

Summer 2012, Vol. 21 No. 2 – Green Building Issues in Construction

**TABLE OF CONTENTS**

---

## **Building Commissioning and the Role of the CxA**

By Richard W. Gaeckle – September 10, 2012

What was once a growing trend—green building and sustainable design—has now become mainstream in building design and construction. Green building is typically associated with environmental responsibility. However, an often-overlooked objective of green building is the bottom-line motivation of the owner to realize energy savings through increased efficiency in building systems. Thus, the hallmark of any green building project is the ability to verify the performance expectations of the owner through a verification process of the building energy systems commonly known as commissioning.

The basic intent of building commissioning is to verify that the building energy systems are installed and that they perform in accordance with the Owners Project Requirements (OPR), the Basis of Design (BOD), and the project construction documents. Commissioning is not a function of design, nor is it an aspect of construction. Rather, commissioning is focused on the planning, recording, testing, and reporting functions relating to the building energy systems. In essence, the commissioning process is a systemic verification that the building systems perform in accordance with the design intent and that such systems meet the owner's operational needs.

In the last two decades, building commissioning has continuously developed and evolved. In the 1990s, American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) Guideline 1 for the commissioning of heating, ventilation, and air-conditioning (HVAC) systems was the standard commissioning guideline for the green building industry. ASHRAE identified the overall purpose and intent of building commissioning, the process for identifying project performance goals, and the procedures necessary for proper verification. However, the ASHRAE guidelines focused more on commissioning as an overall process rather than the individual roles and responsibilities of specific project team members.

Influenced significantly by the energy standards of ASHRAE, the U.S. Green Building Council (USGBC) developed the Leadership in Energy and Environmental Design (LEED) sustainability assessment guidelines in the late 1990s and redeveloped them in 2000. Throughout the last decade, the LEED sustainability guidelines have gained prominence in the industry and are recognized as the predominant standard for green building design and construction. Included within the sustainability guidelines is a detailed itemization of the tasks required for proper building commissioning. Additionally, the LEED commissioning guidelines identify the specific roles and responsibilities of the project team members with respect to building commissioning.

Most recently, in the spring of 2012, the International Code Council finalized its long-awaited International Green Construction Code (IgCC). The IgCC is intended to serve as a model green construction code for adoption by various jurisdictions. Included as part of the IgCC are provisions requiring the commissioning of various building systems. While similar to the LEED commissioning guidelines, a notable aspect of the IgCC is the requirement stating that a final commissioning report must be submitted to and accepted by the code official prior to the issuance of a certificate of occupancy.

While each commissioning standard contains its own unique features, the characteristics common to all standards for a comprehensive building commissioning process generally include documenting the design intent and operation protocols for all building systems, verifying in-place system performance through well-documented testing and measurement, evaluating performance in comparison to the documented design intent, preparing comprehensive operation and maintenance manuals coupled with the appropriate training of building operations staff, and monitoring system performance on an ongoing basis.

Another key characteristic of any building commissioning process is the designation of an objective individual to serve the role of the Commissioning Authority (CxA). Of course, the level of responsibility undertaken by the CxA will ultimately be dictated by the scope of the commissioning agreement. Nevertheless, the basic obligations of the CxA will generally include reviewing the OPR and the BOD, incorporating commissioning requirements into the construction documents, developing and implementing the commissioning plan, verifying the installation and the performance of the commissioned systems, and completing the final commissioning report.

In addition to these basic functions, the CxA may be required to undertake enhanced commissioning services. These additional obligations require greater involvement by the CxA in the design and construction phases. This includes performing design review at various project stages, reviewing contractor submittals, and involvement in the post-occupancy review of building operation systems. Finally, while other project team members may develop required systems manuals and undertake training of operation and maintenance personnel, as part of the commissioning process, the CxA may also be called on to perform or assist in these tasks.

It is important to note that the CxA traditionally does not design, nor does the commissioning agent construct, the system. Rather, the commissioning agent is part of the system check or test run of the system, ascertaining whether the system is operating as intended. In some instances, where enhanced commissioning is required by the project scope, a more involved role of the CxA may be required that may include design review, construction documents review, submittal review, and preparation of systems operation and maintenance manuals. The legal practitioner must be aware of the scope of the commissioning process, the limitations of such a process, and the specific obligations the CxA is required to perform.

Given its prominence in the green building industry, the LEED sustainability guidelines arguably set the standard for the commissioning of building energy systems in the industry. While certainly not intended to be a code, from an industry standpoint, the LEED guidelines identify

the respective roles and responsibilities of those involved in the commissioning process—specifically the obligations expected of the CxA. In its current version, LEED characterizes the commissioning process to be employed on a green building project as either fundamental or enhanced. This can be analogized as basic services versus additional services required by the CxA. Where fundamental commissioning is required, the CxA has very basic and limited obligations. As its name suggests, enhanced commissioning requires the CxA to undertake a greater responsibility and involvement in the commissioning process. The legal responsibility and potential liability of the CxA will ultimately depend on whether the owner elects to employ a fundamental or an enhanced commissioning process.

As noted above, the basic or fundamental commissioning services provided by the CxA require that the CxA reviews the OPR and the BOD developed by the design team. It is important to note that this service requires involvement by not only the CxA, but also by the owner and the design team collaboratively. The OPR is essentially a narrative of the design intent for the commissioned systems. This requires a description of the primary purpose, program, and use of the project, as well as the goals relating to the owner's program needs. This would include operational costs as well as energy efficiency goals, which may be linked to local energy codes or other standards such as ASHRAE or LEED. In addition, the OPR should include the performance expectations of the commissioned systems, including specific efficiency targets. Finally, the OPR should include operation and maintenance requirements and the level of training and orientation that the owner's personnel will require.

The BOD describes the design of the systems to be commissioned and includes specifically the performance criteria required for those systems that are to be commissioned. As part of its fundamental commissioning obligations, the CxA is required to review both the OPR and the BOD to ensure that the latter reflects the intent of the former.

In addition, the CxA is responsible for developing and incorporating the commissioning requirements into the contract documents. The commissioning requirements are generally delineated within the general conditions or contract specifications and typically assign responsibility for the commissioning requirements to the prime contractor.

The CxA is also responsible for the development and implementation of a commissioning plan. This plan is developed in the beginning stages of the commissioning process at design development. The commissioning plan includes those systems that are to be commissioned, as well as the goals, objectives, and performance criteria identified by the OPR and the BOD. The commissioning plan develops the protocol for testing the functional performance of the commissioned systems, as well as the procedures for verifying system performance, reporting deficiencies, and ultimate acceptance of the building systems by the owner.

In further keeping with the underlying purpose of the commissioning process, the CxA is required to verify the installation and performance of the commissioned systems. This requires that the CxA performs installation inspections, performance testing, and an evaluation of those testing results compared with the OPR and BOD.

Depending on the procedures delineated in the commissioning plan, the installation inspections may be performed by either the CxA or the contractor. This pre-function inspection is intended to identify installation issues and determine whether individual components have been installed properly so that any defects are discovered prior to the system's performance testing. The performance testing occurs when the system is ready for operational use—in other words, after all the components have been properly installed, the controls have been properly programmed, and the system has been balanced. The performance testing simulates the actual operating conditions of the system so that the CxA can evaluate the system's performance compared with the OPR and the BOD. It is based on this evaluation that any discrepancies or deficiencies should be discovered and reported to the owner so that a resolution can be developed collaboratively among the project team members.

The final aspect of the fundamental commissioning process is the preparation of the final commissioning report by the CxA. This report summarizes the results of the evaluation of the performance testing and indicates whether the commissioned system meets the requirements of the OPR, the BOD, and the construction documents. The final commissioning report includes an executive summary of the commissioning process, any observations and conclusions by the CxA, any outstanding commissioning items, a history of any system deficiencies, and the system performance test results obtained during the commissioning process.

Enhanced commissioning requires that the CxA takes on additional responsibilities that may include design review, review of contractor submittals, and post-occupancy commissioning. Prior to the issuance of the construction documents, the CxA is required to perform at least one review of the design documents to ensure the clarity, the completeness, and the adequacy of the OPR. The purpose of this design review is to ascertain whether the design documents can achieve the OPR and the BOD. Additionally, enhanced commissioning requires that the CxA reviews contractor submittals for conformance with the OPR and BOD. This review, however, does not replace the scope or responsibility of the design team to review and approve contractor submittals. Finally, within 10 months of turnover, the CxA is required to coordinate and perform a post-occupancy review of the commissioned systems to identify any problems in the system's operation and performance.

The introduction of the commissioning into to the realm of building construction carries with it not only the addition of a new project team member, namely the CxA, but also obligations and responsibilities for all project team members not otherwise present in the traditional construction project. Recall that the underlying purpose of the commissioning process and, thus, the role of the CxA, is to provide a systemic verification that the building energy systems have been constructed in accordance with the design intent. However, building commissioning, as is the case with all green building projects, is a collaborative process requiring involvement by the owner, the designer, and the contractor, as well as the CxA.

While the CxA may assist in the preparation of the OPR, it is the ultimate responsibility of the owner to detail its project performance goals. Additionally, while the CxA may be involved in the review of the design and contractor submittals of the commissioned systems, the CxA is not the actual designer of the systems. Rather, the ultimate responsibility for the design of the

commission systems rests with the professional in responsible charge. Similarly, while the CxA inspects, tests, and evaluates the system as installed, the CxA is not the installer of the system. Rather, the ultimate responsibility to install the system in accordance with the design and performance requirements rests with the contractor. Indeed, commissioning is, in its simplest form, a quality-control systems check. It allows the owner to enjoy the assurances that the system, as installed, will operate and perform as designed. It is the function of the CxA to facilitate this process.

Whether due to a misunderstanding of the underlying purpose of the commissioning process or perhaps more commonly an inartfully worded commissioning agreement, a common misconception is that the CxA is somehow the guarantor of the performance of the building system. Thus, an aggrieved owner may view the CxA as the project member with ultimate responsibility for any failures in the ability to achieve the owner's intended performance goals, despite whether such failure is ultimately due to a design error or a construction defect. In reality, however, any potential liability and exposure to the CxA should be limited to the failure to identify and report any deficiencies, not for the failure to prevent such deficiencies.

Assume, for example, that following the construction and the acceptance of a high-performance energy system, the owner claims that it is not realizing the performance that was intended. The failure is attributed to a construction defect that was not identified by the CxA during the commissioning process. In such an instance, any liability to the CxA would not be the cost to remedy the construction defect because, had the CxA caught the error during the commissioning process, the defect would have required remediation anyway. Stated another way, any cost to remediate the defect would have been incurred by the project prior to the acceptance of the system but for the CxA's failure to catch the error. Thus, any potential liability and exposure to the CxA should be limited to the failure to identify and report the deficiency to the owner and not the cost to correct the deficiency. It follows then that any potential exposure would likely reflect the difference in the cost of correcting such deficiency at the time it should have been discovered versus the cost to correct the deficiency when it was actually discovered. In most cases, this will reflect a premium cost for performing the work at a later date, which is often a fraction of the total cost to actually repair the defect.

In addition, however, and perhaps more directly attributed to the role of the CxA, is the potential for exposure to damages arising from lost or unrealized energy savings. Recall that one of the principal goals in undertaking a green building project and installing high-performance energy systems is the realization by the owner of increased energy efficiency and reduced energy costs. Arguably then, the CxA may have a greater exposure in failing to properly verify the system where such failure results in unrealized energy savings.

Assume the same scenario as above: A construction defect prevents the energy system from performing as intended; this construction defect was not identified and reported during the commissioning process and was not discovered by the owner until some time after the project's completion. An argument can be made by the owner that, had the CxA identified the construction defect prior to completion and during the commissioning process, the defect could have been remedied at that time, allowing the owner to realize the intended energy savings.

However, because the defect was not identified during the commissioning process, the owner has been deprived of the benefit of such savings from the time the final commissioning report was issued until the defect was actually discovered. In such a scenario, a persuasive argument could be made that the CxA is responsible for those unrealized energy savings.

Of course, while this may be a sound *theory* of liability against the CxA, in reality, the ability to prove such damages is a far more difficult task. This is not a situation in which an owner can simply compare an old utility bill to a current utility bill. In fact, the damages experienced by the owner are not necessarily the difference between the energy costs incurred prior to the commencement of the project and those incurred following completion. Rather, the actual damage to the owner would be the lost energy efficiency, which is simply quantified as a dollar figure representing the energy cost.

For instance, additions to an existing structure would in all likelihood increase the energy costs to operate the facility as a whole. The driving purpose in undertaking the green building project, however, is to operate the energy systems more efficiently. In such a situation, the actual energy costs may increase by 20 percent due to the increased size of the facility, infrastructure, equipment, and so on. However, overall, the building energy systems may operate 40 percent more efficiently than before the addition. It is this second figure, the measurement of energy efficiency, that is the critical factor. However, without a baseline energy study or building audit prior to undertaking the green building project, it may certainly be difficult, if not impossible, to prove any lost energy efficiency following the completion of the project. Without the ability to ascertain any lost efficiency, the owner will be unable to quantify any unrealized energy cost savings.

Such a theory of liability against the CxA should not be an afterthought once the failure to properly commission the energy systems has been discovered. If the true intention of the owner is to realize energy savings through increased efficiency, the owner would be wise to establish an energy baseline prior to undertaking the green building project. Keeping with this notion that green building is as much about the bottom line as it is about environmental responsibility, the owner should want to know that it is getting what it paid for.

**Keywords:** litigation, construction litigation, green building, Commissioning Authority, Leadership in Energy and Environmental Design

[Richard W. Gaeckle Esq.](#), LEED AP, is a partner in Hoagland, Longo, Moran, Dunst & Doukas, LLP, in New Jersey.