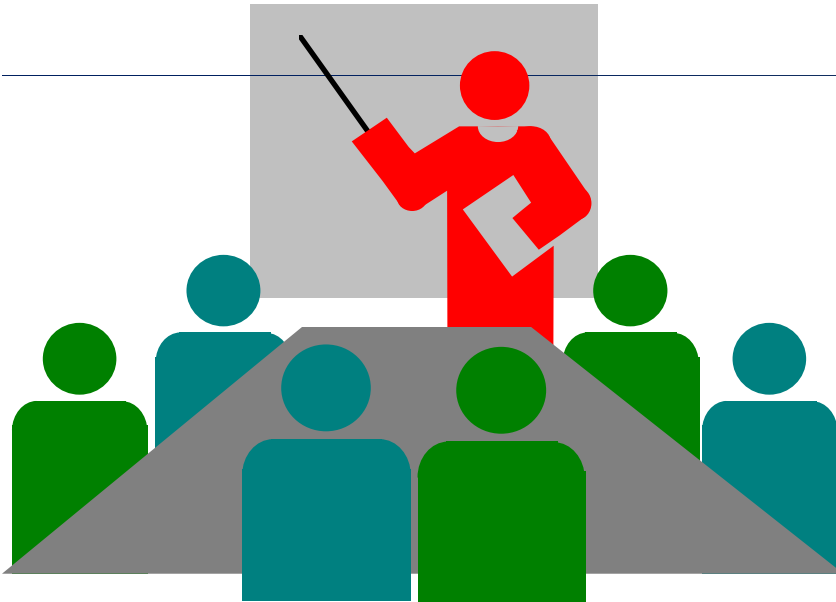
SAVING-TO-INVESTMENT RATIO

SIR ANALYSIS FOR STATE FACILITIES		 STATE CONSTRUCTION OFFICE N.C. DEPT. OF ADMINISTRATION RALEIGH, NORTH CAROLINA				
PROJECT NAME	<input type="text"/>					
PROJECT ID NUMBER	<input type="text"/>	<input type="text"/>				
PROJECT DESCRIPTION	<input type="text"/>					
(A) Alternative ID	(B) Life Cycle Investment Cost	(C) Life Cycle Operating Cost	(D) Increased Investment Cost	(E) Operating Cost Savings	(F) SIR	(G) Rank
1			NA	NA	NA	Base Case
2			\$0	\$0	0.00	1
3			\$0	\$0	0.00	1
4			\$0	\$0	0.00	1
5			\$0	\$0	0.00	1
6			\$0	\$0	0.00	1
7			\$0	\$0	0.00	1
8			\$0	\$0	0.00	1
9			\$0	\$0	0.00	1
10			\$0	\$0	0.00	1

SIR must be >1 to prove that savings pay back the investment over the economic life.

Use SIR-1.0 spreadsheet posted on the SCO website.

THANK YOU!



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