

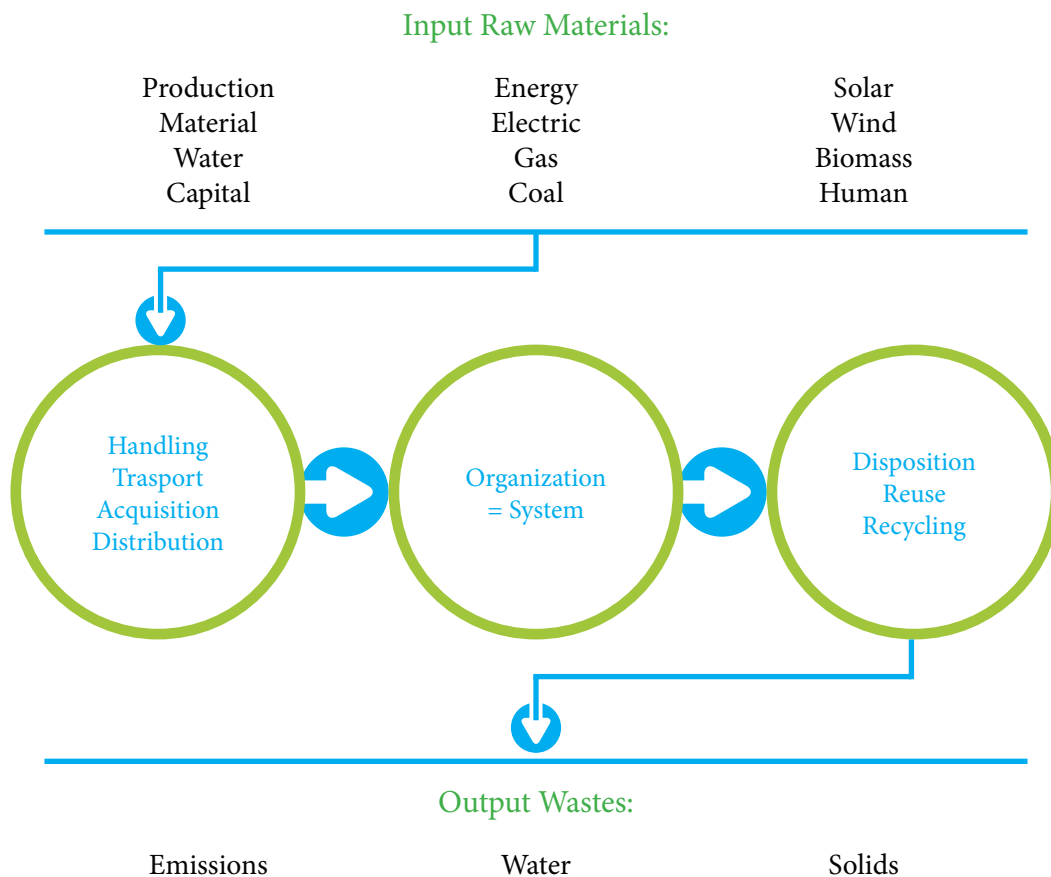


Life-Cycle Costing

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The use of life-cycle cost analysis (LCA) is the primary way to demonstrate savings and also justify the benefits of sustainable buildings and operational practices. LCA provides the total cost of facility ownership, rather than simply the initial cost to design and construct a building, system, or operation. We advocate it when considering all major fund expenditures. LCA provides a holistic view of financial and non-monetary impacts of a decision which include benefits that are often difficult to calculate in strict financial terms. LCA is also useful for system

analysis, and brings the full useful life costs to bear on the decision. Figure 1 shows the input/output relationships that need to be considered in any LCA. All the materials that go into any building or system must be included. This includes both raw materials, as well as external methods, to get the raw materials into your building or system. These external methods are often overlooked, but can provide a key ingredient toward efficiency. For example, if we consider the cost to not only buy, but to transport and get drywall to our construction site, we may find that a greener alternative may not be the least expensive product from a purchase price standpoint. If shipping charges to transport the product across the nation or globe are added, this might be the more costly and less green option.



Life Cycle Analysis - System Analysis

The inclusion of disposition costs are also a part of LCA and can also tip the scale to different products and options if we consider these costs along with the initial acquisition costs. A chair that costs \$30 less to purchase, with equal transportation costs, may not have recyclable components, and, therefore, would incur a \$40 landfill fee at disposition, offsetting the initial cost difference. Most buying decisions do not include this eco-critical disposition consideration unless LCA is utilized.

To begin a LCA, the initial step is to set the analysis period. For a building owner, the useful life of the building may be the selected period for analysis, or the allowable depreciation period may be used. For other service or product decisions, the contract period is normally used for the analysis period.

In the next step, a number of costs must be gathered to analyze the entire acquisition, Operation, maintenance, and disposition of any facility or system.

These cost fall into the following areas:

- Purchase, acquisition, design, and construction costs (first costs)
- Energy and resource costs
- Operation, maintenance, and repair costs
- Replacement costs
- Alteration/Improvement costs
- Residual value – resale/salvage value or disposition costs
- Carrying charges – interest payments on loans, taxes, and other regulated costs
- Non-monetary costs/benefits such as improved safety or aesthetics

Sources for these costs for sustainable buildings may come from internal data for items such as interest rate charges or historical energy costs; or they may come from other external sources such as RS Means or BOMA benchmarks for expected construction

costs and typical maintenance charges. The Whole Building Design Guide website (www.wbdg.org/resources) also provides helpful links to many sources for costs needed to complete a LCA.

After these costs are summarized, a decision on the discount rate to be utilized is required. Most corporations have an internal rate they are charged to borrow funds and use this as their hurdle rate. Other organizations utilize present value analysis since inflation may be unknown.

Consistency is the key to maintaining analytical accuracy. A statement of the assumptions used for the analysis also provides reviewers the needed information in case new or different assumptions are required during approvals. With an established analysis period, cost information, and discount rate determined, LCA is easily performed by using the basic formula:

$$\text{LCC} = \text{First Costs} + \text{Present Value of recurring costs} - \text{Present Value of residual value}$$

With this calculation, understanding the total of all costs is possible and can be further analyzed for payback or other expected results. Many organizations currently operate with only financial analysis, the economic information, used for building decisions.

New impacts of Corporate Social Responsibility (CSR) and environmental concerns are creating new interest in expanded accounting procedures.

Triple Bottom Line Accounting (3BL)

Often debated, but still used in some organizations is the concept of Triple Bottom Line Accounting, (3BL) which refers to analysis of not only economic factors, but also environmental and social impacts to decision making. Criticized for its lack of objective metrics, the business world is increasingly relying on subjective, intuitive, common sense measures that cannot be strictly converted to dollars, pounds, yen, or Euros. In line with many organizations' attempts to bring Corporate Social Responsibility (CSR) to the forefront, 3BL is one methodology that has gained acceptance. Accountancy has even developed social and ethical accounting, auditing, and reporting

(SEAAR). This new financial movement has been accepted by the accounting firms, as well as their customer organizations and the guidelines are included in the Global Reporting Initiative (GRI), and parts of various ISO standards.

The general dissatisfaction with 3BL results from its subjectivity and lack of financial tieback. However, many organizations are expanding their concepts of metrics and including SEAAR or 3BL reports with metrics such as:

- Employee satisfaction ratings increases
- Percentage of senior management in recognized minorities
- Number of incidents/fines for various environmental restriction noncompliances
- Energy usage reduction organization-wide
- Recycled paper, aluminum, copper, glass and plastics reporting
- Reductions of landfill space and charges from prior year
- Charitable donations of excess FM materials in percentage of profits to local and national charities

Applying these types of metrics to facility management can bring increased understanding of the broad role facility management (FM) performs for the organization, especially in the areas of resource reductions, employee satisfaction and comfort, and recycling efforts.