

## Make a Case for Sustainability: Apply Total Cost of Ownership

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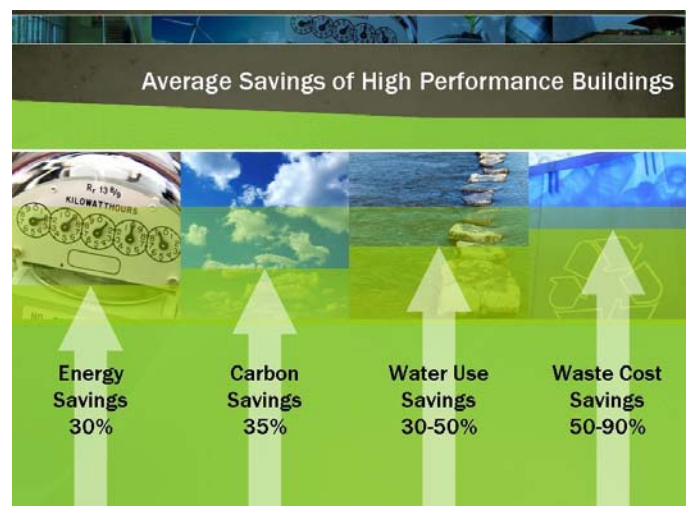
Today there is a lot of buzz in the design and construction community about building green. Daily we hear about the importance of integrated and sustainable design, LEED certification, and reducing our carbon footprint. The intent of this dialogue is to build high performance projects that use our natural resources most efficiently. While we all want to reduce our environmental impact on the planet, we still struggle to meet our social responsibilities while meeting the financial parameters of our projects. The design and construction industry is accustomed to decade's old methods and has not fully grasped that sustainable practices can drive economic development. Total Cost of Ownership is a comprehensive approach toward planning and building high performance projects that are sustainable and provide for an increased return on investment.

What is Total Cost of Ownership (TCO)?

Total Cost of Ownership is the total cost of owning an asset over a period of time. In the real estate and construction industry this usually means the total cost of designing, constructing, operating, and maintaining a project throughout its useful life. TCO can also integrate the cost and benefits associated with

productivity, sustainability, and risk analysis.

The USGBC has done a wonderful job of educating the masses about the importance of incorporating environmentally friendly elements into the built environment. The LEED scorecard is a good guideline for sustainability and integrated design. However, the LEED scorecard could better manage the integrated design process when used in conjunction with a pragmatic tool that enables an owner to evaluate the financial implications of individual points and the total score. Sometimes the first place that owners look to reduce costs is to end the pursuit of a LEED rating when in fact, if the points were reviewed in the context of all the financial costs and user benefits, they might make other considerations. TCO integrates the design, construction, operations and maintenance of a project over its useful life as well as the element of human productivity.



Data per the United States Green Building Council

Where did the concept of Total Cost of Ownership come from?

Total Cost of Ownership was first applied during the late 1980's in the computer industry as a way to understand all costs associated with owning and managing information technology and associated infrastructure.<sup>1</sup> Not long after, business managers started introducing computer systems and network technology. They realized that the first costs associated with buying pc's were minor in comparison to the infrastructure and support each user required to obtain functionality. They sought for a better way to capture and analyze the hard and soft costs associated with new computer systems and improve the efficiency of the systems they procured. In the end they came up with an integrated financial model called Total Cost of Ownership. Typical costs included in a TCO analysis are initial purchase costs, training, IT support, licensing, costs associated with failures or outages, etc.

Has TCO been used effectively in other industries?

Other industries, besides the IT sector, have adopted a Total Cost of Ownership approach to designing, building, and operating assets. Let's look at the commercial airline industry and use Boeing as an example. Thirty years ago it cost approximately \$800 to fly from Seattle to Europe. Today it still costs \$800! How is that possible?

Boeing took an outcome focused approach to designing and building

commercial aircraft. They integrated the design and delivery process and helped make it easier for owners to operate and maintain their aircraft. Boeing vertically integrated itself and aligned all of the key stakeholders involved to work toward a common vision. They took control over the entire process from design inception to final delivery. As a result, they have better controlled their supply chain, achieved higher margins, and gained a tighter control of overall costs.<sup>2</sup>

Why has the construction industry been slow to adopt sustainability and integrated design?

The construction industry has been slow to adopt integrated design and sustainability because it is so fragmented. Owners typically establish minimum design specifications which are determined by local governmental bodies. Often these local codes do not integrate the most sustainable practices. In addition, the numerous consultants, sub consultants, contractors, and vendors all work with competing interests. In a typical construction project, there is no contractual relationship among each of these parties to tie them to reach a common goal. There also has not been a financial tool that integrates the first cost, operating costs and capital expenditures, enabling the owner to understand that the project they are inheriting will have the functional and operational performance that they can afford. TCO will enable an owner to find the solutions that provide the best value in lieu of designing to minimum code or making decisions based on the lowest first cost.

What options are available to better manage the design, build, operations, and/or maintenance decisions?

- › Value Engineering
  - Effective for managing first cost budget decisions.

- › Pro Forma
  - A great financial management tool to track development costs.
- › Life Cycle Cost Analysis
  - A life cycle cost analysis will evaluate a single component or system based on first cost, operations costs, and maintenance costs.
- › LEED
  - Good at integrating sustainable elements into construction. Provides a good marketing piece for owner's looking to rent or sell.
- › Operating Cost Budgets
  - Good for managing an ongoing operations budget for a building.
- › Design Charrettes
  - Design charrettes are an effective way to generate sustainable ideas for a project and ensure that green ideas don't get lost.

TCO integrates all of the above to provide a comprehensive analysis that provides a much broader view of the long term impacts for an owner.



Why do we need TCO in the construction industry?

Managing construction projects has never been easy and as the technological complexity of our projects has increased so has the specialization and fragmentation. Our industry not only continues to be fraught with competing interests on the design and construction side, but also for the owner.

Often in an organization there is one group in charge of the capital budget and one group in charge of the operating budget – and they don't always agree on how money should be spent. TCO can bring these two groups together to make decisions which optimize the budget for both parties.

TCO also provides documented decision making. Many of us have been on a project where a decision has been revisited well after it has been made. Often the documentation compiled to make that decision is scattered amongst the stakeholders and is not comprehensive. However, take the example of a new high school project in Washington State where the owner used TCO in lieu of the state requirement for mandatory value engineering.

By the design development phase of the project many of the major decisions had been made, the Owner's Representative had left the team, and a new one had joined the group. Immediately, the validity of several key decisions was questioned. But in response, all the members of the design team pulled out the previously completed TCO analysis which quantifiably explained the engineering, maintenance, operations, and student productivity in financial terms. Upon a quick review by the new owner's representative, the existing decisions held ground. The TCO also united the design & construction team to support the TCO plan because each had contributed a piece to the analysis to make the decision.<sup>3</sup>

How can TCO encourage developers and property owners to implement sustainability?

Sustainability does not always seemingly go hand in hand with the goals of developers and property owners. Developers, owners, and the occupant sometimes have competing interests which make integration of sustainable elements into a project difficult. A developer may want to build a project for the least first cost and not concern themselves with the implications of the long term operating costs because those costs will be passed along to the tenants or because they do not intend to hold the building in their portfolio for many years.

TCO can bridge these competing interests by giving the owner all of the marketing information about sustainability, lower utility costs, and productivity that will enable them to attract more tenants, charge higher rents, or make the building more marketable when they sell it.



How can TCO assist owners to understand the implications of carbon emissions on their projects?

Currently, the United States does not have a regulatory platform for carbon emissions and greenhouse gases. However, this is proving to be an emerging market both in the United States and in Europe. It is likely that during the next few years either a carbon tax or a cap and trade market will emerge and carbon will have a real cost or value to owners. Owners, who chose to perform energy retrofits, or pursue renewable energy in lieu of traditional energy sources, will have the opportunity to sell the environmental attributes that they earn by completing energy efficiency projects. TCO can quantify the carbon emissions for owners. It will be important for owners to understand the carbon implications of their design decisions so that they understand how much they will pay in a carbon tax or how much they will earn from the sale of their carbon credits.

As an example, a large mid-western university used TCO to analyze the campus energy supply and demand and evaluate renewable energy alternatives. The team used the TCO tool to evaluate the impact and interactions between a multitude of conservation, energy storage, and supply side options. This project resulted in an 80% reduction in carbon emissions enabling the university to purchase carbon offsets for the remainder of their carbon footprint. The TCO tool has helped them become the first carbon neutral university in the United States. <sup>4</sup>

How can I implement Total Cost of Ownership on My Project?

The first step towards implementing TCO on your project is to acknowledge that the current method of making decisions based on first cost is not adequate. In today's world it is necessary to make decisions that optimize first costs, operating costs,



maintenance costs, energy consumption, and human productivity in order to provide a greater return on investment to the owner – true considerations in effective sustainability. Every project should take an outcome focused approach and be integrated from both a fiscal and design standpoint. TCO should start from the project inception and continue through the completion of construction documents. Make a case for sustainability and consider not only the first cost but the long term operations and maintenance benefits associated with the sustainable and holistic life of a project.

Sources:

- 1 The Gartner Group
- 2 Dean Allen, CEO, McKinstry Company
- 3 McKinstry Company Project Files
- 4 McKinstry Company Project Files