

THE CRITICAL ROLE OF PROCESS IN DEVELOPING A GREEN BUILDING RATING SYSTEM: THE LEED FOR HOMES EXPERIENCE



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Summary

The LEED (Leadership in Energy and Environmental Design) for Homes Rating System began its pilot demonstration phase in August 2005. LEED for Homes differs in significant ways from the LEED programs for commercial buildings. Its differences have arisen in response to a particular set of characteristics of the U.S. home building industry.

Many unique aspects of LEED for Homes relate to the technical rating criteria. However, a number of the more important lessons learned in the course of developing the program relate to how the **process by which the development effort is conducted** affects the effectiveness of the resulting rating tool and delivery infrastructure. Still other key lessons relate to the importance of the **process by which homes are designed and built** – as distinct from the physical features of the homes, per se.

This paper describes those key aspects of process and offers ideas about how these insights might benefit others who are developing green building rating systems and assessment tools intended for adoption in their respective unique cultures and industries.

Keywords: Green building, integrated design, LEED, process, rating system

1 Introduction

LEED for Homes began its pilot demonstration phase in August 2005 with regional administrator organizations (“Providers”) in 12 geographic areas around the U.S. Now, with nearly 400 projects and 6,000 residential units participating in the pilot, the rating program is headed toward a significant expansion in mid-2007 – adding service providers in approximately 20 new North American metropolitan areas – and a U.S. Green Building Council (USGBC) member vote in the fall of 2007.

LEED for Homes differs in many significant ways from the LEED programs for commercial buildings (LEED-NC, et al.). Its differences have arisen in response to a particular set of characteristics of the U.S. home building industry. These differences

explain both why we were not able to benefit more by the U.S. Green Building Council's experience with the other LEED programs, and why this paper includes inevitable references to ways in which LEED for Homes differs from the commercial building rating programs.

Many unique aspects of LEED for Homes relate to the technical rating criteria. However, a number of the more important lessons learned in the course of developing the program relate to the critical role of the **process of development** (i.e., how the development effort is conducted) in determining the effectiveness of the resulting rating tool and delivery infrastructure. Still other key lessons relate to the importance of influencing the **process by which homes are designed and built** – as distinct from the features of the homes. The latter can be assessed; the former represents some challenges.

This paper will describe those key aspects of process and offer observations about our experience with them in the LEED for Homes program. It will also – more importantly – offer ideas about how these insights about process might benefit others who are developing green building rating systems and assessment tools intended for adoption in their respective unique cultures and industries. The lessons we learned along the way also may have relevance to individuals and organizations engaged in the creation of other types of instruments aimed at widespread public adoption and market transformation.

2 The Process of Development

Creating a rating system (like creating many things) is all about process: **How** do you do it? Who is involved? At what stages? What tools, skills, and resources will you need? How will the players work together?

When we began work on LEED for Homes, we didn't have answers to many of these questions. To be honest, we didn't even necessarily know all the questions we should be asking. We've since learned a whole lot about what we didn't know then.

In retrospect – nearing two years since the beginning of the pilot demonstration phase – it is clear that many aspects of the process of developing LEED for Homes have influenced the effectiveness of the rating tool and the delivery infrastructure.

The most influential aspects of the development process include:

- Stakeholder engagement
- Commitment of resources
- Volunteer involvement
- Business model development
- Consensus decision-making

The sub-sections that follow discuss each of these topics.

2.1 Stakeholder Engagement

When LEED-NC was developed, it was the only green building rating program for commercial buildings in the US. This perhaps explains USGBC's relative tardiness in recognizing that there in fact *were* other stakeholders to consider in the development of a residential counterpart to LEED-NC, and then its slowness in engaging them. The USGBC historically has drawn the great majority of its membership from the commercial construction industry, with relatively little participation from the residential building

industry. This bias persists today, although the balance is finally shifting somewhat to better reflect the roughly comparable level of economic activity in the two industries in the US.

LEED for Homes (then “LEED-Residential” or “LEED-R”) was first a glimmer in the eye of USGBC sometime in 1998. The effort received initial support from USGBC in 1999 and got off the ground in earnest in 2000. However, it was not until the summer of 2002 that the first stakeholder meeting took place, in Washington, DC. That first meeting included a number of national groups, including the National Association of Home Builders, several federal agencies (US DOE, EPA, HUD), and a select handful of regionally- or nationally-active leaders in residential green building. The focus of this initial meeting was to solicit input on the most strategically effective niche for a LEED residential program to fulfill, a role that would assist the other stakeholders in furthering the green building agenda nationwide.

The following year – in April 2003, in Kansas City, Missouri – USGBC held its second residential “summit”, this time inviting leaders from all of the US residential green building programs then in existence. Most of those invited did participate in that meeting, the goal of which was to further explore the best role for “LEED for Homes” (the name changed as an outcome of the Washington meeting) in the national arena.

By 2002, there were roughly two dozen local or regional residential green building programs in place across the United States, the first having been founded in Austin, Texas, in 1991. Individuals associated with many of these programs were among those first approached by USGBC to work on the LEED residential program, and many in fact became members of the earliest LEED-R technical groups. Even so, it took fully two years – from 2000 to 2002 – before USGBC began to engage formally with the green building programs **themselves**.

The USGBC’s tardy outreach to the residential green building programs was a significant political and strategic error which continues to plague the Council. The U.S. green building community in the late ‘90s and earliest years of the 21st century was still quite small, so word was out that USGBC was working on LEED for Homes. Undertaking this effort without **first** making formal outreach to the existing residential programs engendered a variety of reactions among those programs, principally fear and anger. Some of those attitudes persist today, despite a relatively open and active dialogue between USGBC and those programs in the years since 2002. The delay in outreach unquestionably has been a liability for USGBC in pursuing its aims with LEED for Homes, having set up a relationship with its prospective allies that instead of being enthusiastically collegial, has ranged from merely tolerant to outright adversarial at times. USGBC continues to be slow to pursue a dialogue with those programs in significant depth, and – not surprisingly – USGBC’s ongoing development of the LEED for Homes program continues to be greeted by the other programs with a certain amount of apprehension and resistance.

2.2 Commitment of Resources

LEED for Homes has taken longer than it ideally would have to move from the idea stage to marketplace. This is due at least in part to USGBC’s slowness in mobilizing resources adequate to robustly support the program. Until hiring a consultant to assist with program development in April 2004, the only USGBC personnel support for LEED for Homes was a small portion of a junior administrator’s time, starting in 2002; the program still does not have full-time administrative support (although that is purported to be changing soon). In

the fall of 2004, USGBC hired a staff program manager and assigned one-third of a program administrator. (The staff program manager left in early 2006 and has not been replaced, his duties having been absorbed by the USGBC's consultant. USGBC recently re-advertised for this position.)

In the fall of 2005, a second staffer was hired, to focus on affordable housing. It also was not until the fall of 2005 that the program received any appreciable attention from other USGBC departments, including marketing, public relations, information technology, education, or fundraising. To date, those departments still provide negligible support to LEED for Homes.

In USGBC's defense, the Council has been chronically overwhelmed with the explosive growth of the commercial LEED programs, and has dedicated massive resources to meeting the needs of those programs. Nevertheless, this has meant relatively little attention – or budget – for LEED for Homes, despite the USGBC Board's recognition that residential construction represents half of all building activity in the U.S.

Consequences of the slow commitment of resources have included launching the pilot demonstration phase of the program without key tools in place; pilot participants have consistently requested more and better marketing materials, training, and documentation tools. Among other things, this has meant that the 12 Providers are creating their own tools, representing a huge duplication of effort and costs at the regional level, when this would be much more efficiently done centrally. In many cases, the Providers have not been able to recoup their investments in developing these tools and have concerns about the ongoing financial viability of their role in delivering the LEED for Homes program. A somewhat lesser, but nevertheless valid, concern is a lack of consistency in documentation and verification methods around the country.

2.3 Volunteer Involvement

Most of the work of developing and refining the rating criteria (the credits) has been done by USGBC volunteers working in technical advisory sub-committees ("TASCs") of the LEED for Homes Committee. The TASCs generally meet via conference call every two weeks; their principal responsibilities since the beginning of the pilot in August 2005 have been to adjudicate credit interpretation requests (CIRs) and Innovation & Design Process (ID) credit proposals, and respond to other queries from pilot participants (typically clarifications of the credit language).

The time demands on TASC members, chairs in particular, have been significant. This volunteer-based model, adopted by USGBC with the development of LEED-NC, is somewhat less problematic (though not entirely lacking in challenges) in the context of the LEED commercial programs because many of USGBC's active volunteers in the commercial sector work for organizations large and profitable enough to allow their employees to comfortably contribute a certain amount of their time to support LEED. However, companies and individuals in the home building industry tend to operate on slimmer margins and be more time-constrained, simply because of the different nature of this industry.

This has meant that the TASCs have struggled, at times, to meet frequently enough to stay on top of their work loads. Attendance has also been sporadic, with different subsets of the TASCs meeting on different calls, often necessitating revisiting issues repeatedly. It has also meant that chairs have come and gone, institutional memory and

therefore continuity have suffered, and sometimes project teams have had to wait quite a long time before their questions have been answered.

A consultant was assigned to support the TASCs in mid-2006, a year into the pilot. This has alleviated these problems to a great degree, but not entirely. In a more ideal model, staff support for the TASCs would have been in place from the outset and as much staff time as needed would be made available to the TASCs to assist them with needed research as well as administrative support. It has also been suggested that USGBC provide a stipend to TASC chairs; this suggestion has never received any support, however.

2.4 Business Model Development

Because of the high sensitivity in the home building industry to anything that adds time, cost, or complication to the business of creating homes, LEED for Homes was able to borrow relatively little from LEED-NC, et al., in its fundamental structure. The rating system and delivery process were therefore designed anew, from the ground up. Put differently, the business model for the LEED commercial programs had almost no applicability to LEED for Homes, so the LEED for Homes business model has been entirely new to USGBC. As an entirely new creation, it might have benefited from a more thorough scrutiny and refinement before ‘hitting the streets’ at the beginning of the pilot.

Not having had the benefit of that thorough analysis, the business model has experienced some major refinements since the pilot launch. A few of those refinements include re-envisioning and redefining the roles of various players in the delivery infrastructure; rethinking (several times) the types of education needed by different players (with curricula yet to be developed); and a process unfolding at the time of writing this paper, wherein the Providers are in dialogue with USGBC about how best to structure the ongoing delivery of the program when it expands into new North American markets.

One of the key aspects of the business model at issue relates to competition. The pilot Providers have invested considerable resources in developing their delivery of LEED for Homes as a new business offering. They are therefore understandably loath to see new competitors arise when – in some cases – they have yet to see a profit from their investment in getting the program started. USGBC has from the beginning envisioned the program as a competitive business, wherein multiple Providers might operate in a given geographic area, competing for the business in that area on the basis of their offerings, experience, etc. USGBC is, however, exploring ways in which it can comply with anti-trust law while not jeopardizing the pilot Providers’ initial investment. The business model is therefore still under development.

2.5 Consensus Decision-making

One given of developing a LEED rating system was that the LEED for Homes Committee would operate using USGBC’s standard consensus method of decision-making, which is a core operating tenet of the organization. Stating in my own terms what this has meant, differences of viewpoint needed to be resolved not by voting, but by crafting solutions that were at least reasonably acceptable to all committee members, even when some members may have had minor reservations about some aspect of those decisions. Functioning within the constraints of this process have taught me some profound lessons.

The first lesson has been that consensus, per se, is a tremendously powerful instrument. I have observed, on countless occasions, a decision arrived at by consensus that is much more elegant, innovative, and flexible than any proposed by individuals.

The second lesson is that a really sound, technically robust solution requires a **consensus of experts**. This is a lesson learned both via omission and by commission. As mentioned earlier, the LEED credits were drafted principally by the TASCs, and the LEED for Homes Committee took some effort to populate the TASCs with subject matter experts. Even so, however, we lacked for a time sufficient genuine technical expertise in some specific subject matter areas – notably ecological land use planning, landscaping, irrigation, and hydrology. Although we eventually marshalled that expertise, our delay in doing so has caused us to revisit these areas repeatedly and take extra time to refine the relevant rating criteria.

I first heard the term „consensus of experts“ at an experts‘ meeting held to support our effort to refine the Durability Management Process credit (described below); the term arrested my attention at the time as being a very important concept. I was then already a confirmed advocate of the consensus process, but I had not yet articulated the second crucial element of a good consensus, which is the quality of the participants in that process. Good people + good process = good product. **Really** good people + **really** good process = **really** good product. Setting aside humility for a moment, I believe that LEED for Homes (while far from perfect) embodies evidence of this principle.

The final lesson I have acquired from my efforts at facilitating consensus decisions has been to learn from discomfort. When a committee member is not comfortable with the direction a decision is leaning – no matter how much I might struggle to understand the member’s viewpoint – I have learned to search for the kernel of truth at the heart of his or her discomfort, for that kernel often produces a refinement that distinctly improves the final decision. And similarly, no matter how uncomfortable I may be, or others may be, with a message a committee member is expressing, I have learned to look for the part of that message with which the committee as a whole can agree. In this way, I have found that consensus – among experts – is a path to decision-making that is ultimately extremely rich and rewarding. Also, that while the path to consensus may seem convoluted and even messy at times, it is in reality the most efficient path from the starting point of a discussion to its satisfactory conclusion.

3 The Process of Creating LEED Homes

This part of the paper describes lessons learned about the importance of influencing the process by which homes are designed and built. These lessons relate to four principal topics: durability, integrated design, energy performance, and the mechanics of certification.

3.1 Durability

A continually perplexing aspect of developing LEED for Homes has been the strong desire on the part of committee members and others in the green building world to effectively address durability in the rating system. When we first tackled this problem, we focused on inherently durable materials; however, we rapidly concluded that durability is inextricably a function of design, materials, and construction. Any one of these, addressed inadequately, can undo the good of the other two. We also realized that material selections and design strategies are strongly influenced by a wide range of project-specific variables, rendering it impracticable to specify any but a few materials and design methods that are universally applicable. Thus, we realized, a prescriptive approach to addressing durability

was not workable. A performance-based approach would be even more problematic, given the complete absence of both widely accepted benchmarks for what constitutes durable performance and objective means of judging whether or not the desired performance is in fact achieved in a given home.

This durability conundrum arose to the first “process-based” credit in the LEED family. The durability credit in LEED for Homes is the subject of another paper [1]. The credit, LEED for Homes ID2, “Durability Management Processes”, defines a number of steps that must be completed in order to comply with its mandatory and optional aspects. It is critical to note that (with the exception of a very few indoor moisture measures) the project team is left to decide on its own **what** are the appropriate durability measures to include in the home; the credit simply guides the **process** by which the measures are identified and then addressed in the project.

3.2 Integrated Design

Very early in the process of developing LEED for Homes, a committee member observed that checklists are inherently antithetical to the notion of really green buildings. This is true; the green building community widely acknowledges that the greenest, highest-performing buildings result from an integrated design process that is not checklist-based but rather holistic, cyclical, iterative, and systems-based. So this paradox has been before us since the very beginning: we were charged with creating a checklist-based system that would somehow transcend checklists to foster a more integrated approach to designing and building high-performance homes.

Interestingly enough, despite this early and ongoing realization, it was not until after the pilot was underway for quite some time, and the durability management credit had been crafted and recrafted several times, that we realized that we could adopt the same process-based approach to addressing integrated design. In fact, the further realization was that our delivery system already had the rudiments of an integrated design approach built into it in the form of the “preliminary review” performed by the Provider. While this preliminary review was codified in the Provider and pilot participant agreements, it was not codified in the rating system itself – and yet it was a de facto requirement of achieving a rating.

From this realization, it was but a few short steps to draft a credit that encompassed the preliminary review (mandatory) and some more advanced (optional) aspects of an integrated design process:

- Assembling an integrated project team
- Involving the team in multiple project phases
- Conducting regular meetings with the team
- Holding an integrated design charrette

Because this process was broader in purview than the durability management process, it became ID1, Integrated Project Planning.

The next logical outgrowth of this thought process was a change that may appear relatively superficial but which is didactically important: we moved the physical location of the ID (Innovation & Design Process) category from the end to the beginning of the rating system and checklist documents. This carries a profound message: **these processes should be set in motion before any other activities are begun**. That message is of course reinforced in the credit language itself, but the placement in the rating system is a more powerful message still.

3.3 Energy Performance

The Energy & Atmosphere (EA) category in LEED for Homes has as its cornerstone the US Environmental Protection Agency's Energy Star for Homes program. Specifically, a LEED Home must be Energy Star qualified (or achieve equivalent performance). While it was a strategically important decision for USGBC to align LEED for Homes with an existing, credible, accepted program in the home building industry, achieving Energy Star performance represents an area of uncertainty for LEED project teams that lack prior experience with that program.

At the core of the Energy Star for Homes program is an evaluation process known as a HERS (Home Energy Rating System) rating. There are two principal components to the HERS rating – computer modeling to simulate the energy performance of the home (which generates a numeric score), and a series of physical inspections to verify in-field compliance with assumptions upon which the modeling was based. Provided the in-field tests are passed, the home receives a specified number of points in the EA category based on the numeric HERS score.

For project teams unfamiliar with Energy Star and HERS protocols, a home's performance with respect to the on-site tests (principal among which are insulation installation quality, blower door, and duct blaster) is a complete unknown, making it very difficult for the team to assess the likely performance in the EA category. Because there are important time, budget, and constructability implications attached to the credits selected to achieve the desired LEED score, project teams therefore need to have a **process** that will enable them to estimate their probable HERS rating.

To date that process has not been codified in the LEED for Homes Rating System. The only stated process requirement is to undertake a HERS rating; the means by which the targeted HERS score may be achieved is not prescribed, nor even described. It may be inferred, to an extent, by reviewing the prescriptive energy credits in LEED for Homes, recognizing that each represents one of the variables that will influence the home's total energy performance. Those prescriptive credits (which exist as an alternative scoring method for projects that don't wish to undertake the Energy Star process, per se) address the following parameters:

- Insulation (amount and quality of installation)
- Envelope air leakage
- Window performance (thermal conductance and solar heat gain)
- Duct leakage
- Space heating and cooling equipment efficiency
- Water heating equipment efficiency
- Water heating distribution efficiency
- Lighting
- Appliance selection
- Renewable energy

Not listed, and not addressed explicitly in any of the LEED for Homes energy credits, is passive energy design. This is because the modeling used to generate the HERS rating is held to reflect the performance of the home, including its passive design features. However, different modeling software programs vary as to their ability to account for passive design measures. And as different modeling programs are used by HERS raters in different parts of the U.S., this is an aspect of energy performance that may or may not be

adequately reflected in a particular home's HERS rating. To date, a number of project teams have successfully applied for credit interpretations and/or ID points for passive design when it has not been adequately reflected in the modeling. USGBC has contemplated addressing passive design more comprehensively in future versions of LEED for Homes.

In the mean time, however, it would be desirable to provide further process direction to project teams as to how to strategically approach the energy design of a home. This may be an opportunity for another process-based credit; or if not, there would be great value in at least providing a robust directory of resources to assist design teams in this undertaking. The interplay amongst the numerous variables affecting energy performance is complex; it requires a good deal of technical sophistication to optimize a home's energy design via the manipulation of these myriad variables. Unfortunately, the required expertise is still relatively little-represented in architecture, mechanical engineering, and the allied design professions.

3.4 The Mechanics of Certification

Now, 21 months into the LEED for Homes pilot, confusion still exists among Providers and their representatives about how best to support project teams undertaking a LEED Home certification process. The culprit for this confusion is primarily the lack of formal training yet available for the individuals charged with hands-on support to project teams. This is exacerbated by the inadequacy of tools (e.g., tracking and verification forms) provided by USGBC, mentioned previously.

USGBC, at the beginning of the LEED for Homes pilot, conducted a one-day initial pilot overview workshop for all the Provider organizations; at least one representative from each Provider group attended that workshop. Subsequently, USGBC conducted one full-day orientation seminar in each Provider's home territory; the seminars were attended by prospective pilot project teams (builders, architects, owners, developers, consultants, et al.), Provider staff and consultants, HERS raters [2], sponsors, and other interested parties.

In short, all pilot participants received the same type and amount of training about the program, whether their involvement was going to be in designing, building, rating, administering, or otherwise supporting the program.

As the program has grown during the course of the pilot, many Providers have added new support personnel, some of whom have had no formal LEED for Homes training, either from Providers or from USGBC. As a result, there is now a need, rapidly becoming more urgent, for USGBC to develop appropriate educational opportunities for participants in the LEED for Homes certification process. It has also become evident that the training needs to be differentiated for different roles in the process. It is likely to be 12 to 18 months before that training is forthcoming; meanwhile, USGBC expects to add as many as 20 new Providers, representing numerous personnel, virtually none of whom will be adequately trained if the pilot experience is any indication.

Fortunately, pilot participants understand that they are guinea pigs – that is, USGBC and its Providers are learning at their expense and with their consent. For the most part, the pilot participants to date have shown themselves to be willing, tolerant, and generous contributors to the process of knowledge acquisition for USGBC and the Providers. However, it is time for USGBC to step up the commitment of resources, as the driver of virtually all other critical processes, commensurate with the prospective uptake of the program that will occur with the expansion into 20 new metropolitan areas. The second

wave of participants – albeit still „beta testers“ – are likely to be considerably less tolerant, knowing that USGBC will by then have had two years to refine its “new” program.

4 Conclusions

It may be obvious what I would suggest be done differently, were we to start the LEED for Homes development process over again (and in some cases, I have the perverse satisfaction of having said so at the time!). Nevertheless, it is perhaps worth a few words in the way of distillation. My advice to others engaged in comparable efforts is encapsulated below.

Engage your stakeholders as early in the process as humanly possible. To delay will cost you dearly in good will.

Marshall lots of capital; you can't possibly do too much fund-raising in advance.

Put a robust support infrastructure in place. If your organization wishes to undertake a project of significance, it needs to be prepared to equip it accordingly.

Anticipate your needs and develop tools as you go. Don't wait until your core program is launched; by then, you'll already have legions clamoring for the tools, and not having them ready will mean disappointed constituents and missed revenue opportunities.

Engage as much legitimate expertise as you possibly can, and operate by consensus. Short-changing consensus inevitably means a compromised and therefore vulnerable outcome.

Be ever-watchful for ways in which elements of process can be built into your program. This is tricky; process is by nature qualitative and thus hard to evaluate. However, there are precedents in many industries for processes that are recognized to correlate strongly with positive outcomes. And ultimately, it is through good **process** that good **products** are created. Foster this in all possible ways.

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References

- [1] EDMINSTER, A., YOST, P., HALL, J. *Durability in LEED for Homes: Capturing Integration in a LEED Credit*. Paper at Rethinking Sustainable Construction 2006, Sarasota, Florida, USA, September 2006.
- [2] HERS raters have typically been retained by Providers to perform all in-field verification activities for LEED for Homes, including traditional HERS testing as well as additional LEED verifications.

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