LEED in Upstate New York:
An Exploration of Barriers, Resources and Strategies

Prepared for the USGBC New York Upstate Chapter
and the Environmental Finance Center, EPA Region 2
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Abstract

A team of researchers exploring green building processes conducted a study involving barriers, both perceived and real, to US Green Building Council's LEED certification in small municipalities in Upstate New York. The study was performed to assess factors that influence the complex issues of sustainable design, fund availability and market transformation. Increasingly, construction and renovations are incorporating environmentally friendly design components to address a range of issues from energy costs to global climate change. This study examines the ways in which Upstate New York communities are encountering obstacles that prevent them from initiating or completing LEED certified capital projects. The project team conducted a literature review on existing research and performed case interviews with stakeholders. Evidence from this study suggests that in Upstate New York there are ten key barriers as to why projects may either not be built using green design or may be implemented with LEED in mind, but fail to achieve certification. The researchers provided several recommendations on refining approaches and delivery systems in order to promote LEED certification practices and sustainable development. A comprehensive inventory of available funding sources for municipal capital projects was also identified.

Keywords: green building, LEED, sustainability, US Green Building Council

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Introduction

The US Green Building Council (USGBC) is a pioneer in the emerging movement that promises to revolutionize the built environment through the incorporation of the Triple Bottom Line: social, economic and environmental sustainability. Thanks to their pivotal LEED (Leadership in Energy and Environmental Design) rating system, design and construction practices are reducing their harmful environmental impacts while not sacrificing profitability. Improved health and well-being of occupants through cleaner air and natural lighting are also part of the philosophy of LEED.

Each year, more green processes move into mainstream construction and renovation, but significant stumbling blocks toward widespread adoption of LEED certification remain. Communities and small municipalities continue to encounter obstacles, whether actual or perceived, which prevent them from initiating sustainable capital projects. However, with energy prices continually on the rise, non-green construction risks becoming obsolete. Identifying the regional and cultural barriers to green building faced by communities and small municipalities and strategizing recommendations with which to address those challenges is critically important to furthering the successful transformation of the built environment.

The USGBC New York Upstate Chapter and the Environmental Protection Agency's Environmental Finance Center, EPA Region 2 at Syracuse University are two organizations that are committed to exploring these challenges and crafting methodologies to help impact change in the state of New York. They join a diverse and expanding array of institutions that provide financial, technical and educational resources to communities to help them overcome those barriers. Although these resources provide invaluable tools to municipalities and relevant stakeholders in adopting green building practices, a number of strategic measures are also needed to transform the built environment of New York State at the local level.

This analysis utilizes a variety of research tools to identify the barriers and resources available to municipalities in New York State with regards to green building. The focus of this analysis is specific to municipal governments, although the application of green capital projects transcends beyond the local level. Furthermore, this analysis utilizes the LEED program and its framework for categorizing and evaluating sustainable building as a concept for analysis and promotion. It should be noted that LEED, despite its leading reputation, is an evolving and dynamic program that is developing and changing constantly. LEED should not be considered the only definition of sustainability in terms of building and construction. In fact, some of the findings of this analysis suggest that the LEED product itself can act as a barrier to communities adopting green building practices. The identification of barriers and resources, coupled with further analysis, revealed a number of recommendations that the USGBC New York Upstate Chapter and the Environmental Finance Center could implement to better assist communities in adopting green building and achieving LEED certified capital projects.

Research Design & Methodology

This capstone project sought to identify barriers to sustainable and green building capital projects by municipalities and resources to overcome them. The goal of this investigation was to make recommendations for alleviating the barriers faced by local governments in planning and implementing LEED certified capital projects. In addition to consulting previously published reports on the subject, the project team also believed that it would be valuable to contribute new information. Therefore, three styles of research were employed: literature review, case interviews and research on funding options. Due to the short timeframe of the project, the project team decided that this multi-method approach would provide the most comprehensive evaluation of the current conditions within the USGBC New York Upstate Chapter's region.

The literature review included articles in scholarly journals and popular press, as well as Web sites for professional associations and advocacy organizations. These three source categories offered distinct lenses through which to examine how LEED and green building are currently discussed in diverse groups in the United States. These findings were then synthesized into a single section of this report to summarize the common themes and barriers that emerged. The academic articles illuminated the debates in support of or in opposition to LEED certification within the green building and business professions. The general news outlets are often a reliable reflection of society's opinions about the values and challenges of the complex development and planning decisions. The Web sites contained information generated by organizations who endorse green building and LEED principles.

The primary reason for conducting this type of research was to provide the project team, not the clients, with a foundation of the known obstacles to green capital projects. The project team recognized that the USGBC New York Upstate Chapter and the Environmental Finance Center, EPA Region 2 are likely to be aware of these discussions, since both have been extensively involved in the field of sustainability for many years. However, since there are a myriad of materials written on this topic, the team hopes that even this exploration will uncover new information for the clients.

In drafting its proposal, the project team emphasized the importance of adding to the existing discourse by providing new information. To achieve this goal, we conducted case interviews with government officials, LEED Accredited Professionals (APs), building industry professionals, and community organizations within the USGBC New York Upstate Chapter's region. An initial list of questions (see Appendix B) was prepared to highlight the essential information requested from interview participants. Interviewers utilized either standardized open-ended, semi-structured, or informal conversation interview structures, depending upon the person contacted. A total of 18 interviews were conducted.

Finally, while the USGBC New York Upstate Chapter had some reference materials about funding resources, it was not current. To remedy this, the project team updated this information, while also expanding their investigation to identify new financing options from the federal and New York State governments, private foundations and private lending institutions. We used this information for two purposes. First, the project team compiled a financial resources document to be distributed to local governments who are contemplating green capital projects (See

Supplemental Materials). Second, after the project team familiarized itself with existing funding instruments, it was able to detect the shortcomings of current options. These observations contributed to the finance-related recommendations and future research sections of this paper.

The following section details the barriers uncovered by this investigation. Many were revealed via the literature review and were then supported by the primary research collected during interviews. The interviews also brought some barriers to light that were not discovered in the literature review, but that we deemed to be important in illustrating the issues Upstate New York municipalities face when considering LEED certification.

Barriers to Building Green and Achieving LEED Certification

Many small municipalities throughout Upstate New York do not consider sustainable building practices when planning for development and capital projects. In order for the USGBC New York Upstate Chapter to successfully promote the movement toward sustainable building and LEED standards, the reasons behind communities' reluctance must be better understood. By conducting a literature review and personal interviews with stakeholders, our investigation uncovered ten common obstacles encountered by small communities. These obstacles to green building are not always real issues, they sometimes are perceived as a barrier based on a lack of or incorrect information. Both types are important for the USGBC New York Upstate Chapter to be aware of and to address because both cause municipalities to avoid LEED and sustainable building practices. The following describes each of the ten barriers in detail and discusses whether each is real or perceived.

1. Higher costs (both real and perceived) of sustainable building options

Studies have shown that cost is the greatest concern of most clients considering building green, and is a particularly common obstacle faced by many municipalities.[1&2] Municipalities' understandable emphasis on making responsible and economically-sound investment choices when coupled with their unfamiliarity with green building practices causes many public officials to avoid green capital projects and stay with what they know and are comfortable with. Many studies also show that the overall increased financial impact can be very low, but there is contention on how costs are measured.[3]

The way in which many municipalities organize their budgets also makes cost comparisons difficult. When capital and operational budgets are separate, initial investments can seem overly daunting. This occurs because separate operational budgets will not take future cost savings into account, and thus inaccurately skew the numbers toward the beginning phases of a project. There are also additional costs associated specifically with LEED certification, particularly registration and filing costs that often require a specialist to spend hours completing the proper paperwork. These costs can present a barrier of their own and clients will often choose to either save that money or to spend the potential LEED certification dollars on the project infrastructure itself (see barrier #3).

Upfront costs, when balanced with long term savings, are often shown to "pay for themselves"; but there are also projects and items that simply do cost more, like the use of sustainably harvested wood. This is an area where education plays an important role; officials must be shown not only the economic benefits, but also the public health and productivity gains that will

[1] Landman. (1999). "Breaking through the barriers to sustainable building: Insights from building professionals on government initiatives to promote environmentally sound practices." *Tufts University Master's Thesis.*
[2] Lotspeich. & Larson. (2003). "Environment, entrepreneurship, and innovation: Systems efficiency strategies for industrial and commercial facilities." *University of Virginia.* Darden Business Publishing #UVA-ENT-0052.
[3] United States Green Building Council. Retrieved on May 22, 2007 from www.usgbc.org

be crucial in convincing their constituents that these benefits outweigh any extra costs in the long run.[4]

This will be a difficult barrier to overcome, especially since most savings studies are based on only the estimated savings and/or costs of building green. Very few contractors or project managers have taken the time or effort to fully assess the comparative costs of completing a project with both green building practices and with traditional methods.[5]

In the case of many of the small municipalities interviewed, cost was cited as a major obstacle to using green building techniques. These municipalities were engaged in little, if any, new capital construction. Although they viewed comprehensive "green" rehabbing of older municipal building as unrealistic due to the difficulty and associated cost of renovating masonry buildings, one small municipality, Johnstown, NY, has initiated a more piecemeal approach to greening public buildings by recently installing more energy efficient heating/cooling systems in several municipal buildings.[6]

A LEED AP who is a former heating, ventilation and air conditioning contractor said that although LEED certification may appear to add additional expenses, often when these costs are incorporated into the overall project design they are in the end, no more costly than traditional building. Her comment was based on studies done in a California school district that showed that all design options have a cost associated with them. A cost-conscious team can design and build a LEED certified project at no additional cost (there are many no-cost LEED points). While there are many options that do have an additional hard cost, they often pay for themselves in returned cost-savings, such as with efficient plumbing fixtures in a publicly-used bathroom. The options that have no payback would cost the same for LEED-certified construction or any other type of sustainable construction, although they may be more expensive than conventional methods. In her opinion, the two most important things the USGBC can do to get people invested in green building practices is to educate contractors and address the idea that LEED certification costs more. This is especially true in Central New York where contractors are faced with a very slim marketplace.[7] With a strong perception of green building as being too expensive, many contractors fear that, in this already slim job market, "green" bids won't be accepted and businesses will suffer.[8]

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[4] Schendler & Udall. (2005, October 26). LEED Is Broken; Let's Fix It. *Grist Magazine*. http://www.grist.org/comments/soapbox/2005/10/26/leed/index1.html

[5] Lotspeich. & Keach. (2003). "Rating environmental performance in the building industry: Leadership in energy and environmental design (LEED)." *University of Virginia.* Darden Business Publishing #UVA-ENT-0053.

[6] B. Heberer, Chief of Code Enforcement and Fire Chief, Johnstown, N.Y. (2007, May 29). Personal Communication

[7] H. Rosenthal, former owner of HVAC business, Syracuse, N.Y. (2007, May 25). Personal Communication

[8] M. Thompson, Director of Home Builders and Remodelers of Central New York, Syracuse, N.Y. (2007, May 22). Personal Communication

2. *Builders and contractors failure to use service fee structures that account for the recovery of long-term savings*

Most building quotes only include upfront costs; they do not include the long-term cost savings of energy and maintenance of building green.[9] A fee structure that incorporated estimates of long-term costs in addition to short-term costs would more accurately reflect the real price of building green. This is particularly important for municipal buildings because the entity that pays for the construction and the entity that pays for maintenance and energy is often the same. Private buildings do not always maintain the same continuity and so it may be harder to apply long-term cost structures to private buildings. Often in these cases, both builders and clients are guilty of being short-sighted in their evaluation of the cost-effectiveness of using green building techniques. Syracuse architect and LEED AP, Bob Haley, describes this barrier as requiring an economic and cultural transformation when it comes to building standards. He states that LEED is one system that when used properly, comprehensively reduces energy consumption and thus cost. The way to combat this is to educate on the overall concept of sustainability and long-term savings.[10]

3. *Cost and time of LEED certification*

It is not clear whether this is a real or perceived barrier. There is some discrepancy as to what the actual costs of certification are. Actual estimates range from $50,000 to $150,000 per project.[11] Depending on the size of the project this additional cost can represent a small or large burden to the client. Proponents of LEED estimate that certification costs range from zero to seven percent of the total building costs, while practitioners are skeptical about these estimates.[12] Some LEED contractors believe that inexperienced builders inflate the cost of LEED certification because they have never done it before.[13] Some clients have expressed the view that the money used for certification could be better spent on the physical building rather than paperwork.[14&15] Those that believe that this is a real barrier feel that the USGBC should not deny the extra costs associated with LEED certification and instead concentrate on proving that building green and pursuing LEED certification is worth the extra cost.[16]

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[9] Landman. (1999). "Breaking through the barriers to sustainable building: Insights from building professionals on government initiatives to promote environmentally sound practices." *Tufts University Master's Thesis*

[10] B. Haley, Ashley McGraw Architects, Syracuse, N.Y. (2007, May 25). Personal Communication

[11] Thelin. (2007, May 9). "Q & A with Randy Rapaport: High-profile developer on celeb architects, music and stealing back the Schnitz." *Willamette Week Online.* Retrieved Online on May 22, 2007 from http://www.wweek.com/editorial/3326/8934/

[12] Burgess. (2007, April 29). "City plans ways to get 'greener' carbon emissions reductions, more energy-efficient buildings eyed" *Citizen-Times.com.* Retreived on May 22, 2007 from http://www.citizen-times.com/apps/pbcs.dll/article?AID=200770428063

[13] Stivers. (2007, April 28). "Jail contracts awarded, efficiency uncertain." *Sun Valley Online.* Retrieved on May 22, 2007 from http://www.sunvalleyonline.com/news/article.asp?ID_Article=3405

[14] Thelin. (2007, May 9). "Q & A with Randy Rapaport: High-profile developer on celeb architects, music and stealing back the Schnitz." *Willamette Week Online.* Retrieved Online on May 22, 2007 from http://www.wweek.com/editorial/3326/8934/

[15] Schendler & Udall. (2005, October 26). LEED Is Broken; Let's Fix It. *Grist Magazine.* http://www.grist.org/comments/soapbox/2005/10/26/leed/index1.html

[16] Schendler & Udall. (2005, October 26). LEED Is Broken; Let's Fix It. *Grist Magazine.* http://www.grist.org/comments/soapbox/2005/10/26/leed/index1.html

An oft cited barrier by interviewees was the added time element associated with the LEED certification process and the subsequent costs it generated. For many, the most time-consuming part of the process is the paperwork, which burdens the builder with additional work when he or she is already immersed in fulfilling mandatory building requirements, such as permitting and OSHA standards.[17] The director of the Community Development and Planning Service for the city of Rome believes that this issue is the biggest drawback to municipalities incorporating LEED, as opposed to piecemeal green building strategies, into their planning.

While the paperwork is substantial, there are other features of the LEED process that increase the amount of time a builder spends on a project. Since LEED is an integrated design process that incorporates all players from the beginning stages of a project, there is more time spent meeting and coordinating than there would be in a conventional building process.[18&19] Such consultations not only take more time, but add to costs because the municipality must pay personnel to attend instead of performing other duties. The architects and/or engineers must also attend these design meetings, which in turn costs the builder more in fees.

In some cases, conflicts of interest add to time and cost as well. Even if an owner uses an engineering firm in its design process that is accredited to certify LEED buildings, he or she cannot use the same firm for certification. Because the firm is involved in design and construction, it has a monetary stake in the project. Therefore, there is a conflict of interest in the certification process and the owner must hire an objective third party to approve and fill out LEED paperwork.[20] This adds an extra expense to the project that some municipalities may not be able to absorb.

4. *Lack of interest in or demand for sustainable building from clients (owners/ developers)*

A lack of demand is one of the fundamental barriers for green building. If the clients are unaware of or uneducated on the ease, availability, practicality and additional benefits of building sustainable projects, they will be unlikely to request "green" options or even choose such options when they are presented by proactive designers and project managers.[21]

This barrier also encompasses possible cultural resistance to building green. Studies show that many clients shy away from projects that are labeled "green" because they fear they are too "far out" to be politically feasible. However, this concern also points to the possible effectiveness of an education solution. If proponents of sustainable building frame project proposals in terms of economic and human productivity benefits, many more clients are apt to choose green projects without fear of community reprisals for putting environmental concerns before the local economy.[22]

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[17] S. Beyer, Environmental Compliance Office, Cornell University (2007, May 21). Personal Communication
[18] F. Cirillo, Syracuse Research Corporation, Syracuse, N.Y. (2007, May 29). Personal Communication
[19] B. Seigart, Schopfer Architects, Syracuse, N.Y. (2007, May 24). Personal Communication
[20] F. Cirillo, Syracuse Research Corporation, Syracuse, N.Y. (2007, May 29). Personal Communication
[21] Syracuse Common Council hearing on Green Building (2007, May 16). Personal Communication
[22] Lotspeich & Keach. (2003). "Rating environmental performance in the building industry: Leadership in energy and environmental design (LEED)." *University of Virginia.* Darden Business Publishing #UVA-ENT-0053.

Architect Bob Haley described an additional cultural transformation that needs to take place. Prior to World War II, buildings were constructed using the site to optimum advantage. The use of windows was to optimize heat from the sun. Landscaping was used to affect proper drainage. The quality of materials was based on function and value. Post-World War II, there was a boom in the housing industry where tract homes and expansion into suburbs was rampant. During this time, materials were cheap, construction was fast and the idea was to have swift development rather than quality workmanship. Haley suggested that LEED standards incorporate much of this pre-WWII architectural knowledge and believes that educating people about LEED will help overcome cultural resistance to sustainable building practices.[23]

5. ***No "payback" for community beyond helping the environment***

Ignorance of the benefits of green building is one of the primary barriers faced by green building advocates. The Provost of State University College of Environmental Science and Forestry summed up one of the most significant barriers to LEED certification with the comment, "Why should I?" Traditionally, businesses and many government agencies are used to thinking "What's in it for me?" Most have shareholders or constituents to consider and answer to. Since these benefits are well-documented, more educational outreach to municipal decision-makers is an obvious priority. While cost savings may be a benefit of certain environmental improvements, such as many energy efficiency enhancements, not all desirable sustainable design features will necessarily provide a reduction in cost. For instance, sustainably harvested timber is more expensive than conventionally harvested timber.

In order for the mission of the USGBC to become part of the mainstream sensibility and thus overcome this barrier, it is important to emphasize the commonly shared values that society has about good health and clean air and for the USGBC to show how LEED buildings enhance these. According to architect Bob Haley, human health is a very strong motivator for all people.[24] Moreover, municipal capital projects are particularly well-suited to incorporate societal gains from green building into their cost-benefit calculus. Improvements in worker productivity, human health outcomes and child educational performance are all standard government functional areas that may be directly benefited by investing in green building. Accordingly, this perceived barrier is relatively easy to overcome with adequate educational outreach efforts. The challenge, of course, is that conducting such widespread educational outreach could be quite costly given the need for an extensive staff and/or a large advertising budget.[25] Acceptance of LEED certification as valuable is completely dependent on altering attitudes toward the concept of sustainability as applied to the environment, the economy and society.[26]

It was also mentioned in one interview that there is skepticism concerning claims that LEED (and green building in general) actually improves employee productivity. Many owners believe that this is not supported by real data or that it would not apply to them because they have few

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[23] B. Haley, Ashley McGraw Architects, Syracuse, N.Y. (2007, May 25). Personal Communication
[24] B. Haley, Ashley McGraw Architects, Syracuse, N.Y. (2007, May 25). Personal Communication
[25] Fehd. (2007, May 10). State board hopes to change green building standard. *Nevada Appeal.* http://www.nevadaappeal.com/article/20070510/ELECTIONS/105100105
[26] B. Bongarten, Provost: SUNY-ESF, Syracuse, N.Y. (2007, May 22). Personal Communication

employees or that their employees already "work hard."[27] Since actual data, as opposed to talking points, is not easily comprehensible and/or accessible to many people, productivity improvements are not always taken seriously and therefore not considered when determining long-term benefits of green building and LEED.

6. *Lack of training and education in sustainable design/construction for builders and municipalities*

With the growth of licensed LEED AP's and the training available through USGBC, this factor has the opportunity to become less of an actual barrier, but the perception that there is a lack of trained designers and contractors poses problems. There is also the problem that many experts are trained in sustainable building, but are possibly not LEED certified or even aware of LEED's existence. A further complication, according to The Director of the Homebuilders and Renovators Association of Syracuse, is that many contractors find LEED guidelines overwhelming, especially when established businesses are accustomed to a standard way of doing things.[28]

In addition, some small municipalities that were interviewed are not familiar with LEED certification because they have not undertaken any capital projects within the last 10 years. And, even those aware of LEED's existence were often not familiar with either USGBC or LEED processes because they have not researched them.[29&30] For many, building and renovating are simply not seen as current priorities in their communities.[31&32] One town official in Chestertown also expressed that even if he wanted to promote green building, he had no idea how to start or who to approach for assistance. He was receptive to receiving information on green building, especially on how to reduce energy consumption in municipal buildings.[33]

Even those that are familiar with LEED in general cite a lack of technical knowledge as a major impediment to incorporating it into their planning. A client's understanding – or lack thereof – of the practicality of building green may also impede the way in which RFPs for capital projects are written and put to bid, possibly discouraging LEED educated firms from bidding or, if they do, making it less likely they will win contracts. Bob Seigart, an architect from Schopfer Architects in Syracuse, believes that information provided by the USGBC is sometimes difficult to communicate to clients, as it can be complicated and unfamiliar to conventional builders and owners. This is especially true for municipal employees, who may have limited technical knowledge. For example, community planners and city officials for the city of Rome recently attended an educational meeting with LEED professionals. This meeting lasted for five hours and most government attendees left with more confusion and questions than they had before, due

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[27] B. Siegart, Schopfer Architects, Syracuse, N.Y. (2007, May 24). Personal Communication

[28] M. Thompson, Director of Home Builders and Remodelers of Central New York, Syracuse, N.Y. (2007, May 22). Personal Communication

[29] B. Heberer, Chief of Code Enforcement and Fire Chief, Johnstown, N.Y. (2007, May 29). Personal Communication

[30] W. Tennyson, Head Zoning Administrator, Town of Chester, N.Y. (2007, May 29). Personal Communication

[31] B. Reagan. Code Enforcement Officer, Town of Marcellus, N.Y. (2007, May 22). Personal Communication

[32] K. Mix, Planning and Community Development Coordinator, City of Watertown, N.Y. (2007, May 22). Personal Communication

[33] W. Tennyson, Head Zoning Administrator, Town of Chester, N.Y. (2007, May 29). Personal Communication

to the highly technical nature of the presentations.[34] The director of the Community Development and Planning Service for Rome believes that this type of situation, where government officials simply do not understand the LEED process and the technical details of the point system, is a major reason why communities avoid using LEED certification.

Even USGBC-sponsored educational conferences that are not intended for a technical audience are not seen as valuable enough for a small municipality to make the effort to attend. Some find that often these conferences take place too far away for it to make financial sense to send a representative from their community.[35] Small communities do not usually have significant amounts of money budgeted for travel expenses and generally cannot afford to lose an employee for a few days to attend a conference. Therefore, the education provided by these seminars is not reaching small municipalities effectively.

7. *Lack of local green building materials*

Concern about unavailability of local green building materials is more of a perceived barrier than an actual one in New York State, since there are many sustainable materials producers that fall within LEED's requisite 500 miles of project locale in and surrounding New York. For example, when building their LEED-certified building (certification not yet complete), Syracuse Research Corporation used all local materials with no significant difficulties.[36] But as seen in many of the other barriers, the process of educating or re-educating public officials and their constituents can be as difficult to surmount as physical or fiscal barriers.

8. *LEED standards are not scientifically rigorous and do not adequately measure environmental impact*

Critics of LEED often charge that its rating system is not adequately based on scientific rigor but has instead emerged from a committee consensus process that has made some of the point allocation decisions appear arbitrary. As a result, they argue, techniques endorsed by LEED may not consistently create superior green buildings and the buildings receiving more LEED credits may not be more sustainable than buildings receiving fewer credits.

Weaknesses in the rating system may also be exploited by builders and designers motivated more by the public relations benefits of green building than its actual environmental impact. Builders may take the easiest route to certification versus the one with the most impact. For instance, builders may "value-engineer" out or neglect energy system improvements since these are often quite expensive, albeit a critical component of sustainable design, and collect points through other less costly but less significant improvements such as installing a bicycle rack or using low-VOC (volatile organic compound) paint. Ultimately, this barrier to LEED acceptance will likely require that USGBC reevaluate how points are allocated, possibly requiring improvements in specific key areas and emphasizing performance over design to allow for greater innovation.[37]

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[34] D. Shoemaker, City of Rome, N.Y. (2007, May 24). Personal Communication
[35] D. Shoemaker, City of Rome, N.Y. (2007, May 24). Personal Communication
[36] F. Cirillo, Syracuse Research Corporation, Syracuse, N.Y. (2007, May 29). Personal Communication
[37] Schendler & Udall. (2005, October 26). LEED Is Broken; Let's Fix It. *Grist Magazine*. http://www.grist.org/comments/soapbox/2005/10/26/leed/index1.html

9. LEED has no specific product tie-in

The Environmental Protection Agency (EPA) and the Department of Energy (DOE) have an energy saving program for residential properties that is closely tied to Energy Star products, whereas the USGBC does not have any product association.[38&39] The complexity associated with the application of the LEED standards is a barrier to its widespread adoption. The USGBC does not specifically endorse any particular company or products, although they do alert consumers as to what products meet the required standards. This has both positive and negative implications. The positive implication is that the client is not compelled to use a particular product which can provide for more competition and, hence, lower prices. They also do not have to worry as much if one particular product is unavailable locally, because it is more likely that viable substitutes can be found. The negative implication is that the process of selecting a product may be confusing for an inexperienced contractor or client. Exclusive tie-ins to particular products might be too limiting for LEED, but there still is a need to have an expedient process for certifying materials for LEED projects. Product tie-ins would also likely increase LEED's visibility. When asked if renovating a building to LEED standards was a service available to their clients, two local businesses that conduct comprehensive building energy audits and are tied directly to Energy Star stated they had never heard of LEED certification.[40&41]

10. Skepticism concerning "green" and LEED-approved products

There is a concern among some owners and builders that certain products and materials that meet LEED standards are inferior to what is conventionally used. While it is not known if this is perceived or real, it has been a factor in some Upstate New York institutions' decisions not to build to LEED standards. For example, the Veteran Affairs Medical Center in Syracuse has been reluctant to use LEED in their renovations due to this question of product quality, particularly for the adhesives used in flooring. LEED standards require that these adhesives do not emit more than a designated level of volatile organic compounds (VOCs), which means they must be water-based as opposed to solvent-based. Since water-based adhesives used for this purpose have only been on the market for a short period of time, it is not certain that they will last as long as the solvent-based adhesives, particularly under the harsh cleaning routines of a hospital.[42] These concerns are sometimes significant enough for owners to disregard LEED and stay with conventional products and building techniques.

Summary

Identifying these ten barriers is merely a first step in overcoming reluctance to use LEED and sustainable building practices in Upstate New York municipalities. While the USGBC New York Upstate Chapter must be proactive in addressing these issues, they must also be able to provide informational resources for local government officials to utilize on their own. The following section outlines several avenues of obtaining information regarding each barrier, which the USGBC New York Upstate Chapter can make available to small municipalities.

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[38] Energy Star. Retrieved on May 22, 2007 from http://www.energystar.gov/
[39] USGBC national site. Retrieved on May 22, 2007 from http://www.usgbc.org/
[40] M. Mondlick, GreenHomes, Syracuse, N.Y. (2007, May 19). Personal Communication
[41] J. Martina, Zero Draft, Syracuse, N.Y. (2007, May 29). Personal Communication
[42] B. Seigart, Schopfer Architects, Syracuse, N.Y. (2007, May 24). Personal communication

Resource Analysis

In order to assist municipalities in breaking through some of the common barriers to building green capital projects described in the previous section, the project team identified a number of resources readily available to these municipalities. In selecting resources to highlight, the project team chose to focus on resources available online since they are often more accessible and tend to be updated more frequently than other forms of media. These resources should be provided to municipalities by the USGBC New York Upstate Chapter, whether through direct distribution or by posting the links on its Web site. This will give local government officials the freedom to obtain information about LEED and green building on their own.

A particularly valuable resource to share with municipalities, developed by the project team, is the "Field Guide of Financial Support for Sustainable Capital Projects: New York Upstate Chapter Edition," with its detailed directory of financial assistance opportunities and funding resources available to municipalities within the USGBC New York Upstate Chapter's region. This guide will help municipalities overcome a number of the barriers to green building identified in the previous section, especially those related to cost constraints.

The following is a summary of our findings; a full list of these resources is provided in Appendix E. It should be noted that the resources identified are not allocated evenly among the different barriers, as multiple resources were found for certain barriers while for others, no resources were located.

- Barrier 1: Numerous resources are available to overcome the cost barrier including Web sites like the Catalog of Federal Domestic Assistance and Web sites of various federal agencies, such as the EPA, which provide funding directly to municipalities for various projects.
- Barrier 2: The second barrier is the failure of service fee structures to reflect long-term savings. The Whole Building Design Guide Web site has a number of articles about life-cycle costing which could be useful to contractors or their clients.
- Barrier 3: The project team was not able to find any resources specific to overcoming the barrier of certification cost, but some of the funding sources identified could be applied to these costs.
- Barrier 4: Green building proponents confronting a lack of interest in building green may want to seek out case studies of other municipalities that have gone green, such as those found on the Web sites of Scottsdale, Arizona and San Jose, California.
- Barrier 5: A number of resources are available to help overcome the skepticism or lack of knowledge of the non-environmental benefits associated with LEED buildings. These include the Web site of the Heschong Mahone Group, which conducted several productivity and health-related studies of green buildings and the Web site of Innovative Design that looked at the effects of full spectrum lighting in schools.
- Barrier 6: To overcome the disparity of knowledge and training among builders and contractors, there are several Web sites, such as Greenbuildingsnyc.com, which have been established by LEED APs or other individuals experienced in building green. These sites provide useful information as well as forums to ask questions about LEED and discuss some of its finer points.

- Barrier 7: The seventh barrier is the lack or perceived lack of green materials to construct green buildings. Green Building Blocks is an example of a Web site that allows individuals to search for green materials based on location.
- Barrier 8: The perception that LEED may not be scientifically rigorous or have high enough standards could not be addressed by any of the resources we found. This barrier is more subjective than the previous barriers and will therefore require active involvement to overcome.
- Barrier 9: The lack of branding or product tie-in is an issue internal to the USGBC and therefore cannot be addressed by the materials we found.
- Barrier 10: The lack of confidence in green materials stems from concern among clients that green materials are not as durable as their more traditional counterparts. This issue can only be resolved with product testing, which is outside the scope of our research.

While knowledge of these resources will help the USGBC New York Upstate Chapter provide municipalities with information specific to the barriers they face, it would also be beneficial for the Chapter to provide information specific to the types of projects municipalities are considering undertaking. This could be used as yet another resource to offer municipalities that are considering sustainable projects. The next section outlines characteristics of capital projects that would be best suited to using LEED certification or green building.

Relative Feasibility of Green Capital Projects for Municipalities

When beginning to plan for green building initiatives, municipal stakeholders may wonder what types of capital projects work best being green. The challenge here is that the circumstances of communities, even within the same state, are so diverse and their needs so specific that developing a comprehensive list of suitable green capital projects is inappropriate. In fact, the propensity for municipal actors to seek out such lists may lure them away from the integrated planning process that is critical to LEED and meaningful sustainable municipal construction.

On the other hand, municipalities, particularly ones new to green building and LEED, often struggle on where to begin. As discussed, there are a variety of resources available with information about project ideas, case studies, green products and vendors, and the many diverse components of green building and planning. Even outside of integrated planning, stakeholders better comprehend the most appropriate green building approaches specific to their community as they become increasingly familiar with the industry, LEED and green building practices.

Our approach to determining relative feasibility of green capital projects is intended for the USGBC New York Upstate Chapter to use as a guide when communicating with municipalities. It provides the Chapter with an idea of what characteristics to look for in a capital project that will help facilitate the use of LEED. This information can then be communicated to municipalities to help them make better-informed decisions regarding how well LEED fits into their projects. However, this overview of characteristics is not meant to be exhaustive or to be a laundry list of criteria for LEED's applicability.

Although this analysis strives to avoid providing or encouraging a "restaurant menu" approach to green building, especially if outside a commitment to integrated planning, there are a number of meaningful characteristics common to the types of projects that are most suitable for municipalities to take on, particularly for smaller communities. In the end, the adoption of a green building project or initiative depends on its feasibility. Like all building projects, green projects will have varying dimensions of financial, political, management and construction feasibility.

Financial: Projects that are small in size and low in cost can be easily adopted as green. These lower costs are often realized in municipalities with access to markets that have multiple competitors for green products or contract services. Municipalities will encounter little political or institutional resistance when projects have lower costs. Projects are also more feasible if any savings, revenue or non-financial benefits occur in the short-term. Moreover, communities will find implementing LEED certified projects easier if funding for the project is readily available, whether public or private.

Political: Municipalities must act in the overall interest of the public, but often political considerations must be addressed. Constraints due to political feasibility can be challenging for the departmental bureaucrats that often coordinate green building initiatives. Projects that are entirely uncontroversial or "off-the-radar" of public interest are far easier to implement. In particular, this is true when the users of the facility are a politically viable constituency, such as the elderly in medical care facilities. Ultimately, committed leadership is vital for municipalities

to undertake green building programs and achieve LEED certification. Often successful implementation of LEED projects is the result of the leadership of politicians, philanthropists, or community visionaries that convince the required stakeholders that building green is the way to go. Interestingly, projects that are highly innovative generally elicit greater political support as they are seen as an opportunity to highlight the community. Innovative project ideas are also more likely to be awarded funding and recognition, even though these benefits may come after the project has already been completed.

Management: Municipalities with stronger bureaucratic structures are better able to handle the complexities of the LEED certification process and the challenges inherent with green building as an emerging market. In particular, communities benefit greatly from having a strong budget management capacity that can better manage the challenges of reconciling costs and savings of green building between operating and capital budgets. Critical to LEED and green building is the coordination capacity needed to implement integrated design. Projects that involve a smaller number of key stakeholders are easier to manage. This can lead, however, to disjointed management as project components begin to develop outside of the integrated planning process. This can be mitigated if strong public and private partnerships are already operating in the community or if a significant network of strong relationships exists that can be used as the foundation for integrated design planning among the required stakeholders.

Building: Obviously, the easier something is to build, the easier it will be for municipalities to undertake it as a project. Also, projects that can be constructed and implemented in phases are far more feasible, particularly in smaller communities. Smaller municipalities construct new facilities rarely and often devote their building funding to renovations that may take place over a number of years. Additionally, projects are more feasible when they have lower technology thresholds and when less technical or mechanical expertise is required. This provides an important opportunity for the benefits of good design, where the position or organization of construction elements can have a greater impact on sustainability than technology.

Clearly, green projects that meet many of the requirements discussed in this section are more feasible for municipalities to undertake. However, the core of LEED is the integrated design process. Communities that begin asking what projects work best right away may miss the larger picture of discerning the intricate relationships between the proposed facility's various elements and the community as a whole.

To help the USGBC New York Upstate Chapter ensure that communities do not miss the larger picture, there needs to be more than an awareness of available resources and project characteristics that facilitate LEED. The following section provides suggestions of strategies for the Chapter to implement that will further allow it to help small municipalities pursue LEED and sustainable design.

Recommendations

The USGBC New York Upstate Chapter must go beyond providing lists of outside informational sources and evaluation of capital project characteristics in order to promote LEED in small municipalities. These communities face very real as well as perceived barriers, described in previous sections, which must be addressed before they will consider LEED in their planning processes. The project team has developed six general recommendations for the Chapter to pursue that will help it to assist small communities overcome the barriers to LEED. The recommendations are based on concerns raised during stakeholder interviews, as well as those taken from the literature review. Each is generally described in such a way that the USGBC New York Upstate Chapter can tailor them to suit its specific needs and expertise.

1. Create educational materials geared toward a non-technical audience that are easily accessible to municipalities

One of the most significant deterrents for small communities to considering LEED certification in their municipal planning is a lack of education on LEED's costs and benefits. While the New York Upstate Chapter of the USGBC attempts to educate the public via their Web site and various seminars and conferences, there are many small communities that are not being connected with through this outreach. It is also of concern that those that are reached still do not fully understand LEED because the information supplied to them is highly technical. Many local government officials do not have the expertise to understand the complicated technical language that is found in many LEED standards. To address this, we recommend that the USGBC New York Upstate Chapter modify or create new educational and promotional material that is intended for a non-technical audience. This material can be in the form of short documents and digital presentations. They should not, however, contain merely simple talking points or commonly cited statistics. The information provided in these materials should be short and concise, but be substantiated by data and studies that are cited, easily accessible, and that provide a clear depiction of costs and benefits of LEED. It is important to provide supporting evidence for the issues that people are skeptical of, such as employee productivity improvement claims and the reliability of LEED products and materials. This will ensure that accurate, valuable and easy-to-understand information is communicated to municipalities and, hopefully, increasing their responsiveness.

The distribution of this material is essential to its success. First, the USGBC New York Upstate Chapter should use its Web site strategically for this purpose. Recommendation two provides specific suggestions on how the organization can use its Web site more effectively as a tool for information distribution. Second, to reach municipalities not currently in the USGBC New York Upstate Chapter's database, there must also be proactive distribution of educational materials to local government officials. These materials should include information directing them to the Web site. This can be achieved in the form of a direct mailing campaign to small communities, particularly targeting those communities unlikely to send representatives to regional conferences or otherwise encounter information about the USGBC or LEED. Another essential avenue to reach municipalities is via architects and engineers. When undertaking a capital project, these are the people that a municipality establishes a relationship with, so they are a logical audience to provide with information about LEED. Though architects currently have LEED materials to

show clients, they find them to be too cumbersome and technical to communicate the information effectively. By having short, concise presentations and documents provided by the USGBC New York Upstate Chapter, an architect can easily show a client the benefits of LEED.

A common complaint among small communities that were interviewed in Upstate New York is the difficulty of attending conferences and seminars sponsored by the USGBC. In small municipalities, there are often not enough funds budgeted for travel and it is difficult to spare an employee for days at a time to attend a conference. To address this, it is recommended that the USGBC New York Upstate Chapter take several steps to make the conferences easier for these communities to participate. First, there should be more frequent, centrally located, non-technical conferences geared toward municipalities. These can be shortened to fit into a half-day, so as not to infringe too much on their time. While this will make attendance for government officials easier, the USGBC New York Upstate Chapter must weigh the costs that accrue for holding small, frequent conferences with the potential benefits of educating municipalities. If this proves to be too costly, another possibility is for USGBC New York Upstate Chapter to provide travel stipends for communities that cannot afford to send a representative, but are interested in attending the larger regional conferences. Last, another potential method for municipalities to attend seminars would be to offer "Webinars"; participatory seminars that are broadcast online for a small fee to users. This way, officials can speak with LEED professionals without leaving their offices and avoid the travel cost issue altogether. It will also save the USGBC New York Upstate Chapter in travel and general conference set-up costs as well. However, this could prove to be inconvenient if municipalities do not have access to the technology necessary to participate.

Finally, it is recommended that the USGBC New York Upstate Chapter take advantage of the conferences put on by private and community groups in the region. These are excellent resources and helpful means of providing information on LEED to government officials or those that have access to government officials. The *Accelerate* conferences are a good example, as representatives from all sectors attend. Working closely with *Accelerate's* sponsor FOCUS Greater Syracuse (a citizen-driven organization whose goal is to enhance Syracuse's economic future) to use this as an opportunity to educate municipalities would be highly beneficial to the USGBC New York Upstate Chapter.

2. Conduct a usability study of Web site and update it in accordance with its findings

Web sites are a very important tool for non-profit organizations seeking to disseminate their message to a broad audience. As highlighted in recommendation one, a well-designed Web site can be invaluable in helping to educate municipalities on the benefits of LEED and green building. However, to ensure that the usefulness of this resource is maximized, periodic usability evaluations of the USGBC New York Upstate Chapter's Web site should occur. Such evaluations assess if information is presented in a clear and logical manner and that the needs of the organization's target constituents are met when they use the Web site.

Although a periodic usability evaluation conducted by communication technology experts is advised, this report offers several initial recommendations based on a preliminary evaluation of the USGBC New York Upstate Chapter's Web site. First, the Web site should be reorganized based on user group. Many organizations seeking to communicate with a variety of actors have

begun to organize their sites according to this framework such as many university Web sites with different portals for student, parents, faculty, alumni and others. The advantage of organizing the New York Upstate Chapter's Web site in a portal framework is that it would permit the target audience, such as time-pressed municipal leaders, to easily access information relevant to their needs without having to wade through the entire site. There should be separate sections for local government officials, architects/engineers, contractors, homeowners and commercial owners. Each of these would be tailored to the target audience; for example the local government section could provide links to financial opportunities specific to municipalities as well as examples of LEED successes in other small communities, in non-technical terms.

Second, in addition to reorganizing the site according to a portal framework, USGBC New York Upstate Chapter's Web site would also be made more user-friendly with several minor changes such as improved search capability and better link maintenance. The addition of a search function to the site would allow users to find desired material quickly, while periodic reviews of the site's links would help reduce the number of "dead" links. Currently, the site contains a number of dead links, particularly on the resource page.

3. Advocate for increased government intervention in the building market

While the USGBC's work in developing LEED standards, holding educational events and trainings, and advancing green building in myriad other fashions is impressive, the authors believe the USGBC's current strategy revolving around green building certification is unlikely to lead to transformative results in the building sector. Use of environmentally unfriendly building techniques should be viewed as a market failure. When builders use environmentally unsound building techniques, society at large pays much of the cost in the form of environmental degradation. To put this in economic terms, there is a social cost to all construction but the social cost of green building is significantly less than that of conventional building. Essentially, the green builder is subsidizing public environmental improvements through their private investment. Accordingly, due to these high private costs, few builders will voluntary choose to build green because it is currently a luxury item that requires additional private investment beyond conventional building costs. Additionally, although some proponents may argue that green building is actually cheaper in the long-run, most builders are only concerned about the additional upfront costs of green building in the short-run. Moreover, LEED certification, with its additional fees, further contributes to the likelihood that builders will reject green building or at least LEED certified green building due to the additional private cost burden.

In order to encourage more builders to adopt green methods, the issue of social cost must be addressed by either making conventional builders absorb the true cost of their environmental unfriendly building techniques or by lowering the cost of building green. USGBC's current strategy pursues this latter objective question by creating incentives for builders to build green. Builders that meet LEED standards are rewarded with the USGBC seal of approval, which they can then use for marketing purposes. Unfortunately, such a strategy relegates green building to that of a niche market, similar to that of other luxury products. Only those consumers who care deeply and can afford green buildings will seek out a certified building.

Ultimately, as in the case of any market failure, government intervention is the most effective way to overcome the deterministic tendency of the vast majority of builders to adhere to the law of supply and demand and reject green building. There are two distinct means through which the government could alter the market structure to encourage green building on a mass scale. First, the government could subsidize green building, thus making the private cost incurred by building green less than the social cost. This would be a voluntary mechanism but would likely encourage many builders to become green in order to benefit from the cost savings. The second means of market influence available to the government is direct regulation. For instance, the government could incorporate green building directly into the standard building codes. Those builders that fail to adhere to green building standards would be assessed a fine or would not be permitted to build. By making non-green builders pay fines, this system is requiring them to personally pay some of the negative social costs generated by their building practices such as polluted water or air. With its lower social costs, green building would be more affordable than non-green building under such a system.

While the USGBC cannot change state or federal laws, the organization could develop a strategic plan for lobbying and shift some of its resources into advocating for such changes. If the organization focused significant time, money and personnel into shifting the regulatory framework in a liberal and influential state such as California or New York, that would have major repercussions across the nation. Not only would other states have a model to emulate, but large builders and suppliers would likely "green" the materials and techniques used elsewhere in the nation to reduce the inefficiency of producing distinct products and services for one market. Shifting the organization to a greater prioritization of advocacy does not come without risks. For instance, less tangible results in the short-term are quite likely when pursuing an advocacy strategy. However, if USGBC seeks to be a truly transformative force for change, it should not neglect one of the most effective means available to do so. For its part, the USGBC New York Upstate Chapter may wish to raise this issue with the national organization and, if permissible, pursue such a strategy in New York State. In response to concerns about the legality of a non-profit organization lobbying, it should be noted that even 501(c)3 not-for-profit organizations, like USGBC, can spend up to 20 percent of the first $500,000 of their expenditures, including staff time, on direct lobbying. And, simply talking to elected officials about green building without discussing specific legislation does not count as lobbying – this is considered public education.

4. Allow small communities to achieve LEED certification in phases

Many interviewees for this project, as well as the current literature, find fault with the LEED point system itself. The points create an unrealistic goal for some small communities because they rarely undertake large capital projects. Most of the opportunities to integrate "green" design into building projects are done in a piecemeal fashion (such as updating lighting or heating/cooling systems), sometimes years apart. It is not possible for buildings of this nature to achieve LEED status with the current point system; however, it is also not possible for many of these communities to build any other way since their primary focus is on updating older municipal buildings versus undertaking new construction.

While significantly changing the system is beyond the scope of the USGBC New York Upstate Chapter, it is recommended that they advocate for a simpler, less exhaustive point system or a phase-structured system that allows for these piecemeal projects in small communities to achieve some form of LEED certification, such as LEED Silver Phase 1 or Gold Phase 1. This would allow municipalities to certify their buildings in phases and allow them to claim the buildings as LEED certified without having to perform extensive renovations all at once. To avoid misuse of this rating system, it should be limited to small communities of a designated size and financial capacity.

5. *Consider insurance industry as primary stakeholder to educate them about benefits and encourage reduced insurance rates*

The massive losses suffered by the insurance industry in recent years due to natural disasters have motivated a few insurance companies to support green building through rate credits and other financial incentives. Concerns about the cost impacts of these climate change-related disasters are the main motivation for the industry to offer such benefits. For instance, the Fireman's Fund Green Building Replacement, Green Upgrade, and Commissioning policies provide lower premiums for LEED and Green Globes certified buildings as well as cover the costs of "greening" a building in the event of a covered loss.

The USGBC could help encourage other insurance companies to offer benefits similar to those of the Fireman's Fund by providing them with evidence about green buildings' smaller impact on the environment than conventionally-designed buildings. The challenge, of course, that the USGBC and others in the green building industry face in encouraging such a transformation in the insurance industry is that many insurance companies only examine risk-reduction benefits of household improvements in the short-term. That is, green buildings may help to reduce climate-change induced risk on a long-term horizon by contributing to a reduction in climate-change itself. However, green buildings themselves are at no lesser risk than conventional building to the climate-change induced disasters already underway. Accordingly, from a short-term perspective, these companies have little incentive to encourage green building through financial benefits if they will reduce their immediate profits by doing so. Moreover, many companies may consider the impact of one green building on reducing climate change to be too minimal and too distant in the future to justify the added expense of offering insurance benefits.

Ultimately, if USGBC could encourage insurance companies to examine the cost and benefits of green building from a long-term perspective, they may be successful in convincing the industry to offer the green-building benefits they seek. If insurance benefits were provided to green buildings, it would enhance the desirability of building green. The insurance cost savings of building green could be an adequate incentive to encourage many builders to embrace green methods who otherwise would simply build conventionally.

6. *Ease time and cost constraints of LEED certification process*

Another oft cited barrier is the time and costs involved with the LEED certification process, mostly in the form of extensive paperwork. This alone can cause a municipality to decide against using LEED in capital projects. While it is not possible to eliminate the extra time and

costs involved, they can potentially be minimized or offset by other incentives. It is recommended that the USGBC New York Upstate Chapter be more involved on-site with municipal LEED projects to ease some of the time and cost constraints. It would be extremely helpful to have an employee of the USGBC New York Upstate Chapter conduct site visits to determine eligibility for certification, rather than reviewing paperwork from a distant office. This could also be extended to having USGBC-paid staff fill out the LEED paperwork for projects. This would eliminate the need for a third party to certify a building and significantly reduce the amount of time a municipality spends on a filling out paperwork, both of which translate into cost savings. While the USGBC New York Upstate Chapter is currently not able to hire new employees, it is recommended that it utilize grant opportunities to help fund additional staff.

Indirectly, the USGBC New York Upstate Chapter can help to create incentives for LEED certification in capital projects. By advocating for local governments to expedite permits for LEED capital projects, they can minimize the extra time it takes to fill out paperwork by speeding up another aspect of the project. This benefit would also make LEED projects more appealing than conventional projects, as their progress would be accelerated.

Another avenue that is recommended for the USGBC New York Upstate Chapter is to form partnerships to advance funding opportunities. First, it would be beneficial to partner with the Environmental Finance Center, EPA Region 2, the USDA Rural Development Office, and other financial advisors that could help municipalities navigate the multitudes of funding opportunities available. This will save substantial time and effort on the part of the government officials, as well as help them to cover the extra costs that LEED certification creates. It will be especially beneficial for municipalities if the above-mentioned organizations distributed and encouraged the use of the "Field Guide of Financial Support for Sustainable Capital Projects: New York Upstate Chapter Edition", which was created as part of this project (see Supplemental Materials). This is an easy-to-use reference guide to various funding opportunities for different aspects of green building projects, specific to the government sector. In addition, encouraging local governments to form public-private partnerships (with private or non-profit organizations) for capital projects would allow for a wider range of financial assistance. Many green building grants available are specifically intended for private or non-profit use; not government. By forming partnerships with non-governmental groups, these may then become available, giving local governments the additional means to cover the costs of LEED certification.

Summary

The recommendations described above are intended to be avenues for the USGBC New York Upstate Chapter to consider when determining strategies for helping small municipalities incorporate LEED into their capital projects. These were based on the information collected by the project team from literary research and personal interviews. Due to the short timeframe of this analysis, it must be noted that the recommendations are by no means exhaustive and some may or may not be feasible for the USGBC New York Upstate Chapter to pursue. In order to help modify these recommendations or to create new ones, further research should be performed. The direction this research should take is described in the following section.

Future Research

This project was just a first step toward making LEED the universal standard of building. There are many avenues that still need to be investigated and those that were investigated as part of this project need to be expanded. To expedite future research efforts, the project team has developed a short list of suggested areas for future research. Four main areas of focus have been identified: legislation, performance of LEED buildings, collaborative partnerships and financial resources.

Conducting a thorough legislative analysis would be very helpful in understanding how to convince more municipalities to pursue LEED certification for their capital projects. There are several important questions that could be explored as part of this analysis. Increasing numbers of municipalities have passed some form of legislation regarding LEED adoption; however, researchers need to determine what types of municipalities are adopting LEED standards and why they adopt LEED. This information could be used to compare these municipalities to others that have not adopted LEED. It is also important to examine the types of legislation that have been implemented and how strong the legislation is at maintaining LEED standards. Such information would help the USGBC to support municipalities that are likely to adopt LEED and help them develop strategies to target municipalities that are unlikely to adopt LEED.

Many individuals have expressed a concern that the statistics associated with LEED buildings seem overly optimistic, in particular the statistics measuring employee productivity improvements, health improvements and testing improvements for school children. The best way to convince these individuals that LEED can deliver all of these benefits is to conduct more studies on LEED buildings and make this information easily accessible to the public. There are some studies available but they are not very numerous and not all of them provide conclusive, replicable evidence supporting LEED buildings.

A third area for future research is studying the feasibility of the USGBC Upstate New York Chapter building more collaborative partnerships. The USGBC Upstate New York Chapter could extend their influence by partnering with other agencies to help increase their visibility as well as their impact across the state. Currently, the chapter has only one permanent employee, but partnerships could be an indirect way to increase the number of people officially involved with LEED in Upstate New York. Collaborative networking is used by many successful agencies to help accomplish their missions.

A primary area of focus during this initial investigation was financial resources, but there is still much research to be done. The project team focused on identifying funding sources available to municipalities, but there are many other funding sources that are only available to non-profits. Governments can tap into some of these additional funding sources by partnering with non-profits in the execution of their capital projects. A compilation of these sources is needed and should include information on how they can be applied to capital projects. Additionally, although this project focused only on capital projects for municipalities, there are many other entities that could build using LEED. It would be useful to investigate funding sources that are available for these nongovernmental institutions as well. Finally, in addition to identifying funding sources for construction, the USGBC should also investigate funding resources for supportive activities. These activities include the expenses associated with processing the

paperwork required for LEED certification as well as paying a third party to validate the construction of the building for LEED certification purposes. Many funding sources will only pay for construction, so it is important to identify funding sources that will help cover these other fees as well.

Conclusion

Though environmental and energy consumption issues are becoming increasingly prevalent in today's society, many municipalities have failed to take the initiative to incorporate sustainable practices into their capital projects. The USGBC New York Upstate Chapter and the Environmental Finance Center, EPA Region 2 have recognized that there are major obstacles to overcome before sustainable development, particularly LEED, can become a viable and widely-accepted alternative to conventional building in many communities. This analysis attempted to uncover some of those hurdles, whether real or perceived, by extensively searching existing literature and speaking with the people at the heart of the issue; local government officials, LEED APs and building industry professionals. It is the hope of the project team that this research brought new information to light that can be used as a basis for evaluating small communities' resistance to LEED and green building.

The recommendations made by the project team are intended to help the USGBC New York Upstate Chapter provide the communities within its region with the tools to become aware of, understand and begin to integrate LEED into their building practices. Those recommendations and particularly the "Field Guide of Financial Support for Sustainable Capital Projects", will hopefully allow the USGBC New York Upstate Chapter to help these communities overcome the barriers they face through education, financial research assistance and ease of the financial burdens and time constraints of LEED.

While this analysis is in no way exhaustive, it is hoped that it will be used as a stepping stone to further the USGBC New York Upstate Chapter's goal of making LEED and sustainable development the standard practice for building and renovating within municipal governments.

APPENDIX A. ORIGINAL PROPOSAL

To: Tracie Hall, US Green Building Council, New York Upstate Chapter; Mark Lichtenstein, Environmental Finance Center
CC: David Popp, Maxwell School of Citizenship and Public Affairs
From: Green Building Capstone Group
Date: May 16, 2007
RE: *Green Building Capstone Project Proposal*

The US Green Building Council (USGBC) is a pioneer in the emerging movement that promises to revolutionize the built environment through the incorporation of the triple bottom line: social, economic, and environmental sustainability. However, communities appear to be encountering obstacles, whether actual or perceived, which prevent them from initiating sustainable capital projects. This capstone project will focus on gathering information to generate resources and strategic recommendations that enable communities to surmount these obstacles. This investigation will focus specifically on the LEED certification process for capital projects conducted by municipalities in order to provide thorough, thoughtful analysis that addresses the client's expressed concerns about local governments.

First, the project will identify both actual and perceived barriers through a literature review of existing research and original interviews of primary actors from communities within the USGBC's New York Upstate Chapter region. Second, it will analyze the requirements for LEED certification, specifically why some project managers do not complete the certification process. Third, it will update the current information about financing mechanisms to illuminate the complexities of the application and reporting processes for these resources. Finally, recommendations will be made for strategies to overcome the actual, perceived, and funding barriers, and for types of capital projects best suited for green building.

BARRIER IDENTIFICATION

USGBC New York Upstate Chapter is interested in learning why small communities are not utilizing the LEED certification criteria or other green building principles in capital projects. It is believed that there are both actual and perceived barriers in the process that prevent governments from engaging in sustainable development. This project will identify these barriers through two research methods: literature review and case interviews.

First, the group will explore existing research on the barriers to LEED certified capital projects. The sources will include scholarly journals, popular news media, and Web sites of relevant agencies and nonprofit organizations. While the USGBC New York Upstate Chapter is likely aware (and possibly even the author or sponsor) of some of these articles, it is believed that this summary will be a useful feedback mechanism on the implementation of the LEED process. Results from this assessment should be incorporated into adjustments of current benchmarks and establishment of future ones. Furthermore, the findings from the literature review will provide a meaningful starting point and strong foundation for the capstone project's development.

Additionally, it is important to gather new information from those stakeholders and decision-makers involved with capital projects. Case interviews will be conducted with such actors in

New York State. In particular, the project team is interested in contacting individuals connected with projects that have obtained LEED certification, those that have not finished the certification process, as well as those who have chosen not to pursue sustainable design. Participants will include government officials, LEED Accredited Professionals, construction professionals, and citizen organizations promoting sustainable development. The final analysis will discuss the common issues faced by all projects that emerge from this exploration. In addition, it is critical to address the incomplete certifications to learn more about how the LEED process itself acts as an obstacle to green building projects obtaining certification.

LEED CERTIFICATION ANALYSIS

In determining what defines the sustainability of a building's design, the LEED Certification program of the USGBC provides an invaluable framework for analysis. The LEED program identifies six key areas of design for assessing sustainability: site development, energy efficiency, indoor environmental quality, water conservation, materials and resources, and innovation in design. Identification of barriers and collation of resources for this project will be organized in a manner consistent with this framework. This should help the USGBC integrate project deliverables within their current system of thinking about sustainability.

This proposal assumes that the most appropriate instrument in the United States for understanding sustainable project design, particularly at the capital project level, is the LEED program. However there are a number of ways communities can think about and implement sustainability. In fact, some preliminary research indicates that a number of stakeholders may perceive the LEED program itself as a challenging and arduous tool for sustainable development. Despite the use of LEED standards in the proposed methodology, this perception begs the question whether the LEED Certification program itself is a barrier to sustainable capital investment and achieving final certification as a green capital project?

The suggestion here is that the capstone project should incorporate elements of analysis about the LEED Certification process itself. Anecdotal evidence suggests there are a number of Upstate New York projects that have used LEED as a resource in "building green"; yet, they have not achieved official certification from the program. Elements of the literature review and interviews will explore questions of why certain projects were implemented with LEED in mind yet failed to achieve certification. At the heart of this issue is whether the accessibility of LEED, either actual or perceived, is appropriate for municipal stakeholders in terms of large capital projects. In the end, it is critical to determine what projects are best suited for these communities, and in the context of this analysis, whether LEED itself is a transformative vehicle or an additional impediment.

FINANCIAL RESOURCES COMPONENT

Access to and proper management of capital finances are critical to the capacity of communities to invest in sustainable capital projects. The USGBC's New York Upstate Chapter is interested in an inventory of grant and funding resources for green building projects. One stage of this project will focus on gathering this information for the New York Upstate Chapter region, analyzing the sources in terms of accessibility and payoff, and presenting the results in digital and print formats that can be updated by the organization. The content of this index could be adapted for use by other chapters or the national organization.

In particular, funding resources will be organized using the USGBC sustainable design framework because communities need access to funding resources for all the elements of project design including site development, water quality, energy efficiency, etc. Financial management for capital projects should adopt a holistic approach so that projects do not fail to meet LEED certification or go incomplete because of a shredded patchwork of financial support.

This project aims to go deeper than providing merely a clearinghouse of data. A team within the capstone group with particular experience in public financing will research the processes for obtaining and maintaining grants, including reporting requirements, eligibility criteria, timing of payments, funding limits, and project elements. These principles should illustrate which funding opportunities rank high in terms of efficiency, accessibility, and overall goodness of fit for providing the financial investments municipalities need to transform their built environment. Part of this analysis will also include information on alternative funding mechanisms that may not be included in the current resources known to the USGBC.

STRATEGIES AND RECOMMENDATIONS

Ultimately, the findings will be synthesized into appropriate strategies and recommendations to boost USGBC's effectiveness in transitioning the green building philosophy into mainstream construction practices. The LEED certification and benchmarks are the primary vehicles USGBC employs to pursue this goal. This analysis will include strategies which address the actual barriers to obtaining LEED certification for capital projects, including education of local governments on why and how they should design and build these projects, and how to gain constituent support for these choices. The *perceived* barriers require different strategies of education, awareness, and empowerment to dismiss these myths. This project will also contain recommendations to improve the financing process, including access to funds and reporting requirements. Additional recommendations on the types of projects best suited for different communities to pursue will be based on both the certification requirements and the financing options. Finally, recommendations will be made regarding specific alterations to the LEED process to increase the ability of local governments to receive certification of capital projects without reducing the environmental standards.

DELIVERABLES

Upon completion of this 3-week consulting project, the capstone group will submit a publication containing the findings, along with strategies and recommendations to overcome the concerns discovered through the research. The group also will prepare a presentation to the US Green Building Council New York Upstate Chapter and Environmental Finance Center that highlights the implications of this analysis. The project team's goal is to create flexible tools that would be applicable to alleviating the barriers faced by local governments in planning and implementing LEED certified capital projects. Additionally, the team is committed to preparing a current catalog of available funding sources. Moreover, the prototype of a survey instrument designed by the interview team within the group will be shared for potential future interviews. The project team believes that the multiple methods employed in this research will offer valuable insights for the expansion and improvement of the USGBC LEED certification program.

APPENDIX B. INTERVIEWEE INFORMATION

The following table lists the names, titles, organization affiliations, and interview details of each interviewee for this project.

Name	Organization	Title	Date of interview	Type of Interview	Interviewer
Steve Beyers	Cornell University	Services Team Leader, Environmental Compliance Office	May 21, 2007	E-mail correspondence	Sarah Stewart
Bruce Bongarten	SUNY ESF	Provost	May 17, 2007	In-person interview	Rosalyn Bandy
Diane Brandley	Ashley McGraw Architects	LEED AP, Interior Designer, editor of Greening USA newsletter	May 23, 2007	Phone interview	Rosalyn Bandy
Frank Cirillo & Bob DeLuca	Syracuse Research Corporation	Facilities Manager	May 29, 2007	In-person interview	Sarah Stewart
Bob Haley	Ashley-McGraw Architects	LEED AP, Architect	May 25, 2007	Phone interview	Rosalyn Bandy
Bruce Heberer	Town of Johnstown	Chief of Code Enforcement and Fire Chief	May 29, 2007	Phone interview	Carolyn Danckaert
Charlotte (Chuckie) Holstein & JoAnn Cucci	F.O.C.U.S. Greater Syracuse	Director, Assistant Director	May 16, 2007	In-person interview	Rosalyn Bandy
	City of Ithaca	Planning and Development Office	May 22, 2007	Preliminary phone interview	Sarah Stewart
Steve Kearney & Dave Michel	Economic Development Office, City of Syracuse	Brownfields Coordinator, Director	May 29, 2007	In-person interview	Sarah Stewart
Jim Martina	Zero Draft Building Performance Specialists		May 29, 2007	In-person interview	Rosalyn Bandy
Ken Mix	City of Watertown	Planning & Community Development Coordinator	May 22, 2007	E-mail correspondence	Sarah Stewart
Marvin Mondlick	Green Homes/ EnTherm Company		May 19, 2007	In-person interview	Rosalyn Bandy
Bill Reagan	Town of Marcellus	Code Enforcement Officer	May 22, 2007	Phone interview	Sarah Stewart
Holly Rosenthal		LEED AP, former HVAC business owner	May 24, 2007	In-person interview	Rosalyn Bandy
Bob Seigart	Schopfer Architects	Architect, LEED AP	May 24, 2007	In-person interview	Sarah Stewart
Diane Shoemaker	Community Development and Planning Service, City of Rome	Director	May 24, 2007	Phone interview	Sarah Stewart

Name	Organization	Title	Date of interview	Type of Interview	Interviewer
Walt Tennyson	Town of Chester	Head Zoning Administrator	May 29, 2007	Phone interview	Carolyn Danckaert
Mary Thompson	Home Builders and Renovators Association	Director	May 22, 2007	In-person interview	Rosalyn Bandy

APPENDIX C. INTERVIEW QUESTIONS

The following is a list of general questions that were used during the interviews. They were intended to serve as tools to guide the conversation and were tailored for the personal style of the interviewer and the expertise of the interviewee. It should also be noted that some questions may not be relevant for all people (i.e., municipality questions may not be relevant to an architect).

1. Has your municipality considered green building in its community planning?
2. What do you know about the USGBC?
3. Has your municipality used or considered using the USGBC's LEED-certification system in new buildings and/or existing building renovations?
4. What do you see as the benefits to using this certification program?
5. What do you see as drawbacks?
6. What kind of financial opportunities did you look into/pursue? Where there any problems or reasons you did not pursue particular opportunities?
7. What would be some incentives/benefits that would make you consider LEED certification?
8. In your experience, what kinds of projects are best suited for green building/renovating?
9. Are there any current or proposed policies and or legislation in your municipality that affects (positively or negatively) your ability to build green?

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APPENDIX E. RESOURCES

Municipal Green Building Resources

Searching for project funding and other resources is a dynamic process. New programs are emerging as others become obsolete. The resources listed within this publication are by no means a complete list of all green building resources and their availability may change over time. This brief directory of technical and financial resources is designed to help the USGBC New York Upstate Chapter provide information to municipalities so they can stay abreast of these changes and can find the resources they need to complete their green municipal building projects.

General Green Building Resources:

Smart Communities Network

The DOE's Smart Communities Network offers comprehensive resources related to sustainable development. Topics include green building, land-use planning, sustainable business practices, and transportation. The Web site provides access to a menu of energy-efficiency and renewable-energy programs and features tools for environmental and business excellence such as an interactive checklist for environmental quality and efficiency, an eco-audit tool kit and environmental indicator software for business performance. (www.smartcommunities.ncat.org/)

Sustainable Buildings Industry Council (SBIC)

SBIC is considered the foremost resource for sustainable design and product information and provides professional training, consumer information and energy analysis tools. (www.sbicouncil.org)

Environmental Protection Agency (EPA)

The EPA (www.epa.gov) maintains a variety of informational sites on sustainable practices related to development and design, products and materials. The EPA also houses a Web site devoted to green buildings which provides many useful references and a listing of federal, state and private funding sources. (www.epa.gov/greenbuilding)

The Neighborhood Funders Group

The Neighborhood Funders Group is a national network of foundations and philanthropic organizations. Members support community-based efforts that improve economic and social conditions in low-income communities. NFG provides information, learning opportunities, critical thinking and other professional development activities to its members. (www.nfg.org)

New York Planning Federation (NYPF)

NYPF promotes sound planning, land use and zoning practices in New York State to balance community growth and development with environmental conservation. The site offers valuable information on community programs, training opportunities and funding information. It focuses largely on information about green building and sustainable design. (www.nypf.org)

US Green Building Council (USGBC)

The USGBC is a leader in the green building revolution and promotes the Leadership in Energy and Environmental Design (LEED) system for designing, refurbishing and certifying old and new construction green buildings. The national USGBC homepage provides useful information and resources on green building, including links to funding resources. (www.usgbc.org)

For a more in-depth look at the USGBC in the Upstate and Central New York area, the New York Upstate Chapter provides users with information specific to events and resources specific to Upstate New York. (www.greenupstateny.org)

New York State Quality Communities Clearinghouse

This site provides a wide range of information on local government community development grant and assistance programs in New York State including economic development and planning, transportation, partnerships, conservation and the environment, revitalization and technology. (www.qualitycommunities.org)

Greenbuildingnyc

This easy-to-use website discusses current issues concerning green buildings and LEED and features links to newspaper articles. The Web site was founded by a LEED AP from New York City. It focuses on New York City but provides news about LEED buildings throughout the country. The site also provides many links to other sources. (www.greenbuildingsnyc.com)

Sustainlane

This site provides a ranking of cities with the most LEED buildings. This information can give municipalities an idea of who is leading the field and who they could contact for advice or assistance. It features a separate page for government resources, but individuals need to register with the site to access documents. To register for the site you must be a government employee. It also provides a list of best practices for green building. (www.sustainlane.com)

Building/Materials Resources:

Whole Building Design Guide

This general building Web site has many useful articles, including some on life-cycle costing. To find articles, search criteria can be entered in the search box in the upper left hand corner. (http://www.wbdg.org/)

Green Building Blocks (GBB)

GBB provides a database of green products and green professionals that is searchable by area. It also has a calendar of upcoming green events, including USGBC events. This Web site has a simple and easy-to-use layout. (www.greenbuildingblocks.com)

Green Cities:

San Jose, CA

San Jose encourages builders to adhere to LEED standards, and the city takes a holistic approach to environmental conservation. San Jose describes many of its green innovations on its Web site and could serve as a model for other cities to follow. (http://www.sanjoseca.gov/esd/natural-energy-resources/greenbuilding.htm)

Scottsdale, AZ

Scottsdale, Arizona was the first city to adopt the requirement that all new and renovated city buildings must earn the LEED gold certification. The city has also incorporated their own green policies relating to the Sonoran desert into the building requirements. This city offers a good example of how a municipality can expand upon LEED. (http://www.scottsdaleaz.gov/greenbuilding/)

Financial Resources:

Department of Energy (DOE)

The DOE (http://www.doe.gov) provides helpful resources in a number of programs. The Office of Energy Efficiency and Renewable Energy (http://www.eere.energy.gov) is the primary source for DOE-sponsored technical information and resources for energy efficient construction with access to more than 600 links and 80,000 documents (including funding information). The EERE houses information on a number of green building programs and initiatives:

- Building Technologies Program offers a range of energy related financial and technical assistance resources. (www.eere.energy.gov/buildings)
- Clean Cities Program supports local decisions to adopt practices that contribute to the reduction of petroleum consumption. (www.eere.energy.gov/cleancities)
- High Performance Buildings features case histories and exemplary buildings. (www.eere.energy.gov/buildings/highperformance/)

Energy Star

The Energy Star program of the Department of Energy provides resources for technical assistance for energy saving initiatives in buildings, partner resources, and energy service and product providers. Organizations that participate in the Energy Star Buildings Program receive technical assistance, customized support services, public relations assistance and access to a broad range of tools to reduce their building's total energy consumption. (www.energystar.gov)

Environmental Finance Center (EFC)

The EFC was established by the EPA as a provider of a large variety of environmental financing activities. The EFC, located at Syracuse University's Maxwell School of Citizenship and Public Affairs, provides services throughout New York State. The EFC funds a variety of programs and its Web site provides useful links to funding sources from other agencies. The site also provides a links to technical assistance providers for community development, capital

budgeting, development and economic growth and environmental programs. (www.maxwell.syr.edu/efc)

Environmental Grantmakers Association (EGA)

The EGA membership includes a variety of environmental funding institutions, with over 250 foundations represented. The EGA works to help member organizations become more effective environmental grantmakers through information sharing, collaboration and networking. (www.ega.org)

Funders Network for Smart Growth and Livable Communities

This organization, comprised of major grant funding agencies, works to inform and strengthen philanthropic funders' individual and collective abilities to support and connect organizations working to improve the quality of life by improving livable communities and protecting natural resources. At least 30 major grant making agencies are among its charter members. The list of these environmentally and energy-oriented foundations appears on the Network's Web site (www.fundersnetwork.org).

Grants.gov

Grants.gov is another valuable source for searching through available government grant opportunities. This site is one of the 24 federal cross-agency e-government initiatives focused on improving citizens' access to services via the Internet. It provides the ability to search through available grant opportunities and also to register to receive email notifications of future grant opportunities. The site may be used as a compliment to the CFDA to identify available grant opportunities, look up deadlines and obtain application forms. (www.grants.gov)

Grantmakers in Health (GIH)

GIH is a nonprofit, educational organization dedicated to helping foundations and corporate giving programs improve the health of all people. Although their members are not fully active in green building, the health funding community has considerable untapped potential in terms of finding funds for green initiatives with regards to indoor air quality. (www.gih.org)

New York State Department of Environmental Conservation (DEC)

The NYS DEC offers a number of grants for municipalities and communities interested in environmental protection and improvement projects with a focus on land and water conservation, waste management and environmental remediation. Information about green building and tax credits can be found in the "Energy and Climate" section of its Web site and information on grant opportunities can be found under the "Publications, Forms, Maps" section on the DEC homepage. (www.dec.ny.gov)

Office for Small Cities: Housing Trust Fund Corporation

This site offers funding and information for community development block grants for cities, town and villages with a population under 50,000 or counties with an area population under 200,000 to revitalize neighborhoods, enhance housing and economic opportunities and improve community facilities and services. (www.nysmallcities.com)

Catalog of Federal Domestic Assistance (CFDA)

The online Catalog of Federal Domestic Assistance provides access to a database of all federal programs available to state and local governments; federally-recognized Indian tribal governments; territories of the United States; domestic public, quasi-public, and private and nonprofit organizations; specialized groups; and individuals. The database may be searched in a variety of ways to find financial and technical assistance programs. Each program is unique and has its own requirements and procedures. The office that administers the program can also be contacted to find out how to apply. Additionally, the site offers several guides to assist in the writing of a proposal. (www.cfda.gov)

Database of State Incentives for Renewables & Efficiency

DSIRE is a comprehensive source of information on state, local, utility and federal incentives that promote renewable energy and energy efficiency. (www.dsireusa.org)

New York State Energy Research and Development Authority (NYSERDA)

NYSERDA maintains a web page for numerous funding opportunities related to energy issues for public and private entities. Descriptions, deadlines and contact information for various programs are summarized for easy perusal. Additional resources can be found under "External funding." This section provides a link to a pdf file entitled "External Sources for Financial, Technical, and Marketing Assistance: NY State, Federal, and Private Sources." (www.nyserda.org)

Green Professionals:

Larsen Engineers

This private firm is a member of the USGBC and does business with governments. They are based out of Rochester, NY and provide many services including water treatment and waste removal. (www.larsen-engineers.com)

Paladino & Company

As a green building consulting firm based out of Seattle, they have very close ties to LEED. They helped write the standards, helped run the pilot programs and have built many LEED buildings and therefore would be a good resource to contact for tips about LEED. (www.paladinoandco.com)

Case Studies:

Cambridge, MA

Cambridge renovated a building built in 1871 to meet LEED standards. (http://www.bostonusa.com/member/resdet.php?cat=&cat_seqnum=&type=event&seqnum=16410).

Resources for Schools:

Energy Smart Schools Program

The EERE (Energy Efficiency and Renewable Energy) is the agency in charge of the Energy Smart Schools program. The program is aimed at increasing energy efficiency in schools. (http://www.eere.energy.gov/buildings/info/schools/)

National Clearinghouse for Educational Facilities (NCEF)

The NCEF has an extensive list of material pertaining to building green schools. (http://www.edfacilities.org/rl/high_performance.cfm)

Interstate Renewable Energy Council (IREC)

IREC is a non-profit organization dedicated to the "acceleration of sustainable utilization of renewable energy sources and technologies in and through state and local government and community activities". They have a program called "schools going solar" and on this page they list many articles about different schools that have installed solar panels. (http://www.irecusa.org/index.php?id=9)

Green Studies/Research:

BuildingGreen.com

This site lists articles and case studies about green buildings and organizes them by LEED points, so you can actually read about the points you are trying to achieve. There is a $200 subscription fee to use the site. However, if you purchase more than one subscription you can save money so a few towns could coordinate and save money. (www.buildinggreen.com)

Heschong Mahone Group, Inc.

This group conducted several studies on daylighting and productivity. The various studies looked at the effect of several different factors on productivity, including lighting, temperature and air quality. A number of the studies also specifically examined the impact of daylighting on the productivity of schoolchildren. (http://www.h-m-g.com/projects/daylighting/projects-PIER.htm)

Innovative Design

There are several studies on this site, including one study that examined student performance in full spectrum lighting. Besides higher test scores, they found that kids were healthier, absent less, had less tooth decay and grew taller than kids at schools with standard lighting. (http://www.innovativedesign.net/paper.htm)

Green buildings, organizational success and occupant productivity

This article was written by Judith Heerwagen and was published in the Routledge Taylor & Francis Group journal in 2000: 28 (5-6): 353-367. The author found a positive relationship between green buildings and economic success. (http://www.informaworld.com/smpp/content~content=a713762767~db=all)

What are the Costs and Financial Benefits of Green Buildings

This study was conducted by Greg Kats in 2004 from Capital E in partnership with USGBC. It examined the benefits of building green as well as studied how much LEED buildings cost on average (broken down by certification level). They found that productivity increased anywhere from 3 to 34%. The study appears as a power point presentation. (http://www.1800arkansas.com/Energy/files/9-06Kats.pdf)

Informing the Decision Makers on the Cost and Value of Green Building

This study was written by Ed Bartlett and Nigel Howard and appeared in the Routledge Taylor & Francis Group journal in 2000: 28 (5-6): 315-324. The authors examined the costs of building green in the UK.
(http://www.informaworld.com/smpp/content~content=a713762774~db=all)

Sick Building Syndrome: A Study of 4373 Office Workers

This study was conducted by Sherwood Burge, Alan Hedge, Sheena Wilson, Jon Harris Bass and Alastair Robertson. It appeared in the British Occupational Hygiene Society journal in 1987: 31(4A): 493-504. They looked at sick building syndrome among many different workers and found that natural ventilation systems resulted in the healthiest employees.
(http://annhyg.oxfordjournals.org/cgi/content/abstract/31/4A/493)

Sick Building Syndrome

This article was written by P.S. Burge and appeared in the Occupational and Environmental Medicine Journal in 2004: 61: 185-190. This article describes Sick Building Syndrome and how it is caused by the conditions of a building.
(http://oem.bmj.com/cgi/content/extract/61/2/185)

Estimates of Improved Productivity and Health from Better Indoor Environments

This article was written by William J. Fisk and Arthur H. Rosenfeld and printed in Indoor Air in 1997: 7 (3), 158–172. This study looked at how productivity would increase in the United States if indoor air quality was improved. They suggested that this increase in productivity would generate billions in additional dollars. (http://www.blackwell-synergy.com/links/doi/10.1111/j.1600-0668.1997.t01-1-00002.x/abs/)

The Business Case for High Performance Green Buildings: Sustainability and its Financial Impact

This study was written by Paul von Paumgartten and was published in the Journal of Facilities Management in 2003: 2 (1), 26-34. This study was conducted in the United Kingdom and only examined the performance of LEED buildings. The author examined energy efficiency, employee productivity, health improvements and several other performance factors. (http://www.emeraldinsight.com/Insight/viewContentItem.do?contentType=Article&hdAction=lnkpdf&contentId=1528543&history=false).