

From Single Commercial Buildings to Portfolios: Streamlining LEED® Documentation for Volume Customers

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ABSTRACT

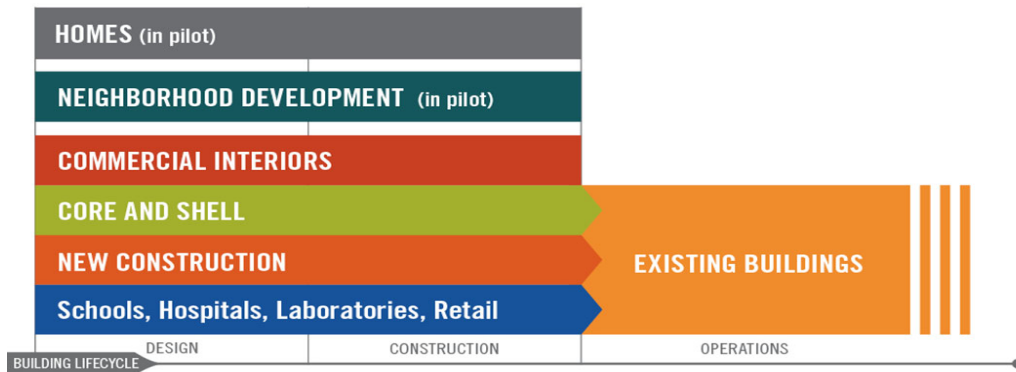
Historically the Leadership in Energy and Environmental Design (LEED®) Green Building Rating System™ has certified buildings one at a time, with each LEED customer submitting full support documentation. As LEED's uptake in the market has grown, many customers seek to certify dozens or hundreds of buildings. This paper describes a volume review process, currently in pilot, representing LEED's response to this demand – a method of submitting documentation that reduces duplication, uses economies of scale, and leverages a single project team's ability to oversee a whole portfolio. Key to the process is the assessment of variance in the portfolio: whether all buildings in the LEED application are physically similar, are located on the same site, and operate similarly. The variance assessment defines whether each LEED credit's submittal for the portfolio can be collapsed into a single uniform portfolio submittal. The guidelines for this process vary across LEED credits and across customer situations, and are different for initial design and construction versus ongoing operations and maintenance. The paper summarizes LEED's pilot volume review process and the challenges of providing better process efficiency and flexibility for LEED and its customers while maintaining certification program integrity. The paper highlights LEED's energy credits – efficiency, renewables, commissioning, and measurement & verification.

Introduction - The LEED Program

USGBC's LEED program encourages and accelerates global adoption of sustainable green building and development practices through the creation and implementation of universally understood and accepted tools and performance criteria. Over 1200 buildings have been certified under LEED, and over 12,000 more have registered their intent to certify and begun the process. LEED promotes a whole-building approach to sustainability by recognizing high performance in five key areas of human and environmental health: sustainable site development, water savings, energy efficiency, materials selection, and indoor environmental quality. The LEED system embraces many building types and settings, as well as the entire life cycle of buildings, from design to construction to ongoing operations to major renovation or demolition (Figure 1).

As Figure 1 stresses, LEED draws a distinction in a building's life cycle between the combined design & construction phases, which generally last a few months or years, and the ongoing operations phase, which generally lasts for decades. These two general building phases have different types of requirements in LEED — the former is considered a single event or snapshot in time, and the latter is based on measured performance over a period of time. Each life cycle phase is certified separately and stands alone, with LEED-certified design & construction not implying LEED-certified operations & maintenance, and vice versa. LEED certification for design & construction does not expire, whereas LEED certification for operations & maintenance must be recertified every 1-5 years.

Figure 1. Mirroring the Market: the LEED Family of Rating Systems



Source: U.S. Green Building Council

Although becoming LEED-certified for design & construction does not guarantee sustainable performance in the operations & maintenance phase of a building's life, it does set the stage for achieving it more easily. Data to date show that at the program level at least, LEED-certified design & construction does lead to above-average operating performance in the area of energy efficiency (Turner & Frankel 2008). Since all projects that registered for LEED after 26 June 2007 are required to earn at least two points in energy efficiency, it is expected that going forward LEED-certified buildings will perform even better as a group.

Each LEED rating system includes both minimum mandatory requirements (prerequisites) and optional items that contribute to the project's total point score (credits); hereafter both will be referred to collectively as *LEED credits*. Each LEED credit has the same four-part structure that calls out its essential elements (Table 1):

Table 1. Structure of LEED Credits

LEED credit element	Description	Conceptual role
Intent	the objective of each credit; the environmental goal it achieves	The Why
Requirements	the sustainable traits the building &/or site must have in order to earn the credit	The What
Potential technologies & strategies	the methods of meeting the credit requirements	The How
Submittals	the documentation given to USGBC during the LEED certification process to show the credit requirements have been met	The Evidence

Source: U.S. Green Building Council

The first three elements are all part of each LEED rating system, and are focused on the LEED customer's actual process of designing, building, and/or operating a sustainable building. These activities occur before LEED certification, and USGBC has no role in them beyond answering customer questions about LEED. The fourth element, submittals, is separate from the LEED rating systems per se, and is focused on the process of certifying the building in LEED. USGBC plays an integral role in verifying LEED certification.

LEED Certification Process

Achieving LEED certification for a building provides independent, third-party verification that a building project satisfies sustainable building and performance criteria. In the certification process the LEED customer uses various forms of documentation to demonstrate to USGBC that the project has satisfied LEED requirements for building and site design, construction, or operation.

Standard Process — Individual Buildings

The standard LEED certification process is an exercise of USGBC review of customer submittal documentation for each prerequisite and credit pursued in one project building. The process hinges on the technical submittals USGBC has defined and tailored to each LEED credit; submittals are designed to provide the necessary evidence that the associated credit requirements have been achieved (Table 1). Each LEED credit may have several requirements, and a given requirement may have several associated submittals. LEED submittals mirror the credit requirements, but focus on documenting that the credits have been achieved in a given building rather than describing what must be done in the building (Table 2):

Table 2. LEED Credit Requirements vs. Submittals - Excerpts from the Energy & Atmosphere Category

LEED credit	Requirement	Submittal Documentation
Conceptual Example	Paint the room green.	Provide photos showing the room is green.
LEED-NC v2.2 EA prerequisite 1 - fundamental commissioning of the building energy systems	Verify the installation and performance of the systems to be commissioned.	Provide a narrative description of the systems that were commissioned and the results of the commissioning process.
LEED-EB:O&M EA credit 3.2 - performance measurement: system-level metering	Employ system-level metering that covers at least 40% of the building's annual energy use.	For each system-level energy meter, describe the meter type and location.

Sources: USGBC NC 2005, USGBC EB 2008

For example, since the LEED-NC v2.2 system has 7 prerequisites and 34 credits available, a customer pursuing 20 optional credits in LEED-NC must provide a total of 27 sets of LEED submittals that describe the sustainable strategies implemented in the building, one submittal set per LEED prerequisite and optional credit. Since a single LEED credit may have several associated submittals, a customer pursuing 27 LEED credits typically sends 30-50 separate submittals to USGBC for review. LEED submittals reference building industry standard performance reporting and documentation practices where possible (e.g., commissioning reports), only adding LEED-specific documentation where industry reporting practices are unsuitable or do not exist.

LEED *submittal templates* (Figure 2) are standard forms available from USGBC that define the specific submittal requirements for each LEED credit and help LEED customers organize their documentation and deliver it to USGBC. Early versions used spreadsheets and had to be printed and mailed to USGBC. The modern form is based on the Adobe PDF format and is

downloaded by the customer, filled out, and then uploaded back to *LEED Online*, USGBC's Web-based project workspace.

Figure 2. LEED-NC v2.2 Submittal Template for EA p1 - Fundamental Commissioning

The form is titled "LEED-NC 2.2 Submittal Template EA Prerequisite 1: Fundamental Commissioning of the Building Energy Systems" and includes the USGBC logo. It contains the following sections:

- Header:** LEED-NC logo and title.
- Identification:** Fields for "(Responsible Individual)" and "(Company Name)".
- Verification:** A statement: "I, [redacted], from [redacted] verify that the information provided below is accurate, to the best of my knowledge."
- CREDIT COMPLIANCE:** A section with a large redacted box for "Name of Cx Authority" and "Name of Company".
- Credit Requirements:** A list of requirements with checkboxes:
 - Completed Owner's Project Requirements (OPR) and Basis of Design (BOD) documentation.
 - Incorporated Commissioning requirements into construction documents.
 - Developed and utilized a commissioning plan.
 - Verified installation and performance of commissioned systems.
 - Completed Commissioning Report.
- NARRATIVE (Required):** A section with the instruction "Provide a narrative description of the systems that were commissioned and the results of the commissioning process." and a large redacted box for the response.

Source: USGBC NC 2005

LEED Application Phases

The standard LEED certification process for any LEED rating system is split into four separate phases (USGBC-driven phases are bolded):

- Preparation for review - customer implements sustainable strategies in the building project, then assembles the required documentation and uses LEED submittal templates to organize them and transfer them to USGBC.
- Preliminary certification review (30 days) - customer applies for LEED certification. USGBC performs an initial technical review of all documentation submitted. Based on rigor, clarity, and completeness, USGBC indicates whether each LEED credit is earned, denied, or pending further clarification.
- Customer response - customer provides further clarification requested for any pending LEED credits.
- Final certification review (30 days) - USGBC performs a technical review of any clarifications submitted. Based on rigor, clarity, and completeness, USGBC indicates whether each LEED credit is earned or denied.

Thus in the standard process USGBC reviews every submittal for every LEED credit the customer pursues, and every customer has two separate chances to use the submittals to show

that the project building earned each LEED credit. If the customer wishes to challenge any credits denied in the final review, an appeal process is available. Finally, if the customer is using any design & construction-based rating system (i.e., any except LEED-EB), the customer may also choose to split the overall LEED review into an initial, separate design review and a subsequent construction review, each of which has all the phases listed above.

Challenges for Volume Customers

USGBC developed the standard LEED certification process to ensure LEED's integrity as a third-party certification program. A customer cannot complete the process unless USGBC determines that all required submittals are technically valid and complete; this must be done for all LEED prerequisites plus enough optional points to earn certification (in the LEED-NC v2.2 system, this means at least 26 points).

Although the standard LEED certification process works well for individual buildings, it is less than ideal for customers who plan to pursue certification for dozens or hundreds of buildings. Such customers may need to certify large groups of buildings at the same time, or their building programs may employ standardized designs, systems and equipment, construction processes or operations practices that change little over time, and therefore have many common elements across large numbers of buildings.

From a business perspective these volume customers find it cost-prohibitive to follow the standard LEED certification process for hundreds of buildings; they want and expect to tap into economies of scale. From a technical perspective, their standardized building processes bring uniformity to the table that justifies a more streamlined certification review process.

Early Effort - the Multiple Building Application Guide

USGBC recognized quickly after LEED's initial rollout that many customers wanted to certify buildings in multiple-building contexts. Early requests from LEED customers focused on campus settings, where buildings had common site features or had various amenities provided centrally. Some customers wanted to certify buildings in groups, others wanted to certify new buildings in a setting of existing buildings, and eventually more sophisticated customers wanted to design and construct buildings to common standards and document to USGBC that those standards met LEED requirements. In October 2005 USGBC released its initial effort to provide suitable guidance for such customers – the LEED-NC application guide for multiple buildings and on-campus building projects, or MBAG, which covered LEED-NC versions 2.1 and 2.2 [USGBC MBAG].

The MBAG provided guidance for LEED-NC customers with many buildings on a single campus, and in particular introduced the concept of *prototyping*, in which the customer develops a set of *prototype credits*, or LEED credits intended for repetition on subsequent campus build projects. A prototype credit has the same technical outcome for a group of buildings because of uniformity across the buildings. The MBAG called for USGBC to review each prototype credit normally for the first building using a given customer's prototype credit set, and for subsequent buildings in the group USGBC reviewed the prototype credits on a sampled or audited basis.

The MBAG was a good start at dealing with the multiple-building context, but by late 2006 USGBC realized it needed a more robust solution that provided more scalability and flexibility in the following ways:

- Multiple sites – the MBAG is focused on the campus setting, not nationwide portfolios
- Better alignment with typical building processes – the market perceived even the MBAG’s lighter review process for prototype credits as too burdensome and too LEED-specific for customers having large portfolios with standardized buildings or practices
- Multiple, flexible sets of prototype credits – some customers have several standardized sets of designs or operations practices for different groups of buildings
- Other rating systems – the MBAG focuses on LEED-NC, but customers wanted a scalable process for all LEED variants (EB, CS, CI, Schools, Retail)

Volume Customers, Uniformity, and Prototyping Assessment

A LEED volume customer is an organization that owns, leases, or manages large numbers of buildings or tenant spaces that the customer wants to certify in LEED. USGBC is now piloting a Portfolio Program intended to help LEED volume customers integrate sustainable building practices into their standard business operations; the program includes 40 organizations covering approximately 1700 buildings and 130 million square feet of floor space [USGBC PP].

As part of that pilot program USGBC built on the principles in the MBAG and designed an alternative process, the *LEED volume review*, for certifying buildings for these customers. The USGBC had five basic goals in designing the LEED volume review, many of which the MBAG had partly accomplished:

- Take advantage of uniformity in buildings or business processes to achieve economies of scale, in turn leading to reduced costs for LEED volume customers and for USGBC
- Develop alternative documentation methods to substitute for full LEED submittals for every LEED credit for every building
- Standardize the process as much as possible, while tailoring it where necessary to specific commercial building market segments, programs, or practices
- Preserve the integrity of the LEED program and the LEED certification process
- Allow changes to the LEED submittal documentation but no changes to LEED credit requirements (Tables 1 and 2); any single project must fail to certify in the LEED volume review if it would fail in the standard individual building process

The potential for making the LEED volume review more efficient depends on the level or degree of conformity within a given LEED volume customer's buildings. A basic level of uniformity exists by virtue of being a volume customer, which in itself enables a basic amount of review process efficiency. Higher levels of uniformity enable progressively higher efficiency. The USGBC's pilot volume review process requires that the base level of uniformity applies, and also requires the volume customer to assess whether any higher levels of uniformity exist.

Base Uniformity - Standardized Building Programs

Since a LEED volume customer's portfolio is owned, leased, or operated by a single organizational entity, all building projects within that portfolio fall under the same business processes and management structure. This is the most basic level of uniformity present for a volume customer, and USGBC developed two fundamental, volume-specific submittals to take advantage of that uniformity. Taken together they serve as substitutes for site-by-site procedure and documentation, allowing USGBC to be confident that all LEED requirements have been and will be met in every project building for that customer, but without USGBC having to review all the submittals for every LEED credit for each separate project (USGBC QC 2008):

LEED quality control plan - the volume customer's methods of verifying that LEED intent becomes reality, ensuring that LEED requirements have been incorporated into its standard building processes. The customer explains the ways it consistently delivers buildings that meet the requirements of each LEED credit no matter where the project is located and who is overseeing the job. The LEED QC Plan explains how the customer ensures LEED elements will be verified at various stages of the building process and that the LEED elements of the project will not be eliminated by the owner or by any member of the team. The scope of the QC Plan must include every pursued LEED credit, all phases of each task from initial planning to completion, and methods of maintaining accountability. The plan must cover all elements of the QC process for each critical building task, including what is checked, how it is checked, who does the checking, when and where the checking is done, and at what level of detail. All task checks must have formal outputs as documents that can be reviewed, both by the participant as part of its overall QC process and by USGBC during later phases of the LEED volume review. Examples include completed checklists, design review reports, summaries of construction site spot-checks, photos of interim progress, etc. These QC documentation outputs are created, used, and stored using the customer's choice of methods and formats.

LEED education plan - the volume customer's internal methods of training its staff, consultants, and contractors on how to implement LEED measures and incorporate them into existing quality control programs. The training must be directed at those responsible for meeting new requirements (such as local design and construction teams) and those who verify that new requirements have been met (such as corporate review of local work, or project managers that review on-site procedures). The training ensures that everyone involved in planning, managing, and executing the building job understands what their role is in delivering sustainable buildings. The submittal includes training materials (meeting presentations, required readings), required training schedules for all key personnel, as well as descriptions of the types of training performed (briefings, tailgate meetings on-site, employee awareness programs, online resources offered). Although USGBC sets these minimum requirements for the education and training, USGBC does not offer such training; it is USGBC's intention and expectation that each volume customer integrate LEED training into its standard building practices as it sees fit.

Higher Uniformity - The Variance Assessment

Generally LEED projects encompass a wide variety of building shapes, sizes, appearances, types, uses, designs, and mechanical systems. LEED itself does not prescribe any boundaries on any of these traits; it merely insists that traits be sustainable where feasible. However, a given owner or manager of multiple buildings often has standardized designs or operations practices for buildings having standard uses. Other owners have diverse buildings clustered together on a single campus taking advantage of common facilities and amenities.

This second layer of uniformity allows an even more efficient review process for certain LEED credits by enabling prototyping, as originally introduced in the MBAG. The *potential* to prototype each LEED credit depends on the volume customer's specific situation, which LEED defines using four types of customer scenarios that describe four general but distinct levels of uniformity within a given LEED volume customer's portfolio of buildings (Table 3).

Table 3. Prototyping Potential by Customer Scenario

Volume customer scenario	Uniformity / Prototyping Potential	Example
Different project, different site	Lowest	General case
Different project, same site	Low	General corporate or university campus
Same project, different site	High	Identical nationwide retail outlets
Same project, same site	Highest	Identical college dorms, military barracks on one campus

Source: USGBC PP

The terms in the first column of Table 3 (e.g., *same site*) are illustrative, but too vague for use in formal prototyping rules for LEED credits. USGBC defines these terms in more detail, intentionally avoiding over-precision to allow some flexibility [USGBC key defs].

With the uniformity assessments and general process documentation described above in place, each LEED volume customer has a firm foundation from which to develop a collection of buildings and prototyped credits for the LEED volume review.

Structured Prototyping — the LEED Schema

The prototyping of LEED credits is the heart of any customer's preparation for a LEED volume review. The basic prototyping concept is the same as that introduced in the MBAG, but the process is more formal and structured and takes full advantage of the variance assessment described above.

The LEED volume customer develops its suite of prototype credits based on a *LEED schema*, or conceptual building representing a group of buildings expected to have the same LEED results because they have the same design, construction, or operational traits. Each LEED schema is formally linked to a customer-defined sub-group of its overall portfolio. The customer submits the prototyped credits to USGBC for a formal LEED review, and once complete, all

earned prototype credits are then considered “precertified” for all buildings within that schema. All approved prototype credits have greatly reduced review requirements when that schema's buildings later come through certification review (details discussed in example below).

The LEED schema often represents a standardized building design intended to look the same regardless of where it is or who manages the construction job (e.g., same project, different site). One example of this is a corporate restaurant chain, whose brand identity demands that all outlets look, feel, and operate the same way. Building programs that deliver many buildings with the same look and feel typically also design and specify their materials and systems to be similar in order to achieve economies of scale and predictable construction outcomes. The prototyping of LEED credits intends to take full advantage of this uniformity.

In the LEED volume review the traits of the schema determine which customer scenario in Table 3 applies, and thus the prototyping potential of the project. A given volume customer may have only one LEED schema or several, and may have schemas in one scenario or several, with each schema representing a different standardized building design and each with different sets of prototype credits tailored to the uniformity in those designs. If prototyping is not possible for a given credit in a given schema, the volume customer can still pursue that individual credit using standard methods. Similarly, some buildings may not belong to a schema at all; such buildings are best suited to the standard LEED review process because they lack the uniformity of the schemas.

Prototyping Rule Sets

The LEED volume customer does not prototype credits in a vacuum; prototyping occurs within specific USGBC-defined limits. Prototyping is possible only if the customer produces a detailed QC Plan and Education Plan as described above that explain the customer's methods of ensuring job quality and the proper outcomes for all LEED credits. The prototyping process cannot be completed until and unless USGBC reviews and approves both plans.

Even having a good QC Plan and Education Plan, however, does not by itself enable prototyping throughout LEED. Prototyping is highly context-dependent, applying to some LEED credits but not others, and to some customer situations but not others. Also, prototyping of the same technical building issue (e.g., energy efficiency performance) may make sense in a design & construction setting (LEED-NC) but not in the operations & maintenance setting (LEED-EB). Moreover, within a given LEED credit some submittals may be appropriate for prototyping while others are not. Using a common scoring matrix, USGBC has performed a technical assessment of prototyping potential for each LEED credit in each LEED rating system, and for all four customer scenarios from Table 3 [USGBC rule sets]. It is essential to understand that the prototyping rules *assume a USGBC-approved QC Plan and Education Plan are in place as part of the overall LEED volume review*; without these key documents no prototyping is possible.

Table 4 shows prototyping rules for some Energy and Atmosphere credits.

Table 4. Example Prototyping Rules

Rating system	EA credit	Volume customer scenario	Prototyping permitted?	Notes
NC v2.2	p3 - CFCs	all	usually	lack of CFCs is easily demonstrated for ground-up new construction
NC v2.2	c1 - energy model	same project, different site	sometimes	model must represent "worst case" performance of any building/climate in the schema
NC v2.2	c1 - energy model	different project, different site	never	--
EB: O&M	c4 - off-site renewables	all	usually	green power purchasing is generically available and documentable
EB: O&M	c2.1 - commissioning investigation	same project, different site	sometimes	the same analysis and procedure must be followed in all buildings within the schema

Source: USGBC rule sets

The volume customer starts with the prototyping rule set that applies to its customer scenario and chosen rating system and overlays it with the customer's matrix of desired prototype credits. If the overlay shows that prototyping is not permitted for any credits the customer wishes to pursue, those must be documented using the normal method (full standard LEED submittals for each building). If the overlay shows "sometimes" then USGBC and the customer have further discussions to clarify the customer's situation and assess whether prototyping is valid for that credit. If the overlay shows "usually" then the credit is deemed appropriate for prototyping unless the expected level of uniformity is somehow ambiguous or missing in the customer's situation.

Once the slate of prototype credits is developed and approved, the customer finishes specifying the LEED schema and assembles support documentation for all prototype credits. The next step is beginning the LEED volume review.

The LEED Volume Review Process - LEED-NC Example

Once the volume customer has fully prepared all documentation and applied for LEED certification, the volume review process proceeds through the following phases. For simplicity this summary will focus only on LEED-NC; the process for LEED-EB is similar in concept.

Schema precertification (intent) — USGBC performs a technical review of the submittals for all prototyped credits based on the customer's LEED schema. Design-oriented credits are reviewed normally; construction-oriented credits are reviewed based on the *intended* outcomes instead of *actual* outcomes. No buildings need be completed yet, which makes this step of the process different from the standard LEED review process. USGBC also reviews the QC Plan and Education Plan to be confident LEED intentions will actually be realized in the field. Upon successful review the schema is declared precertified in LEED, and USGBC issues a precertification LEED scorecard for the schema showing the results for all prototype credits. The schema precertification lasts for a maximum period of 2 years.

Initial volume certifications (early outcomes) — the customer provides standard LEED submittal documentation for the first set of constructed buildings within the precertified schema and proceeds through a standard LEED review for those buildings. (required for the first 3-10 buildings, depending on how many buildings the customer intends to certify under the schema) For all prototyped credits the customer has implemented its QC Plan and Education Plan, recorded any variances that occurred, and documented their resolutions and/or their impact on LEED performance. The QC Plan and Education Plan are revised as needed. Any individual credits (i.e., not prototyped) are reviewed using the standard LEED process. During this phase USGBC awards or denies LEED credits based on actual outcomes. If a given building earns enough LEED credits, USGBC awards regular certification to that building and its LEED review is deemed final. If enough of the initial buildings in the LEED schema earn certification, the schema has successfully proceeded through this phase.

Ongoing certifications / maintenance period (later outcomes) — in this phase the volume customer provides only basic project information to start the LEED review of a given building (address, completion date), along with an annotated prototype scorecard with explanations of any variances from prototype credits for the building and how they were resolved. USGBC review of prototype credits in this phase is drastically reduced and is no longer based on formal LEED submittals. Rather, USGBC randomly audits the documentation outputs established in the QC Plan according to the customer's standard building program and documentation process. This is done for 5-20% of buildings, again depending on how many are registered under the schema. When a building is QC audited and passes the audit, it earns regular LEED certification, as do any other buildings that have come through the maintenance period since the last audit if they have no individual credits. Thus, it is possible that in this review phase some buildings in the schema may earn LEED certification with USGBC reviewing only simple, basic building-specific information.

By the time a volume customer reaches the maintenance period several buildings have been through the full LEED review process and the QC Plan and Education Plan have been thoroughly tested and revised as needed. Both the volume customer and USGBC have established confidence that a rigorous building program is in place that will deliver consistent, high-quality outcomes in the field. At this point in the process hundreds of buildings can be certified quickly, efficiently, and with high confidence.

The LEED volume review achieves its goals by tailoring the process to the level of uniformity within each LEED schema, but retains the certification focus on individual buildings. Although schemas and their corresponding collections of prototype credits can be precertified, only completed buildings with all their sustainable strategies in place can be LEED certified.

Conclusion

The original LEED certification process has its roots in certifying one sustainable building at a time, and thus is poorly suited to large portfolios of buildings. The LEED volume review provides a high level of process efficiency for large portfolio owners or operators of buildings, particularly those with similarities across their building stock. It offers alternative methods of documenting and reviewing LEED credits, while disallowing any changes to the

LEED requirements themselves. This meets the needs of large portfolio owners while preserving the integrity of the LEED program.

At this writing the LEED Portfolio Program and the LEED volume review are in a late pilot phase of development. The pilot will continue throughout 2008 as the 40 participants help USGBC refine the process; roll-out is expected in early 2009. It is hoped that refinements will allow more streamlining options for more types of volume customers, enabling ever-larger adoption of LEED and ever-growing reductions in the environmental impact of building design, construction, and ongoing use.

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