The CM's Role in the Successful Transition to Sustainable Building Operations

As high-performance buildings take center stage relative to both owner and tenant requirements, buildings are constantly watched to see if they are performing to their engineered standards and intent. The responsibility of ensuring these buildings meet their design potential falls to a number of people. Understanding the critical role the Construction Manager plays in this challenge will help deliver more sustainable, better quality buildings with optimized performance to clients.

Integrated Delivery

The success of high-performance buildings is directly related to an integrated approach to project delivery. This approach requires that a robust and collaborative project team, including the owner, tenant, facilities personnel, contractors, architect, engineers, and others, is established at the earliest stages.

This team is engaged in developing the initial concepts and vetting viable approaches during the early stages of design. This is an iterative effort that reveals the most effective solutions. While the initial costs for engaging the project team at an early stage may be higher than the more traditional approach, evidence from other successful high-performance projects shows that the overall cost is often less and the quality and operating efficiencies of the project are enhanced. The CM is a very important voice in that collaborative effort.

Design

The CM's role in the project starts during the pre-design phase. A clear understanding of the owner's requirements is essential. If they are not already established, the CM should assist in developing guidelines for such project-related issues as cost, quality, and project team selection. These goals will determine which central characteristics of high-performance buildings a particular project will pursue.

If the owner's project requirements have already been established, the CM should confirm that they include requirements for all energy systems, indoor environments, siting, water, and environmental responsiveness of the facility. It should also address the ideas, objectives, and criteria that the owner considers important. Often an owner will need guidance in this area and may need to undertake a team brainstorming effort to establish these criteria. The CM can be effective in helping the owner organize and develop this document.

The project team should be selected based on their experience in designing and constructing high-performance buildings. Firms with experience in sustainable and energy-efficient design and construction methods are critical for success. They must understand the use and potential impact of building configuration and orientation, daylighting, natural ventilation, high-efficiency mechanical equipment and lighting installations, and renewable/alternative energy sources (e.g., wind, solar, fuel cells). Considering the project through a sustainability perspective during the design phase will help seamlessly incorporate the key elements that will make the project successful.

During the design phase, the CM will need to ensure that the sustainability criteria outlined by the owner are included in the building design plans and specifications. Establishing clear communication channels, expectations, and performance criteria with the design team will be essential in this stage. The CM should also be prepared to provide the owner with knowledge about the newest developments in high-performance building technologies. Through these suggestions, the owner will be able to make decisions about design with direct industry knowledge.

There are many tools to assist in successfully integrating sustainability into these projects. Few sustainability "extras" actually require extra time or cost if incorporated correctly and at the appropriate time. Tools such as energy modeling software, Building Information Modeling (BIM), water balance calculations, and daylight modeling will be instrumental during the design phase of the project. For sustainable material selection, resources like BEES (Building for Environmental and Economic Sustainability) and EPP (Environmental Preferable Purchasing) will be valuable references.

There are a variety of rating systems for measuring building performance. Understanding the processes and values associated with each system is important so that the owner can be directed toward those that will best meet his goals. Incorporating rating systems like the U.S. Green Building Council's LEED® Certification early in the process will be necessary to avoid costly late changes. Be sure to explore a variety of certification options, including: IPMVP (International Performance Measurement and Verification Protocol), ASHRAE criteria, LEED rating systems, and EnergyStar ratings.

Similar to selecting the appropriate rating system to track building performance, deliberate analysis of building components and strategies should be a priority. Incorporating evaluation based on life cycle presents the owner with an opportunity to improve building performance while fully understanding the impacts of his decision. Establishing methods for evaluating life cycle costs during design will bring long-term benefits to both the owner and occupants. A tool that evaluates the cost over time will allow the owner to better understand his investment options. For example, design strategies and systems that are very energy efficient may have higher first costs, but may be the better investment when analyzed over their expected life in terms of energy savings, maintenance, repairs, and other costs. The CM should be prepared to explain the value of this type of analysis to the owner and project team.

Construction

A CM's task during the construction phase is to ensure that the project is built to the plans and specifications established during the design phase. These documents should address all high-performance standards, as well as Division 1: General Requirements for the contractor, describing administrative and procedural requirements to realize these high-performance goals, including tracking, reporting, and meetings.

The procedures used on a high-performance project will be similar to a traditional project but may vary considerably in detail, especially if a LEED rating is being sought. Requirements for documenting the LEED construction credits will mean the contractor and their sub-contractors will have additional responsibilities in the submittal and installation processes. The CM needs to be aware of these differences and ensure that they are adequately covered in the Division 1 requirements as well as instituted in the day-to-day activities on site. Of particular note would be any prerequisite credits such as Erosion and Sedimentation Control or Fundamental Building System Commissioning.

Regular site walks are a standard activity for a CM but will also require attention to issues that are not part of the normal observations, particularly with regard to indoor air quality issues which should follow SMACNA standards for isolation, protection, housekeeping, and scheduling to control the amount of contamination of the space by ongoing activities.

Commissioning (Cx) should be a part of any high-performance project, whether attempting a LEED rating or not. The requirements for the Cx work are typically specified by the mechanical and electrical engineers, but may also involve other systems including the exterior envelope or even irrigation systems. An independent commissioning agent will be hired by the owner to develop a commissioning plan and perform functional tests. This may also involve a peer review of the design before the construction documents are complete. The CM will need to be aware of the Cx strategy selected for the project in order to properly manage the schedule of activities that need to occur.

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Before the project is completed, the CM needs to ensure that all staff training and operations and maintenance manuals are in place. This process traditionally begins as construction is completed, but for the most successful transition, training should be ongoing during the project, educating the staff that will be operating the finished product.

Training is comprised of two areas: Operations and maintenance. Employees who will be using or running various systems should be given instructions on how to do this properly. They should understand the installed energy-saving features and how to use them. With new technologies, there is often a lack of understanding about how these systems work or interact. It is critical that the appropriate personnel are educated on all the systems and the controls needed to operate them. Similarly, those expected to maintain and repair equipment need to know correct procedures for doing so. Equipment that is properly maintained lasts longer, is more reliable, and tends to operate more efficiently. Training should be provided by qualified manufacturer representatives. The bid specifications should spell out the requirements.

Operations & Maintenance

Owner education runs through the entire project process and is a critical avenue for the CM to influence the success of this transition. Ensuring that the owner is aware of the importance of fundamental commissioning and the ongoing measurement and verification of his systems will be critical for the life of his building. Setting up these standards and expectations before the project closeout will give the owner more tools, ensuring that the building will continue to meet his or her expectations for sustainable building performance.

A successful closeout of a project could include contracting with third-party monitoring and verification services, recommended by the project CM. Utilizing these services takes pressure off the owner for tracking details like warranty issues, O&M manuals, and measurement and verification of their building system operations. Tracking building performance in real time with a third-party monitoring system will ensure that any changes in building performance are identified and addressed immediately, ensuring the design of these systems is living up to the expected financial and energy savings.

Preparing the owner with operational procedure training, connecting him or her with third-party building monitoring, and setting him or her up for successful monitoring and verification are essential for transition to sustainable operations. CM

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Upcoming Sustainability Events

Two large and important events for sustainability-focused professionals are opening soon for registration.

USGBC's Greenbuild
Nov. 16-19
Chicago, IL

Ecobuild America
Dec. 6-10
Washington, DC

Register early since the most interesting sessions fill up quickly. Another interesting opportunity for our international members is the upcoming World Expo in Shanghai co-sponsored by Stanford University, which will be held in August. "Better Building-Better World" is the theme, and the program will explore many aspects of sustainability.